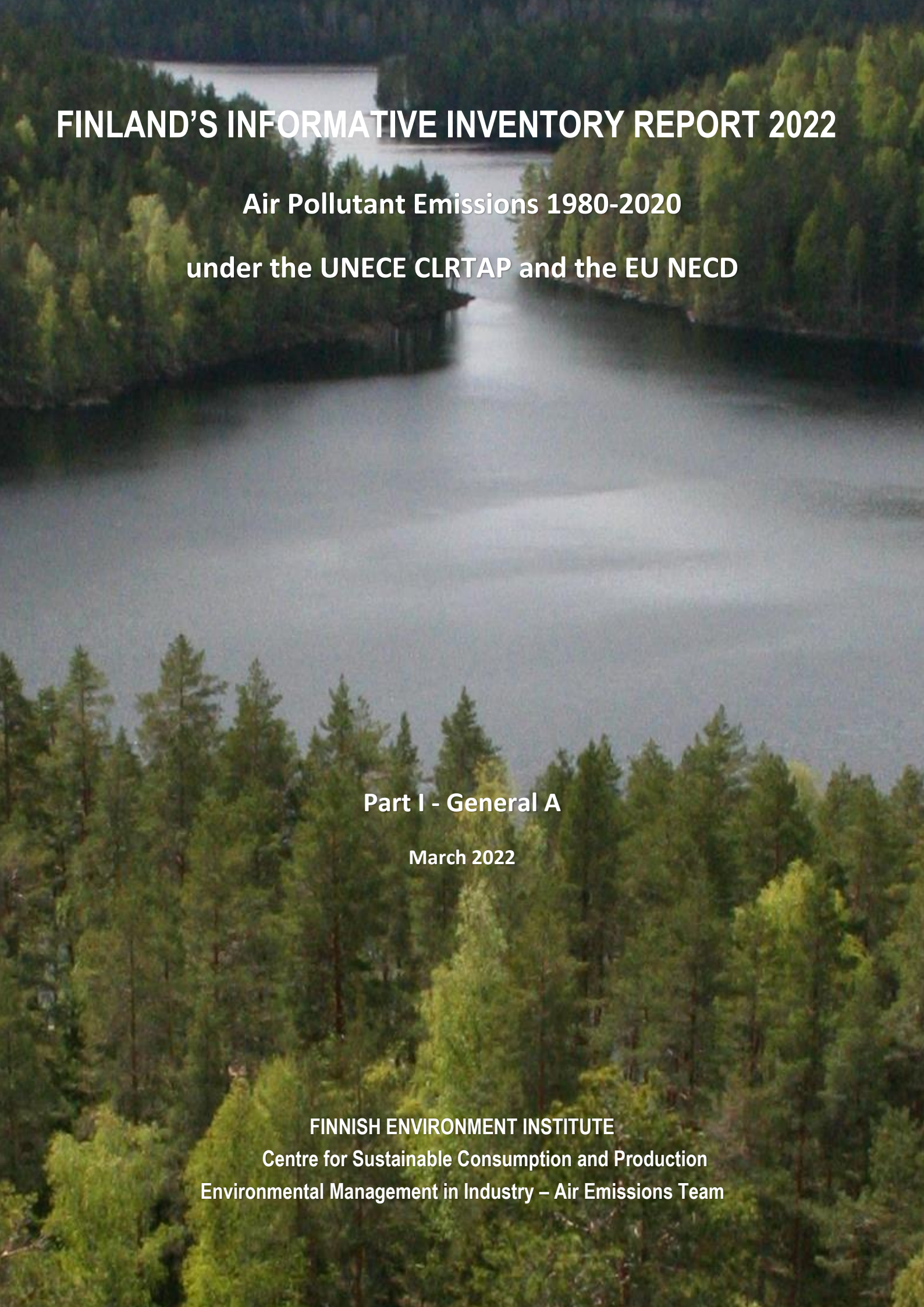

FINLAND'S INFORMATIVE INVENTORY REPORT 2022

Air Pollutant Emissions 1980-2020

under the UNECE CLRTAP and the EU NECD

Part I - General A

March 2022

FINNISH ENVIRONMENT INSTITUTE
Centre for Sustainable Consumption and Production
Environmental Management in Industry – Air Emissions Team

PART 1

GENERAL A

Cover page Part 1: Esa Nikunen (2016) Repovesi, Ympäristöhallinnon kuvapankki

PREFACE

Finland's Informative Inventory Report (IIR) 2021 under the United Nations Economic Commission for Europe's (UNECE) Convention on Long-Range Transboundary Air Pollution (CLRTAP) and under the EU National Emission Ceilings Directive (NECD) contains information on the organisation of the national air pollutant emissions inventory, on emission sources, trends, methods and data analysis for the emissions time series 1980-2019.

The IIR is prepared according to the Guidelines for Reporting Emission Data under the Convention on Long-Range Transboundary Air Pollution (ECE/EB.AIR/97, 27 January 2010) and its structure follows the template of the Informative Inventory Report. The report is reviewed and completed annually to include updated information.

The IIR consists of the following general parts

Part 1A General	General information, data analysis, emission trends, progress in meeting targets. Time series of emissions are summarised in Tables 1.1-1.3.
Part 1B General	Recalculations, projections, inventory improvement, gridded data, LPS, adjustments, memo items

Methods used to estimate emissions are presented in Parts 2-6 of the IIR
Part 2 Energy
Part 3 Transport
Part 4 Industrial processes and product use
Part 5 Agriculture
Part 6 Waste
Part 7 Annexes

The Finnish submissions of NFR tables and IIR can be downloaded from the EIONET CDR website and from Finnish Environmental Administration's website http://www.environment.fi > State of the environment > Air > Air pollutant emissions in Finland (in English). The website is updated annually by 31st March at the latest with the latest data and reports.

Tools and maps to explore air pollutant emissions are available on webpage https://www.ymparisto.fi/en-US/Maps_and_statistics/Air_pollutant_emissions .

The submissions to the UNECE CLRTAP and the EU NECD are prepared at the Finnish Environment Institute SYKE by the Air Emission Team: Mr Tommi Forsberg, Mr Juha Grönroos, Ms Johanna Mikkola-Pusa, Mr Joonas Munther, Mr Jouko Petäjä and Ms Kristina Saarinen. Transport sector emissions are calculated by Mr Kari Mäkelä (Tremmo) and Mr Kari Grönfors (Statistics Finland) in cooperation with VTT Technical Research Centre of Finland.

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Helsinki 15th March 2022

Requested information on the inclusion of the condensable part of PM emissions is summarized on the next page, page 4

A summary of information on the condensable part of particulate matter

The summary presented in the table below on whether the condensable part of particulate matter is included or not in the emissions estimates, covers only those cases where (1) emission data reported by the plants are used in the inventory, or (2) domestic emission factors used in the calculation.

Information on whether the emission factors from the EMEP/EEA Emission Inventory Guidebook include or exclude the condensable part has not thoroughly been studied.

Table – Inclusion/exclusion of the condensable component from PM_{10} and $PM_{2.5}$ in the emission data

Source	Included	Excluded	Comments	Reference
Energy				
NFRs 1A1/1A2	see comments		Combustion in the energy production units - TSP emission concentrations are measured in the stack according to the agreed the EN standards (EN 13284-1), which is a gravimetric particle measurement and thus does not cover condensable particles. In cases where PM10 and PM2.5 are calculated from reported TSP emissions or using domestic TSP EFs, the condensable part of PMs is not included.	Part 2 Energy p. 33
NFR 1A4	see comments		For small scale wood combustion, country specific emission factors are based on measurements where the condensable part is included. For coal combustion, Guidebook EFs are used and we refer to the knowledge of the Guidebook regarding inclusion or exclusion of condensables.	Part 2 Energy
Transport				
NFR 1A3	see comments		For all transport modes Guidebook EFs are used - According to general information, the transport sector standard measurements include dilution of the sample and cooling it to 51 ^{o}C temperature, which enables the measurement to capture most of the condensable part of particulate matter	Part 3 Transport
Industry and product use				
NFR 2	see comments		Industrial processes - TSP emission concentrations are measured in the stack according to the agreed the EN standards (EN 13284-1), which is a gravimetric particle measurement and thus does not cover condensable particles. When Guidebook 2016 EFs for particles are used, we refer to the Guidebook in the knowledge of inclusion or exclusion of condensables. Each NFR sub-category covers both data reported by plants and data calculated with Guidebook EFs.	Part 4 IPPU p. 5
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NFR 3F	see comments		Field burning - When Guidebook EFs for particles are used, we refer to the Guidebook in the knowledge of inclusion or exclusion of condensables.	Part 5 Agriculture
Waste				
NFR 5C	see comments		Waste incineration - TSP emission concentrations are measured in the stack according to the agreed the EN standards (EN 13284-1), which is a gravimetric particle measurement and thus does not cover condensable particles. When Guidebook 2016 EFs for particles are used, we refer to the Guidebook in the knowledge of inclusion or exclusion of condensables.	Part 6 Waste

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ABBREVIATIONS

CEPMEIP	Co-ordinated European Programme on Particulate Matter Emission Inventories, Projections and Guidance
CLRTAP	Convention on Long Range Transboundary Air Pollution
CRF	Common Reporting Format tables, reported to the UNFCCC Secretariat
GNFR	Gridding NFR (emissions gridded for each GNRF aggregated sector)
GPG	IPCC Good Practice Guidance
EEA	European Environment Agency
EMEP	Cooperative programme for the monitoring and evaluation of the long range transmission of air pollutants in Europe (European Monitoring and Evaluation Programme)
E-PRTR	European Pollutant and Transfer Register
EU	European Union
EUMM	Decision No 280/2004/EC of the European Parliament and of the Council of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol, OJ L 49, 19.02.2004
ILMI	Calculation model for emissions from aviation at VTT Technical Research Centre of Finland
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution Prevention and Control
IPTJ	Air pollutant emission data system at the Finnish Environment Institute SYKE
LCP	Large combustion plant
LIISA	Calculation model for the road transport sector emissions at VTT Technical Research Centre of Finland
LIPASTO	Calculation system for the transport sector emissions at VTT Technical Research Centre of Finland
LPS	Large point sources, equals to the definition of E-PRTR installations
LUKE	Natural Resources Institute Finland (Luonnonvarakeskus)
MEERI	Calculation model for emissions from navigation at VTT Technical Research Centre of Finland
MTT	MTT Agrifood Research Finland
NECD	Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants, OJ L 309, 27 November 2001
NFR	Nomenclature for Reporting
SYKE	Finnish Environment Institute
SNAP	Selected Nomenclature for Air Pollution
TIKE	Information Center of the Ministry of Agriculture and Forestry
TYKO	Calculation model for emissions from off-road machinery at VTT Technical Research Centre of Finland
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention for Climate Change
USEPA	United States Environmental Protection Agency
VAHTI	Compliance Monitoring Data System at the Centres for Economic Development, Transport and the Environment
VTT	VTT Technical Research Centre of Finland

Pollutants

As	Arsenic
BC	Black carbon
Cd	Cadmium
Cr	Chromium
Cu	Copper
CO	Carbon monoxide
HCB	Hexachlorobenzene
HCl	Hydrochloric acid
Hg	Mercury
HM	Heavy metals
SO_2	Sulphur dioxide, all sulphur compounds expressed as sulphur dioxide
NH_3	Ammonia
Ni	Nickel
NMVOC	Non-methane volatile organic compounds, any organic compound, excluding methane, having a vapour pressure of 0.01 kPa or more at 293.15 K, or having a corresponding volatility under the particular conditions of use. For the purpose of the UNECE CLRTAP Reporting Guidelines, the fraction of creosote which exceeds this value of vapour pressure at 293.15 K is considered as a NMVOC
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides, nitric oxide and nitrogen dioxide, expressed as nitrogen dioxide
PAH-4	Polyaromatic hydrocarbons expressed as the sum of benzo(a)pyrene, benzo(b)fluoranthene,benzo(k), fluoranthene and indeno(1,2,3,-cd)pyrene
Pb	Lead
PCDD/F	Dioxins and furans: 1,2,3,7,8-PeCDD; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF;1,2,3,6,7,8-HxCDF
PCB	Polychlorinated biphenyls
PCP	Pentachlorophenol
$PM_{2.5}$	Particulate matter, the mass of particulate matter that is measured after passing through a size-selective inlet with a 50 per cent efficiency cut-off at 2.5 µm aerodynamic diameter
PM_{10}	Particulate matter, the mass of particulate matter that is measured after passing through a size-selective inlet with a 50 per cent efficiency cut-off at 10 µm aerodynamic diameter
POP	Persistent organic pollutants, (lindane, dichloro-diphenyl-trichloroethane (DDT), polychlorinated biphenyl (PCBs), pentabromodiphenyl ether (PeBDE), perfluorooctane sulfonate (PFOS), hexachlorobutadeine (HCBD), octabromodiphenyl ether (OctaBDE), polychlorinated naphthalenes (PCNs), pentachlorobenzene (PeCB) and short-chained chlorinated paraffins (SCCP)
SCCP	Short-chained chlorinated paraffins
TSP	Total suspended particulates. the mass of particles, of any shape, structure or density, dispersed in the gas phase at the sampling point conditions which may be collected by filtration under specified conditions after representative sampling of the gas to be analyzed, and which remain upstream of the filter and on the filter after drying under specified conditions
Zn	Zinc

Notation keys

IE Included elsewhere – Emissions for this source are estimated and included in the inventory but not presented separately for this source (the source where included is indicated).

NA Not applicable – The source exists but relevant emissions are considered never to occur. Instead of NA, the actual emissions are presented for source categories where both the sources and their emissions are well-known due to availability of bottom-up data (i.e. mainly in the energy and industrial processes sectors). When pointing the value "0.000" with the cursor, the actual emissions can be seen and the value "0.000" is shown due to the rounding of data to three significant decimals.

NE Not estimated – Emissions occur but have not been estimated or reported.
NO Not occurring – A source or process does not exist within the country.

C Confidential information – Emissions are aggregated and included elsewhere in the inventory because reporting at a disaggregated level could lead to the disclosure of confidential information.

NR Not relevant - According to paragraph 9 in the Emission Reporting Guidelines, emission inventory reporting should cover all years from 1980 onwards if data are available. However, “NR” (not relevant) is introduced to ease the reporting where emissions are not strictly required by the different protocols, e.g. for some Parties emissions of NMVOCs prior to 1988. – NR is not in use in the Finnish inventory report.

The use of notation keys in the Finnish inventory is explained in the sector specific Chapters 4 - 9.

i Background information on air pollutants inventories

Changes in chapter	
March 2018	KS

Responsibilities in the Finnish national system for air emission inventories are divided between Statistics Finland, responsible for greenhouse gas inventories, and the Finnish Environment Institute, responsible for air pollutant emission inventories, as shown in Figure 1.1.

UNECE CLRTAP

The United Nations Economic Commission for Europe Convention on Long-Range Transboundary Air Pollution (UNECE CLRTAP) entered into force in 1983. Under the Convention there are eight protocols: the protocol on Reduction of Sulphur Emissions and their Transboundary Fluxes (entered into force in 1987), protocol on Control of Nitrogen Oxides or their Transboundary Fluxes (entered into force in 1991), protocol on Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes (entered into force in 1997), protocol on Further Reduction of Sulphur Emissions (entered into force in 1998), protocol on Persistent Organic Pollutants POPs (entered into force in 2003, protocol on Heavy Metals (entered into force in 2003) and protocol on Abating Acidification, Eutrophication and Ground-level Ozone (entered into force in 2005). Reduction targets and base years for the emission inventories are specified for the substances covered by each Protocol.

The annual reports under the UNECE CLRTAP Convention include emission inventories for sulphur as SO_2, nitrogen oxides, ammonia, non-methane volatile organic compounds (NMVOCs), heavy metals and persistent organic compounds since their base years as specified in the relevant protocols. Projected emissions for sulphur dioxide, nitrogen oxides, ammonia, particulate matter and NMVOCs are reported for the years 2020 and 2050. Methods used to quantify emissions as well as data analysis and other additional information to understand the emission trends as required in the reporting guidelines[1] are included in national Informative Inventory Reports (IIRs) submitted annually.

Finland has annually submitted emission data and inventory reports to the UNECE Secretariat since the 1980's to meet the obligations of the United Nations Economic Commission for Europe Convention on Long-Range Transboundary Air Pollution (UNECE CLRTAP). The inventory reports submitted to the UNECE Secretariat and to the EEA are uploaded to the EIONET CDR (http://cdr.eionet.europa.eu/) as specified in the reporting instructions. Information on air pollutant inventories and submission of reports under the UNECE CLRTAP is provided on the website of Finland's Environmental Administration in Finnish[2], Swedish[3] and English[4].

EU NECD

The aim of Directive 2001/81/EC, revised 2016/2284, of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants is to limit emissions of acidifying and eutrophying pollutants and ozone precursors. The Directive establishes national emission ceilings as benchmarks, for SO_2, NO_x, NH_3, NMVOC and $PM_{2.5}$ emissions. Emission inventories and projections as well as additional data are reported since the 2017 submission according to the revised NEC Directive (Directive 2016/2284) reporting requirements.

[1] http://www.ceip.at/fileadmin/inhalte/emep/reporting_2009/Rep_Guidelines_ECE_EB_AIR_97_e.pdf
[2] http://www.ymparisto.fi/default.asp?node=6323&lan=fi
[3] http://www.ymparisto.fi/default.asp?contentid=371537&lan=fi&clan=sv
[4] https://www.ymparisto.fi/en-US/Maps_and_statistics/Air_pollutant_emissions/Finnish_air_pollutant_inventory_to_the_CLRTAP
https://www.ymparisto.fi/en-US/Maps_and_statistics/Air_pollutant_emissions

Finland has submitted emission inventories to the European Commission and to the EEA annually since the first reporting under the NECD in 2002 for the year 2000 final data. The data and reports are uploaded to the EIONET CDR (http://cdr.eionet.europa.eu/). Detailed information on air pollutant inventories is provided on the website of Finland's Environmental Administration in Finnish[5], Swedish[6] and English[7]

ii Summary of national emissions related to trends

Changes in chapter	
February 2022	KS

Summaries of air pollutant emissions in Finland for the years 1980-2019 are presented in Tables 1.1, 1.2 and 1.3.

The methodology presented in the EMEP EEA Emission Inventory Guidebook has been applied in the inventory and completed by national methods where available, according to the Guidebook principles.

Table 1.1. Summary of main air pollutant emissions in Finland for 1980–2020. Corrections to data reported in 2021 to data reported in 2022 are printed in red.

kt/a	NO_x (as NO_2)	NMVOC	SO_x (as SO_2)	NH_3	CO	$PM_{2.5}$	PM_{10}	TSP	BC
1980	307	*	585	37	* No estimates for total national emissions are available for 1980-1989 although estimates are provided for individual NFR categories				
1981	288	*	535	37					
1982	283	*	485	38					
1983	273	*	373	38					
1984	269	*	369	38					
1985	287	*	383	38					
1986	289	*	332	37					
1987	300	229	329	37					
1988	303	240	303	36					
1989	310	233	245	34					
1990	307	235	249	36	764	47	74	99	10
1991	304	226	206	34	736	43	67	86	10
1992	288	220	156	33	715	39	61	79	9
1993	293	214	138	33	700	35	56	73	9
1994	294	213	123	34	687	35	56	74	9
1995	273	206	105	34	662	32	51	68	8
1996	277	197	109	35	657	31	50	65	8
1997	272	197	101	37	651	30	49	65	7
1998	257	193	93	36	646	28	45	59	7
1999	253	186	92	39	630	28	46	61	7
2000	241	179	82	36	594	26	43	56	6
2001	244	177	96	36	596	27	44	58	7
2002	242	168	90	37	577	27	44	59	6
2003	249	164	101	38	542	27	45	60	6
2004	237	159	84	37	547	27	44	59	6
2005	208	146	70	38	524	26	42	57	6
2006	224	142	83	37	499	26	43	59	6
2007	211	138	81	38	486	25	41	56	6
2008	194	122	67	37	452	23	38	53	5
2009	176	113	59	37	429	22	37	52	5

[5] http://www.ymparisto.fi/default.asp?node=6323&lan=fi
[6] http://www.ymparisto.fi/default.asp?contentid=371537&lan=fi&clan=sv
[7] http://www.ymparisto.fi/default.asp?node=13255&lan=en

kt/a	NO_x (as NO_2)	NMVOC	SO_x (as SO_2)	NH_3	CO	$PM_{2.5}$	PM_{10}	TSP	BC
2010	187	114	66	38	446	23	38	54	5
2011	171	105	60	36	407	20	36	51	5
2012	161	102	50	36	402	20	34	48	5
2013	159	97	48	36	389	20	34	49	5
2014	151	95	44	36	383	19	34	48	5
2015	139	90	41	34	359	17	31	45	4
2016	135	90	40	34	371	18	32	47	4
2017	130	88	35	33	357	17	31	45	4
2018	127	86	33	33	349	17	31	45	4
2019	120	85	30	32	345	16	30	45	4
2020	105	85	23	31	317	14	27	39	3

Remark 1: Due to rounding the sum of subtotals does not equal to total figure

Table 1.2. Summary of heavy metal emissions in Finland for the years 1990–2020.

Year	Heavy Metals (t/a)								
	Pb	**Cd**	**Hg**	**As**	**Cr**	**Cu**	**Ni**	**Se**	**Zn**
1990	321	7	1	35	48	157	78	NE*	683
1991	237	4	1	24	60	149	61		473
1992	165	3	1	18	48	124	52		374
1993	105	3	1	16	38	112	46		349
1994	74	3	1	11	41	106	45		406
1995	73	2	1	5	36	116	47		403
1996	49	2	1	8	33	110	37		270
1997	34	2	1	14	33	129	38		152
1998	37	2	1	14	30	84	34		151
1999	34	2	1	5	31	68	37		141
2000	31	1	1	4	29	65	35		128
2001	30	2	1	5	26	66	32		131
2002	31	1	1	4	39	69	38		147
2003	25	1	1	4	29	62	35		127
2004	26	2	1	4	26	60	31		125
2005	21	1	1	3	20	58	26		119
2006	25	1	1	3	25	59	28		119
2007	22	1	1	3	29	44	25		108
2008	20	1	1	3	27	42	22		117
2009	17	1	1	3	17	40	20		116
2010	20	1	1	3	26	42	23		129
2011	19	1	1	3	17	42	20		124
2012	16	1	1	3	19	41	19		128
2013	16	1	1	3	18	42	17		124
2014	17	1	1	3	23	43	17		132
2015	15	1	1	2	17	41	16		119
2016	16	1	1	3	18	42	16		127
2017	16	1	1	2	17	41	15		120
2018	15	1	1	2	15	40	14		118
2019	13	1	1	2	14	40	12		130
2020	12	1	1	2	14	38	10		117

Remark 1: Due to rounding the sum of subtotals does not equal to total figures

[6]The time series for Se emissions is not yet completed.

Table 1.3. Summary of persistent organic pollutant emissions in Finland for the years 1990–2020.

Year	Persistent Organic Pollutants			
	PCDD/F (g I-TEQ)	PAH-4 (Mg)	HCB (kg)	PCB (kg)
1990	18	18	36	29
1991	18	19	36	25
1992	17	19	36	26
1993	18	19	36	28
1994	18	20	36	29
1995	19	18	36	29
1996	17	19	38	27
1997	17	19	38	29
1998	17	20	38	30
1999	17	19	38	31
2000	18	18	39	30
2001	15	20	18	29
2002	15	21	12	29
2003	14	21	10	30
2004	14	21	26	31
2005	13	22	32	31
2006	14	21	36	31
2007	14	22	38	32
2008	14	22	17	31
2009	12	23	27	21
2010	16	26	9	28
2011	14	22	26	27
2012	15	24	9	24
2013	15	23	17	23
2014	16	23	22	24
2015	14	22	16	24
2016	15	24	60	25
2017	12	23	33	23
2018	13	23	32	23
2019	10	23	23	20
2020	9	18	21	20

Remark 1: Due to rounding the sum of subtotals do not equal to total figures

iii Overview of source category specific emission estimates and trends

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The sources of air pollutants are discussed in detail in Sections 3 - 10 of this report. For the land use change and forestry sector no air pollutant emissions have been estimated thus far.

Energy

Combustion of fuels in the energy and heat production sectors is the main source of SO_2, NO_x, particulate matter and heavy metal emissions. NMVOC and POP compounds are released especially from small combustion sources. Emissions from the energy sector are related to the production, distribution and consumption of fuels and fluctuate from year to year due to the economic trends and variations in the energy supply structure. The availability of hydropower in the integrated Nordic electricity market has a notable effect on the emissions.

Transport

Transport sector is a significant source of NO_x, CO and NMVOC emissions. In the transport sector, emissions have a decreasing trend though the use of fuels is increasing. One of the most essential emission reduction measures in the transport sector is the EU level agreement with car manufacturers on reducing vehicles' fuel consumption. Emissions from the off-road sector are increasing.

Industrial Processes

Emissions from the industrial processes sector are in general decreasing but variations due to fluctuations in production occur annually. Emissions cover process-based sulphur compounds (mainly Total Reduced Sulphur, TRS), NMVOCs, heavy metals, particles and POP compounds, depending on the industrial activity.

Solvent and other product use

The inventory of the solvent and other product use sector covers NMVOC compounds, particles, heavy metals and POP compounds. Paint application and printing are the most significant NMVOC sources. The trends of emissions are generally decreasing. Since 2020 NMVOC emissions from the use of hand desinfectants has peaked due to the pandemic.

Agriculture

Agriculture is the main source for ammonia emissions and, also a source of particle, NOx and NMVOC emissions. The main emission sources for ammonia are manure management and fertilizers. The emissions trends are decreasing due to decreases in the numbers of livestock and in nitrogen fertilisation.

Waste

Emissions from the waste sector include SO_2, NO_x, CO, NMVOC, particulate matter, heavy metals and POPs. The trends of these emissions are generally declining. All waste incineration occurs currently with energy recovery and these emissions are reported under the Energy sector.

1 INTRODUCTION

1.1 Background information on air pollutants emissions and their impact on the environment

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1.1.1 National circumstances relevant to air pollutant emissions

Population and geography

The population of Finland was 5 513 130 at the end of 2017 (Figure 1.1). As a result of the low population density, 18 inhabitants per km², and the geographical extent of the country, the average distances travelled for different purposes can be quite long.

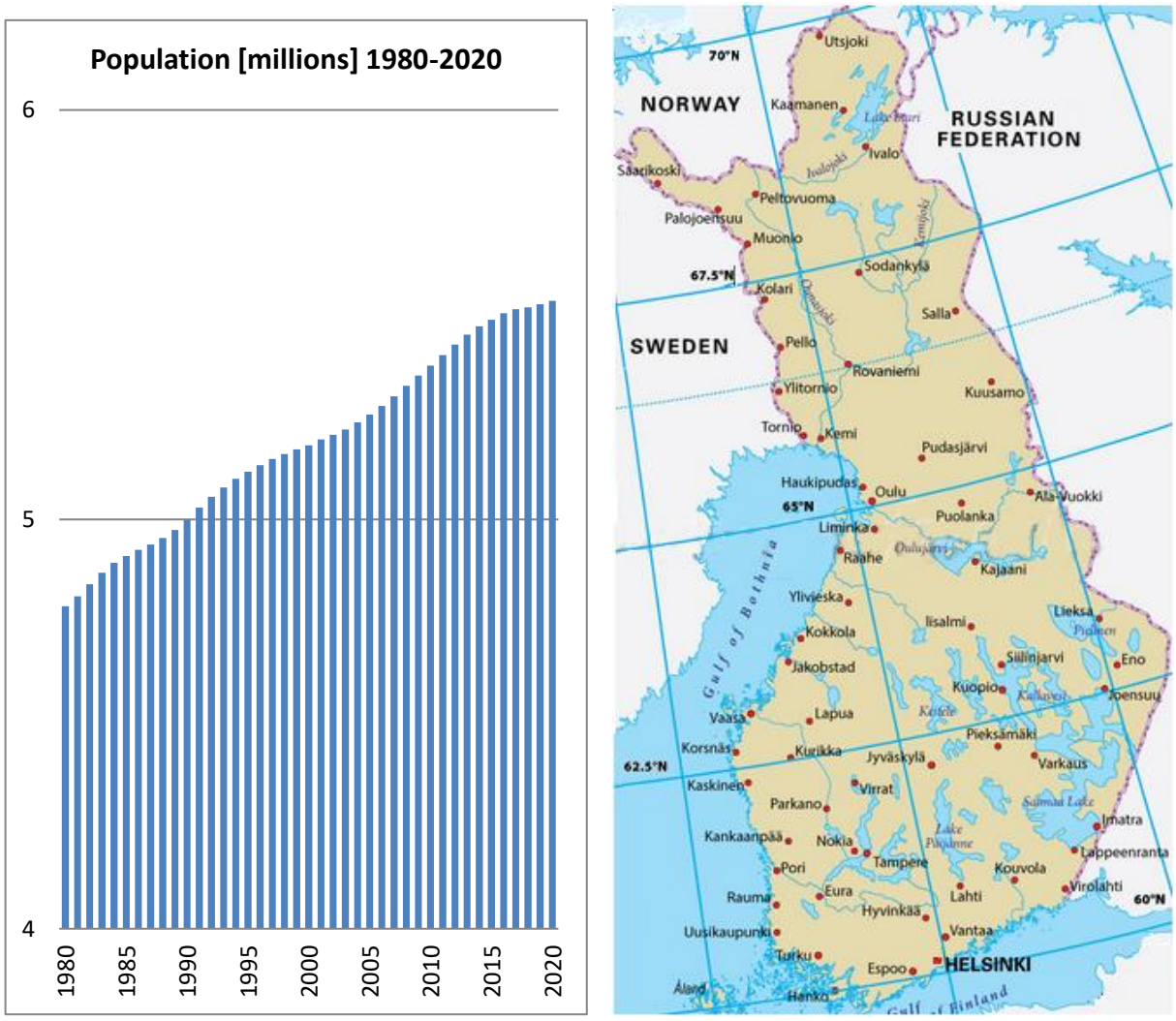

Figure 1.1 Population and geographical location of Finland

Finland is situated at a latitude between 60 and 70 degrees north, with a quarter of the country extending north of the Arctic Circle. With a total area of 338,432 km2, it is Europe's seventh largest

country. Nearly all of Finland is situated in the boreal coniferous forest zone, and 72 per cent of the total land area is classified as forest land, while only some 8 per cent is farmed. Finland has more than 34,300 km2 of inland water systems, which represents approximately 10 per cent of its total area. There are some 190,000 lakes and 180,000 islands.

Climate

Finland's northern location increases the demand for energy and natural resources, but the cold climate has also forced efficient use of energy.

The climate of Finland displays features of both maritime and continental climates, depending on the direction of air flow. Considering its northern location, the mean temperature in Finland is several degrees higher than in most other areas at these latitudes. The temperature is higher due to the Baltic Sea, because of the inland waters and, above all, as a result of air flows from the Atlantic Ocean, which are warmed by the Gulf Stream. The mean annual temperature is approximately 5.5°C in south-western Finland and decreases towards the northeast.

Winter – Winter begins around mid-October in Lapland and during November in the rest of Finland, while not until December in the southwestern archipelago. The sea and large lakes, where existing, slow down the progress of winter. Winter is the longest season in Finland, lasting for about 100 days in southwestern Finland and 200 days in Lapland. The mean temperature in winter remains below 0°C. North of the Arctic Circle, part of winter is the period known as the "polar night", when the sun does not rise above the horizon at all. In the northernmost corner of Finland, the polar night lasts for 51 days. In southern Finland, the shortest day is about 6 hours long. Permanent snow covers open grounds about two weeks after winter begins. The snow cover is deepest around mid-March, with an average of 60 to 90 cm of snow in eastern and northern Finland and 20 to 30 cm in southwestern Finland. The lakes freeze over in late November and early December. The ice is thickest in early April, at about 50 to 65 cm. In severe winters, the Baltic Sea may ice over almost completely, but in mild winters it remains open except for the far ends of the Gulf of Bothnia and the Gulf of Finland. The coldest temperatures in winter are from -45°C to -50°C in Lapland and eastern Finland; from -35°C to -45°C elsewhere; and -25°C to -35°C over islands and coastal regions. The lowest temperature recorded in Helsinki is -34.3°C (1987). The lowest temperature recorded at any weather station in Finland as of 2010 is -51.5°C (1999).

Spring - In spring, the mean daily temperature rises from 0°C to 10°C. Spring begins in a month earlier in the southern part of the country, early April, and proceeds to Lapland in early May, ranging from 45 to 65 days, and being longest in the maritime islands and coastal regions, because of the coolness of the sea. Once the mean daily temperature exceeds 5°C, the thermal growing season is considered to have begun. This takes place about one month after the beginning of spring: at the end of April in southern Finland and at the end of May in northernmost Lapland. For the real growing season to begin the snow must melt. Melting depends on the amount of snow, elevation and the position of the region relative to the sea. Open areas lose their snow cover within two to three weeks of the beginning of spring, whereas on average the snow in the forest smelts about two weeks later. The lakes usually become ice-free soon after the growing season begins in April in southwestern Finland, in May in the interior and in June in Lapland.

Summer - In summer the mean daily temperature is consistently above 10°C. Summer usually begins in late May in southern Finland and lasts until mid-September, while in Lapland it starts about one month later and ends a month earlier. The regions north of the Arctic Circle are characterized by "polar days", when the sun does not set at all, 73 days in the northernmost area. In southern Finland, the longest day (around Midsummer) is nearly 19 hours long. The highest summer temperatures measured in the Finnish interior are from 32°C to 35°C. Near the sea and over the maritime islands, temperatures over 30°C are extremely rare; the highest temperature ever recorded in Helsinki is 31.6°C. Heat waves, with a maximum daily temperature exceeding 25°C, occur on an average of 10 to 15 days per summer inland in southern and central Finland, and 5 to 10 days in northern Finland

and on the coast. In the course of the summer, thunderstorms occur on 8 to 14 days in the interior and 4 to 8 days in coastal areas and northern Lapland.

Autumn - Daily mean temperature in the Autumn remains below 10°C. Autumn begins around the last week of August in northern Finland and about one month later in southwestern Finland. The growing season ends in autumn when the mean daily temperature drops below 5°C around the last week of September in northern Finland and in late October in southwestern Finland. The average length of the growing season is 180 days in the southwestern archipelago, 140 to 175 days elsewhere in southern and central Finland and 100 to 140 days in Lapland. The first snow falls in northern Finland in September and elsewhere in October.

Source: Finnish Meteorological Institute FMI

Economy and industrial activities

Finland has an open economy with prominent service and manufacturing sectors. The main manufacturing industries include electrical and electronics, forest and metal and engineering industries. Foreign trade is important, with exports accounting for about 40 per cent of the gross domestic product (GDP).

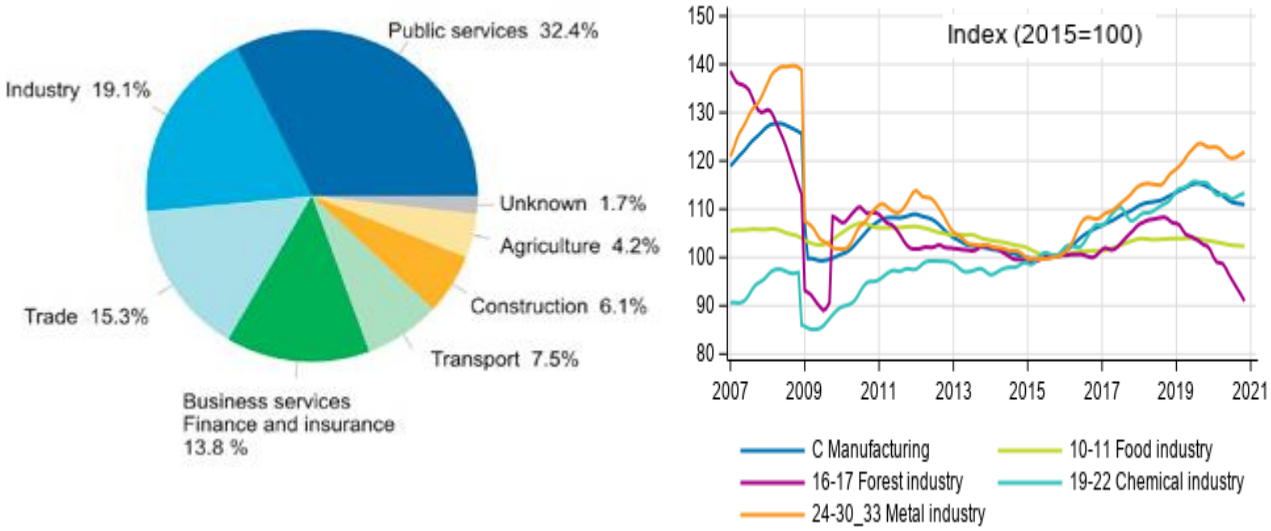

Figure 1.2 Economic Structure Finland (Statistics Finland 2021)

The total annual energy consumption is around 1 500 PJ, out of which the domestic industry uses approximately half. For decades, the use of primary energy as well as electricity has been increasing, and they reached their top values in the years 2006–2007. Demand rose more rapidly than GDP until 1994. Since then, parallel with the structural changes in the economy, both the energy intensity and the electricity intensity of the economy have decreased. Finland has a high share in non-fossil energy sources in power and heat production, i.e. hydro, nuclear and biomass sources.

Finland has significant forest resources that have led to the development of forest industries. Metal, technology and refinery industries developed due to paying reparations to the Soviet Union and due to the bilateral trade with the Soviet Union. The great depression in the beginning of the 1990's was due to the collapse of the Soviet Union as well as the unsuccessful monetary policy. Finland recovered from the depression that brought down thousands of enterprises and the mass unemployment through the growth of information technologies, mobile phones and telecommunication services. In 2009 there was a recession with the value of industrial output felling by approximately one third from year before. (Figure 1.3)

Finland joined the EU in 1995 and the Euro zone in 2001.

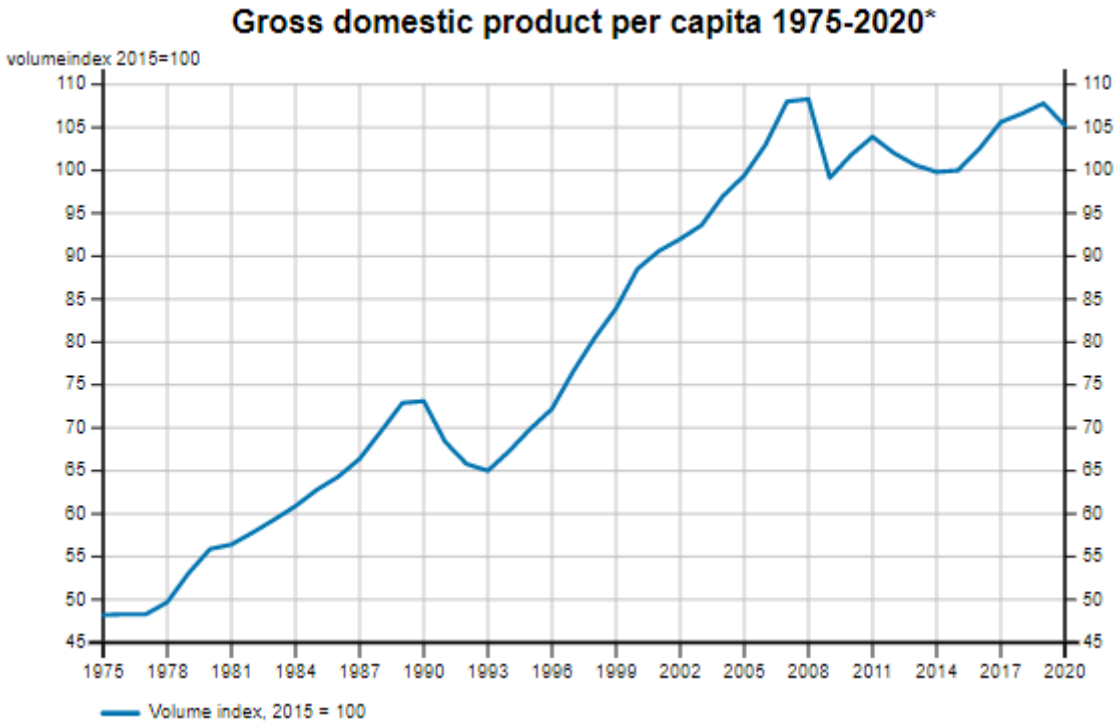

*Figure 1.3 GDP evolution 1975-2020 (**GDP per capita | Findicator.fi (findikaattori.fi)**)*

Domestic passenger transport, measured in terms of passenger-kilometres, has increased by approximately 22 per cent since 1990. Cars account for around 83 per cent of the total passenger-kilometres. The total number of freight tonne-kilometres in Finland is almost double the EU average, mainly because of the long distances and the industrial structure. Indoor heating is a large source of emissions, however, during the past three decades the consumption of energy per unit of heated space has been reduced significantly, in particular due to tightening building regulations.
(Reference: Finland's 6th National Communication to the UNFCCC, Population Statistics, Statistics Finland)

1.1.2 Environmental Protection

Figure 1.4. Snapshots of Finnish Environment

Finland's low population density and comparatively unspoilt natural environment has given good starting points to facilitate nature conservation. Environmental protection actions have resulted in many of the earlier polluted lakes and rivers to be cleaned up. Air quality has improved around industrial locations and a network of protected area has been built up to safeguard biodiversity. Forests are managed more sensitively than in the past and the overall annual growth rate exceeds the total timber harvest.

Finland has been rated among the world's leading countries in many international comparisons of environmental protection standards, such as the Global Economic Forum's regularly compiled Environmental Sustainability Index. Finland's strengths include highly effective environmental administration and legislations, and the ways environmental protection is considered in all sectors of the society. However, Finland has large ecological footprint and high levels of material and energy consumption.

Measures taken to combat acidification have had the desired effects. Finland's soils are naturally vulnerable to acidification since they only contain low concentrations of calcium to buffer the acidifying effects of sulphur and nitrogen compounds deposited in the soils from airborne pollution. The same applies to forests and inland waters. Farmland soils in Finland have to be regularly limed due to their natural acidity.

In Finland well-planned measures to combat air pollution have led to a considerable reduction in the emissions and acidifying deposits over the last 30 years. Instead, the amount of street dust and long-range transport of ozone have not decreased and emissions from agricultural sources continue to be

a problem. While the air quality on average is still, in difficult weather conditions in winter and spring, the amounts of pollutants in certain urban areas may rise to the same level as in cities of about the same size in Central Europe.

Unnatural concentrations of toxic chemicals in the environment do not currently represent health risk in Finland. Emissions of the most hazardous substances have been significantly reduced and Finland does not suffer from large quantities of airborne toxic pollution originating from other countries.

Finland's winters are too cold for many crop pests to survive, so there is no need to use as much pesticides as in the south. However, in the harsh conditions, even small quantities of hazardous substances can be fateful for sensitive ecosystems and the cold climate can slow the natural degradation of toxic substances.

Chemicals contaminating soil can cause problems decades after the pollution occurs. In Finland there are approximately 20 000 sites potentially suffering from soil contamination. Efforts to remediate such sites intensified in the late 1990s and more recent clean-up work has been initiated at several hundred sites annually.

Air Pollution Control Programmes 2010 and 2030

In 2002 the Finnish Government adopted a national programme establishing the maximum annual emission levels for sulphur dioxide, nitrogen oxides, volatile organic compounds and ammonia as from 2010. The programme sets out the measures to reduce emissions in energy production, transport, agriculture and manufacturing industries as well as actions that contribute to emission reduction in working machinery, pleasure boats and residential wood combustion. Finland has successfully reduced emissions in line with the programme, with ammonia emissions as an exception.

The air pollution control programme up to 2030 is currently under preparation and will be finalized by the end of 2018.

International cooperation

The air presents an efficient transport route for gaseous and particulate substances, making it possible for emissions to spread to neighboring regions and even to the other side of the globe. This means that, besides national action in Finland, reaching the air pollution control objectives calls for international collaboration. More than half of the small particle loading and acidifying and eutrophying loading comes to Finland as long-range transboundary pollution. All countries in the world share the same ozone layer, which is why the responsibility for its protection rests with the international community.

The most significant international agreements on which air pollution control and the protection of the ozone layer in Finland are based are:

- UN Convention on Long Range Transboundary Air Pollution to control the transport of air pollutants between countries,
- Vienna Convention and the more detailed Montreal Protocol under it, imposing strict restrictions on the manufacture, consumption and trade of substances that deplete the ozone layer, and
- EU directives and regulations.

1.1.3 Environmental conditions

Air quality in Finland is generally good and the local impacts of air pollution are fairly limited. During periods when certain atmospheric conditions prevail, however – particularly atmospheric inversions in the winter and spring – concentrations of pollutants in the air in Finnish cities may be compared to those observed in cities of similar size elsewhere in Europe.

Acidifying compounds can reach the ground with rain or snow as wet deposition, or in the form of particles or gases as dry deposition. Ecosystems may eventually lose their neutralising or buffering capacity completely, if acid deposition rates persistently exceed the critical levels. Rainfall is naturally slightly acidic, but certain types of air pollutants can increase its acidity considerably. Combustion gases formed during the use of fossil fuels like oil, coal and peat particularly contain oxides of nitrogen and sulphur that can subsequently react in the atmosphere to produce acids that are dissolved in precipitation.

Acidification problems first became evident in the 1960s, when industrial emissions increased rapidly, and efficient methods for cleaning waste gases had not yet been developed. It took some time for action to be taken, although the threat of “acid rain” was clearly serious, with fish disappearing from some lakes, forests dying, and metal structures being rapidly corroded. Ultimately international agreements were signed to force industry and energy production to curb harmful emissions, and these measures have been particularly successful where sulphur emissions are concerned.

Finland carries out extensive monitoring of air quality/deposition and effects in various sectors. Finland participates in all the international effects programmes (ICPs) of the Working Group on Effects of the UNECE CLRTAP and has carried out extensive air quality/deposition monitoring as part of EMEP. Results from these activities have also been published in several national assessment reports and in papers in scientific journals.

Acidification represents a serious threat to many plants and animals, particularly in sensitive aquatic ecosystems. One of the most harmful impacts of acidification is that in acidic conditions toxic aluminium and heavy metal ions are more easily rinsed out of the soil and absorbed by living organisms. The ecosystems most sensitive to acidification are the nutrient-poor lakes and forests of northern Finland, whose natural buffering capacity is already weak. In more fertile regions, soils and the bedrock typically contain higher concentrations of calcium, which helps to prevent acidification.

The concentrations of sulphur compounds decreased and buffering capacity increased in all types of lakes in Finland during the 1990s, thanks to dramatic reductions in the atmospheric deposition. Some 5,000 smaller lakes in Finland are now considered to be recovering well from serious acidification problems.

Since the early 1990s stocks of perch (Perca fluviatilis) have been increasing in many lakes in forested areas of southern Finland where fish stocks had suffered badly from acidification in the 1970s and 1980s.

Declining atmospheric deposition has also reduced acidification problems in Finland’s vital groundwater reserves. It may still take decades for groundwater to recover completely, since sulphur compounds and other acidifying impurities are still widely present in the soil, and are only gradually leached out into water courses.

(Ministry of the Environment 2017 Air Pollution Control, http://www.ymparisto.fi/en-US/Climate_and_air/Air_pollution_control and Lyytimäki J. 2014 Environmental protection in Finland, Finnish Environment Institute)

1.2 Institutional arrangements for inventory preparation

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Responsibilities in the Finnish national system for air emission inventories are divided between Statistics Finland, which is responsible for greenhouse gas inventories under the UNFCCC and the EU CO_2 Monitoring Mechanism Decision, and the Finnish Environment Institute SYKE, which is responsible for air pollutant emissions under the UNECE CLRTAP and the EU Directives (NECD, LCPD). The task is included in the national legislation and in agreements between the MoE and SYKE.

E-PRTR reporting is under the responsibility of the Centres for Economic Development, Transport and the Environment. Energy Authority is the responsible unit for EU ETS data.

The share of responsibilities between the different organizations in the preparation on air emission inventories is illustrated in Figure 1.5.

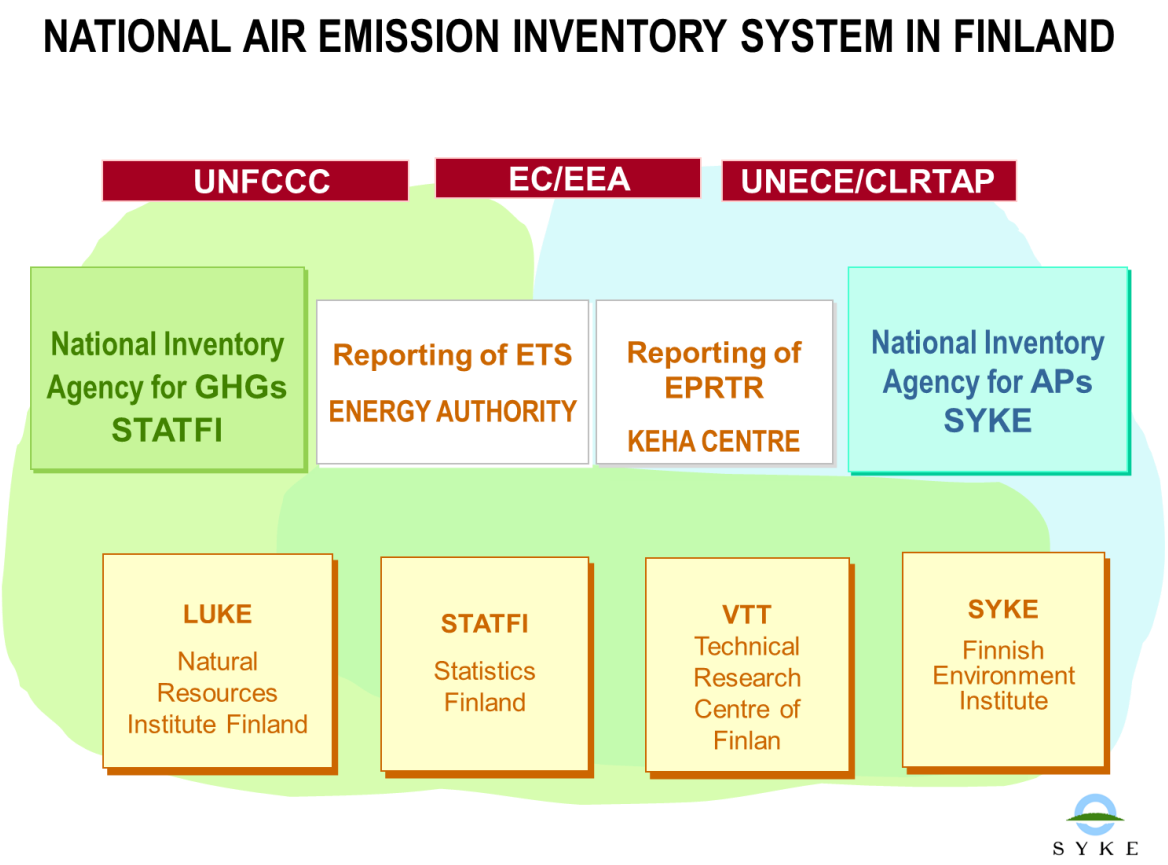

Figure 1.5. National systems for air emission inventories in Finland.

1.3 Brief description of the process of inventory preparation

1.3.1 Organization of the air pollutant inventory

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The inventory of air pollutant emissions to the UNECE CLRTAP Secretariat is coordinated by, and for the most parts also carried out, at Finnish Environment Institute (SYKE). SYKE also compiles the NFR reporting tables and the Informative Inventory Report (IIR) (Figure 1.6).

In the preparation of the inventory SYKE cooperates with several authorities: Finnish Customs; Finnish Food Safety Authority Evira; Finnish Safety and Chemicals Agency TUKES; Natural Resources Institute LUKE; Ministry of Employment and the Economy; Ministry of the Environment, Ministry of Transport and Communications; National Institute for Health and Welfare THL; National Supervisory Authority for Welfare and Health Valvira; Rescue Services in Finland; Statistics Finland.

Several industrial associations and companies provide data for the preparation of the inventory: Association of Finnish Paint Industry; Chemical Industry Federation of Finland; Confederation of Finnish Construction Industries RT; Finnish Cosmetic, Toiletry and Detergent Association TY; Finnish Energy Industries Finergy, Finnish Food and Drinks Industries' Federation ETL; Finnish Forest Industries Federation; Federation of Finnish Technology Industries; First Quantum Minerals Ltd Lemminkäinen Infra Ltd Asphalt Division; Nynas Ltd (specialty oils); Paulig Ltd (coffee); Suomen Hiiva (yeast), Yara (chemicals) as well as the following research institutes: Natural Resources Institute LUKE and VTT Technical Research Centre of Finland.

In 2020 an agreement was made between SYKE and VTT to transfer the emission inventory of all the remaining transport sector emission sources to VTT (i.e. heavy metals, POPs, particles as well as volatile and abrasion emissions).

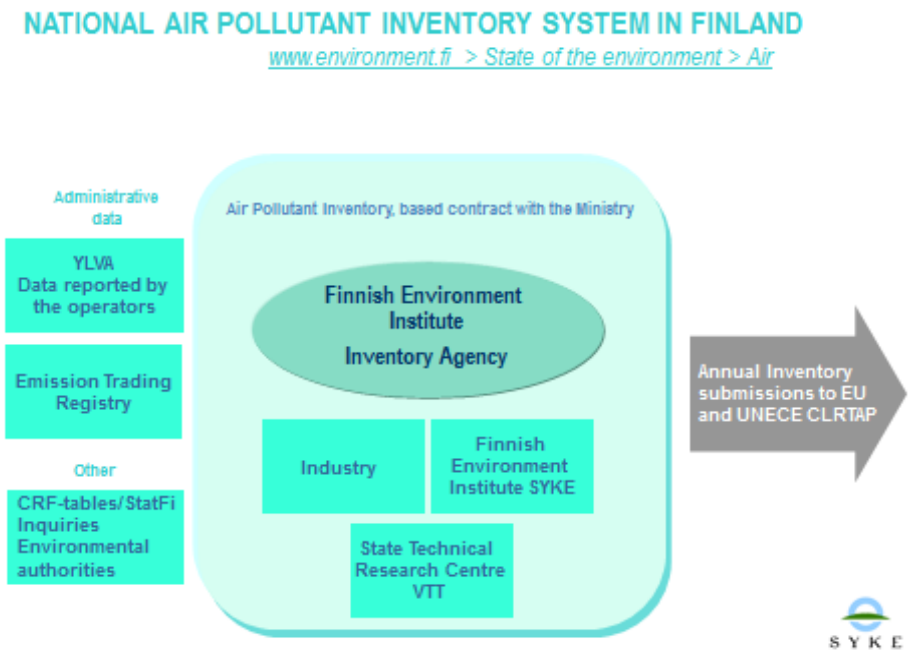

Figure 1.6 Organization of the air pollutant emission inventory in Finland.

1.3.2 Preparation of the inventory

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Air pollutant inventory agency

The national air pollutant emission inventories under the UNECE CLRTAP and the EU Directives (NECD and LCPD) are carried out at SYKE by the Air Emissions Team. Resources used for the preparation of air pollutant inventories are about 2.5 man years.

The team also participates the national greenhouse gas inventory by carrying out the inventory of F-gases and the waste sector inventory. The team also prepares as the NMVOC emission inventory under the CLRTAP and the NECD to be in the format to be reported under the UNFCCC and EU CO_2 Monitoring Mechanism. Resources used for contributing the greenhouse gas inventory are about 0.9 man years.

The annual schedule of the inventory work is presented in Figure 1.7.

Other services

The Air Emissions Team develops and maintains national release estimation techniques for air pollutants and maintains this information available on to the operators of industrial installations and to environmental authorities on the environmental administration's website [8]. The Team, in addition, develops tools for estimating greenhouse gases on the level of municipalities.

The Air Emissions Team provides expert services and technical support to the Ministry of the Environment.

Participation in national and international cooperation and research projects with research institutes, universities and industry is an essential tool to further develop the knowledge and expertise.

The Team members also participates in international work under the UNECE TFEIP, IPCC, OECD and the Nordic Council of Ministers as well as in the inventory review programmes under the UNFCCC and CLRTAP/NECD.

Bilateral cooperation and development projects as well as EU Twinning projects are included in the annual work of experts where resources allow.

Annual schedule of air emission inventories

The annual working schedule of air pollutant and greenhouse gas inventories at Finnish Environment Institute SYKE is provided in Figure 1.7.

[8] Information on national emission estimation methods is provided in Finnish and in Swedish on the website www.ymparisto.fi/paastot

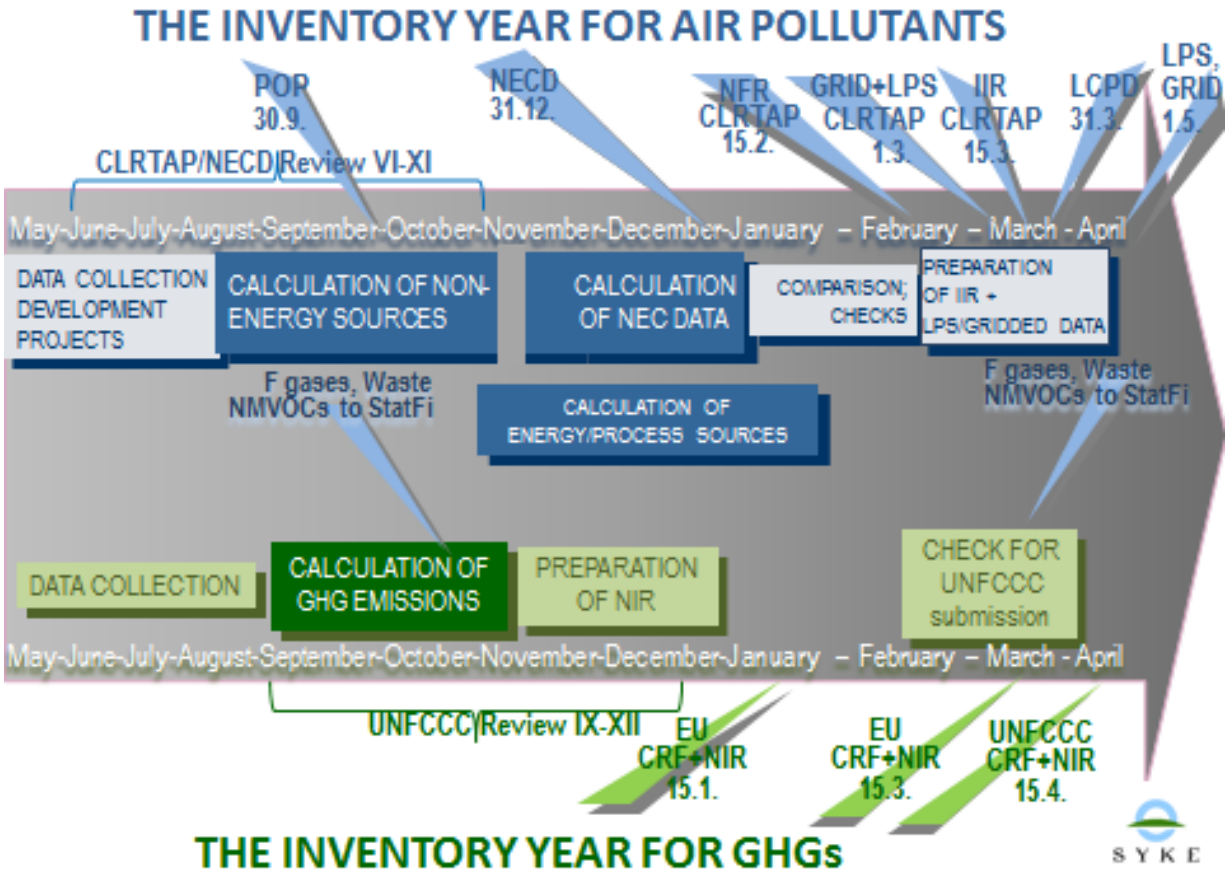

Figure 1.7. Annual schedule of inventory work at SYKE.

1.3.3 Reporting tool IPTJ

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The air pollutant emission data system IPTJ (Ilmapäästötietojärjestelmä) was built up during 2000 – 2003 as a reporting tool for the inventory. IPTJ currently contains emission data for the years 1990 – 2019 while data for 1980-1989 are based on manual documentation and the earlier data system SIPS[9].

During the year 2013 the data compilation system was upgraded and automated using a Microsoft Visual Studio 2008 extension Business Intelligence Development Studio (BIDS). Microsoft Access based queries were extracted and the syntax converted into a format compatible with Microsoft SQL Server Database and most SQL-compatible database management systems and the SQL queries stored as SQL Server Integration Services (SSIS) packages.

[9] SIPS (1998) Suomen ilmapäästöt ja skenaariot (Finnish Air Emissions and Scenarios)

Emission data in the IPTJ system is retrievable in different reporting formats: SNAP (Source Nomenclature for Air Pollutants), CRF (Common Reporting Format, IPCC), IPPC (Integrated Pollution Prevention and Control, Council directive 96/61/EC), as well as in IPPC and EPRTR categories. The structure of IPTJ is presented in Figure 1.8.

Spatial emission data calculated at the level of EMEP grids (0.1° * 0.1° and 50 km * 50 km) as well as for each municipality (431 municipalities in 2006 and 320 in 2013), provinces (19 in 2013) and Centres for Economic Development, Transport and the Environment (sc. ELY Centres, the number of which were 16 in 2014).

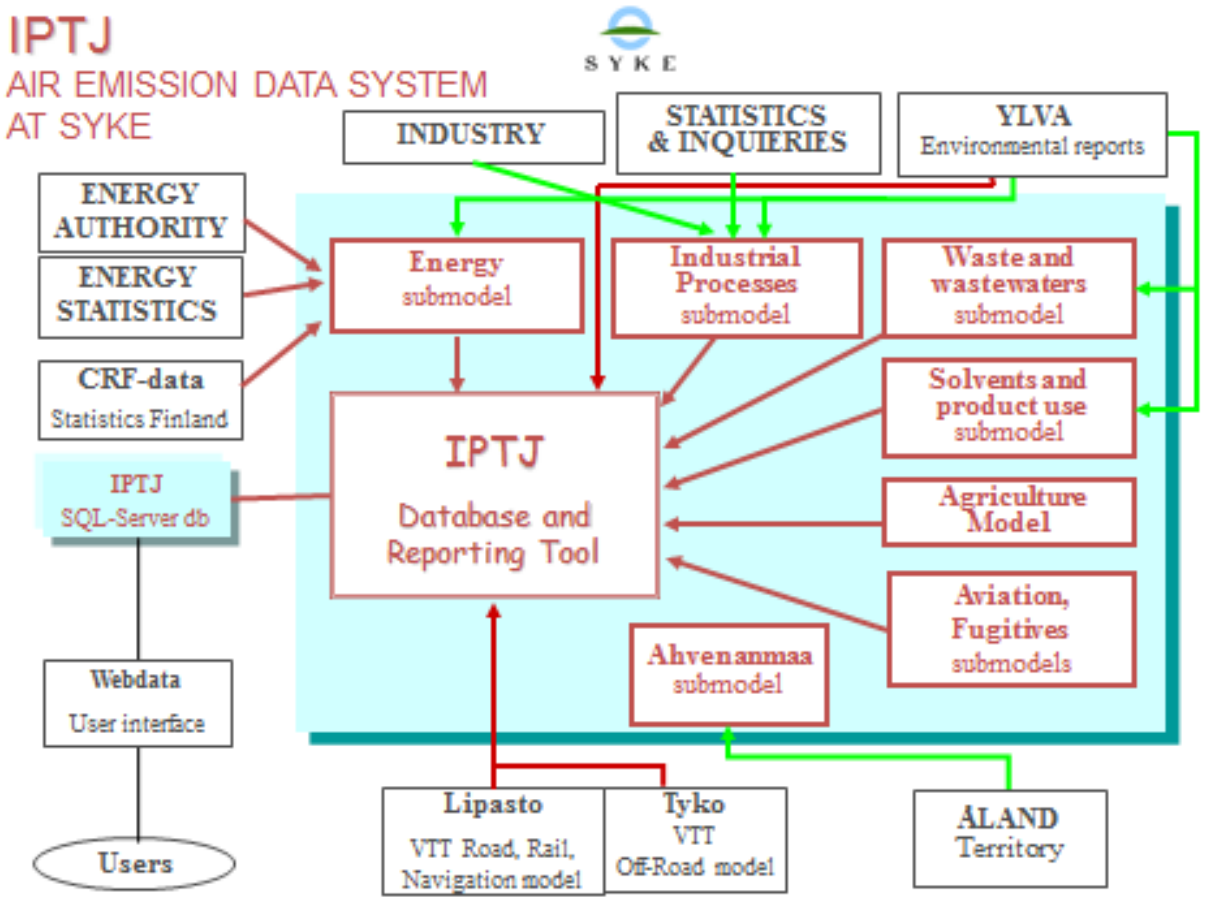

Figure 1.8. Structure of the air pollutant emission data system IPTJ at the Finnish Environment Institute SYKE.

1.3.4 Use of bottom-Up Data in the Emission Inventories

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The approach

A specific feature of the Finnish emission inventories is the use of data reported by the industrial installations[10]. The installations report their annual emissions to the supervising authorities at the Centres for Economic Development, Transport and the Environment according to the monitoring and reporting obligations determined in their environmental permits. After checking and approving the emission reports by the plants the supervising authorities record the information, including emission data for the supervised period, into their database (YLVA)[11] from where it is available also for emission inventory purposes.

At the Finnish emission inventory agencies (i.e. Finnish Environment Institute for air pollutants and Statistics Finland for greenhouse gases), the data is checked with normal statistical comparisons (e.g. check of magnitude and trend) and according to the IPCC Good Practice Guidelines principles before it is taken into the inventory databases of the inventory agencies. The use of bottom-up data increases the accuracy of the inventory by allowing actually measured emissions to be included into the inventory and covering, for instance, emissions during exceptional situations[12], which otherwise would not easily be captured (Figures 1.9 and 1.10). However, this also brings along additional work load in checking and allocating this information correctly. Results of the quality check carried out for the 2014 energy sector data is presented in Annex 4 of Part 2 of the IIR.

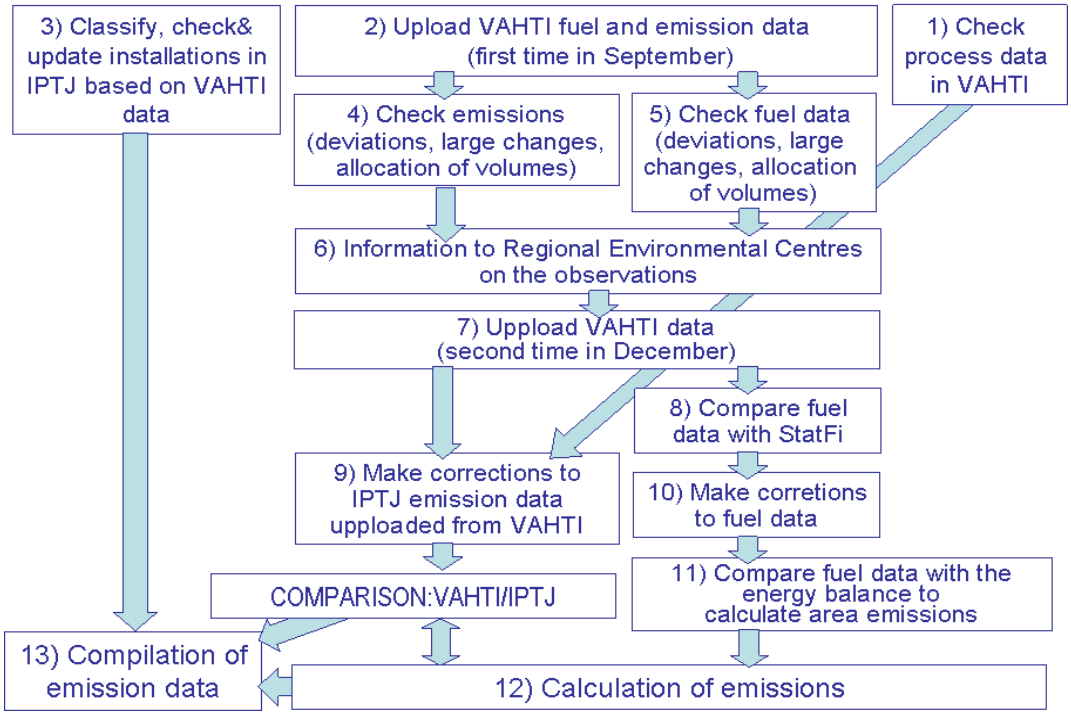


Figure 1.9. Processing of emission data reported by the plants for use in the air pollutant emission inventory, Part 1. (Note; the name of VAHTI has been changed to YLVA in 2018)

[10] This data is reported by the operators according to the reporting obligation in the environmental permit, as described in Chapter 1.3.3 first paragraph.
[11] Database for the supervising authority
[12] Such as malfunctioning of abatement technique, accidental releases due to process failures etc.

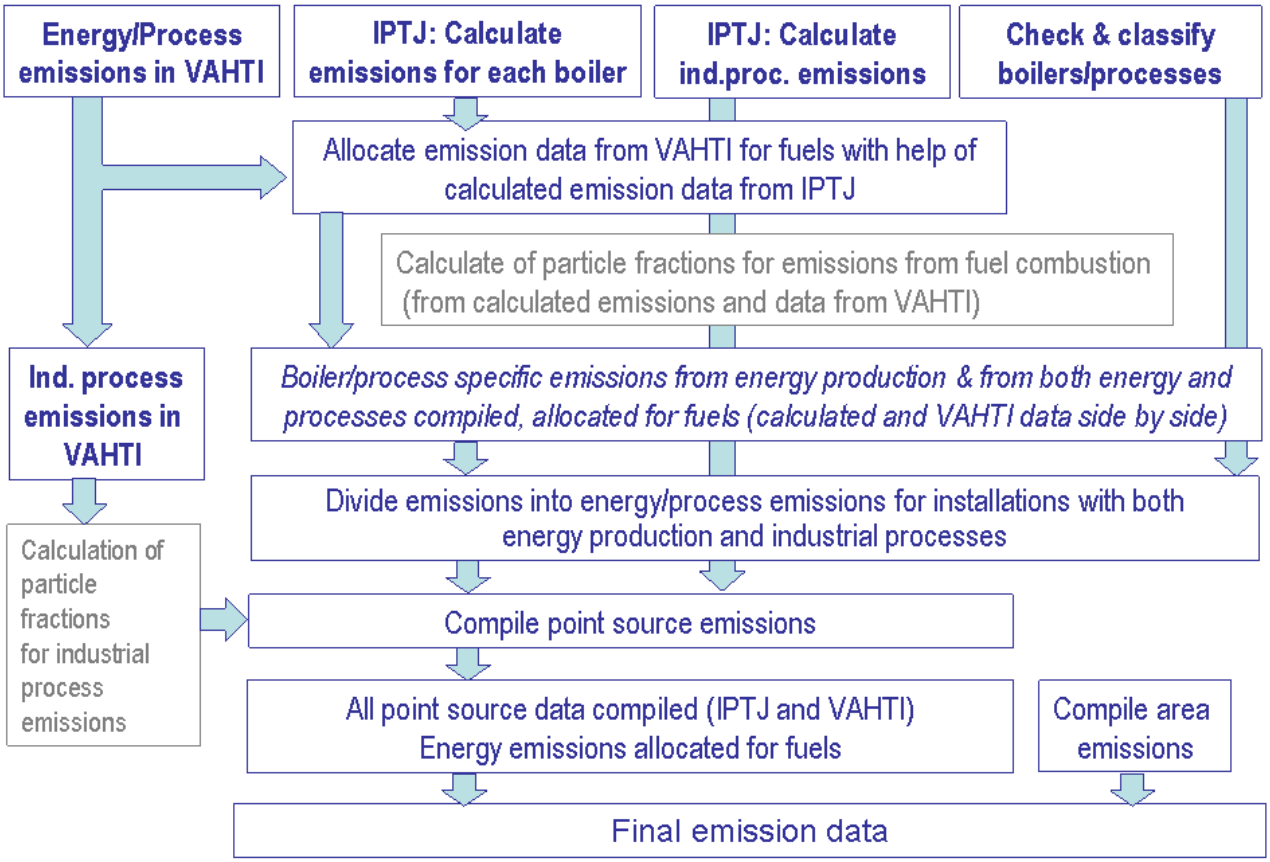


Figure 1.10. Processing of emission data reported by the plants for use in the air pollutant emission inventory, Part 2. (Note; the name of VAHTI has been changed to YLVA in 2018)

YLVA database

The Centres for Economic Development, Transport and the Environment (ELY Centres[13]) process environmental permits and monitor the compliance of activities to the requirements. The operators report data and information according to the monitoring and reporting obligations in their permits. The data is collected into the central YLVA database of the ELY Centres (Figure 1.11 to be updated to the next submission).

YLVA includes information and data on wastes generated, wastewater discharges and emission into the air. This baseline data is used by the ELY Centres in their work for supervising the activities. Emission data is also available to the inventory agencies for the use in emission inventories.

YLVA contains information on how facilities comply with the environmental regulations. A case management tool is incorporated into the system and the user interface makes it possible to add new customers, change or add customer data, retrieve reports from database and write inspection reports. The system includes mapping functions and a calendar to remind the inspector of time limits. Currently, there are 800 active users of the system.

[13] https://www.ely-keskus.fi/en/web/ely-en/

YLVA is a customer information system. The information recorded of the customer (i.e. an industrial plant) include, for example:

- facility identification details
- contact persons at the facility and environmental administration
- environmental permit conditions
- environment insurance information
- discharge points (stacks and sewers)
- information on process techniques and existing
- release control techniques
- information on fuels used
- information on landfills
- information on releases to air, water and wastes as well as related analysis data
- information on energy production and other production
- information on consumption of raw materials and water

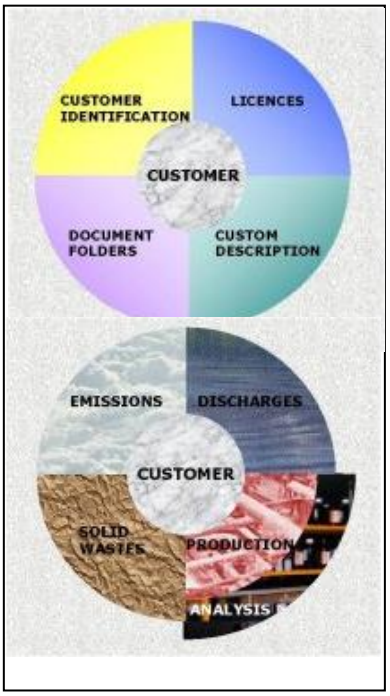


Figure 1.11. Structure of the YLVA database

The operators of installations (i.e. energy producers, industrial installations, fish farmers, peat producers, waste management, wastewater treatment plants) that have an environmental permit report information to the ELY Centres through a national portal (TYVI), which is the same one used for reporting on taxation (see chapter 2.3.6.4 and Figure 1.12). After checking and approving the data the supervising authorities record the data into the YLVA database from where it is available also for emission inventory purposes.

The coverage of installations in the Finnish environmental legislation is wider than in the European Union's IPPC Directive. YLVA database includes information of about 31 000 clients out of which about 28 000 are currently in operation and about 3 000 out of operation. Out of these only about 600 installations fall under the European Union's IPPC Directive. In 2006, 3 401 facilities sent their emission reports to the authorities. The number of facilities that reported information in 2015 on emissions to air, water or on wastes is presented in Table 1.4.

Table 1.4 Facilities reporting information to VAHTI in 2015. (to be updated to the contents of YLVA)

Activity	Water	Air	Waste
Energy production and industrial installations	1 110	623	770
Municipalities	384	6	261
Fish farms	169	0	20
Others	111	421	1 096
Total	1 774	1 050	2 147

Small facilities as well as part of the medium sized facilities, such as small animal shelters and petrol stations, are not yet requested to report to the authorities.

Air pollutant reporting obligations for plant operators

Annual emissions reporting under the environmental permit

In the environmental permit, or in a plant specific emission monitoring and reporting programme annexed to the permit, requirements are determined on what the operator (i.e. a person or a legal person in charge of a facility) must report to the authorities. The annual reporting obligation of an installation concerns emissions for which the installation has an emission limit value (ELV) in the environmental permit. The monitoring system for these substances is stipulated together with the ELV for these compounds. In the environmental permits ELVs are usually given for emissions of sulphur (as SO_2), particles (as TSP or PM_{10}) and nitrogen oxides (as NO_2), in some cases also for heavy metals, NMVOCs, ammonia, POPs and halogens, but not for greenhouse gases (carbon dioxide, methane, nitrous oxide or F-gases).

E-PRTR reporting

Emissions falling under the European Pollutant Release and Transfer Register (E-PRTR)[14] reporting scheme are reported as total emissions for an industrial site. Those air pollutants that are not included in the reporting requirements under the environmental permits may, however, fall under the reporting requirement of the E-PRTR.

Format and procedure of reporting

The plants report the emissions by individual boilers and processes or as total emissions for an industrial site, according to how the data is stipulated to be reported in the environmental permit.

The operators also report on the types, characteristics and consumption of fuels, though this data may not be as complete as emission data. Information on waste amounts, with official classification codes, to solid waste disposal sites, and wastewater handling data are available from YLVA.

The operators may submit emission reports to the supervising authorities as hard copies, electronically by email or through the Internet (Figure 1.12). The larger industrial installations use systems that allow direct information flow from the plant information systems to the supervising authority.

The emission data is always checked by the supervising authority before it is recorded into YLVA.

When the operator chooses to send the data over the Internet using the national authorities' centralized data collection system (TYVI)[15] the data is automatically checked for completeness and only the completed data set will be sent to the authorities for further checking.

[14] According to the Finnish Environmental Protection Act paragraph 27.2 the Environmental Protection Register contains information about emission reports and monitoring connected to the environmental permits. The Regional Environmental Centres and municipal authorities are responsible for collecting the data from the operators. This data, as well as the data reported under the EPER or E-PRTR obligations are recorded into the VAHTI data system from where it is available for inventory purposes.

[15] The centralized data collection system TYVI is a consultant service used in various data collection procedures from the companies to the governmental authorities. In addition to the environmental administration also to e.g. the tax authority, the customs and statistics uses the data collection service.

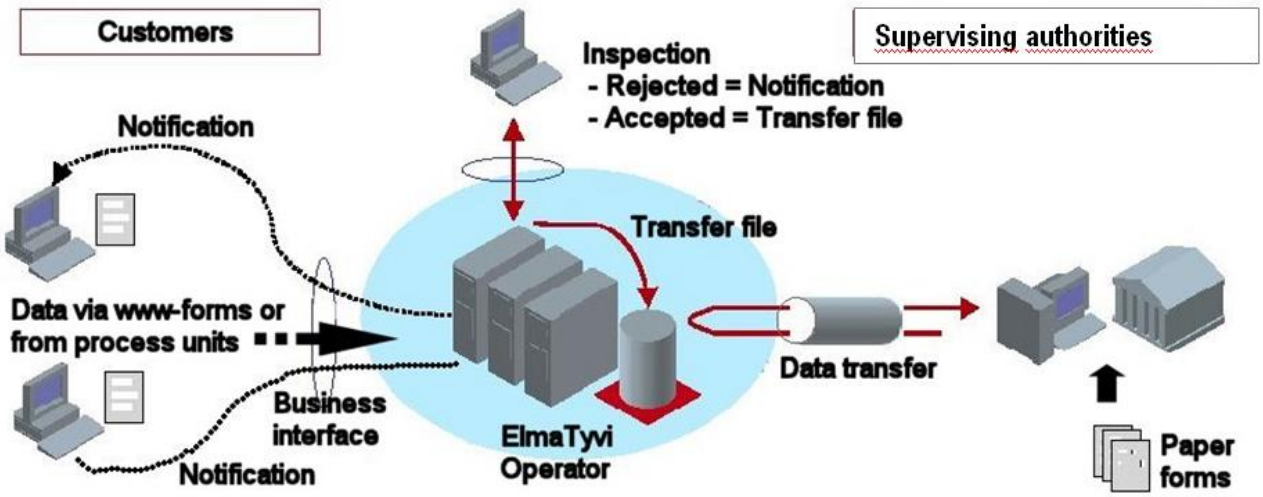


Figure 1.12. Reporting options for the operators.

QA/QC carried out by the supervising authority

When receiving the emission report from the operator the supervising authority checks the correctness of the data as well whether the data is produced according to the methods agreed upon in the environmental permit or in a separate monitoring programme for the plant. The methods usually include the use of international standards or approved in-house methods. The principles of the EU IPPC Reference Document on Monitoring of Emissions (Monitoring BREF) are also followed.

Programme to improve point source data

In 2011-2013 a project (TIVA2) was running in the environmental administration to integrate the contents of YLVA database with corrected and completed data from air and wastewater databases at SYKE to provide the end-users of data the latest and corrected information through a new interface. This means that cross-checks and corrections made e.g. in the air pollutant emission inventory are included in the data available through the new system. The new interface is planned to serve also the needs of a national PRTR system.

Use of EU ETS data

The operators report emissions of carbon dioxide as well as fuel data to the Energy Market Authority that keeps the Emission Trading Register. The annual emission data in the EU ETS was earlier reported mainly on process level but recently only on the level of facilities. This data is available for emission inventory purposes for Statistics Finland and the Finnish Environment Institute.

More details of the use of ETS data in the inventory is provided under the Energy sector in Chapter 4.2.4 Source specific QA/QC and verification.

How data reported to authorities is handled in the inventory

For all substances falling under the substances list of the CLRTAP, default emissions are calculated in the inventory system. These default emissions are used in the preparation of the national inventory. In case the operator reports any emission values, these are compared against the default values calculated in the inventory system and in case found reasonable, included in the inventory in-stead of the default values. In unclear cases, the inventory agency contacts the supervising authorities or the plant operator directly to confirm the correctness of the reported value and the reason behind any deviating values. The comparison between the calculated default values and data reported by the operator can be seen as part of a verification process for both data sets.

In cases where the operator reports only the total emissions of a site, the default emissions calculated for energy production activities (e.g. boilers, turbines etc.) for the site, are used to allocate the total emissions of the site under relevant NFR categories as follows: the default emission value(s) calculated for energy production are subtracted from the total emission of a site and the remainder is reported under the relevant NFR sector (e.g. under an industrial processes sector).

1.3.5 Inter-comparison with greenhouse gas emission inventory data

The calculation systems for the air emissions inventories under the UNECE CLRTAP and EU NECD are separate from the GHG calculation system but use mostly the same basic data sources for calculating emissions from fuel combustion. The independence of the calculation systems is used as a verification tool for the inventories, and moreover, as a source of additional corrections in point source data. Comparisons between the data in these two calculations systems are performed continuously during the inventory preparation. The annual calculation at Finnish Environment Institute SYKE is performed a bit later than the GHG inventory and, thus, the source data set usually includes more updated data than used in the preliminary EU GHG inventory. The thorough comparison between the Air pollutant and GHG inventories in accordance with the EU Regulation 525/2013 is performed after 15 February and the differences are either corrected or accounted for by the 15 March submissions.

The inter-comparison between Statistics Finland and the Finnish Environment Institute is carried out with data related to the fuel combustion source categories at the aggregation level allowed for statistical confidentiality as presented in Figure 1.13. The inter-comparison is explained in more details under Energy sector in Chapter 4.2.4 Source-specific QA/QC and verification.

The observed omissions and errors are corrected to both inventories according to the results of the inter-comparison. The remaining differences are explained in Chapter 2.4.3. and the results of the comparison of possible differences in the regular annual reports are presented in Appendix 2.

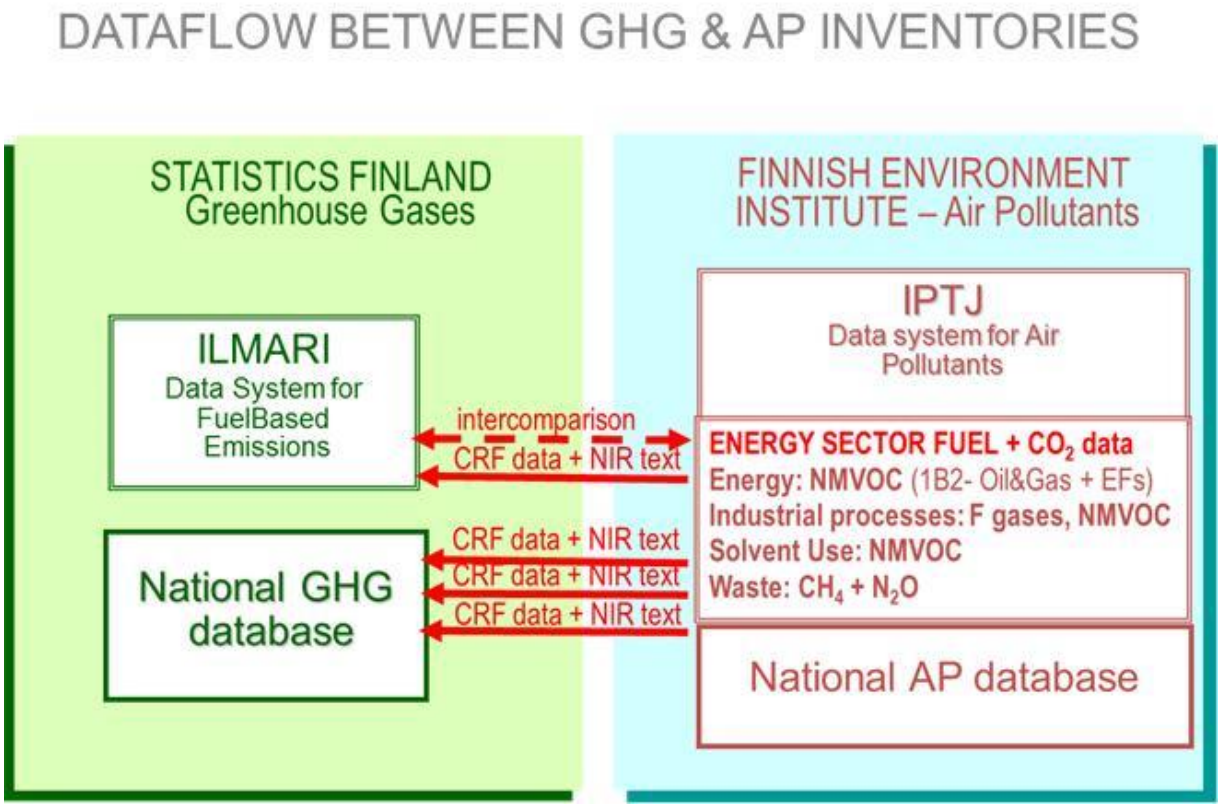


Figure 1.13. Inter-comparison of air emissions inventory data between Statistics Finland and SYKE.

1.4 Methods and data sources

1.4.1 Methodology

Changes in chapter	
February 2021	KS

The EMEP/EEA Emission Inventory Guidebook methodology and national methods are used in the preparation of air pollutant emission inventories. Country specific emission factors and compliance data reported by the operators or emissions estimated by the industrial associations are used whenever they provide better estimates of the national circumstances than the default values.

The Nomenclature for Reporting (NFR) tables are used in reporting the emission figures under the UNECE CLRTAP and the EU NECD.

In this report, compilation of emission data for 2019 is described in detail while the compilation of the data for the earlier years is presented at a more general level.

No comprehensive recalculations have been made to the time series, although new sources have been added and major errors identified have been corrected for the earlier years, too.

1.4.2 Differences in the methods between the submissions in 2021 and in 2022

Changes in chapter
March 2022 KS

There are no major differences in methods used in the previous inventories and the one submitted in 2022. Some updates and improvements are made as detailed in the sector specific chapters 4-9 and summarised in Chapter 14.

1.4.3 Differences in emission data reported under different reporting obligations and cooperation between inventory agencies

Changes in chapter
March 2022 KS

This chapter explains differences between the submissions to the UNECE CLRTAP Secretariat and to the EU NECD to the UNFCCC Secretariat and to the Commission under the European Union CO_2 and other greenhouse gas Monitoring Mechanism.

A quantification of differences in the 2019 submissions to the UNFCCC, CLRTAP and NECD regarding data for 2017 are presented in Table 1.5.

Table 1.5 Differences between the UNFCCC/EC (2021)-CLRTAP (2022)-NECD(2022) submissions for year 2020 emissions

Submissions				Difference %		
2021	UNFCCC	CLRTAP	NECD	CLRTAP-UNFCCC	NECD-UNFCCC	CLRTAP-NECD
SOx	24.182	23.218	23.218	-4.2	-4.2	0
NOx	99.015	105.392	105.392	6.1	6.1	0
NMVOC	80.967	84.587	84.587	4.3	4.3	0
CO	335.730	317.211	317.211	-5.8	-5.8	0

The differences for NO_x emissions are due to the use of different versions of the agriculture calculation model in the air pollutant and the greenhouse gas inventories. For NMVOC and CO, additional differences originate from the method used to calculate emissions from small scale wood combustion, where the greenhouse gas inventory not yet has updated the emission factors. NMVOC emissions from the use of hand disinfectants due to the Covid pandemic were not yet included in the CRF tables at the time of the submission (15.2.2022).

In addition, some minor differences generally exist for SO_2, NO_x, NMVOC and CO emissions, due to the following reasons:

(1) Energy sector emission data in Finland is calculated in two different calculation systems:

- The data submitted to the UNFCCC Secretariat and to the EU Commission under the CO_2 Monitoring Mechanism Decision is calculated at Statistics Finland, which is the National Inventory Agency for Greenhouse Gas Inventories.
- The data submitted to the UNECE CLRTAP Secretariat and the EU Commission under the EU NECD is calculated at the Finnish Environment Institute, which is responsible for the national inventory of air pollutants and point source inventories (e.g. LCPD).

(2) Allocation of data in the CRF and NFR tables: harmonization of the allocation of emissions has some inherent challenges due to the different reporting formats (CRF and NFR). For instance, it is not always possible to report the same activities under the corresponding CRF/NFR source categories because certain sources fall under a CFR category in the greenhouse gas inventory, while air pollutants generated from the same activity are not related to the given CRF/NFR category and are therefore reported under the main activity of the plant.

(3) The allocation of point sources in the CRF and NFR inventory categories may differ somewhat in the data systems of the two institutes and checks on the allocation are regularly made between StatFi and SYKE.

(4) Currently in the time series of the inventories there are certain differences, some of which are related to a different timing of uploading point source data from the compliance reporting database VAHTI (Chapter 2.3.3), as the contents of YLVA is being improved by completing and correcting the data throughout the year, for both the current and the historical years. In cases where deficient data is not corrected in YLVA database, the inventory agencies cooperate to use corrected data in their inventories. Some differences between the two energy sector inventories may also be related to errors and omissions in the inventory databases at Finnish Environment Institute or Statistics Finland. Efforts are made to ensure consistency of the data.

The annual inter-comparisons between Statistics Finland and Finnish Environment Institute are explained in Chapter 2.3.4.

Benefits of the cooperation

Due to intensive cooperation of energy experts at Statistics Finland and SYKE, the two inventory approaches in calculation of energy sector emissions can be regarded as an efficient QA/QC tool because errors and omissions are efficiently identified and corrected where found.

NMVOC emissions

NMVOC emission data for other sources than energy are calculated at Finnish Environment Institute and integrated into the CRF tables reported under the UNFCCC and EU MM. Thus the emission data, activity data and methodologies are the same in all of these inventories. Energy sector NMVOC emissions are calculated in both Statistics Finland and SYKE's calculation systems using the same emission factors. In the 2017 reporting emissions for small scale combustion sources are calculated by the new technology specific model under the CLRTAP and NECD while not yet included in the UNFCCC reporting, where adoption of the new model is underway.

Nitrogen/NH_3 emissions

Nitrogen emissions used as input data in the greenhouse gas inventory are calculated at LUKE (Agrifood Finland) for the use of agriculture sector greenhouse gas emission inventory. The emissions are calculated in the same model (see Chapter 7.1.2 Nitrogen model) as ammonia emissions in the air pollutant emission inventory. The model is accessible for both institutes through the Internet. This guarantees that the source data and emissions are the same in both inventories.

1.4.4 Possible differences between the emission inventory reports under the UNECE CLRTAP and the EU NECD

Changes in chapter
February 2021 KS

Since the revision of the NECD and adoption of the same reporting requirements than the CLRTAP, no differences will be in the reported emissions because a copy of the data submitted under the CLRTAP is reported under the NECD.

The inventories under the UNECE CLRTAP and under the EU NECD are both calculated in the same inventory system at Finnish Environment Institute.

1.5 Key categories

Changes in chapter
February 2022 TF

According to the EMEP/EEA emission inventory guidebook 2019, "a key category is one that is prioritised within the national inventory system because it is significantly important for one or a number of air pollutants in a country's national inventory of air pollutants in terms of the absolute level, the trend, or the uncertainty in emissions".

The results of the key category analysis are used in prioritizing the inventory improvements. For the Finnish 2022 submission inventory, the Approach 1 methodology presented in the EMEP/EEA emission inventory guidebook 2019, including the level and the trend assessment, has been used to identify key categories for each pollutant. Key source categories are sources that together contribute with either 80 % of the level or 80 % of the overall trend of reported emissions.

The combined results of the level and trend analysis for the 2022 submission are presented below in Table 1.6 and the Level and Trend analysis in Appendix 1A *"Results of the Key Category Analysis, Level and Trend"*, at the end of IIR Part 1A General.

Table 1.6 Combined results of the level and trend key category analysis for the 2022 submission

NO_x

NFR Code	Fuel	Pollutant	Identification criteria
1A2d	Biomass	NOx	L1, T1
1A3biii	Diesel oil	NOx	L1, T1
1A3bi	Diesel oil	NOx	L1, T1
1A1a	Biomass	NOx	L1, T1
3Da1		NOx	L1, T1
1A3bii	Diesel oil	NOx	L1, T1
1A4bi	Biomass	NOx	L1, T1
3Da2a		NOx	L1, T1
1A2a	Gaseous	NOx	L1, T1
1A4cii	Liquid	NOx	L1, T1
1A1a	Solid	NOx	L1, T1
1A3bi	Gasoline	NOx	L1, T1
1A1a	Gaseous	NOx	L1, T1

1A2gvii	Liquid	NOx	L1
1A3dii	Liquid	NOx	L1
1A1a	Peat	NOx	L1
1A4ciii	Liquid	NOx	L1
1A1b	Gaseous	NOx	L1
1A5a	Biomass	NOx	L1
1A5a	Liquid	NOx	L1
1A3c	Liquid	NOx	L1

NMVOC

NFR Code	Fuel	Pollutant	Identification criteria
1A4bi	Biomass	NMVOC	L1, T1
2D3a		NMVOC	L1, T1
2D3d		NMVOC	L1, T1
3B1a		NMVOC	L1, T1
3B1b		NMVOC	L1, T1
1A3dii	Liquid	NMVOC	L1
1B2av		NMVOC	L1
1B2aiv		NMVOC	L1
1A4bii	Liquid	NMVOC	L1
3Da2a		NMVOC	L1
2B10a		NMVOC	L1
2D3g		NMVOC	L1
2D3i		NMVOC	L1
2H2		NMVOC	L1
2H1		NMVOC	L1
1A4cii	Liquid	NMVOC	L1
1A3bi	Gasoline	NMVOC	T1
1A3bv		NMVOC	T1
2D3h		NMVOC	T1
1A3biii	Diesel oil	NMVOC	T1
2D3c		NMVOC	T1
1A4aii	Liquid	NMVOC	T1

SO_x

NFR Code	Fuel	Pollutant	Identification criteria
1A1b	Gaseous	SOx	L1, T1
1A1a	Peat	SOx	L1, T1
1A1a	Solid	SOx	L1, T1
1A2b	Liquid	SOx	L1, T1
1A1a	Biomass	SOx	L1, T1
1A2b	Solid	SOx	L1, T1
1A5a	Liquid	SOx	L1, T1
2H1		SOx	L1, T1

2C1		SOx	L1, T1
1A2d	Liquid	SOx	L1, T1
1A5a	Biomass	SOx	L1, T1
2B10a		SOx	L1
1A4ai	Liquid	SOx	L1
1A2d	Biomass	SOx	L1
1A2d	Peat	SOx	L1
1A4bi	Liquid	SOx	L1
1A2c	Liquid	SOx	L1
1A1a	Liquid	SOx	T1
1A1b	Solid	SOx	T1
1A2d	Solid	SOx	T1
1A2a	Solid	SOx	T1

NH_3

NFR Code	Fuel	Pollutant	Identification criteria
3Da2a		NH3	L1, T1
3B1a		NH3	L1, T1
3B1b		NH3	L1, T1
3B3		NH3	L1, T1
3Da1		NH3	L1, T1
3B4h		NH3	L1
3Da3		NH3	L1
1A3bi	Gasoline	NH3	T1
3B4gii		NH3	T1
3B4e		NH3	T1
2H1		NH3	T1

$PM_{2.5}$

NFR Code	Fuel	Pollutant	Identification criteria
1A4bi	Biomass	PM2.5	L1, T1
1A2d	Biomass	PM2.5	L1, T1
1A3bvi		PM2.5	L1, T1
1A3bvii		PM2.5	L1, T1
2H2		PM2.5	L1, T1
2C1		PM2.5	L1, T1
1B1c		PM2.5	L1
1A3dii	Liquid	PM2.5	L1
1A2gvii	Liquid	PM2.5	L1
2B10a		PM2.5	L1
3Dc		PM2.5	L1
1A3bii	Diesel oil	PM2.5	L1
1A3biii	Diesel oil	PM2.5	T1

1A3bi	Diesel oil	PM2.5	T1
1A4cii	Liquid	PM2.5	T1
1A1a	Solid	PM2.5	T1
2H1		PM2.5	T1
1A1a	Liquid	PM2.5	T1
1A2d	Liquid	PM2.5	T1
1A5a	Biomass	PM2.5	T1

PM_{10}

NFR Code	Fuel	Pollutant	Identification criteria
1A4bi	Biomass	PM10	L1, T1
1A3bvii		PM10	L1, T1
3Dc		PM10	L1, T1
1A2d	Biomass	PM10	L1, T1
1A3bvi		PM10	L1, T1
1A5a	Biomass	PM10	L1, T1
1B1c		PM10	L1
1A1a	Biomass	PM10	L1
2H2		PM10	L1
2B10a		PM10	L1
1A1a	Solid	PM10	T1
1A3biii	Diesel oil	PM10	T1
2C1		PM10	T1
1A3bi	Diesel oil	PM10	T1
2H1		PM10	T1
1A4cii	Liquid	PM10	T1
1A1a	Liquid	PM10	T1
1A2f	Solid	PM10	T1

TSP

NFR Code	Fuel	Pollutant	Identification criteria
1A3bvii		TSP	L1, T1
1A4bi	Biomass	TSP	L1, T1
3Dc		TSP	L1, T1
1A5a	Biomass	TSP	L1, T1
1A2d	Biomass	TSP	L1, T1
1A3bvi		TSP	L1, T1
1A1a	Biomass	TSP	L1, T1
1B1c		TSP	L1
1A1a	Peat	TSP	L1
3B4gi		TSP	L1
1A1a	Solid	TSP	T1
2C1		TSP	T1

1A3biii	Diesel oil	TSP	T1
1A2f	Solid	TSP	T1
1A3bi	Diesel oil	TSP	T1
2H1		TSP	T1
1A2d	Liquid	TSP	T1
1A4cii	Liquid	TSP	T1
1A4ci	Peat	TSP	T1

BC

NFR Code	Fuel	Pollutant	Identification criteria
1A4bi	Biomass	BC	L1, T1
1A2gvii	Liquid	BC	L1, T1
1A3bvi		BC	L1, T1
1A3bi	Diesel oil	BC	L1, T1
1A3bii	Diesel oil	BC	L1
1A3biii	Diesel oil	BC	T1
1A4cii	Liquid	BC	T1

CO

NFR Code	Fuel	Pollutant	Identification criteria
1A4bi	Biomass	CO	L1, T1
1A4bii	Liquid	CO	L1, T1
1A3dii	Liquid	CO	L1, T1
1A3bi	Gasoline	CO	L1, T1
1A1a	Biomass	CO	L1, T1
1A2d	Biomass	CO	L1
1A4aii	Liquid	CO	T1

Pb

NFR Code	Fuel	Pollutant	Identification criteria
1A1b	Solid	Pb	L1, T1
1A2d	Biomass	Pb	L1, T1
1A1a	Peat	Pb	L1, T1
1A5a	Biomass	Pb	L1, T1
2C1		Pb	L1, T1
1A1a	Biomass	Pb	L1
1A2f	Solid	Pb	L1
1A4bi	Biomass	Pb	L1
1A3bi	Gasoline	Pb	T1
2C7c		Pb	T1

Cd

NFR Code	Fuel	Pollutant	Identification criteria
1A2d	Biomass	Cd	L1, T1
1A4bi	Biomass	Cd	L1, T1
1A1a	Biomass	Cd	L1, T1
1A5a	Biomass	Cd	L1, T1
1A1b	Solid	Cd	L1, T1
1A4ci	Biomass	Cd	L1
1A2gviii	Biomass	Cd	L1
2C7c		Cd	T1
2C6		Cd	T1

Hg

NFR Code	Fuel	Pollutant	Identification criteria
2C1		Hg	L1, T1
1A2d	Biomass	Hg	L1, T1
1A1a	Peat	Hg	L1, T1
1A1a	Biomass	Hg	L1, T1
2B10a		Hg	L1, T1
5C1bv		Hg	L1, T1
1A1a	Solid	Hg	L1, T1
1A4bi	Biomass	Hg	L1
1A2f	Solid	Hg	L1
1A2gviii	Other	Hg	T1

As

NFR Code	Fuel	Pollutant	Identification criteria
1A1a	Peat	As	L1, T1
1A1b	Solid	As	L1, T1
2C7c		As	L1, T1
1A2d	Biomass	As	L1, T1
1A4ci	Peat	As	L1, T1
1A2f	Solid	As	L1
2C1		As	L1

Cr

NFR Code	Fuel	Pollutant	Identification criteria
1A1b	Solid	Cr	L1, T1
2C1		Cr	L1, T1
1A4bi	Biomass	Cr	L1, T1
1A3bvi		Cr	L1, T1
2C2		Cr	L1
1A2f	Solid	Cr	L1

1A1a	Peat	Cr	L1
1A1a	Solid	Cr	T1
1A5a	Biomass	Cr	T1
1A2e	Solid	Cr	T1
1A1a	Biomass	Cr	T1

Cu

NFR Code	Fuel	Pollutant	Identification criteria
1A3bvi		Cu	L1, T1
1A1b	Solid	Cu	L1
2C7c		Cu	T1
1A1a	Solid	Cu	T1

Ni

NFR Code	Fuel	Pollutant	Identification criteria
1A4bi	Biomass	Ni	L1, T1
2C7b		Ni	L1, T1
1A5a	Liquid	Ni	L1, T1
1A1a	Peat	Ni	L1, T1
2C1		Ni	L1, T1
1A2f	Solid	Ni	L1, T1
1A5a	Biomass	Ni	L1, T1
1A1a	Biomass	Ni	L1, T1
1A4ci	Biomass	Ni	L1, T1
1A4ai	Liquid	Ni	L1
1A2c	Liquid	Ni	L1
1A3dii	Liquid	Ni	L1
1A2d	Biomass	Ni	L1
2C7c		Ni	T1
1A1a	Solid	Ni	T1
1A1a	Liquid	Ni	T1
1A1b	Liquid	Ni	T1

Se

NFR Code	Fuel	Pollutant	Identification criteria
1A4bi	Biomass	Se	L1, T1
1A4ci	Biomass	Se	L1
1A3bvi		Se	L1
2C7c		Se	T1

Zn

NFR Code	Fuel	Pollutant	Identification criteria
1A4bi	Biomass	Zn	L1, T1
1A3bvi		Zn	L1, T1
1A1a	Biomass	Zn	L1, T1
1A5a	Biomass	Zn	L1, T1
2C6		Zn	L1, T1
1A1b	Solid	Zn	L1
1A4ci	Biomass	Zn	L1
2C1		Zn	T1
2C7c		Zn	T1

PCDD/F

NFR Code	Fuel	Pollutant	Identification criteria
1A1a	Biomass	PCDD/F	L1, T1
1A4bi	Biomass	PCDD/F	L1, T1
5E		PCDD/F	L1, T1
1A1a	Other	PCDD/F	L1, T1
2C1		PCDD/F	L1, T1
2B10a		PCDD/F	L1, T1
1A5a	Biomass	PCDD/F	L1, T1
1A1a	Peat	PCDD/F	L1
1A2d	Biomass	PCDD/F	L1
1A3bi	Diesel oil	PCDD/F	L1
2C7a		PCDD/F	L1
1B1b		PCDD/F	T1
1A3bi	Gasoline	PCDD/F	T1

PAH-4

NFR Code	Fuel	Pollutant	Identification criteria
1A4bi	Biomass	PAH-4	L1, T1
1A1a	Other	PAH-4	T1
1A1a	Biomass	PAH-4	T1
1B1b		PAH-4	T1
2C1		PAH-4	T1
1A2gviii	Other	PAH-4	T1
1A4bi	Liquid	PAH-4	T1
1A4ai	Liquid	PAH-4	T1

HCB

NFR Code	Fuel	Pollutant	Identification criteria
2B10a		HCB	L1, T1

2C7a		HCB	L1, T1

PCBs

NFR Code	Fuel	Pollutant	Identification criteria
2C1		PCBs	L1, T1
2A1		PCBs	L1, T1
1A4bi	Biomass	PCBs	L1, T1
1B1b		PCBs	L1, T1
1A2d	Solid	PCBs	T1
1A2f	Solid	PCBs	T1
1A2a	Solid	PCBs	T1
1A2c	Solid	PCBs	T1

1.6 QA/QC, verification and treatment of confidentiality issues

Changes in chapter	
May 2018	KS, JM

1.6.1 Quality system

A quality management system is used to support the preparation of the air pollutant emissions inventory. QA/QC procedures have been implemented in the inventory work since the inventory of the year 2003 emissions carried out in 2005 they follow the principles carried out in the Finnish greenhouse gas emission inventory http://tilastokeskus.fi/tup/khkinv/khkaasut_laadunhallinta_en.html.

Due to the pending recalculation of energy sector emissions, there are currently constrains in following the QA/QC practices in many quality checks, e.g. where data for the previous years would need to be corrected due to the fact that it is impossible to track the data where the desired corrections should be made. After the finalization of the recalculation of energy sector emissions, these corrections will be carried out.

1.6.2 Quality plan and QA/QC procedures

Quality plan

The QA/QC plan covers quality objectives and the planned general quality control and quality assurance procedures regarding all sectors. The checklist in Table 1.7 specifies the actions, schedules and responsibilities in order to attain the quality objectives and to provide confidence in the preparation of high-quality inventories.

The QC procedures comply with those set in the EMEP/EEA Emission Inventory Guidebook 2009. General inventory QC procedures include routine checks of the integrity, correctness and completeness of the data, identification of errors and deficiencies, documentation and archiving of the inventory data as well as quality control actions.

*Table 1.7 Quality objectives (* means restricted applications due to availability of resources)*

Inventory principle	Quality objectives
1.Continuous improvement	1.1. Treatment of review feedback is systematic 1.2. Improvements are indicated in Informative Inventory Report and carried out* 1.3. Improvement of the inventory is systematic * 1.4. Inventory quality control procedures meet the requirements * 1.5. Inventory quality assurance is appropriate and sufficient*
2. Transparency	2.1. Archiving of the inventory is systematic and complete 2.2. Internal documentation of calculations supports emission and removal estimates 2.3. NFR tables and Informative Inventory Report include transparent and appropriate descriptions of emission estimates and of their preparation
3. Consistency	3.1. The time series are consistent * 3.2. Data have been used in a consistent manner in the inventory *
4. Comparability	4.1. The methodologies and formats used in the inventory meet comparability requirements
5. Completeness	5.1. The inventory covers all emission sources, pollutants and geographic areas
6. Accuracy	6.1. Estimates are systematically neither higher nor lower than the true emissions or removals 6.2. Calculations are performed correctly 6.3. Inventory uncertainties are estimated
7. Timeliness	7.1. Inventory reports submitted within the set time

Applied QA/QC procedures

Internal review

Normal statistical quality checks and comparisons to the previous years' data are implemented in the preparation of the inventory.

For the energy and industrial processes sectors compliance data reported by the plants have been used where applicable. The quality checks performed to the compliance data are explained in Chapter 2.4. The corrections made to the year 2014 compliance data are documented in Annex 4 of Part 2 of the IIR.

Category-specific QC checks including technical reviews of the source categories, activity data, emission factors and methods are applied on a case-by-case basis focusing on key categories and on categories where significant methodological and data revisions have taken place.

QA reviews performed after the implementation of QC procedures concerning the finalised inventory comprise comparisons and checks to assess procedures already taken and to identify areas where improvements could be made. Specific QA actions include basic reviews of the draft report, data verification with other available datasets and information sources. The data and documentation are cross-checked by several experts not involved in the area where they do the checks.

QA/QC tools

In 2017-2018 a series of tools was developed to manage the data in the IPTJ and to compile, analyse and correct the NFR output data. The tools were applied in the recalculation of the time series 1990-2016 reported on 13th April 2018.

The tools consist of a variation of solutions, techniques and manual routines to manage the content of over two million rows or air emission data. The tools connect directly to the IPTJ and allow the latest information to be always available in a comprehensive format. The embedded check-ups find inconsistent notation keys, strongly deviating values, gaps in emission data and trend progression analysis (remark on sudden decrease or increase) and general value validity. Also notation key management tools are included.

The tools enable comparisons between datasets by highlighting emission rates that increase or decrease over a selected tolerance. It also highlights cells to which IPTJ contains updated values. In such cases, the changes can be exported to the NFR reporting sheet instantaneously for the selected year, range of years or all years. This enables agile and adjustable control over the whole time series.

The time series for national totals or individual NFR-categories can be evaluated with an index value that is constructed by analysing the standard deviation of the series and the count of points of discontinuity. The indexing helps in directing focus into the most relevant subjects. All values are also visually enhanced to create a visual overview of series consistency. A more detailed description of the tools is presented in Annex 6.

Inter-comparisons

Close cooperation is carried out with the Finnish Greenhouse Gas Inventory Unit at Statistics Finland, to maintain comparability and to discuss improvements and their impacts on both air pollutant and greenhouse gas inventories. Annual inventories are compared and possible differences discussed and corrective actions made in both inventories where relevant.

External review

CLRTAP S1 and S2 review results by the review conducted by the CEIP are used to identify deficiencies and errors in the data. Due to resource constraints, this part will be re-introduced to the quality checks only when the time series has been recalculated

CLRTAP 2009 and 2018 S3 review results as well as NECD Technical Reviews' results 2017 and 2018 have been addressed in Chapter Recalculations

1.6.3 Implementation of the QA/QC plan in the preparation of the data

The leading principle has been that certain source categories or certain types of quality measures to solve systematic errors are taken under work during one inventory year.

Implementation of quality control and assurance measures has seriously been restricted the last years due to the lack of time between the finalization of the inventory and the reporting date, which should preferably cover one month or at the minimum two weeks, instead of the current few days.

QA/QC measures are carried out separately for each of the boxes illustrated in Figure 1.14 as follows:

1. dark blue boxes cover calculation in MSExcel sheets where data checking and comparison is mostly visual but rather straight forward, and the data used comes from statistics, industrial organizations or research
2. light blue boxes cover database tables within the IPTJ data system with inbuilt check operations; these data are also compared, where possible, against environmental reports by plants and E-PRTR data, both of which are also used in the inventory, as well as statistics and expert institutes
3. light red boxes include data, which is cross-checked between Statistics Finland data sets for fuels and emissions at CRF classification level, as well as comparisons to EU ETS data, which is also used in the inventory
4. the final results are manually compiled for 1980-19889 into the NFR table; for 1990-2016 the IPTJ QA/QC tool is use both to compile the NFR tables and to check the data.
5. Manual comparison against CRF data is carried out before the reporting, Deviations larger than 5% are explained in the IIR Chapter x.

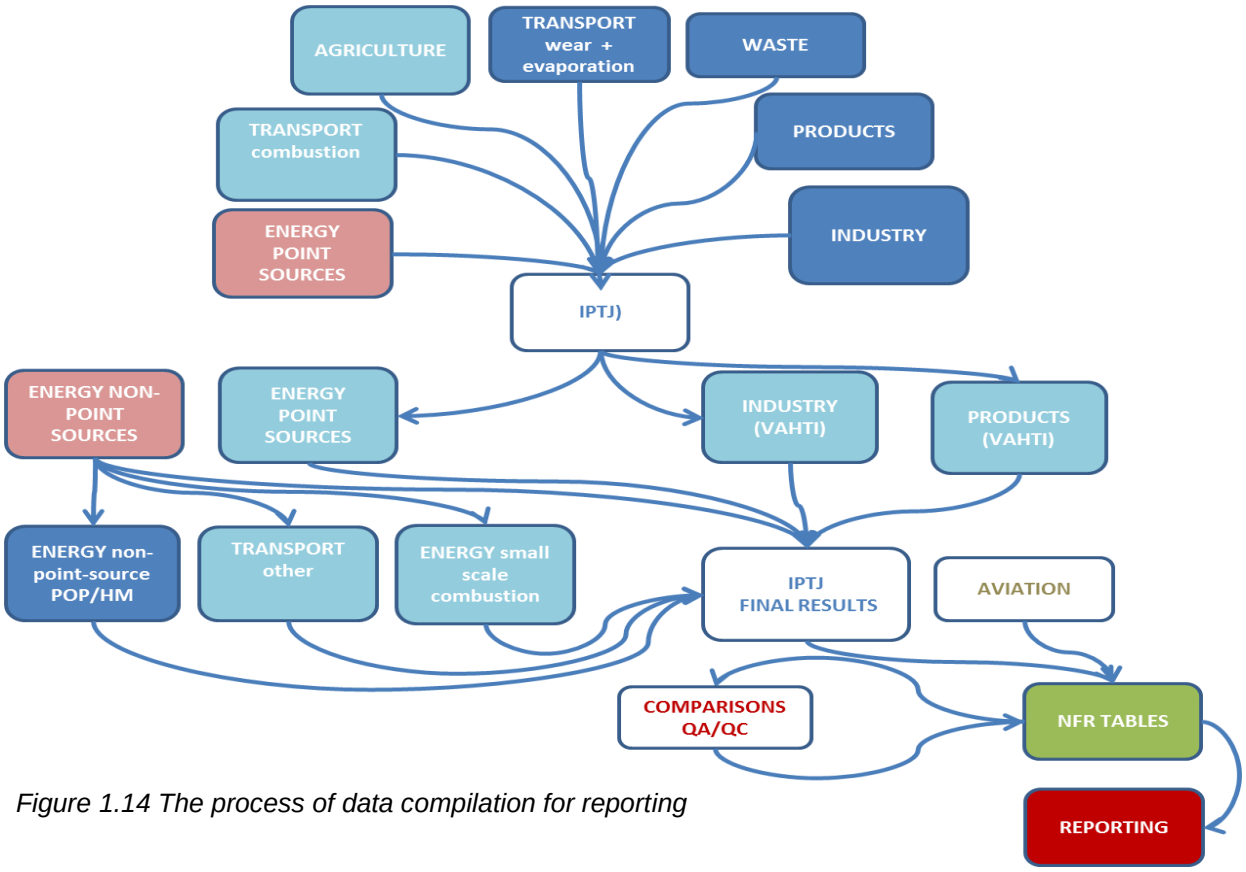


Figure 1.14 The process of data compilation for reporting

1.6.4 Documentation

Documentation of the calculation methods is updated whenever there are changes in the methods or new sources are included in the inventory. The documentation is carried out in the working guidelines available for each source sector (in Finnish). Notes and explanations for deviating values are recorded in the calculation sheets.

A summary of improvements made in the inventory submitted in February 2019 is presented in Chapter 14.

1.6.5 Archiving of the inventory

The annually reported NFR tables, calculation sheets and documentation of the methods together with the records of the original data are archived at the Finnish Environment Institute. The original data sets and calculation results are stored in databases on a SQL server.

1.6.6 Verification

The inter-comparison explained in Chapter 1.4 is carried out annually. The inventory has not yet been verified by a third party.

1.6.7 Treatment of confidential issues

When confidential information is used for the preparation of the inventory, this data is handled and stored in a way that ensures the confidentiality to remain. When confidential data is included in the reported emissions, the emissions are aggregated so that disclosure of confidential information is not possible.

1.7 Uncertainties

Changes in chapter	
March 2021	TF

1.7.1 Methodology

The uncertainty analysis for emission data is carried out following the Approach 1 methodology presented in the EMEP/EEA emission inventory guidebook 2019. The Approach 1 comprise estimation of uncertainties using the error propagation equations, and simple combination of uncertainties by source category to estimate overall uncertainty for one year and the uncertainty in the trend. The uncertainties of the input parameters (activity data and emission factors) are estimated by experts compiling the inventories and those of the measured emissions by the competent authorities that supervise emission monitoring carried out at the individual plants. In the case of emissions reported by the plants, the total uncertainty of the reported emission is determined instead of separate uncertainties for AD and EF. The fuel use uncertainties are the same that Statistics Finland uses in the UC analysis for the Finnish greenhouse gas inventory. The emissions of some pollutants from certain sources are poorly understood, for instance some POP compounds from fuel combustion and industrial processes, and therefore estimation of their uncertainty is found to be very challenging at the moment. The uncertainty analysis will be further developed to the next submission by re-evaluating the input parameters.

The uncertainty analysis covers all emission sources included in the inventory and represents thus the uncertainty of the reported emission data. The possible lack of completeness of emission sources is, however, not reflected in the uncertainty analysis. Information of the completeness of the inventory is presented in Chapter 2.8.

The uncertainty analysis is carried out at the country-level, i.e. uncertainties in emissions by region are not assessed.

The complete results of the uncertainty analysis are presented in Annex 7. The uncertainty for the total emissions together with the uncertainty for the trend for all pollutants are presented in Table 1.8. The year 1990 has been used as a base year for all pollutants in the uncertainty analysis.

Table 1.8. Summary of uncertainties in total inventory by pollutant in 2020 and trend uncertainties 1990-2020.

Pollutant	Uncertainty in total inventory 2020 (%)	Uncertainty introduced into the trend 1990-2020 (%)	Pollutant	Uncertainty in total inventory 2020 (%)	Uncertainty introduced into the trend 1990-2020 (%)
NO_x	13.3	6.5	Hg	43.1	30.2
NMVOC	39.9	20.2	As	29.5	2.4
SO_x	8.5	1.2	Cr	27.1	11.2
NH_3	67.8	82.5	Cu	77.9	26.4
$PM_{2.5}$	45.0	20.4	Ni	18.9	3.3
PM_{10}	43.8	23.5	Zn	31.4	7.6
TSP	30.2	17.1	PCDD/F	269.8	202.5
BC	56.7	25.2	PAH-4	184.1	257.7
CO	33.6	19.7	HCB	317.9	266.6
Pb	30.5	1.6	PCB	278.5	278.2
Cd	33.0	4.9			

1.8 General assessment of completeness

Changes in chapter	
March 2022	JMP, ks

The completeness by emission sources and the geographical and timely coverage of the inventory is explained in this chapter.

The annual submissions of LPS data are presented in Chapter 11 and of projected emissions in Chapter 13.

The figures in the NFR tables are given with an accuracy of three decimals from the inventory calculations.

1.8.1 Completeness by emission sources

The inventory is almost complete regarding the emission sources and substances and it can be estimated that the total emission levels are representative to the actual emissions. However, there are still a few cases where either the lack of methodology or activity data has prevented quantifying the emissions, for instance, in the product use sector.

Sources that are reported as not estimated (NE) are listed in Table 1.9

Table 1.9 Explanation of the use of the Notation key NE in NFR Tables submitted in 2022.

NFR14	Substance	Reason for not estimated
1A1a 1A1b 1A2a-f 1A2gviii 1B1b 2C1 2C2 2G	Se	A comprehensive inventory of all sources of Se is not yet available, however, bottom-up data reported by the plants is included in the inventory

Allocation of emissions reported as included elsewhere (IE) is provided in Table 1.10 and explanation of sources reported under categories Other in Table 1.11.

Table 1.10 Explanation of the use of the Notation key IE in NFR tables submitted in 2022.

NFR14	Substance	Included in
1A2a-f, gviii	NOx, SOx 1980-1989*	1A1a
1A1c	NOx, NMVOC, Sox, PCDD/PCDF, HCB	IE depending on the year reported (use of NA/IE will be checked when the recalculation is finalized)
1A2f	NH3	USE of notation keys and allocation will be checked when the
1A3ei	NOx, SOx 1980-1989*	1A1a
1A4ai, bi, ci	NOx, SOx 1980-1989*	1A1a
1A5a	NOx, SOx 1980-1989*	1A1a
1B1a	Particles	2A5c
1B1b	NOx, CO	1A2a
1B2ai	NMVOC 1990-2019	1A3ei

1B2aiv	NOx, SOx, NH3, BC, CO, heavy metals, PCDD/PCDF	See IIR Part2Energy on page 27
1B2c	NOx, NMVOC, SOx, particles, heavy metals	1A1a
2A1	NOx, SOx, PM2.5, PM10, TSP, BC	1A2f
2A2	SOx	1A2f/1A2gviii
2A3	NOx	1A2f
2C1	NOx	1A2a, 1A2b or 1A2gviii
2C2	NMVOC 1990-2002, SOx 1990-2012	1A2a
2C3	NMVOC 1992-1996, 1998, 2001-2002, 2014-2019	1A2b or 1A2gviii
2C6	Hg 1990-1994, Cu 1990-2001, Ni 1990-1991	1A2b or 1A2c
2C6	PM2.5, PM10, TSP 2016-2017, 2019	1A2b
2C7a	NMVOC 1990-1995	1A2b
2C7b	PM2.5, PM10, TSP	1A2a
2D3f	NMVOC	2D3e
5C1bii	all	1A1a or 1A2gviii
5C1biii	NOx, NMVOC, SOx, NH3, particles, CO, Cr, Ni	1A1a or 1A2gviii
5C1biv	NOx, NMVOC, SOx, CO	1A1a or 1A2gviii

*will be verified to the next submissions

Table 1.11 Sub-categories reported under "Other" in the 2022 submission (updated every 5 yrs).

NFR14	Substance	SNAP	Sub-source description
1 A 2 g viii	all	030101 030102 030103a 030103b	Combustion plants in - manufacturing of fishing equipment - dry cleaners - rock wool manufacturing - concrete production - limestone production - car production - testing of engines - shipyards - quarrying and crushing - manufacturing of textiles - reparation of railway vehicles - starch modification - pellet production - manufacturing of zip production machines - light gravel manufacturing - manufacturing of gypsium products - manufacturing of tiles - glass production - talc manufacturing
1 A 2 g viii	all	030105	Stationary engines in crushing
1 A 2 g viii	all	030204	Gas turbines in manufacturing of gypsium products
1 A 2 gviii	all	030205	Other furnaces, crushing
		030326	Other, boiler plants in food industry, mines tc
2C1		040210	Other metal production, -foundries
2C7c		040306 040307	allied metal manufacturing galvanizing
2C7c		040309z	smelteries, surface treatment plants
2C7d		040211	ferrous metals storage and handling
2 B10 a	all	040401	Sulfuric acid
2 B 10 a	all	040406	Ammonium phosphate
2 B 10 a	all	040407	NPK fertilisers
2 B 10 a	all	040413	Chlorine production
2 B 10 a	all	040414	Phosphate fertilizers
2 B 10 a	all	040416	Calcium Carbonate manufacturing
2 B 10 a	all	040416	Silicon wafer manufacturing

NFR14	Substance	SNAP	Sub-source description
2 B 10 a	all	040416	Production of oxygen, nitrogen and hydrogen
2 B 10 a	all	040416	Al- and Fe-chemicals manufacturing
2 B 10 a	all	040416	Manufacturing of ion exchange and chromatographic resins and special polymers
2 B 10 a	all	040416	Pigments manufacturing
2 B 10 a	all	040416	Manufacturing of explosives
2 B 10 a	all	040416	Fertilizer manufacturing
2 B 10 a	all	040416	Manufacturing of cobolt based special chemicals
2 B 10 a	all	040416	Hydrogen peroxide plant
2 B 10 a	all	040416	Manufacturing of natrium silicate
2 B 10 a	all	040416	Potassium sulphate manufacturing
2 B 10 a	all	040416	Formic acid and hydrogen peroxide manufacturing
2 B 10 a	all	040416	Manufacturing of viscose staple fibres and by-products
2 B 10 a	all	040501	Ethylene
2 B 10 a	all	040506	Polyethylene Low Density
2 B 10 a	all	040507	Polyethylene High Density
2 B 10 a	all	040509	Polypropylene
2 B 10 a	all	040511	Polystyrene
2 B 10 a	all	040512	Styrene butadiene
2 B 10 a	all	040513	Styrene-butadiene latex
2 B 10 a	all	040527	Enzyme production
2 B 10 a	all	040527	Manufacturing of techno-chemical products
2 B 10 a	all	040527	Manufacturing of benzene, cumene and phenols
2 B 10 a	all	040527	Drag reducing additive production
2 B 10 a	all	040527	Manufacturing of prganic base chemicals
2 B 10 a	all	040527	Manufacturing of tall oil
2 B 10 a	all	040527	Manufacturing of organic fine chemicals
2 B 10 a	all	040527	Manufacturing of pharmaceuticals
2 B 10 a	all	040527	Manufacturing of titanium dioxide pigments
2 B 10 a	all	040527	Manufacturing of lignosulphonate products
2 B 10 a	all	040527	Cleaning of solvents and manufacturing of solvent mixtures
2 B 10 a	all	040527	Manufacturing of biocides and other 56gricultural chemicals
2 B 10 a	all	040527	Manufacturing of carboxymethylcellulose
2 A 6		040618	Limestone and Dolomite use
2 B 10 b	all	040522	Storage and handling of organic products
2 B 10 b	all	040415	Storage and handling of inorganic chemical products
2 L	all	040617	Light gravel manufacturing
2 L	all	040617	Talc manufacturing
2 L	all	040617	Ceramic household and decorative products manufacturing
2 L	all	040617	Tile manufacturing
2 L	all	040617	Gypsium product manufacturing
2 L	all	040617	Quarrying and crushing
2 L	all	040617	Manufacturing of electricity distribution and monitoring devices
2 L	all	040617	Starch modification
3 B 4 h	all	100510	Fur animals and reindeer
3 B 4 g iv	all	100509z	other poultry
5 E	all	091101	Unintentional house fires
5 E	all	091102	Unintentional car fires
5 E	all	091103	Unintentional landfill fires
5 E	all	091007	Latrines

1.8.2 Completeness by geographical coverage

The inventory includes emissions from the autonomic territory of Åland (Ahvenanmaa). Information on national emissions allocated for the territory of Åland is underway and will be available later at the website *http://www.environment.fi > Maps and statistics Air pollutant emissions in Finland >.*

The gridded emissions data over the national territory are illustrated by maps for each substance in Chapter 3.2.

As a result from the project to prepare geographical presentation of emission data in 1 km *1 km resolution, Finland reported in May 2015 gridded data in the new 0.1^{O} * 0.1^{O} EMEP grid. The new EMEP grid equals approximately 7 km * 7 km resolution in Finland. The submissions of gridded data (Table 1.12) are available in the EIONET CDR.

Table 1.12 Finnish submissions of gridded data.

Pollutants	For the year	Comments
SO_X	1999 - 2020	Gridded data for earlier years has been submitted year by year by their due dates. Updated gridded data will be sent when recalculation of time-series is finalized *excluded from NFR tables since the 2009 submission ** inventory not complete, Se not one of the obligatory heavy metals
NO_X	1999 - 2020	
NH_3	1999 - 2020	
CO	1999 - 2020	
NMVOC	1999 - 2020	
PCDD/F	1999 - 2020	
PAH-4	1999 - 2020	
HCB	1999 - 2020	
PCB	1999 - 2020	
PCP	1999 – 2007*	
SCCP	-*	
TSP	1999 - 2020	
PM10	1999 - 2020	
PM2.5	1999 - 2020	
As	1999 - 2020	
BC	2018-2020	
Cd	1999 - 2020	
Cr	1999 - 2020	
Cu	1999 - 2020	
Hg	1999 - 2020	
Pb	1999 - 2020	
Ni	1999 - 2020	
Se	-**	
Zn	1999 - 2020	

1.8.3. Completeness by coverage of years

The annual inventory submissions under the UNECE CLRTAP include emission estimates since 1980 as presented in Tables 1.9 and 1.10.

Complete emission data sets for all substances have been reported for the years 1980-2019 with the following exceptions:

SO_x, NO_x, NH_3 and CO: Emission data has been reported for the years 1980-2019 and is complete in the details for the years 1990-2019.

Heavy metals: Emission data has been reported for the years 19980/1990 –-2019. The reporting requirement starts from the year 1990, the data is complete in details since 1990.

NMVOC: Emission data has been reported for the years 1988 –-2019. The reporting requirement starts from the base year of NMVOCs for Finland 1988.

Particles: Emission data has been reported for the years 1990 –-2016. The reporting requirement for particles starts from the year 2000.

Table 1.13 and 1.14 present Finland's official submissions of emissions and projections data.

Table 1.13 Finnish official submissions of emission data – the years indicate the year of emissions (not the submission).

Pollutants	Data per sector	National Totals	Comments
SO_X	1990-2020	1980-2020	National totals available for only those pollutants and Tiers for which reporting requirements existed
NO_X	1990-2020	1980-2020	
NH_3	1990-2020	1980-2020	The reporting requirement starts from 1990
CO	1990-2020	1980-2020	
NMVOCs	1990-2020	1980-2020	The reporting requirement starts from the base year for Finland 1988
PCDD/F	1990-2020	1980-2020	The reporting requirement starts from 1990
PAH-4 and indicator substances	1990-2020	1980-2020	The reporting requirement starts from 1990
HCB	1990-2020	1980-2020	The reporting requirement starts from 1990
PCB	1990-2020	1980-2020	The reporting requirement starts from 1990
PCP	1990-2007	1980-2020	Available separately and in the old submissions
SCCP	1990-2007	1980-2020	Available separately and in the old submissions
As	1990-2020	1980-2020	The reporting requirement starts from 1990
Cd			
Cr			
Cu			
Hg			
Ni			
Pb			
Zn			
Se	1990-2020	(inventory is not complete)	

Table 1.14 Finnish projected data (submitted annually).

Pollutants	Per sector for years	National totals for years	Based on
SO_X	2020, 2025, 2030	2020, 2025, 2030	WM
NO_X	2020, 2025, 2030	2020, 2025, 2030	WM
NH_3	2020, 2025, 2030, 2050	2020, 2025, 2030, 2050	WM
NMVOCs	2020, 2025, 2030	2020, 2025, 2030	WM
PM2.5	2020, 2025, 2030	2020, 2025, 2030	WM
PM10	2020, 2025, 2030	2020, 2025, 2030	WM

1.8.4 Completeness of information reported

In addition to emissions and projections data presented in Chapter 2.13.4. Finland reports gridded data as presented in Table 1.15 and data for large point sources (LPSs) as presented in Table 1.16.

Table 1.15 Finnish submissions of gridded data – the years indicate the year of emissions (not the submission.

LPS data submissions	Format
1999-2015, 2018-2022	EMEP Grid 50 km * 50 km
2012-2014, 2016, 2017-2022 (not in 2015-2018 submissions due to resource restrictions)	EMEP Grid 0.1 ° * 0.1 °

Table 1.16 Finnish submissions of LPS data - the years indicate the year of emissions (not the submission.

Main Pollutants	LPS data submitted
SO_X	1999 – 2015, 2018-2020
NO_X	1999 – 2015, 2018-2020
NH_3	1999 – 2015, 2018-2020
CO	1999 – 2015, 2018-2020
NMVOCs	1999 – 2015, 2018-2020
PCDD/F	1999 – 2015, 2018-2020
PAHs	1999 – 2015, 2018-2020
HCB	1999 – 2015, 2018-2020
PCBs	1999 – 2015, 2018-2020
HCH	1999 – 2015, 2018-2020
Cd	1999 – 2015, 2018-2020
Pb	1999 – 2015, 2018-2020
Hg	1999 – 2015, 2018-2020
Additional heavy metals	1999 – 2015, 2018-2020
TSP, PM_{10}, $PM_{2.5}$	1999 – 2015, 2018-2020

1.8.5 Use of Notation Keys

Changes in chapter	
March 2022	ks, jmp

The application of notation keys is reported on Reporting Table IV extension sheet. Notation keys are used and understood in the Finnish inventory as follows:

IE — Included elsewhere – Emissions for this source are estimated and included in the inventory but not presented separately for this source (the source where included is indicated in 0).

In the Finnish inventory IE is used when it is not possible to give disaggregated values.

NA — Not applicable – The source exists but relevant emissions are considered never to occur.

In certain cases, mainly in the Energy and Industrial Processes sectors, ***instead of using NA, the actual emissions*** are presented for categories where both the sources and their emissions are well-known due to availability of bottom-up data. When pointing the value "0.000" with the cursor, the actual emissions can be seen. The value "0.000" is shown in the NFR table due to the rounding of data to three significant decimals. Summing up of these below 0.000 values often results in emissions of > 1 reporting unit and would thus cause inaccuracies in the sums as well as when compared to e.g. gridded or LPS data.

NE — Not estimated – Emissions occur but have not been estimated or reported.

In the Finnish inventory NE is used when the source exists and it can be assumed that emissions occur, but the emissions have not been estimated.

NO — Not occurring – A source or process does not exist within the country.

The source does not exist in Finland

C Confidential information – Emissions are aggregated and included elsewhere in the inventory because reporting at a disaggregated level could lead to the disclosure of confidential information.

NR Not relevant - According to paragraph 9 in the Emission Reporting Guidelines, emission inventory reporting should cover all years from 1980 onwards if data are available. However, "NR" (not relevant) is introduced to ease the reporting where emissions are not strictly required by the different protocols, e.g. for some Parties emissions of NMVOCs prior to 1988.

NR is not in use in the Finnish inventory report.

1.8.6 Basis for estimating emissions from mobile sources

The basis for estimating emissions from mobile sources is presented in Table 1.17 Fuel statistics for mobile sources is providing in the NRF reporting tables.

Table 1.17 Basis for estimating emissions from mobile sources.

NFR09	**Description**	**Fuel sold**	**Fuel used**
1 A 3 a i (i)	International aviation (LTO)	*x*	
1 A 3 a i (ii)	International aviation (Cruise)	*x*	
1 A 3 a ii (i)	1 A 3 a ii Civil aviation (Domestic, LTO)	x	
1 A 3 a ii (ii)	1 A 3 a ii Civil Aviation (Domestic, Cruise)	x	
1A3b	Road transport	x	
1A3c	Railways	*x*	
1A3di (i)	International maritime navigation	*x*	
1A3di (ii)	International inland waterways	*x*	
1A3dii	National navigation	*x*	
1A4ci	Agriculture	x	
1A4cii	Off-road vehicles and other machinery	x	
1A4ciii	National fishing	x	
1 A 5 b	Other mobile (Including military)	*x*	

2 KEY EMISSION TRENDS

Changes in chapter
February 2021 ks

2.1 Description and interpretation of emission trends for air pollutants emissions

2.1.1 Overview of factors having impact on the emission trends

Fluctuations in the economic and climatic conditions are reflected in the different emission source sectors. For instance, changes in electricity imports and production of fossil fuel based condensing power cause annual variation in the energy sector emissions and emissions from industrial processes are influenced each by the economic situation. The main industrial sectors in Finland are energy intensive. In addition, weather conditions and the volumes of energy produced with renewable energy sources vary annually.

Information by individual air pollutants is provided under Chapter 3.2 and by emission sources under Chapter 3.

2.1.2 Air pollutant emission time-series

The air pollutant emission inventory includes estimates of the so-called main pollutants, i.e. sulphur dioxide, nitrogen oxides, carbon monoxide and ammonia since year 1980 and non-methane volatile organic compounds (NMVOC) since 1988.

Heavy metal emissions have been estimated since 1990 for lead, cadmium, mercury, arsenic, chromium, copper, nickel, vanadium and zinc. There is not yet a comprehensive emission inventory covering all sources of selene. Vanadium is not included in the international reporting obligations, but an annual inventory is prepared for domestic purposes. Information on cobolt emissions from point sources is collected annually but a comprehensive inventory has not been established.

Persistent organic pollutants (POPs) are estimated since 1990 and include PCDD/F, PAH-4, HCB, HCH, PCB. In addition, PCP and SCCP which no more are included in the reporting obligations are covered by annual inventories for domestic purposes. In addition, studies were carried out in 1990-2006 on emissions of the following POP compounds: HBCD, HBCDD, HCBD, DeBDE, OBDE, PeBDE PeCB, PCN, PFAS/PFOS.

Particulate matter emissions have been estimated since year 2000 for total particles and particle sizes smaller than 10 μm and 2.5 μm as well as for black carbon (BC).

The time series has not yet been completely recalculated for any substances. Recalculations are already finished for several subcategories, but the completion of the work is waiting for the energy sector recalculations to be finalized.

Air pollutant emission trends by pollutant are discussed in Chapter 3.1.5 and illustrated in Figures 1.16 and 1.17. Although the time series have not fully been recalculated[16], it is obvious that the emission levels are generally decreasing. The annual variations mainly depend on economic trends for the energy intensive sectors, the production level of hydropower, the level of imported electricity and the availability of alternative non-carbon energy sources. In Finland, the level of imported electricity is highly affected by the annual rainfall situation in the neighboring countries, Sweden and Norway, which have significant hydropower capacities.

Future emissions of air pollutants have been estimated by using national integrated models and scenarios as explained in detail in Chapter 12.

2.1.3 Meeting of reduction targets

Changes in chapter
March 2022 ks

2010 Ceilings

According to the National Air Pollution Control Programme 2010 (Ministry of the Environment, 2002) the reduction targets adopted in the EU Directive on national emission ceilings as well as in the Gothenburg Protocol were anticipated to be met by 2010 by applying already adopted national and international measures to reduce emissions from both stationary and mobile sources. However, when approaching the year 2010 it become clear that the national emission ceiling for ammonia (31 kt in 2010) would not be met as explained in Chapter 3.1.4.

To meet the best science practise inventories and to show more compliance towards the reduction targets of ammonia emissions, Finland applied for adjustments for (1) manure management, (2) small scale combustion and (3) transport sector emissions. The adjustment application is presented as Appendix 3 to the Finnish IIR 2015.

The Adjustments Expert Review Team in 2015 accepted two of the applied adjustments (small scale combustion and transport) but rejected the application for manure management. Finland disagrees with the conclusions of the ERT and continues to discuss the reasons for the current level of ammonia emissions from manure management. The ERT Review Report is presented in Appendix 3D of the IIR.

Finland changed the calculation in the national agriculture emissions calculation model in 2015-2016 closer to follow the method presented in the Guidebook. As a result from that, ammonia emissions decreased to a level which enabled Finland to meet the 2010 ceiling with the help of the granted adjustments already in 2015.

2020 ceilings

The 2020 reduction targets were expected to be achieved without additional measures (Suoheimo et al. 2015) with the exception of NH_3 for which the adjustments procedure was used for the years 2010-2019. In the submission 15.2.2022 ammonia emissions in 2020 are now below the 2020 ceiling.

The reduction target for sulphur oxides' emissions was possible to be reached in all the different scenarios. In the submission 15.2.2022 sulphur oxides' emissions in 2020 are well below the 2020 ceiling.

[16] Recalculations have been carried out for several subcategories in the latest years but the complete recalculation and reporting of the full the time-series is waiting for the finalization of the energy sector emission recalculations.

The reduction target for nitrogen oxides was achieved in all scenarios. NO_x emissions are generated in all combustion processes, which means that changes in the use of different fuels partly compensate each other while the use of solid fuels and a decrease of plant size increase the average emissions. The renewal rate of the car fleet also contributes to the NO_x target. In the submission 15.2.2022 NOx emissions in 2020 are well below the 2020 ceiling.

The achievement of the target set for fine particulate matter has been dependent on the development of peat use and residential wood combustion, also, combustion and traffic are the central activities releasing fine particles to air and consequently causing harmful human health effects in Finland. In the air pollution control programme the emission reduction measures were to be focused on these sectors.

Further information on the preparation of national emission projections is presented in Chapter 9.

2.1.4 Progress in meeting the reduction targets set in the CLRTAP Protocols, especially in the Gothenburg Protocol

Follow up of meeting the reduction targets set in Gothenburg Protocol and the respective emission levels in 2010 are presented in Table 1.15. Note that for some pollutants progress in decreasing emissions is not straightforward due to the pending recalculation of time series as the years are not calculated with consistent methodologies. However, the only pollutant, where Finland currently does not comply with the reduction targets is ammonia, and the time series of ammonia emissions has been recalculated as for this pollutant there is no interdependency in emissions from the energy sector, where the pending recalculation creates challenges for the other pollutants.

Sulphur dioxide
The reduction target of 80 per cent for sulphur dioxide from the 1980 level (584 kt), as well as the Gothenburg emission ceiling of 116 kt, were achieved already in 1995, when the emissions were 105 kt.

Nitrogen oxides
The Sophia Protocol target was to reduce nitrogen oxides below the 1987 level, when the Finnish NO_x emissions were 300 kt including emissions from agriculture. Without NO_x emissions from agriculture the emissions in 1987 were 287 kt. The emission ceiling in the old Gothenburg protocol of 170 kt and has been met in 2009 and since 2011.

Non-methane volatile organic compounds
For NMVOC emissions the reduction target is 30 per cent from the year 1988 emissions (240 kt), without agricultural emissions (219 kt), to 1999 (was achieved in 2002 when the emissions were 150 kt (agriculture excluded) kt. The emission ceiling in the old Gothenburg protocol was 130 kt, which was met since 2006. The emission ceiling in the revised Gothenburg protocol is 96 kt (-48% of 2005 emissions), which has been met since 2009/2010.

Ammonia
Ammonia emissions have been reduced since 1990 but not as rapidly as expected. Finland carried out a profound recalculation of the agriculture sector emissions in 2015-2016 to more closely follow the international methods provided in the EMEP/EEA Guidebook. Between 2010-2019 Finland complied with the Gothenburg ceiling of 31 kt with the adjustment procedure (for details see Finland's IIR 2021).
Ammonia emissions in 2020 were 30.661 kt, which is below the 2020 national emission ceiling of -20% of the base year 2005 emissions (38.940 kt), i.e. the ceiling of 31 kt,

Heavy metals
Reduction targets set for the three priority heavy metals lead, cadmium and mercury, to reduce the emissions below 1990 level have all been achieved since 1991.

POP emissions

PCDD/F
The PCDD/F reduction target to decrease the emission level below the 1994 level has been met since 1995.

PAH-4
The PAH-4 reduction target to decrease the emission level below the 1994 level (20 t) has been met in 2020 in addition to 1995, 1997 and 2000. During the time of setting the reduction target, PAH-4 emissions were calculated with a different method than currently and the increase of wood use in combustion was not foreseen at that time: small-scale wood combustion is the main source of PAH emissions. In 2020 a research project was carried out to verify the national methodology, to check the results of data collection to the national wood use statistics and to verify the development of combustion technologies. The project resulted in a considerable increase in the emission level throughout the timeseries as explained in detail under the Energy Sector.

The foreseen decrease in PAH emissions due to the verified technology development as well as and a milder 2020 winter resulted in reaching the target of 20 kilotonnes in 2020 (Figure 1.16a). The related projection made in 2019 is presented in Figure 1.16b.

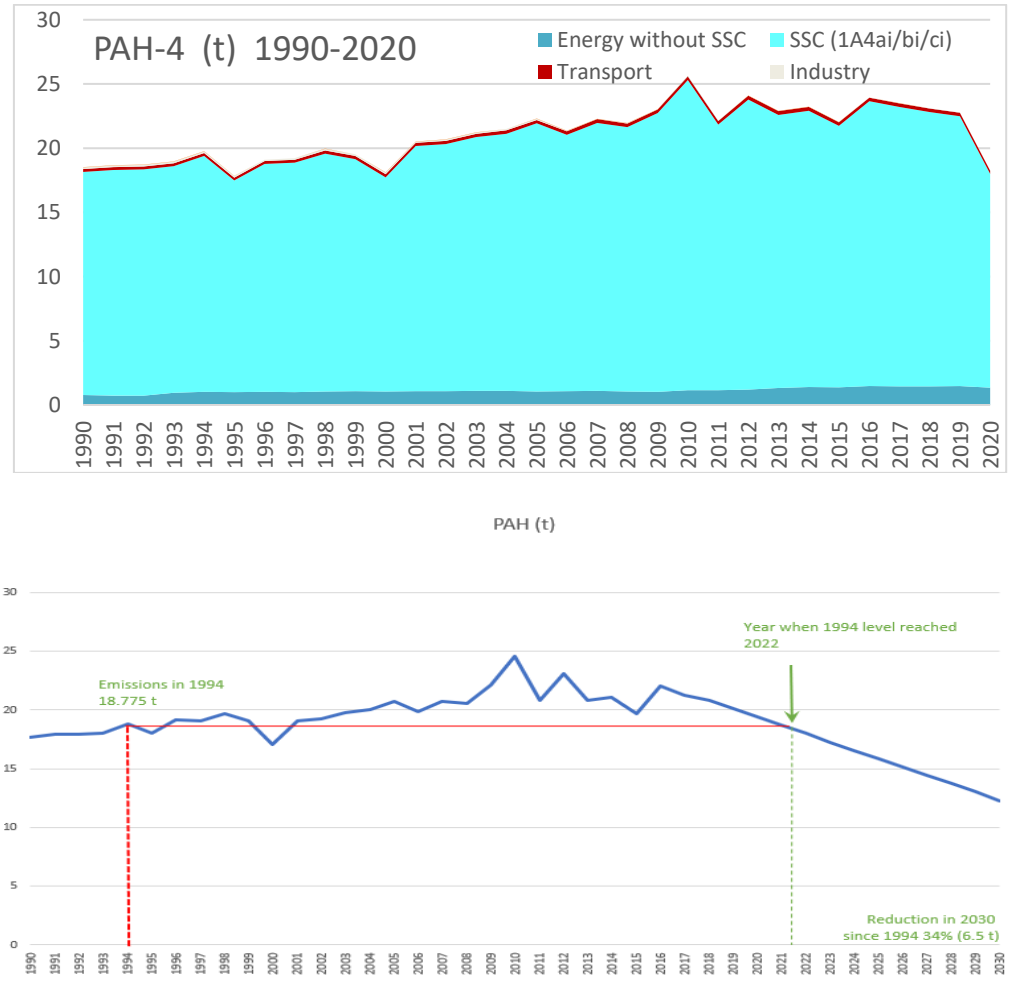


Figure 1.16a/b. PAH-4 emissions scenario up to 2030. SSC stands for small scale wood combustion.

HCB
The target to reduce HCB emissions below the level in 1994 (36 kt) has been met in 1996, in 2001-2006, 2008-2015 and since 2017.

PCBs
The target to reduce emissions of PCBs below the level in 1994 (28 kt) has been met in 1996 and since 2008.

2.1.5 4 Progress in meeting the reduction targets set in the National emission ceilings Directive (2016) for 2020 (EU NECD)

Finland is currently meeting all its emission ceilings as presented in Table 1.18. Annual variations in the emission levels occur depending on economic and climatic conditions.

Sulphur dioxide
SO_x emission ceiling of the old NECD directive of 110 kt for the year 2010 was met in 1996, when the emissions were 93 kt. In 2010 the emissions were 66 kt. The emissions have also been under the emission ceiling of 49 kt of the revised NECD for 2020 since 2013.

Nitrogen oxides
The NO_x emission ceiling of 170 kt in the old NECD for the year 2010 has been met since 2009. New sources have recently been added to the inventory for the whole time series and annual variations in emissions are common due to variations in both economic and climatic conditions. The emission ceiling of 131 kt of the revised NECD for 2020 was met in 2015.

Non-methane volatile organic compounds
NMVOC emission ceiling of 130 kt (without agriculture emissions) for the year 2010 was met in 2006, when the emissions were 124 kt. In 2020 the emissions were 69 kt (excl. agriculture). Slight variations in the emissions are possible depending on economic and climatic conditions. Finland has implemented and fulfilled the requirements on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations (EU Solvents Emissions Directive (1999/13/EC) and Paint Directive (2004/42/EC) and reports regularly on the environmental permits and registrations under this directive. Due to the revised calculation of small-scale wood combustion the level of emissions decreased by 10%. New sources have been added to the NMVOC emissions inventory and slight variations in emissions are possible depending on the climatic conditions.

Ammonia
Ammonia emissions have been reduced since 1990 but not as rapidly as expected. Finland revised the agriculture sector emissions calculation model in 2015-2016 to more closely follow the guidance provided in the EMEP EEA Guidebook. Finland applied adjustments for the small-scale combustion and transport sector ammonia emission inventories, which were accepted and applied, as explained in detail in Finland's IIR 2021. In 2020 ammonia emissions were 30.661 kt, which is below the reduction target of 30% of the 2005 emissions of 38.940 kt, i.e. a ceiling of 31 kt.

$PM_{2.5}$
$PM_{2.5}$ emissions have been reduced since the base year of 2000 and were in 2020 (14 kt) already under the 2020-2029 NECD ceiling of 18 kt as well as the 2030 ceiling of 17 kt.

Table 1.18 Emission ceilings, reduction targets and emissions.

NECD	2020	NECD Old	NECD 2016 (Base year 2005)				
		Ceiling 2010-2020		Ceiling 2020-2029		Ceiling from 2030	
		(kt)	Emissions in 2005 (kt)	(%)	(kt)	(%)	(kt)
NO_x	**105.392**	**170**	208	-35	**135**	-47	**110**
Nox agriculture excl.	**95.689**						
SO_2	**23.218**	**110**	70	-30	**49**	-34	**46**
NMVOC	**84.587**	**130**	148	-35	**96**	-48	**77**
NMVOC agriculture excl.	**68.920**						
$PM_{2,5}$	**14.062**		26	-30	**18**	-34	**17**
NH_3	**30.661**	**31**	39	-20	**31**	-20	**31**
NH3 adj	*-1.402*						
Compliance NH3	*29.260*						

CLRTAP Gothenburg Protocol	2020	Base year 1990	Emission (kt) in the base year	Target (kt) (-XX%)	Year when target reached
NOx	**105.392**	1987	300.330	170 (-43%)	2011
SO2	**23.218**	1980	585.029	116 (-55%)	1995
NMVOC	**84.587**	1988	240.042	130 (-38%)	2008
NH3		1990	35.624	31 (-11%)	2017
TSP		2000	56.410	na	
PM10		2000	42.510	na	
PM2.5		2000	25.921	na	

CLRTAP HM Protocol	2020	Emissions (t) in the base year 1990	Target reached (below the level of the base year)
Pb	13.220	321.435	1995
Cd	0.794	6.685	1991
Hg	0.587	1.086	1991
As	2.065	34.816	1991
Cr	14.286	47.670	1992
Cu	40.171	156.893	1992
Ni	11.541	78.439	1991
Zn	130.305	682.839	1991

CLRTAP POP Protocol	2020	Emissions in the base year 1994	Target reached (below the level of the base year)
PCDD/F	9.310	**18**	since 1992
HCB	21.163	**36**	1991, 1995, 2001-2006, 2010-2015, 2017-2019
PCB	20.176	**29**	1996, 2001, 2009-2019
PAH-4	18.239	**20**	1995, 2000 and in 2020

2.3 Description and interpretation of emissions in 2019 and the trends by pollutant

Changes in chapter
March 2022 KS

This section describes the sources of air pollutants, emission trends and their spatial distribution. The maps are based on the new EMEP 0.1º* 0.1º grid and the intensity of the colouring is pollutant specific.

2.3.1 Main pollutants

The time series of the main pollutants SO_x, NO_x, NH_3, NMVOC and CO for 1980-2019 are presented in Figure 1.17.

- *Sulphur oxides* trend since 1980 has been strongly declining.
- *Nitrogen oxides* trend since 1980 is declining. New sources have been included in the inventory over the years.
- *NMVOC* emissions have been continuously decreasing since the base year of 1988. New sources have been included in the inventory over the years.
- *Ammonia* emissions have been slightly decreasing since 1980. There was an unexpected change in the emission levels regarding especially dairy cows when the animal-specific emissions started gradually grow in the 1990's with the increased animal size and productivity while the number of animals decreased drastically. New sources have been included in the inventory over the years.
- The annual fluctuations in the *carbon monoxide* emissions are related to fluctuations in the energy use in fuel combustion and transport sectors, but the trend is generally declining. Full emission inventories have been carried out since 1990.

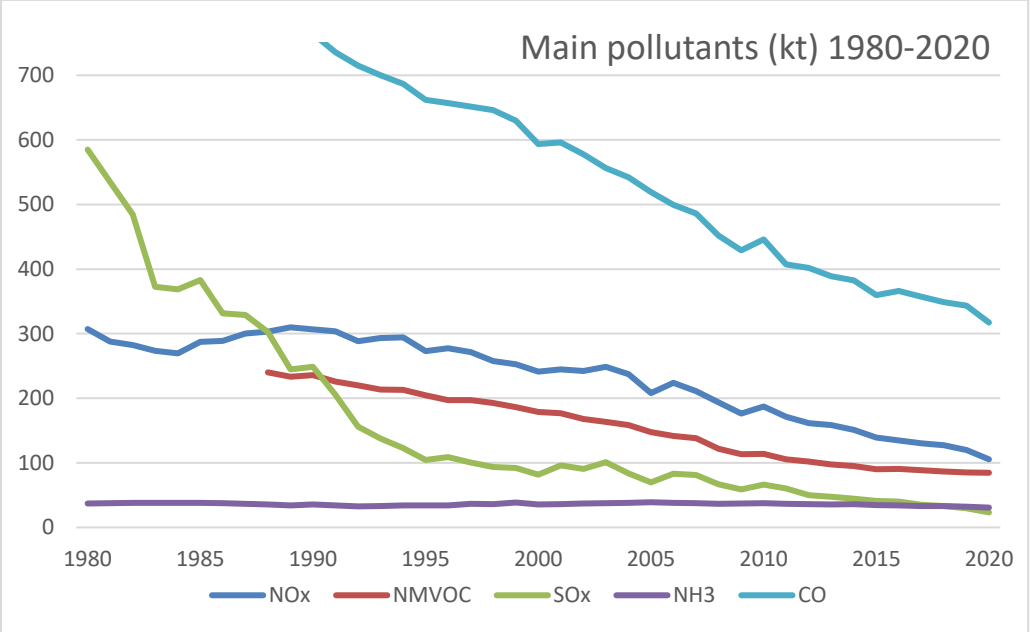


Figure 1.17. Emissions of main pollutants SO_2, NO_2, NH_3, NMVOC and CO in 1990–2020.

2.3.2 Nitrogen oxide emissions reported as nitrogen dioxide NO_2

Emission trend

Nitrogen oxides have been reduced from the base year 1987 emissions of 300 kt to 105 kt in 2020. The target to freeze emissions below the base year has been met since 2011.

The Finnish inventory covers all nitrogen oxide emissions converted into nitrogen dioxide (NO_2). Other nitrogen compounds include, for instance, nitric acid (HNO_3), nitrogen oxide (NO) and nitrogen trioxide (NO_3). The main sources of NO_2 in Finland are energy production and transport.

Nitrogen oxide emissions have decreased since the 1980's. In 1991 the government issued general guidelines restricting emissions from boilers and gas turbines, and, in 1988 a resolution on the reduction of emissions from road transport. New petrol-engine vehicles were required to be equipped with three-way catalytic converters since 1991 and emissions from diesel-engine vehicles were to be reduced through new engine construction and after-treatment equipment. Follow-up of how Finland has met the reduction targets under the UN and EU legislation is presented in Chapters 3.1.4 – 3.1.5.

The NO_x emissions trend 1980-2020 is presented in Figure 1.18. Time series fluctuation are mostly driven by changes in fuel combustion. Emission data reported by the plants according to their monitoring programmes in their environmental permits is used in the inventory, so energy and industry sector emissions are considered to be quite accurate.

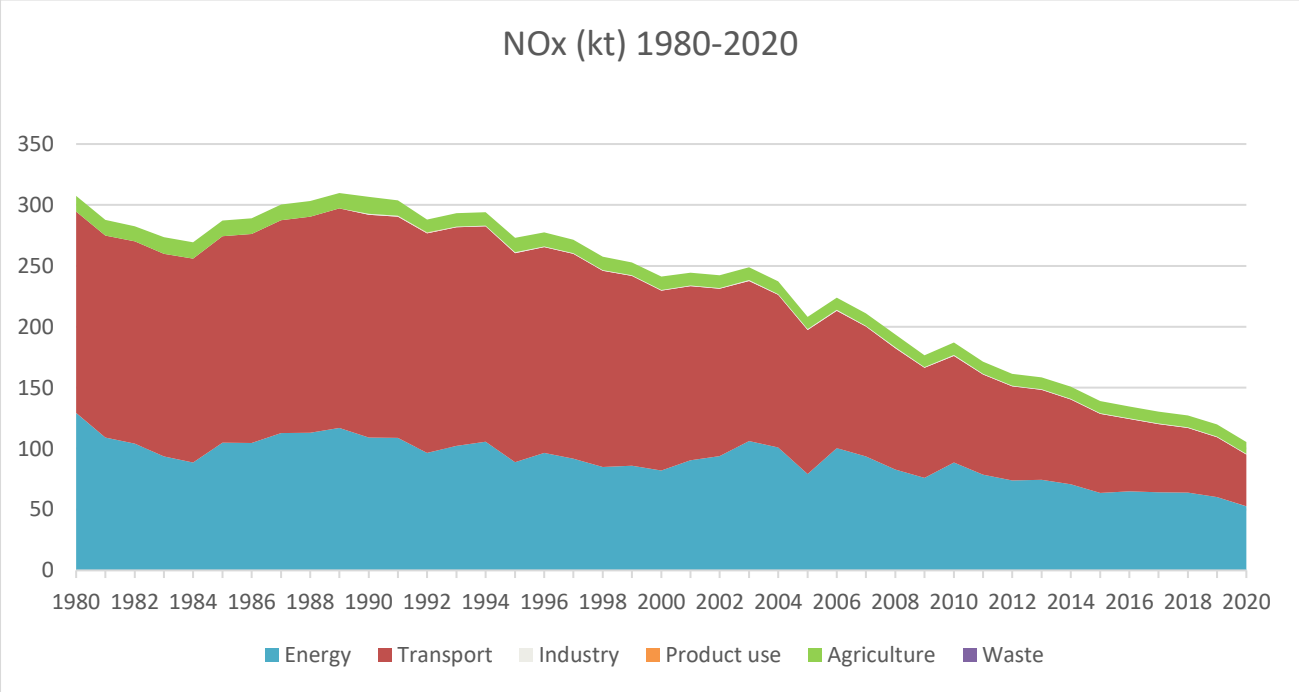
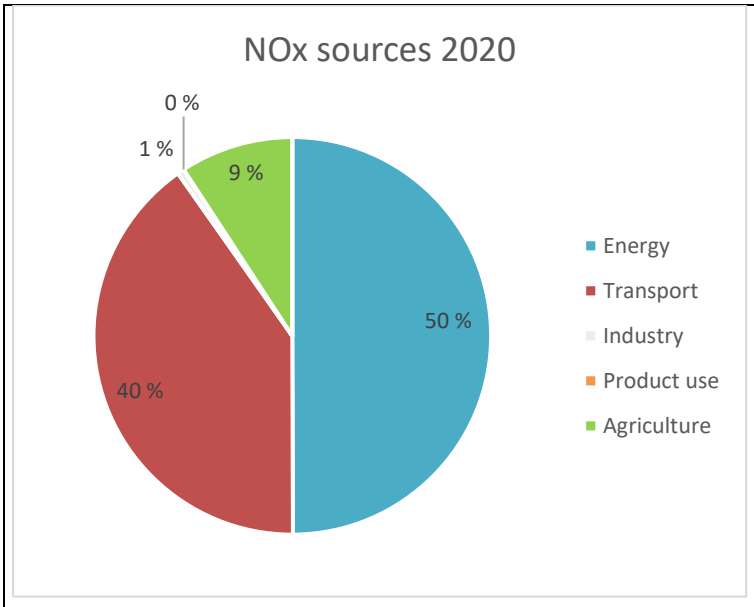
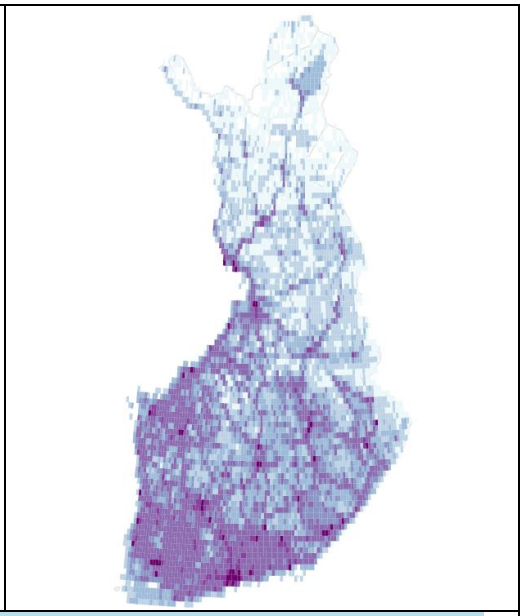


Figure 1.18 Emissions of nitrogen oxide (Gg) in 1980-2020.

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.19.





Shares of data reported by the plants of total NOx emissions in 2020

NFR	Percentage of NationalTotal	Total Release	Percentage Reported By Plants	NFR	Percentage Of National Total	Total Release	Percentage Reported By Plants
1A1a	15.3	16.170	88.3	1A4cii	2.3	2.396	0
1A1b	1.8	1.861	100	1A4ciii	1.6	1.719	0
1A2a	2.8	2.909	99.9	1A5a	3.4	3.607	0
1A2b	0.2	0.201	93.7	2B10a	0.1	0.149	48.8
1A2c	1.3	1.319	98.9	2B2	0.4	0.428	100
1A2d	14.5	15.313	98.8	2G	<0.1	0.004	0
1A2e	0.3	0.338	86.2	3B1a	<0.1	0.045	0
1A2f	2.1	2.199	84.6	3B1b	0.1	0.147	0
1A2gvii	5.1	5.324	0	3B2	<0.1	0.008	0
1A2gviii	1.8	1.924	70.5	3B3	<0.1	0.005	0
1A3ai(i)	0.3	0.295	0	3B4d	<0.1	<0.001	0
1A3aii(i)	<0.1	0.074	0	3B4e	<0.1	0.031	0
1A3bi	10.3	10.868	0	3B4gi	<0.1	0.047	0
1A3bii	3.8	4.056	0	3B4gii	<0.1	0.087	0
1A3biii	8.8	9.267	0	3B4giii	<0.1	0.008	0
1A3biv	0.2	0.194	0	3B4giv	<0.1	0.003	0
1A3c	1.3	1.379	0	3B4h	<0.1	0.034	0
1A3dii	4.5	4.757	0	3Da1	5.3	5.575	0
1A3ei	<0.1	0.001	100	3Da2a	2.8	2.943	0
1A4ai	1.0	1.102	6.7	3Da2b	0.1	0.110	0
1A4aii	1.2	1.251	0	3Da2c	<0.1	<0.001	0
1A4bi	4.4	4.601	0	3Da3	0.6	0.595	0
1A4bii	0.8	0.884	0	3F	<0.1	0.062	0
1A4ci	1.0	1.100	0.7	**Total**	**100**	**105.392**	**37.7**

Figure 1.19. The contribution of different sources to NOx emissions and data reported by the plants.

2.3.3 Non-methane organic compounds emissions (NMVOC)

Emission trend

NMVOC emissions have been reduced from the base year 1988 emissions of 240 kt to 85 kt in 2020.

NMVOC emissions originate in energy production, transport and product use and have been decreased since the 1990s. In its time, the CLRTAP VOC protocol requirement to reduce emissions by 30% from the 1988 level by 1999 proved to be difficult, because emissions in the transport sector did not decrease as expected, particularly concerning non-road machinery and equipment, as vehicles had not been replaced at the rate that was earlier foreseen. Strict emission limits have been applied to new vehicles since 1990 and their impact on emissions can be seen through the gradual renewal of the passenger car fleet. With the aid of differential taxes, there was a transition in the 1990s toward reformulated traffic fuels, which helped reduce evaporative emissions from petrol engine vehicles as well as CO and VOC emissions from vehicle flue gases.

Finland has implemented EU Directives on the control of volatile organic compound emissions from storage and distribution of petrol and from industrial solvents. Decreased NMVOC content in paints and the introduction of better abatement techniques in several industrial processes have contributed emission reductions in addition to the economic depression resulting in lower production volumes. The most important emission sources for the decreased NMVOC emissions after 2007 are paint application and printing industry. Low-NMVOC containing and waterborne paint products were introduced during the 1990's and their market-share rapidly increased, typically in indoor paints and road marking paints, leading to source specific emission reductions of 20- 50%. At the same time, also the sales of thinners for paint products decreased, printing processes were improved and new abatement technologies as well as substitution and recovery of NMVOC containing substances took place.

Follow-up of how Finland has met the reduction targets under the UN and EU legislation is presented in Chapters 3.1.4 – 3.1.5.

The NMVOC emission trend presented in Figure 1.20 shows decreasing emissions since 1990. The time series is not consistent: especially for the years 1980-1987 for which not all sources are included. The calculation model for small scale combustion was revised in 2016 resulting in a sharp drop of NMVOC emissions and transport sector emissions have been updated according to the revision of the national transport sector calculation model LIPASTO.

The uncertainties of emission data in 2020 are included in Annex 7 of the IIR.

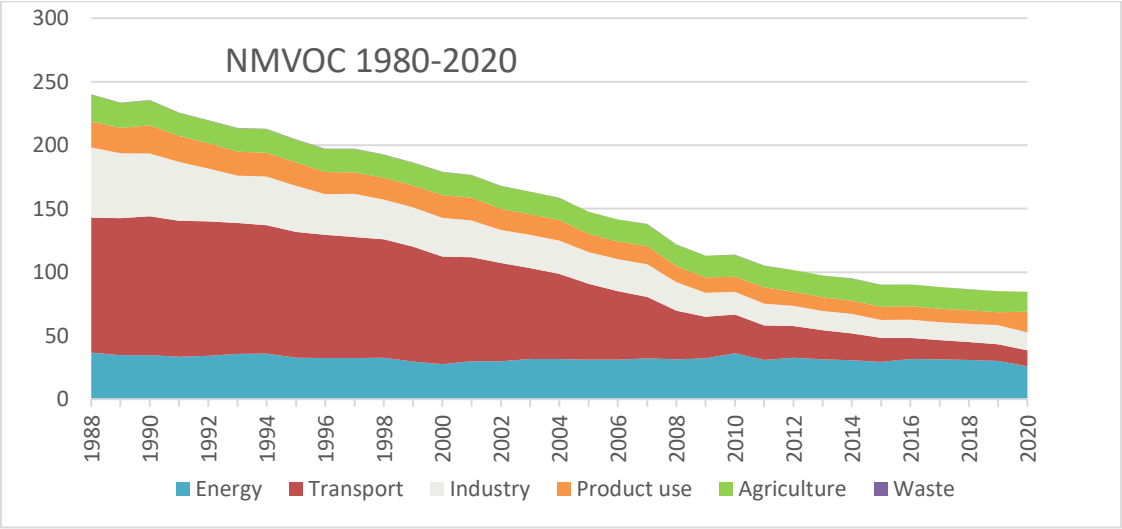
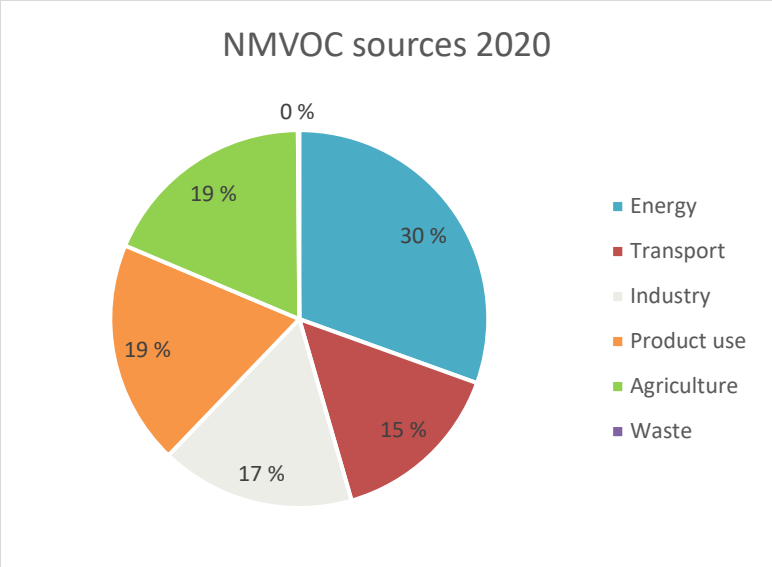


Figure 1.20. NMVOC emissions (Gg) in 1988-2020

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.21.



Shares of data reported by the plants of total NMVOC emissions in 2020

NFR	Percentage of NationalTotal	Total Release	Percentage Reported By Plants	NFR	Percentage Of National Total	Total Release	Percentage Reported By Plants
1A1a	1.7	1.411	23.7	2C2	<0.1	0.002	100
1A1b	0.1	0.085	39.7	2C3	<0.1	<0.001	100
1A2a	<0.1	0.015	0	2C6	<0.1	0.001	0
1A2b	<0.1	0.001	17.7	2C7a	<0.1	<0.001	0
1A2c	<0.1	0.008	15.5	2C7b	<0.1	0.026	100
1A2d	0.4	0.346	3.7	2C7c	<0.1	0.006	100
1A2e	<0.1	0.024	0	2D3a	13.7	11.588	0
1A2f	<0.1	0.016	0	2D3b	0.5	0.386	0
1A2gvii	1.3	1.118	0	2D3c	0.4	0.343	0
1A2gviii	0.3	0.229	12.7	2D3d	8.4	7.088	14.3
1A3ai(i)	<0.1	0.042	0	2D3e	0.5	0.464	5.9
1A3aii(i)	<0.1	0.013	0	2D3g	2.1	1.754	84.5
1A3bi	1.5	1.303	0	2D3h	0.4	0.318	89.5
1A3bii	0.3	0.267	0	2D3i	2.0	1.705	5.6
1A3biii	0.3	0.261	0	2G	<0.1	0.014	0
1A3biv	1.2	0.978	0	2H1	1.7	1.424	5.2
1A3bv	1.5	1.272	0	2H2	2.0	1.672	6.7
1A3c	<0.1	0.076	0	2I	1.3	1.140	29.1
1A3dii	3.8	3.228	0	2L	<0.1	<0.001	100
1A3ei	<0.1	<0.001	0	3B1a	7.2	6.088	0
1A4ai	<0.1	0.074	0	3B1b	4.6	3.896	0
1A4aii	0.5	0.458	0	3B2	0.2	0.161	0
1A4bi	20.7	17.538	0	3B3	0.3	0.252	0
1A4bii	2.7	2.290	0	3B4d	<0.1	0.005	0
1A4ci	0.4	0.301	0	3B4e	0.3	0.247	0

1A4cii	1.6	1.326	0	3B4gi	0.3	0.254	0
1A4ciii	<0.1	0.078	0	3B4gii	0.9	0.739	0
1A5a	0.4	0.310	0	3B4giii	<0.1	0.028	0
1B1b	<0.1	0.059	0	3B4giv	<0.1	0.018	0
1B2aiv	3.0	2.532	100	3B4h	0.8	0.676	0
1B2av	3.1	2.603	5.7	3Da2a	2.6	2.185	0
1B2b	0.3	0.252	0	3Da3	<0.1	0.073	0
2A1	<0.1	0.026	27.8	3De	1.1	0.930	0
2A3	<0.1	0.002	99.3	3F	0.1	0.114	0
2B10a	2.4	2.042	100	5A	<0.1	0.075	0
2B10b	0.1	0.123	100	5D1	<0.1	0.009	0
2C1	0.2	0.178	100	5D2	<0.1	0.018	0
				Total	100	84.587	10.5

Figure 1.21. The contribution of different sources to NMVOC emissions and data reported by the plants..

2.3.4 Sulphur emissions as sulphur dioxide SO_2

Emission trend

Sulphur oxides emissions have been reduced from the base year 1980 emissions of 584 kt to 23 kt in 2020.

The main sources of sulphur emissions in Finland are energy production and industrial processes. All sulphur compounds converted into sulphur dioxide (SO_2) are included in the inventory, such as sulphur trioxide (SO_3), sulphuric acid (H_2SO4), and reduced sulphur compounds, e.g. hydrogen sulphide (H_2S), mercaptans and dimethyl sulphides. Emissions of sulphur compounds other than SO_2 originate, for instance, from petroleum refineries, tank farms for unrefined petroleum products, natural gas plants, petrochemical plants, oil sands plants, sewage treatment facilities, kraft pulp and paper plants and animal feedlots.

Sulphur emissions have been dramatically decreased since the beginning of1980's due to successful national programmes to reduce emissions. A Government resolution was issued in 1986 for a 50% reduction of emissions from the 1980 level, and in 1990, the aim was set at an 80% reduction over the next ten years. Emissions from energy production, pulp mills, sulphur acid plants and refineries were limited as was the sulphur content of coal and oil products. The industry branch specific reduction targets were regularly followed and re-examined. Investments, including desulphurization units for existing coal-fired power stations, were made in the beginning of the 1990's to implement these decisions. Follow-up on how Finland meets the reduction targets under the UN and EU legislation is presented in Chapters 3.1.4 – 5.

SO_x emissions are regarded rather accurate as emission data reported by the plants according to their monitoring programmes in environmental permits is used in the inventory. Fluctuations in annual emission levels are related to economic conditions and changes in energy production (Figure 1.22)

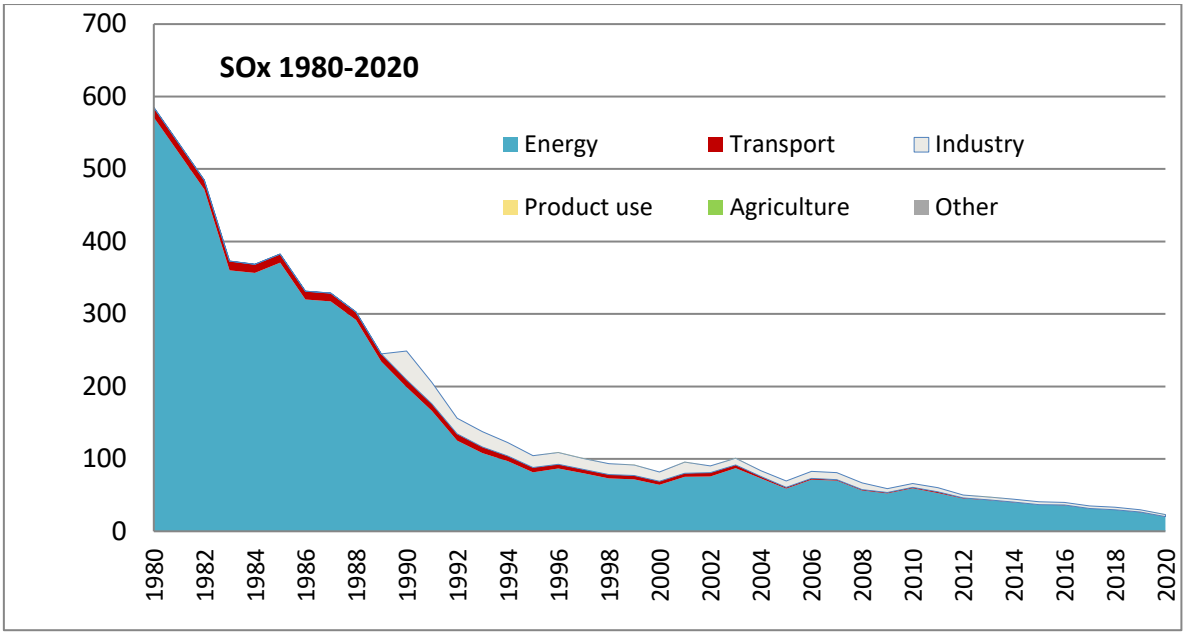
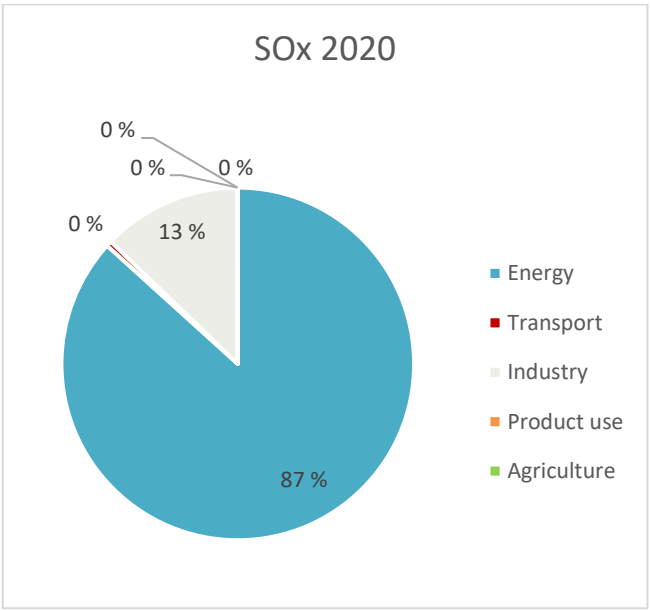


Figure 1.22. Emissions of sulphur dioxide (Gg) in 1980-2020.

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.23.



Shares of data reported by the plants of total SOx emissions in 2020							
NFR	Percentage of NationalTotal	Total Release	Percentage Reported By Plants	NFR	Percentage Of National Total	Total Release	Percentage Reported By Plants
1A1a	27.5	6.389	85.2	1A4aii	<0.1	0.001	0
1A1b	15.4	3.583	100	1A4bi	2.9	0.671	0
1A2a	1.1	0.260	98.0	1A4bii	<0.1	<0.001	0
1A2b	10.9	2.528	99.5	1A4ci	2.6	0.595	0.1
1A2c	1.4	0.328	96.9	1A4cii	<0.1	0.003	0
1A2d	8.0	1.852	91.5	1A4ciii	<0.1	<0.001	0
1A2e	2.2	0.522	55.3	1A5a	6.3	1.471	0
1A2f	2.1	0.478	80.7	1B1b	0.2	0.045	100
1A2gvii	<0.1	0.004	0	2B10a	4.5	1.035	100
1A2gviii	1.9	0.447	44.0	2C1	3.6	0.843	100
1A3ai(i)	<0.1	0.017	0	2C2	<0.1	0.002	100
1A3aii(i)	<0.1	0.005	0	2C7a	0.5	0.112	2.6
1A3bi	0.1	0.024	0	2C7b	<0.1	0.009	100
1A3bii	<0.1	0.003	0	2C7c	<0.1	<0.001	100
1A3biii	<0.1	0.014	0	2D3g	<0.1	<0.001	100
1A3biv	<0.1	<0.001	0	2D3i	<0.1	<0.001	100
1A3c	<0.1	<0.001	0	2G	<0.1	0.001	0
1A3dii	0.2	0.040	0	2H1	4.1	0.958	100
1A3ei	<0.1	<0.001	0	2L	<0.1	<0.001	100
1A4ai	4.1	0.963	0	3F	<0.1	0.009	0
				Total	100	23.218	75.7

Figure 1.23 The contribution of different sources to SOx emissions and data reported by the plants.

2.3.5 Ammonia emissions

Emission trend

Ammonia emissions have been reduced from the 1990 level of 35 kt to 31 kt in 2020.

The main ammonia source is agriculture, while transport and industrial processes contribute to 10% of emissions. The emissions decreased from early 1980's by 1990, however, after that the emission trend has been rather consistent. Ammonia emission trend is presented in Figure 1.24.

According to the current understanding, the emissions are expected to stay at the present level, or even slightly increase. Follow-up of how Finland has met the reduction targets under the UN and EU legislation is presented in Chapters 3.1.4 – 3.1.5. A project to closer study manure management practices and present options to reduce emissions from this source is underway.

Understanding of ammonia emission sources and levels has gradually been improved during the 2000's. Still in 2002 not all sources of ammonia emissions were identified and the emissions from the major source, agriculture, were underestimated. While the Gothenburg protocol which limits NH3 emissions had not yet entered into force, it was understood that further assessment of the inventory was necessary. A new calculation model to improve the agriculture sector inventory was developed in 2006-2008. Based on the results of this work, it was concluded that the earlier estimates, especially

for dairy cows, did not take into account the increased specific emissions following the growth of the animals while the number of the animals had significantly decreased. The time series has been revised several times since, while a comprehensive recalculation in 2016. After that, minor corrections and inclusion of minor new sources have been carried out. A detailed description of ammonia emissions is presented in Appendix 1.

In 2014 new sources were identified (residential combustion, leather tanning, coke production and use of latrines) and ammonia emissions from the new sources were included in the inventories from the year 1990 onward. Earlier, ammonia emissions had been estimated as national totals only for 1980, 1985-1988, 1990, 1995 and 1997-1999 and in NFR format only from 2000 onwards. The recalculated time series is available in NFR format since 1980.

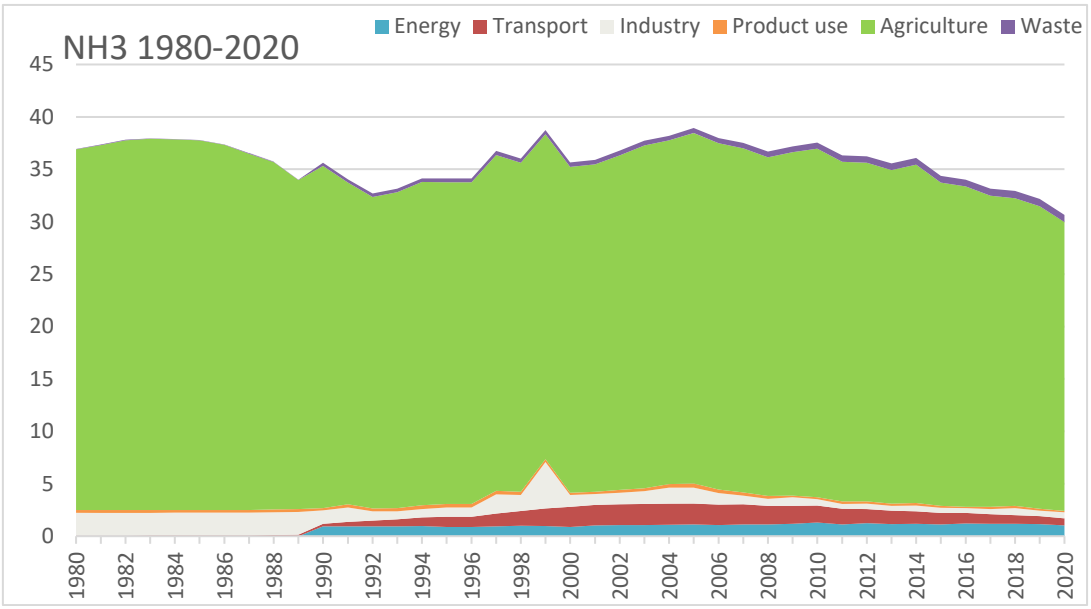
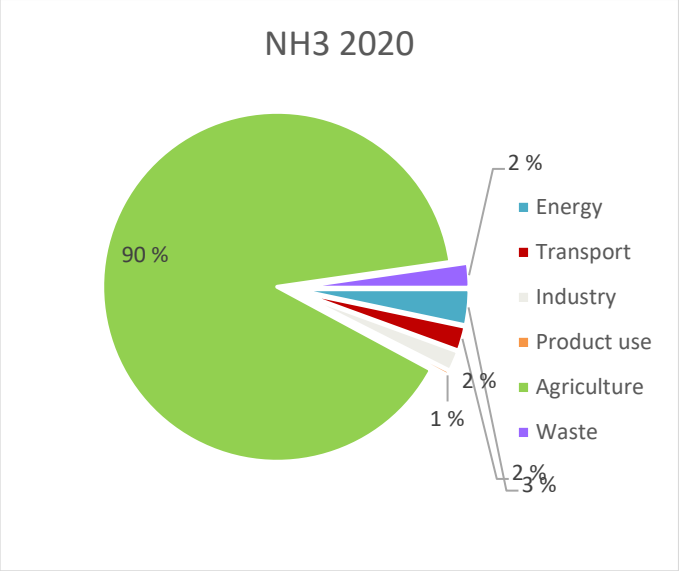


Figure 1.24. Ammonia emissions (Gg) in 1980-2020. Note, the peak NFR2 (Industry) in 1999 is due to an accidental emission reported by the plant to the environmental authorities.

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.25.



Shares of data reported by the plants of total NH_3 emissions in 2020

NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	<0.1	0.004	100	2D3i	0.4	0.113	100
1A2gvii	<0.1	0.003	0	2G	<0.1	0.008	0
1A2gviii	<0.1	0.002	100	2H1	0.5	0.157	100
1A3bi	2.1	0.642	0	2L	<0.1	0.007	100
1A3bii	<0.1	0.011	0	3B1a	18.9	5.751	0
1A3biii	<0.1	0.029	0	3B1b	17.3	5.280	0
1A3biv	<0.1	0.002	0	3B2	0.4	0.134	0
1A3c	<0.1	<0.001	0	3B3	8.9	2.718	0
1A3dii	<0.1	<0.001	0	3B4d	<0.1	0.008	0
1A4ai	<0.1	0.005	0	3B4e	2.3	0.692	0
1A4aii	<0.1	<0.001	0	3B4gi	0.9	0.280	0
1A4bi	3.2	0.990	0	3B4gii	1.9	0.581	0
1A4bii	<0.1	<0.001	0	3B4giii	0.3	0.080	0
1A4ci	<0.1	0.013	0	3B4giv	<0.1	0.026	0
1A4cii	<0.1	0.002	0	3B4h	5.1	1.543	0
1A4ciii	<0.1	<0.001	0	3Da1	6.5	1.978	0
1A5a	<0.1	<0.001	0	3Da2a	22.6	6.889	0
1B1b	<0.1	0.003	0	3Da2b	0.2	0.075	0
2B10a	1.1	0.340	100	3Da2c	<0.1	<0.001	0
2C1	0.1	0.036	100	3Da3	4.8	1.457	0
2C7b	0.1	0.038	100	3F	0.2	0.061	0
2C7c	<0.1	<0.001	100	5B1	0.4	0.117	0
2D3e	<0.1	0.004	0	5B2	<0.1	<0.001	0
2D3g	<0.1	0.002	35.5	5D1	1.3	0.384	1.2
				Total	100	30.661	2.3

Figure 1.25 The contribution of different sources to NH3 emissions and data reported by the plants.

2.3.6 Carbon monoxide emissions

Emission trend

Carbon monoxide emissions have been reduced from the 1990 level of 770 kt to 317 kt in 2020.

The carbon monoxide emission trend is presented in Figure 1.26. The trend is decreasing and the main sources are fuel combustion in the energy production and transport sectors. CO emission data reported by the plants is used in the inventory. CO emission levels are well known due to the use of CO as process parameter.

CO emission data is available as national totals since the year 1980 and in NFR format since the year 2000. However, the earlier reported CO emissions are not consistent with those data after 1990, e.g. emissions from off-road machinery are not included in them. A revised time series for the 1980's is under work.

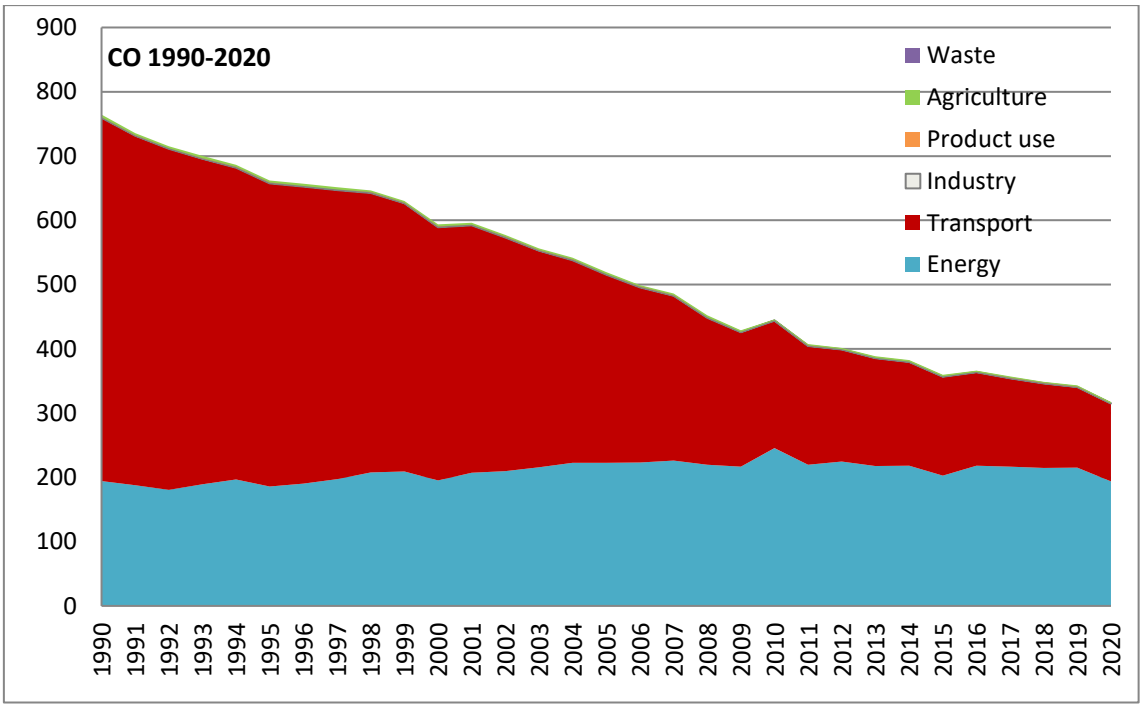
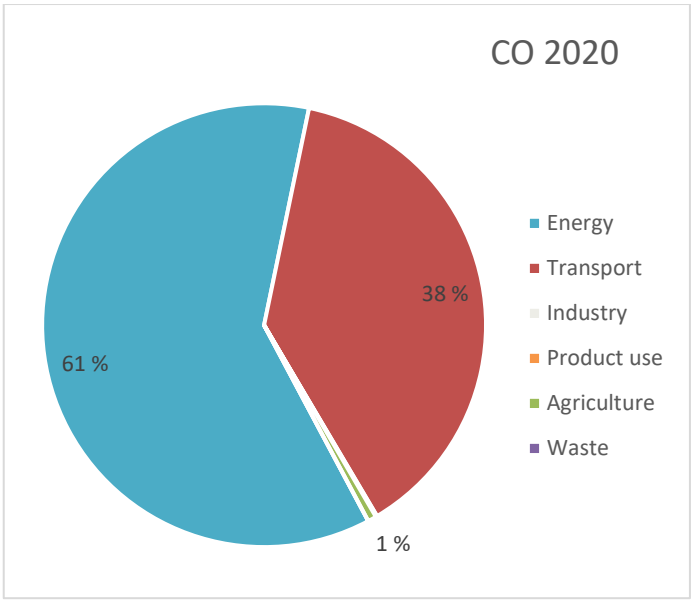


Figure 1.26. Emissions of carbon monoxide (Gg) in 1990-2020.

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.27.



Shares of data reported by the plants of total CO emissions in 2020

NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	4.8	15.096	15.7	1A3c	<0.1	0.186	0
1A1b	0.4	1.212	11.7	1A3dii	7.1	22.634	0
1A2a	0.3	1.035	14.2	1A3ei	<0.1	<0.001	0
1A2b	<0.1	0.151	86.1	1A4ai	0.3	0.911	0.5
1A2c	0.1	0.318	7.7	1A4aii	4.9	15.413	0
1A2d	6.2	19.605	13.4	1A4bi	42.8	135.818	0
1A2e	<0.1	0.174	0.4	1A4bii	11.7	37.098	0
1A2f	1.3	4.020	6.9	1A4ci	0.7	2.087	0
1A2gvii	2.3	7.286	0	1A4cii	2.8	8.865	0
1A2gviii	1.1	3.613	7.8	1A4ciii	<0.1	0.261	0
1A3ai(i)	<0.1	0.296	0	1A5a	3.0	9.556	0
1A3aii(i)	<0.1	0.202	0	2C1	<0.1	0.188	100
1A3bi	6.6	20.869	0	2C7a	<0.1	0.008	100
1A3bii	0.6	1.758	0	2G	<0.1	0.116	0
1A3biii	0.7	2.379	0	3F	0.6	1.990	0
1A3biv	1.3	4.066	0	Total	100	317.211	2

Figure 1.27. The contribution of different sources to CO emissions and data reported by the plants.

2.3.7 Particulate matter emissions

Particulate matter emissions have been estimated since 2000 and the trend is slightly decreasing. The main sources for particle emissions in Finland are energy, road transport and industrial processes sectors. The emission trend is presented in Figure 1.28.

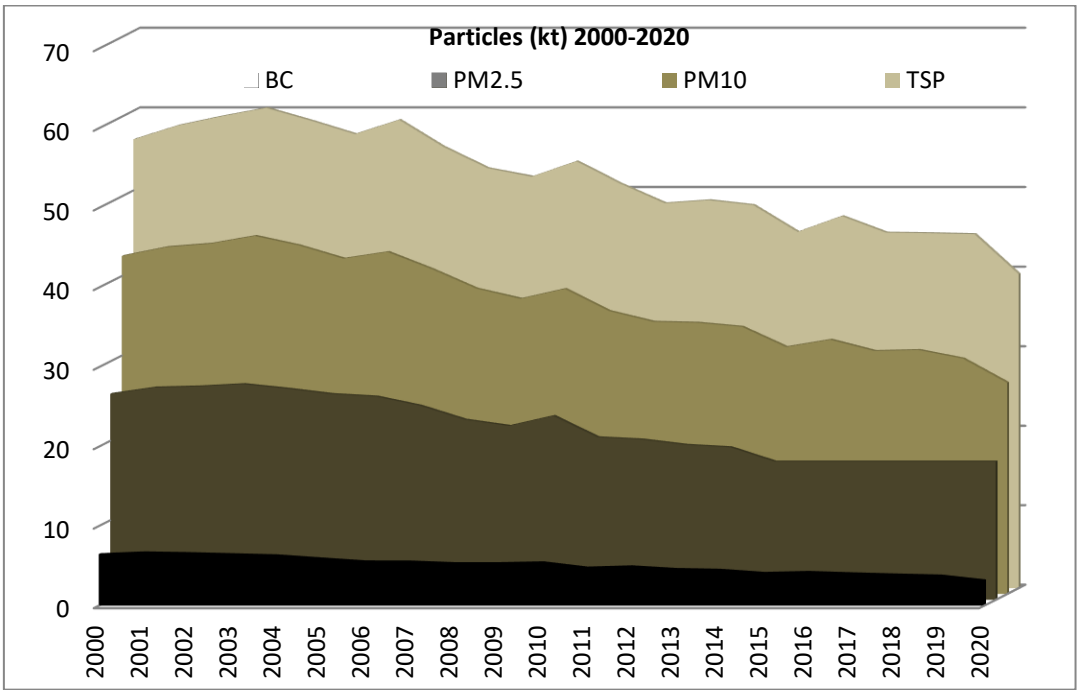


Figure 1.28 Particle emissions (TSP, PM_{10}, $PM_{2.5}$ and BC) in 2000-2020.

In 2020 all particle size emissions are below half of the level in 1990. In 1990 TSP emissions were 98 kt, PM_{10} emissions 74 kt, $PM_{2.5}$ emissions 47 and BC emissions 10 kt, while in 2020 they were 39 kt, 27 kt, 14 kt and 3 kt, respectively.

Particulate matter emissions fluctuate largely from year to year due to changes in energy consumption, which is affected by the level of annually imported electricity and fossil fuel based condensing power in annual energy production. Energy consumption reflects the energy intensity of the Finnish industry (forest industry, chemical industry and manufacture of basic metals), extensive consumption during the long heating period, as well as energy consumption in the transport sector due to long distances in the sparsely inhabited country. During the last decades large decreases in specific emissions have been achieved through implementation of abatement techniques especially in peat and oil combustion.

The especially high peat production volumes in summer 2006 can be seen as a peak in the emission trend. The drop in emissions in 2014 is due to introduction of small-scale combustion calculation model, the results of which have not been possible to integrate over the whole time series due to pending recalculation of the energy sector emissions. The recalculation of emissions from small scale combustion sources decreased significantly particle emissions as the new inventory system more accurately defines the wood amounts used in small scale combustion equipment and larger boilers.

Reporting of TSP emissions is traditionally included in the monitoring programs of environmental permits and emission data for LCPs can therefore be regarded quite accurate. This data as well as PM10 emission data reported under the ETS and the E-PRTR are used in the inventory. Particle emissions from energy production are efficiently abated in the centralized electricity and power production using electrostatic precipitators and scrubbers.

However, the current particle emissions time series are strongly affected by smaller boilers, where the inventory does not reflect implemented abatement technology. These emissions are calculated as unabated due to the fact that information is not available of the implemented abatement technology in smaller district heating plants.

Note: the sources for $PM_{2.5}$ and BC are not equal: peat production (NFR 1B3) is a significant source for $PM_{2.5}$ but is not a source of BC. In the black carbon emission inventory, the main sources are transport (road transport and off-road machinery) and energy production, mainly residential combustion. The preliminary BC time series for 2000-2012, reported on a separate sheet in the NFR table submission in February 2014, the technology-specific calculation method was already used.

The new calculation model for small scale wood combustion that has been implemented since the 2016 submission decreased the level of particle emissions substantially. Detailed information on the model and methods are presented under the Chapter for NFR 1A4bi.

2.3.7.1 Particles TSP

Emission trend

The trend of TSP emissions is presented in Figure 1.29.

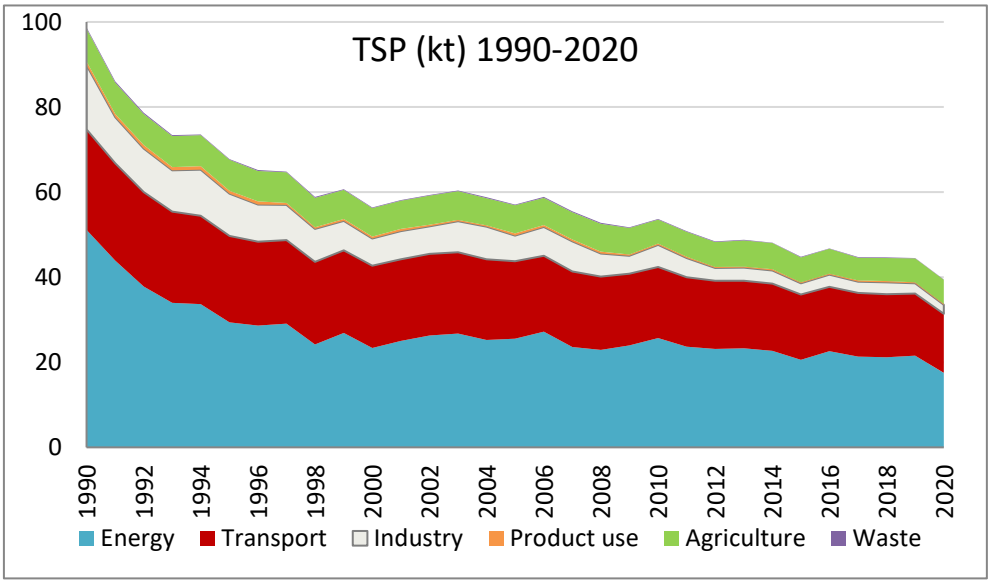
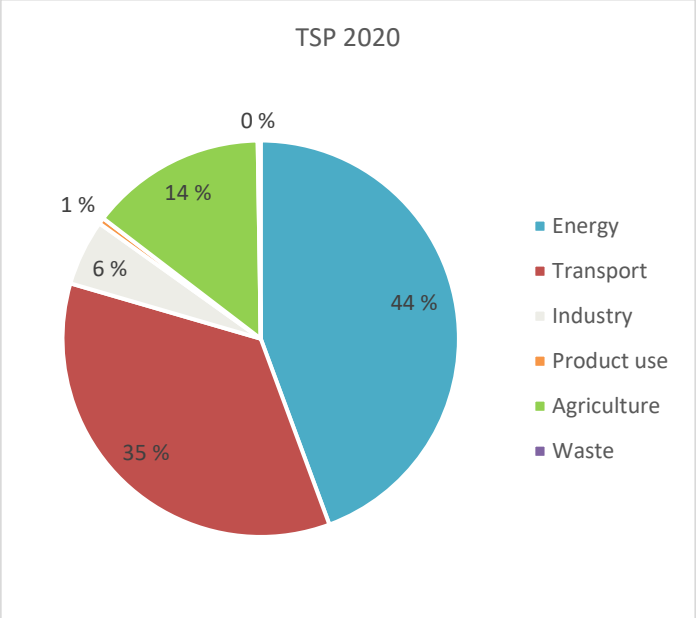


Figure 1.29. TSP emissions (kt) 1990-2020

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.30.



Shares of total TSP emissions reported by the plants in 2020							
NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	5.2	2.038	71.3	2A5c	1.0	0.391	0
1A1b	0.2	0.081	100	2B10a	1.0	0.381	100
1A2a	<0.1	0.017	100	2B10b	<0.1	0.038	0.1
1A2b	<0.1	0.009	100	2B6	<0.1	<0.001	100
1A2c	<0.1	0.035	100	2C1	0.7	0.277	100
1A2d	4.2	1.663	100	2C2	0.3	0.116	100
1A2e	<0.1	0.038	100	2C3	<0.1	<0.001	83.5
1A2f	0.2	0.073	100	2C7a	<0.1	<0.001	2.7
1A2gvii	0.7	0.288	0	2C7c	<0.1	0.014	100
1A2gviii	1.4	0.560	100	2C7d	<0.1	0.010	0
1A3ai(i)	<0.1	0.002	0	2D3b	0.2	0.088	0
1A3aii(i)	<0.1	<0.001	0	2D3d	<0.1	0.001	100
1A3bi	0.6	0.231	0	2D3g	<0.1	0.003	100
1A3bii	0.5	0.208	0	2D3i	0.1	0.056	100
1A3biii	0.4	0.140	0	2G	0.1	0.055	0
1A3biv	<0.1	0.020	0	2H1	0.8	0.318	100
1A3bvi	3.8	1.501	0	2H2	1.1	0.424	14.6
1A3bvii	27.1	10.72	0	2I	0.2	0.094	100
1A3c	<0.1	0.029	0	2L	<0.1	0.014	100
1A3dii	0.8	0.322	0	3B1a	0.5	0.185	0
1A4ai	0.6	0.256	2.1	3B1b	0.4	0.153	0
1A4aii	0.2	0.088	0	3B2	<0.1	0.010	0
1A4bi	19.5	7.707	0	3B3	0.8	0.305	0
1A4bii	0.3	0.129	0	3B4d	<0.1	<0.001	0
1A4ci	1.8	0.692	0.8	3B4e	<0.1	0.021	0
1A4cii	0.4	0.152	0	3B4gi	1.7	0.688	0

1A4ciii	0.1	0.044	0	3B4gii	0.5	0.178	0
1A5a	8.9	3.511	0	3B4giii	<0.1	0.015	0
1B1b	<0.1	0.030	100	3B4giv	0.2	0.067	0
1B1c	2.0	0.805	0	3B4h	<0.1	0.032	0
1B2aiv	<0.1	0.002	100	3Dc	9.8	3.850	0
1B2av	<0.1	<0.001	100	3F	0.4	0.166	0
2A2	<0.1	0.002	100	5A	<0.1	0.001	0
2A3	<0.1	0.004	100	5C1bv	<0.1	0.001	0
2A5a	<0.1	0.005	92.5	5E	0.2	0.095	0
2A5b	<0.1	0.033	6.1	Total	100	39.486	13.5

Figure 1.30 The contribution of different sources to TSP emissions and data reported by the plants.

2.3.7.2 Particles PM_{10}

Emission Trend

For introduction to drivers behind the emission trend, please see the beginning of Chapter 3.1.12. The trend of PM_{10} emissions is presented in Figure 1.31.

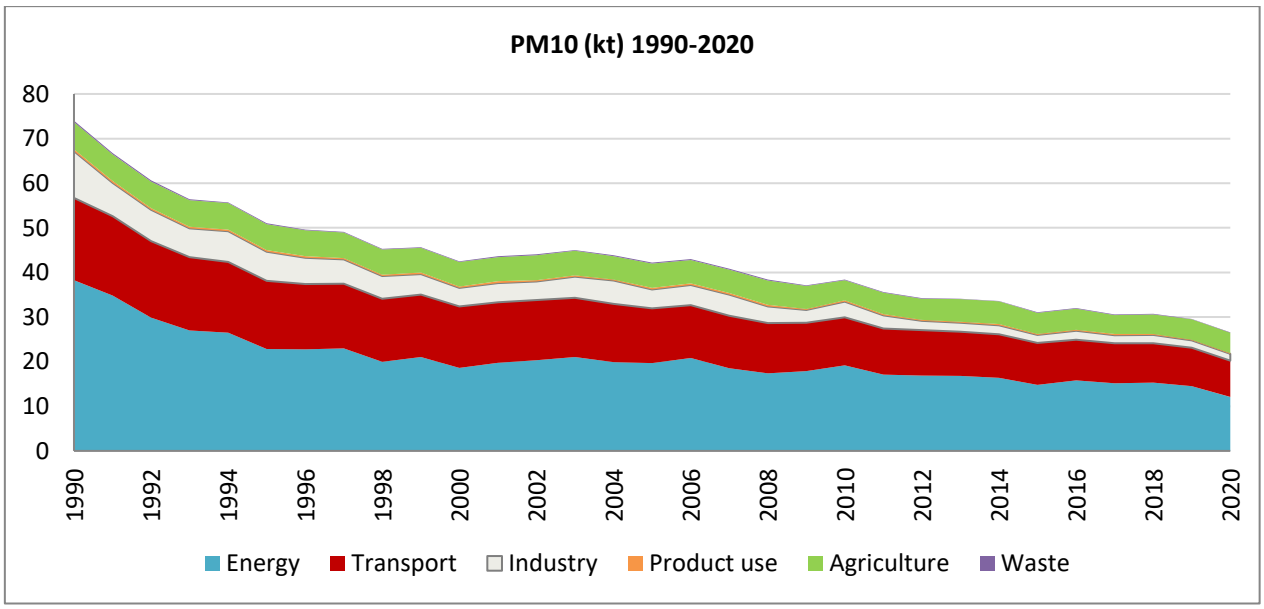
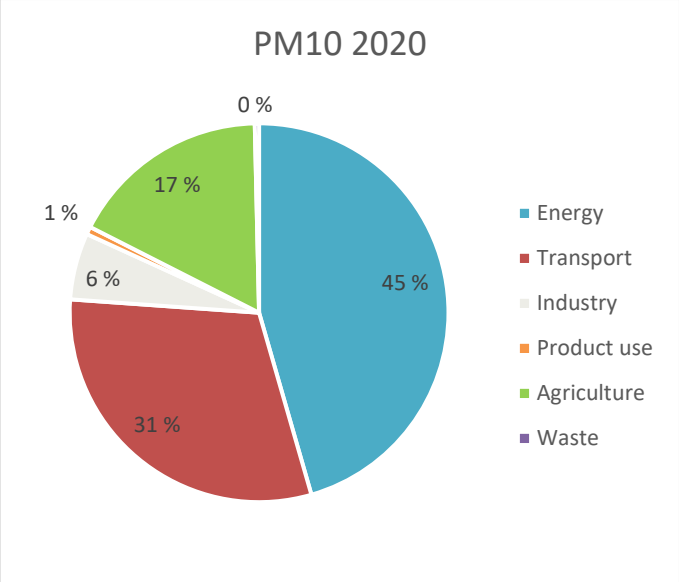


Figure 1.31. PM_{10} emissions (kt) in 1990-2020

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.32.



Shares of total PM_{10} emissions reported by the plants in 2020

NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	3.1	0.824	0	2A5c	0.6	0.154	0
1A1b	<0.1	0.023	0	2B10a	1.2	0.330	0
1A2a	<0.1	0.008	0	2B10b	<0.1	0.012	0
1A2b	<0.1	0.005	0	2B6	<0.1	<0.001	0
1A2c	0.1	0.030	0	2C1	0.8	0.224	0
1A2d	5.4	1.438	0	2C2	0.4	0.099	0
1A2e	<0.1	0.021	0	2C3	<0.1	<0.001	0
1A2f	0.1	0.033	0	2C7a	<0.1	<0.001	0
1A2gvii	1.1	0.288	0	2C7c	<0.1	0.009	0
1A2gviii	1.0	0.275	0	2C7d	<0.1	0.005	0
1A3ai(i)	<0.1	0.002	0	2D3b	0.2	0.066	0
1A3aii(i)	<0.1	<0.001	0	2D3d	<0.1	<0.001	0
1A3bi	0.9	0.231	0	2D3g	<0.1	0.002	0
1A3bii	0.8	0.208	0	2D3i	0.2	0.052	0
1A3biii	0.5	0.140	0	2G	0.2	0.055	0
1A3biv	<0.1	0.020	0	2H1	0.8	0.221	0
1A3bvi	4.2	1.114	0	2H2	1.5	0.410	0
1A3bvii	20.2	5.360	0	2I	<0.1	0.018	0
1A3c	0.1	0.027	0	2L	<0.1	0.010	0
1A3dii	1.2	0.322	0	3B1a	0.3	0.085	0
1A4ai	0.7	0.187	0	3B1b	0.3	0.071	0
1A4aii	0.3	0.088	0	3B2	<0.1	0.004	0
1A4bi	27.8	7.391	0	3B3	0.2	0.047	0
1A4bii	0.5	0.129	0	3B4d	<0.1	<0.001	0
1A4ci	1.1	0.287	0	3B4e	<0.1	0.010	0
1A4cii	0.6	0.152	0	3B4gi	0.5	0.145	0
1A4ciii	0.2	0.044	0	3B4gii	0.3	0.089	0
1A5a	3.9	1.035	0	3B4giii	<0.1	0.015	0

1B1b	<0.1	0.013	0	3B4giv	0.2	0.065	0
1B1c	2.0	0.526	0	3B4h	<0.1	0.014	0
1B2aiv	<0.1	0.002	0	3Dc	14.5	3.850	0
1B2av	<0.1	<0.001	0	3F	0.6	0.163	0
2A2	<0.1	<0.001	0	5A	<0.1	<0.001	0
2A3	<0.1	0.004	0	5C1bv	<0.1	0.001	0
2A5a	<0.1	0.002	0	5E	0.4	0.095	0
2A5b	<0.1	0.011	0	Total	100	26.564	0

Figure 1.32. The contribution of different sources to PM10 emissions and data reported by the plants.

2.3.7.3 Particles $PM_{2.5}$

Emission trend

The trend of $PM_{2.5}$ emissions is presented in Figure 1.33.

For introduction to drivers behind the emission trend, please see the beginning of Chapter 3.1.12.

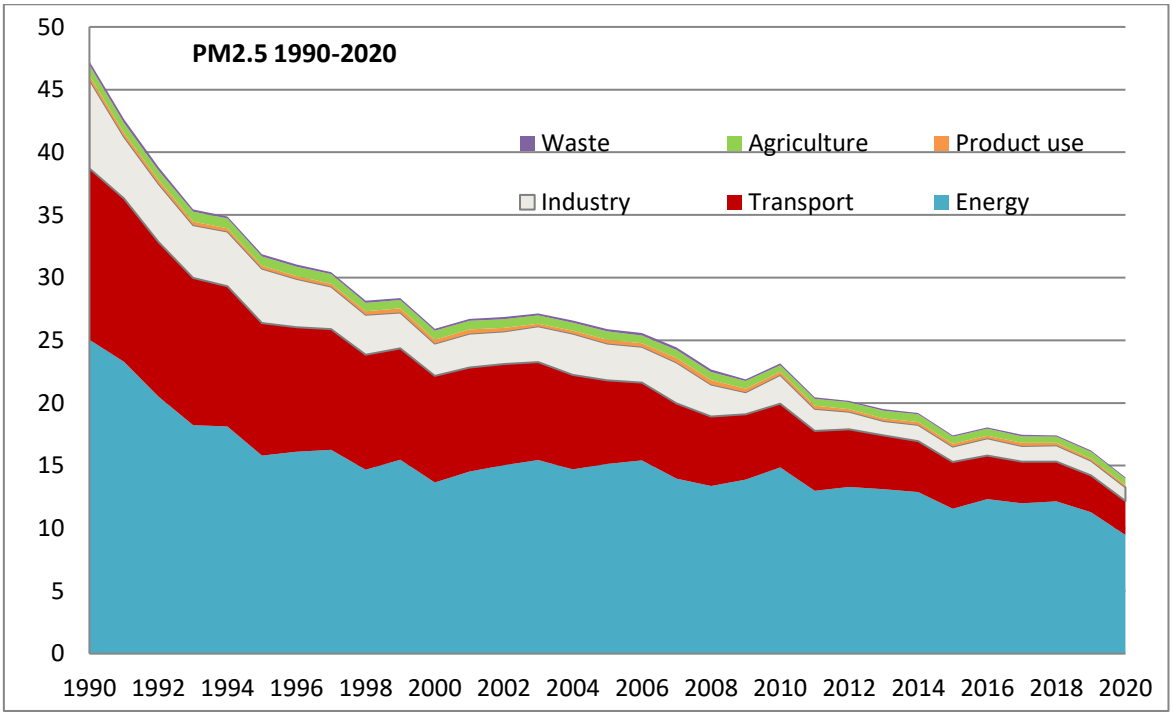
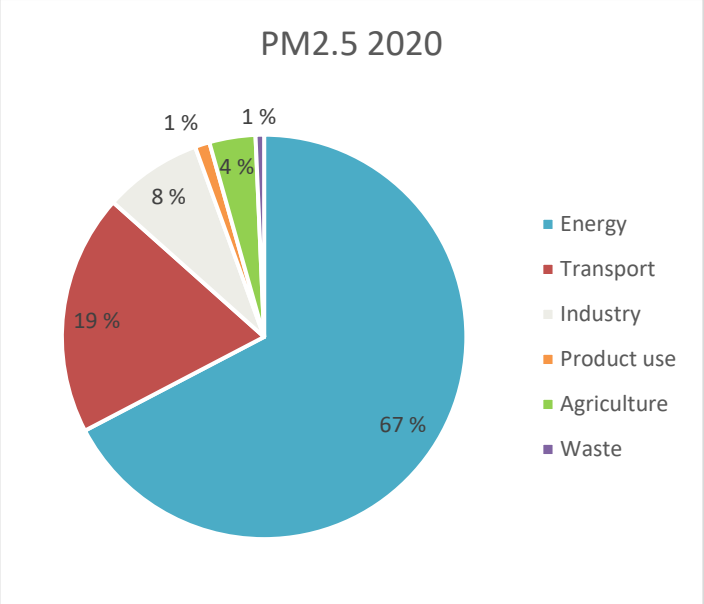


Figure 1.33. $PM_{2.5}$ emissions in 2000-2020

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to $PM_{2.5}$ emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in in Figure 1.34.



Shares of total $PM_{2.5}$ emissions reported by the plants in 2019

NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	1.5	0.217	0	2A5c	0.1	0.016	0
1A1b	<0.1	0.005	0	2B10a	1.6	0.224	0
1A2a	<0.1	0.003	0	2B10b	<0.1	0.002	0
1A2b	<0.1	0.003	0	2B6	<0.1	<0.001	0
1A2c	0.1	0.019	0	2C1	1.5	0.210	0
1A2d	7.0	0.990	0	2C2	0.5	0.070	0
1A2e	<0.1	0.009	0	2C3	<0.1	<0.001	0
1A2f	0.1	0.014	0	2C7a	<0.1	<0.001	0
1A2gvii	2.0	0.288	0	2C7c	<0.1	0.007	0
1A2gviii	0.9	0.128	0	2C7d	<0.1	<0.001	0
1A3ai(i)	<0.1	0.002	0	2D3b	0.4	0.061	0
1A3aii(i)	<0.1	<0.001	0	2D3d	<0.1	<0.001	0
1A3bi	1.6	0.231	0	2D3g	<0.1	0.002	0
1A3bii	1.5	0.208	0	2D3i	0.3	0.048	0
1A3biii	1.0	0.140	0	2G	0.4	0.055	0
1A3biv	0.1	0.020	0	2H1	1.2	0.165	0
1A3bvi	4.4	0.614	0	2H2	2.8	0.398	0
1A3bvii	3.2	0.454	0	2I	<0.1	<0.001	0
1A3c	0.2	0.026	0	2L	<0.1	0.007	0
1A3dii	2.2	0.316	0	3B1a	0.4	0.055	0
1A4ai	0.9	0.121	0	3B1b	0.3	0.046	0
1A4aii	0.6	0.088	0	3B2	<0.1	0.001	0
1A4bi	50.8	7.144	0	3B3	<0.1	0.002	0
1A4bii	0.9	0.129	0	3B4d	<0.1	<0.001	0
1A4ci	1.1	0.155	0	3B4e	<0.1	0.006	0
1A4cii	1.1	0.152	0	3B4gi	<0.1	0.011	0
1A4ciii	0.3	0.041	0	3B4gii	<0.1	0.009	0
1A5a	2.0	0.284	0	3B4giii	<0.1	0.003	0

1B1b	<0.1	0.005	0	3B4giv	<0.1	0.009	0
1B1c	2.6	0.369	0	3B4h	<0.1	0.007	0
1B2aiv	<0.1	0.001	0	3Dc	1.5	0.213	0
1B2av	<0.1	<0.001	0	3F	1.1	0.156	0
2A2	<0.1	<0.001	0	5A	<0.1	<0.001	0
2A3	<0.1	0.003	0	5C1bv	<0.1	0.001	0
2A5a	<0.1	<0.001	0	5E	0.7	0.095	0
2A5b	<0.1	0.003	0	Total	100	14.062	0

Figure 1.34 The contribution of different sources to PM2.5 emissions and data reported by the plants.

2.3.7.4 Black carbon (BC)

Emission trend

The trend of black carbon emissions is presented in Figure 1.35.

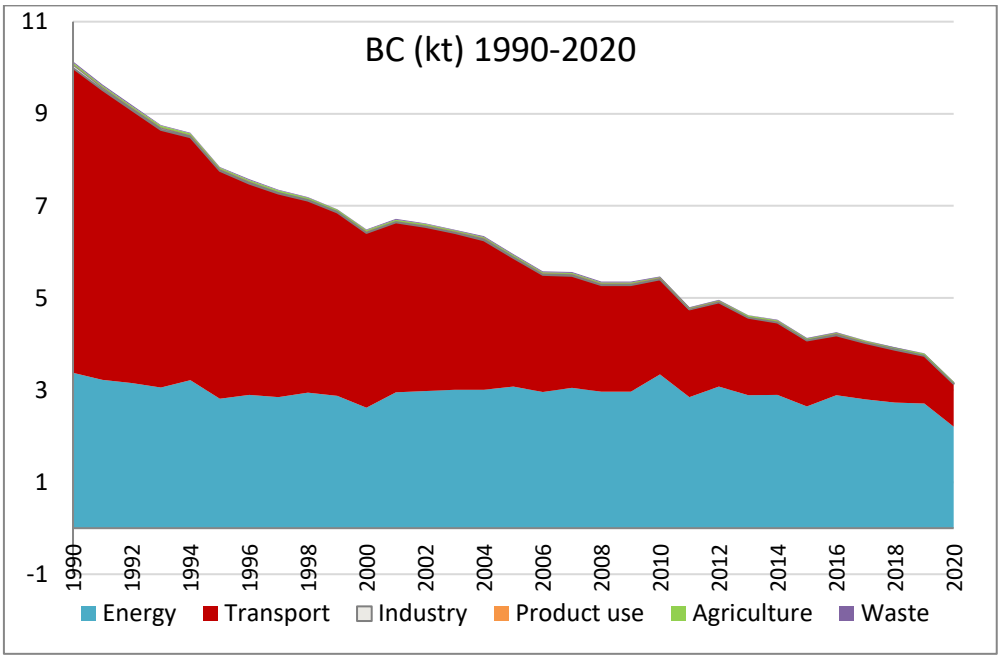
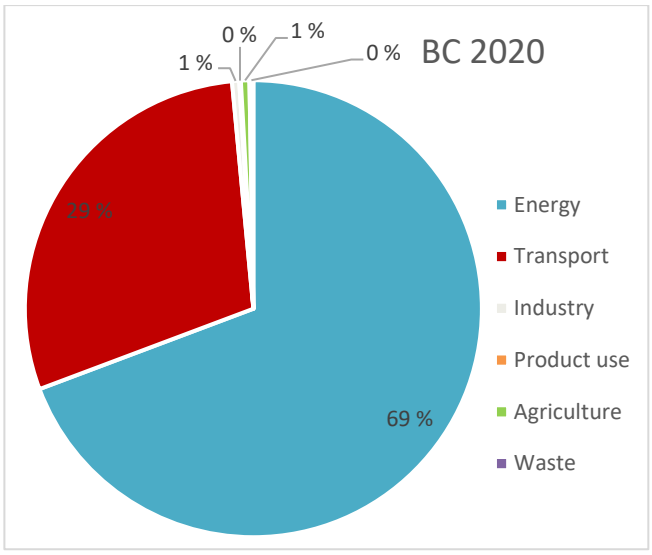


Figure 1.35. BC emissions (kt) in 2000-2020

The uncertainties of emission data in 2019 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.36.



Shares of total BC emissions reported by the plants in 2020							
NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	0.4	0.011	0	1A4bi	64.5	2.052	0
1A1b	<0.1	<0.001	0	1A4bii	0.7	0.022	0
1A2a	<0.1	<0.001	0	1A4ci	0.3	0.009	0
1A2b	<0.1	<0.001	0	1A4cii	2.0	0.064	0
1A2c	0.2	0.005	0	1A4ciii	0.4	0.014	0
1A2d	0.2	0.005	0	1A5a	2.7	0.086	0
1A2e	<0.1	0.002	0	1B1b	<0.1	<0.001	0
1A2f	<0.1	0.002	0	2A2	<0.1	<0.001	0
1A2gvii	5.5	0.175	0	2A3	<0.1	<0.001	0
1A2gviii	0.2	0.006	0	2B10a	0.1	0.004	0
1A3ai(i)	<0.1	0.001	0	2B6	<0.1	<0.001	0
1A3aii(i)	<0.1	<0.001	0	2C1	<0.1	<0.001	0
1A3bi	3.7	0.117	0	2C2	0.2	0.007	0
1A3bii	3.6	0.114	0	2C3	<0.1	<0.001	0
1A3biii	2.3	0.074	0	2C7a	<0.1	<0.001	0
1A3biv	0.2	0.005	0	2D3b	0.1	0.003	0
1A3bvi	5.0	0.159	0	2D3i	<0.1	<0.001	0
1A3bvii	2.8	0.089	0	2G	<0.1	<0.001	0
1A3c	0.5	0.017	0	2H1	0.1	0.004	0
1A3dii	1.7	0.055	0	3F	0.6	0.019	0
1A4ai	0.8	0.024	0	5C1bv	<0.1	<0.001	0
1A4aii	0.7	0.024	0	5E	0.3	0.008	0
				Total	100	3.182	0

Figure 1.36. The contribution of different sources to BC emissions and data reported by the plants.

2.3.8 Heavy metals

The following heavy metals are included in the Finnish inventory: primary heavy metals, lead, cadmium and mercury, and in addition, arsenic, chromium, copper, nickel and zinc. The time series 1990-2019 are presented in Figure 1.37.

Selene is one of the non-obligatory heavy metals for reporting and as a full inventory has not yet been performed for selene, the national total is reported as NE although sector specific values exist and are reported. The same applies also to all other heavy metals prior to the year 1990 when the obligation for inventories starts.

The inventory includes bottom-up data, i.e. data reported by the plants on basis of reporting obligations in their environmental permits. Although a thorough recalculation of the time series has been carried out, there still is need to check the correct abatement techniques used especially for small boilers, currently part of these emissions are calculated as unabated. In addition, a project funded by the Nordic Council of Ministers is running in 2016-2022 to study emissions in the Nordic countries and to develop methodologies that better reflect the real emission levels.

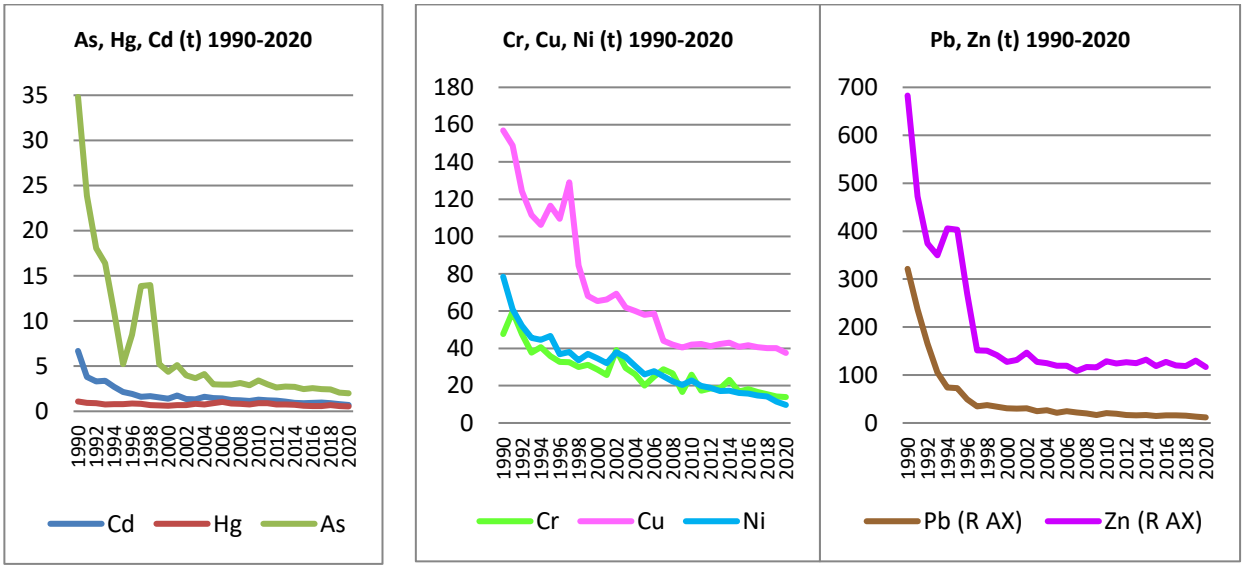


Figure 1.37. Heavy metal emission trends

The emission trends have been strongly decreasing (Figure 1.37) after the first reporting year 1990:

The main sources of heavy metal emissions in Finland are industrial processes and energy production. In both sources there can be large annual variations. For industrial processes the variations are due to changes in the production capacities and in the energy sector, the energy supply structure causes fluctuations. In the integrated Nordic electricity market the annual rainfall and accordingly the availability of cheap hydropower decreased the Finnish emissions in the early 1990's as well as in the turn of the millennium. After that, in years with limited availability of Nordic hydropower, coal and peat fuelled condensing power generation has increased and impacted emission levels.

Annual variations in the emissions are mainly due to fluctuations in the production of non-ferrous metals. In the energy sector, emissions are more stable though affected by the variations in energy production.

2.3.8.1 Arsenic emissions

Emission trend

Arsenic emissions have been reduced from 35 t in 1990 to 2 t in 2020.

The main source in the beginning of the 1990's was industrial processes (mainly non-ferrous metals), where the emissions have dropped considerably. The largest source at the moment is energy production where the energy supply structure causes fluctuations. The main source currently is combustion of wood in the residential sector (Figure 1.38).

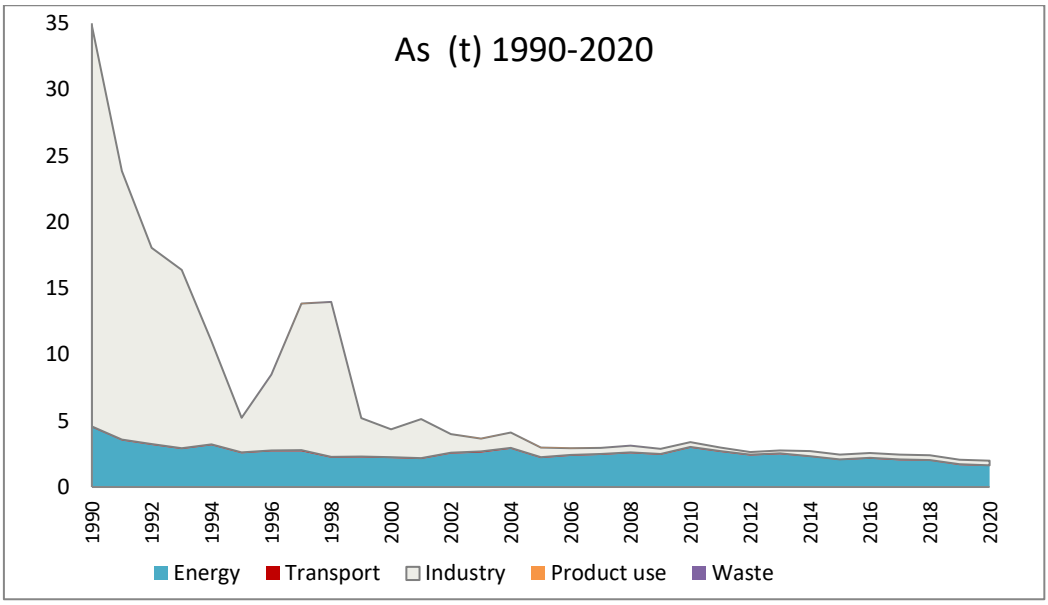
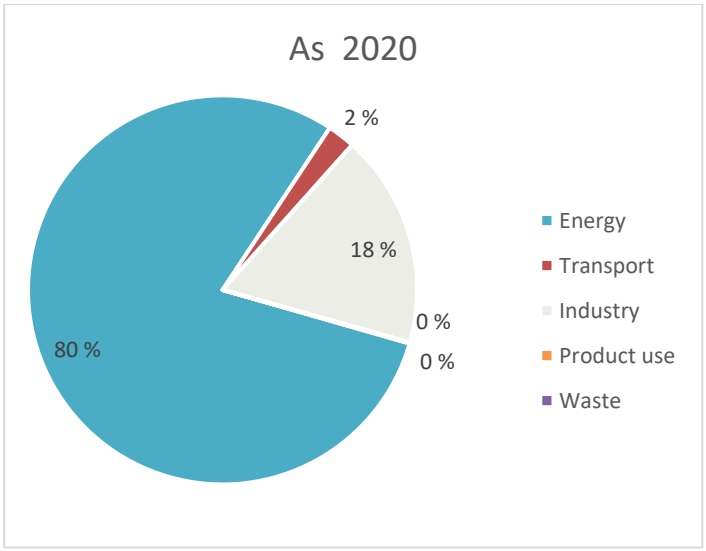


Figure 1.38. Arsenic emissions (t) in 1990-2020

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.39.



	Shares of total As emissions reported by the plants in 2020							
NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	
1A1a	1A1a	27.5	0.549	9.8	1A4bi	3.0	0.059	0
1A1b	1A1b	24.3	0.485	0	1A4ci	5.7	0.113	0
1A2a	1A2a	<0.1	<0.001	97.0	1A4ciii	<0.1	0.001	0
1A2b	1A2b	<0.1	<0.001	0	1A5a	1.1	0.023	0
1A2c	1A2c	0.1	0.002	0	1B1b	0.3	0.006	100
1A2d	1A2d	7.7	0.154	9.0	2C1	3.5	0.069	100
1A2e	1A2e	2.7	0.053	5.8	2C2	<0.1	<0.001	100
1A2f	1A2f	5.3	0.105	0.8	2C3	<0.1	<0.001	0
1A2gviii	1A2gviii	1.5	0.029	4.1	2C6	1.0	0.020	100
1A3bi	1A3bi	<0.1	<0.001	0	2C7a	2.8	0.056	80.8
1A3bii	1A3bii	<0.1	<0.001	0	2C7c	10.4	0.207	100
1A3biii	1A3biii	<0.1	<0.001	0	2G	<0.1	<0.001	0
1A3biv	1A3biv	<0.1	<0.001	0	3F	<0.1	<0.001	0
1A3bvi	1A3bvi	2.1	0.041	0	5C1bv	<0.1	<0.001	0
1A3dii	1A3dii	0.1	0.003	0	5E	<0.1	<0.001	0
1A4ai	1A4ai	0.6	0.013	0	**Total**	**100**	**1.993**	**21.2**

Figure 1.39 The contribution of different sources to AS emissions and data reported by the plants.

2.3.8.2 Cadmium emissions

Emission trend

Cadmium emissions have been reduced from 7 t in 1990 to 0.7 t in 2020.

The main sources of cadmium are industrial processes and energy production. The emissions fluctuate annually depending on the consumption of fossil fuels and production rates in manufacturing industries. (Figure 1.40).

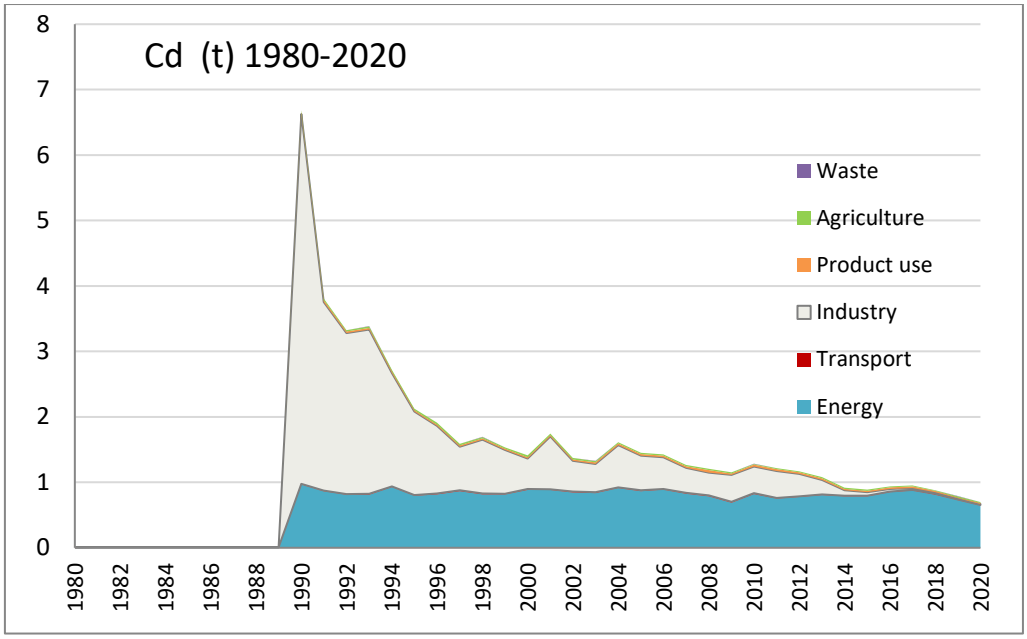
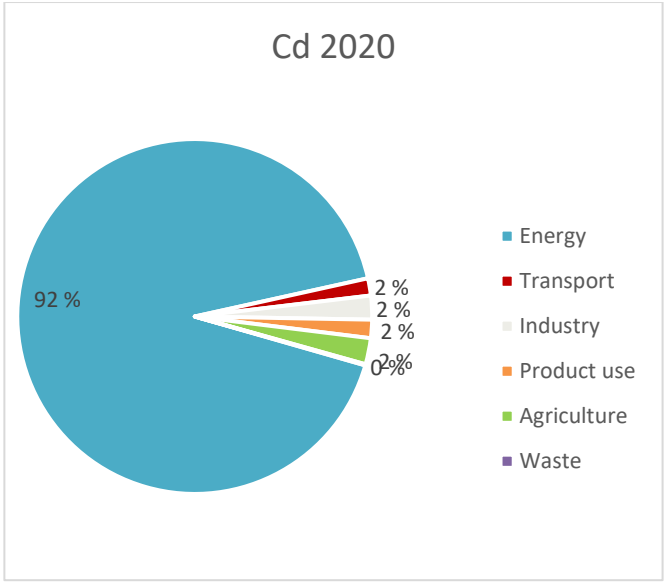


Figure 1.40. Emissions of cadmium (t) in 1990-2020.

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.41.



Shares of total Cd emissions reported by the plants in 2020							
NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	16.5	0.116	18.5	1A4aii	0.1	0.001	0
1A1b	9.6	0.067	0	1A4bi	20.4	0.142	0
1A2a	<0.1	<0.001	51.6	1A4bii	<0.1	<0.001	0
1A2b	<0.1	<0.001	0	1A4ci	3.7	0.026	0
1A2c	<0.1	<0.001	0	1A4cii	0.3	0.002	0
1A2d	23.0	0.161	4.2	1A4ciii	<0.1	<0.001	0

1A2e	0.4	0.003	3.9	1A5a	11.9	0.083	0
1A2f	2.2	0.015	3.4	1B1b	<0.1	<0.001	100
1A2gvii	0.5	0.004	0	2C1	0.6	0.004	100
1A2gviii	2.9	0.021	0.7	2C2	<0.1	<0.001	100
1A3bi	<0.1	<0.001	0	2C3	<0.1	<0.001	0
1A3bii	<0.1	<0.001	0	2C6	1.4	0.010	100
1A3biii	<0.1	<0.001	0	2C7a	<0.1	<0.001	100
1A3biv	<0.1	<0.001	0	2C7c	0.2	0.001	100
1A3bvi	0.2	0.002	0	2G	1.7	0.012	0
1A3c	<0.1	<0.001	0	3F	2.4	0.017	0
1A3dii	<0.1	<0.001	0	5C1bv	<0.1	<0.001	0
1A4ai	1.3	0.009	0	5E	<0.1	<0.001	0
				Total	100	0.7	6.4

Figure 1.41. The contribution of different sources to Cd emissions and data reported by the plants.

2.3.8.3 Chromium emissions

Emission trend

Chromium emissions have been reduced from 48 t in 1990 to 14 t in 2019.

Both energy production and industrial processes contribute the annual releases. Emissions from industrial processes have large annual variations due to variations in the production volumes, also the energy supply structure causes fluctuations. (Figure 1.42).

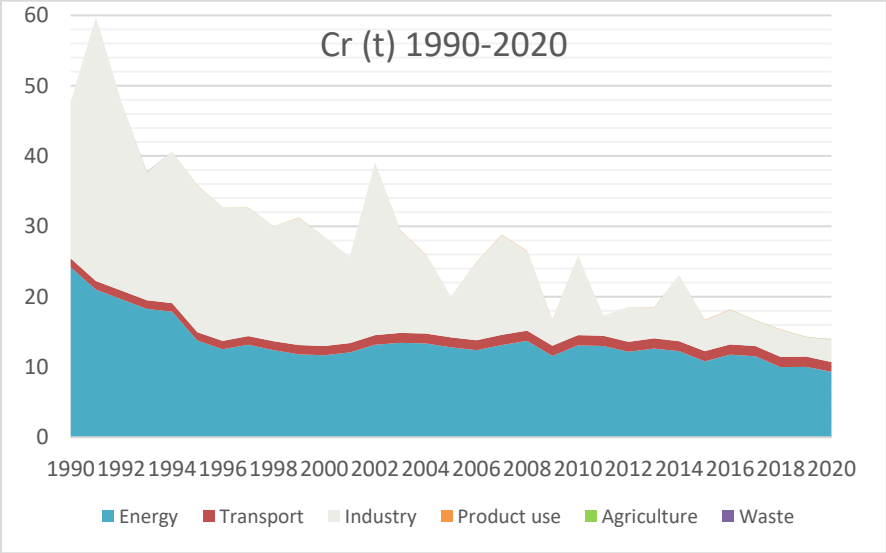
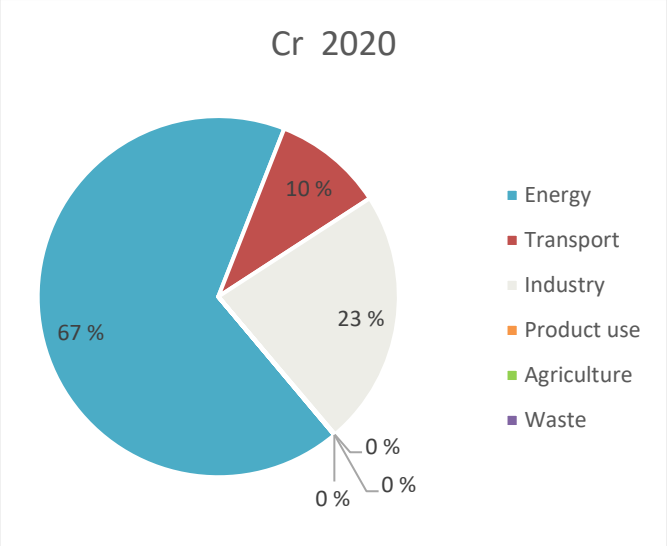


Figure 1.42. Emissions of chromium (t) in 1990-2020.

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.43.



Shares of total Cr emissions reported by the plants in 2020							
NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	9.4	1.307	13.2	1A4ai	0.8	0.115	0
1A1b	26.8	3.728	0	1A4aii	<0.1	0.005	0
1A2a	<0.1	<0.001	31.4	1A4bi	12.1	1.679	0
1A2b	1.4	0.198	0	1A4bii	<0.1	0.003	0
1A2c	<0.1	0.004	0	1A4ci	3.2	0.440	0
1A2d	1.3	0.182	64.5	1A4cii	<0.1	0.012	0
1A2e	0.8	0.104	1.8	1A4ciii	<0.1	0.002	0
1A2f	5.9	0.825	2.9	1A5a	4.2	0.580	0
1A2gvii	0.1	0.018	0	1B1b	0.1	0.019	100
1A2gviii	1.0	0.137	1.9	2C1	16.2	2.254	100
1A3bi	<0.1	0.013	0	2C2	6.7	0.929	100
1A3bii	<0.1	0.003	0	2C7a	<0.1	<0.001	100
1A3biii	<0.1	0.011	0	2C7c	<0.1	0.009	100
1A3biv	<0.1	<0.001	0	2G	<0.1	0.007	0
1A3bvi	9.3	1.297	0	3F	<0.1	0.003	0
1A3c	<0.1	0.001	0	5C1bv	<0.1	<0.001	0
1A3dii	<0.1	0.007	0	5E	<0.1	<0.001	0
				Total	100	13.893	25.4

Figure 1.43. The contribution of different sources to Cr emissions and data reported by the plants.

2.3.8.4 Copper emissions

Emission trend

Copper emissions have been reduced from 157 t in 1990 to 38 t in 2020.

The main sources of copper emissions are industrial processes and transport. In the industrial processes sector emissions from metal industry have the largest contribution and the emissions vary depending on the annual production rates. Also, the national energy supply structure causes fluctuations to emissions. (Figure 1.44)

Emissions from the industry sector have been decreased due to improvements in processes and abatement technology.

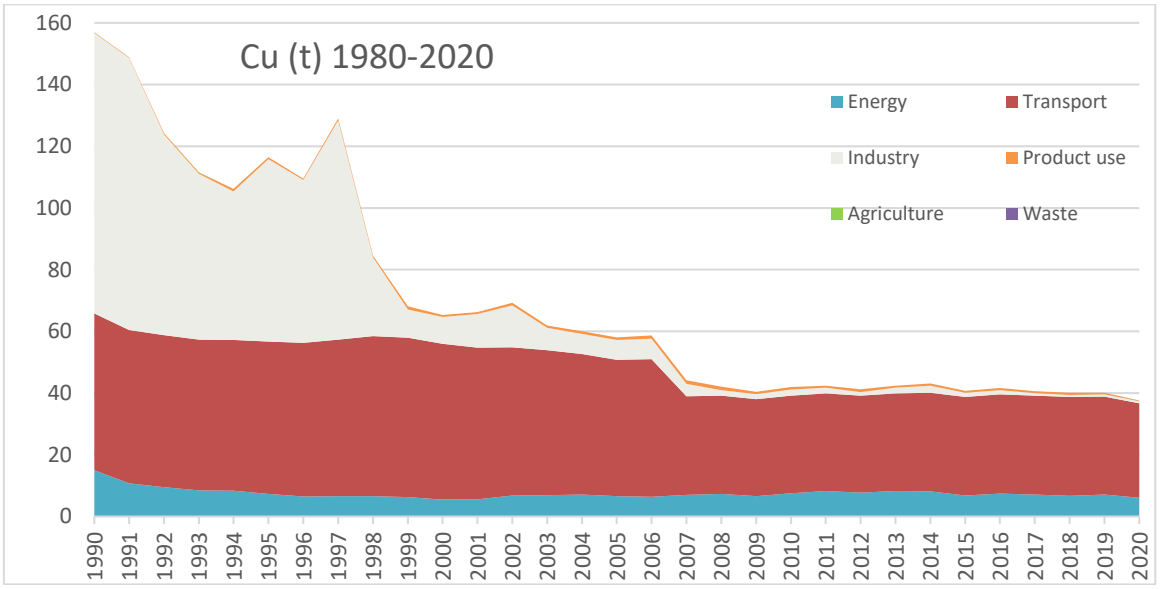
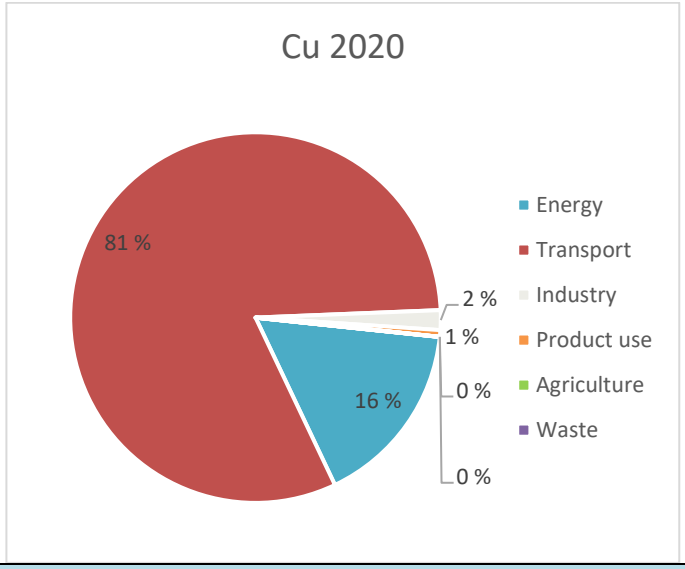


Figure 1.44. Emissions of copper (t) 1990-2020.

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.45.



Shares of total Cu emissions reported by the plants in 2020							
NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	5.6	2.103	9.1	1A4aii	0.5	0.172	0
1A1b	3.5	1.305	0	1A4bi	0.8	0.316	0
1A2a	<0.1	<0.001	44.3	1A4bii	0.3	0.098	0

1A2b	<0.1	<0.001	0	1A4ci	0.9	0.329	0
1A2c	<0.1	0.004	0	1A4cii	1.1	0.406	0
1A2d	1.3	0.480	83.5	1A4ciii	<0.1	0.006	0
1A2e	0.4	0.144	1.2	1A5a	2.3	0.851	0
1A2f	0.8	0.314	10	1B1b	<0.1	0.022	100
1A2gvii	1.7	0.627	0	2B10a	<0.1	0.005	100
1A2gviii	0.6	0.207	1.1	2C1	1.0	0.379	100
1A3bi	<0.1	0.009	0	2C2	<0.1	0.024	100
1A3bii	<0.1	0.002	0	2C6	<0.1	0.017	100
1A3biii	<0.1	0.008	0	2C7a	<0.1	0.002	100
1A3biv	<0.1	<0.001	0	2C7c	0.6	0.220	100
1A3bvi	77.7	29.200	0	2G	0.6	0.218	0
1A3c	<0.1	0.034	0	3F	<0.1	0.001	0
1A3dii	<0.1	0.013	0	5C1bv	<0.1	<0.001	0
1A4ai	0.1	0.040	0	5E	<0.1	0.002	0
				Total	100	37.559	3.5

Figure 1.45. The contribution of different sources to Cu emissions and data reported by the plants.

2.3.8.5 Lead emissions

Emission trend

Lead emissions have been reduced from 321 t in 1990 to 12 t in 2020.

The main source of lead in the beginning of the 1990's was the use of lead added to gasoline being 1211 tonnes in 1980 and 192 tonnes in 1990 and coming down to 0 tonnes in 1994. Lead is still emitted from lubricant use in vehicles. Lead emissions from industrial processes (metal industry) have been significantly decreased since the mid-1990's. The largest source of lead at the moment is combustion of fuels and the emissions vary annually depending on changes in the annual energy supply structure.

The time series is presented in Figure 1.46

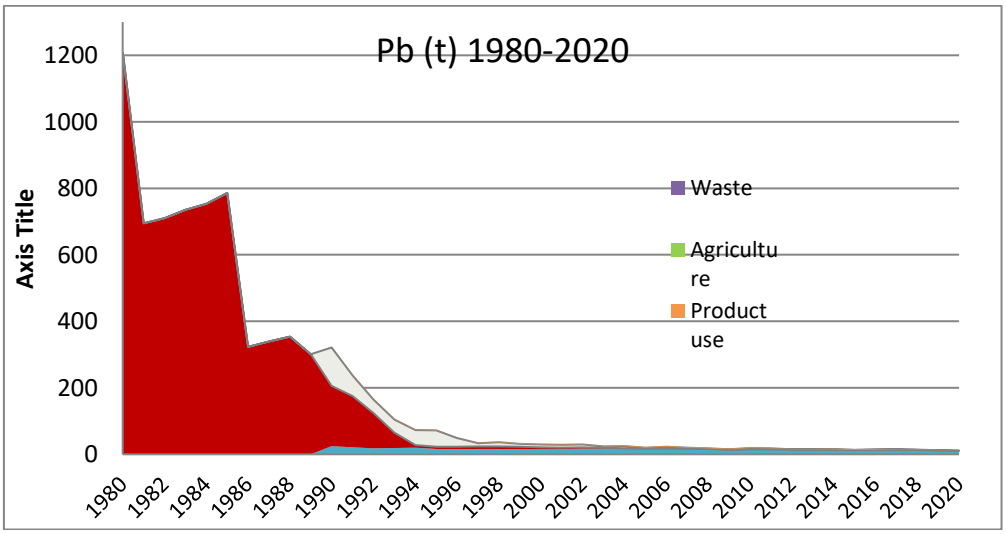
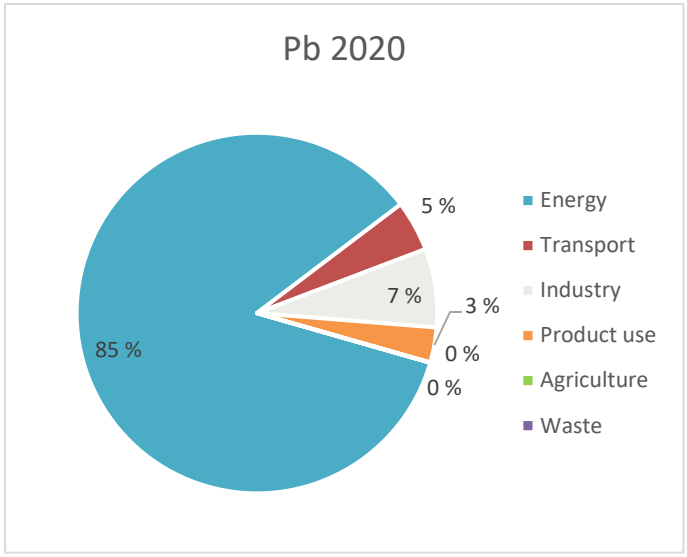
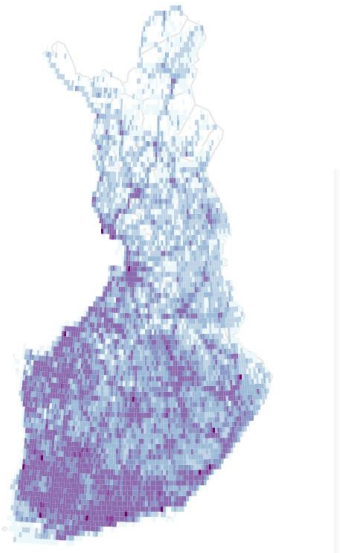


Figure 1.46. Pb emissions (Mg) in 1980-2020.

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.47.





Shares of total Pb emissions reported by the plants in 2020							
NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	14.5	1.684	15.2	1A4bi	4.3	0.499	0
1A1b	25.3	2.945	0	1A4ci	2.6	0.299	0
1A2a	<0.1	0.004	90.0	1A4ciii	<0.1	0.004	0
1A2b	<0.1	<0.001	0	1A5a	7.0	0.815	0
1A2c	0.2	0.027	0	1B1b	0.2	0.027	100
1A2d	22.0	2.564	5.8	2B10a	<0.1	0.001	0
1A2e	1.1	0.127	3	2C1	4.4	0.518	100
1A2f	5.7	0.667	4.4	2C2	<0.1	0.011	100
1A2gviii	1.6	0.182	0.5	2C3	<0.1	<0.001	100
1A3aii(i)	0.4	0.046	0	2C6	0.1	0.013	100
1A3bi	<0.1	0.002	0	2C7a	<0.1	0.002	11.9
1A3bii	<0.1	<0.001	0	2C7c	2.4	0.276	100
1A3biii	<0.1	<0.001	0	2G	3.1	0.365	0
1A3biv	<0.1	<0.001	0	3F	<0.1	0.002	0
1A3bvi	4.0	0.466	0	5C1bv	<0.1	<0.001	0
1A3dii	<0.1	0.009	0	5E	<0.1	<0.001	0
1A4ai	0.7	0.078	0	Total	100	11.636	11.1

Figure 1.47 The contribution of different sources to Pb emissions and data reported by the plants.

2.3.8.6 Mercury emissions

Emission trend

Mercury emissions have been reduced from 1 t in 1990 to 0.5 t in 2020.

The emissions are fluctuating annually depending on changes in the annual energy production structure and fluctuations in the industrial production volumes. (Figure 1.48)

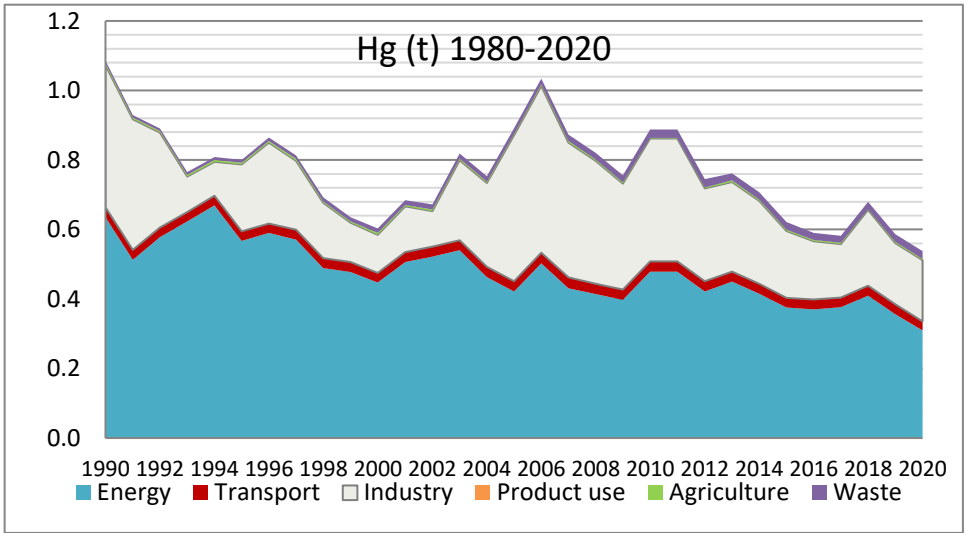
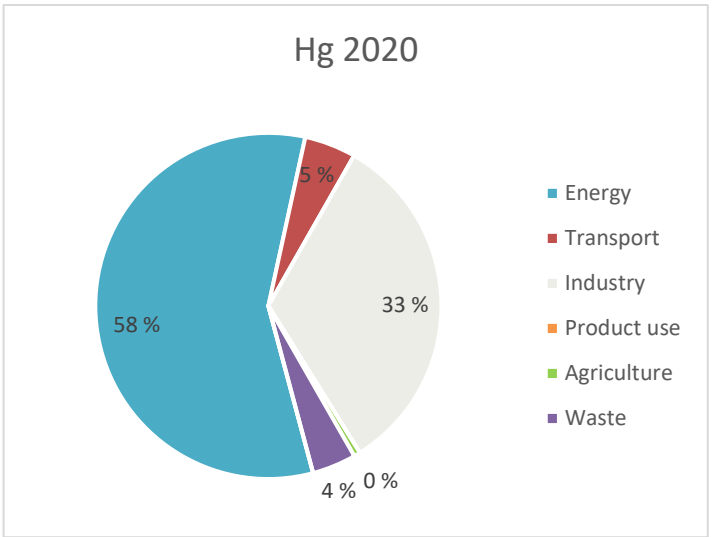


Figure 1.48. The emissions of mercury (t) in 1990-2020.

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.49.



Shares of total Hg emissions reported by the plants in 2020							
NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	19.6	0.105	50.9	1A4bi	4.5	0.024	0
1A1b	2.6	0.014	0	1A4ci	1.3	0.007	0
1A2a	<0.1	<0.001	0	1A4ciii	0.2	<0.001	0
1A2b	<0.1	<0.001	0	1A5a	1.6	0.009	0
1A2c	<0.1	<0.001	0	1B1b	<0.1	<0.001	0
1A2d	20.4	0.109	34.8	2B10a	6.5	0.035	0.9

1A2e	0.5	0.002	21.3	2C1	24.4	0.131	100
1A2f	4.7	0.025	88.2	2C2	0.4	0.002	100
1A2gviii	2.2	0.012	59	2C6	1.0	0.005	100
1A3bi	2.6	0.014	0	2C7a	<0.1	<0.001	0
1A3bii	0.3	0.002	0	2C7c	0.6	0.003	100
1A3biii	1.3	0.007	0	2G	<0.1	<0.001	0
1A3biv	<0.1	<0.001	0	3F	0.6	0.003	0
1A3dii	0.3	0.002	0	5C1bv	4.0	0.022	0
1A4ai	0.3	0.002	0	5E	<0.1	<0.001	0
				Total	100	0.538	49.0

Figure 1.49 The contribution of different sources to Hg emissions and data reported by the plants.

2.3.8.7 Nickel emissions

Emission trend

Nickel emissions have been reduced from 78 t in 1990 to 10 t in 2020.

The emission trend is decreasing (Figure 1.50) and the emissions are fluctuating annually depending on the consumption of fossil fuels and production rates in the manufacturing industries (mainly non-ferrous metals).

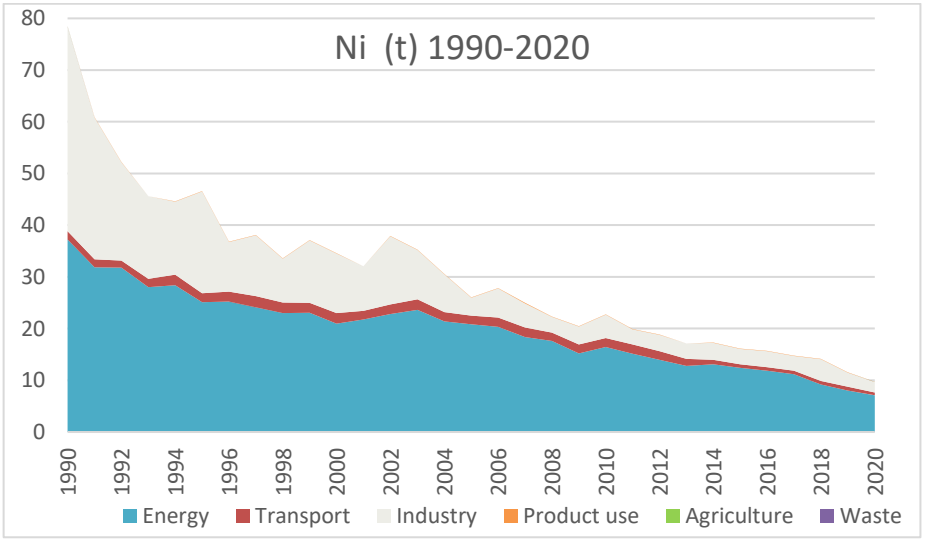
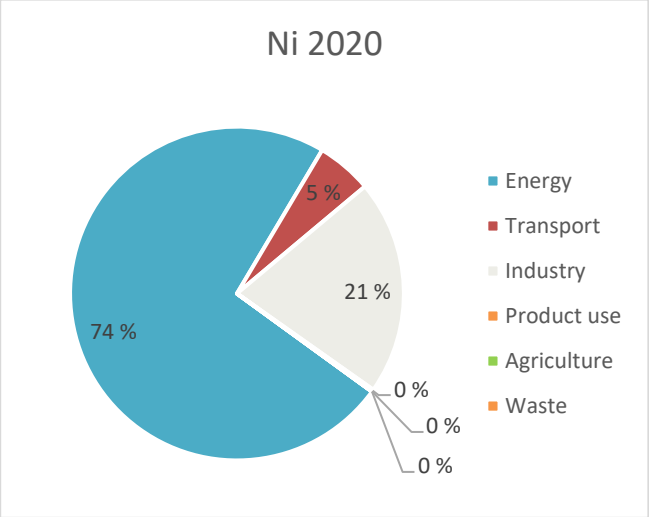


Figure 1.50. Nickel emissions (t) in 1990-2020.

The uncertainties of emission data in 2019 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.51.



Shares of total Ni emissions reported by the plants in 2020							
NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	14.8	1.432	18.0	1A4aii	<0.1	0.007	0
1A1b	0.2	0.016	19.3	1A4bi	15.0	1.448	0
1A2a	0.5	0.046	99.4	1A4bii	<0.1	0.004	0
1A2b	0.4	0.037	0	1A4ci	4.8	0.468	0
1A2c	3.0	0.291	0	1A4cii	0.2	0.017	0
1A2d	4.2	0.406	48.3	1A4ciii	0.3	0.031	0
1A2e	2.0	0.191	15.0	1A5a	14.3	1.381	0
1A2f	7.3	0.703	2.3	1B1b	0.2	0.018	100
1A2gvii	0.3	0.026	0	2B10a	0.5	0.047	100
1A2gviii	1.8	0.177	0.9	2C1	6.7	0.651	100
1A3bi	<0.1	0.003	0	2C2	0.4	0.035	100
1A3bii	<0.1	<0.001	0	2C7a	<0.1	<0.001	0
1A3biii	<0.1	<0.001	0	2C7b	13.1	1.266	100
1A3biv	<0.1	<0.001	0	2C7c	0.2	0.021	100
1A3bvi	1.9	0.186	0	2G	0.2	0.020	0
1A3c	<0.1	0.001	0	3F	<0.1	<0.001	0
1A3dii	2.5	0.245	0	5C1bv	<0.1	<0.001	0
1A4ai	5.2	0.503	0	Total	100	9.677	26.7

Figure 1.51 The contribution of different sources to Ni emissions and data reported by the plants.

2.3.8.8 Zinc emissions

Emission trend

Zinc emissions have been reduced from 682 t in 1990 to 117 t in 2020.

The main source until 1998 was industrial processes (metal industry), where significant reductions occurred annually after 1990. Emissions from energy production have been fluctuating due to changes in the annual energy supply structure. (Figure 1.52)

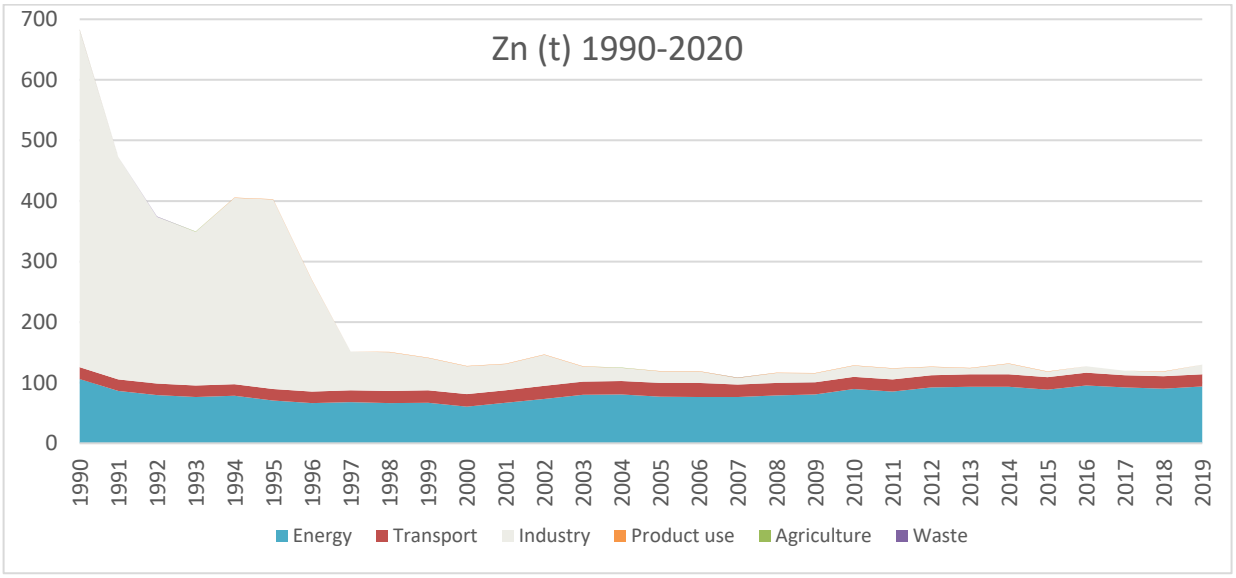
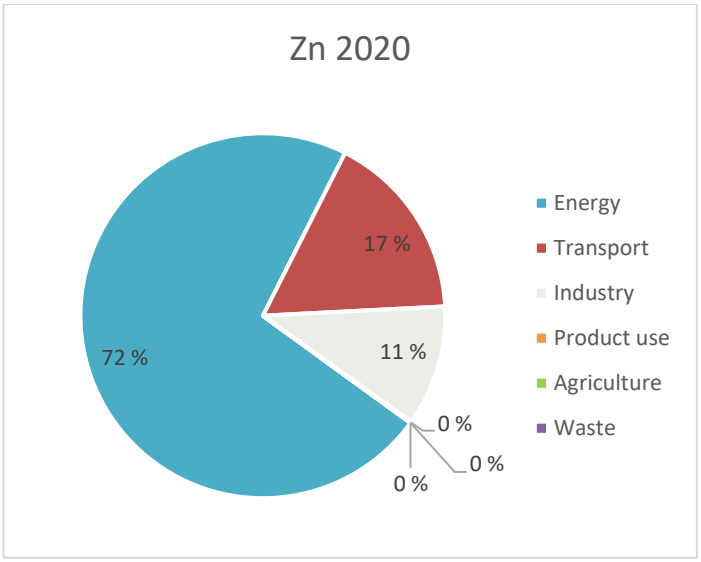
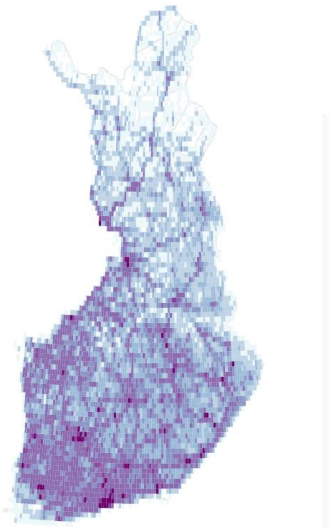


Figure 1.52. Emissions of zinc (t) in 1990-2020

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.53.





Shares of total Zn emissions reported by the plants in 2020							
NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	15.3	17.897	8.4	1A4aii	<0.1	0.101	0
1A1b	4.8	5.592	0	1A4bi	28.4	33.198	0
1A2a	<0.1	0.008	21.6	1A4bii	<0.1	0.058	0
1A2b	<0.1	<0.001	0	1A4ci	4.8	5.609	0
1A2c	<0.1	0.021	0	1A4cii	0.2	0.239	0
1A2d	1.7	1.935	22.8	1A4ciii	<0.1	0.037	0
1A2e	0.3	0.341	9.5	1A5a	9.9	11.571	0
1A2f	2.8	3.264	0	1B1b	<0.1	0.037	100
1A2gvii	0.3	0.369	0	2B10a	0.2	0.250	0
1A2gviii	2.8	3.242	0	2C1	1.5	1.784	100
1A3bi	<0.1	0.052	0	2C2	0.5	0.579	100
1A3bii	<0.1	0.005	0	2C3	<0.1	<0.001	100
1A3biii	<0.1	0.024	0	2C6	7.9	9.205	100

1A3biv	<0.1	0.001	0	2C7a	<0.1	0.002	100
1A3bvi	15.9	18.604	0	2C7c	0.6	0.688	100
1A3c	<0.1	0.020	0	2G	0.1	0.127	0
1A3dii	<0.1	0.077	0	3F	<0.1	0.014	0
1A4ai	1.8	2.058	0	5C1bv	<0.1	0.005	0
				Total	100	117.015	12.2

Figure 1.53. The contribution of different sources to Zn emissions and data reported by the plants

2.3.9 Persistent organic pollutants

The time series of PCDD/F, PAH-4, HCB and PCBs are presented in Figure 1.54.

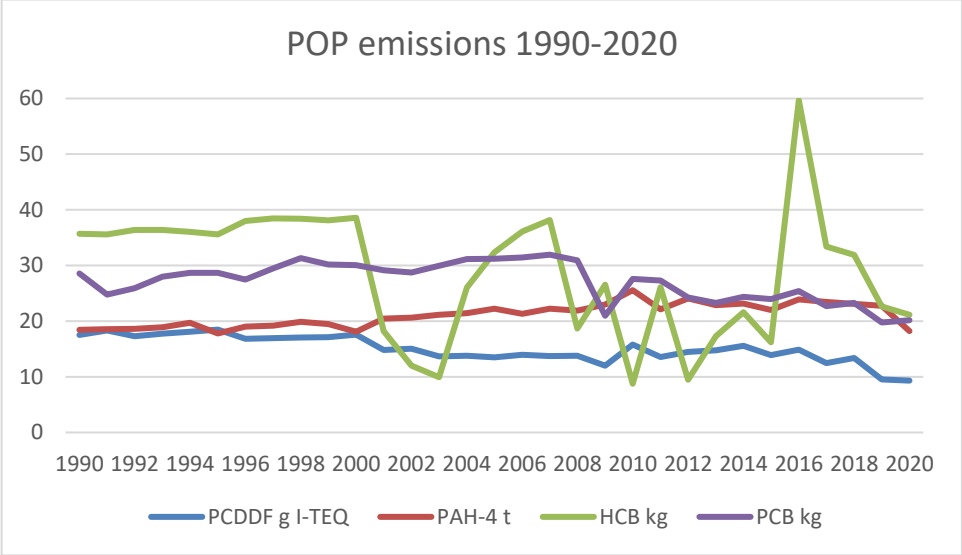


Figure 1.54. POP emissions (PCDD/F (gI-Teq), PAH-4 (t), HCB (kg) and PCB (kg)) emissions 1990–2020.

2.3.9.1 Polychlorinated dioxins and furanes, PCDD/F

Emission trend

PCDD/F emissions have been reduced from the level of 18 g I-Teq in 1990 to 9 g I-Teq in 2020. (Figure 1.55)

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.56.

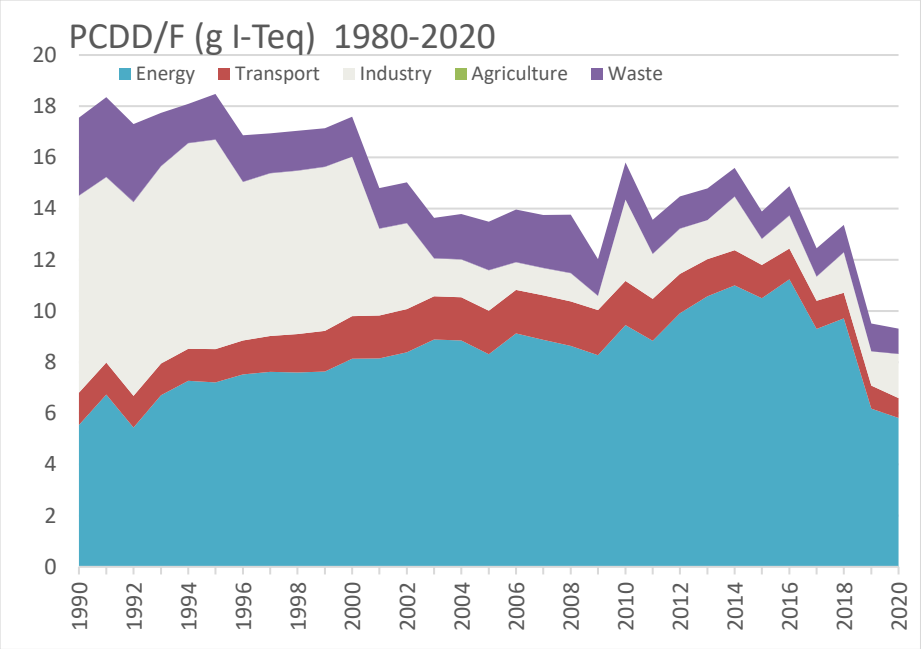
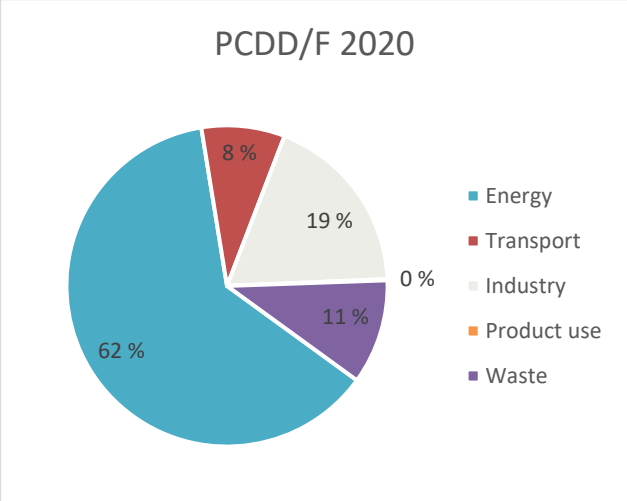
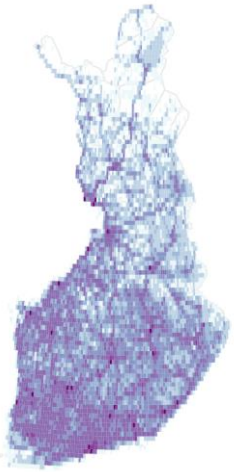


Figure 1.55. Emissions of PCDD/F (g I-Teq) in 1990-2020.





Shares of total PCDD/F emissions reported by the plants in 2020

NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	26.2	3.173	14.2	1A4ci	1.5	0.184	0
1A1a	33.1	3.079	14.1	1A4ci	1.9	0.181	0
1A1b	0.4	0.039	0	1A4ciii	<0.1	0.004	0
1A2a	<0.1	0.007	0	1A5a	3.8	0.354	0
1A2b	<0.1	0.001	0	1B1b	0.2	0.023	100
1A2c	<0.1	0.007	0	2A1	0.2	0.02	100
1A2d	8.6	0.804	43.4	2A2	0.3	0.026	0
1A2e	0.2	0.021	0	2A3	<0.1	<0.001	0
1A2f	0.1	0.014	31.7	2B10a	6.8	0.630	100
1A2gviii	2.3	0.214	7.3	2C1	7.7	0.721	100
1A3bi	5.5	0.509	0	2C3	<0.1	<0.001	0
1A3bii	1.8	0.164	0	2C6	0.7	0.065	0
1A3biii	0.8	0.075	0	2C7a	2.5	0.237	0.5
1A3biv	0.2	0.019	0	2D3b	0.1	0.011	0
1A3dii	0.1	0.010	0	2G	<0.1	<0.001	0
1A3ei	<0.1	<0.001	0	2L	0.2	0.022	0
1A4ai	0.7	0.067	0	5C1bv	<0.1	<0.001	0

1A4bi	10.8	1.002	0	5E	10.6	0.982	0
				Total	100	9.31	23.6

Figure 1.56. The contribution of different sources to PCDD/F emissions and data reported by the plants.

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

2.3.9.2 Polyaromatic hydrocarbons, PAH

Polyaromatic hydrocarbons under the CLRTAP convention are reported as the sum of four indicator substances (PAH-4), i.e. benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3_cd)pyrene as well as separately for the individual indicator substances.

The inventory of PAH indicator species was completed for all sources to the 2021 submission as requested by the NECD ERT in 2020. The level of PAH-4 emissions has increased substantially since the last submission due to the revision of the emission factors for small scale combustion (explained in detail under the Energy sector).

Emission trend

PAH-4 emissions have decreased from the level of 20 kt in the base year 1994 to 18 kt in 2020 (Figure 1.57).

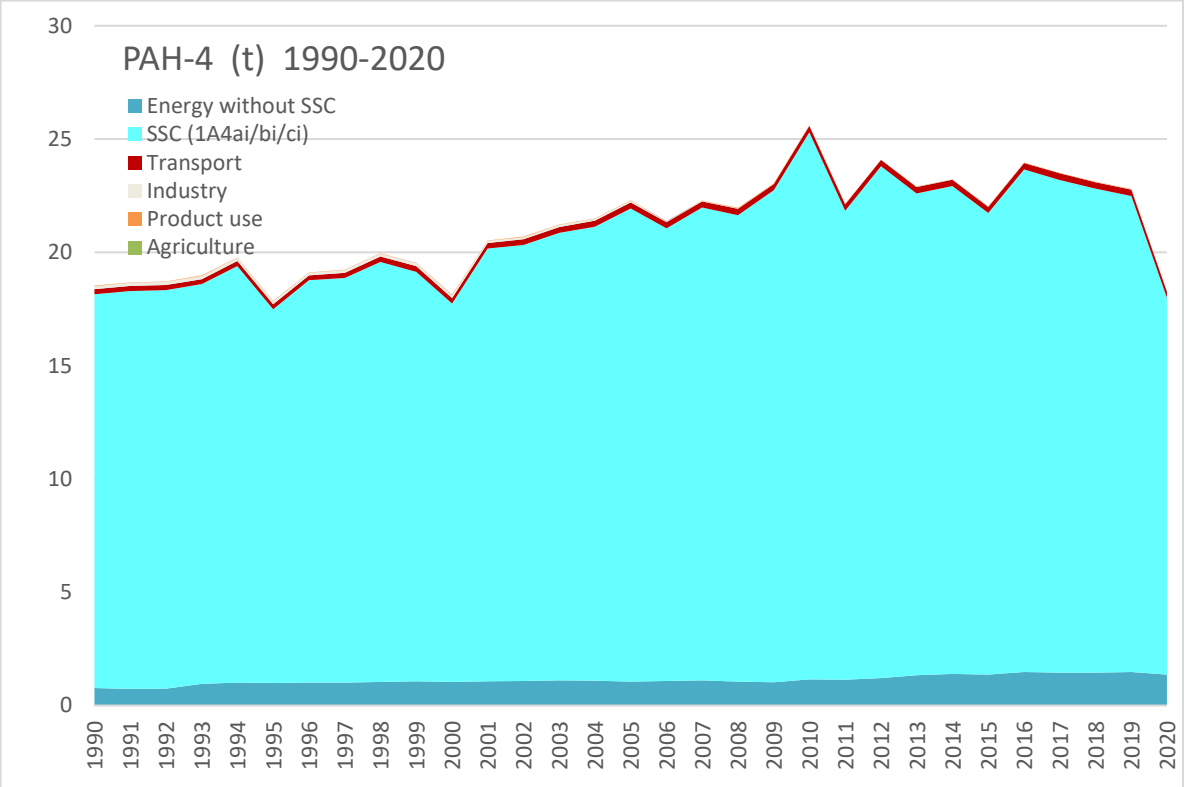
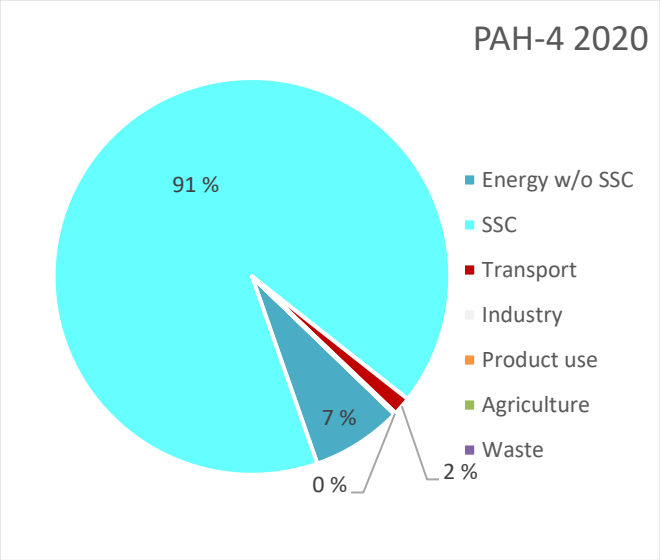


Figure 1.57. The emissions of PAH-4 (Mg) in 1990-2020 SSC stands for small scale wood combustion.

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.58.



Shares of total PAH-4 emissions reported by the plants in 2020							
NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	2.7	0.494	32.6	1A4ai	0.2	0.028	0
1A1b	<0.1	0.007	0	1A4aii	<0.1	0.008	0
1A2a	<0.1	<0.001	0	1A4bi	90.9	16.586	0
1A2b	<0.1	0.002	0	1A4bii	<0.1	0.005	0
1A2c	<0.1	0.003	1.2	1A4ci	<0.1	0.017	0
1A2d	1.0	0.178	50.1	1A4cii	0.1	0.019	0
1A2e	<0.1	0.003	0	1A5a	0.4	0.065	0
1A2f	<0.1	0.009	0	1B1b	2.2	0.404	0
1A2gvii	0.2	0.030	0	2A1	<0.1	<0.001	0
1A2gviii	0.8	0.149	0	2C1	<0.1	0.009	0
1A3bi	0.5	0.085	0	2C2	<0.1	<0.001	0
1A3bii	<0.1	0.017	0	2D3i	<0.1	0.011	0
1A3biii	0.6	0.105	0	2G	<0.1	<0.001	0
1A3biv	<0.1	0.001	0	3F	<0.1	<0.001	0
1A3c	<0.1	0.002	0	5C1bv	<0.1	0.001	0
				Total	100	18.239	1.4

Figure 1.58 The contribution of different sources to PAH-4 emissions and data reported by the plants.

2.3.9.3 Hexachlorobenzene, HCB

Emission trend

HCB emissions have been reduced from the base year 1994 level of 36 kt to 21 kt in 2020.

The emission trend is dominated by the fluctuations in the industrial processes sector and may be overestimated for the other sources due to the highly uncertain methods. (Figure 1.59).

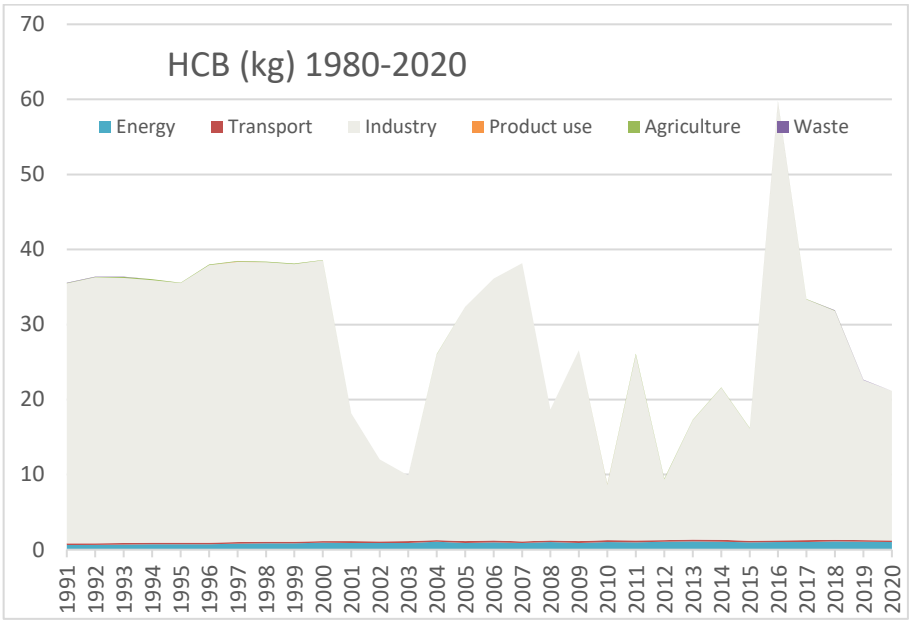
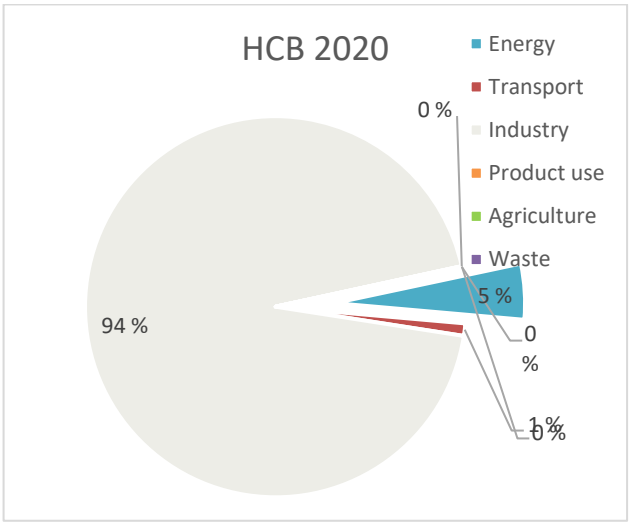


Figure 1.59. Emissions of HCB (kg) in 1990-2020

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.60.



Sares of total HCB emissions reported by the plants in 2020							
NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	2.0	0.424	0	1A4ai	<0.1	0.014	0
1A2a	<0.1	<0.001	0	1A4bi	1.1	0.237	0
1A2b	<0.1	<0.001	0	1A4ci	0.2	0.038	0
1A2c	<0.1	<0.001	0	1A4ciii	<0.1	0.002	0
1A2d	0.6	0.125	0	1A5a	<0.1	0.017	0
1A2e	<0.1	0.001	0	2B10a	62.4	13.200	100
1A2f	<0.1	0.001	0	2C1	<0.1	0.016	0
1A2gviii	0.7	0.141	0	2C3	0.2	0.033	0
1A3bi	0.5	0.114	0	2C7a	31.5	6.673	0
1A3bii	<0.1	0.018	0	2D3i	<0.1	0.001	0
1A3biii	0.4	0.081	0	3Df	<0.1	0.010	0

1A3biv	<0.1	0.002	0	5C1bv	<0.1	0.005	0
1A3dii	<0.1	0.005	0	Total	100	21.163	62.4

Figure 1.60 The contribution of different sources to HCB emissions and data reported by the plants.

2.3.9.4 Polychlorinated biphenyls, PCBs

Emission trend

Emissions of PCBs have been reduced from the level of 29 kt in base year 1994 to 20 kt in 2020.

The PCB emission trend (Figure 1.61) is fluctuating mainly due to changes in emission levels in the IPPU sector.

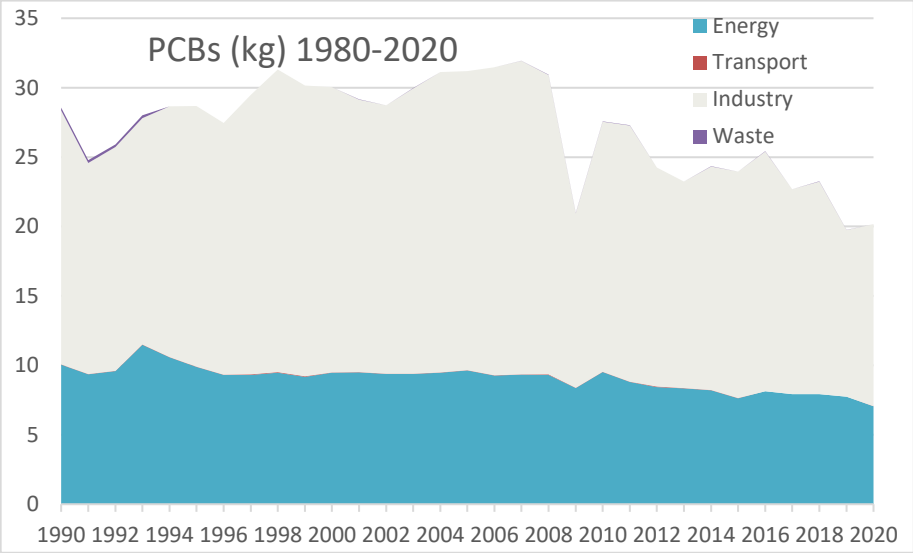
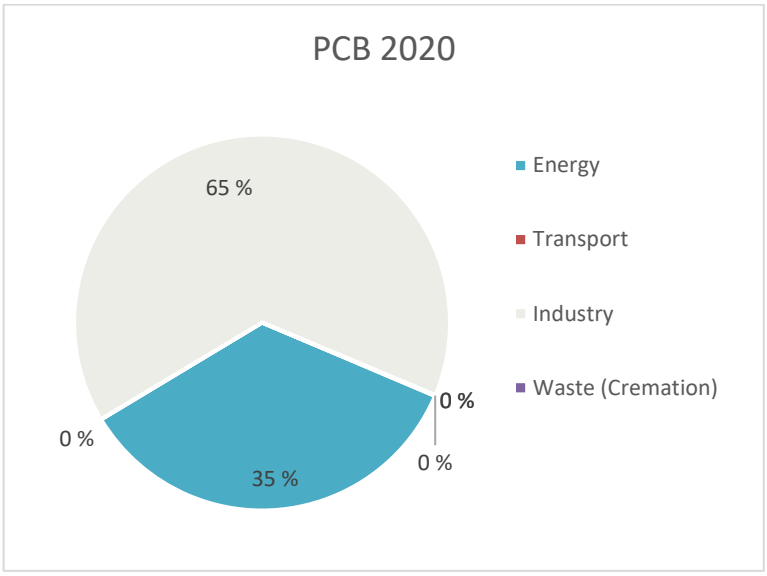


Figure 1.61. Emissions of PCB (kg) in 1990-2020.

The uncertainties of emission data in 2020 are presented in Annex 7 of the IIR.

The contribution of different sources to emissions, the spatial distribution of emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Figure 1.67.



Shares of total PCB emissions reported by the plants in 2020							
NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [Gg]	Percentage reported by the plants
1A1a	1.5	0.297	0	1A4ai	0.9	0.173	0
1A2a	0.6	0.118	0	1A4bi	14.1	2.842	0
1A2b	0.2	0.034	0	1A4ci	2.2	0.443	0
1A2c	<0.1	<0.001	0	1A4ciii	<0.1	0.001	0
1A2d	0.4	0.087	0	1B1b	13.6	2.742	0
1A2e	0.3	0.066	0	2A1	14.3	2.878	0
1A2f	1.1	0.230	0	2A2	<0.1	<0.001	0
1A2gviii	0.1	0.026	0	2C1	50.2	10.12	49.4
1A3bi	<0.1	<0.001	0	2C3	0.4	0.087	0
1A3bii	<0.1	<0.001	0	2C7a	<0.1	<0.001	0
1A3biii	<0.1	<0.001	0	2C7c	<0.1	0.012	0
1A3biv	<0.1	<0.001	0	5C1bv	<0.1	0.014	0
1A3dii	<0.1	0.006	0	Total	100	20.176	24.8

Figure 1.62 The contribution of different sources to emissions of PCBs and data reported by the plants.

2.3.9.5 Polychlorinated biphenols PCP

Emission trend

PCP emissions were earlier, but not currently requested to be reported under the CLRTAP. Emissions of PCP originate mainly in the waste sector (Figure 1.63).

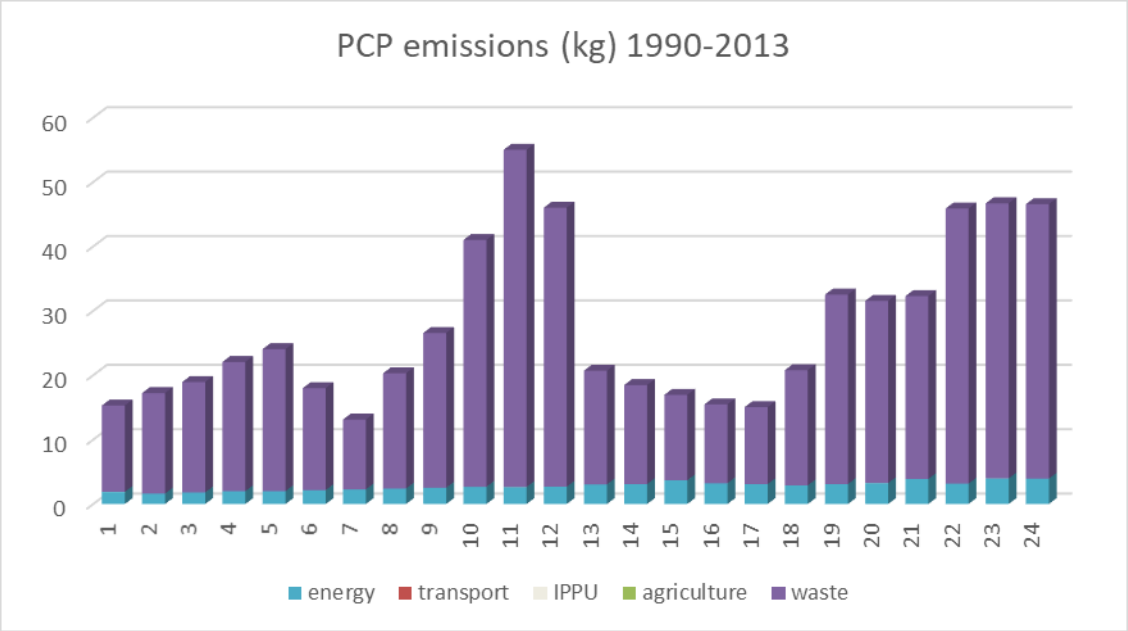


Figure 1.63. Emissions of PCP (kg) in 1990-2007.

Emissions in 2007

PCP emissions in 2013 emissions were 46.6 kg. The contribution of different sources to emissions and the shares of data reported by operators of industrial plants of total emissions are presented in Table 1.19 (The information for PCP will be updated to the next submission)

Table 1.19. PCP emissions, the share of emissions reported by the plants of the total emissions by NFR categories in 2007.

NFR	Percentage of national total	Total release [kg]	Percentage reported by the plants	NFR	Percentage of national total	Total release [kg]	Percentage reported by the plants
1A1a	4.3	2.025	0	1A4ci	0.4	0.170	0
1A2gviii	1.3	0.590	0	2C7c	<0.1	0.003	0
1A4ai	<0.1	0.004	0	5C1a	91.5	42.595	0
1A4bi	2.4	1.140	0	5C1bi	<0.1	0.040	0
				Total	**100**	**152.046**	**2.6**

2.3.9.6 Short chain chlorinated paraffins, SCCP

According to studies carried out at the Finnish Environment Institute SCCP emissions from the industrial processes sector deceased after 1995 totalling around 0.02 kilogrammes during 1990-1995. SCCP emissions from the use of products were not included in the inventory because no methodology exists at the moment. Further work to develop estimation methods and quantify emissions will be carried out when resources allow.

2.4 Description and interpretation of emissions by source

The sources of the air pollutant emissions are reported in the NFR (Nomenclature for Reporting) classification: energy (NFR 1), industrial processes (NFR 2), solvent and other product use (NFR 3), agriculture (NFR 4) and waste (NFR 6).

More detailed information of the contribution of different sources to the emissions of the specific air pollutants is provided in Chapter 3.2 Description and interpretation of emission trends by pollutants.

NFR 1 Sulphur dioxide (SO_2) emissions are mainly due to fuel combustion in the energy industries. Nitrogen oxides (NO_2) and carbon monoxide (CO) are generated both in the energy industries and in the traffic sector. NMVOC and POP emissions are released mainly from small combustion processes in the energy sector.

The emissions in the energy sector have varied considerably throughout the 1990's with an overall slightly increasing trend being visible.

NFR 2 Industrial processes release mainly heavy metals and POP compounds from production of iron, steel and non-ferrous metals as well as SO_2 from wood processing industries and NMVOC from the chemical industry.

The trends are in general decreasing but variations due to fluctuations in production occur annually.

Solvent and other product use emit mainly NMVOC compounds. Paint application and printing are the most significant NMVOC sources, since 2020 also use of hand desinfectants due to the pandemic. Small amounts of particles are generated in spray painting, barbeques, meat frying, tobacco smoking, fires and fire works. The trends of both NMVOC and particulate matter emissions are decreasing.

NFR 3 Agriculture is the main source of ammonia emissions in Finland. The main sources of NH_3 are manure management and application of fertilizers. The annual emissions have been reduced compered to emissions level in 1990 due to strong decreases in the number of livestock, and in nitrogen fertilisation. The decreasing emission trend will be safeguarded in the EU common agricultural policy by adopting support measures encouraging production that minimises the burden on the greenhouse gas balance.

NFR 5 The emissions from the waste sector include NMVOC emissions from solid waste disposal on land, from wastewater treatment and composting. Particulate matter emissions from waste incineration are included. Emissions from waste incineration (reported by the operators) are included (NO_x, CO, NMVOC, SO_2, particles, heavy metals, PCB, PCDD/F, and PAH-4).

Detailed information of the emissions under the NFR categories is presented in Sections 4-10 as well as information of the source sector specific emissions and the calculation methodologies.

APPENDIX 1A

Level and Trend Key Category Analysis to the 2022 Submission

Level analysis

The key category assessment by level for the 2022 submission is presented below.

NO_x

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A2d	Biomass	11.531	11.531	Yes	3B1b		0.140	98.184	
1A3biii	Diesel oil	8.782	20.313	Yes	1A2d	Other	0.140	98.324	
1A3bi	Diesel oil	8.171	28.485	Yes	1A2b	Liquid	0.123	98.446	
1A1a	Biomass	6.766	35.251	Yes	1A4ci	Peat	0.122	98.569	
3Da1		5.290	40.541	Yes	1A1b	Liquid	0.106	98.675	
1A2gvii	Liquid	4.970	45.511	Yes	3Da2b		0.105	98.779	
1A3dii	Liquid	4.514	50.024	Yes	1A1b	Solid	0.087	98.867	
1A3bii	Diesel oil	3.766	53.791	Yes	3B4gii		0.083	98.950	
1A4bi	Biomass	3.595	57.385	Yes	1A2gvii	Gaseous	0.082	99.031	
1A1a	Peat	3.284	60.669	Yes	1A3bii	Gasoline	0.081	99.113	
3Da2a		2.792	63.462	Yes	1A2gviii	Peat	0.071	99.184	
1A2a	Gaseous	2.279	65.741	Yes	1A3aii(i)	Liquid	0.070	99.254	
1A4cii	Liquid	2.273	68.014	Yes	1A2e	Liquid	0.062	99.315	
1A1a	Solid	2.225	70.239	Yes	3F		0.059	99.375	
1A3bi	Gasoline	2.134	72.373	Yes	1A4bi	Gaseous	0.052	99.426	
1A4ciii	Liquid	1.631	74.004	Yes	1A4ai	Gaseous	0.048	99.474	
1A1b	Gaseous	1.573	75.577	Yes	1A2e	Solid	0.047	99.521	
1A5a	Biomass	1.562	77.139	Yes	3B4gi		0.045	99.565	
1A5a	Liquid	1.523	78.662	Yes	3B1a		0.043	99.609	
1A1a	Gaseous	1.318	79.981	Yes	1A2e	Biomass	0.038	99.646	
1A3c	Liquid	1.308	81.289	Yes	1A2b	Solid	0.037	99.683	
1A1a	Other	1.296	82.585		1A3biv	Diesel oil	0.036	99.720	
1A4aii	Liquid	1.187	83.772		1A2d	Solid	0.036	99.756	
1A2f	Solid	1.165	84.937		3B4h		0.032	99.789	
1A2d	Gaseous	1.130	86.067		1A2b	Gaseous	0.031	99.819	
1A2d	Liquid	0.976	87.043		3B4e		0.029	99.848	
1A4bii	Liquid	0.839	87.882		1A2e	Gaseous	0.024	99.872	
1A2gviii	Biomass	0.821	88.703		1A2f	Biomass	0.018	99.890	
1A2c	Liquid	0.770	89.473		1A2a	Liquid	0.014	99.904	
1A4ai	Liquid	0.769	90.242		1A4bi	Peat	0.013	99.917	
1A2d	Peat	0.716	90.959		1A4ci	Solid	0.012	99.929	
1A4bi	Liquid	0.705	91.664		1A4ai	Peat	0.011	99.940	
1A4ci	Biomass	0.569	92.233		1A3biii	Gaseous	0.011	99.951	
3Da3		0.564	92.797		3B4giii		0.008	99.959	
1A2c	Gaseous	0.481	93.278		3B2		0.008	99.967	
1A2a	Solid	0.464	93.743		1A3bi	Gaseous	0.006	99.973	
1A1a	Liquid	0.453	94.196		1A4ci	Gaseous	0.005	99.978	
1A2gviii	Other	0.442	94.638		3B3		0.005	99.983	
2B2		0.406	95.044		1A2e	Other	0.005	99.988	
1A2f	Other	0.364	95.408		2G		0.004	99.991	
1A5a	Gaseous	0.337	95.745		3B4giv		0.003	99.995	
1A4ci	Liquid	0.335	96.080		1A2a	Biomass	0.002	99.997	
1A2f	Gaseous	0.302	96.381		1A3ei	Gaseous	0.001	99.998	

1A2gviii	Liquid	0.282	96.663	1A3bii	Gaseous	0.001	99.999
1A3ai(i)	Liquid	0.280	96.943	3B4d		0.000	99.999
1A2f	Liquid	0.237	97.181	3Da2c		0.000	99.999
1A4ai	Biomass	0.218	97.399	1A2c	Biomass	0.000	100
1A2gviii	Gaseous	0.210	97.608	1A4bi	Solid	0.000	100
1A3biv	Gasoline	0.148	97.756	1A2c	Solid	0.000	100
1A2e	Peat	0.146	97.902	1A4bi	Other	0.000	100
2B10a		0.142	98.044				

NMVOC

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A4bi	Biomass	20.639	20.639	Yes	1A4bi	Peat	0.033	99.497	
2D3a		13.699	34.338	Yes	1A2gviii	Gaseous	0.031	99.528	
2D3d		8.379	42.717	Yes	2C7b		0.031	99.559	
3B1a		7.198	49.915	Yes	2A1		0.031	99.590	
3B1b		4.606	54.521	Yes	1A4ci	Biomass	0.026	99.616	
1A3dii	Liquid	3.817	58.338	Yes	1A4ci	Liquid	0.026	99.642	
1B2av		3.077	61.415	Yes	1A2d	Gaseous	0.021	99.664	
1B2aiv		2.993	64.408	Yes	5D2		0.021	99.685	
1A4bii	Liquid	2.707	67.115	Yes	3B4giv		0.021	99.706	
3Da2a		2.584	69.699	Yes	1A2d	Peat	0.019	99.724	
2B10a		2.414	72.113	Yes	1A1b	Solid	0.018	99.742	
2D3g		2.073	74.186	Yes	1A2d	Liquid	0.018	99.759	
2D3i		2.015	76.201	Yes	1A4ai	Peat	0.017	99.776	
2H2		1.977	78.178	Yes	2G		0.017	99.793	
2H1		1.684	79.862	Yes	1A2e	Peat	0.017	99.810	
1A4cii	Liquid	1.568	81.430	Yes	1A2a	Gaseous	0.016	99.826	
1A3bv		1.504	82.934		1A1b	Liquid	0.016	99.842	
1A3bi	Gasoline	1.424	84.358		1A3aii(i)	Liquid	0.016	99.858	
2I		1.348	85.706		5D1		0.011	99.869	
1A2gvii	Liquid	1.169	86.875		1A4ai	Biomass	0.010	99.879	
1A3biv	Gasoline	1.147	88.022		1A2gviii	Liquid	0.010	99.889	
3De		1.099	89.121		1A1a	Liquid	0.010	99.899	
1A1a	Biomass	0.989	90.110		1A3biv	Diesel oil	0.009	99.908	
3B4gii		0.874	90.984		1A2f	Other	0.007	99.915	
3B4h		0.799	91.783		1A2c	Gaseous	0.007	99.922	
2D3e		0.548	92.331		2C7c		0.007	99.930	
1A4aii	Liquid	0.541	92.872		1A2d	Other	0.007	99.936	
2D3b		0.457	93.329		1A4bi	Gaseous	0.006	99.943	
2D3c		0.406	93.734		3B4d		0.006	99.949	
2D3h		0.376	94.111		1A4ai	Gaseous	0.006	99.954	
1A2d	Biomass	0.342	94.453		1A2e	Biomass	0.005	99.959	
1A1a	Other	0.315	94.768		1A2gviii	Peat	0.003	99.962	
1A3biii	Diesel oil	0.308	95.076		1A2f	Gaseous	0.003	99.966	

1A4ci	Peat	0.303	95.379		1A3bi	Gaseous	0.003	99.969	
3B4gi		0.300	95.679		1A2f	Solid	0.003	99.972	
3B3		0.298	95.978		1A2f	Liquid	0.003	99.975	
1B2b		0.298	96.276		1A2f	Biomass	0.003	99.977	
3B4e		0.293	96.569		2C2		0.002	99.980	
1A3bii	Diesel oil	0.281	96.849		1A2e	Other	0.002	99.982	
2C1		0.210	97.059		2A3		0.002	99.984	
1A5a	Biomass	0.195	97.254		1A2e	Solid	0.002	99.986	
3B2		0.190	97.445		1A2d	Solid	0.002	99.988	
1A2gviii	Biomass	0.185	97.629		2C6		0.002	99.990	
1A1a	Peat	0.182	97.811		1A2e	Liquid	0.002	99.991	
1A2gvii	Gaseous	0.153	97.964		1A2c	Liquid	0.001	99.993	
2B10b		0.145	98.108		1A3biii	Gaseous	0.001	99.993	
3F		0.135	98.243		2C3		0.001	99.994	
1A5a	Liquid	0.130	98.373		1A4ci	Gaseous	0.001	99.995	
1A3bi	Diesel oil	0.114	98.487		2C7a		0.001	99.995	
1A4ciii	Liquid	0.093	98.579		1A2b	Liquid	0.001	99.996	
1A3c	Liquid	0.090	98.669		2L		0.001	99.997	
5A		0.088	98.757		1A2a	Biomass	0.001	99.997	
1A1a	Solid	0.088	98.846		1A2e	Gaseous	0.001	99.998	
3Da3		0.086	98.932		1A2b	Gaseous	0.000	99.998	
1A1a	Gaseous	0.085	99.017		1A4bi	Solid	0.000	99.999	
1B1b		0.069	99.086		1A4ci	Solid	0.000	99.999	
1A1b	Gaseous	0.067	99.153		1A3bii	Gaseous	0.000	99.999	
1A4bi	Liquid	0.055	99.208		1A2a	Liquid	0.000	100	
1A4ai	Liquid	0.055	99.262		1A2c	Biomass	0.000	100	
1A3ai(i)	Liquid	0.050	99.312		1A2b	Solid	0.000	100	
1A5a	Gaseous	0.042	99.354		1A3ei	Gaseous	0.000	100	
1A2gviii	Other	0.041	99.395		1A4bi	Other	0.000	100	
1A3bii	Gasoline	0.035	99.430		1A2c	Solid	0.000	100	
3B4giii		0.034	99.464						

SO_x

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A1b	Gaseous	12.832	12.832	Yes	1A2gviii	Other	0.085	99.228	
1A1a	Peat	10.552	23.384	Yes	1A3ai(i)	Liquid	0.075	99.303	
1A1a	Solid	9.857	33.241	Yes	1A2e	Biomass	0.074	99.377	
1A2b	Liquid	6.058	39.299	Yes	1A3bi	Gasoline	0.072	99.45	
1A1a	Biomass	4.833	44.132	Yes	1A4ai	Peat	0.07	99.519	
1A2b	Solid	4.829	48.961	Yes	1A2d	Solid	0.065	99.585	
1A5a	Liquid	4.66	53.621	Yes	1A3biii	Diesel oil	0.062	99.647	
2B10a		4.458	58.078	Yes	1A4ai	Biomass	0.062	99.708	
2H1		4.125	62.204	Yes	2C7b		0.041	99.749	
1A4ai	Liquid	4.014	66.218	Yes	3F		0.039	99.788	
2C1		3.63	69.848	Yes	1A2c	Gaseous	0.038	99.826	
1A2d	Biomass	2.839	72.687	Yes	1A3bi	Diesel oil	0.033	99.859	
1A2d	Liquid	2.293	74.979	Yes	1A3aii(i)	Liquid	0.022	99.881	

1A2d	Peat	1.816	76.795	Yes	1A2gvii	Liquid	0.019	99.9	
1A4bi	Liquid	1.758	78.553	Yes	1A2e	Other	0.014	99.914	
1A5a	Biomass	1.418	79.972	Yes	1A3bii	Diesel oil	0.014	99.927	
1A2c	Liquid	1.374	81.346	Yes	1A2f	Other	0.013	99.94	
1A1b	Liquid	1.353	82.698		1A4cii	Liquid	0.012	99.952	
1A1b	Solid	1.248	83.947		2C2		0.011	99.963	
1A2f	Solid	1.217	85.163		2G		0.006	99.969	
1A1a	Liquid	1.192	86.355		1A4bi	Solid	0.005	99.975	
1A4ci	Liquid	1.188	87.543		1A4aii	Liquid	0.005	99.98	
1A2e	Liquid	1.035	88.578		1A2f	Biomass	0.005	99.985	
1A4bi	Biomass	1.02	89.597		1A4bii	Liquid	0.003	99.989	
1A4ci	Peat	0.999	90.596		1A3biv	Gasoline	0.002	99.991	
1A2gviii	Biomass	0.921	91.517		2D3i		0.002	99.993	
1A2e	Solid	0.724	92.241		1A4ciii	Liquid	0.002	99.994	
1A2d	Gaseous	0.71	92.951		1A2b	Gaseous	0.001	99.996	
1A2a	Solid	0.666	93.617		1A2e	Gaseous	0.001	99.997	
1A2gviii	Liquid	0.655	94.272		1A3c	Liquid	0.001	99.998	
1A2f	Liquid	0.632	94.904		1A2a	Biomass	0	99.998	
1A1a	Other	0.627	95.531		1A2c	Biomass	0	99.999	
2C7a		0.481	96.012		1A3bii	Gasoline	0	99.999	
1A1a	Gaseous	0.454	96.466		2C7c		0	99.999	
1A2e	Peat	0.402	96.868		2L		0	99.999	
1A2a	Gaseous	0.281	97.149		1A4bi	Gaseous	0	99.999	
1A5a	Gaseous	0.257	97.407		1A4ai	Gaseous	0	100	
1A2d	Other	0.255	97.661		1A2c	Solid	0	100	
1A4ci	Solid	0.205	97.866		1A3bi	Gaseous	0	100	
1B1b		0.194	98.06		1A3biv	Diesel oil	0	100	
1A2f	Gaseous	0.193	98.253		1A4bi	Other	0	100	
1A2a	Liquid	0.174	98.427		2D3g		0	100	
1A3dii	Liquid	0.174	98.6		1A2gvii	Gaseous	0	100	
1A4ci	Biomass	0.169	98.77		1A3biii	Gaseous	0	100	
1A2gviii	Peat	0.169	98.938		1A3bii	Gaseous	0	100	
1A4bi	Peat	0.109	99.047		1A4ci	Gaseous	0	100	
1A2gviii	Gaseous	0.096	99.143		1A3ei	Gaseous	0	100	

NH_3

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
3Da2a		22.612	22.612	Yes	2G		0.028	99.820	
3B1a		18.876	41.488	Yes	1A3bi	Gaseous	0.027	99.847	
3B1b		17.331	58.819	Yes	3B4d		0.025	99.872	
3B3		8.920	67.739	Yes	2L		0.022	99.895	
3Da1		6.493	74.232	Yes	1A4ai	Biomass	0.016	99.910	
3B4h		5.065	79.297	Yes	2D3e		0.013	99.924	
3Da3		4.783	84.080	Yes	1A1a		0.012	99.935	
1A4bi	Biomass	3.248	87.328		1A2gvii	Liquid	0.010	99.945	
3B4e		2.271	89.598		1B1b		0.009	99.954	

1A3bi	Gasoline	1.994	91.592		2D3g		0.007	99.961	
3B4gii		1.905	93.497		1A4cii	Liquid	0.006	99.967	
5D1		1.260	94.758		1A3biv	Gasoline	0.006	99.973	
2B10a		1.117	95.874		1A2gviii		0.006	99.979	
3B4gi		0.918	96.792		1A3bii	Gasoline	0.005	99.985	
2H1		0.515	97.307		2C7c		0.003	99.987	
3B2		0.441	97.748		1A3dii	Liquid	0.003	99.990	
5B1		0.385	98.133		1A4aii	Liquid	0.002	99.992	
2D3i		0.370	98.503		3Da2c		0.002	99.994	
3B4giii		0.261	98.765		1A3bii	Gaseous	0.002	99.996	
3Da2b		0.248	99.012		1A4bii	Liquid	0.001	99.997	
3F		0.201	99.213		1A4ciii	Liquid	0.001	99.998	
2C7b		0.125	99.338		1A3biii	Gaseous	0.001	99.998	
2C1		0.118	99.456		5B2		0.001	99.999	
1A3biii	Diesel oil	0.096	99.552		1A3c	Liquid	0.000	99.999	
1A3bi	Diesel oil	0.086	99.637		1A5a	Liquid	0.000	100	
3B4giv		0.085	99.723		1A3biv	Diesel oil	0.000	100	
1A4ci	Biomass	0.041	99.764		1A2gvii	Gaseous	0.000	100	
1A3bii	Diesel oil	0.029	99.792		1A4bi	Solid	0.000	100	

$PM_{2.5}$

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A4bi	Biomass	50.153	50.153	Yes	2L		0.046	99.507	
1A2d	Biomass	6.752	56.905	Yes	1A3biv	Diesel oil	0.046	99.553	
1A3bvi		4.364	61.269	Yes	3B4e		0.044	99.597	
1A3bvii		3.226	64.495	Yes	1B1b		0.038	99.635	
2H2		2.830	67.326	Yes	1A2f	Liquid	0.036	99.671	
1B1c		2.627	69.953	Yes	1A1b	Solid	0.026	99.698	
1A3dii	Liquid	2.249	72.201	Yes	1A1a	Other	0.024	99.722	
1A2gvii	Liquid	2.040	74.241	Yes	2A3		0.023	99.745	
2B10a		1.594	75.836	Yes	3B4giii		0.019	99.764	
3Dc		1.513	77.348	Yes	1A2b	Liquid	0.019	99.783	
2C1		1.495	78.843	Yes	2A5b		0.019	99.801	
1A3bii	Diesel oil	1.478	80.321	Yes	3B3		0.015	99.816	
1A3bi	Diesel oil	1.415	81.736		1A3ai(i)	Liquid	0.015	99.831	
2H1		1.177	82.913		1A4ai	Peat	0.011	99.842	
1A5a	Biomass	1.171	84.083		2D3g		0.011	99.853	
3F		1.108	85.191		2B10b		0.011	99.864	
1A4cii	Liquid	1.082	86.273		3B2		0.010	99.874	
1A3biii	Diesel oil	0.993	87.266		1A2a	Liquid	0.010	99.885	
1A1a	Biomass	0.923	88.190		1A1b	Liquid	0.010	99.894	
1A4bii	Liquid	0.915	89.105		1A2a	Solid	0.009	99.903	
1A2gviii	Biomass	0.853	89.957		1A2d	Other	0.008	99.912	
1A5a	Liquid	0.848	90.805		5C1bv		0.008	99.920	
1A4ci	Biomass	0.817	91.622		1B2aiv		0.008	99.928	
5E		0.672	92.295		1A2f	Other	0.006	99.934	
1A4aii	Liquid	0.624	92.919		1A2gvii	Gaseous	0.005	99.939	

1A4ai	Liquid	0.531	93.450		1A2f	Biomass	0.005	99.944
2C2		0.495	93.945		1A4bi	Solid	0.005	99.948
2D3b		0.430	94.375		1A3aii(i)	Liquid	0.004	99.952
2G		0.393	94.768		1A2e	Solid	0.004	99.957
3B1a		0.391	95.159		2D3d		0.004	99.961
1A1a	Peat	0.380	95.539		1A2gviii	Other	0.004	99.965
2D3i		0.340	95.879		1A2d	Solid	0.004	99.969
3B1b		0.327	96.207		2C7d		0.004	99.973
1A4bi	Liquid	0.326	96.533		1A2e	Biomass	0.003	99.976
1A4ai	Biomass	0.320	96.853		2B6		0.003	99.979
1A4bi	Peat	0.319	97.171		1A2e	Peat	0.003	99.982
1A4ciii	Liquid	0.289	97.460		2C7a		0.002	99.984
1A3bi	Gasoline	0.226	97.686		1A3bi	Gaseous	0.002	99.986
1A3c	Liquid	0.186	97.872		1A4ci	Solid	0.002	99.988
1A4ci	Peat	0.182	98.055		2A5a		0.002	99.990
1A2d	Liquid	0.163	98.218		2I		0.002	99.992
1A2c	Liquid	0.134	98.352		1A2gviii	Peat	0.002	99.993
1A1a	Liquid	0.114	98.466		1A2b	Solid	0.001	99.995
2A5c		0.112	98.578		1B2av		0.001	99.996
1A4ci	Liquid	0.103	98.681		2A2		0.001	99.997
1A3biv	Gasoline	0.099	98.780		1A3bii	Gasoline	0.001	99.998
1A1a	Solid	0.099	98.879		5A		0.001	99.998
3B4gi		0.077	98.956		1A2a	Biomass	0.000	99.999
3B4giv		0.066	99.022		3B4d		0.000	99.999
1A2d	Peat	0.063	99.085		1A2e	Other	0.000	99.999
3B4gii		0.063	99.149		2C3		0.000	100
1A2e	Liquid	0.054	99.203		1A3biii	Gaseous	0.000	100
1A2f	Solid	0.054	99.256		1A3bii	Gaseous	0.000	100
1A2d	Gaseous	0.052	99.308		1A2c	Biomass	0.000	100
3B4h		0.051	99.359		1A4bi	Other	0.000	100
2C7c		0.051	99.410		1A2c	Solid	0.000	100
1A2gviii	Liquid	0.051	99.460					

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NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A4bi	Biomass	27.406	27.406	Yes	1A3biv	Gasoline	0.052	99.251	
1A3bvii		20.178	47.584	Yes	1B1b		0.048	99.299	
3Dc		14.495	62.079	Yes	1A2f	Liquid	0.048	99.347	
1A2d	Biomass	5.131	67.210	Yes	2B10b		0.046	99.392	
1A3bvi		4.192	71.402	Yes	1A2e	Liquid	0.045	99.438	
1A5a	Biomass	3.223	74.625	Yes	2A5b		0.042	99.480	
1B1c		1.980	76.605	Yes	1A1a	Other	0.040	99.52	
1A1a	Biomass	1.763	78.368	Yes	2L		0.038	99.558	
2H2		1.543	79.910	Yes	3B4e		0.037	99.595	
2B10a		1.242	81.153	Yes	1A2d	Gaseous	0.034	99.628	
1A3dii	Liquid	1.213	82.366		2C7c		0.032	99.660	
1A2gvii	Liquid	1.080	83.446		1A2d	Solid	0.031	99.691	

1A2gviii	Biomass	0.966	84.412	1A4ai	Peat	0.031	99.722
1A1a	Peat	0.858	85.269	1A3biv	Diesel oil	0.024	99.746
2C1		0.845	86.114	1A2a	Solid	0.020	99.767
2H1		0.831	86.945	2C7d		0.019	99.786
1A3bii	Diesel oil	0.782	87.727	3B2		0.017	99.802
1A3bi	Diesel oil	0.749	88.476	1A2b	Liquid	0.015	99.818
1A5a	Liquid	0.673	89.149	1A1b	Liquid	0.014	99.832
3F		0.615	89.764	2A3		0.014	99.846
2A5c		0.581	90.346	1A2d	Other	0.013	99.859
1A4cii	Liquid	0.573	90.919	1A2e	Biomass	0.013	99.872
3B4gi		0.545	91.464	1A2f	Biomass	0.012	99.884
1A3biii	Diesel oil	0.526	91.990	1A2e	Solid	0.012	99.896
1A4ci	Peat	0.502	92.492	2D3g		0.009	99.905
1A4ai	Liquid	0.497	92.989	1A2a	Liquid	0.009	99.914
1A4bii	Liquid	0.484	93.474	2A5a		0.009	99.922
1A4ci	Biomass	0.454	93.928	1A2e	Peat	0.008	99.930
2C2		0.371	94.299	1A2f	Other	0.008	99.938
5E		0.356	94.655	1A3ai(i)	Liquid	0.008	99.946
3B4gii		0.335	94.991	1B2aiv		0.007	99.953
1A4aii	Liquid	0.330	95.321	1A2gviii	Other	0.005	99.958
3B1a		0.318	95.639	1A4ci	Solid	0.005	99.963
1A1a	Solid	0.282	95.921	5C1bv		0.004	99.968
3B1b		0.267	96.188	1A2gviii	Peat	0.004	99.972
2D3b		0.248	96.436	1A2b	Solid	0.004	99.975
3B4giv		0.245	96.681	2D3d		0.004	99.979
1A4bi	Liquid	0.224	96.906	1A4bi	Solid	0.003	99.982
2G		0.208	97.114	2A2		0.003	99.984
2D3i		0.195	97.309	1A2gvii	Gaseous	0.003	99.987
1A4bi	Peat	0.190	97.498	1A3aii(i)	Liquid	0.002	99.989
3B3		0.177	97.675	5A		0.002	99.991
1A4ai	Biomass	0.175	97.850	2C7a		0.002	99.992
1A4ciii	Liquid	0.164	98.014	2B6		0.002	99.994
1A1a	Liquid	0.161	98.174	1A2a	Biomass	0.001	99.995
1A2d	Liquid	0.128	98.302	1A3bi	Gaseous	0.001	99.996
1A3bi	Gasoline	0.120	98.422	1A2e	Other	0.001	99.997
1A4ci	Liquid	0.119	98.541	3B4d		0.001	99.998
1A2c	Liquid	0.111	98.652	1B2av		0.001	99.999
1A3c	Liquid	0.103	98.755	1A3bii	Gasoline	0.000	99.999
1A2d	Peat	0.076	98.832	1A2c	Biomass	0.000	99.999
1A1b	Solid	0.073	98.904	2C3		0.000	100
2I		0.066	98.970	1A3biii	Gaseous	0.000	100
1A2gviii	Liquid	0.060	99.031	1A3bii	Gaseous	0.000	100
1A2f	Solid	0.058	99.089	1A4bi	Other	0.000	100
3B4giii		0.055	99.144	1A2c	Solid	0.000	100
3B4h		0.054	99.198				

TSP

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A3bvii		27.149	27.149	Yes	1A3c	Liquid	0.073	99.137	
1A4bi	Biomass	19.206	46.355	Yes	1A2d	Peat	0.068	99.204	
3Dc		9.751	56.107	Yes	1A2gviii	Liquid	0.065	99.269	
1A5a	Biomass	8.339	64.445	Yes	3B4e		0.054	99.323	
1A2d	Biomass	3.945	68.390	Yes	1A2f	Liquid	0.054	99.377	
1A3bvi		3.802	72.192	Yes	1A1a	Other	0.049	99.426	
1A1a	Biomass	2.904	75.096	Yes	3B4giii		0.037	99.463	
1B1c		2.038	77.135	Yes	1A2e	Liquid	0.037	99.500	
1A1a	Peat	1.783	78.918	Yes	1A3biv	Gasoline	0.035	99.535	
3B4gi		1.742	80.66	Yes	2L		0.034	99.570	
1A2gviii	Biomass	1.343	82.003		2C7c		0.034	99.604	
1A4ci	Peat	1.300	83.303		1A2a	Solid	0.033	99.638	
2H2		1.073	84.376		1A2d	Gaseous	0.031	99.669	
2A5c		0.990	85.366		1A2f	Biomass	0.031	99.700	
2B10a		0.966	86.332		3B2		0.026	99.725	
1A3dii	Liquid	0.816	87.148		2C7d		0.026	99.751	
2H1		0.805	87.953		1A2e	Biomass	0.023	99.774	
3B3		0.773	88.726		1A2e	Peat	0.019	99.793	
1A2gvii	Liquid	0.727	89.452		1A2d	Other	0.019	99.813	
2C1		0.702	90.155		1A3biv	Diesel oil	0.016	99.829	
1A5a	Liquid	0.554	90.708		1A1b	Liquid	0.016	99.845	
1A3bii	Diesel oil	0.526	91.235		1A2e	Solid	0.016	99.861	
1A3bi	Diesel oil	0.504	91.738		1A2f	Other	0.014	99.875	
3B1a		0.469	92.207		1A2b	Liquid	0.012	99.888	
3B4gii		0.451	92.658		2A5a		0.012	99.900	
1A4ai	Liquid	0.448	93.106		2A3		0.010	99.910	
3F		0.420	93.527		1A2b	Solid	0.010	99.920	
3B1b		0.388	93.915		2D3g		0.008	99.928	
1A4cii	Liquid	0.385	94.300		1A2a	Liquid	0.007	99.935	
1A3biii	Diesel oil	0.354	94.654		1A4ci	Solid	0.007	99.942	
1A4bii	Liquid	0.326	94.980		1B2aiv		0.006	99.948	
1A4ci	Biomass	0.321	95.301		1A2gviii	Other	0.006	99.954	
2C2		0.294	95.595		1A2d	Solid	0.006	99.959	
5E		0.239	95.834		1A3ai(i)	Liquid	0.005	99.964	
1A1a	Solid	0.239	96.073		1A2gviii	Peat	0.004	99.969	
2I		0.238	96.311		2A2		0.004	99.973	
2D3b		0.223	96.534		5C1bv		0.003	99.977	
1A4aii	Liquid	0.222	96.756		1A2a	Biomass	0.003	99.980	
1A1b	Solid	0.188	96.945		2D3d		0.003	99.983	
1A1a	Liquid	0.186	97.131		1A2e	Other	0.003	99.985	
3B4giv		0.170	97.301		5A		0.003	99.988	
1A4bi	Liquid	0.169	97.470		1A4bi	Solid	0.002	99.990	
1A2d	Liquid	0.142	97.612		2C7a		0.002	99.992	
1A4bi	Peat	0.142	97.754		1A2gvii	Gaseous	0.002	99.993	
2D3i		0.141	97.895		1A3aii(i)	Liquid	0.002	99.995	
2G		0.140	98.035		1A2c	Biomass	0.001	99.996	
1A4ci	Liquid	0.124	98.159		3B4d		0.001	99.997	
1A4ai	Biomass	0.123	98.281		2B6		0.001	99.998	

1A4ciii	Liquid	0.110	98.392	1A3bi	Gaseous	0.001	99.999
2B10b		0.096	98.487	1B2av		0.000	99.999
1A2c	Liquid	0.089	98.576	1A3bii	Gasoline	0.000	100
1A2f	Solid	0.085	98.661	2C3		0.000	100
2A5b		0.084	98.745	1A3biii	Gaseous	0.000	100
3B4h		0.082	98.827	1A3bii	Gaseous	0.000	100
1A3bi	Gasoline	0.080	98.907	1A4bi	Other	0.000	100
1A4ai	Peat	0.079	98.986	1A2c	Solid	0.000	100
1B1b		0.077	99.063				

BC

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A4bi	Biomass	63.95	63.950	Yes	2C1		0.024	99.861	
1A2gvii	Liquid	5.489	69.438	Yes	1A2b	Liquid	0.020	99.881	
1A3bvi		4.982	74.420	Yes	5C1bv		0.018	99.899	
1A3bii	Diesel oil	3.591	78.011	Yes	1A2d	Gaseous	0.016	99.914	
1A3bi	Diesel oil	3.564	81.575	Yes	1A1b	Liquid	0.012	99.926	
1A3bvii		2.796	84.371		1A1a	Solid	0.010	99.936	
1A3biii	Diesel oil	2.326	86.697		1A3aii(i)	Liquid	0.009	99.946	
1A4cii	Liquid	2.020	88.717		1A2d	Peat	0.009	99.955	
1A3dii	Liquid	1.722	90.440		2G		0.008	99.963	
1A5a	Biomass	1.448	91.888		1A2f	Other	0.007	99.969	
1A5a	Liquid	1.258	93.146		1A2a	Liquid	0.006	99.975	
1A4aii	Liquid	0.748	93.894		1A2f	Solid	0.005	99.980	
1A4ai	Liquid	0.711	94.605		1A1a	Other	0.004	99.984	
1A4bii	Liquid	0.701	95.306		1A2d	Other	0.004	99.988	
3F		0.599	95.905		1A1b	Solid	0.002	99.991	
1A3c	Liquid	0.534	96.439		1A4ai	Peat	0.002	99.992	
1A4bi	Liquid	0.482	96.921		1A2e	Other	0.001	99.994	
1A4ciii	Liquid	0.424	97.346		1A2gvii	Gaseous	0.001	99.995	
5E		0.258	97.604		1A2a	Solid	0.001	99.995	
2C2		0.219	97.822		1A2f	Biomass	0.001	99.996	
1A2c	Liquid	0.168	97.990		1A2e	Biomass	0.000	99.997	
1A1a	Liquid	0.149	98.139		1A4bi	Solid	0.000	99.997	
1A4ci	Liquid	0.141	98.280		1A2e	Peat	0.000	99.997	
2H1		0.135	98.415		1A2e	Solid	0.000	99.998	
1A1a	Biomass	0.134	98.549		1A2d	Solid	0.000	99.998	
2B10a		0.127	98.676		1A2gviii	Other	0.000	99.999	
1A2gviii	Biomass	0.124	98.801		1A2gviii	Peat	0.000	99.999	
1A3bi	Gasoline	0.120	98.920		2B6		0.000	99.999	
1A4ci	Biomass	0.117	99.037		1A3bii	Gasoline	0.000	99.999	
1A3biv	Diesel oil	0.116	99.153		1A4ci	Solid	0.000	99.999	
2D3b		0.108	99.261		1A2b	Solid	0.000	100	
1A2e	Liquid	0.071	99.332		1A4bi	Other	0.000	100	
1A2d	Biomass	0.070	99.402		1B1b		0.000	100	
1A2d	Liquid	0.069	99.472		2D3i		0.000	100	
1A2gviii	Liquid	0.063	99.535		2A3		0.000	100	

1A1a	Peat	0.055	99.59	1A2a	Biomass	0.000	100
1A3biv	Gasoline	0.048	99.639	2C3		0.000	100
1A2f	Liquid	0.048	99.686	2A2		0.000	100
1A4bi	Peat	0.046	99.733	1A2c	Biomass	0.000	100
1A4ai	Biomass	0.045	99.778	2C7a		0.000	100
1A3ai(i)	Liquid	0.032	99.810	1A2c	Solid	0.000	100
1A4ci	Peat	0.027	99.837				

CO

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A4bi	Biomass	42.731	42.731	Yes	1A2gvii	Gaseous	0.049	99.439	
1A4bii	Liquid	11.695	54.427	Yes	1A2a	Liquid	0.047	99.486	
1A3dii	Liquid	7.135	61.562	Yes	1A2f	Liquid	0.043	99.529	
1A3bi	Gasoline	6.289	67.851	Yes	1A2b	Gaseous	0.042	99.571	
1A2d	Biomass	5.728	73.580	Yes	1A1b	Solid	0.040	99.612	
1A4aii	Liquid	4.859	78.438	Yes	2G		0.037	99.648	
1A1a	Biomass	3.808	82.247	Yes	1A1a	Liquid	0.030	99.678	
1A4cii	Liquid	2.795	85.041		1A2d	Other	0.028	99.706	
1A5a	Biomass	2.595	87.636		1A4ci	Liquid	0.028	99.734	
1A2gvii	Liquid	2.248	89.885		1A3bi	Gaseous	0.027	99.761	
1A3biv	Gasoline	1.267	91.152		1A2f	Gaseous	0.026	99.786	
1A2gviii	Biomass	1.052	92.204		1A2e	Peat	0.021	99.807	
1A2f	Solid	0.964	93.168		1A2e	Biomass	0.021	99.828	
1A3biii	Diesel oil	0.748	93.916		1A2f	Biomass	0.018	99.846	
3F		0.627	94.544		1A4bi	Gaseous	0.017	99.864	
1A4ci	Biomass	0.545	95.089		1A2c	Liquid	0.015	99.879	
1A1a	Peat	0.528	95.617		1A4ai	Gaseous	0.015	99.894	
1A3bii	Diesel oil	0.396	96.012		1A1b	Liquid	0.015	99.909	
1A1b	Gaseous	0.327	96.339		1A3biv	Diesel oil	0.015	99.923	
1A5a	Liquid	0.305	96.644		1A2gviii	Peat	0.013	99.936	
1A3bi	Diesel oil	0.263	96.908		1A2gviii	Liquid	0.013	99.949	
1A2f	Other	0.217	97.124		1A4bi	Peat	0.009	99.958	
1A4ai	Biomass	0.208	97.332		1A2gviii	Other	0.006	99.964	
1A2d	Gaseous	0.206	97.537		1A4ai	Peat	0.005	99.969	
1A3bii	Gasoline	0.156	97.694		1A2e	Liquid	0.005	99.974	
1A2a	Solid	0.147	97.840		1A2b	Liquid	0.004	99.978	
1A1a	Gaseous	0.140	97.980		1A2e	Solid	0.004	99.981	
1A2a	Gaseous	0.132	98.112		2C7a		0.003	99.984	
1A1a	Solid	0.130	98.243		1A2d	Solid	0.003	99.986	
1A1a	Other	0.123	98.366		1A2e	Other	0.002	99.989	
1A5a	Gaseous	0.112	98.478		1A3bii	Gaseous	0.002	99.991	
1A2d	Liquid	0.111	98.589		1A2e	Gaseous	0.002	99.994	
1A2d	Peat	0.104	98.693		1A4ci	Gaseous	0.002	99.995	
1A3ai(i)	Liquid	0.093	98.786		1A3biii	Gaseous	0.002	99.997	
1A2c	Gaseous	0.085	98.871		1A2b	Solid	0.001	99.998	
1A4ciii	Liquid	0.082	98.954		1A4ci	Solid	0.001	99.999	
1A4ci	Peat	0.082	99.036		1A2c	Biomass	0.000	100	

1A3aii(i)	Liquid	0.064	99.099	1A4bi	Solid	0.000	100
1A4ai	Liquid	0.060	99.159	1A3ei	Gaseous	0.000	100
2C1		0.059	99.218	1A2a	Biomass	0.000	100
1A4bi	Liquid	0.059	99.277	1A2c	Solid	0.000	100
1A3c	Liquid	0.059	99.335	1A4bi	Other	0.000	100
1A2gviii	Gaseous	0.055	99.390				

Pb

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A1b	Solid	25.309	25.309	Yes	1A2e	Liquid	0.065	99.543	
1A2d	Biomass	21.734	47.044	Yes	1A4ci	Liquid	0.047	99.590	
1A1a	Peat	6.996	54.039	Yes	1A2gviii	Liquid	0.042	99.632	
1A5a	Biomass	6.367	60.406	Yes	1A2d	Peat	0.038	99.670	
1A1a	Biomass	5.928	66.334	Yes	1A4ciii	Liquid	0.035	99.705	
1A2f	Solid	5.591	71.925	Yes	1A2f	Liquid	0.034	99.738	
2C1		4.449	76.374	Yes	1A2e	Biomass	0.033	99.771	
1A4bi	Biomass	4.070	80.444	Yes	1A2a	Liquid	0.032	99.804	
1A3bvi		4.002	84.446		1A2c	Solid	0.023	99.826	
2G		3.140	87.586		1A2f	Biomass	0.018	99.844	
2C7c		2.376	89.962		1A3bi	Gasoline	0.016	99.860	
1A4ci	Peat	1.882	91.844		3F		0.016	99.876	
1A2gviii	Biomass	1.395	93.239		1A2gviii	Peat	0.016	99.892	
1A1a	Other	1.132	94.371		1A2e	Other	0.016	99.908	
1A2e	Peat	0.859	95.231		2C7a		0.014	99.921	
1A5a	Liquid	0.639	95.87		1A4bi	Solid	0.014	99.935	
1A4ci	Biomass	0.637	96.506		1A2d	Solid	0.011	99.946	
1A3aii(i)	Liquid	0.398	96.905		2B10a		0.009	99.955	
1A1a	Solid	0.299	97.203		5C1bv		0.009	99.963	
1A4ai	Liquid	0.290	97.493		1A2b	Liquid	0.007	99.970	
1A4ai	Biomass	0.247	97.740		1A3biii	Diesel oil	0.006	99.975	
1B1b		0.229	97.969		1A4bi	Liquid	0.005	99.980	
1A2c	Liquid	0.206	98.175		1A1b	Liquid	0.004	99.984	
1A4bi	Peat	0.205	98.380		1A2a	Biomass	0.004	99.988	
1A2d	Liquid	0.151	98.531		1A3bi	Diesel oil	0.003	99.991	
1A4ai	Peat	0.131	98.662		1A4ci	Solid	0.003	99.993	
1A1a	Liquid	0.122	98.784		1A2c	Biomass	0.002	99.996	
1A2e	Solid	0.119	98.903		5E		0.002	99.998	
2C6		0.109	99.012		1A3bii	Diesel oil	0.001	99.999	
1A2gviii	Other	0.107	99.119		1A3biv	Gasoline	0.000	100	
1A2d	Other	0.099	99.218		2C3		0.000	100	
2C2		0.095	99.313		1A3bii	Gasoline	0.000	100	
1A2f	Other	0.091	99.404		1A3biv	Diesel oil	0.000	100	
1A3dii	Liquid	0.074	99.478						

Cd

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A2d	Biomass	22.851	22.851	Yes	1A2c	Liquid	0.041	99.604	
1A4bi	Biomass	20.295	43.146	Yes	1A4ai	Peat	0.036	99.640	
1A1a	Biomass	12.047	55.192	Yes	1A1a	Liquid	0.035	99.675	
1A5a	Biomass	11.760	66.952	Yes	1A3bi	Gasoline	0.034	99.709	
1A1b	Solid	9.585	76.538	Yes	1A2f	Biomass	0.033	99.742	
1A4ci	Biomass	3.170	79.707	Yes	1A2f	Other	0.03	99.772	
1A2gviii	Biomass	2.714	82.422	Yes	1A2e	Other	0.029	99.801	
3F		2.383	84.804		1A3c	Liquid	0.029	99.830	
1A1a	Other	2.182	86.986		2C2		0.027	99.857	
1A2f	Solid	2.098	89.084		5C1bv		0.024	99.881	
1A1a	Peat	1.942	91.026		1A2e	Liquid	0.013	99.894	
2G		1.677	92.704		1A3biii	Diesel oil	0.010	99.903	
2C6		1.371	94.075		1A2d	Solid	0.009	99.913	
1A4ai	Biomass	1.232	95.307		1A4ci	Liquid	0.009	99.922	
2C1		0.581	95.888		1A2gviii	Liquid	0.009	99.931	
1A2gvii	Liquid	0.522	96.410		1A2c	Solid	0.009	99.940	
1A4ci	Peat	0.515	96.925		1A2a	Liquid	0.007	99.947	
1A4cii	Liquid	0.341	97.266		1A2f	Liquid	0.007	99.954	
1A1a	Solid	0.332	97.597		1A2a	Biomass	0.007	99.960	
1A3bvi		0.248	97.845		1A4bi	Solid	0.005	99.965	
1A2e	Peat	0.235	98.081		1A3bi	Diesel oil	0.005	99.971	
1A2gviii	Other	0.207	98.287		1A2gvii	Gaseous	0.005	99.976	
2C7c		0.192	98.480		1A2gviii	Peat	0.005	99.980	
1A4aii	Liquid	0.145	98.624		1A2d	Peat	0.004	99.985	
1A5a	Liquid	0.140	98.764		1A2c	Biomass	0.004	99.989	
1A2d	Other	0.121	98.885		1A4ci	Solid	0.002	99.991	
1A3dii	Liquid	0.099	98.984		1A3bii	Diesel oil	0.002	99.993	
1B1b		0.083	99.067		2C3		0.001	99.995	
1A4bii	Liquid	0.082	99.150		1A2b	Liquid	0.001	99.996	
5E		0.077	99.226		2C7a		0.001	99.997	
1A2e	Biomass	0.064	99.290		1A3biv	Gasoline	0.001	99.998	
1A2d	Liquid	0.063	99.353		1A4bi	Liquid	0.001	99.999	
1A4ai	Liquid	0.058	99.411		1A1b	Liquid	0.001	100	
1A4bi	Peat	0.056	99.467		1A3bii	Gasoline	0.000	100	
1A2e	Solid	0.052	99.518		1A3biv	Diesel oil	0.000	100	
1A4ciii	Liquid	0.045	99.563						

Hg

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
2C1		24.416	24.416	Yes	5E		0.100	99.516	
1A2d	Biomass	18.765	43.181	Yes	1A2d	Solid	0.097	99.613	
1A1a	Peat	8.281	51.462	Yes	1A4bi	Peat	0.068	99.681	

1A1a	Biomass	6.802	58.264	Yes	1A5a	Liquid	0.065	99.746	
2B10a		6.528	64.791	Yes	1A3biv	Gasoline	0.058	99.805	
1A4bi	Biomass	4.405	69.196	Yes	1A4ai	Peat	0.044	99.848	
1A2f	Solid	4.149	73.345	Yes	1A2d	Liquid	0.035	99.883	
5C1bv		4.008	77.352	Yes	1A2e	Biomass	0.023	99.906	
1A1a	Solid	3.806	81.158	Yes	1A4ci	Solid	0.020	99.926	
1A1b	Solid	2.566	83.724		1A2a	Solid	0.012	99.938	
1A3bi	Gasoline	1.915	85.638		1A2f	Biomass	0.010	99.948	
1A5a	Biomass	1.531	87.170		1A4ai	Liquid	0.008	99.956	
1A3biii	Diesel oil	1.326	88.496		1A3bii	Gasoline	0.007	99.962	
1A2d	Peat	1.324	89.820		1A1a	Liquid	0.006	99.968	
1A2gviii	Other	1.240	91.059		1A2c	Liquid	0.005	99.974	
2C6		0.967	92.027		2G		0.005	99.979	
1A2gviii	Biomass	0.777	92.803		1A2e	Other	0.004	99.982	
1A3bi	Diesel oil	0.697	93.500		1A2gviii	Liquid	0.002	99.985	
1A4ci	Biomass	0.689	94.190		1A2c	Solid	0.002	99.987	
1A1a	Other	0.686	94.876		1B1b		0.002	99.989	
1A4ci	Peat	0.623	95.499		1A2f	Liquid	0.002	99.991	
2C7c		0.599	96.098		1A2e	Liquid	0.002	99.992	
3F		0.591	96.689		1A3biv	Diesel oil	0.001	99.994	
1A2f	Other	0.551	97.239		1A4bi	Solid	0.001	99.995	
2C2		0.372	97.611		1A4ci	Liquid	0.001	99.996	
1A3dii	Liquid	0.345	97.956		1A2a	Biomass	0.001	99.997	
1A2e	Peat	0.321	98.277		1A2a	Liquid	0.001	99.998	
1A3bii	Diesel oil	0.292	98.569		1A2c	Biomass	0.001	99.999	
1A4ai	Biomass	0.267	98.836		2C7a		0.001	99.999	
1A4ciii	Liquid	0.174	99.011		1A2b	Liquid	0.001	100	
1A2gviii	Peat	0.149	99.160		1A4bi	Liquid	0.000	100	
1A2d	Other	0.149	99.309		1A1b	Liquid	0.000	100	
1A2e	Solid	0.107	99.416						

As

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A1a	Peat	24.719	24.719	Yes	1A4ciii	Liquid	0.063	99.612	
1A1b	Solid	24.316	49.036	Yes	5E		0.043	99.655	
2C7c		10.383	59.419	Yes	1A2d	Other	0.039	99.694	
1A2d	Biomass	7.296	66.715	Yes	2C2		0.035	99.729	
1A2f	Solid	5.255	71.970	Yes	2G		0.031	99.760	
1A4ci	Peat	5.235	77.205	Yes	1A4ci	Solid	0.030	99.790	
2C1		3.480	80.685	Yes	1A2e	Liquid	0.028	99.818	
2C7a		2.822	83.507		1A2gviii	Liquid	0.023	99.841	
1A2e	Peat	2.391	85.897		5C1bv		0.023	99.864	
1A4bi	Biomass	2.376	88.274		1A4ci	Liquid	0.022	99.886	
1A3bvi		2.078	90.351		1A2c	Solid	0.022	99.907	
1A1a	Solid	1.669	92.020		1A3bi	Gasoline	0.018	99.925	
1A2gviii	Peat	1.165	93.185		1A2a	Liquid	0.015	99.940	
2C6		1.014	94.198		1A4bi	Solid	0.013	99.953	

1A1a	Biomass	0.933	95.132		1A2f	Liquid	0.009	99.962	
1A5a	Biomass	0.826	95.958		1A3biii	Diesel oil	0.007	99.968	
1A4bi	Peat	0.569	96.527		3F		0.005	99.974	
1A4ci	Biomass	0.371	96.898		1A2e	Biomass	0.004	99.978	
1A4ai	Peat	0.366	97.264		1A3bi	Diesel oil	0.004	99.982	
1B1b		0.319	97.582		1A2b	Liquid	0.003	99.985	
1A5a	Liquid	0.311	97.894		2C3		0.003	99.988	
1A2e	Solid	0.248	98.142		1A2f	Biomass	0.002	99.990	
1A2gviii	Biomass	0.190	98.332		1A4bi	Liquid	0.002	99.992	
1A1a	Other	0.158	98.490		1A2e	Other	0.002	99.994	
1A4ai	Biomass	0.144	98.634		1A1b	Liquid	0.002	99.996	
1A2d	Solid	0.143	98.777		1A3bii	Diesel oil	0.001	99.998	
1A2d	Liquid	0.141	98.918		1A2f	Other	0.001	99.999	
1A4ai	Liquid	0.135	99.053		1A3biv	Gasoline	0.001	99.999	
1A3dii	Liquid	0.131	99.184		1A2a	Biomass	0.000	100	
1A2d	Peat	0.125	99.309		1A2c	Biomass	0.000	100	
1A2c	Liquid	0.097	99.406		1A3bii	Gasoline	0.000	100	
1A2gviii	Other	0.077	99.482		1A3biv	Diesel oil	0.000	100	
1A1a	Liquid	0.068	99.550						

Cr

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A1b	Solid	26.832	26.832	Yes	1A2c	Solid	0.024	99.768	
2C1		16.221	43.053	Yes	1A4bii	Liquid	0.021	99.789	
1A4bi	Biomass	11.930	54.984	Yes	1A2e	Biomass	0.021	99.810	
1A3bvi		9.333	64.317	Yes	3F		0.019	99.828	
2C2		6.687	71.004	Yes	1A3bii	Diesel oil	0.018	99.846	
1A2f	Solid	5.907	76.911	Yes	1A2d	Liquid	0.015	99.861	
1A1a	Peat	4.792	81.703	Yes	1A4bi	Solid	0.014	99.875	
1A5a	Biomass	4.148	85.851		1A2d	Peat	0.012	99.888	
1A1a	Biomass	3.569	89.419		1A2d	Solid	0.012	99.900	
1A4ci	Biomass	1.862	91.282		1A4ciii	Liquid	0.011	99.911	
1A2b	Solid	1.421	92.703		1A2gviii	Peat	0.011	99.921	
1A4ci	Peat	1.298	94.001		1A2e	Other	0.010	99.932	
1A2d	Biomass	1.235	95.236		1A4ai	Liquid	0.010	99.941	
1A2gviii	Biomass	0.890	96.125		1A3c	Liquid	0.007	99.949	
1A4ai	Biomass	0.724	96.849		1A2c	Liquid	0.007	99.956	
1A1a	Other	0.698	97.547		1A2f	Liquid	0.007	99.962	
1A2e	Peat	0.593	98.140		5E		0.006	99.968	
1A1a	Solid	0.343	98.482		1A1a	Liquid	0.005	99.973	
1A4bi	Peat	0.141	98.623		5C1bv		0.003	99.976	
1B1b		0.135	98.759		1A2b	Liquid	0.003	99.979	
1A2gvii	Liquid	0.132	98.890		1A2f	Other	0.003	99.982	
1A2e	Solid	0.126	99.016		1A4ci	Solid	0.003	99.985	
1A4ai	Peat	0.091	99.107		1A2a	Biomass	0.002	99.987	
1A4cii	Liquid	0.086	99.193		1A2e	Liquid	0.002	99.990	
1A3biii	Diesel oil	0.082	99.275		1A3biv	Gasoline	0.002	99.991	

1A2gviii	Other	0.081	99.356		1A4ci	Liquid	0.002	99.993	
2C7c		0.065	99.421		1A2c	Biomass	0.002	99.995	
1A3bi	Gasoline	0.054	99.475		1A2gviii	Liquid	0.001	99.996	
2G		0.052	99.527		1A2gvii	Gaseous	0.001	99.997	
1A3dii	Liquid	0.051	99.579		1A2a	Liquid	0.001	99.998	
1A3bi	Diesel oil	0.043	99.622		2C7a		0.001	99.999	
1A2d	Other	0.037	99.659		1A3bii	Gasoline	0.000	100	
1A4aii	Liquid	0.036	99.695		1A4bi	Liquid	0.000	100	
1A5a	Liquid	0.025	99.720		1A1b	Liquid	0.000	100	
1A2f	Biomass	0.024	99.744		1A3biv	Diesel oil	0.000	100	

Cu

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A3bvi		77.745	77.745	Yes	1A2gvii	Gaseous	0.016	99.846	
1A1b	Solid	3.474	81.219	Yes	1A3bi	Gasoline	0.014	99.861	
1A1a	Peat	2.854	84.073		1A2d	Peat	0.014	99.875	
1A5a	Biomass	2.236	86.309		1A2f	Other	0.013	99.888	
1A1a	Biomass	2.198	88.506		1A2e	Biomass	0.012	99.900	
1A2gvii	Liquid	1.654	90.160		2B10a		0.012	99.912	
1A4cii	Liquid	1.080	91.241		1A3bi	Diesel oil	0.011	99.923	
1A2d	Biomass	1.024	92.265		1A4ai	Liquid	0.009	99.932	
2C1		1.009	93.274		1A2f	Biomass	0.007	99.938	
1A2f	Solid	0.815	94.089		1A2c	Liquid	0.006	99.945	
1A4bi	Biomass	0.756	94.845		1A2gviii	Peat	0.006	99.951	
1A4ci	Peat	0.754	95.599		1A2e	Other	0.005	99.957	
2C7c		0.586	96.186		2C7a		0.005	99.962	
2G		0.580	96.766		5E		0.005	99.967	
1A2gviii	Biomass	0.504	97.270		1A3bii	Diesel oil	0.004	99.972	
1A4aii	Liquid	0.458	97.729		1A1a	Liquid	0.004	99.976	
1A1a	Other	0.408	98.137		1A2d	Solid	0.004	99.979	
1A2e	Peat	0.345	98.481		3F		0.003	99.983	
1A4bii	Liquid	0.261	98.742		1A2c	Solid	0.003	99.986	
1A2d	Liquid	0.173	98.916		1A2e	Liquid	0.002	99.988	
1A1a	Solid	0.135	99.051		1A4bi	Solid	0.002	99.990	
1A4ci	Biomass	0.119	99.170		1A4ci	Liquid	0.001	99.991	
1A3c	Liquid	0.091	99.261		1A2gviii	Liquid	0.001	99.992	
1A4bi	Peat	0.082	99.343		1A2a	Biomass	0.001	99.994	
1A2d	Other	0.063	99.406		1A2f	Liquid	0.001	99.995	
2C2		0.063	99.469		5C1bv		0.001	99.996	
1B1b		0.057	99.526		1A2a	Liquid	0.001	99.997	
1A4ai	Peat	0.053	99.579		1A2c	Biomass	0.001	99.998	
1A4ai	Biomass	0.046	99.625		1A4ci	Solid	0.001	99.999	
2C6		0.046	99.671		1A2b	Liquid	0.001	99.999	
1A2gviii	Other	0.041	99.711		1A3biv	Gasoline	0.000	100	
1A3dii	Liquid	0.034	99.745		1A4bi	Liquid	0.000	100	
1A5a	Liquid	0.029	99.775		1A1b	Liquid	0.000	100	
1A3biii	Diesel oil	0.020	99.795		1A3bii	Gasoline	0.000	100	

1A2e	Solid	0.019	99.814	1A3biv	Diesel oil	0.000	100
1A4ciii	Liquid	0.017	99.830				

Ni

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A4bi	Biomass	14.680	14.680	Yes	1B1b		0.186	98.745	
2C7b		13.082	27.762	Yes	1A4cii	Liquid	0.173	98.918	
1A5a	Liquid	9.171	36.933	Yes	1A2e	Solid	0.145	99.063	
1A1a	Peat	6.858	43.791	Yes	1A4ai	Peat	0.130	99.193	
2C1		6.729	50.520	Yes	1A1b	Solid	0.102	99.295	
1A2f	Solid	6.726	57.246	Yes	1A2gviii	Other	0.094	99.389	
1A5a	Biomass	5.104	62.349	Yes	1A2b	Solid	0.091	99.481	
1A1a	Biomass	4.535	66.884	Yes	1A4aii	Liquid	0.073	99.554	
1A4ai	Liquid	4.179	71.063	Yes	1A4bi	Liquid	0.068	99.622	
1A2c	Liquid	2.976	74.039	Yes	1A2d	Other	0.059	99.681	
1A3dii	Liquid	2.529	76.568	Yes	1A1b	Liquid	0.058	99.739	
1A4ci	Biomass	2.292	78.860	Yes	1A4bii	Liquid	0.042	99.781	
1A2d	Biomass	2.074	80.934	Yes	1A3bi	Gasoline	0.028	99.809	
1A3bvi		1.924	82.857		1A2c	Solid	0.027	99.836	
1A4ci	Peat	1.863	84.721		1A2e	Biomass	0.026	99.862	
1A2d	Liquid	1.781	86.502		1A2f	Biomass	0.024	99.886	
1A1a	Liquid	1.763	88.264		1A4bi	Solid	0.017	99.903	
1A2gviii	Biomass	1.109	89.373		1A2gviii	Peat	0.016	99.918	
1A2e	Liquid	0.942	90.315		1A3c	Liquid	0.015	99.933	
1A4ai	Biomass	0.891	91.206		1A2d	Solid	0.014	99.947	
1A1a	Other	0.856	92.062		1A2e	Other	0.013	99.959	
1A2e	Peat	0.851	92.913		3F		0.010	99.969	
1A1a	Solid	0.787	93.701		5C1bv		0.006	99.975	
1A4ci	Liquid	0.676	94.376		1A2f	Other	0.006	99.981	
1A2gviii	Liquid	0.606	94.982		1A4ci	Solid	0.003	99.984	
1A2f	Liquid	0.508	95.490		1A2a	Biomass	0.003	99.987	
2B10a		0.484	95.974		1A3biii	Diesel oil	0.003	99.990	
1A2a	Liquid	0.468	96.442		2C7a		0.003	99.993	
2C2		0.357	96.798		1A2gvii	Gaseous	0.003	99.995	
1A4ciii	Liquid	0.323	97.121		1A2c	Biomass	0.002	99.997	
1A2b	Liquid	0.286	97.407		1A3bi	Diesel oil	0.001	99.998	
1A2d	Peat	0.267	97.674		1A3biv	Gasoline	0.001	99.999	
1A2gvii	Liquid	0.264	97.939		1A3bii	Diesel oil	0.001	100	
2C7c		0.216	98.155		1A3bii	Gasoline	0.000	100	
1A4bi	Peat	0.203	98.357		1A3biv	Diesel oil	0.000	100	
2G		0.202	98.559						

Se

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A4bi	Biomass	66.194	66.194	Yes	1A4bii	Liquid	0.161	99.685	
1A4ci	Biomass	10.327	76.522	Yes	1A4ciii	Liquid	0.087	99.772	
1A3bvi		8.393	84.915	Yes	1A3bi	Gasoline	0.066	99.838	
2C7a		7.409	92.323		1A3c	Liquid	0.056	99.895	
1A4ai	Biomass	4.017	96.341		1A3biii	Diesel oil	0.038	99.932	
1A2gvii	Liquid	1.022	97.362		1A5a	Liquid	0.028	99.960	
1A4cii	Liquid	0.667	98.030		1A3bi	Diesel oil	0.020	99.980	
2C7c		0.609	98.639		1A2gvii	Gaseous	0.010	99.989	
1A4aii	Liquid	0.283	98.922		1A3bii	Diesel oil	0.008	99.998	
1A3dii	Liquid	0.227	99.149		1A3biv	Gasoline	0.002	100	
3F		0.191	99.340		1A3bii	Gasoline	0	100	
5C1bv		0.184	99.523		1A3biv	Diesel oil	0	100	

Zn

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A4bi	Biomass	28.328	28.328	Yes	1B1b		0.032	99.739	
1A3bvi		15.899	44.228	Yes	1A2f	Biomass	0.030	99.770	
1A1a	Biomass	10.553	54.781	Yes	1A4ai	Peat	0.025	99.795	
1A5a	Biomass	9.849	64.629	Yes	1A2d	Solid	0.025	99.820	
2C6		7.867	72.496	Yes	1A2e	Other	0.024	99.845	
1A1b	Solid	4.778	77.275	Yes	1A3biii	Diesel oil	0.021	99.865	
1A4ci	Biomass	4.422	81.697	Yes	1A3c	Liquid	0.017	99.882	
1A1a	Other	2.852	84.549		1A4ai	Liquid	0.014	99.896	
1A2gviii	Biomass	2.149	86.698		3F		0.012	99.908	
1A2f	Solid	2.051	88.749		1A3bi	Diesel oil	0.011	99.919	
1A4ai	Biomass	1.719	90.469		1A2c	Liquid	0.010	99.929	
1A1a	Peat	1.609	92.077		1A2d	Peat	0.009	99.937	
2C1		1.524	93.602		1A1a	Liquid	0.007	99.944	
1A2d	Biomass	1.339	94.941		1A2gviii	Peat	0.006	99.950	
1A2f	Other	0.705	95.646		1A2a	Biomass	0.006	99.956	
1A2gviii	Other	0.612	96.257		1A4ci	Solid	0.005	99.961	
2C7c		0.588	96.846		1A3bii	Diesel oil	0.005	99.966	
2C2		0.495	97.340		5C1bv		0.005	99.971	
1A4ci	Peat	0.363	97.704		1A2c	Solid	0.004	99.975	
1A2gvii	Liquid	0.312	98.016		1A2c	Biomass	0.004	99.978	
1A1a	Solid	0.275	98.290		1A2gviii	Liquid	0.003	99.982	
2B10a		0.214	98.504		1A2e	Liquid	0.003	99.985	
1A4cii	Liquid	0.204	98.708		1A2gvii	Gaseous	0.003	99.988	
1A2e	Peat	0.167	98.875		1A4bi	Solid	0.003	99.990	
1A2d	Liquid	0.141	99.016		1A2f	Liquid	0.002	99.993	
1A2d	Other	0.139	99.156		1A4ci	Liquid	0.002	99.995	
2G		0.108	99.264		1A2a	Liquid	0.002	99.997	
1A4aii	Liquid	0.087	99.350		2C7a		0.002	99.998	

1A3dii	Liquid	0.065	99.416	1A3biv	Gasoline	0.001	99.999
1A2e	Biomass	0.051	99.467	1A2b	Liquid	0.000	99.999
1A4bii	Liquid	0.049	99.516	1A4bi	Liquid	0.000	100
1A2e	Solid	0.047	99.563	1A1b	Liquid	0.000	100
1A5a	Liquid	0.040	99.603	1A3bii	Gasoline	0.000	100
1A4bi	Peat	0.039	99.642	2C3		0.000	100
1A3bi	Gasoline	0.033	99.676	1A3biv	Diesel oil	0.000	100
1A4ciii	Liquid	0.032	99.708				

PCDD/F

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A1a	Biomass	16.396	16.396	Yes	1A4bi	Liquid	0.050	99.481	
1A4bi	Biomass	10.682	27.078	Yes	1A4ai	Liquid	0.048	99.530	
5E		10.550	37.628	Yes	1A5a	Liquid	0.047	99.577	
1A1a	Other	9.689	47.317	Yes	1A4ciii	Liquid	0.044	99.621	
2C1		7.747	55.065	Yes	1A2f	Other	0.040	99.660	
2B10a		6.767	61.831	Yes	1A5a	Gaseous	0.038	99.698	
1A1a	Peat	5.759	67.591	Yes	1A3biv	Diesel oil	0.032	99.731	
1A2d	Biomass	4.750	72.341	Yes	1A2f	Biomass	0.027	99.758	
1A5a	Biomass	3.714	76.055	Yes	1A4bi	Peat	0.026	99.784	
1A3bi	Diesel oil	3.344	79.399	Yes	1A4ci	Liquid	0.023	99.808	
2C7a		2.550	81.949	Yes	1A2d	Solid	0.022	99.829	
1A2d	Other	2.255	84.204		1A2f	Gaseous	0.017	99.846	
1A3bi	Gasoline	2.124	86.327		1A4ai	Peat	0.017	99.863	
1A2gviii	Biomass	1.911	88.239		1A2e	Solid	0.017	99.880	
1A3bii	Diesel oil	1.755	89.994		1A1a	Liquid	0.014	99.893	
1A4ci	Biomass	1.672	91.666		1A2f	Liquid	0.012	99.906	
1A1a	Solid	1.034	92.700		1A1b	Liquid	0.012	99.918	
1A2d	Peat	0.852	93.551		1A3bii	Gasoline	0.010	99.927	
1A3biii	Diesel oil	0.801	94.353		5C1bv		0.010	99.937	
2C6		0.697	95.050		1A2e	Other	0.009	99.946	
1A4ai	Biomass	0.648	95.698		1A2b	Solid	0.008	99.954	
1A2d	Liquid	0.463	96.161		1A2gviii	Liquid	0.007	99.961	
1A2d	Gaseous	0.291	96.453		1A4bi	Gaseous	0.006	99.967	
2A2		0.274	96.727		1A4ai	Gaseous	0.005	99.972	
1A1b	Gaseous	0.249	96.975		1A2c	Liquid	0.004	99.976	
1B1b		0.247	97.222		2A3		0.003	99.979	
1A4ci	Peat	0.242	97.464		1A4ci	Solid	0.003	99.982	
2L		0.238	97.703		1A2e	Liquid	0.003	99.985	
2A1		0.215	97.918		1A2b	Liquid	0.003	99.988	
1A1a	Gaseous	0.176	98.093		1A2e	Gaseous	0.002	99.990	
1A3biv	Gasoline	0.175	98.269		2G		0.002	99.992	
1A2gviii	Other	0.173	98.442		1A2a	Biomass	0.002	99.994	
1A1b	Solid	0.160	98.602		1A2c	Biomass	0.001	99.996	
1A2e	Peat	0.139	98.741		2C3		0.001	99.997	
2D3b		0.118	98.859		1A2b	Gaseous	0.001	99.998	
1A2gviii	Gaseous	0.116	98.975		1A2a	Liquid	0.001	99.999	

1A3dii	Liquid	0.110	99.085	1A4ci	Gaseous	0.001	100
1A2gviii	Peat	0.095	99.180	1A2c	Solid	0.000	100
1A2a	Gaseous	0.072	99.252	1A3ei	Gaseous	0.000	100
1A2c	Gaseous	0.070	99.322	1A4bi	Solid	0.000	100
1A2e	Biomass	0.057	99.378	1A4bi	Other	0.000	100
1A2f	Solid	0.053	99.431				

PAH-4

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
1A4bi	Biomass	90.795	90.795	Yes	1A2e	Liquid	0.009	99.935	
1B1b		2.214	93.009		1A3c	Liquid	0.009	99.944	
1A1a	Other	1.318	94.327		1A4ai	Biomass	0.008	99.952	
1A1a	Biomass	1.142	95.469		1A4ci	Peat	0.007	99.959	
1A2gviii	Other	0.66	96.129		1A3biv	Gasoline	0.007	99.966	
1A2d	Biomass	0.660	96.789		5C1bv		0.006	99.972	
1A3biii	Diesel oil	0.577	97.366		1A2e	Peat	0.004	99.976	
1A3bi	Diesel oil	0.298	97.663		1A2e	Biomass	0.004	99.980	
1A5a	Biomass	0.244	97.907		1A2gviii	Peat	0.004	99.983	
1A2d	Liquid	0.218	98.125		1A2a	Liquid	0.003	99.986	
1A1a	Peat	0.183	98.308		2G		0.003	99.989	
1A3bi	Gasoline	0.170	98.478		1A2f	Biomass	0.002	99.991	
1A2gvii	Liquid	0.160	98.638		1A2gvii	Gaseous	0.002	99.993	
1A4bi	Liquid	0.143	98.781		2A1		0.001	99.994	
1A4ai	Liquid	0.143	98.923		1A1a	Solid	0.001	99.995	
1A2gviii	Biomass	0.130	99.053		1A4bi	Peat	0.001	99.996	
1A5a	Liquid	0.110	99.163		1A3biv	Diesel oil	0.001	99.997	
1A4cii	Liquid	0.105	99.268		1A2e	Other	0.001	99.997	
1A3bii	Diesel oil	0.092	99.36		2C2		0.001	99.998	
1A4ci	Liquid	0.068	99.428		3F		0.001	99.998	
1A2d	Other	0.067	99.495		1A4ai	Peat	0.000	99.999	
1A1a	Liquid	0.064	99.559		1A3bii	Gasoline	0.000	99.999	
2D3i		0.061	99.620		1A1b	Solid	0.000	100	
2C1		0.049	99.668		1A2f	Solid	0.000	100	
1A4aii	Liquid	0.044	99.713		1A2a	Biomass	0.000	100	
1A1b	Liquid	0.036	99.749		1A2c	Biomass	0.000	100	
1A2f	Liquid	0.036	99.785		1A2d	Solid	0.000	100	
1A2d	Peat	0.032	99.817		1A2e	Solid	0.000	100	
1A4bii	Liquid	0.025	99.842		1A4bi	Other	0.000	100	
1A2gviii	Liquid	0.024	99.866		1A2b	Solid	0.000	100	
1A4ci	Biomass	0.021	99.886		1A4ci	Solid	0.000	100	
1A2c	Liquid	0.019	99.905		1A2a	Solid	0.000	100	
1A2f	Other	0.011	99.916		1A2c	Solid	0.000	100	
1A2b	Liquid	0.010	99.926		1A4bi	Solid	0.000	100	

HCB

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
2B10a		62.374	62.374	Yes	1A4ci	Solid	0.007	99.965	
2C7a		31.532	93.906	Yes	1A2e	Biomass	0.006	99.971	
1A1a	Biomass	2.003	95.909		2D3i		0.006	99.977	
1A4bi	Biomass	1.119	97.028		1A2f	Solid	0.004	99.981	
1A2d	Biomass	0.589	97.617		1A3bi	Gaseous	0.004	99.984	
1A2gviii		0.468	98.085		1A5a	Liquid	0.003	99.988	
1A3biii	Diesel oil	0.381	98.466		1A2f	Biomass	0.003	99.991	
1A3bi	Gasoline	0.335	98.802		1A2a	Solid	0.002	99.993	
1A3bi	Diesel oil	0.200	99.002		1A2d	Solid	0.001	99.994	
1A2gviii	Biomass	0.200	99.202		1A3bii	Gasoline	0.001	99.995	
1A4ci	Biomass	0.175	99.377		1A2e	Solid	0.001	99.996	
2C3		0.157	99.534		1A1a	Solid	0.001	99.997	
1A3bii	Diesel oil	0.084	99.619		1A3biii	Gaseous	0.001	99.998	
1A5a	Biomass	0.078	99.696		1A2b	Solid	0.001	99.999	
2C1		0.075	99.771		1A3biv	Diesel oil	0.000	99.999	
1A4ai	Biomass	0.068	99.839		1A3bii	Gaseous	0.000	99.999	
3Df		0.047	99.886		1A2a	Biomass	0.000	100	
1A3dii	Liquid	0.026	99.912		1A4bi	Solid	0.000	100	
5C1bv		0.024	99.936		1A2c	Biomass	0.000	100	
1A4ciii	Liquid	0.012	99.948		1A2c	Solid	0.000	100	
1A3biv	Gasoline	0.010	99.958						

PCB

NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source	NFR Code	Fuel	Contribution percentage	Cumulative percentage	Key source
2C1		50.159	50.159	Yes	2C7a		0.001	99.997	
2A1		14.266	64.424	Yes	1A1a	Solid	0.001	99.998	
1A4bi	Biomass	14.083	78.507	Yes	1A4ci	Liquid	0.000	99.998	
1B1b		13.593	92.100	Yes	1A4ci	Peat	0.000	99.999	
1A4ci	Biomass	2.197	94.297		1A3bi	Diesel oil	0.000	99.999	
1A1a	Biomass	1.471	95.768		2A2		0.000	99.999	
1A2f	Solid	1.140	96.907		1A3bi	Gasoline	0.000	99.999	
1A4ai	Biomass	0.855	97.762		1A3bii	Diesel oil	0.000	100	
1A2a	Solid	0.583	98.345		1A2c	Solid	0.000	100	
2C3		0.433	98.778		1A2e	Biomass	0.000	100	
1A2d	Solid	0.422	99.199		1A3biii	Diesel oil	0.000	100	
1A2e	Solid	0.327	99.526		1A4ci	Solid	0.000	100	
1A2b	Solid	0.166	99.693		1A4bi	Peat	0.000	100	
1A2gviii		0.127	99.820		1A2f	Biomass	0.000	100	
5C1bv		0.068	99.887		1A4ai	Peat	0.000	100	
2C7c		0.057	99.945		1A3biv	Gasoline	0.000	100	
1A3dii	Liquid	0.027	99.972		1A3biv	Diesel oil	0.000	100	
1A2d	Biomass	0.007	99.980		1A2a	Biomass	0.000	100	

1A4ciii	Liquid	0.006	99.986	1A3bii	Gasoline	0.000	100
1A4bi	Liquid	0.004	99.990	1A2c	Biomass	0.000	100
1A4ai	Liquid	0.004	99.993	1A4bi	Solid	0.000	100
1A2gviii	Biomass	0.003	99.996				

Trend analysis

The key category assessment by trend for the 2022 submission is presented below.

NO_x

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
1A3bi	Gasoline	62.636	306.415	2.250	105.392	Gg	0.063	20.038	20.038	Yes
1A3biii	Diesel oil	58.866	306.415	9.256	105.392	Gg	0.036	11.415	31.452	Yes
1A1a	Solid	36.204	306.415	2.345	105.392	Gg	0.033	10.497	41.949	Yes
1A2d	Biomass	8.474	306.415	12.153	105.392	Gg	0.03	9.594	51.543	Yes
1A1a	Biomass	0.877	306.415	7.131	105.392	Gg	0.022	7.093	58.636	Yes
1A3bi	Diesel oil	6.783	306.415	8.612	105.392	Gg	0.02	6.521	65.157	Yes
1A4bi	Biomass	3.303	306.415	3.788	105.392	Gg	0.009	2.754	67.911	Yes
1A3bii	Diesel oil	4.439	306.415	3.969	105.392	Gg	0.008	2.537	70.448	Yes
3Da1		9.143	306.415	5.575	105.392	Gg	0.008	2.524	72.972	Yes
1A2a	Gaseous	1.090	306.415	2.402	105.392	Gg	0.007	2.105	75.077	Yes
1A4cii	Liquid	12.825	306.415	2.396	105.392	Gg	0.007	2.093	77.171	Yes
3Da2a		3.147	306.415	2.943	105.392	Gg	0.006	1.932	79.103	Yes
1A1a	Gaseous	8.866	306.415	1.389	105.392	Gg	0.005	1.724	80.827	Yes
1A5a	Biomass	0.032	306.415	1.646	105.392	Gg	0.005	1.698	82.525	
1A3dii	Liquid	9.130	306.415	4.757	105.392	Gg	0.005	1.679	84.204	
1A1a	Other	0.006	306.415	1.366	105.392	Gg	0.004	1.416	85.620	
1A2gvii	Liquid	12.486	306.415	5.238	105.392	Gg	0.003	0.979	86.600	
1A5a	Liquid	2.047	306.415	1.606	105.392	Gg	0.003	0.936	87.536	
1A1a	Liquid	3.795	306.415	0.478	105.392	Gg	0.003	0.860	88.395	
1A2d	Solid	2.455	306.415	0.038	105.392	Gg	0.003	0.837	89.232	
1A4bii	Liquid	0.396	306.415	0.884	105.392	Gg	0.002	0.777	90.009	
1A1b	Gaseous	2.857	306.415	1.657	105.392	Gg	0.002	0.701	90.710	
1A2gviii	Biomass	0.803	306.415	0.865	105.392	Gg	0.002	0.612	91.322	
1A2c	Liquid	0.713	306.415	0.812	105.392	Gg	0.002	0.588	91.910	
1A4aii	Liquid	5.216	306.415	1.251	105.392	Gg	0.002	0.564	92.474	
1A4ciii	Liquid	3.580	306.415	1.719	105.392	Gg	0.002	0.506	92.980	
1A3bii	Gasoline	1.532	306.415	0.086	105.392	Gg	0.001	0.458	93.438	
1A4ci	Biomass	0.520	306.415	0.600	105.392	Gg	0.001	0.437	93.875	
1A2gviii	Other	0.148	306.415	0.466	105.392	Gg	0.001	0.431	94.307	
3Da3		0.727	306.415	0.595	105.392	Gg	0.001	0.358	94.665	
1A4bi	Liquid	3.105	306.415	0.743	105.392	Gg	0.001	0.337	95.002	
1A5a	Gaseous	0.247	306.415	0.355	105.392	Gg	0.001	0.281	95.282	
1A2c	Gaseous	0.707	306.415	0.507	105.392	Gg	0.001	0.274	95.557	
1A2d	Peat	1.476	306.415	0.755	105.392	Gg	0.001	0.257	95.813	
1A2d	Liquid	2.290	306.415	1.029	105.392	Gg	0.001	0.250	96.064	
1A3ai(i)	Liquid	0.251	306.415	0.295	105.392	Gg	0.001	0.217	96.281	
1A2f	Gaseous	0.350	306.415	0.318	105.392	Gg	0.001	0.205	96.486	
1A2f	Other	0.580	306.415	0.384	105.392	Gg	0.001	0.191	96.677	
1A2gviii	Gaseous	0.107	306.415	0.221	105.392	Gg	0.001	0.191	96.869	
1A4ai	Biomass	0.156	306.415	0.230	105.392	Gg	0.001	0.183	97.052	
2B2		0.744	306.415	0.428	105.392	Gg	0.001	0.178	97.230	

1A2e	Liquid	0.661	306.415	0.065	105.392	Gg	0.001	0.169	97.399
1A2gviii	Liquid	1.294	306.415	0.297	105.392	Gg	0.000	0.154	97.553
1A3biv	Gasoline	0.065	306.415	0.156	105.392	Gg	0.000	0.139	97.692
1A2d	Other	0.044	306.415	0.147	105.392	Gg	0.000	0.137	97.829
2B10a		0.061	306.415	0.149	105.392	Gg	0.000	0.133	97.962
1A2c	Solid	0.346	306.415	0	105.392	Gg	0.000	0.123	98.085
1A4ci	Peat	0.040	306.415	0.129	105.392	Gg	0.000	0.120	98.205
1A2b	Solid	0.422	306.415	0.039	105.392	Gg	0.000	0.110	98.315
3B1b		0.135	306.415	0.147	105.392	Gg	0.000	0.105	98.420
1A4ci	Liquid	0.739	306.415	0.353	105.392	Gg	0.000	0.102	98.522
1A2e	Peat	0.165	306.415	0.154	105.392	Gg	0.000	0.101	98.623
1A2a	Liquid	0.316	306.415	0.015	105.392	Gg	0.000	0.097	98.721
1A1a	Peat	9.791	306.415	3.461	105.392	Gg	0.000	0.097	98.818
3Da2b		0.063	306.415	0.110	105.392	Gg	0.000	0.092	98.910
1A2a	Solid	1.661	306.415	0.489	105.392	Gg	0.000	0.085	98.995
3B4gii		0.027	306.415	0.087	105.392	Gg	0.000	0.081	99.076
1A3c	Liquid	4.212	306.415	1.379	105.392	Gg	0.000	0.073	99.148
1A2b	Liquid	0.205	306.415	0.129	105.392	Gg	0.000	0.061	99.210
1A2gviii	Peat	0.046	306.415	0.075	105.392	Gg	0.000	0.061	99.271
1A2f	Solid	3.724	306.415	1.228	105.392	Gg	0.000	0.055	99.326
1A2f	Liquid	0.575	306.415	0.250	105.392	Gg	0.000	0.054	99.380
1A4bi	Gaseous	0.039	306.415	0.055	105.392	Gg	0.000	0.043	99.423
1A3biv	Diesel oil		306.415	0.038	105.392	Gg	0.000	0.040	99.463
1A2e	Solid	0.247	306.415	0.049	105.392	Gg	0.000	0.037	99.500
1A4ai	Gaseous	0.043	306.415	0.050	105.392	Gg	0.000	0.037	99.537
1A3aii(i)	Liquid	0.311	306.415	0.074	105.392	Gg	0.000	0.034	99.571
1A1b	Liquid	0.232	306.415	0.112	105.392	Gg	0.000	0.033	99.604
1A2gvii	Gaseous	0.164	306.415	0.086	105.392	Gg	0.000	0.031	99.635
3B4gi		0.052	306.415	0.047	105.392	Gg	0.000	0.030	99.665
1A2e	Biomass	0.031	306.415	0.040	105.392	Gg	0.000	0.030	99.695
3B4e		0.016	306.415	0.031	105.392	Gg	0.000	0.026	99.721
3F		0.113	306.415	0.062	105.392	Gg	0.000	0.024	99.745
1A2c	Biomass	0.062	306.415	0.000	105.392	Gg	0.000	0.022	99.767
3B4h		0.041	306.415	0.034	105.392	Gg	0.000	0.021	99.788
1A2b	Gaseous	0.036	306.415	0.032	105.392	Gg	0.000	0.021	99.809
1A2f	Biomass	0.000	306.415	0.019	105.392	Gg	0.000	0.020	99.828
3B3		0.068	306.415	0.005	105.392	Gg	0.000	0.019	99.847
1A4ci	Gaseous	0.061	306.415	0.006	105.392	Gg	0.000	0.016	99.863
1A4ai	Liquid	2.314	306.415	0.811	105.392	Gg	0.000	0.015	99.878
1A2d	Gaseous	3.423	306.415	1.191	105.392	Gg	0.000	0.014	99.893
1A1b	Solid	0.231	306.415	0.092	105.392	Gg	0.000	0.013	99.906
1A4bi	Solid	0.037	306.415	0.000	105.392	Gg	0.000	0.013	99.919
1A3biii	Gaseous		306.415	0.011	105.392	Gg	0.000	0.012	99.931
1A4bi	Peat	0.065	306.415	0.014	105.392	Gg	0.000	0.009	99.939
3B1a		0.156	306.415	0.045	105.392	Gg	0.000	0.008	99.948
3B4giii		0.001	306.415	0.008	105.392	Gg	0.000	0.008	99.956
1A3bi	Gaseous		306.415	0.006	105.392	Gg	0.000	0.007	99.963
1A4ai	Peat	0.015	306.415	0.011	105.392	Gg	0.000	0.007	99.969
3B2		0.006	306.415	0.008	105.392	Gg	0.000	0.006	99.975
1A2e	Gaseous	0.090	306.415	0.025	105.392	Gg	0.000	0.006	99.982
1A2e	Other	0.001	306.415	0.005	105.392	Gg	0.000	0.005	99.987

1A4ci	Solid	0.024	306.415	0.013	105.392	Gg	0.000	0.005	99.992
1A2a	Biomass		306.415	0.003	105.392	Gg	0.000	0.003	99.994
1A3ei	Gaseous	0.009	306.415	0.001	105.392	Gg	0.000	0.002	99.996
1A4bi	Other	0.003	306.415	0.000	105.392	Gg	0.000	0.001	99.997
3B4giv		0.007	306.415	0.003	105.392	Gg	0.000	0.001	99.999
1A3bii	Gaseous		306.415	0.001	105.392	Gg	0.000	0.001	99.999
3B4d		0.000	306.415	0.000	105.392	Gg	0.000	0.000	99.999
3Da2c		0.000	306.415	0.000	105.392	Gg	0.000	0.000	100
2G		0.01	306.415	0.004	105.392	Gg	0.000	0.000	100

NMVOC

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
1A3bi	Gasoline	49.364	235.501	1.204	84.587	Gg	0.07	22.841	22.841	Yes
1A4bi	Biomass	17.720	235.501	17.458	84.587	Gg	0.047	15.332	38.174	Yes
2D3a		3.825	235.501	11.588	84.587	Gg	0.043	14.117	52.291	Yes
1A3bv		13.655	235.501	1.272	84.587	Gg	0.015	5.021	57.311	Yes
3B1a		7.763	235.501	6.088	84.587	Gg	0.014	4.561	61.872	Yes
2D3h		8.800	235.501	0.318	84.587	Gg	0.012	3.928	65.801	Yes
2D3d		27.500	235.501	7.088	84.587	Gg	0.012	3.856	69.657	Yes
1A3biii	Diesel oil	7.843	235.501	0.261	84.587	Gg	0.011	3.533	73.190	Yes
3B1b		3.732	235.501	3.896	84.587	Gg	0.011	3.532	76.722	Yes
2D3c		6.260	235.501	0.343	84.587	Gg	0.008	2.634	79.355	Yes
1A4aii	Liquid	6.267	235.501	0.458	84.587	Gg	0.008	2.478	81.834	Yes
1A4cii	Liquid	6.642	235.501	1.326	84.587	Gg	0.005	1.465	83.298	
2D3i		2.085	235.501	1.705	84.587	Gg	0.004	1.321	84.620	
1A1a	Biomass	0.095	235.501	0.837	84.587	Gg	0.003	1.109	85.729	
2B10a		7.836	235.501	2.042	84.587	Gg	0.003	1.067	86.796	
2H2		2.523	235.501	1.672	84.587	Gg	0.003	1.059	87.855	
2I		1.070	235.501	1.140	84.587	Gg	0.003	1.045	88.899	
3Da2a		4.173	235.501	2.185	84.587	Gg	0.003	0.949	89.848	
3B4gii		0.235	235.501	0.739	84.587	Gg	0.003	0.905	90.753	
1A3bii	Gasoline	1.669	235.501	0.029	84.587	Gg	0.002	0.788	91.541	
3De		1.062	235.501	0.930	84.587	Gg	0.002	0.758	92.299	
2D3e		2.638	235.501	0.464	84.587	Gg	0.002	0.669	92.968	
1A3bi	Diesel oil	1.332	235.501	0.096	84.587	Gg	0.002	0.528	93.496	
2H1		2.966	235.501	1.424	84.587	Gg	0.002	0.496	93.992	
2D3g		3.956	235.501	1.754	84.587	Gg	0.001	0.460	94.452	
1A1a	Other	0.001	235.501	0.266	84.587	Gg	0.001	0.368	94.820	
1A3dii	Liquid	9.646	235.501	3.228	84.587	Gg	0.001	0.327	95.147	
3B4h		1.237	235.501	0.676	84.587	Gg	0.001	0.320	95.466	
1A2gvii	Liquid	2.115	235.501	0.989	84.587	Gg	0.001	0.317	95.783	
1A4ci	Peat	0.080	235.501	0.256	84.587	Gg	0.001	0.314	96.097	
3B4e		0.153	235.501	0.247	84.587	Gg	0.001	0.266	96.363	
2C1		1.027	235.501	0.178	84.587	Gg	0.001	0.264	96.627	
3B4gi		0.256	235.501	0.254	84.587	Gg	0.001	0.224	96.851	
1B2aiv		6.600	235.501	2.532	84.587	Gg	0.001	0.223	97.073	

1B2b		0.255	235.501	0.252	84.587	Gg	0.001	0.222	97.296
1A5a	Biomass	0.014	235.501	0.165	84.587	Gg	0.001	0.221	97.516
1A2d	Biomass	0.424	235.501	0.290	84.587	Gg	0.001	0.190	97.706
3B2		0.105	235.501	0.161	84.587	Gg	0.001	0.171	97.877
3B3		0.423	235.501	0.252	84.587	Gg	0.000	0.139	98.016
1A2gviii	Biomass	0.199	235.501	0.156	84.587	Gg	0.000	0.117	98.133
1A1a	Peat	0.199	235.501	0.154	84.587	Gg	0.000	0.113	98.246
1A4bii	Liquid	6.597	235.501	2.290	84.587	Gg	0.000	0.110	98.356
2B10b		0.134	235.501	0.123	84.587	Gg	0.000	0.103	98.459
1A5a	Liquid	0.126	235.501	0.110	84.587	Gg	0.000	0.089	98.548
2D3b		0.900	235.501	0.386	84.587	Gg	0.000	0.087	98.635
1B2av		7.411	235.501	2.603	84.587	Gg	0.000	0.082	98.717
1A1a	Gaseous	0.042	235.501	0.072	84.587	Gg	0.000	0.078	98.796
1A1b	Gaseous	0.009	235.501	0.056	84.587	Gg	0.000	0.073	98.869
1A2d	Liquid	0.180	235.501	0.015	84.587	Gg	0.000	0.069	98.938
1A3bii	Diesel oil	0.796	235.501	0.238	84.587	Gg	0.000	0.067	99.005
1B1b		0.037	235.501	0.059	84.587	Gg	0.000	0.062	99.067
1A2gvii	Gaseous	0.251	235.501	0.129	84.587	Gg	0.000	0.054	99.121
3Da3		0.104	235.501	0.073	84.587	Gg	0.000	0.050	99.171
1A1a	Solid	0.117	235.501	0.075	84.587	Gg	0.000	0.045	99.216
1A2a	Gaseous	0.124	235.501	0.014	84.587	Gg	0.000	0.042	99.258
1A2gviii	Other	0.011	235.501	0.035	84.587	Gg	0.000	0.042	99.300
1A4ciii	Liquid	0.144	235.501	0.078	84.587	Gg	0.000	0.037	99.337
1A5a	Gaseous	0.025	235.501	0.036	84.587	Gg	0.000	0.037	99.374
3B4giii		0.006	235.501	0.028	84.587	Gg	0.000	0.036	99.411
1A4bi	Solid	0.074	235.501	0.000	84.587	Gg	0.000	0.036	99.447
1A2gviii	Gaseous	0.002	235.501	0.027	84.587	Gg	0.000	0.036	99.482
1A4bi	Liquid	0.194	235.501	0.046	84.587	Gg	0.000	0.032	99.515
1A3biv	Gasoline	2.767	235.501	0.971	84.587	Gg	0.000	0.032	99.547
3F		0.253	235.501	0.114	84.587	Gg	0.000	0.032	99.578
2C7b		0.010	235.501	0.026	84.587	Gg	0.000	0.031	99.609
1A3ai(i)	Liquid	0.056	235.501	0.042	84.587	Gg	0.000	0.031	99.640
1A4bi	Peat	0.130	235.501	0.028	84.587	Gg	0.000	0.026	99.666
1A4ci	Biomass	0.020	235.501	0.022	84.587	Gg	0.000	0.021	99.687
1A1b	Solid		235.501	0.015	84.587	Gg	0.000	0.021	99.708
1A1b	Liquid	0.002	235.501	0.013	84.587	Gg	0.000	0.018	99.725
1A2d	Solid	0.038	235.501	0.002	84.587	Gg	0.000	0.017	99.742
5D2		0.022	235.501	0.018	84.587	Gg	0.000	0.014	99.756
1A2e	Peat	0.012	235.501	0.014	84.587	Gg	0.000	0.014	99.769
1A2d	Gaseous	0.077	235.501	0.018	84.587	Gg	0.000	0.013	99.783
1A2d	Peat	0.018	235.501	0.016	84.587	Gg	0.000	0.013	99.795
5A		0.234	235.501	0.075	84.587	Gg	0.000	0.013	99.808
1A4ai	Peat	0.016	235.501	0.014	84.587	Gg	0.000	0.012	99.820
1A3c	Liquid	0.234	235.501	0.076	84.587	Gg	0.000	0.011	99.832
5D1		0.003	235.501	0.009	84.587	Gg	0.000	0.011	99.843
1A3aii(i)	Liquid	0.057	235.501	0.013	84.587	Gg	0.000	0.010	99.853
1A3biv	Diesel oil		235.501	0.007	84.587	Gg	0.000	0.010	99.863
2C3		0.022	235.501	0.001	84.587	Gg	0.000	0.010	99.873
1A4ci	Liquid	0.043	235.501	0.022	84.587	Gg	0.000	0.009	99.882
2A1		0.054	235.501	0.026	84.587	Gg	0.000	0.009	99.891
1A2f	Other		235.501	0.006	84.587	Gg	0.000	0.009	99.899

1A4ai	Biomass	0.007	235.501	0.009	84.587	Gg	0.000	0.008	99.908
1A2d	Other	0.000	235.501	0.006	84.587	Gg	0.000	0.008	99.916
1A2c	Gaseous	0.003	235.501	0.006	84.587	Gg	0.000	0.007	99.923
2G		0.027	235.501	0.014	84.587	Gg	0.000	0.006	99.929
2L		0.013	235.501	0.000	84.587	Gg	0.000	0.006	99.935
1A4bi	Gaseous	0.004	235.501	0.005	84.587	Gg	0.000	0.006	99.940
1A4ai	Gaseous	0.003	235.501	0.005	84.587	Gg	0.000	0.005	99.945
3B4d		0.004	235.501	0.005	84.587	Gg	0.000	0.004	99.950
2C7c		0.025	235.501	0.006	84.587	Gg	0.000	0.004	99.954
3B4giv		0.041	235.501	0.018	84.587	Gg	0.000	0.004	99.958
1A3bi	Gaseous		235.501	0.003	84.587	Gg	0.000	0.004	99.962
1A2gviii	Liquid	0.017	235.501	0.009	84.587	Gg	0.000	0.003	99.965
1A2gviii	Peat	0.002	235.501	0.003	84.587	Gg	0.000	0.003	99.968
1A2f	Biomass	0.000	235.501	0.002	84.587	Gg	0.000	0.003	99.971
2C2			235.501	0.002	84.587	Gg	0.000	0.003	99.974
1A2e	Other	0.000	235.501	0.002	84.587	Gg	0.000	0.003	99.977
1A2e	Biomass	0.007	235.501	0.004	84.587	Gg	0.000	0.002	99.979
1A1a	Liquid	0.027	235.501	0.008	84.587	Gg	0.000	0.002	99.981
1A2f	Gaseous	0.004	235.501	0.003	84.587	Gg	0.000	0.002	99.983
2A3		0.001	235.501	0.002	84.587	Gg	0.000	0.002	99.985
1A4ai	Liquid	0.125	235.501	0.046	84.587	Gg	0.000	0.002	99.987
1A2c	Solid	0.004	235.501	0.000	84.587	Gg	0.000	0.002	99.988
2C6		0.001	235.501	0.001	84.587	Gg	0.000	0.002	99.990
1A2f	Liquid	0.004	235.501	0.002	84.587	Gg	0.000	0.001	99.991
1A2e	Solid	0.007	235.501	0.002	84.587	Gg	0.000	0.001	99.993
1A2f	Solid	0.009	235.501	0.003	84.587	Gg	0.000	0.001	99.994
1A3biii	Gaseous		235.501	0.001	84.587	Gg	0.000	0.001	99.995
1A2e	Liquid	0.005	235.501	0.001	84.587	Gg	0.000	0.001	99.995
2C7a			235.501	0.001	84.587	Gg	0.000	0.001	99.996
1A2a	Biomass		235.501	0.000	84.587	Gg	0.000	0.001	99.997
1A2a	Liquid	0.002	235.501	0.000	84.587	Gg	0.000	0.001	99.997
1A2c	Biomass	0.002	235.501	0.000	84.587	Gg	0.000	0.001	99.998
1A2b	Gaseous	0.000	235.501	0.000	84.587	Gg	0.000	0.000	99.998
1A4ci	Gaseous	0.002	235.501	0.001	84.587	Gg	0.000	0.000	99.999
1A3bii	Gaseous		235.501	0.000	84.587	Gg	0.000	0.000	99.999
1A2b	Liquid	0.001	235.501	0.001	84.587	Gg	0.000	0.000	99.999
1A2c	Liquid	0.003	235.501	0.001	84.587	Gg	0.000	0.000	100
1A4ci	Solid	0.001	235.501	0.000	84.587	Gg	0.000	0.000	100
1A4bi	Other	0.000	235.501	0.000	84.587	Gg	0.000	0.000	100
1A2e	Gaseous	0.001	235.501	0.000	84.587	Gg	0.000	0.000	100
1A2b	Solid	0.000	235.501	0.000	84.587	Gg	0.000	0.000	100
1A3ei	Gaseous	0.000	235.501	0.000	84.587	Gg	0.000	0.000	100

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NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
1A1b	Gaseous	1.599	248.793	2.979	23.218	Gg	0.011	13.253	13.253	Yes

1A1a	Solid	50.545	248.793	2.289	23.218	Gg	0.01	11.372	24.626	Yes
1A1a	Peat	8.877	248.793	2.45	23.218	Gg	0.007	7.594	32.219	Yes
1A2d	Liquid	19.652	248.793	0.532	23.218	Gg	0.005	6.096	38.315	Yes
1A1a	Liquid	16.678	248.793	0.277	23.218	Gg	0.005	5.992	44.307	Yes
1A1b	Solid	15.681	248.793	0.290	23.218	Gg	0.005	5.496	49.803	Yes
2H1		22.811	248.793	0.958	23.218	Gg	0.005	5.483	55.287	Yes
1A1a	Biomass	0.560	248.793	1.122	23.218	Gg	0.004	5.010	60.297	Yes
1A2b	Liquid	4.045	248.793	1.407	23.218	Gg	0.004	4.819	65.116	Yes
1A2b	Solid	4.034	248.793	1.121	23.218	Gg	0.003	3.487	68.604	Yes
2C1		2.867	248.793	0.843	23.218	Gg	0.002	2.694	71.298	Yes
1A2d	Solid	6.141	248.793	0.015	23.218	Gg	0.002	2.613	73.910	Yes
1A5a	Liquid	5.957	248.793	1.082	23.218	Gg	0.002	2.463	76.373	Yes
1A2a	Solid	6.995	248.793	0.155	23.218	Gg	0.002	2.333	78.706	Yes
1A5a	Biomass	0.008	248.793	0.329	23.218	Gg	0.001	1.538	80.244	Yes
1A2gviii	Liquid	4.979	248.793	0.152	23.218	Gg	0.001	1.464	81.708	
2B10a		13.894	248.793	1.035	23.218	Gg	0.001	1.225	82.933	
1A3biii	Diesel oil	2.738	248.793	0.014	23.218	Gg	0.001	1.129	84.062	
1A4ci	Peat	0.072	248.793	0.232	23.218	Gg	0.001	1.054	85.117	
1A4bi	Biomass	0.206	248.793	0.237	23.218	Gg	0.001	1.019	86.135	
1A2gviii	Biomass	0.276	248.793	0.214	23.218	Gg	0.001	0.881	87.016	
1A2f	Solid	1.111	248.793	0.282	23.218	Gg	0.001	0.837	87.854	
1A2c	Gaseous	1.839	248.793	0.009	23.218	Gg	0.001	0.762	88.616	
1A1a	Other	0.027	248.793	0.146	23.218	Gg	0.001	0.670	89.286	
1A2d	Gaseous	0.239	248.793	0.165	23.218	Gg	0.001	0.668	89.954	
1A2a	Liquid	1.958	248.793	0.040	23.218	Gg	0.001	0.666	90.620	
1A2d	Peat	5.876	248.793	0.422	23.218	Gg	0.001	0.594	91.213	
1A3dii	Liquid	1.65	248.793	0.040	23.218	Gg	0.000	0.532	91.746	
2C7a		0.000	248.793	0.112	23.218	Gg	0.000	0.522	92.268	
1A1b	Liquid	4.507	248.793	0.314	23.218	Gg	0.000	0.499	92.767	
1A1a	Gaseous	0.002	248.793	0.106	23.218	Gg	0.000	0.493	93.260	
1A2e	Solid	0.783	248.793	0.168	23.218	Gg	0.000	0.444	93.705	
1A2c	Solid	0.962	248.793	0.000	23.218	Gg	0.000	0.420	94.125	
1A2gvii	Liquid	1.003	248.793	0.004	23.218	Gg	0.000	0.418	94.543	
1A4cii	Liquid	0.986	248.793	0.003	23.218	Gg	0.000	0.417	94.960	
1A2d	Biomass	6.176	248.793	0.659	23.218	Gg	0.000	0.387	95.348	
1A3bi	Diesel oil	0.909	248.793	0.008	23.218	Gg	0.000	0.362	95.709	
1A2e	Peat	0.230	248.793	0.093	23.218	Gg	0.000	0.337	96.046	
1A3bi	Gasoline	0.860	248.793	0.017	23.218	Gg	0.000	0.297	96.344	
1A3bii	Diesel oil	0.705	248.793	0.003	23.218	Gg	0.000	0.293	96.637	
1A2e	Liquid	3.245	248.793	0.240	23.218	Gg	0.000	0.293	96.930	
1A5a	Gaseous	0.000	248.793	0.060	23.218	Gg	0.000	0.280	97.210	
1A3c	Liquid	0.438	248.793	0.000	23.218	Gg	0.000	0.190	97.400	
1A2a	Gaseous	0.271	248.793	0.065	23.218	Gg	0.000	0.187	97.587	
1A4ci	Solid	0.093	248.793	0.048	23.218	Gg	0.000	0.183	97.769	
1A2f	Gaseous	0.064	248.793	0.045	23.218	Gg	0.000	0.181	97.951	
1A2gviii	Peat	0.019	248.793	0.039	23.218	Gg	0.000	0.175	98.126	
1A4aii	Liquid	0.409	248.793	0.001	23.218	Gg	0.000	0.173	98.299	
1A4ci	Biomass	0.033	248.793	0.039	23.218	Gg	0.000	0.170	98.469	
1B1b		0.795	248.793	0.045	23.218	Gg	0.000	0.137	98.606	
1A4ci	Liquid	3.231	248.793	0.276	23.218	Gg	0.000	0.121	98.727	
1A4bi	Solid	0.290	248.793	0.001	23.218	Gg	0.000	0.121	98.848	

1A2f	Liquid	1.827	248.793	0.147	23.218	Gg	0.000	0.112	98.959
1A2d	Other	0.390	248.793	0.059	23.218	Gg	0.000	0.107	99.066
1A2gviii	Gaseous	0.028	248.793	0.022	23.218	Gg	0.000	0.092	99.158
1A4ciii	Liquid	0.195	248.793	0.000	23.218	Gg	0.000	0.083	99.241
1A3ai(i)	Liquid	0.021	248.793	0.017	23.218	Gg	0.000	0.072	99.314
1A2e	Biomass	0.025	248.793	0.017	23.218	Gg	0.000	0.069	99.383
1A4ai	Peat	0.016	248.793	0.016	23.218	Gg	0.000	0.069	99.452
1A4bi	Peat	0.117	248.793	0.025	23.218	Gg	0.000	0.067	99.519
1A4bi	Liquid	4.226	248.793	0.408	23.218	Gg	0.000	0.065	99.583
1A4ai	Biomass	0.010	248.793	0.014	23.218	Gg	0.000	0.063	99.646
1A4ai	Liquid	10.103	248.793	0.932	23.218	Gg	0.000	0.051	99.698
1A2c	Liquid	3.311	248.793	0.319	23.218	Gg	0.000	0.047	99.744
2C7b		0.004	248.793	0.009	23.218	Gg	0.000	0.042	99.787
1A2gviii	Other	0.307	248.793	0.020	23.218	Gg	0.000	0.042	99.829
2D3i		0.089	248.793	0.000	23.218	Gg	0.000	0.037	99.866
3F		0.015	248.793	0.009	23.218	Gg	0.000	0.036	99.902
1A2c	Biomass	0.038	248.793	0.000	23.218	Gg	0.000	0.016	99.918
1A2e	Other	0.001	248.793	0.003	23.218	Gg	0.000	0.015	99.933
1A3aii(i)	Liquid	0.021	248.793	0.005	23.218	Gg	0.000	0.015	99.947
1A3bii	Gasoline	0.032	248.793	0.000	23.218	Gg	0.000	0.014	99.961
2C2			248.793	0.002	23.218	Gg	0.000	0.012	99.972
1A4bii	Liquid	0.032	248.793	0.001	23.218	Gg	0.000	0.010	99.983
2G		0.001	248.793	0.001	23.218	Gg	0.000	0.006	99.989
1A2f	Biomass	0.000	248.793	0.001	23.218	Gg	0.000	0.006	99.995
1A2b	Gaseous	0.000	248.793	0.000	23.218	Gg	0.000	0.001	99.996
2D3g		0.002	248.793	0.000	23.218	Gg	0.000	0.001	99.997
1A2e	Gaseous	0.005	248.793	0.000	23.218	Gg	0.000	0.001	99.998
1A3biv	Gasoline	0.007	248.793	0.001	23.218	Gg	0.000	0.001	99.998
1A2a	Biomass		248.793	0.000	23.218	Gg	0.000	0.000	99.999
1A2f	Other	0.033	248.793	0.003	23.218	Gg	0.000	0.000	99.999
2L			248.793	0.000	23.218	Gg	0.000	0.000	99.999
1A4bi	Gaseous	0.000	248.793	0.000	23.218	Gg	0.000	0.000	99.999
1A4ai	Gaseous	0.000	248.793	0.000	23.218	Gg	0.000	0.000	100
1A4bi	Other	0.000	248.793	0.000	23.218	Gg	0.000	0.000	100
1A3bi	Gaseous		248.793	0.000	23.218	Gg	0.000	0.000	100
1A3biv	Diesel oil		248.793	0.000	23.218	Gg	0.000	0.000	100
2C7c		0.001	248.793	0.000	23.218	Gg	0.000	0.000	100
1A2gvii	Gaseous	0.000	248.793	0.000	23.218	Gg	0.000	0.000	100
1A3biii	Gaseous		248.793	0.000	23.218	Gg	0.000	0.000	100
1A3bii	Gaseous		248.793	0.000	23.218	Gg	0.000	0.000	100
1A4ci	Gaseous	0.000	248.793	0.000	23.218	Gg	0.000	0.000	100
1A3ei	Gaseous	0.000	248.793	0.000	23.218	Gg	0.000	0.000	100

NH_3

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
3Da2a		9.93	35.620	6.889	30.661	Gg	0.047	18.982	18.982	Yes
3B1b		4.566	35.620	5.280	30.661	Gg	0.038	15.444	34.425	Yes
3Da1		3.733	35.620	1.978	30.661	Gg	0.035	14.140	48.565	Yes

3B1a		5.687	35.620	5.751	30.661	Gg	0.024	9.790	58.355	Yes
3B3		3.767	35.620	2.718	30.661	Gg	0.015	6.011	64.366	Yes
1A3bi	Gasoline	0.235	35.620	0.607	30.661	Gg	0.011	4.638	69.004	Yes
3B4gii		0.204	35.620	0.581	30.661	Gg	0.011	4.635	73.639	Yes
3B4e		0.386	35.620	0.692	30.661	Gg	0.010	4.114	77.753	Yes
2H1		0.542	35.620	0.157	30.661	Gg	0.009	3.542	81.296	Yes
1A4bi	Biomass	0.907	35.620	0.990	30.661	Gg	0.006	2.389	83.685	
5B2		0.000	35.620	0.196	30.661	Gg	0.005	2.242	85.927	
3B4gi		0.535	35.620	0.280	30.661	Gg	0.005	2.071	87.998	
2B10a		0.582	35.620	0.340	30.661	Gg	0.005	1.840	89.838	
5D1		0.275	35.620	0.384	30.661	Gg	0.004	1.683	91.521	
5B1		0.035	35.620	0.117	30.661	Gg	0.002	0.998	92.519	
3B2		0.067	35.620	0.134	30.661	Gg	0.002	0.872	93.39	
3B4giii		0.013	35.620	0.080	30.661	Gg	0.002	0.786	94.176	
3B4giv		0.104	35.620	0.026	30.661	Gg	0.002	0.725	94.901	
2D3e		0.061	35.620	0.004	30.661	Gg	0.001	0.554	95.455	
2C7b		0.100	35.620	0.038	30.661	Gg	0.001	0.550	96.005	
3Da3		1.640	35.620	1.457	30.661	Gg	0.001	0.516	96.521	
3Da2b		0.043	35.620	0.075	30.661	Gg	0.001	0.436	96.957	
3B4h		1.837	35.620	1.543	30.661	Gg	0.001	0.434	97.391	
2C1		0.003	35.620	0.036	30.661	Gg	0.001	0.382	97.774	
3F		0.109	35.620	0.061	30.661	Gg	0.001	0.376	98.149	
2D3i		0.097	35.620	0.113	30.661	Gg	0.001	0.335	98.485	
2G		0.042	35.620	0.008	30.661	Gg	0.001	0.320	98.805	
1A3bi	Diesel oil	0.005	35.620	0.026	30.661	Gg	0.001	0.247	99.052	
1A3biii	Diesel oil	0.010	35.620	0.029	30.661	Gg	0.001	0.235	99.287	
2D3g		0.024	35.620	0.002	30.661	Gg	0.001	0.217	99.504	
2L		0.020	35.620	0.007	30.661	Gg	0.000	0.123	99.626	
1A3bi	Gaseous		35.620	0.008	30.661	Gg	0.000	0.094	99.720	
1A3bii	Diesel oil	0.003	35.620	0.009	30.661	Gg	0.000	0.066	99.786	
1A4ci	Biomass	0.011	35.620	0.013	30.661	Gg	0.000	0.035	99.821	
3B4d		0.006	35.620	0.008	30.661	Gg	0.000	0.032	99.853	
1A1a		0.001	35.620	0.004	30.661	Gg	0.000	0.030	99.883	
1A4ai	Biomass	0.003	35.620	0.005	30.661	Gg	0.000	0.023	99.906	
1A2gviii			35.620	0.002	30.661	Gg	0.000	0.021	99.927	
1B1b		0.002	35.620	0.003	30.661	Gg	0.000	0.015	99.942	
1A3biv	Gasoline	0.001	35.620	0.002	30.661	Gg	0.000	0.014	99.956	
1A2gvii	Liquid	0.002	35.620	0.003	30.661	Gg	0.000	0.011	99.967	
2C7c		0.000	35.620	0.001	30.661	Gg	0.000	0.007	99.974	
1A3bii	Gaseous		35.620	0.001	30.661	Gg	0.000	0.006	99.980	
3Da2c		0.000	35.620	0.001	30.661	Gg	0.000	0.005	99.985	
1A3bii	Gasoline	0.002	35.620	0.002	30.661	Gg	0.000	0.003	99.988	
1A3c	Liquid	0.000	35.620	0.000	30.661	Gg	0.000	0.003	99.990	
1A3biii	Gaseous		35.620	0.000	30.661	Gg	0.000	0.003	99.993	
1A4ciii	Liquid	0.000	35.620	0.000	30.661	Gg	0.000	0.002	99.994	
1A4bii	Liquid	0.000	35.620	0.000	30.661	Gg	0.000	0.001	99.996	
1A4aii	Liquid	0.001	35.620	0.001	30.661	Gg	0.000	0.001	99.997	
1A4cii	Liquid	0.002	35.620	0.002	30.661	Gg	0.000	0.001	99.998	
1A3dii	Liquid	0.001	35.620	0.001	30.661	Gg	0.000	0.001	99.999	
1A3biv	Diesel oil		35.620	0.000	30.661	Gg	0.000	0.001	99.999	
1A2gvii	Gaseous	0.000	35.620	0.000	30.661	Gg	0.000	0.000	100	

1A5a	Liquid	0.000	35.620	0.000	30.661	Gg	0.000	0.000	100	
1A4bi	Solid	0.000	35.620	0.000	30.661	Gg	0.000	0.000	100	

$PM_{2.5}$

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
1A4bi	Biomass	7.392	47.234	7.053	14.062	Gg	0.103	34.135	34.135	Yes
1A2d	Biomass	8.973	47.234	0.950	14.062	Gg	0.036	12.113	46.247	Yes
1A3biii	Diesel oil	4.287	47.234	0.140	14.062	Gg	0.024	7.996	54.243	Yes
2C1		3.152	47.234	0.210	14.062	Gg	0.015	5.122	59.365	Yes
1A3bi	Diesel oil	2.366	47.234	0.199	14.062	Gg	0.011	3.556	62.921	Yes
1A3bvi		0.542	47.234	0.614	14.062	Gg	0.010	3.183	66.104	Yes
1A3bvii		0.404	47.234	0.454	14.062	Gg	0.007	2.345	68.449	Yes
1A4cii	Liquid	1.620	47.234	0.152	14.062	Gg	0.007	2.323	70.772	Yes
1A1a	Solid	1.103	47.234	0.014	14.062	Gg	0.007	2.213	72.985	Yes
2H2		0.303	47.234	0.398	14.062	Gg	0.007	2.166	75.151	Yes
2H1		1.420	47.234	0.165	14.062	Gg	0.005	1.811	76.961	Yes
1A1a	Liquid	0.704	47.234	0.016	14.062	Gg	0.004	1.361	78.322	Yes
1A2d	Liquid	0.686	47.234	0.023	14.062	Gg	0.004	1.275	79.597	Yes
1A5a	Biomass	0.002	47.234	0.165	14.062	Gg	0.003	1.153	80.750	Yes
1A3dii	Liquid	0.548	47.234	0.316	14.062	Gg	0.003	1.076	81.827	
1A2f	Solid	0.526	47.234	0.008	14.062	Gg	0.003	1.048	82.875	
2A5b		0.504	47.234	0.003	14.062	Gg	0.003	1.037	83.913	
1A2gvii	Liquid	1.421	47.234	0.287	14.062	Gg	0.003	0.958	84.871	
1A4aii	Liquid	0.746	47.234	0.088	14.062	Gg	0.003	0.946	85.817	
1A2gviii	Liquid	0.471	47.234	0.007	14.062	Gg	0.003	0.937	86.754	
3Dc		0.268	47.234	0.213	14.062	Gg	0.003	0.935	87.689	
1A3bii	Diesel oil	1.074	47.234	0.208	14.062	Gg	0.002	0.787	88.476	
1A1a	Peat	0.467	47.234	0.053	14.062	Gg	0.002	0.601	89.077	
1A4ci	Biomass	0.101	47.234	0.115	14.062	Gg	0.002	0.598	89.675	
1A4ai	Liquid	0.506	47.234	0.075	14.062	Gg	0.002	0.535	90.211	
2B6		0.248	47.234	0.000	14.062	Gg	0.002	0.517	90.727	
3F		0.287	47.234	0.156	14.062	Gg	0.001	0.495	91.222	
2C2		0.014	47.234	0.07	14.062	Gg	0.001	0.460	91.683	
1A2f	Liquid	0.219	47.234	0.005	14.062	Gg	0.001	0.423	92.106	
1A2gviii	Biomass	0.203	47.234	0.120	14.062	Gg	0.001	0.418	92.524	
1A4bii	Liquid	0.242	47.234	0.129	14.062	Gg	0.001	0.399	92.923	
1B2aiv		0.189	47.234	0.001	14.062	Gg	0.001	0.388	93.311	
1A1a	Biomass	0.252	47.234	0.130	14.062	Gg	0.001	0.387	93.698	
2C7c		0.201	47.234	0.007	14.062	Gg	0.001	0.370	94.067	
1B1c		1.085	47.234	0.369	14.062	Gg	0.001	0.327	94.395	
2I		0.131	47.234	0.000	14.062	Gg	0.001	0.274	94.668	
1A2d	Peat	0.154	47.234	0.009	14.062	Gg	0.001	0.260	94.929	
1A4ai	Biomass	0.03	47.234	0.045	14.062	Gg	0.001	0.254	95.182	
1A2c	Liquid	0.184	47.234	0.019	14.062	Gg	0.001	0.252	95.434	
1A4ci	Liquid	0.167	47.234	0.015	14.062	Gg	0.001	0.249	95.682	
1A2e	Liquid	0.143	47.234	0.008	14.062	Gg	0.001	0.247	95.929	
2D3b		0.087	47.234	0.061	14.062	Gg	0.001	0.244	96.173	
1A4bi	Solid	0.118	47.234	0.001	14.062	Gg	0.001	0.243	96.416	

2A3		0.124	47.234	0.003	14.062	Gg	0.001	0.236	96.652
1A2d	Solid	0.110	47.234	0.001	14.062	Gg	0.001	0.226	96.878
2D3i		0.064	47.234	0.048	14.062	Gg	0.001	0.201	97.079
1A5a	Liquid	0.308	47.234	0.119	14.062	Gg	0.001	0.194	97.274
1A2a	Solid	0.087	47.234	0.001	14.062	Gg	0.001	0.174	97.448
1A4ci	Peat	0.008	47.234	0.026	14.062	Gg	0.000	0.164	97.612
3B1b		0.079	47.234	0.046	14.062	Gg	0.000	0.158	97.770
1A2c	Solid	0.073	47.234	0.000	14.062	Gg	0.000	0.152	97.922
1A1b	Liquid	0.076	47.234	0.001	14.062	Gg	0.000	0.150	98.073
2A5a		0.068	47.234	0.000	14.062	Gg	0.000	0.141	98.214
1A3bi	Gasoline	0.174	47.234	0.032	14.062	Gg	0.000	0.141	98.354
1A4bi	Liquid	0.219	47.234	0.046	14.062	Gg	0.000	0.137	98.491
1A4ciii	Liquid	0.072	47.234	0.041	14.062	Gg	0.000	0.136	98.627
1A2a	Liquid	0.069	47.234	0.001	14.062	Gg	0.000	0.133	98.760
1A4bi	Peat	0.208	47.234	0.045	14.062	Gg	0.000	0.120	98.881
3B1a		0.132	47.234	0.055	14.062	Gg	0.000	0.110	98.991
2L		0.054	47.234	0.007	14.062	Gg	0.000	0.068	99.059
2G		0.153	47.234	0.055	14.062	Gg	0.000	0.068	99.127
1A2b	Liquid	0.038	47.234	0.003	14.062	Gg	0.000	0.061	99.188
1A2d	Gaseous	0.052	47.234	0.007	14.062	Gg	0.000	0.059	99.246
3B4gii		0.003	47.234	0.009	14.062	Gg	0.000	0.056	99.303
2A2		0.026	47.234	0.000	14.062	Gg	0.000	0.054	99.356
2C7a		0.026	47.234	0.000	14.062	Gg	0.000	0.051	99.407
3B4gi		0.014	47.234	0.011	14.062	Gg	0.000	0.047	99.454
1A2e	Peat	0.023	47.234	0.000	14.062	Gg	0.000	0.046	99.500
1A3biv	Diesel oil		47.234	0.006	14.062	Gg	0.000	0.045	99.545
5E		0.299	47.234	0.095	14.062	Gg	0.000	0.039	99.584
3B4e		0.004	47.234	0.006	14.062	Gg	0.000	0.035	99.619
2B10a		0.738	47.234	0.224	14.062	Gg	0.000	0.031	99.650
1B1b		0.003	47.234	0.005	14.062	Gg	0.000	0.031	99.680
1A2b	Solid	0.014	47.234	0.000	14.062	Gg	0.000	0.028	99.708
3B4h		0.013	47.234	0.007	14.062	Gg	0.000	0.023	99.731
2D3g		0.016	47.234	0.002	14.062	Gg	0.000	0.023	99.754
1A1a	Other	0.001	47.234	0.003	14.062	Gg	0.000	0.023	99.777
1A2e	Solid	0.013	47.234	0.001	14.062	Gg	0.000	0.022	99.799
1A3biv	Gasoline	0.057	47.234	0.014	14.062	Gg	0.000	0.021	99.819
1A2e	Biomass	0.011	47.234	0.000	14.062	Gg	0.000	0.020	99.839
3B4giii		0.001	47.234	0.003	14.062	Gg	0.000	0.018	99.857
1A2gviii	Other	0.009	47.234	0.001	14.062	Gg	0.000	0.015	99.872
1A1b	Solid	0.020	47.234	0.004	14.062	Gg	0.000	0.015	99.887
1A3bii	Gasoline	0.006	47.234	0.000	14.062	Gg	0.000	0.011	99.898
3B2		0.001	47.234	0.001	14.062	Gg	0.000	0.009	99.907
2B10b		0.001	47.234	0.002	14.062	Gg	0.000	0.009	99.916
1B2av		0.005	47.234	0.000	14.062	Gg	0.000	0.008	99.924
2A5c		0.049	47.234	0.016	14.062	Gg	0.000	0.008	99.932
5C1bv		0.000	47.234	0.001	14.062	Gg	0.000	0.008	99.940
1A4ai	Peat	0.002	47.234	0.002	14.062	Gg	0.000	0.007	99.947
1A3ai(i)	Liquid	0.003	47.234	0.002	14.062	Gg	0.000	0.007	99.955
1A3c	Liquid	0.084	47.234	0.026	14.062	Gg	0.000	0.007	99.962
3B3		0.004	47.234	0.002	14.062	Gg	0.000	0.006	99.968
1A2f	Other		47.234	0.001	14.062	Gg	0.000	0.006	99.974

1A2f	Biomass	0.000	47.234	0.001	14.062	Gg	0.000	0.005	99.979
2D3d		0.000	47.234	0.001	14.062	Gg	0.000	0.004	99.983
3B4giv		0.032	47.234	0.009	14.062	Gg	0.000	0.003	99.985
1A2c	Biomass	0.001	47.234	0.000	14.062	Gg	0.000	0.002	99.988
2C7d		0.001	47.234	0.001	14.062	Gg	0.000	0.002	99.990
1A2gvii	Gaseous	0.001	47.234	0.001	14.062	Gg	0.000	0.002	99.992
1A3bi	Gaseous		47.234	0.000	14.062	Gg	0.000	0.002	99.994
1A2d	Other	0.005	47.234	0.001	14.062	Gg	0.000	0.001	99.995
2C3		0.001	47.234	0.000	14.062	Gg	0.000	0.001	99.997
1A2gviii	Peat	0.001	47.234	0.000	14.062	Gg	0.000	0.001	99.998
1A2a	Biomass		47.234	0.000	14.062	Gg	0.000	0.000	99.998
1A4bi	Other	0.000	47.234	0.000	14.062	Gg	0.000	0.000	99.998
1A3aii(i)	Liquid	0.002	47.234	0.001	14.062	Gg	0.000	0.000	99.999
3B4d		0.000	47.234	0.000	14.062	Gg	0.000	0.000	99.999
1A2e	Other	0.000	47.234	0.000	14.062	Gg	0.000	0.000	99.999
1A3biii	Gaseous		47.234	0.000	14.062	Gg	0.000	0.000	100
1A3bii	Gaseous		47.234	0.000	14.062	Gg	0.000	0.000	100
1A4ci	Solid	0.001	47.234	0.000	14.062	Gg	0.000	0.000	100
5A		0.000	47.234	0.000	14.062	Gg	0.000	0.000	100

PM_{10}

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
1A4bi	Biomass	7.630	73.947	7.280	26.564	Gg	0.061	17.028	17.028	Yes
1A3bvii		4.766	73.947	5.360	26.564	Gg	0.049	13.685	30.713	Yes
1A2d	Biomass	11.931	73.947	1.363	26.564	Gg	0.040	10.966	41.679	Yes
3Dc		4.897	73.947	3.850	26.564	Gg	0.028	7.845	49.524	Yes
1A1a	Solid	4.794	73.947	0.075	26.564	Gg	0.022	6.180	55.704	Yes
1A3biii	Diesel oil	4.287	73.947	0.140	26.564	Gg	0.019	5.253	60.957	Yes
2C1		4.059	73.947	0.224	26.564	Gg	0.017	4.629	65.585	Yes
1A5a	Biomass	0.012	73.947	0.856	26.564	Gg	0.012	3.195	68.781	Yes
1A3bvi		0.982	73.947	1.114	26.564	Gg	0.010	2.854	71.634	Yes
1A3bi	Diesel oil	2.366	73.947	0.199	26.564	Gg	0.009	2.442	74.076	Yes
2H1		1.965	73.947	0.221	26.564	Gg	0.007	1.820	75.896	Yes
1A4cii	Liquid	1.620	73.947	0.152	26.564	Gg	0.006	1.613	77.509	Yes
1A1a	Liquid	1.057	73.947	0.043	26.564	Gg	0.005	1.264	78.773	Yes
1A2f	Solid	0.971	73.947	0.015	26.564	Gg	0.005	1.251	80.024	Yes
1A2d	Liquid	0.956	73.947	0.034	26.564	Gg	0.004	1.161	81.185	
2H2		0.320	73.947	0.410	26.564	Gg	0.004	1.105	82.290	
2A5b		0.796	73.947	0.011	26.564	Gg	0.004	1.031	83.321	
1A1a	Biomass	0.556	73.947	0.468	26.564	Gg	0.004	1.007	84.329	
1A2gviii	Liquid	0.749	73.947	0.016	26.564	Gg	0.003	0.949	85.278	
1A1a	Peat	1.337	73.947	0.228	26.564	Gg	0.003	0.947	86.225	
1A2gvii	Liquid	1.421	73.947	0.287	26.564	Gg	0.003	0.839	87.064	
1A4aii	Liquid	0.746	73.947	0.088	26.564	Gg	0.002	0.677	87.741	
1A3bii	Diesel oil	1.074	73.947	0.208	26.564	Gg	0.002	0.668	88.408	
1A2d	Solid	0.493	73.947	0.008	26.564	Gg	0.002	0.633	89.041	
1A4ai	Liquid	0.814	73.947	0.132	26.564	Gg	0.002	0.601	89.642	
2C7c		0.408	73.947	0.009	26.564	Gg	0.002	0.518	90.159	

1A2a	Solid	0.394	73.947	0.005	26.564	Gg	0.002	0.511	90.670
1A3dii	Liquid	0.565	73.947	0.322	26.564	Gg	0.002	0.447	91.117
1A4ci	Peat	0.042	73.947	0.133	26.564	Gg	0.002	0.444	91.562
1A2f	Liquid	0.358	73.947	0.013	26.564	Gg	0.002	0.435	91.997
1B2aiv		0.312	73.947	0.002	26.564	Gg	0.001	0.413	92.410
1A2d	Peat	0.326	73.947	0.020	26.564	Gg	0.001	0.363	92.773
2C2		0.020	73.947	0.099	26.564	Gg	0.001	0.343	93.116
2B6		0.248	73.947	0.000	26.564	Gg	0.001	0.333	93.449
1A2c	Solid	0.243	73.947	0.000	26.564	Gg	0.001	0.327	93.776
2B10a		1.156	73.947	0.330	26.564	Gg	0.001	0.320	94.096
1A4ci	Biomass	0.104	73.947	0.121	26.564	Gg	0.001	0.313	94.408
2A5a		0.230	73.947	0.002	26.564	Gg	0.001	0.301	94.709
2I		0.271	73.947	0.018	26.564	Gg	0.001	0.300	95.009
3B4gii		0.031	73.947	0.089	26.564	Gg	0.001	0.293	95.301
3B4gi		0.189	73.947	0.145	26.564	Gg	0.001	0.289	95.590
1A2c	Liquid	0.289	73.947	0.030	26.564	Gg	0.001	0.279	95.869
1A2e	Liquid	0.221	73.947	0.012	26.564	Gg	0.001	0.253	96.122
1A4ci	Liquid	0.269	73.947	0.032	26.564	Gg	0.001	0.244	96.366
1A4bi	Liquid	0.336	73.947	0.060	26.564	Gg	0.001	0.229	96.595
3F		0.301	73.947	0.163	26.564	Gg	0.001	0.208	96.803
2A3		0.142	73.947	0.004	26.564	Gg	0.001	0.178	96.981
1A4bi	Solid	0.133	73.947	0.001	26.564	Gg	0.001	0.177	97.158
1A4bii	Liquid	0.242	73.947	0.129	26.564	Gg	0.001	0.157	97.315
1A1b	Liquid	0.123	73.947	0.004	26.564	Gg	0.001	0.151	97.466
1A2a	Liquid	0.117	73.947	0.002	26.564	Gg	0.001	0.149	97.615
1A2e	Peat	0.111	73.947	0.002	26.564	Gg	0.001	0.141	97.756
1A4ai	Biomass	0.032	73.947	0.046	26.564	Gg	0.000	0.131	97.888
1A4bi	Peat	0.234	73.947	0.050	26.564	Gg	0.000	0.126	98.014
2D3b		0.095	73.947	0.066	26.564	Gg	0.000	0.120	98.134
1A3bi	Gasoline	0.174	73.947	0.032	26.564	Gg	0.000	0.115	98.249
1B1c		1.544	73.947	0.526	26.564	Gg	0.000	0.108	98.357
3B1b		0.122	73.947	0.071	26.564	Gg	0.000	0.101	98.458
2A2		0.072	73.947	0.001	26.564	Gg	0.000	0.094	98.552
1A2b	Solid	0.072	73.947	0.001	26.564	Gg	0.000	0.093	98.645
1A2e	Solid	0.065	73.947	0.003	26.564	Gg	0.000	0.076	98.721
2L		0.081	73.947	0.010	26.564	Gg	0.000	0.071	98.792
1A2d	Gaseous	0.074	73.947	0.009	26.564	Gg	0.000	0.066	98.858
1A1b	Solid	0.103	73.947	0.019	26.564	Gg	0.000	0.066	98.924
1A2gviii	Biomass	0.666	73.947	0.257	26.564	Gg	0.000	0.065	98.989
2A5c		0.477	73.947	0.154	26.564	Gg	0.000	0.064	99.053
1A2b	Liquid	0.059	73.947	0.004	26.564	Gg	0.000	0.064	99.117
3B4giv		0.227	73.947	0.065	26.564	Gg	0.000	0.062	99.179
3B3		0.086	73.947	0.047	26.564	Gg	0.000	0.060	99.239
1A4ciii	Liquid	0.077	73.947	0.044	26.564	Gg	0.000	0.060	99.299
1A2gviii	Other	0.048	73.947	0.001	26.564	Gg	0.000	0.060	99.359
2D3i		0.187	73.947	0.052	26.564	Gg	0.000	0.058	99.417
3B4giii		0.003	73.947	0.015	26.564	Gg	0.000	0.051	99.468
5E		0.299	73.947	0.095	26.564	Gg	0.000	0.048	99.517
2C7a		0.034	73.947	0.000	26.564	Gg	0.000	0.044	99.560
3B1a		0.203	73.947	0.085	26.564	Gg	0.000	0.043	99.603
1A2e	Biomass	0.040	73.947	0.003	26.564	Gg	0.000	0.042	99.645

1A1a	Other	0.002	73.947	0.011	26.564	Gg	0.000	0.037	99.682
1B1b		0.008	73.947	0.013	26.564	Gg	0.000	0.037	99.719
2B10b		0.007	73.947	0.012	26.564	Gg	0.000	0.035	99.755
3B4e		0.006	73.947	0.010	26.564	Gg	0.000	0.028	99.783
1A3biv	Diesel oil		73.947	0.006	26.564	Gg	0.000	0.024	99.807
1A3biv	Gasoline	0.057	73.947	0.014	26.564	Gg	0.000	0.024	99.831
1A4ai	Peat	0.009	73.947	0.008	26.564	Gg	0.000	0.019	99.850
3B4h		0.026	73.947	0.014	26.564	Gg	0.000	0.019	99.868
1A5a	Liquid	0.485	73.947	0.179	26.564	Gg	0.000	0.017	99.886
1A3c	Liquid	0.089	73.947	0.027	26.564	Gg	0.000	0.016	99.902
2D3g		0.017	73.947	0.002	26.564	Gg	0.000	0.014	99.916
3B2		0.002	73.947	0.004	26.564	Gg	0.000	0.014	99.929
1A2f	Biomass	0.000	73.947	0.003	26.564	Gg	0.000	0.012	99.941
2C7d		0.006	73.947	0.005	26.564	Gg	0.000	0.011	99.952
1A2f	Other		73.947	0.002	26.564	Gg	0.000	0.008	99.960
1A3bii	Gasoline	0.006	73.947	0.000	26.564	Gg	0.000	0.007	99.967
1B2av		0.005	73.947	0.000	26.564	Gg	0.000	0.005	99.972
5C1bv		0.000	73.947	0.001	26.564	Gg	0.000	0.004	99.976
1A2c	Biomass	0.003	73.947	0.000	26.564	Gg	0.000	0.004	99.980
1A3ai(i)	Liquid	0.003	73.947	0.002	26.564	Gg	0.000	0.003	99.983
2D3d		0.000	73.947	0.001	26.564	Gg	0.000	0.003	99.986
1A2gviii	Peat	0.005	73.947	0.001	26.564	Gg	0.000	0.003	99.989
2C3		0.002	73.947	0.000	26.564	Gg	0.000	0.002	99.991
1A2d	Other	0.011	73.947	0.004	26.564	Gg	0.000	0.002	99.993
1A2a	Biomass		73.947	0.000	26.564	Gg	0.000	0.001	99.994
1A3bi	Gaseous		73.947	0.000	26.564	Gg	0.000	0.001	99.995
2G		0.153	73.947	0.055	26.564	Gg	0.000	0.001	99.996
1A2gvii	Gaseous	0.001	73.947	0.001	26.564	Gg	0.000	0.001	99.997
1A3aii(i)	Liquid	0.002	73.947	0.001	26.564	Gg	0.000	0.001	99.998
1A2e	Other	0.000	73.947	0.000	26.564	Gg	0.000	0.001	99.998
3B4d		0.000	73.947	0.000	26.564	Gg	0.000	0.000	99.999
1A4ci	Solid	0.003	73.947	0.001	26.564	Gg	0.000	0.000	99.999
1A4bi	Other	0.000	73.947	0.000	26.564	Gg	0.000	0.000	100
5A		0.001	73.947	0.000	26.564	Gg	0.000	0.000	100
1A3biii	Gaseous		73.947	0.000	26.564	Gg	0.000	0.000	100
1A3bii	Gaseous		73.947	0.000	26.564	Gg	0.000	0.000	100

TSP

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
1A3bvii		9.531	98.465	10.720	39.486	Gg	0.070	17.259	17.259	Yes
1A4bi	Biomass	7.948	98.465	7.584	39.486	Gg	0.045	10.999	28.258	Yes
1A2d	Biomass	13.907	98.465	1.558	39.486	Gg	0.041	10.055	38.313	Yes
1A5a	Biomass	0.046	98.465	3.293	39.486	Gg	0.033	8.192	46.505	Yes
1A1a	Solid	7.164	98.465	0.094	39.486	Gg	0.028	6.952	53.457	Yes
2C1		5.545	98.465	0.277	39.486	Gg	0.020	4.869	58.326	Yes
3Dc		4.897	98.465	3.850	39.486	Gg	0.019	4.720	63.047	Yes
1A3biii	Diesel oil	4.287	98.465	0.140	39.486	Gg	0.016	3.951	66.998	Yes
1A3bvi		1.325	98.465	1.501	39.486	Gg	0.010	2.427	69.425	Yes

1A2f	Solid	1.954	98.465	0.034	39.486	Gg	0.008	1.876	71.301	Yes
1A3bi	Diesel oil	2.366	98.465	0.199	39.486	Gg	0.008	1.876	73.177	Yes
1A1a	Biomass	1.061	98.465	1.147	39.486	Gg	0.007	1.805	74.982	Yes
2H1		2.389	98.465	0.318	39.486	Gg	0.007	1.602	76.584	Yes
1A2d	Liquid	1.536	98.465	0.056	39.486	Gg	0.006	1.401	77.984	Yes
1A4cii	Liquid	1.620	98.465	0.152	39.486	Gg	0.005	1.245	79.229	Yes
1A4ci	Peat	0.160	98.465	0.513	39.486	Gg	0.005	1.123	80.353	Yes
1A1a	Liquid	1.214	98.465	0.074	39.486	Gg	0.004	1.034	81.387	
2A5b		1.014	98.465	0.033	39.486	Gg	0.004	0.935	82.321	
1A2a	Solid	0.932	98.465	0.013	39.486	Gg	0.004	0.902	83.223	
2C7c		0.855	98.465	0.014	39.486	Gg	0.003	0.824	84.047	
3B4gi		0.897	98.465	0.688	39.486	Gg	0.003	0.821	84.868	
1A2gviii	Liquid	0.835	98.465	0.026	39.486	Gg	0.003	0.774	85.642	
2H2		0.329	98.465	0.424	39.486	Gg	0.003	0.731	86.373	
1A2d	Solid	0.715	98.465	0.002	39.486	Gg	0.003	0.712	87.085	
1A2gvii	Liquid	1.421	98.465	0.287	39.486	Gg	0.003	0.708	87.793	
1A3bii	Diesel oil	1.074	98.465	0.208	39.486	Gg	0.002	0.557	88.351	
1A4ai	Liquid	0.994	98.465	0.177	39.486	Gg	0.002	0.554	88.905	
1A1a	Peat	2.295	98.465	0.704	39.486	Gg	0.002	0.541	89.446	
1A4aii	Liquid	0.746	98.465	0.088	39.486	Gg	0.002	0.529	89.975	
2D3i		0.598	98.465	0.056	39.486	Gg	0.002	0.461	90.436	
2B10a		1.409	98.465	0.381	39.486	Gg	0.002	0.459	90.896	
1B2aiv		0.442	98.465	0.002	39.486	Gg	0.002	0.438	91.333	
1A2f	Liquid	0.449	98.465	0.021	39.486	Gg	0.002	0.397	91.731	
2A5a		0.400	98.465	0.005	39.486	Gg	0.002	0.390	92.121	
3B4gii		0.061	98.465	0.178	39.486	Gg	0.002	0.384	92.505	
1A2d	Peat	0.435	98.465	0.027	39.486	Gg	0.002	0.370	92.875	
1B1c		2.363	98.465	0.805	39.486	Gg	0.001	0.357	93.232	
2I		0.590	98.465	0.094	39.486	Gg	0.001	0.356	93.588	
1A2c	Solid	0.291	98.465	0.000	39.486	Gg	0.001	0.292	93.88	
1A2b	Solid	0.277	98.465	0.004	39.486	Gg	0.001	0.268	94.149	
2C2		0.023	98.465	0.116	39.486	Gg	0.001	0.267	94.415	
1A4bi	Liquid	0.425	98.465	0.067	39.486	Gg	0.001	0.259	94.675	
1A2gviii	Biomass	1.572	98.465	0.530	39.486	Gg	0.001	0.251	94.925	
2B6		0.248	98.465	0.000	39.486	Gg	0.001	0.248	95.173	
3B3		0.518	98.465	0.305	39.486	Gg	0.001	0.244	95.417	
2A5c		1.217	98.465	0.391	39.486	Gg	0.001	0.242	95.660	
1A3dii	Liquid	0.565	98.465	0.322	39.486	Gg	0.001	0.239	95.899	
1A2c	Liquid	0.325	98.465	0.035	39.486	Gg	0.001	0.238	96.137	
1A2e	Solid	0.251	98.465	0.006	39.486	Gg	0.001	0.236	96.373	
1A2e	Liquid	0.26	98.465	0.015	39.486	Gg	0.001	0.224	96.597	
1A1b	Solid	0.395	98.465	0.074	39.486	Gg	0.001	0.210	96.808	
1A4ci	Biomass	0.108	98.465	0.127	39.486	Gg	0.001	0.209	97.016	
1A4ci	Liquid	0.329	98.465	0.049	39.486	Gg	0.001	0.208	97.224	
1A2gviii	Other	0.189	98.465	0.002	39.486	Gg	0.001	0.184	97.408	
2A2		0.174	98.465	0.002	39.486	Gg	0.001	0.170	97.578	
1A2e	Peat	0.169	98.465	0.008	39.486	Gg	0.001	0.150	97.729	
1A2a	Liquid	0.157	98.465	0.003	39.486	Gg	0.001	0.150	97.879	
2A3		0.158	98.465	0.004	39.486	Gg	0.001	0.149	98.027	
1A4bi	Solid	0.148	98.465	0.001	39.486	Gg	0.001	0.146	98.174	
1A1b	Liquid	0.150	98.465	0.006	39.486	Gg	0.001	0.134	98.308	

1A4bi	Peat	0.260	98.465	0.056	39.486	Gg	0.000	0.121	98.429
3B1b		0.264	98.465	0.153	39.486	Gg	0.000	0.118	98.547
3F		0.305	98.465	0.166	39.486	Gg	0.000	0.109	98.656
1A3bi	Gasoline	0.174	98.465	0.032	39.486	Gg	0.000	0.095	98.751
2D3b		0.126	98.465	0.088	39.486	Gg	0.000	0.093	98.845
1A4ai	Biomass	0.037	98.465	0.048	39.486	Gg	0.000	0.084	98.929
1A4bii	Liquid	0.242	98.465	0.129	39.486	Gg	0.000	0.079	99.008
2B10b		0.023	98.465	0.038	39.486	Gg	0.000	0.071	99.079
3B4giv		0.234	98.465	0.067	39.486	Gg	0.000	0.067	99.147
5E		0.299	98.465	0.095	39.486	Gg	0.000	0.064	99.210
2L		0.093	98.465	0.014	39.486	Gg	0.000	0.059	99.269
1A2d	Gaseous	0.088	98.465	0.012	39.486	Gg	0.000	0.058	99.327
1B1b		0.019	98.465	0.030	39.486	Gg	0.000	0.057	99.384
1A2b	Liquid	0.069	98.465	0.005	39.486	Gg	0.000	0.057	99.441
1A2e	Biomass	0.073	98.465	0.009	39.486	Gg	0.000	0.051	99.491
1A5a	Liquid	0.591	98.465	0.219	39.486	Gg	0.000	0.046	99.537
1A4ai	Peat	0.034	98.465	0.031	39.486	Gg	0.000	0.044	99.582
2C7a		0.043	98.465	0.001	39.486	Gg	0.000	0.041	99.623
3B4e		0.014	98.465	0.021	39.486	Gg	0.000	0.039	99.662
1A1a	Other	0.013	98.465	0.019	39.486	Gg	0.000	0.036	99.698
3B4giii		0.003	98.465	0.015	39.486	Gg	0.000	0.034	99.731
1A4ciii	Liquid	0.077	98.465	0.044	39.486	Gg	0.000	0.032	99.763
1A2f	Biomass	0.001	98.465	0.012	39.486	Gg	0.000	0.029	99.792
1A3biv	Gasoline	0.057	98.465	0.014	39.486	Gg	0.000	0.022	99.815
3B4h		0.059	98.465	0.032	39.486	Gg	0.000	0.022	99.836
1A3c	Liquid	0.094	98.465	0.029	39.486	Gg	0.000	0.021	99.857
3B2		0.005	98.465	0.010	39.486	Gg	0.000	0.021	99.878
3B1a		0.445	98.465	0.185	39.486	Gg	0.000	0.016	99.894
1A3biv	Diesel oil		98.465	0.006	39.486	Gg	0.000	0.016	99.911
2G		0.153	98.465	0.055	39.486	Gg	0.000	0.015	99.926
1A2f	Other	0.029	98.465	0.006	39.486	Gg	0.000	0.015	99.941
2C7d		0.012	98.465	0.01	39.486	Gg	0.000	0.013	99.954
2D3g		0.019	98.465	0.003	39.486	Gg	0.000	0.011	99.965
1A3bii	Gasoline	0.006	98.465	0.000	39.486	Gg	0.000	0.005	99.970
1B2av		0.005	98.465	0.000	39.486	Gg	0.000	0.004	99.975
1A2a	Biomass		98.465	0.001	39.486	Gg	0.000	0.003	99.978
1A2gviii	Peat	0.007	98.465	0.002	39.486	Gg	0.000	0.003	99.981
5C1bv		0.000	98.465	0.001	39.486	Gg	0.000	0.003	99.984
2D3d		0.001	98.465	0.001	39.486	Gg	0.000	0.002	99.986
1A2c	Biomass	0.003	98.465	0.000	39.486	Gg	0.000	0.002	99.988
2C3		0.003	98.465	0.000	39.486	Gg	0.000	0.002	99.991
1A3ai(i)	Liquid	0.003	98.465	0.002	39.486	Gg	0.000	0.002	99.993
1A2d	Other	0.017	98.465	0.008	39.486	Gg	0.000	0.002	99.994
1A2e	Other	0.001	98.465	0.001	39.486	Gg	0.000	0.002	99.996
1A4ci	Solid	0.008	98.465	0.003	39.486	Gg	0.000	0.001	99.997
3B4d		0.000	98.465	0.000	39.486	Gg	0.000	0.001	99.998
1A3bi	Gaseous		98.465	0.000	39.486	Gg	0.000	0.001	99.998
1A3aii(i)	Liquid	0.002	98.465	0.001	39.486	Gg	0.000	0.001	99.999
1A2gvii	Gaseous	0.001	98.465	0.001	39.486	Gg	0.000	0.000	100
1A4bi	Other	0.000	98.465	0.000	39.486	Gg	0.000	0.000	100
1A3biii	Gaseous		98.465	0.000	39.486	Gg	0.000	0.000	100

1A3bii	Gaseous		98.465	0.000	39.486	Gg	0.000	0.000	100	
5A		0.003	98.465	0.001	39.486	Gg	0.000	0.000	100	

BC

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
1A4bi	Biomass	2.260	10.137	2.035	3.182	Gg	0.131	40.29	40.290	Yes
1A3biii	Diesel oil	2.272	10.137	0.074	3.182	Gg	0.063	19.428	59.719	Yes
1A3bi	Diesel oil	1.349	10.137	0.113	3.182	Gg	0.031	9.421	69.140	Yes
1A4cii	Liquid	0.877	10.137	0.064	3.182	Gg	0.021	6.410	75.550	Yes
1A3bvi		0.140	10.137	0.159	3.182	Gg	0.011	3.483	79.033	Yes
1A2gvii	Liquid	0.877	10.137	0.175	3.182	Gg	0.01	3.057	82.091	Yes
1A3bii	Diesel oil	0.591	10.137	0.114	3.182	Gg	0.007	2.162	84.252	
1A3bvii		0.079	10.137	0.089	3.182	Gg	0.006	1.950	86.202	
1A1a	Liquid	0.177	10.137	0.005	3.182	Gg	0.005	1.549	87.751	
1A4aii	Liquid	0.230	10.137	0.024	3.182	Gg	0.005	1.472	89.223	
1A5a	Biomass	0	10.137	0.046	3.182	Gg	0.005	1.400	90.624	
1A2gviii	Liquid	0.140	10.137	0.002	3.182	Gg	0.004	1.274	91.898	
1A2d	Liquid	0.113	10.137	0.002	3.182	Gg	0.003	1.007	92.904	
1A3dii	Liquid	0.069	10.137	0.055	3.182	Gg	0.003	1.005	93.909	
1A4ai	Liquid	0.152	10.137	0.023	3.182	Gg	0.002	0.766	94.675	
1A2f	Liquid	0.066	10.137	0.002	3.182	Gg	0.002	0.584	95.259	
1A4bii	Liquid	0.027	10.137	0.022	3.182	Gg	0.001	0.423	95.682	
1A4ci	Liquid	0.050	10.137	0.004	3.182	Gg	0.001	0.345	96.027	
1A2e	Liquid	0.043	10.137	0.002	3.182	Gg	0.001	0.341	96.368	
1A5a	Liquid	0.094	10.137	0.04	3.182	Gg	0.001	0.324	96.692	
1A2c	Liquid	0.051	10.137	0.005	3.182	Gg	0.001	0.322	97.014	
2H1		0.046	10.137	0.004	3.182	Gg	0.001	0.312	97.325	
3F		0.034	10.137	0.019	3.182	Gg	0.001	0.253	97.579	
1A1a	Solid	0.024	10.137	0.000	3.182	Gg	0.001	0.222	97.801	
1A4bi	Liquid	0.072	10.137	0.015	3.182	Gg	0.001	0.222	98.023	
2C2		0.001	10.137	0.007	3.182	Gg	0.001	0.198	98.221	
1A4ciii	Liquid	0.024	10.137	0.014	3.182	Gg	0.001	0.184	98.405	
1A2a	Liquid	0.015	10.137	0.000	3.182	Gg	0.000	0.138	98.543	
1A2d	Biomass	0.021	10.137	0.002	3.182	Gg	0.000	0.133	98.676	
1A3biv	Diesel oil		10.137	0.004	3.182	Gg	0.000	0.112	98.788	
1A2f	Solid	0.012	10.137	0.000	3.182	Gg	0.000	0.105	98.893	
1A1a	Peat	0.015	10.137	0.002	3.182	Gg	0.000	0.093	98.986	
1A2b	Liquid	0.011	10.137	0.001	3.182	Gg	0.000	0.089	99.076	
2C1		0.012	10.137	0.001	3.182	Gg	0.000	0.089	99.165	
1A1b	Liquid	0.010	10.137	0.000	3.182	Gg	0.000	0.086	99.250	
1A3bi	Gasoline	0.021	10.137	0.004	3.182	Gg	0.000	0.083	99.333	
1A4ci	Biomass	0.003	10.137	0.004	3.182	Gg	0.000	0.082	99.415	
1A1a	Biomass	0.005	10.137	0.004	3.182	Gg	0.000	0.08	99.495	
2D3b		0.005	10.137	0.003	3.182	Gg	0.000	0.058	99.552	
1A2gviii	Biomass	0.007	10.137	0.004	3.182	Gg	0.000	0.056	99.609	
2B6		0.004	10.137	0.000	3.182	Gg	0.000	0.042	99.651	
1A2d	Peat	0.005	10.137	0.000	3.182	Gg	0.000	0.040	99.691	
1A4ai	Biomass	0.001	10.137	0.001	3.182	Gg	0.000	0.035	99.726	

1A4bi	Solid	0.003	10.137	0.000	3.182	Gg	0.000	0.024	99.750
1A2gviii	Other	0.002	10.137	0.000	3.182	Gg	0.000	0.023	99.774
1A4ci	Peat	0.000	10.137	0.001	3.182	Gg	0.000	0.023	99.797
1A2d	Solid	0.002	10.137	0.000	3.182	Gg	0.000	0.023	99.819
1A4bi	Peat	0.007	10.137	0.001	3.182	Gg	0.000	0.021	99.840
1A2d	Gaseous	0.004	10.137	0.000	3.182	Gg	0.000	0.020	99.860
1A2a	Solid	0.002	10.137	0.000	3.182	Gg	0.000	0.017	99.876
5C1bv		0.000	10.137	0.001	3.182	Gg	0.000	0.016	99.893
1A2c	Solid	0.002	10.137	0.000	3.182	Gg	0.000	0.015	99.908
1A3ai(i)	Liquid	0.002	10.137	0.001	3.182	Gg	0.000	0.015	99.923
1A3biv	Gasoline	0.006	10.137	0.002	3.182	Gg	0.000	0.013	99.936
1A2d	Other	0.002	10.137	0.000	3.182	Gg	0.000	0.011	99.947
1A2e	Peat	0.001	10.137	0.000	3.182	Gg	0.000	0.007	99.954
1A2f	Other		10.137	0.000	3.182	Gg	0.000	0.006	99.960
1A3c	Liquid	0.055	10.137	0.017	3.182	Gg	0.000	0.006	99.967
1A1a	Other	0.000	10.137	0.000	3.182	Gg	0.000	0.004	99.971
5E		0.027	10.137	0.008	3.182	Gg	0.000	0.004	99.975
2B10a		0.013	10.137	0.004	3.182	Gg	0.000	0.004	99.978
1A2e	Biomass	0.000	10.137	0.000	3.182	Gg	0.000	0.003	99.981
1A2b	Solid	0.000	10.137	0.000	3.182	Gg	0.000	0.003	99.984
1A3bii	Gasoline	0.000	10.137	0.000	3.182	Gg	0.000	0.003	99.987
1A2e	Solid	0.000	10.137	0.000	3.182	Gg	0.000	0.002	99.989
1A1b	Solid	0.000	10.137	0.000	3.182	Gg	0.000	0.002	99.990
1A3aii(i)	Liquid	0.001	10.137	0.000	3.182	Gg	0.000	0.001	99.992
1A4bi	Other	0.000	10.137	0.000	3.182	Gg	0.000	0.001	99.993
2A2		0.000	10.137	0.000	3.182	Gg	0.000	0.001	99.994
1A4ai	Peat	0.000	10.137	0.000	3.182	Gg	0.000	0.001	99.995
2G		0.001	10.137	0.000	3.182	Gg	0.000	0.001	99.996
1A2e	Other	0.000	10.137	0.000	3.182	Gg	0.000	0.001	99.997
2A3		0.000	10.137	0.000	3.182	Gg	0.000	0.001	99.998
1A2f	Biomass	0.000	10.137	0.000	3.182	Gg	0.000	0.001	99.999
1A2gvii	Gaseous	0.000	10.137	0.000	3.182	Gg	0.000	0.000	99.999
1A2c	Biomass	0.000	10.137	0.000	3.182	Gg	0.000	0.000	99.999
2C7a		0.000	10.137	0.000	3.182	Gg	0.000	0.000	100
1A2gviii	Peat	0.000	10.137	0.000	3.182	Gg	0.000	0.000	100
2C3		0.000	10.137	0.000	3.182	Gg	0.000	0.000	100
2D3i		0.000	10.137	0.000	3.182	Gg	0.000	0.000	100
1A2a	Biomass		10.137	0.000	3.182	Gg	0.000	0.000	100
1B1b		0.000	10.137	0.000	3.182	Gg	0.000	0.000	100
1A4ci	Solid	0.000	10.137	0.000	3.182	Gg	0.000	0.000	100

CO

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
1A3bi	Gasoline	412.338	763.782	19.950	317.211	Gg	0.198	43.728	43.728	Yes
1A4bi	Biomass	124.241	763.782	135.549	317.211	Gg	0.110	24.263	67.991	Yes
1A4bii	Liquid	34.909	763.782	37.098	317.211	Gg	0.030	6.532	74.523	Yes
1A3dii	Liquid	22.554	763.782	22.634	317.211	Gg	0.017	3.834	78.357	Yes
1A1a	Biomass	0.870	763.782	12.080	317.211	Gg	0.015	3.387	81.744	Yes

1A4aii	Liquid	11.336	763.782	15.413	317.211	Gg	0.014	3.094	84.838
1A5a	Biomass	0.130	763.782	8.232	317.211	Gg	0.011	2.364	87.201
1A2d	Biomass	25.190	763.782	18.171	317.211	Gg	0.010	2.228	89.429
1A3bii	Gasoline	18.286	763.782	0.496	317.211	Gg	0.009	2.052	91.481
1A3biii	Diesel oil	15.069	763.782	2.374	317.211	Gg	0.005	1.123	92.604
1A2gvii	Liquid	8.124	763.782	7.132	317.211	Gg	0.005	1.086	93.690
1A3bi	Diesel oil	9.979	763.782	0.835	317.211	Gg	0.004	0.957	94.646
1A2f	Solid	12.941	763.782	3.057	317.211	Gg	0.003	0.670	95.316
1A2a	Solid	6.570	763.782	0.466	317.211	Gg	0.003	0.654	95.970
1A2gviii	Biomass	3.840	763.782	3.339	317.211	Gg	0.002	0.504	96.474
1A4ci	Biomass	1.515	763.782	1.729	317.211	Gg	0.001	0.318	96.792
1A4cii	Liquid	18.799	763.782	8.865	317.211	Gg	0.001	0.306	97.098
1A1a	Peat	1.544	763.782	1.674	317.211	Gg	0.001	0.298	97.396
1A2f	Gaseous	2.421	763.782	0.082	317.211	Gg	0.001	0.267	97.663
1A1b	Gaseous	0.480	763.782	1.037	317.211	Gg	0.001	0.242	97.905
1A3biv	Gasoline	7.906	763.782	4.019	317.211	Gg	0.001	0.213	98.118
1A2f	Other		763.782	0.687	317.211	Gg	0.001	0.198	98.316
1A4ai	Biomass	0.455	763.782	0.658	317.211	Gg	0.001	0.136	98.452
3F		3.695	763.782	1.990	317.211	Gg	0.001	0.132	98.584
1A3bii	Diesel oil	4.107	763.782	1.255	317.211	Gg	0.001	0.130	98.714
1A1a	Other	0.008	763.782	0.390	317.211	Gg	0.001	0.112	98.826
1A2d	Solid	0.645	763.782	0.008	317.211	Gg	0	0.075	98.901
1A5a	Gaseous	0.246	763.782	0.355	317.211	Gg	0	0.073	98.974
1A2a	Gaseous	0.408	763.782	0.419	317.211	Gg	0	0.072	99.046
1A2c	Gaseous	0.081	763.782	0.269	317.211	Gg	0	0.068	99.114
1A4ci	Peat	0.080	763.782	0.261	317.211	Gg	0	0.066	99.180
1A3ai(i)	Liquid	0.231	763.782	0.296	317.211	Gg	0	0.058	99.238
1A5a	Liquid	1.900	763.782	0.969	317.211	Gg	0	0.052	99.290
1A2f	Liquid	0.748	763.782	0.136	317.211	Gg	0	0.051	99.340
1A2gviii	Gaseous	0.059	763.782	0.175	317.211	Gg	0	0.043	99.384
1A4bi	Liquid	0.776	763.782	0.186	317.211	Gg	0	0.039	99.423
1A2b	Gaseous	0.001	763.782	0.134	317.211	Gg	0	0.039	99.462
1A1a	Gaseous	0.780	763.782	0.443	317.211	Gg	0	0.035	99.496
1A2d	Gaseous	1.849	763.782	0.653	317.211	Gg	0	0.033	99.53
1A2d	Liquid	1.110	763.782	0.354	317.211	Gg	0	0.031	99.561
1A1b	Solid	0.053	763.782	0.127	317.211	Gg	0	0.030	99.591
1A2gviii	Other	0.279	763.782	0.019	317.211	Gg	0	0.028	99.619
1A2d	Other	0.008	763.782	0.089	317.211	Gg	0	0.025	99.644
2C7a		0.223	763.782	0.008	317.211	Gg	0	0.024	99.669
1A1a	Solid	0.793	763.782	0.413	317.211	Gg	0	0.024	99.693
1A3bi	Gaseous		763.782	0.084	317.211	Gg	0	0.024	99.717
1A4ciii	Liquid	0.442	763.782	0.261	317.211	Gg	0	0.022	99.740
1A2a	Liquid	0.214	763.782	0.150	317.211	Gg	0	0.018	99.757
1A3aii(i)	Liquid	0.631	763.782	0.202	317.211	Gg	0	0.018	99.775
1A1a	Liquid	0.371	763.782	0.095	317.211	Gg	0	0.017	99.792
1A2f	Biomass	0.000	763.782	0.058	317.211	Gg	0	0.017	99.809
1A3biv	Diesel oil		763.782	0.047	317.211	Gg	0	0.014	99.822
1A2gviii	Liquid	0.204	763.782	0.040	317.211	Gg	0	0.013	99.835
1A3c	Liquid	0.548	763.782	0.186	317.211	Gg	0	0.012	99.847
1A2c	Solid	0.095	763.782	0	317.211	Gg	0	0.011	99.859
1A2d	Peat	0.700	763.782	0.330	317.211	Gg	0	0.011	99.87

1A4bi	Gaseous	0.039	763.782	0.055	317.211	Gg	0	0.011	99.881
1A4ai	Gaseous	0.031	763.782	0.047	317.211	Gg	0	0.010	99.891
1A2e	Biomass	0.077	763.782	0.066	317.211	Gg	0	0.010	99.901
1A2gviii	Peat	0.024	763.782	0.041	317.211	Gg	0	0.009	99.910
1A4bi	Solid	0.074	763.782	0	317.211	Gg	0	0.009	99.919
1A1b	Liquid	0.042	763.782	0.047	317.211	Gg	0	0.009	99.927
1A2gvii	Gaseous	0.300	763.782	0.154	317.211	Gg	0	0.009	99.936
1A4ai	Liquid	0.527	763.782	0.190	317.211	Gg	0	0.008	99.944
1A2b	Solid	0.079	763.782	0.004	317.211	Gg	0	0.008	99.953
1A4bi	Peat	0.130	763.782	0.028	317.211	Gg	0	0.008	99.960
1A2e	Liquid	0.089	763.782	0.015	317.211	Gg	0	0.006	99.967
1A2c	Liquid	0.162	763.782	0.048	317.211	Gg	0	0.005	99.972
2G		0.315	763.782	0.116	317.211	Gg	0	0.004	99.976
1A4ci	Liquid	0.178	763.782	0.088	317.211	Gg	0	0.004	99.980
1A2e	Solid	0.053	763.782	0.012	317.211	Gg	0	0.003	99.983
1A4ai	Peat	0.018	763.782	0.016	317.211	Gg	0	0.002	99.986
1A3bii	Gaseous		763.782	0.008	317.211	Gg	0	0.002	99.988
1A2e	Peat	0.143	763.782	0.066	317.211	Gg	0	0.002	99.990
1A2e	Other	0.002	763.782	0.008	317.211	Gg	0	0.002	99.992
1A2c	Biomass	0.017	763.782	0.001	317.211	Gg	0	0.002	99.994
1A4ci	Gaseous	0.027	763.782	0.006	317.211	Gg	0	0.002	99.995
2C1		0.464	763.782	0.188	317.211	Gg	0	0.001	99.997
1A3biii	Gaseous		763.782	0.005	317.211	Gg	0	0.001	99.998
1A2b	Liquid	0.019	763.782	0.013	317.211	Gg	0	0.001	99.999
1A4ci	Solid	0.007	763.782	0.004	317.211	Gg	0	0	100
1A4bi	Other	0.001	763.782	0	317.211	Gg	0	0	100
1A2e	Gaseous	0.019	763.782	0.007	317.211	Gg	0	0	100
1A2a	Biomass		763.782	0	317.211	Gg	0	0	100
1A3ei	Gaseous	0.001	763.782	0	317.211	Gg	0	0	100

Pb

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
1A3bi	Gasoline	166.003	321.374	0.002	11.636	Mg	0.019	30.142	30.142	Yes
1A1b	Solid	2.081	321.374	2.945	11.636	Mg	0.009	14.395	44.537	Yes
2C7c		80.081	321.374	0.276	11.636	Mg	0.008	13.158	57.696	Yes
1A2d	Biomass	4.479	321.374	2.529	11.636	Mg	0.007	11.873	69.569	Yes
1A1a	Peat	1.291	321.374	0.814	11.636	Mg	0.002	3.849	73.418	Yes
1A5a	Biomass	0.015	321.374	0.741	11.636	Mg	0.002	3.714	77.132	Yes
2C1		34.463	321.374	0.518	11.636	Mg	0.002	3.663	80.794	Yes
1A1a	Biomass	0.118	321.374	0.690	11.636	Mg	0.002	3.439	84.233	
1A2f	Solid	2.811	321.374	0.651	11.636	Mg	0.002	2.753	86.986	
1A4bi	Biomass	0.413	321.374	0.474	11.636	Mg	0.001	2.301	89.287	
2G		0.310	321.374	0.365	11.636	Mg	0.001	1.777	91.063	
1A3bii	Gasoline	6.400	321.374	0.000	11.636	Mg	0.001	1.162	92.226	
1A4ci	Peat	0.068	321.374	0.219	11.636	Mg	0.001	1.086	93.312	
1A3bvi		7.220	321.374	0.466	11.636	Mg	0.001	1.025	94.336	
1A1a	Solid	5.751	321.374	0.035	11.636	Mg	0.001	0.870	95.207	
1A2gviii	Biomass	0.319	321.374	0.162	11.636	Mg	0.000	0.756	95.963	

1A1a	Other	0.001	321.374	0.132	11.636	Mg	0.000	0.661	96.624
1A2e	Peat	0.167	321.374	0.100	11.636	Mg	0.000	0.471	97.095
1A4ci	Biomass	0.065	321.374	0.074	11.636	Mg	0.000	0.360	97.455
1A5a	Liquid	0.211	321.374	0.074	11.636	Mg	0.000	0.335	97.790
1A3biv	Gasoline	1.300	321.374	0.000	11.636	Mg	0.000	0.236	98.025
1A2e	Solid	1.384	321.374	0.014	11.636	Mg	0.000	0.182	98.207
1A2d	Solid	1.025	321.374	0.001	11.636	Mg	0.000	0.180	98.387
1A3aii(i)	Liquid	0.297	321.374	0.046	11.636	Mg	0.000	0.178	98.565
1A4ai	Biomass	0.020	321.374	0.029	11.636	Mg	0.000	0.141	98.706
1B1b		0.022	321.374	0.027	11.636	Mg	0.000	0.130	98.835
1A4ai	Liquid	0.261	321.374	0.034	11.636	Mg	0.000	0.122	98.957
1A2c	Liquid	0.082	321.374	0.024	11.636	Mg	0.000	0.106	99.063
1A4bi	Peat	0.111	321.374	0.024	11.636	Mg	0.000	0.099	99.162
1A4ai	Peat	0.020	321.374	0.015	11.636	Mg	0.000	0.073	99.235
1A2d	Peat	0.499	321.374	0.004	11.636	Mg	0.000	0.069	99.304
2C6		0.000	321.374	0.013	11.636	Mg	0.000	0.064	99.368
2C7a		0.374	321.374	0.002	11.636	Mg	0.000	0.06	99.428
1A2d	Other	0.001	321.374	0.011	11.636	Mg	0.000	0.057	99.485
2C2		0.001	321.374	0.011	11.636	Mg	0.000	0.056	99.540
1A2gviii	Other	0.049	321.374	0.012	11.636	Mg	0.000	0.054	99.594
1A2f	Other		321.374	0.011	11.636	Mg	0.000	0.053	99.647
1A2d	Liquid	0.195	321.374	0.018	11.636	Mg	0.000	0.053	99.700
1A4bi	Solid	0.292	321.374	0.002	11.636	Mg	0.000	0.045	99.745
1A3dii	Liquid	0.015	321.374	0.009	11.636	Mg	0.000	0.040	99.785
1A2c	Solid	0.201	321.374	0.003	11.636	Mg	0.000	0.023	99.809
1A2e	Liquid	0.083	321.374	0.008	11.636	Mg	0.000	0.023	99.832
1A4ciii	Liquid	0.007	321.374	0.004	11.636	Mg	0.000	0.019	99.851
1A2e	Biomass	0.008	321.374	0.004	11.636	Mg	0.000	0.018	99.868
1A1a	Liquid	0.319	321.374	0.014	11.636	Mg	0.000	0.013	99.882
1A4ci	Liquid	0.081	321.374	0.005	11.636	Mg	0.000	0.013	99.894
1A2a	Liquid	0.036	321.374	0.004	11.636	Mg	0.000	0.012	99.907
2C3		0.066	321.374	0.000	11.636	Mg	0.000	0.012	99.919
1A2f	Biomass	0.000	321.374	0.002	11.636	Mg	0.000	0.010	99.929
3F		0.003	321.374	0.002	11.636	Mg	0.000	0.009	99.938
1A2gviii	Peat	0.003	321.374	0.002	11.636	Mg	0.000	0.009	99.946
1A2e	Other	0.003	321.374	0.002	11.636	Mg	0.000	0.009	99.955
1A2f	Liquid	0.062	321.374	0.004	11.636	Mg	0.000	0.008	99.963
1A4bi	Liquid	0.046	321.374	0.001	11.636	Mg	0.000	0.006	99.969
5C1bv		0.000	321.374	0.001	11.636	Mg	0.000	0.005	99.974
1A4ci	Solid	0.035	321.374	0.000	11.636	Mg	0.000	0.005	99.979
2B10a		0.001	321.374	0.001	11.636	Mg	0.000	0.005	99.984
1A2gviii	Liquid	0.113	321.374	0.005	11.636	Mg	0.000	0.004	99.988
1A3biii	Diesel oil	0.000	321.374	0.001	11.636	Mg	0.000	0.003	99.991
1A2a	Biomass		321.374	0.000	11.636	Mg	0.000	0.002	99.993
1A2b	Liquid	0.010	321.374	0.001	11.636	Mg	0.000	0.002	99.995
1A3bi	Diesel oil	0.000	321.374	0.000	11.636	Mg	0.000	0.002	99.997
5E		0.001	321.374	0.000	11.636	Mg	0.000	0.001	99.998
1A2c	Biomass	0.003	321.374	0.000	11.636	Mg	0.000	0.001	99.999
1A3bii	Diesel oil	0.000	321.374	0.000	11.636	Mg	0.000	0.001	100
1A1b	Liquid	0.015	321.374	0.000	11.636	Mg	0.000	0.000	100
1A3biv	Diesel oil		321.374	0.000	11.636	Mg	0.000	0.000	100

Cd

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
2C7c		4.203	6.678	0.001	0.700	Mg	0.066	37.116	37.116	Yes
1A4bi	Biomass	0.124	6.678	0.142	0.700	Mg	0.019	10.908	48.024	Yes
1A2d	Biomass	0.317	6.678	0.160	0.700	Mg	0.019	10.708	58.733	Yes
1A1a	Biomass	0.012	6.678	0.084	0.700	Mg	0.012	7.018	65.751	Yes
1A5a	Biomass	0.002	6.678	0.082	0.700	Mg	0.012	6.941	72.692	Yes
2C6		0.850	6.678	0.010	0.700	Mg	0.012	6.718	79.411	Yes
1A1b	Solid	0.047	6.678	0.067	0.700	Mg	0.009	5.250	84.661	Yes
2C1		0.390	6.678	0.004	0.700	Mg	0.006	3.113	87.774	
1A4ci	Biomass	0.020	6.678	0.022	0.700	Mg	0.003	1.702	89.476	
1A1a	Other	0.000	6.678	0.015	0.700	Mg	0.002	1.290	90.766	
1A2gviii	Biomass	0.036	6.678	0.019	0.700	Mg	0.002	1.289	92.055	
1A1a	Solid	0.155	6.678	0.002	0.700	Mg	0.002	1.180	93.235	
3F		0.027	6.678	0.017	0.700	Mg	0.002	1.171	94.406	
1A1a	Peat	0.023	6.678	0.014	0.700	Mg	0.002	0.948	95.354	
2G		0.028	6.678	0.012	0.700	Mg	0.001	0.746	96.101	
1A4ai	Biomass	0.006	6.678	0.009	0.700	Mg	0.001	0.677	96.777	
1A2f	Solid	0.068	6.678	0.015	0.700	Mg	0.001	0.637	97.414	
1A4ci	Peat	0.001	6.678	0.004	0.700	Mg	0.001	0.295	97.709	
1A2gvii	Liquid	0.003	6.678	0.004	0.700	Mg	0.001	0.283	97.992	
1A2e	Solid	0.032	6.678	0.000	0.700	Mg	0.000	0.249	98.241	
1A2d	Solid	0.024	6.678	0.000	0.700	Mg	0.000	0.207	98.448	
2C3		0.023	6.678	0.000	0.700	Mg	0.000	0.203	98.651	
1A4cii	Liquid	0.003	6.678	0.002	0.700	Mg	0.000	0.176	98.827	
1A3bvi		0.002	6.678	0.002	0.700	Mg	0.000	0.133	98.960	
1A2gviii	Other	0.028	6.678	0.001	0.700	Mg	0.000	0.127	99.086	
1A2e	Peat	0.003	6.678	0.002	0.700	Mg	0.000	0.115	99.201	
1A4aii	Liquid	0.001	6.678	0.001	0.700	Mg	0.000	0.074	99.275	
1A2d	Peat	0.008	6.678	0.000	0.700	Mg	0.000	0.071	99.345	
1A2d	Other	0.000	6.678	0.001	0.700	Mg	0.000	0.070	99.416	
1A5a	Liquid	0.003	6.678	0.001	0.700	Mg	0.000	0.060	99.475	
1A4bi	Solid	0.007	6.678	0.000	0.700	Mg	0.000	0.056	99.531	
1B1b		0.000	6.678	0.001	0.700	Mg	0.000	0.049	99.580	
1A3dii	Liquid	0.001	6.678	0.001	0.700	Mg	0.000	0.047	99.627	
1A4bii	Liquid	0.000	6.678	0.001	0.700	Mg	0.000	0.045	99.671	
5E		0.002	6.678	0.001	0.700	Mg	0.000	0.030	99.701	
1A2e	Biomass	0.001	6.678	0.000	0.700	Mg	0.000	0.029	99.731	
1A1a	Liquid	0.005	6.678	0.000	0.700	Mg	0.000	0.025	99.755	
1A4ciii	Liquid	0.001	6.678	0.000	0.700	Mg	0.000	0.021	99.777	
1A2f	Biomass	0.000	6.678	0.000	0.700	Mg	0.000	0.019	99.796	
1A4ai	Peat	0.000	6.678	0.000	0.700	Mg	0.000	0.018	99.814	
1A2f	Other		6.678	0.000	0.700	Mg	0.000	0.018	99.832	
1A4bi	Peat	0.002	6.678	0.000	0.700	Mg	0.000	0.017	99.849	
1A3bi	Gasoline	0.000	6.678	0.000	0.700	Mg	0.000	0.017	99.866	
1A2e	Other	0.000	6.678	0.000	0.700	Mg	0.000	0.016	99.882	
1A2c	Liquid	0.001	6.678	0.000	0.700	Mg	0.000	0.016	99.898	

5C1bv		0.000	6.678	0.000	0.700	Mg	0.000	0.014	99.911
2C2		0.003	6.678	0.000	0.700	Mg	0.000	0.012	99.923
1A3c	Liquid	0.001	6.678	0.000	0.700	Mg	0.000	0.012	99.935
1A2d	Liquid	0.003	6.678	0.000	0.700	Mg	0.000	0.010	99.945
1A2gviii	Liquid	0.001	6.678	0.000	0.700	Mg	0.000	0.007	99.952
1A4ai	Liquid	0.003	6.678	0.000	0.700	Mg	0.000	0.006	99.958
1A4ci	Solid	0.001	6.678	0.000	0.700	Mg	0.000	0.006	99.964
1A3biii	Diesel oil	0.000	6.678	0.000	0.700	Mg	0.000	0.005	99.969
1A4bi	Liquid	0.001	6.678	0.000	0.700	Mg	0.000	0.004	99.974
1A2a	Biomass		6.678	0.000	0.700	Mg	0.000	0.004	99.978
1A4ci	Liquid	0.001	6.678	0.000	0.700	Mg	0.000	0.003	99.981
1A3bi	Diesel oil	0.000	6.678	0.000	0.700	Mg	0.000	0.003	99.983
1A2gvii	Gaseous	0.000	6.678	0.000	0.700	Mg	0.000	0.002	99.986
1A2gviii	Peat	0.000	6.678	0.000	0.700	Mg	0.000	0.002	99.988
1A2f	Liquid	0.001	6.678	0.000	0.700	Mg	0.000	0.002	99.990
1A1b	Liquid	0.000	6.678	0.000	0.700	Mg	0.000	0.002	99.992
1A2c	Solid	0.000	6.678	0.000	0.700	Mg	0.000	0.001	99.994
1A2e	Liquid	0.001	6.678	0.000	0.700	Mg	0.000	0.001	99.995
1A2c	Biomass	0.000	6.678	0.000	0.700	Mg	0.000	0.001	99.997
1A3bii	Diesel oil	0.000	6.678	0.000	0.700	Mg	0.000	0.001	99.998
2C7a		0.000	6.678	0.000	0.700	Mg	0.000	0.001	99.999
1A3biv	Gasoline	0.000	6.678	0.000	0.700	Mg	0.000	0.001	99.999
1A2b	Liquid	0.000	6.678	0.000	0.700	Mg	0.000	0.000	100
1A2a	Liquid	0.000	6.678	0.000	0.700	Mg	0.000	0.000	100
1A3bii	Gasoline	0.000	6.678	0.000	0.700	Mg	0.000	0.000	100
1A3biv	Diesel oil		6.678	0.000	0.700	Mg	0.000	0.000	100

Hg

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
2B10a		0.369	1.085	0.035	0.538	Mg	0.136	22.275	22.275	Yes
2C1		0.005	1.085	0.131	0.538	Mg	0.119	19.425	41.701	Yes
1A2gviii	Other	0.171	1.085	0.007	0.538	Mg	0.072	11.796	53.497	Yes
1A1a	Solid	0.172	1.085	0.020	0.538	Mg	0.06	9.795	63.291	Yes
1A2d	Biomass	0.089	1.085	0.101	0.538	Mg	0.052	8.575	71.867	Yes
1A1a	Biomass	0.003	1.085	0.037	0.538	Mg	0.032	5.267	77.133	Yes
5C1bv		0.006	1.085	0.022	0.538	Mg	0.017	2.808	79.941	Yes
1A1a	Peat	0.062	1.085	0.045	0.538	Mg	0.013	2.112	82.053	Yes
1A2f	Solid	0.017	1.085	0.022	0.538	Mg	0.013	2.102	84.155	
1A4bi	Biomass	0.021	1.085	0.024	0.538	Mg	0.012	2.029	86.185	
2C7c		0.028	1.085	0.003	0.538	Mg	0.010	1.606	87.791	
1A1b	Solid	0.010	1.085	0.014	0.538	Mg	0.008	1.353	89.143	
1A2d	Solid	0.018	1.085	0.001	0.538	Mg	0.008	1.300	90.443	
1A5a	Biomass	0.000	1.085	0.008	0.538	Mg	0.008	1.229	91.672	
1A2a	Solid	0.017	1.085	0.000	0.538	Mg	0.007	1.226	92.898	
2C6			1.085	0.005	0.538	Mg	0.005	0.784	93.682	
1A3biii	Diesel oil	0.005	1.085	0.007	0.538	Mg	0.004	0.683	94.366	
1A1a	Other	0.000	1.085	0.004	0.538	Mg	0.003	0.555	94.921	
2C7a		0.007	1.085	0.000	0.538	Mg	0.003	0.485	95.406	

1A2f	Other		1.085	0.003	0.538	Mg	0.003	0.447	95.852
1A3bi	Diesel oil	0.002	1.085	0.004	0.538	Mg	0.003	0.435	96.287
1A4ci	Peat	0.001	1.085	0.003	0.538	Mg	0.003	0.427	96.715
1A2e	Solid	0.006	1.085	0.001	0.538	Mg	0.002	0.397	97.112
1A3bi	Gasoline	0.016	1.085	0.01	0.538	Mg	0.002	0.388	97.499
1A2c	Solid	0.005	1.085	0.000	0.538	Mg	0.002	0.369	97.868
1A4ci	Biomass	0.003	1.085	0.004	0.538	Mg	0.002	0.316	98.185
2C2		0.000	1.085	0.002	0.538	Mg	0.002	0.290	98.474
1A2gviii	Biomass	0.005	1.085	0.004	0.538	Mg	0.002	0.287	98.761
1A4ai	Biomass	0.001	1.085	0.001	0.538	Mg	0.001	0.144	98.906
1A3bii	Diesel oil	0.001	1.085	0.002	0.538	Mg	0.001	0.136	99.042
1A2d	Other	0.000	1.085	0.001	0.538	Mg	0.001	0.112	99.154
1A2gviii	Peat	0.000	1.085	0.001	0.538	Mg	0.001	0.105	99.259
1A4bi	Solid	0.001	1.085	0.000	0.538	Mg	0.001	0.101	99.360
1A3dii	Liquid	0.003	1.085	0.002	0.538	Mg	0.001	0.091	99.451
1A2d	Peat	0.016	1.085	0.007	0.538	Mg	0.001	0.090	99.540
1A4bi	Peat	0.002	1.085	0.000	0.538	Mg	0.000	0.071	99.612
3F		0.005	1.085	0.003	0.538	Mg	0.000	0.070	99.682
5E		0.002	1.085	0.001	0.538	Mg	0.000	0.049	99.732
1A3biv	Gasoline	0.000	1.085	0.000	0.538	Mg	0.000	0.038	99.770
1A3bii	Gasoline	0.001	1.085	0.000	0.538	Mg	0.000	0.037	99.807
1A1a	Liquid	0.001	1.085	0.000	0.538	Mg	0.000	0.034	99.841
1A4ai	Liquid	0.000	1.085	0.000	0.538	Mg	0.000	0.017	99.858
1A5a	Liquid	0.000	1.085	0.000	0.538	Mg	0.000	0.017	99.876
1A4ciii	Liquid	0.002	1.085	0.001	0.538	Mg	0.000	0.017	99.892
1A2c	Biomass	0.000	1.085	0.000	0.538	Mg	0.000	0.015	99.907
1A4ai	Peat	0.000	1.085	0.000	0.538	Mg	0.000	0.012	99.919
1A4ci	Solid	0.000	1.085	0.000	0.538	Mg	0.000	0.010	99.928
1A2e	Peat	0.003	1.085	0.002	0.538	Mg	0.000	0.009	99.938
1A2gviii	Liquid	0.000	1.085	0.000	0.538	Mg	0.000	0.009	99.946
1A2f	Biomass	0.000	1.085	0.000	0.538	Mg	0.000	0.008	99.955
1A2e	Biomass	0.000	1.085	0.000	0.538	Mg	0.000	0.007	99.962
1A2e	Liquid	0.000	1.085	0.000	0.538	Mg	0.000	0.007	99.968
1A4ci	Liquid	0.000	1.085	0.000	0.538	Mg	0.000	0.006	99.974
1A4bi	Liquid	0.000	1.085	0.000	0.538	Mg	0.000	0.004	99.979
1A2f	Liquid	0.000	1.085	0.000	0.538	Mg	0.000	0.004	99.982
1A2c	Liquid	0.000	1.085	0.000	0.538	Mg	0.000	0.003	99.986
1A2a	Liquid	0.000	1.085	0.000	0.538	Mg	0.000	0.003	99.989
1A2e	Other	0.000	1.085	0.000	0.538	Mg	0.000	0.003	99.992
1A1b	Liquid	0.000	1.085	0.000	0.538	Mg	0.000	0.003	99.994
2G		0.000	1.085	0.000	0.538	Mg	0.000	0.002	99.997
1A3biv	Diesel oil		1.085	0.000	0.538	Mg	0.000	0.001	99.998
1B1b		0.000	1.085	0.000	0.538	Mg	0.000	0.001	99.999
1A2a	Biomass		1.085	0.000	0.538	Mg	0.000	0.001	99.999
1A2b	Liquid	0.000	1.085	0.000	0.538	Mg	0.000	0.001	100
1A2d	Liquid	0.000	1.085	0.000	0.538	Mg	0.000	0.000	100

As

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
2C7c		28.000	34.815	0.207	1.993	Mg	0.040	44.463	44.463	Yes
1A1b	Solid	0.342	34.815	0.485	1.993	Mg	0.013	14.812	59.275	Yes
1A1a	Peat	0.628	34.815	0.493	1.993	Mg	0.013	14.546	73.822	Yes
1A2d	Biomass	0.160	34.815	0.145	1.993	Mg	0.004	4.340	78.161	Yes
1A4ci	Peat	0.032	34.815	0.104	1.993	Mg	0.003	3.264	81.425	Yes
2C6		1.700	34.815	0.020	1.993	Mg	0.002	2.456	83.882	
1A2f	Solid	0.491	34.815	0.105	1.993	Mg	0.002	2.440	86.322	
1A1a	Solid	1.618	34.815	0.033	1.993	Mg	0.002	1.891	88.213	
2C7a		0.113	34.815	0.056	1.993	Mg	0.001	1.585	89.798	
2C1		0.411	34.815	0.069	1.993	Mg	0.001	1.460	91.258	
1A4bi	Biomass	0.041	34.815	0.047	1.993	Mg	0.001	1.433	92.691	
1A2e	Peat	0.080	34.815	0.048	1.993	Mg	0.001	1.372	94.064	
1A3bvi		0.036	34.815	0.041	1.993	Mg	0.001	1.252	95.316	
1A2gviii	Peat	0.001	34.815	0.023	1.993	Mg	0.001	0.737	96.053	
1A1a	Biomass	0.003	34.815	0.019	1.993	Mg	0.001	0.587	96.640	
1A5a	Biomass	0.000	34.815	0.016	1.993	Mg	0.000	0.524	97.164	
1A2d	Peat	0.238	34.815	0.002	1.993	Mg	0.000	0.355	97.519	
1A2d	Solid	0.229	34.815	0.003	1.993	Mg	0.000	0.327	97.847	
1A4bi	Peat	0.053	34.815	0.011	1.993	Mg	0.000	0.265	98.112	
1A2e	Solid	0.228	34.815	0.005	1.993	Mg	0.000	0.258	98.370	
1A4ci	Biomass	0.007	34.815	0.007	1.993	Mg	0.000	0.224	98.593	
1A4ai	Peat	0.010	34.815	0.007	1.993	Mg	0.000	0.214	98.808	
1B1b		0.004	34.815	0.006	1.993	Mg	0.000	0.195	99.003	
1A5a	Liquid	0.017	34.815	0.006	1.993	Mg	0.000	0.167	99.169	
1A2gviii	Biomass	0.007	34.815	0.004	1.993	Mg	0.000	0.108	99.277	
1A1a	Other	0.000	34.815	0.003	1.993	Mg	0.000	0.100	99.377	
1A4ai	Biomass	0.002	34.815	0.003	1.993	Mg	0.000	0.088	99.465	
1A4bi	Solid	0.048	34.815	0.000	1.993	Mg	0.000	0.079	99.545	
1A2d	Liquid	0.018	34.815	0.003	1.993	Mg	0.000	0.056	99.601	
1A2c	Liquid	0.007	34.815	0.002	1.993	Mg	0.000	0.049	99.650	
1A4ai	Liquid	0.021	34.815	0.003	1.993	Mg	0.000	0.048	99.698	
1A2gviii	Other	0.001	34.815	0.002	1.993	Mg	0.000	0.047	99.745	
1A4ciii	Liquid	0.002	34.815	0.001	1.993	Mg	0.000	0.036	99.781	
1A3dii	Liquid	0.028	34.815	0.003	1.993	Mg	0.000	0.032	99.812	
1A2d	Other	0.000	34.815	0.001	1.993	Mg	0.000	0.025	99.837	
5E		0.003	34.815	0.001	1.993	Mg	0.000	0.022	99.859	
2G		0.001	34.815	0.001	1.993	Mg	0.000	0.019	99.878	
2C2		0.002	34.815	0.001	1.993	Mg	0.000	0.019	99.897	
5C1bv		0.000	34.815	0.000	1.993	Mg	0.000	0.014	99.911	
2C3		0.008	34.815	0.000	1.993	Mg	0.000	0.013	99.924	
1A1a	Liquid	0.029	34.815	0.001	1.993	Mg	0.000	0.011	99.934	
1A3bi	Gasoline	0.001	34.815	0.000	1.993	Mg	0.000	0.010	99.945	
1A4ci	Solid	0.006	34.815	0.001	1.993	Mg	0.000	0.007	99.952	
1A2c	Solid	0.011	34.815	0.000	1.993	Mg	0.000	0.007	99.959	
1A2e	Liquid	0.007	34.815	0.001	1.993	Mg	0.000	0.006	99.964	
1A4bi	Liquid	0.004	34.815	0.000	1.993	Mg	0.000	0.005	99.970	
1A2a	Liquid	0.003	34.815	0.000	1.993	Mg	0.000	0.004	99.974	
1A3biii	Diesel oil	0.000	34.815	0.000	1.993	Mg	0.000	0.004	99.978	

1A2f	Liquid	0.005	34.815	0.000	1.993	Mg	0.000	0.003	99.981
3F		0.000	34.815	0.000	1.993	Mg	0.000	0.003	99.984
1A2e	Biomass	0.000	34.815	0.000	1.993	Mg	0.000	0.003	99.987
1A2gviii	Liquid	0.009	34.815	0.000	1.993	Mg	0.000	0.002	99.989
1A3bi	Diesel oil	0.000	34.815	0.000	1.993	Mg	0.000	0.002	99.991
1A4ci	Liquid	0.006	34.815	0.000	1.993	Mg	0.000	0.002	99.993
1A2f	Biomass	0.000	34.815	0.000	1.993	Mg	0.000	0.001	99.994
1A1b	Liquid	0.001	34.815	0.000	1.993	Mg	0.000	0.001	99.996
1A2e	Other	0.000	34.815	0.000	1.993	Mg	0.000	0.001	99.997
1A3bii	Diesel oil	0.000	34.815	0.000	1.993	Mg	0.000	0.001	99.998
1A2b	Liquid	0.001	34.815	0.000	1.993	Mg	0.000	0.001	99.999
1A2f	Other		34.815	0.000	1.993	Mg	0.000	0.001	99.999
1A3biv	Gasoline	0.000	34.815	0.000	1.993	Mg	0.000	0.000	100
1A2a	Biomass		34.815	0.000	1.993	Mg	0.000	0.000	100
1A2c	Biomass	0.000	34.815	0.000	1.993	Mg	0.000	0.000	100
1A3biv	Diesel oil		34.815	0.000	1.993	Mg	0.000	0.000	100
1A3bii	Gasoline	0.000	34.815	0.000	1.993	Mg	0.000	0.000	100

Cr

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
2C1		19.554	47.623	2.254	13.893	Mg	0.072	23.183	23.183	Yes
1A1b	Solid	2.634	47.623	3.728	13.893	Mg	0.062	19.881	43.065	Yes
1A1a	Solid	6.765	47.623	0.048	13.893	Mg	0.04	12.938	56.003	Yes
1A4bi	Biomass	1.445	47.623	1.657	13.893	Mg	0.026	8.303	64.306	Yes
1A3bvi		1.143	47.623	1.297	13.893	Mg	0.020	6.472	70.778	Yes
1A5a	Biomass	0.012	47.623	0.576	13.893	Mg	0.012	3.848	74.626	Yes
1A2e	Solid	1.752	47.623	0.017	13.893	Mg	0.010	3.315	77.941	Yes
1A1a	Biomass	0.069	47.623	0.496	13.893	Mg	0.010	3.195	81.136	Yes
1A2d	Solid	1.263	47.623	0.002	13.893	Mg	0.008	2.465	83.601	
1A1a	Peat	1.076	47.623	0.666	13.893	Mg	0.007	2.364	85.965	
2C2		2.000	47.623	0.929	13.893	Mg	0.007	2.322	88.287	
1A2b	Solid	1.845	47.623	0.197	13.893	Mg	0.007	2.290	90.577	
1A4ci	Biomass	0.228	47.623	0.259	13.893	Mg	0.004	1.292	91.869	
1A4ci	Peat	0.056	47.623	0.180	13.893	Mg	0.003	1.102	92.971	
1A2f	Solid	3.365	47.623	0.821	13.893	Mg	0.003	1.082	94.053	
2C7c		0.520	47.623	0.009	13.893	Mg	0.003	0.958	95.011	
1A2d	Peat	0.411	47.623	0.002	13.893	Mg	0.002	0.794	95.805	
1A2gviii	Biomass	0.817	47.623	0.124	13.893	Mg	0.002	0.772	96.576	
1A4bi	Solid	0.370	47.623	0.002	13.893	Mg	0.002	0.712	97.288	
1A1a	Other	0.001	47.623	0.097	13.893	Mg	0.002	0.650	97.938	
1A4ai	Biomass	0.068	47.623	0.101	13.893	Mg	0.002	0.543	98.481	
2C7a		0.145	47.623	0.000	13.893	Mg	0.001	0.284	98.764	
1A2e	Peat	0.138	47.623	0.082	13.893	Mg	0.001	0.283	99.048	
1B1b		0.003	47.623	0.019	13.893	Mg	0.000	0.120	99.168	
1A2gvii	Liquid	0.014	47.623	0.018	13.893	Mg	0.000	0.094	99.263	
1A4ci	Solid	0.044	47.623	0.000	13.893	Mg	0.000	0.084	99.347	
1A3biii	Diesel oil	0.008	47.623	0.011	13.893	Mg	0.000	0.060	99.407	
1A2d	Biomass	0.558	47.623	0.172	13.893	Mg	0.000	0.060	99.467	

1A4ai	Peat	0.017	47.623	0.013	13.893	Mg	0.000	0.052	99.519
1A4cii	Liquid	0.015	47.623	0.012	13.893	Mg	0.000	0.051	99.570
1A4bi	Peat	0.091	47.623	0.020	13.893	Mg	0.000	0.047	99.617
2G		0.006	47.623	0.007	13.893	Mg	0.000	0.037	99.654
1A3bi	Diesel oil	0.003	47.623	0.006	13.893	Mg	0.000	0.035	99.689
1A2d	Other	0.001	47.623	0.005	13.893	Mg	0.000	0.033	99.722
1A2gviii	Liquid	0.016	47.623	0.000	13.893	Mg	0.000	0.030	99.752
1A3bi	Gasoline	0.011	47.623	0.007	13.893	Mg	0.000	0.028	99.780
1A2gviii	Other	0.024	47.623	0.011	13.893	Mg	0.000	0.028	99.808
1A1a	Liquid	0.015	47.623	0.001	13.893	Mg	0.000	0.024	99.832
1A2f	Biomass	0.000	47.623	0.003	13.893	Mg	0.000	0.023	99.854
1A4aii	Liquid	0.007	47.623	0.005	13.893	Mg	0.000	0.021	99.875
1A4bii	Liquid	0.002	47.623	0.003	13.893	Mg	0.000	0.015	99.890
1A3bii	Diesel oil	0.002	47.623	0.003	13.893	Mg	0.000	0.013	99.903
1A3dii	Liquid	0.030	47.623	0.007	13.893	Mg	0.000	0.012	99.915
1A4ai	Liquid	0.010	47.623	0.001	13.893	Mg	0.000	0.011	99.926
3F		0.005	47.623	0.003	13.893	Mg	0.000	0.008	99.934
1A2e	Biomass	0.006	47.623	0.003	13.893	Mg	0.000	0.007	99.941
1A2gviii	Peat	0.002	47.623	0.001	13.893	Mg	0.000	0.006	99.947
1A5a	Liquid	0.009	47.623	0.003	13.893	Mg	0.000	0.006	99.953
1A4ciii	Liquid	0.003	47.623	0.002	13.893	Mg	0.000	0.005	99.958
1A4ci	Liquid	0.003	47.623	0.000	13.893	Mg	0.000	0.005	99.963
1A2e	Liquid	0.003	47.623	0.000	13.893	Mg	0.000	0.004	99.967
1A2d	Liquid	0.009	47.623	0.002	13.893	Mg	0.000	0.004	99.971
1A2c	Solid	0.013	47.623	0.003	13.893	Mg	0.000	0.004	99.975
1A4bi	Liquid	0.002	47.623	0.000	13.893	Mg	0.000	0.003	99.978
1A2e	Other	0.006	47.623	0.001	13.893	Mg	0.000	0.003	99.982
5C1bv		0.000	47.623	0.000	13.893	Mg	0.000	0.003	99.984
1A2f	Other		47.623	0.000	13.893	Mg	0.000	0.003	99.987
1A2a	Biomass		47.623	0.000	13.893	Mg	0.000	0.002	99.989
1A2f	Liquid	0.002	47.623	0.001	13.893	Mg	0.000	0.002	99.991
1A2a	Liquid	0.001	47.623	0.000	13.893	Mg	0.000	0.002	99.993
1A3biv	Gasoline	0.000	47.623	0.000	13.893	Mg	0.000	0.001	99.995
1A1b	Liquid	0.001	47.623	0.000	13.893	Mg	0.000	0.001	99.996
1A2b	Liquid	0.001	47.623	0.000	13.893	Mg	0.000	0.001	99.997
1A3c	Liquid	0.003	47.623	0.001	13.893	Mg	0.000	0.001	99.998
1A2c	Biomass	0.000	47.623	0.000	13.893	Mg	0.000	0.001	99.998
1A3bii	Gasoline	0.000	47.623	0.000	13.893	Mg	0.000	0.001	99.999
1A2gvii	Gaseous	0.000	47.623	0.000	13.893	Mg	0.000	0.001	100
5E		0.003	47.623	0.001	13.893	Mg	0.000	0.000	100
1A3biv	Diesel oil		47.623	0.000	13.893	Mg	0.000	0.000	100
1A2c	Liquid	0.003	47.623	0.001	13.893	Mg	0.000	0.000	100

Cu

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
2C7c		80.257	156.824	0.220	37.559	Mg	0.121	41.231	41.231	Yes
1A3bvi		49.238	156.824	29.200	37.559	Mg	0.111	37.773	79.004	Yes
1A1a	Solid	5.471	156.824	0.051	37.559	Mg	0.008	2.733	81.737	Yes

2C7a		4.803	156.824	0.002	37.559	Mg	0.007	2.492	84.229
1A1b	Solid	0.922	156.824	1.305	37.559	Mg	0.007	2.352	86.581
2C1		5.540	156.824	0.379	37.559	Mg	0.006	2.057	88.637
1A5a	Biomass	0.017	156.824	0.840	37.559	Mg	0.005	1.813	90.450
1A1a	Biomass	0.105	156.824	0.825	37.559	Mg	0.005	1.737	92.187
1A1a	Peat	1.662	156.824	1.072	37.559	Mg	0.004	1.463	93.649
1A2gvii	Liquid	0.491	156.824	0.621	37.559	Mg	0.003	1.093	94.742
1A4cii	Liquid	0.499	156.824	0.406	37.559	Mg	0.002	0.622	95.364
1A4ci	Peat	0.088	156.824	0.283	37.559	Mg	0.002	0.569	95.933
1A4bi	Biomass	0.248	156.824	0.284	37.559	Mg	0.001	0.488	96.420
1A2d	Biomass	0.813	156.824	0.384	37.559	Mg	0.001	0.412	96.832
2G		0.203	156.824	0.218	37.559	Mg	0.001	0.368	97.200
1A2d	Solid	0.648	156.824	0.001	37.559	Mg	0.001	0.334	97.533
1A1a	Other	0.001	156.824	0.153	37.559	Mg	0.001	0.332	97.865
1A2d	Peat	0.646	156.824	0.005	37.559	Mg	0.001	0.325	98.190
1A2e	Solid	0.613	156.824	0.007	37.559	Mg	0.001	0.303	98.493
1A4aii	Liquid	0.227	156.824	0.172	37.559	Mg	0.001	0.256	98.749
1A4bii	Liquid	0.075	156.824	0.098	37.559	Mg	0.001	0.174	98.923
1A2e	Peat	0.216	156.824	0.129	37.559	Mg	0.000	0.168	99.092
2B10a		0.270	156.824	0.005	37.559	Mg	0.000	0.131	99.222
1A2d	Liquid	0.022	156.824	0.065	37.559	Mg	0.000	0.130	99.352
1A4ci	Biomass	0.039	156.824	0.045	37.559	Mg	0.000	0.076	99.428
1A4bi	Solid	0.130	156.824	0.001	37.559	Mg	0.000	0.066	99.494
1A2d	Other	0.001	156.824	0.024	37.559	Mg	0.000	0.051	99.545
2C2		0.003	156.824	0.024	37.559	Mg	0.000	0.050	99.595
1A2gviii	Biomass	0.699	156.824	0.189	37.559	Mg	0.000	0.048	99.643
1B1b		0.004	156.824	0.022	37.559	Mg	0.000	0.045	99.687
2C6			156.824	0.017	37.559	Mg	0.000	0.037	99.725
1A4ai	Biomass	0.013	156.824	0.017	37.559	Mg	0.000	0.031	99.755
1A4ai	Peat	0.026	156.824	0.020	37.559	Mg	0.000	0.029	99.785
1A3dii	Liquid	0.100	156.824	0.013	37.559	Mg	0.000	0.024	99.809
1A3c	Liquid	0.103	156.824	0.034	37.559	Mg	0.000	0.021	99.830
1A1a	Liquid	0.034	156.824	0.002	37.559	Mg	0.000	0.014	99.844
1A2gviii	Other	0.037	156.824	0.015	37.559	Mg	0.000	0.014	99.858
1A3biii	Diesel oil	0.006	156.824	0.008	37.559	Mg	0.000	0.014	99.872
1A4ciii	Liquid	0.049	156.824	0.006	37.559	Mg	0.000	0.012	99.884
1A2f	Other		156.824	0.005	37.559	Mg	0.000	0.011	99.895
1A2gviii	Liquid	0.022	156.824	0.001	37.559	Mg	0.000	0.010	99.905
1A5a	Liquid	0.029	156.824	0.011	37.559	Mg	0.000	0.009	99.914
1A3bi	Diesel oil	0.002	156.824	0.004	37.559	Mg	0.000	0.008	99.922
1A4bi	Peat	0.143	156.824	0.031	37.559	Mg	0.000	0.007	99.929
1A4ci	Solid	0.016	156.824	0.000	37.559	Mg	0.000	0.007	99.937
1A3bi	Gasoline	0.008	156.824	0.005	37.559	Mg	0.000	0.007	99.944
1A2gvii	Gaseous	0.012	156.824	0.006	37.559	Mg	0.000	0.007	99.951
1A4ai	Liquid	0.026	156.824	0.003	37.559	Mg	0.000	0.006	99.957
1A2f	Biomass	0.000	156.824	0.003	37.559	Mg	0.000	0.005	99.963
1A2e	Biomass	0.009	156.824	0.005	37.559	Mg	0.000	0.005	99.968
1A2e	Other	0.000	156.824	0.002	37.559	Mg	0.000	0.004	99.972
1A2gviii	Peat	0.003	156.824	0.002	37.559	Mg	0.000	0.003	99.975
1A4ci	Liquid	0.008	156.824	0.001	37.559	Mg	0.000	0.003	99.978
1A3bii	Diesel oil	0.001	156.824	0.002	37.559	Mg	0.000	0.003	99.981

1A2e	Liquid	0.008	156.824	0.001	37.559	Mg	0.000	0.003	99.984
1A2c	Solid	0.010	156.824	0.001	37.559	Mg	0.000	0.003	99.986
1A4bi	Liquid	0.005	156.824	0.000	37.559	Mg	0.000	0.002	99.989
1A2f	Liquid	0.006	156.824	0.000	37.559	Mg	0.000	0.002	99.991
3F		0.002	156.824	0.001	37.559	Mg	0.000	0.002	99.993
1A2f	Solid	1.280	156.824	0.306	37.559	Mg	0.000	0.001	99.994
1A2a	Liquid	0.004	156.824	0.000	37.559	Mg	0.000	0.001	99.995
1A2a	Biomass		156.824	0.000	37.559	Mg	0.000	0.001	99.996
1A2c	Liquid	0.008	156.824	0.002	37.559	Mg	0.000	0.001	99.997
5E		0.006	156.824	0.002	37.559	Mg	0.000	0.001	99.998
5C1bv		0.000	156.824	0.000	37.559	Mg	0.000	0.001	99.999
1A1b	Liquid	0.002	156.824	0.000	37.559	Mg	0.000	0.001	100
1A3biv	Gasoline	0.000	156.824	0.000	37.559	Mg	0.000	0.000	100
1A3bii	Gasoline	0.000	156.824	0.000	37.559	Mg	0.000	0.000	100
1A3biv	Diesel oil		156.824	0.000	37.559	Mg	0.000	0.000	100
1A2b	Liquid	0.001	156.824	0.000	37.559	Mg	0.000	0.000	100
1A2c	Biomass	0.001	156.824	0.000	37.559	Mg	0.000	0.000	100

Ni

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
2C7c		31.000	78.398	0.021	9.677	Mg	0.049	31.562	31.562	Yes
1A4bi	Biomass	1.239	78.398	1.421	9.677	Mg	0.016	10.514	42.076	Yes
2C7b		5.000	78.398	1.266	9.677	Mg	0.008	5.381	47.457	Yes
1A1a	Solid	5.396	78.398	0.076	9.677	Mg	0.008	4.893	52.35	Yes
1A5a	Liquid	2.531	78.398	0.888	9.677	Mg	0.007	4.770	57.119	Yes
1A1a	Peat	1.066	78.398	0.664	9.677	Mg	0.007	4.413	61.532	Yes
1A5a	Biomass	0.010	78.398	0.494	9.677	Mg	0.006	4.086	65.618	Yes
1A1a	Biomass	0.061	78.398	0.439	9.677	Mg	0.006	3.578	69.196	Yes
2C1		2.002	78.398	0.651	9.677	Mg	0.005	3.351	72.546	Yes
1A2f	Solid	2.771	78.398	0.651	9.677	Mg	0.004	2.561	75.107	Yes
1A1a	Liquid	3.688	78.398	0.171	9.677	Mg	0.004	2.360	77.468	Yes
1A1b	Liquid	1.729	78.398	0.006	9.677	Mg	0.003	1.723	79.191	Yes
1A4ci	Biomass	0.195	78.398	0.222	9.677	Mg	0.003	1.640	80.831	Yes
1A2c	Liquid	0.833	78.398	0.288	9.677	Mg	0.002	1.536	82.366	
1A4ci	Peat	0.056	78.398	0.180	9.677	Mg	0.002	1.438	83.804	
1A3bvi		0.164	78.398	0.186	9.677	Mg	0.002	1.376	85.180	
1A2e	Solid	1.401	78.398	0.014	9.677	Mg	0.002	1.318	86.499	
1A2d	Biomass	0.475	78.398	0.201	9.677	Mg	0.002	1.178	87.676	
1A2b	Solid	1.115	78.398	0.009	9.677	Mg	0.002	1.068	88.745	
1A2d	Solid	1.036	78.398	0.001	9.677	Mg	0.002	1.049	89.794	
1A2gviii	Liquid	1.361	78.398	0.059	9.677	Mg	0.001	0.907	90.701	
1A2d	Liquid	2.234	78.398	0.172	9.677	Mg	0.001	0.857	91.559	
1A3dii	Liquid	1.280	78.398	0.245	9.677	Mg	0.001	0.719	92.278	
2B10a		1.052	78.398	0.047	9.677	Mg	0.001	0.689	92.967	
1A1a	Other	0.001	78.398	0.083	9.677	Mg	0.001	0.686	93.653	
1A2gviii	Biomass	0.212	78.398	0.107	9.677	Mg	0.001	0.673	94.326	
1A4ai	Biomass	0.058	78.398	0.086	9.677	Mg	0.001	0.656	94.982	
1A2e	Peat	0.138	78.398	0.082	9.677	Mg	0.001	0.542	95.524	

2C7a		0.508	78.398	0.000	9.677	Mg	0.001	0.518	96.042
1A4bi	Liquid	0.555	78.398	0.007	9.677	Mg	0.001	0.513	96.555
1A4ci	Liquid	0.971	78.398	0.065	9.677	Mg	0.001	0.451	97.007
1A4bi	Solid	0.296	78.398	0.002	9.677	Mg	0.000	0.290	97.297
1A2f	Liquid	0.676	78.398	0.049	9.677	Mg	0.000	0.284	97.581
1A2e	Liquid	1.007	78.398	0.091	9.677	Mg	0.000	0.275	97.856
2C2		0.017	78.398	0.035	9.677	Mg	0.000	0.269	98.125
1A2d	Peat	0.412	78.398	0.026	9.677	Mg	0.000	0.207	98.332
1A4ciii	Liquid	0.056	78.398	0.031	9.677	Mg	0.000	0.202	98.534
1A2gvii	Liquid	0.020	78.398	0.026	9.677	Mg	0.000	0.191	98.726
1B1b		0.002	78.398	0.018	9.677	Mg	0.000	0.147	98.873
1A4ai	Liquid	3.134	78.398	0.404	9.677	Mg	0.000	0.145	99.018
2G		0.025	78.398	0.020	9.677	Mg	0.000	0.136	99.154
1A4cii	Liquid	0.021	78.398	0.017	9.677	Mg	0.000	0.118	99.271
1A2b	Liquid	0.124	78.398	0.028	9.677	Mg	0.000	0.103	99.374
1A4ai	Peat	0.017	78.398	0.013	9.677	Mg	0.000	0.087	99.462
1A1b	Solid	0.150	78.398	0.010	9.677	Mg	0.000	0.071	99.533
1A2a	Liquid	0.435	78.398	0.045	9.677	Mg	0.000	0.070	99.603
1A4bi	Peat	0.091	78.398	0.020	9.677	Mg	0.000	0.069	99.672
1A2gviii	Other	0.021	78.398	0.009	9.677	Mg	0.000	0.054	99.726
1A4aii	Liquid	0.009	78.398	0.007	9.677	Mg	0.000	0.049	99.775
1A2d	Other	0.001	78.398	0.006	9.677	Mg	0.000	0.046	99.822
1A4ci	Solid	0.035	78.398	0.000	9.677	Mg	0.000	0.034	99.855
1A4bii	Liquid	0.003	78.398	0.004	9.677	Mg	0.000	0.030	99.886
1A2f	Biomass	0.000	78.398	0.002	9.677	Mg	0.000	0.019	99.905
1A3bi	Gasoline	0.004	78.398	0.003	9.677	Mg	0.000	0.018	99.923
1A2e	Biomass	0.005	78.398	0.003	9.677	Mg	0.000	0.015	99.939
1A2c	Solid	0.010	78.398	0.003	9.677	Mg	0.000	0.012	99.950
1A2gviii	Peat	0.002	78.398	0.002	9.677	Mg	0.000	0.010	99.961
1A3c	Liquid	0.004	78.398	0.001	9.677	Mg	0.000	0.007	99.968
1A2e	Other	0.003	78.398	0.001	9.677	Mg	0.000	0.007	99.975
3F		0.002	78.398	0.001	9.677	Mg	0.000	0.006	99.981
1A2f	Other		78.398	0.001	9.677	Mg	0.000	0.005	99.986
5C1bv		0.000	78.398	0.001	9.677	Mg	0.000	0.005	99.991
1A2a	Biomass		78.398	0.000	9.677	Mg	0.000	0.002	99.993
1A3biii	Diesel oil	0.000	78.398	0.000	9.677	Mg	0.000	0.002	99.995
1A2gvii	Gaseous	0.000	78.398	0.000	9.677	Mg	0.000	0.002	99.997
1A2c	Biomass	0.000	78.398	0.000	9.677	Mg	0.000	0.001	99.998
1A3bi	Diesel oil	0.000	78.398	0.000	9.677	Mg	0.000	0.001	99.999
1A3biv	Gasoline	0.000	78.398	0.000	9.677	Mg	0.000	0.001	99.999
1A3bii	Diesel oil	0.000	78.398	0.000	9.677	Mg	0.000	0.000	100
1A3bii	Gasoline	0.000	78.398	0.000	9.677	Mg	0.000	0.000	100
1A3biv	Diesel oil		78.398	0.000	9.677	Mg	0.000	0.000	100

Se

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
2C7c		1.400	1.840	0.002	0.358	Mg	0.147	48.047	48.047	Yes
1A4bi	Biomass	0.206	1.840	0.237	0.358	Mg	0.107	35.006	83.054	Yes

1A4ci	Biomass	0.033	1.840	0.037	0.358	Mg	0.017	5.451	88.505
1A3bvi		0.026	1.840	0.030	0.358	Mg	0.014	4.428	92.933
2C7a		0.050	1.840	0.027	0.358	Mg	0.009	2.987	95.920
1A4ai	Biomass	0.010	1.840	0.014	0.358	Mg	0.007	2.228	98.148
1A2gvii	Liquid	0.003	1.840	0.004	0.358	Mg	0.002	0.550	98.698
1A3dii	Liquid	0.014	1.840	0.001	0.358	Mg	0.001	0.336	99.035
1A4cii	Liquid	0.003	1.840	0.002	0.358	Mg	0.001	0.323	99.358
1A4ciii	Liquid	0.006	1.840	0.000	0.358	Mg	0.000	0.137	99.495
1A4aii	Liquid	0.001	1.840	0.001	0.358	Mg	0.000	0.134	99.629
5C1bv		0.000	1.840	0.001	0.358	Mg	0.000	0.112	99.741
1A4bii	Liquid	0.000	1.840	0.001	0.358	Mg	0.000	0.088	99.829
3F		0.001	1.840	0.001	0.358	Mg	0.000	0.076	99.905
1A3bi	Gasoline	0.000	1.840	0.000	0.358	Mg	0.000	0.030	99.935
1A3biii	Diesel oil	0.000	1.840	0.000	0.358	Mg	0.000	0.021	99.955
1A3c	Liquid	0.001	1.840	0.000	0.358	Mg	0.000	0.015	99.970
1A3bi	Diesel oil	0.000	1.840	0.000	0.358	Mg	0.000	0.011	99.982
1A5a	Liquid	0.001	1.840	0.000	0.358	Mg	0.000	0.009	99.990
1A3bii	Diesel oil	0.000	1.840	0.000	0.358	Mg	0.000	0.004	99.995
1A2gvii	Gaseous	0.000	1.840	0.000	0.358	Mg	0.000	0.004	99.998
1A3biv	Gasoline	0.000	1.840	0.000	0.358	Mg	0.000	0.001	100
1A3bii	Gasoline	0.000	1.840	0.000	0.358	Mg	0.000	0.000	100
1A3biv	Diesel oil		1.840	0.000	0.358	Mg	0.000	0.000	100

Zn

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
2C1		303.559	681.894	1.784	117.015	Mg	0.074	27.856	27.856	Yes
1A4bi	Biomass	28.903	681.894	33.149	117.015	Mg	0.041	15.608	43.465	Yes
2C7c		160.391	681.894	0.688	117.015	Mg	0.039	14.859	58.324	Yes
1A3bvi		18.420	681.894	18.604	117.015	Mg	0.023	8.551	66.875	Yes
1A1a	Biomass	1.382	681.894	12.349	117.015	Mg	0.018	6.706	73.581	Yes
1A5a	Biomass	0.238	681.894	11.524	117.015	Mg	0.017	6.359	79.940	Yes
2C6		90.174	681.894	9.205	117.015	Mg	0.009	3.471	83.411	Yes
1A1b	Solid	3.951	681.894	5.591	117.015	Mg	0.007	2.721	86.132	
1A1a	Solid	28.018	681.894	0.321	117.015	Mg	0.007	2.484	88.616	
1A4ci	Biomass	4.550	681.894	5.175	117.015	Mg	0.006	2.433	91.049	
1A1a	Other	0.016	681.894	3.337	117.015	Mg	0.005	1.846	92.896	
1A4ai	Biomass	1.355	681.894	2.012	117.015	Mg	0.003	0.985	93.881	
1A2gviii	Biomass	4.949	681.894	2.515	117.015	Mg	0.002	0.922	94.803	
1A2f	Solid	5.497	681.894	2.400	117.015	Mg	0.002	0.807	95.610	
1A1a	Peat	2.706	681.894	1.883	117.015	Mg	0.002	0.785	96.395	
1A2f	Other		681.894	0.825	117.015	Mg	0.001	0.457	96.852	
1A2gviii	Other	0.221	681.894	0.716	117.015	Mg	0.001	0.375	97.227	
2C2		0.100	681.894	0.579	117.015	Mg	0.001	0.311	97.539	
1A2d	Solid	3.342	681.894	0.029	117.015	Mg	0.001	0.301	97.840	
2C7a		2.563	681.894	0.002	117.015	Mg	0.001	0.243	98.082	
1A4ci	Peat	0.132	681.894	0.425	117.015	Mg	0.001	0.223	98.305	
1A2e	Solid	2.627	681.894	0.055	117.015	Mg	0.001	0.219	98.524	
1A2gvii	Liquid	0.289	681.894	0.365	117.015	Mg	0.000	0.175	98.699	

1A2d	Biomass	10.754	681.894	1.567	117.015	Mg	0.000	0.154	98.854
2B10a		0.010	681.894	0.250	117.015	Mg	0.000	0.137	98.991
1A2c	Solid	1.219	681.894	0.005	117.015	Mg	0.000	0.113	99.104
1A4cii	Liquid	0.293	681.894	0.239	117.015	Mg	0.000	0.104	99.208
1A2d	Peat	0.999	681.894	0.010	117.015	Mg	0.000	0.089	99.298
1A2d	Other	0.016	681.894	0.163	117.015	Mg	0.000	0.089	99.386
1A2d	Liquid	0.110	681.894	0.165	117.015	Mg	0.000	0.081	99.468
1A2e	Peat	0.328	681.894	0.195	117.015	Mg	0.000	0.077	99.544
2G		0.116	681.894	0.127	117.015	Mg	0.000	0.059	99.604
1A4bi	Solid	0.555	681.894	0.003	117.015	Mg	0.000	0.051	99.655
1A4aii	Liquid	0.134	681.894	0.101	117.015	Mg	0.000	0.043	99.698
1A3dii	Liquid	0.117	681.894	0.077	117.015	Mg	0.000	0.031	99.729
1A2f	Liquid	0.327	681.894	0.003	117.015	Mg	0.000	0.030	99.759
1A4bii	Liquid	0.044	681.894	0.058	117.015	Mg	0.000	0.028	99.787
1A2e	Biomass	0.123	681.894	0.060	117.015	Mg	0.000	0.021	99.808
1A2f	Biomass	0.003	681.894	0.036	117.015	Mg	0.000	0.020	99.828
1A3bi	Gasoline	0.059	681.894	0.039	117.015	Mg	0.000	0.016	99.844
1A5a	Liquid	0.111	681.894	0.047	117.015	Mg	0.000	0.015	99.859
1A2e	Other	0.004	681.894	0.028	117.015	Mg	0.000	0.015	99.874
1A4ciii	Liquid	0.067	681.894	0.037	117.015	Mg	0.000	0.014	99.889
1A4ai	Peat	0.040	681.894	0.030	117.015	Mg	0.000	0.013	99.901
2C3		0.127	681.894	0.000	117.015	Mg	0.000	0.012	99.913
1A1a	Liquid	0.170	681.894	0.008	117.015	Mg	0.000	0.012	99.925
1A3biii	Diesel oil	0.018	681.894	0.024	117.015	Mg	0.000	0.012	99.937
1A3bi	Diesel oil	0.006	681.894	0.013	117.015	Mg	0.000	0.006	99.944
1A3c	Liquid	0.060	681.894	0.020	117.015	Mg	0.000	0.005	99.949
3F		0.024	681.894	0.014	117.015	Mg	0.000	0.005	99.954
1B1b		0.160	681.894	0.037	117.015	Mg	0.000	0.005	99.959
1A4bi	Peat	0.215	681.894	0.046	117.015	Mg	0.000	0.005	99.965
1A2a	Biomass		681.894	0.007	117.015	Mg	0.000	0.004	99.968
1A2gviii	Peat	0.005	681.894	0.007	117.015	Mg	0.000	0.004	99.972
1A4ci	Solid	0.072	681.894	0.006	117.015	Mg	0.000	0.003	99.975
1A2gviii	Liquid	0.055	681.894	0.004	117.015	Mg	0.000	0.003	99.978
1A4ai	Liquid	0.125	681.894	0.016	117.015	Mg	0.000	0.003	99.981
5C1bv		0.001	681.894	0.005	117.015	Mg	0.000	0.003	99.984
1A2c	Liquid	0.040	681.894	0.012	117.015	Mg	0.000	0.003	99.987
1A3bii	Diesel oil	0.005	681.894	0.005	117.015	Mg	0.000	0.003	99.989
1A4ci	Liquid	0.039	681.894	0.003	117.015	Mg	0.000	0.002	99.991
1A4bi	Liquid	0.022	681.894	0.000	117.015	Mg	0.000	0.002	99.993
1A2e	Liquid	0.040	681.894	0.004	117.015	Mg	0.000	0.002	99.995
1A2gvii	Gaseous	0.007	681.894	0.004	117.015	Mg	0.000	0.001	99.997
1A2c	Biomass	0.014	681.894	0.004	117.015	Mg	0.000	0.001	99.998
1A1b	Liquid	0.009	681.894	0.000	117.015	Mg	0.000	0.001	99.998
1A2a	Liquid	0.018	681.894	0.002	117.015	Mg	0.000	0.001	99.999
1A3biv	Gasoline	0.000	681.894	0.001	117.015	Mg	0.000	0.001	100
1A2b	Liquid	0.005	681.894	0.000	117.015	Mg	0.000	0.000	100
1A3bii	Gasoline	0.002	681.894	0.000	117.015	Mg	0.000	0.000	100
1A3biv	Diesel oil		681.894	0.000	117.015	Mg	0.000	0.000	100

PCDD/F

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
2C1		4.552	17.518	0.721	9.310	g I-Teq	0.097	18.044	18.044	Yes
1A1a	Biomass	0.122	17.518	1.526	9.310	g I-Teq	0.083	15.531	33.575	Yes
2B10a		3.000	17.518	0.630	9.310	g I-Teq	0.055	10.249	43.824	Yes
1A1a	Other	0.002	17.518	0.902	9.310	g I-Teq	0.051	9.576	53.400	Yes
1B1b		1.461	17.518	0.023	9.310	g I-Teq	0.043	8.007	61.407	Yes
5E		3.034	17.518	0.982	9.310	g I-Teq	0.036	6.699	68.107	Yes
1A4bi	Biomass	0.867	17.518	0.994	9.310	g I-Teq	0.030	5.671	73.778	Yes
1A5a	Biomass	0.007	17.518	0.346	9.310	g I-Teq	0.020	3.634	77.412	Yes
1A3bi	Gasoline	0.962	17.518	0.198	9.310	g I-Teq	0.018	3.335	80.747	Yes
1A3bi	Diesel oil	0.008	17.518	0.311	9.310	g I-Teq	0.018	3.265	84.011	
2C7a		0.001	17.518	0.237	9.310	g I-Teq	0.014	2.518	86.529	
1A2d	Other	0.009	17.518	0.210	9.310	g I-Teq	0.012	2.179	88.708	
1A3bii	Diesel oil	0.004	17.518	0.163	9.310	g I-Teq	0.009	1.713	90.421	
1A1a	Peat	0.747	17.518	0.536	9.310	g I-Teq	0.008	1.481	91.901	
1A1a	Solid	0.411	17.518	0.096	9.310	g I-Teq	0.007	1.298	93.200	
1A2gviii	Other	0.192	17.518	0.016	9.310	g I-Teq	0.005	0.915	94.115	
1A4ci	Biomass	0.137	17.518	0.156	9.310	g I-Teq	0.005	0.883	94.998	
1A2gviii	Biomass	0.199	17.518	0.178	9.310	g I-Teq	0.004	0.766	95.764	
2C6		0.038	17.518	0.065	9.310	g I-Teq	0.003	0.474	96.238	
1A3biii	Diesel oil	0.217	17.518	0.075	9.310	g I-Teq	0.002	0.431	96.669	
1A2d	Liquid	0.006	17.518	0.043	9.310	g I-Teq	0.002	0.427	97.096	
1A4ai	Biomass	0.041	17.518	0.060	9.310	g I-Teq	0.002	0.412	97.508	
1A2d	Solid	0.045	17.518	0.002	9.310	g I-Teq	0.001	0.232	97.740	
1A2d	Gaseous	0.016	17.518	0.027	9.310	g I-Teq	0.001	0.200	97.940	
1A4ci	Peat	0.007	17.518	0.023	9.310	g I-Teq	0.001	0.200	98.140	
1A1b	Gaseous	0.012	17.518	0.023	9.310	g I-Teq	0.001	0.178	98.318	
1A2d	Biomass	0.808	17.518	0.442	9.310	g I-Teq	0.001	0.138	98.457	
1A3bii	Gasoline	0.024	17.518	0.001	9.310	g I-Teq	0.001	0.127	98.584	
1A2gviii	Gaseous	0.001	17.518	0.011	9.310	g I-Teq	0.001	0.112	98.696	
1A1b	Solid	0.011	17.518	0.015	9.310	g I-Teq	0.001	0.099	98.795	
1A3biv	Gasoline	0.014	17.518	0.016	9.310	g I-Teq	0.001	0.094	98.889	
1A2f	Solid	0.024	17.518	0.005	9.310	g I-Teq	0.000	0.085	98.974	
1A2gviii	Peat	0.004	17.518	0.009	9.310	g I-Teq	0.000	0.072	99.046	
1A2c	Solid	0.013	17.518	0.000	9.310	g I-Teq	0.000	0.071	99.118	
2L		0.029	17.518	0.022	9.310	g I-Teq	0.000	0.069	99.187	
1A2c	Biomass	0.012	17.518	0.000	9.310	g I-Teq	0.000	0.066	99.253	
1A1a	Gaseous	0.020	17.518	0.016	9.310	g I-Teq	0.000	0.061	99.314	
1A4bi	Liquid	0.019	17.518	0.005	9.310	g I-Teq	0.000	0.059	99.374	
2A2		0.038	17.518	0.026	9.310	g I-Teq	0.000	0.056	99.430	
2A1		0.029	17.518	0.020	9.310	g I-Teq	0.000	0.046	99.476	
1A2c	Gaseous	0.004	17.518	0.007	9.310	g I-Teq	0.000	0.044	99.520	
1A2f	Other		17.518	0.004	9.310	g I-Teq	0.000	0.039	99.559	
1A4bi	Peat	0.011	17.518	0.002	9.310	g I-Teq	0.000	0.038	99.598	
1A3dii	Liquid	0.026	17.518	0.010	9.310	g I-Teq	0.000	0.035	99.633	
1A3biv	Diesel oil		17.518	0.003	9.310	g I-Teq	0.000	0.032	99.665	
1A2a	Gaseous	0.008	17.518	0.007	9.310	g I-Teq	0.000	0.029	99.693	
2D3b		0.016	17.518	0.011	9.310	g I-Teq	0.000	0.028	99.721	
2A3		0.005	17.518	0.000	9.310	g I-Teq	0.000	0.027	99.749	

1A1a	Liquid	0.007	17.518	0.001	9.310	g I-Teq	0.000	0.027	99.776
1A2f	Biomass	0.000	17.518	0.003	9.310	g I-Teq	0.000	0.027	99.802
1A5a	Gaseous	0.002	17.518	0.004	9.310	g I-Teq	0.000	0.024	99.826
1A2e	Solid	0.007	17.518	0.002	9.310	g I-Teq	0.000	0.023	99.849
1A4ai	Liquid	0.012	17.518	0.005	9.310	g I-Teq	0.000	0.021	99.87
1A2e	Peat	0.028	17.518	0.013	9.310	g I-Teq	0.000	0.019	99.889
1A2e	Biomass	0.007	17.518	0.005	9.310	g I-Teq	0.000	0.018	99.907
1A2f	Gaseous	0.001	17.518	0.002	9.310	g I-Teq	0.000	0.009	99.916
1A2e	Other	0.000	17.518	0.001	9.310	g I-Teq	0.000	0.008	99.924
5C1bv		0.000	17.518	0.001	9.310	g I-Teq	0.000	0.008	99.933
1A2gviii	Liquid	0.003	17.518	0.001	9.310	g I-Teq	0.000	0.008	99.941
1A4bi	Solid	0.001	17.518	0.000	9.310	g I-Teq	0.000	0.008	99.949
1A1b	Liquid	0.001	17.518	0.001	9.310	g I-Teq	0.000	0.007	99.956
1A2e	Liquid	0.002	17.518	0.000	9.310	g I-Teq	0.000	0.006	99.962
1A2f	Liquid	0.001	17.518	0.001	9.310	g I-Teq	0.000	0.005	99.967
1A4ai	Peat	0.002	17.518	0.002	9.310	g I-Teq	0.000	0.005	99.972
1A2c	Liquid	0.002	17.518	0.000	9.310	g I-Teq	0.000	0.005	99.977
1A4bi	Gaseous	0.000	17.518	0.001	9.310	g I-Teq	0.000	0.004	99.980
1A2a	Liquid	0.001	17.518	0.000	9.310	g I-Teq	0.000	0.003	99.984
1A4ai	Gaseous	0.000	17.518	0.000	9.310	g I-Teq	0.000	0.003	99.987
1A4ciii	Liquid	0.007	17.518	0.004	9.310	g I-Teq	0.000	0.002	99.989
1A2b	Solid	0.002	17.518	0.001	9.310	g I-Teq	0.000	0.002	99.992
1A2a	Biomass		17.518	0.000	9.310	g I-Teq	0.000	0.002	99.994
1A4ci	Gaseous	0.000	17.518	0.000	9.310	g I-Teq	0.000	0.001	99.995
1A2d	Peat	0.149	17.518	0.079	9.310	g I-Teq	0.000	0.001	99.996
2G		0.001	17.518	0.000	9.310	g I-Teq	0.000	0.001	99.997
1A5a	Liquid	0.008	17.518	0.004	9.310	g I-Teq	0.000	0.001	99.998
1A2b	Gaseous	0.000	17.518	0.000	9.310	g I-Teq	0.000	0.001	99.999
2C3		0.000	17.518	0.000	9.310	g I-Teq	0.000	0.001	99.999
1A2b	Liquid	0.000	17.518	0.000	9.310	g I-Teq	0.000	0.000	100
1A2e	Gaseous	0.000	17.518	0.000	9.310	g I-Teq	0.000	0.000	100
1A4bi	Other	0.000	17.518	0.000	9.310	g I-Teq	0.000	0.000	100
1A4ci	Liquid	0.004	17.518	0.002	9.310	g I-Teq	0.000	0.000	100
1A4ci	Solid	0.001	17.518	0.000	9.310	g I-Teq	0.000	0.000	100
1A3ei	Gaseous	0.000	17.518	0.000	9.310	g I-Teq	0.000	0.000	100

PAH-4

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
1A4bi	Biomass	17.153	18.423	16.56	18.239	Mg	0.023	25.251	25.251	Yes
1A1a	Other	0.000	18.423	0.240	18.239	Mg	0.013	14.414	39.666	Yes
1A1a	Biomass	0.015	18.423	0.208	18.239	Mg	0.010	11.572	51.238	Yes
1B1b		0.258	18.423	0.404	18.239	Mg	0.008	8.890	60.128	Yes
2C1		0.132	18.423	0.009	18.239	Mg	0.007	7.297	67.424	Yes
1A2gviii	Other	0.017	18.423	0.120	18.239	Mg	0.006	6.216	73.640	Yes
1A4bi	Liquid	0.109	18.423	0.026	18.239	Mg	0.004	4.892	78.532	Yes
1A4ai	Liquid	0.074	18.423	0.026	18.239	Mg	0.003	2.818	81.350	Yes
1A5a	Biomass	0.001	18.423	0.044	18.239	Mg	0.002	2.612	83.961	
1A1a	Liquid	0.05	18.423	0.012	18.239	Mg	0.002	2.276	86.237	
1A3bi	Diesel oil	0.025	18.423	0.054	18.239	Mg	0.002	1.756	87.994	

1A3biii	Diesel oil	0.077	18.423	0.105	18.239	Mg	0.002	1.711	89.704
1A5a	Liquid	0.045	18.423	0.020	18.239	Mg	0.001	1.465	91.169
1A2d	Biomass	0.103	18.423	0.120	18.239	Mg	0.001	1.086	92.255
1A3bi	Gasoline	0.047	18.423	0.031	18.239	Mg	0.001	0.929	93.184
1A4ci	Liquid	0.025	18.423	0.012	18.239	Mg	0.001	0.737	93.921
1A2d	Other	0.001	18.423	0.012	18.239	Mg	0.001	0.695	94.616
1A2gviii	Liquid	0.016	18.423	0.004	18.239	Mg	0.001	0.695	95.311
1A1a	Peat	0.043	18.423	0.033	18.239	Mg	0.000	0.533	95.844
1A2e	Liquid	0.010	18.423	0.002	18.239	Mg	0.000	0.518	96.361
2D3i		0.020	18.423	0.011	18.239	Mg	0.000	0.506	96.867
1A2gvii	Liquid	0.023	18.423	0.029	18.239	Mg	0.000	0.380	97.247
1A2c	Liquid	0.010	18.423	0.003	18.239	Mg	0.000	0.369	97.616
1A2a	Liquid	0.005	18.423	0.001	18.239	Mg	0.000	0.248	97.864
1A4cii	Liquid	0.023	18.423	0.019	18.239	Mg	0.000	0.248	98.111
1A3c	Liquid	0.005	18.423	0.002	18.239	Mg	0.000	0.190	98.301
1A2d	Peat	0.009	18.423	0.006	18.239	Mg	0.000	0.157	98.459
1A3bii	Diesel oil	0.015	18.423	0.017	18.239	Mg	0.000	0.150	98.609
1A4aii	Liquid	0.011	18.423	0.008	18.239	Mg	0.000	0.148	98.757
1A2f	Other		18.423	0.002	18.239	Mg	0.000	0.120	98.877
1A2gviii	Biomass	0.026	18.423	0.024	18.239	Mg	0.000	0.100	98.977
1A2f	Liquid	0.008	18.423	0.007	18.239	Mg	0.000	0.094	99.071
1A2c	Biomass	0.002	18.423	0.000	18.239	Mg	0.000	0.090	99.161
1A3bii	Gasoline	0.001	18.423	0.000	18.239	Mg	0.000	0.074	99.235
1A4bii	Liquid	0.004	18.423	0.005	18.239	Mg	0.000	0.068	99.303
1A2d	Liquid	0.039	18.423	0.04	18.239	Mg	0.000	0.063	99.366
1A1a	Solid	0.001	18.423	0.000	18.239	Mg	0.000	0.060	99.426
1A2b	Liquid	0.003	18.423	0.002	18.239	Mg	0.000	0.056	99.482
1A4ci	Peat	0.000	18.423	0.001	18.239	Mg	0.000	0.054	99.535
2G		0.001	18.423	0.001	18.239	Mg	0.000	0.053	99.588
5C1bv		0.000	18.423	0.001	18.239	Mg	0.000	0.052	99.640
1A2e	Peat	0.002	18.423	0.001	18.239	Mg	0.000	0.050	99.689
1A3biv	Gasoline	0.000	18.423	0.001	18.239	Mg	0.000	0.046	99.736
1A1b	Liquid	0.006	18.423	0.007	18.239	Mg	0.000	0.046	99.782
1A4ci	Biomass	0.003	18.423	0.004	18.239	Mg	0.000	0.032	99.814
1A4bi	Peat	0.001	18.423	0.000	18.239	Mg	0.000	0.030	99.844
1A2gviii	Peat	0.000	18.423	0.001	18.239	Mg	0.000	0.027	99.871
1A4ai	Biomass	0.001	18.423	0.001	18.239	Mg	0.000	0.025	99.897
1A2f	Biomass	0.000	18.423	0.000	18.239	Mg	0.000	0.019	99.916
1A2gvii	Gaseous	0.001	18.423	0.000	18.239	Mg	0.000	0.016	99.931
1A2e	Biomass	0.001	18.423	0.001	18.239	Mg	0.000	0.010	99.941
2A1		0.000	18.423	0.000	18.239	Mg	0.000	0.009	99.950
1A2d	Solid	0.000	18.423	0.000	18.239	Mg	0.000	0.008	99.958
1A4bi	Other	0.000	18.423	0.000	18.239	Mg	0.000	0.007	99.965
1A3biv	Diesel oil		18.423	0.000	18.239	Mg	0.000	0.007	99.971
2C2			18.423	0.000	18.239	Mg	0.000	0.006	99.977
1A2e	Other	0.000	18.423	0.000	18.239	Mg	0.000	0.006	99.983
3F		0.000	18.423	0.000	18.239	Mg	0.000	0.005	99.988
1A2f	Solid	0.000	18.423	0.000	18.239	Mg	0.000	0.002	99.990
1A2c	Solid	0.000	18.423	0.000	18.239	Mg	0.000	0.002	99.993
1A4ai	Peat	0.000	18.423	0.000	18.239	Mg	0.000	0.002	99.994
1A2a	Biomass		18.423	0.000	18.239	Mg	0.000	0.002	99.996

1A2b	Solid	0.000	18.423	0.000	18.239	Mg	0.000	0.001	99.997	
1A2a	Solid	0.000	18.423	0.000	18.239	Mg	0.000	0.001	99.998	
1A2e	Solid	0.000	18.423	0.000	18.239	Mg	0.000	0.001	99.999	
1A1b	Solid	0.000	18.423	0.000	18.239	Mg	0.000	0.001	100	
1A4bi	Solid	0.000	18.423	0.000	18.239	Mg	0.000	0.000	100	
1A4ci	Solid	0.000	18.423	0.000	18.239	Mg	0.000	0.000	100	

HCB

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
2B10a		29.000	35.677	13.200	21.163	kg	0.112	48.794	48.794	Yes
2C7a		5.514	35.677	6.673	21.163	kg	0.095	41.476	90.270	Yes
1A1a	Biomass	0.037	35.677	0.424	21.163	kg	0.011	4.903	95.173	
1A4bi	Biomass	0.206	35.677	0.237	21.163	kg	0.003	1.394	96.567	
1A3biii	Diesel oil	0.059	35.677	0.081	21.163	kg	0.001	0.554	97.121	
2C1		0.096	35.677	0.016	21.163	kg	0.001	0.499	97.621	
1A3bi	Diesel oil	0.020	35.677	0.042	21.163	kg	0.001	0.374	97.995	
3Df		0.057	35.677	0.010	21.163	kg	0.001	0.292	98.287	
1A4ci	Biomass	0.033	35.677	0.037	21.163	kg	0.000	0.215	98.502	
1A5a	Biomass		35.677	0.016	21.163	kg	0.000	0.201	98.703	
1A2gviii		0.143	35.677	0.099	21.163	kg	0.000	0.173	98.876	
2C3		0.033	35.677	0.033	21.163	kg	0.000	0.170	99.046	
1A2gviii	Biomass	0.049	35.677	0.042	21.163	kg	0.000	0.162	99.208	
1A2d	Biomass	0.191	35.677	0.125	21.163	kg	0.000	0.135	99.343	
1A3bii	Diesel oil	0.015	35.677	0.018	21.163	kg	0.000	0.106	99.449	
1A4ai	Biomass	0.010	35.677	0.014	21.163	kg	0.000	0.106	99.555	
1A3bi	Gasoline	0.108	35.677	0.071	21.163	kg	0.000	0.088	99.643	
5C1bv		0.001	35.677	0.005	21.163	kg	0.000	0.053	99.696	
1A4bi	Solid	0.007	35.677	0.000	21.163	kg	0.000	0.052	99.748	
1A2d	Solid	0.007	35.677	0.000	21.163	kg	0.000	0.047	99.794	
1A3bii	Gasoline	0.004	35.677	0.000	21.163	kg	0.000	0.025	99.820	
1A3biv	Gasoline	0.001	35.677	0.002	21.163	kg	0.000	0.020	99.840	
1A2c	Biomass	0.003	35.677	0.000	21.163	kg	0.000	0.020	99.860	
1A4ci	Solid		35.677	0.001	21.163	kg	0.000	0.018	99.878	
1A2f	Solid	0.004	35.677	0.001	21.163	kg	0.000	0.017	99.895	
2D3i		0.004	35.677	0.001	21.163	kg	0.000	0.017	99.912	
1A2a	Solid	0.003	35.677	0.000	21.163	kg	0.000	0.015	99.928	
1A2c	Solid	0.002	35.677	0.000	21.163	kg	0.000	0.014	99.942	
1A2b	Solid	0.002	35.677	0.000	21.163	kg	0.000	0.013	99.955	
1A3bi	Gaseous		35.677	0.001	21.163	kg	0.000	0.010	99.965	
1A2f	Biomass	0.000	35.677	0.001	21.163	kg	0.000	0.007	99.972	
1A3dii	Liquid	0.010	35.677	0.005	21.163	kg	0.000	0.006	99.979	
1A2e	Solid	0.001	35.677	0.000	21.163	kg	0.000	0.005	99.984	
1A5a	Liquid	0.001	35.677	0.001	21.163	kg	0.000	0.004	99.988	
1A2e	Biomass	0.002	35.677	0.001	21.163	kg	0.000	0.004	99.992	
1A1a	Solid	0.001	35.677	0.000	21.163	kg	0.000	0.002	99.994	
1A3biii	Gaseous		35.677	0.000	21.163	kg	0.000	0.002	99.996	
1A4ciii	Liquid	0.004	35.677	0.002	21.163	kg	0.000	0.002	99.998	
1A3biv	Diesel oil		35.677	0.000	21.163	kg	0.000	0.001	99.999	
1A3bii	Gaseous		35.677	0.000	21.163	kg	0.000	0.001	99.999	

1A2a	Biomass		35.677	0.000	21.163	kg	0.000	0.001	100	

PCB

NFR Code	Fuel	Base year emission of the NFR category	Base year total emission	Year 2020 emission of the NFR category	Year 2020 total emission	Unit	Trend assessment	Contribution to trend, %	Cumulative total, %	Key source
1B1b		1.753	28.558	2.742	20.176	kg	0.053	20.040	20.040	Yes
1A2d	Solid	1.907	28.558	0.085	20.176	kg	0.044	16.819	36.859	Yes
1A4bi	Biomass	2.477	28.558	2.841	20.176	kg	0.038	14.540	51.399	Yes
2C1		13.464	28.558	10.120	20.176	kg	0.021	8.095	59.494	Yes
2A1		3.298	28.558	2.878	20.176	kg	0.019	7.302	66.796	Yes
1A2f	Solid	1.037	28.558	0.230	20.176	kg	0.018	6.696	73.492	Yes
1A2a	Solid	0.784	28.558	0.118	20.176	kg	0.015	5.816	79.308	Yes
1A2c	Solid	0.538	28.558	0	20.176	kg	0.013	5.062	84.370	Yes
1A2b	Solid	0.551	28.558	0.034	20.176	kg	0.012	4.737	89.107	
1A1a	Biomass	0.026	28.558	0.297	20.176	kg	0.010	3.713	92.820	
1A4ci	Biomass	0.390	28.558	0.443	20.176	kg	0.006	2.236	95.056	
1A2e	Solid	0.298	28.558	0.066	20.176	kg	0.005	1.925	96.981	
1A4ai	Biomass	0.115	28.558	0.172	20.176	kg	0.003	1.219	98.200	
1A2gviii		0.135	28.558	0.026	20.176	kg	0.002	0.927	99.127	
2C3		0.083	28.558	0.087	20.176	kg	0.001	0.381	99.508	
5C1bv		0.003	28.558	0.014	20.176	kg	0.000	0.152	99.661	
1A3dii	Liquid	0.024	28.558	0.006	20.176	kg	0.000	0.152	99.813	
2C7c		0.002	28.558	0.012	20.176	kg	0.000	0.138	99.951	
1A4bi	Liquid	0.003	28.558	0.001	20.176	kg	0.000	0.020	99.971	
1A4ai	Liquid	0.002	28.558	0.001	20.176	kg	0.000	0.009	99.980	
1A4ciii	Liquid	0.002	28.558	0.001	20.176	kg	0.000	0.004	99.985	
1A4ci	Liquid	0.001	28.558	0.000	20.176	kg	0.000	0.004	99.989	
1A1a	Solid	0.000	28.558	0.000	20.176	kg	0.000	0.002	99.990	
1A2d	Biomass	0.002	28.558	0.001	20.176	kg	0.000	0.002	99.992	
1A3bi	Gasoline	0.000	28.558	0.000	20.176	kg	0.000	0.001	99.993	
2C7a		0.001	28.558	0.000	20.176	kg	0.000	0.001	99.995	
1A2gviii	Biomass	0.001	28.558	0.001	20.176	kg	0.000	0.001	99.996	
1A4ci	Peat	0.000	28.558	0.000	20.176	kg	0.000	0.001	99.997	
1A3bi	Diesel oil	0.000	28.558	0.000	20.176	kg	0.000	0.001	99.998	
1A4bi	Solid	0.000	28.558	0.000	20.176	kg	0.000	0.001	99.998	
1A3bii	Diesel oil	0.000	28.558	0.000	20.176	kg	0.000	0.000	99.999	
1A2c	Biomass	0.000	28.558	0.000	20.176	kg	0.000	0.000	99.999	
1A4bi	Peat	0.000	28.558	0.000	20.176	kg	0.000	0.000	99.999	
1A3bii	Gasoline	0.000	28.558	0.000	20.176	kg	0.000	0.000	99.999	
1A4ci	Solid		28.558	0.000	20.176	kg	0.000	0.000	100	
1A3biii	Diesel oil	0.000	28.558	0.000	20.176	kg	0.000	0.000	100	
1A2f	Biomass	0.000	28.558	0.000	20.176	kg	0.000	0.000	100	
1A3biv	Gasoline	0.000	28.558	0.000	20.176	kg	0.000	0.000	100	
2A2		0.000	28.558	0.000	20.176	kg	0.000	0.000	100	
1A2e	Biomass	0.000	28.558	0.000	20.176	kg	0.000	0.000	100	
1A4ai	Peat	0.000	28.558	0.000	20.176	kg	0.000	0.000	100	
1A3biv	Diesel oil		28.558	0.000	20.176	kg	0.000	0.000	100	
1A2a	Biomass		28.558	0.000	20.176	kg	0.000	0.000	100	