Informative Inventory Report Sweden 2026 - Annexes

Submitted under the Convention on Long-Range Transboundary Air Pollution

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1 Annex 1: Uncertainties and Key Sources

1.1 Methodology for analysis of Key Sources

The complete analysis of Sweden's key sources and uncertainties are presented in section 1.3. Key sources are reported together with theirs order of priority. Some important key sources according to level and trend are also discussed in sections 1.3 – 1.4 of the main report.

The key source analysis includes Approach 1 and the Approach 2 assessments of level and trend for the base year 1990 (2000 for BC) and the latest emission year 2024, according to the 2006 IPCC Guidelines. The Approach 1 method assesses the impacts of various source categories on the level and the trend of the national emission inventory. In the Approach 2, emission uncertainties are also considered in the identification and ranking of key sources. Key source analysis is here performed for the following pollutants: As, Cd, CO, Cr, Cu, dioxins/furans, Hg, NH_3, Ni, NMVOC, NO_X, PAH 1-4, Pb, $PM_{2.5}$, PM_{10}, Se, SO_2, TSP, Zn and BC.

1.1.1 Level assessment, Approach 1

For each source category and pollutant, the level assessment (LA) is calculated as:

$$L_{x,t} = E_{x,t} / E_t$$

Key sources include those source categories for each pollutant, that when summed together in descending order of magnitude, exceed 95 % of the total emission estimates in the inventory for each year.

1.1.2 Level assessment, Approach 2

In the Approach 2 analysis the uncertainty of the emissions is also taken into account.

$$LU_{x,t} = L_{x,t} \bullet U_{x,t}$$

The key sources are then those source categories that in descending rank order add up to 90 % of the cumulative sum of $LU_{x,t}$.

1.1.3 Trend assessment, Approach 1

The trend is calculated in accordance with the 2019 Refinement to the 2006 IPCC Guidelines) as:

$$T_{x,t} = \left| \frac{E_{x,t} - E_{x,0}}{\sum_i E_{i,t} - \sum_i E_{i,0}} \right|$$

$T_{x,t}$= trend assessment of source or sink category x in year t as compared to the base year (year 0)
$E_{x,t}$ and $E_{x,0}$ = value of emission or removal estimate of source or sink category x in year 0 and Year t.
$\sum E_{i,t}$ and $\sum E_{i,0}$ = total inventory estimates in years t and 0, respectively

For each pollutant, the percentage contribution to the overall trend (C%) is then calculated for each source as:

$$C\% = \frac{T_{x,t}}{\sum T_{x,t}}$$

Finally, the cumulative total of percentage contribution is calculated for each pollutant in the same way as for the level assessment. Key source categories are those that for each pollutant, when summed together in descending order of magnitude, add up to more than 95% of the contribution to trend.

1.1.4 Trend assessment, Approach 2

In the same way as for the level assessment, in the Approach 2 analysis the uncertainty is also considered.

$$TU_{x,t} = T_{x,t} \times U_{x,t}$$

The Approach 2 key sources for trend are then those that add up to 90 % of the cumulative value of $T_{x,t}/\sum T_{x,t}$.

1.2 Methodology for estimation of uncertainties

As a basis for the calculations the 95 % confidence intervals have been assessed for all subcategories and substances. This information is documented in Swedish in “Expert Protocols”, describing how and what sources was used to quantify the individual uncertainty ranges. National references on uncertainty estimates of emission factors are used when available (e.g. emission factors for stationary combustion, emission factors for navigation and fisheries). Most other uncertainty estimates for emission factors derive from expert judgments or information from the EMEP/EEA

Guidebook. Uncertainty estimates of activity data are mostly based on expert judgments. The data in the Expert Protocols are then used to calculate the 95 % confidence interval for the aggregated emissions reported in section 1.4. The calculations are made according to the 2006 IPCC guidelines. Lack of completeness, i.e. in this context entire source categories missing (NE), are not taken into consideration when quantifying uncertainties.

1.3 Key Sources and Uncertainty results

Table A1-1 to Table A1-A20 provide a detailed account for the key source and uncertainty analyses of the following substances: As, Cd, CO, Cr, Cu, dioxins/furans, Hg, NH_3, Ni, NMVOC, NO_X, PAH 1-4, Pb, $PM_{2.5}$, PM_{10}, Se, SO_2, TSP, Zn and BC. The tables include key source rankings for level and trend according to both Approach 1 and Approach 2. Estimates of total emissions and total uncertainty in base year and the latest year of the inventory are given at the bottom of the tables, both for the level and for the trend. Due to potential confidentiality reasons some emissions and uncertainty results may not be disclosed and are indicated as “C” in the tables.

Table A1-1. Summary of the key source and uncertainty analysis of As emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	As	0.01	0.05	1.5	299	299	6.51	791.5	0.063		5	8		3	4
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	As	0.01	0.00	1.2	59	59	0.00	-81.1	0.000						
1.A.1.a Public Electricity and Heat Production: Other Fuels	As	0.01	0.05	2.0	400	400	14.43	391.0	0.137		4	9	10	2	3
1.A.1.a Public Electricity and Heat Production: Peat	As	0.05	0.00	2.0	99	99	0.00	-96.8	0.000	7		7			
1.A.1.a Public Electricity and Heat Production: Solid Fuels	As	0.11	0.01	1.8	89	89	0.05	-86.7	0.000	4	9	4	5		6
1.A.1.a Public Electricity and Heat Production: Other Fuels	As	0.02	0.09	1.3	559	559	73.62	409.9	0.700		3	5	6	1	2
1.A.1.b Petroleum refining: Liquid Fuels	As	0.00	0.00	10.0	100	100	0.00	-72.1	0.000						
1.A.2.a Iron and Steel: Biomass	As	0.00	0.00					-100.0							
1.A.2.a Iron and Steel: Liquid Fuels	As	0.00	0.00	5.0	100	100	0.00	-91.0	0.000						
1.A.2.a Iron and Steel: Solid Fuels	As	0.00	0.00					-100.0							
1.A.2.b Non-ferrous metals: Liquid Fuels	As	0.00	0.00	5.0	100	100	0.00	-61.9	0.000						
1.A.2.b Non-ferrous metals: Solid Fuels	As	0.00	0.00					-100.0							

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.c Chemicals: Biomass	As	0.00	0.00	5.0	300	300	0.00	195.7	0.000						
1.A.2.c Chemicals: Liquid Fuels	As	0.00	0.00	5.0	100	100	0.00	-90.6	0.000						
1.A.2.c Chemicals: Other Fuels	As	0.00	0.00					-100.0							
1.A.2.c Chemicals: Solid Fuels	As	0.00	0.00	2.0	200	200	0.00	-98.2	0.000						
1.A.2.d Pulp, Paper and Print: Biomass	As	0.02	0.02	8.0	400	400	1.66	8.7	0.013		8		7	4	
1.A.2.d Pulp, Paper and Print: Liquid Fuels	As	0.02	0.00	5.0	100	100	0.01	-80.1	0.000						
1.A.2.d Pulp, Paper and Print: Other Fuels	As	0.00	0.00					-100.0							
1.A.2.d Pulp, Paper and Print: Solid Fuels	As	0.01	0.00					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	As	0.00	0.00	5.0	400	400	0.00	448.2	0.000						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	As	0.01	0.00	5.0	100	100	0.00	-97.7	0.000						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	As	0.00	0.00					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	As	0.00	0.00					-100.0							
1.A.2.f Non-metallic minerals: Biomass	As	0.00	0.00	4.7	216	217	0.00	2303.3	0.000						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.f Non-metallic minerals: Liquid Fuels	As	0.00	0.00	9.9	50	51	0.00	-53.4	0.000						
1.A.2.f Non-metallic minerals: Solid Fuels	As	0.03	0.01	9.0	45	46	0.00	-82.0	0.000		12				
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	As	0.00	0.00	3.6	72	72	0.00		0.000						
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	As	0.00	0.00	4.8	95	96	0.00	75.6	0.000						
1.A.2.g.vii Off-road vehicles and other machinery: Other Fossil Fuels	As	0.00	0.00	5.0	100	100	0.00		0.000						
1.A.2.g.viii Other: Biomass	As	0.01	0.01	4.4	133	133	0.02	-39.6	0.000		14				
1.A.2.g.viii Other: Liquid Fuels	As	0.02	0.00	3.9	24	24	0.00	-72.2	0.000		15				
1.A.2.g.viii Other: Solid Fuels	As	0.00	0.01	4.8	29	29	0.00	299.8	0.000		11				
1.A.3.b.i Road Transportation, Cars: Biomass	As	0.00	0.00	3.9	77	77	0.00		0.000						
1.A.3.b.i Road Transportation, Cars: Diesel oil	As	0.00	0.00	5.0	100	100	0.00	746.6	0.000						
1.A.3.b.i Road Transportation, Cars: Gasoline	As	0.00	0.00	3.0	100	100	0.00	-56.7	0.000						
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	As	0.00	0.00	3.2	65	65	0.00		0.000						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	As	0.00	0.00	5.0	100	100	0.00	908.5	0.000						

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1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	As	0.00	0.00	3.0	100	100	0.00	-88.3	0.000						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	As	0.00	0.00	2.6	52	52	0.00	8188.5	0.000						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	As	0.00	0.00	4.7	94	94	0.00	2.5	0.000						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	As	0.00	0.00	3.0	100	100	0.00	-87.1	0.000						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	As	0.00	0.00	4.7	95	95	0.00		0.000						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	As	0.00	0.00	3.0	100	100	0.00	108.8	0.000						
1.A.3.d Domestic Navigation: Biomass	As	0.00	0.00	5.0	100	100	0.00		0.000						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	As	0.00	0.00	3.6	72	72	0.00	51.0	0.000						
1.A.3.d Domestic Navigation: Gasoline	As	0.00	0.00	5.0	100	100	0.00		0.000						
1.A.3.d Domestic Navigation: Residual Oil	As	0.09	0.02	15.0	100	101	0.18	-72.4	0.001	6	6	6	3		
1.A.3.e Other Transportation: Biomass	As	0.00	0.00	3.7	75	75	0.00		0.000						
1.A.3.e Other Transportation: Other Fossil Fuels	As	0.00	0.00	5.0	100	100	0.00		0.000						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.e Other Transportation: Total	As	0.00	0.00	5.0	100	100	0.00	-35.9	0.000						
1.A.4.a Commercial/Institutional: Biomass	As	0.00	0.00	10.0	399	399	0.00	99.3	0.000						
1.A.4.a Commercial/Institutional: Gasoline	As	0.00	0.00	5.0	100	100	0.00	-6.0	0.000						
1.A.4.a Commercial/Institutional: Liquid Fuels	As	0.02	0.00	19.4	97	99	0.00	-98.8	0.000						
1.A.4.a Commercial/Institutional: Other Fossil Fuels	As	0.00	0.00	5.0	100	100	0.00		0.000						
1.A.4.b Residential: Biomass	As	0.02	0.01	10.0	400	400	0.86	-15.6	0.007		10		9	7	
1.A.4.b Residential: Liquid Fuels	As	0.04	0.00	19.4	97	99	0.00	-98.6	0.000						
1.A.4.b Residential: Other Fossil Fuels	As	0.00	0.00	5.0	100	100	0.00		0.000						
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	As	0.00	0.00	10.0	399	399	0.01	49.0	0.000						
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	As	0.00	0.00	30.0	100	104	0.00	-71.5	0.000						
1.A.4.c Agriculture/Forestry/Fisheries: Fossil part of biodiesel and bio-gasoline	As	0.00	0.00	3.5	71	71	0.00		0.000						
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	As	0.00	0.00	3.6	72	72	0.00	180.9	0.000						

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1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	As	0.00	0.00	19.1	96	98	0.00	-71.2	0.000						
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	As	0.01	0.00					-100.0							
2.A.3 Glass Production	As	0.11	0.00		100	100	0.00	-98.3	0.000	5		3	2		5
2.B.10 Other	As	0.00	0.00		100	100	0.00	4415.9	0.000						
2.C.1 Iron and Steel Production	As	0.21	0.02	3.1	31	31	0.01	-90.4	0.000	2	7	2	4		
2.C.3 Aluminium production	As	0.00	0.00	2.0	50	50	0.00	-95.5	0.000						
2.C.7 Other	As	4.71	0.14	4.0	50	50	1.56	-97.0	0.091	1	1	1	1	5	1
2.G.4 Other	As	0.00	0.00	12.0	691	691	0.06	-25.4	0.000						
2.H.1 Pulp and paper	As	0.13	0.11	6.9	50	50	0.98	-15.0	0.008	3	2		8	6	
2.H.3 Other (NFR 2A5a)	As	0.04	0.00					-100.0		8					
2.H.3 Other (NFR 2A6)	As	0.00	0.00		100	100	0.00	-70.0	0.000						
5.C.1 Waste Incineration	As	0.00	0.01	51.6	216	222	0.05	31.5	0.001		13				
5.E Other	As	0.00	0.00	50.0	68	84	0.00	-17.1	0.000						
Total		**5.73**	**0.59**			**96**	**100**	**-89.6**	**10.1**						

Table A1-2. Summary of the key source and uncertainty analysis of Cd emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	Cd	0.014	0.119	1.5	22	23	2.95	773.6	0.0135	10	1	3		2	5
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	Cd	0.006	0.001	1.2	59	59	0.00	-79.0	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	Cd	0.003	0.014	2.0	30	30	0.07	391.0	0.0003		9				
1.A.1.a Public Electricity and Heat Production: Peat	Cd	0.009	0.000	2.0	99	99	0.00	-99.9	0.0001						10
1.A.1.a Public Electricity and Heat Production: Solid Fuels	Cd	0.016	0.000	2.0	100	100	0.00	-99.2	0.0002	9			8		8
1.A.1.a Public Electricity and Heat Production: Other Fuels	Cd	0.004	0.022	1.3	62	62	0.75	409.9	0.0033		5	9		7	9
1.A.1.b Petroleum refining: Liquid Fuels	Cd	0.004	0.002	10.0	100	100	0.02	-42.6	0		12				
1.A.2.a Iron and Steel: Biomass	Cd	0.000	0.000					-100.0							
1.A.2.a Iron and Steel: Liquid Fuels	Cd	0.002	0.000	5.0	100	100	0.00	-90.7	0						
1.A.2.a Iron and Steel: Solid Fuels	Cd	0.000	0.000					-100.0							

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.b Non-ferrous metals: Liquid Fuels	Cd	0.000	0.000	5.0	100	100	0.00	-58.9	0						
1.A.2.b Non-ferrous metals: Solid Fuels	Cd	0.000	0.000					-100.0							
1.A.2.c Chemicals: Biomass	Cd	0.001	0.001	5.0	40	40	0.00	22.2	0						
1.A.2.c Chemicals: Liquid Fuels	Cd	0.001	0.000	5.0	100	100	0.00	-90.0	0						
1.A.2.c Chemicals: Other Fuels	Cd	0.000	0.000					-100.0							
1.A.2.c Chemicals: Solid Fuels	Cd	0.000	0.000	2.0	40	40	0.00	-98.8	0						
1.A.2.d Pulp, Paper and Print: Biomass	Cd	0.057	0.038	8.0	40	41	0.96	-33.7	0.0024	5	4	7	6	5	12
1.A.2.d Pulp, Paper and Print: Liquid Fuels	Cd	0.009	0.002	5.0	100	100	0.01	-79.2	0				11		
1.A.2.d Pulp, Paper and Print: Other Fuels	Cd	0.000	0.000					-100.0							
1.A.2.d Pulp, Paper and Print: Solid Fuels	Cd	0.001	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	Cd	0.000	0.002	5.0	40	40	0.00	479.1	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	Cd	0.003	0.000	5.0	100	100	0.00	-97.4	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	Cd	0.000	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	Cd	0.000	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	Cd	0.000	0.002	4.7	19	19	0.00	1381.8	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	Cd	0.002	0.001	9.9	49	50	0.00	-68.3	0						
1.A.2.f Non-metallic minerals: Solid Fuels	Cd	0.005	0.000	8.8	18	20	0.00	-92.9	0						
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	Cd	0.000	0.000	3.6	71	71	0.00		0						
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	Cd	0.000	0.000	4.7	94	94	0.00	73.9	0						
1.A.2.g.vii Off-road vehicles and other machinery: Other Fossil Fuels	Cd	0.000	0.000	5.0	100	100	0.00		0						
1.A.2.g.viii Other: Biomass	Cd	0.036	0.014	4.5	18	19	0.03	-60.8	0	6	8	6			
1.A.2.g.viii Other: Liquid Fuels	Cd	0.007	0.002	3.8	15	16	0.00	-72.1	0						
1.A.2.g.viii Other: Solid Fuels	Cd	0.000	0.002	4.9	20	20	0.00	338.5	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.i Road Transportation, Cars: Biomass	Cd	0.000	0.000	3.9	78	78	0.00		0						
1.A.3.b.i Road Transportation, Cars: Diesel oil	Cd	0.000	0.000	5.0	100	100	0.00	746.6	0						
1.A.3.b.i Road Transportation, Cars: Gasoline	Cd	0.001	0.000	3.0	100	100	0.00	-56.7	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	Cd	0.000	0.000	3.1	63	63	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	Cd	0.000	0.000	5.0	100	100	0.00	908.5	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	Cd	0.000	0.000	3.0	100	100	0.00	-88.3	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	Cd	0.000	0.000	2.6	51	51	0.00	6135.0	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	Cd	0.000	0.000	4.7	94	94	0.00	2.5	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	Cd	0.000	0.000	3.0	100	100	0.00	-87.1	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	Cd	0.000	0.000	4.7	95	95	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	Cd	0.000	0.000	3.0	100	100	0.00	108.8	0						
1.A.3.b.vi Road Transportation: Automobile tyre and brake wear	Cd	0.002	0.002		200	200	0.07	9.1	0.0002						
1.A.3.c Railways: Liquid Fuels	Cd	0.000	0.000	5.0	95	95	0.00	-63.7	0						
1.A.3.d Domestic Navigation: Biomass	Cd	0.000	0.000	5.0	100	100	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	Cd	0.000	0.000	3.5	71	71	0.00	50.9	0						
1.A.3.d Domestic Navigation: Gasoline	Cd	0.000	0.000	5.0	100	100	0.00		0						
1.A.3.d Domestic Navigation: Residual Oil	Cd	0.001	0.000	15.0	100	101	0.00	-72.4	0						
1.A.3.e Other Transportation: Biomass	Cd	0.000	0.000	3.7	75	75	0.00		0						
1.A.3.e Other Transportation: Other Fossil Fuels	Cd	0.000	0.000	5.0	100	100	0.00		0						
1.A.3.e Other Transportation: Total	Cd	0.000	0.000	5.0	100	100	0.00	-41.2	0						
1.A.4.a Commercial/Institutional: Biomass	Cd	0.002	0.004	10.0	150	150	0.17	98.7	0.0006		11			9	

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.a Commercial/Institutional: Gasoline	Cd	0.000	0.000	5.0	100	100	0.00	-6.0	0						
1.A.4.a Commercial/Institutional: Liquid Fuels	Cd	0.008	0.000	19.4	97	99	0.00	-98.6	0						11
1.A.4.a Commercial/Institutional: Other Fossil Fuels	Cd	0.000	0.000	5.0	100	100	0.00		0						
1.A.4.b Residential: Biomass	Cd	0.117	0.099	10.0	150	150	90.76	-15.6	0.2488	3	2	8	2	1	4
1.A.4.b Residential: Liquid Fuels	Cd	0.017	0.000	19.2	96	98	0.00	-98.5	0.0002	8		10	7		7
1.A.4.b Residential: Other Fossil Fuels	Cd	0.000	0.000	5.0	100	100	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	Cd	0.009	0.013	10.0	150	150	1.48	48.6	0.0053		10		9	3	
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	Cd	0.000	0.000	30.0	100	104	0.00	-71.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Fossil part of biodiesel and bio-gasoline	Cd	0.000	0.000	3.5	71	71	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	Cd	0.000	0.000	3.6	72	72	0.00	180.9	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	Cd	0.001	0.000	18.9	95	97	0.00	-69.6	0						
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	Cd	0.007	0.000					-100.0							

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.A.3 Glass Production	Cd	0.004	0.000		100	100	0.00	-95.3	0						
2.B.10 Other	Cd	0.000	0.000		100	100	0.00	875.0	0						
2.C.1 Iron and Steel Production	Cd	0.451	0.016	3.3	13	14	0.02	-96.4	0.0021	2	7	2	3		2
2.C.3 Aluminium production	Cd	0.000	0.000	2.0	100	100	0.00	-93.2	0						
2.C.7 Other	Cd	1.337	0.087	4.0	20	20	1.30	-93.5	0.0291	1	3	1	1	4	1
2.G.4 Other	Cd	0.002	0.002	13.0	726	726	0.85	-14.0	0.0023				10	6	
2.H.1 Pulp and paper	Cd	0.087	0.021	6.5	51	51	0.47	-76.2	0.0001	4	6	4	4	8	3
2.H.3 Other (NFR 2A5a)	Cd	0.003	0.000					-100.0							
2.H.3 Other (NFR 2A6)	Cd	0.023	0.000		93	93	0.00	-99.4	0.0004	7		5	5		6
5.C.1 Waste Incineration	Cd	0.001	0.002	39.9	225	228	0.08	55.7	0.0003						
5.E Other	Cd	0.001	0.001	50.0	67	84	0.00	-16.8	0						
Total		**2.253**	**0.470**			**33**	**100**	**-79.1**	**5.563**						

Table A1-3. Summary of the key source and uncertainty analysis of CO emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	CO	0.409	3.445	1.5	55.6	55.6	0.13	743.1	0.0003		13			11	
1.A.1.a Public Electricity and Heat Production: Gaseous Fuels	CO	0.086	0.031	1.8	26.3	26.4	0.00	-63.6	0						
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	CO	0.355	0.072	1.2	24.6	24.6	0.00	-79.7	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	CO	0.110	0.541	2.0	75.0	75.0	0.01	391.0	0						
1.A.1.a Public Electricity and Heat Production: Peat	CO	1.640	0.026	2.0	29.6	29.6	0.00	-98.4	0						
1.A.1.a Public Electricity and Heat Production: Solid Fuels	CO	0.318	0.049	1.8	26.9	26.9	0.00	-84.7	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	CO	0.196	0.876	1.3	24.6	24.6	0.00	346.6	0						
1.A.1.b Petroleum refining: Biomass	CO	0.000	0.002		30.0	30.0	0.00		0						
1.A.1.b Petroleum refining: Gaseous Fuels	CO	0.004	0.078	2.0	30.0	30.1	0.00	1967.7	0						
1.A.1.b Petroleum refining: Liquid Fuels	CO	0.430	0.385	10.0	40.0	41.2	0.00	-10.4	0						
1.A.1.c Manufacture of Solid fuels and Other Energy Industries: Solid Fuels	CO	0.044	0.042	5.0	30.0	30.4	0.00	-4.2	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.a Iron and Steel: Biomass	CO	0.000	0.008	5.0	75.0	75.2	0.00	6458.4	0						
1.A.2.a Iron and Steel: Gaseous Fuels	CO	0.005	0.023	5.0	30.0	30.4	0.00	420.0	0						
1.A.2.a Iron and Steel: Liquid Fuels	CO	0.202	0.127	5.0	35.0	35.4	0.00	-37.0	0						
1.A.2.a Iron and Steel: Solid Fuels	CO	0.040	0.024	2.0	20.0	20.1	0.00	-41.2	0						
1.A.2.b Non-ferrous metals: Gaseous Fuels	CO	0.002	0.004	5.0	30.0	30.4	0.00	136.2	0						
1.A.2.b Non-ferrous metals: Liquid Fuels	CO	0.027	0.019	5.0	30.0	30.4	0.00	-29.9	0						
1.A.2.b Non-ferrous metals: Solid Fuels	CO	0.002	0.000					-100.0							
1.A.2.c Chemicals: Biomass	CO	0.017	0.047	5.0	50.0	50.2	0.00	169.7	0						
1.A.2.c Chemicals: Gaseous Fuels	CO	0.027	0.021	5.0	30.0	30.4	0.00	-25.0	0						
1.A.2.c Chemicals: Liquid Fuels	CO	0.106	0.087	5.0	40.0	40.3	0.00	-17.7	0						
1.A.2.c Chemicals: Other Fuels	CO	0.002	0.015	10.0	50.0	51.0	0.00	899.6	0						
1.A.2.c Chemicals: Solid Fuels	CO	0.009	0.002	2.0	30.0	30.1	0.00	-83.4	0						
1.A.2.d Pulp, Paper and Print: Biomass	CO	1.229	1.304	8.0	75.0	75.4	0.03	6.1	0.0001		20				
1.A.2.d Pulp, Paper and Print: Gaseous Fuels	CO	0.012	0.006	5.0	30.0	30.4	0.00	-51.0	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.d Pulp, Paper and Print: Liquid Fuels	CO	0.563	0.108	5.0	30.0	30.4	0.00	-80.8	0						
1.A.2.d Pulp, Paper and Print: Other Fuels	CO	0.019	0.004	10.0	50.0	51.0	0.00	-81.4	0						
1.A.2.d Pulp, Paper and Print: Solid Fuels	CO	0.030	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	CO	0.007	0.059	5.0	75.0	75.2	0.00	756.3	0						
1.A.2.e Food Processing, Beverages and Tobacco: Gaseous Fuels	CO	0.045	0.041	5.0	30.0	30.4	0.00	-8.3	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	CO	0.177	0.012	5.0	40.0	40.3	0.00	-93.0	0						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	CO	0.002	0.000	10.0	50.0	51.0	0.00	-87.4	0						
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	CO	0.008	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	CO	0.003	0.046	4.5	35.7	35.9	0.00	1725.3	0						
1.A.2.f Non-metallic minerals: Gaseous Fuels	CO	0.012	0.018	4.1	12.8	13.4	0.00	58.1	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	CO	0.169	0.069	8.3	16.7	18.7	0.00	-59.0	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.f Non-metallic minerals: Other Fuels	CO	0.000	0.039	10.0	30.0	31.6	0.00		0						
1.A.2.f Non-metallic minerals: Solid Fuels	CO	0.108	0.034	9.0	18.0	20.1	0.00	-68.3	0						
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	CO	0.000	1.017	3.0	11.9	12.2	0.00		0						
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	CO	9.649	10.752	2.7	14.5	14.7	0.09	11.4	0.0001	9	7			12	
1.A.2.g.viii Other: Biomass	CO	0.718	0.483	4.0	24.0	24.3	0.00	-32.7	0						
1.A.2.g.viii Other: Gaseous Fuels	CO	0.021	0.010	2.6	5.1	5.7	0.00	-52.2	0						
1.A.2.g.viii Other: Liquid Fuels	CO	0.750	0.150	3.1	6.2	6.9	0.00	-80.1	0						
1.A.2.g.viii Other: Other Fuels	CO	0.000	0.002	5.0	20.0	20.6	0.00		0						
1.A.2.g.viii Other: Solid Fuels	CO	0.009	0.147	4.9	19.7	20.3	0.00	1454.4	0						
1.A.3.a Domestic Aviation: Aviation Gasoline	CO	0.019	0.001	10.0	10.0	14.1	0.00	-93.3	0						
1.A.3.a Domestic Aviation: Biomass	CO	0.000	0.007	10.0	10.0	14.1	0.00		0						
1.A.3.a Domestic Aviation: Jet Kerosene	CO	0.810	0.171	10.0	10.0	14.1	0.00	-78.8	0						
1.A.3.b.i Road Transportation, Cars: Biomass	CO	0.000	5.945	4.4	43.7	43.9	0.25		0.0006		10	7		9	
1.A.3.b.i Road Transportation, Cars: Diesel oil	CO	2.864	2.505	5.0	49.8	50.0	0.06	-12.5	0.0001		17				

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.i Road Transportation, Cars: Gasoline	CO	694.36	38.68	3.0	49.9	50.0	13.48	-94.4	0.3282	1	2	1	1	2	1
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	CO	0.000	0.783	3.3	36.2	36.3	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	CO	0.864	1.135	5.0	50.0	50.2	0.01	31.4	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gaseous Fuels	CO	0.000	0.016	5.0	50.0	50.2	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	CO	80.373	3.054	3.0	50.0	50.1	0.08	-96.2	0.0054	3	14	2	3	13	3
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	CO	0.006	1.109	2.4	26.9	27.0	0.00	18324.8	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	CO	15.626	2.724	4.3	42.8	43.0	0.05	-82.6	0	6	16	5			
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	CO	0.172	0.022	3.0	49.6	49.7	0.00	-87.2	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: LNG	CO	0.000	0.061	5.0	30.0	30.4	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	CO	0.000	0.220	4.6	46.0	46.2	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	CO	5.293	2.994	3.0	50.0	50.1	0.08	-43.4	0.0001		15			14	
1.A.3.c Railways: Liquid Fuels	CO	0.539	0.191	5.0	75.0	75.2	0.00	-64.7	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.d Domestic Navigation: Biomass	CO	0.000	0.046	5.0	20.0	20.6	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	CO	13.342	15.85	4.8	19.2	19.7	0.35	18.8	0.0006	7	5			8	
1.A.3.d Domestic Navigation: Gasoline	CO	0.000	0.051	5.0	20.0	20.6	0.00		0						
1.A.3.d Domestic Navigation: LNG	CO	0.000	0.312	10.0	30.0	31.6	0.00		0						
1.A.3.d Domestic Navigation: Residual Oil	CO	0.228	0.216	15.0	20.0	25.0	0.00	-5.1	0						
1.A.3.e Other Transportation: Biomass	CO	0.000	0.029	3.8	38.2	38.4	0.00		0						
1.A.3.e Other Transportation: Gaseous fuels	CO	0.001	0.001	5.0	30.0	30.4	0.00	-1.5	0						
1.A.3.e Other Transportation: Total	CO	6.806	0.663	5.0	50.0	50.2	0.00	-90.3	0			6			
1.A.4.a Commercial/Institutional: Biomass	CO	2.298	1.991	4.1	37.9	38.1	0.02	-13.3	0		19				
1.A.4.a Commercial/Institutional: Gaseous Fuels	CO	0.038	0.065	10.0	30.0	31.6	0.00	70.6	0						
1.A.4.a Commercial/Institutional: Gasoline	CO	24.484	19.34	5.0	20.0	20.6	0.57	-21.0	0.0008	5	4			5	
1.A.4.a Commercial/Institutional: Liquid Fuels	CO	2.724	0.570	4.9	19.1	19.7	0.00	-79.1	0						
1.A.4.b Residential: Biomass	CO	136.66	63.56	9.7	72.4	73.1	77.88	-53.5	0.0489	2	1	3	2	1	2

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1.A.4.b Residential: Gaseous Fuels	CO	0.038	0.021	10.0	30.0	31.6	0.00	-45.1	0						
1.A.4.b Residential: Liquid Fuels	CO	44.238	29.71	3.3	13.0	13.4	0.57	-32.8	0.0007	4	3	4	4	6	
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	CO	8.303	5.292	8.3	62.0	62.5	0.40	-36.3	0.0004	10	11			7	
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	CO	0.319	0.091	30.0	20.0	36.1	0.00	-71.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Gaseous Fuels	CO	0.015	0.001	10.0	30.0	31.6	0.00	-92.6	0						
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	CO	2.164	4.367	3.5	14.2	14.6	0.01	101.8	0		12				
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	CO	7.250	7.298	2.5	16.5	16.7	0.05	0.7	0.0001		9				
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	CO	0.086	0.000					-100.0							
1.B.1.b Charcoal production	CO	0.660	0.440	70.0	53.0	87.8	0.01	-33.3	0						
1.B.1.c Fugitive emissions from Solid Fuels	CO	0.001	0.003	50.0	30.0	58.3	0.00	146.0	0						
1.B.2.c Venting and flaring	CO	0.000	0.000	50.0	40.0	64.0	0.00	39.4	0						
1.D International Aviation: Biomass	CO	0.000	0.026	10.0	10.0	14.1	0.00		0						
1.D International Aviation: Jet Kerosene	CO	0.657	0.685	10.0	10.0	14.1	0.00	4.2	0						

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2.B.10 Other	CO	0.246	0.170		63.9	63.9	0.00	-31.0	0						
2.C.1 Iron and Steel Production	CO	2.356	2.156	4.8	95.9	96.0	0.15	-8.5	0.0002		18			10	
2.C.3 Aluminium production	CO	6.852	9.652	2.0	100.0	100.0	3.36	40.9	0.0054		8			3	
2.D.3 Other	CO	0.001	C	10.0	216.0	216.2	0.00	C	C						
2.G.4 Other	CO	0.474	C	14.3	3.8	14.8	0.00	C	C						
2.H.1 Pulp and paper	CO	11.960	15.606	6.6	50.3	50.8	2.27	30.5	0.0036	8	6			4	
5.B.1 Composting	CO	0.011	0.136		92.2	92.2	0.00	1110.8	0						
5.C.1 Waste Incineration	CO	0.517	0.587	71.1	190.3	203.2	0.05	13.5	0.0001						
Total		1091.2	259.0			20	100	-76.3	6.2907						

Table A1-4. Summary of the key source and uncertainty analysis of Cr emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	Cr	0.044	0.363	1.5	30.0	30.0	0.55	733.7	0.0022		3	3		5	
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	Cr	0.007	0.002	1.2	60.5	60.6	0.00	-72.7	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	Cr	0.014	0.068	2.0	40.0	40.1	0.03	391.0	0.0001		7				
1.A.1.a Public Electricity and Heat Production: Peat	Cr	0.055	0.005	2.0	39.4	39.5	0.00	-90.4	0						
1.A.1.a Public Electricity and Heat Production: Solid Fuels	Cr	0.252	0.003	2.0	50.0	50.0	0.00	-99.0	0.0001	3		4			
1.A.1.a Public Electricity and Heat Production: Other Fuels	Cr	0.022	0.109	1.3	61.9	61.9	0.21	409.9	0.0008		5			6	
1.A.1.b Petroleum refining: Liquid Fuels	Cr	0.014	0.030	10.0	100.0	100.5	0.04	122.6	0.0002		11			9	
1.A.2.a Iron and Steel: Biomass	Cr	0.000	0.000					-100.0							
1.A.2.a Iron and Steel: Liquid Fuels	Cr	0.003	0.000	5.0	100.0	100.1	0.00	-89.5	0						
1.A.2.a Iron and Steel: Solid Fuels	Cr	0.001	0.000					-100.0							
1.A.2.b Non-ferrous metals: Liquid Fuels	Cr	0.000	0.000	5.0	100.0	100.1	0.00	-50.5	0						
1.A.2.b Non-ferrous metals: Solid Fuels	Cr	0.000	0.000					-100.0							
1.A.2.c Chemicals: Biomass	Cr	0.002	0.003	5.0	40.0	40.3	0.00	75.7	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.c Chemicals: Liquid Fuels	Cr	0.001	0.000	5.0	100.0	100.1	0.00	-88.4	0						
1.A.2.c Chemicals: Other Fuels	Cr	0.000	0.000					-100.0							
1.A.2.c Chemicals: Solid Fuels	Cr	0.009	0.000	2.0	50.0	50.0	0.00	-98.8	0						
1.A.2.d Pulp, Paper and Print: Biomass	Cr	0.121	0.113	8.0	40.0	40.8	0.10	-6.1	0.0003		4			7	
1.A.2.d Pulp, Paper and Print: Liquid Fuels	Cr	0.012	0.002	5.0	100.0	100.1	0.00	-80.2	0						
1.A.2.d Pulp, Paper and Print: Other Fuels	Cr	0.000	0.000					-100.0							
1.A.2.d Pulp, Paper and Print: Solid Fuels	Cr	0.022	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	Cr	0.001	0.006	5.0	40.0	40.3	0.00	599.1	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	Cr	0.003	0.000	5.0	100.0	100.1	0.00	-96.7	0						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	Cr	0.000	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	Cr	0.008	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	Cr	0.000	0.006	4.7	18.8	19.4	0.00	2156.7	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	Cr	0.003	0.003	9.9	49.7	50.6	0.00	-8.2	0						
1.A.2.f Non-metallic minerals: Solid Fuels	Cr	0.098	0.011	8.8	26.7	28.1	0.00	-89.3	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	Cr	0.000	0.001	3.7	74.2	74.2	0.00		0						
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	Cr	0.002	0.004	4.9	98.8	98.9	0.00	79.8	0						
1.A.2.g.vii Off-road vehicles and other machinery: Other Fossil Fuels	Cr	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.2.g.viii Other: Biomass	Cr	0.077	0.042	4.6	18.4	19.0	0.00	-45.6	0		10				
1.A.2.g.viii Other: Liquid Fuels	Cr	0.011	0.004	3.8	15.3	15.8	0.00	-64.2	0						
1.A.2.g.viii Other: Solid Fuels	Cr	0.007	0.030	4.9	19.4	20.0	0.00	342.7	0		12				
1.A.3.b.i Road Transportation, Cars: Biomass	Cr	0.000	0.003	2.8	55.9	56.0	0.00		0						
1.A.3.b.i Road Transportation, Cars: Diesel oil	Cr	0.001	0.012	5.0	99.7	99.8	0.01	746.6	0						
1.A.3.b.i Road Transportation, Cars: Gasoline	Cr	0.024	0.010	3.0	99.5	99.6	0.00	-56.7	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	Cr	0.000	0.001	3.6	71.3	71.4	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	Cr	0.001	0.005	5.0	100.0	100.1	0.00	908.5	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	Cr	0.002	0.000	3.0	100.0	100.0	0.00	-88.3	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	Cr	0.000	0.002	2.6	51.9	52.0	0.00	33221.4	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	Cr	0.011	0.011	4.7	93.9	94.1	0.00	2.5	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	Cr	0.000	0.000	3.0	100.0	100.0	0.00	-87.1	0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	Cr	0.000	0.000	4.7	94.5	94.6	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	Cr	0.000	0.000	3.0	100.0	100.0	0.00	108.8	0						
1.A.3.b.vi Road Transportation: Automobile tyre and brake wear	Cr	0.014	0.023		200.0	200.0	0.09	63.5	0.0003		13			8	
1.A.3.c Railways: Liquid Fuels	Cr	0.002	0.001	5.0	95.0	95.1	0.00	-63.7	0						
1.A.3.d Domestic Navigation: Biomass	Cr	0.000	0.001	5.0	100.0	100.1	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	Cr	0.004	0.006	3.4	67.8	67.9	0.00	51.8	0						
1.A.3.d Domestic Navigation: Gasoline	Cr	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.d Domestic Navigation: Residual Oil	Cr	0.077	0.021	15.0	100.0	101.1	0.02	-72.4	0						
1.A.3.e Other Transportation: Biomass	Cr	0.000	0.000	3.7	74.9	75.0	0.00		0						
1.A.3.e Other Transportation: Other Fossil Fuels	Cr	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.e Other Transportation: Total	Cr	0.001	0.001	5.0	100.0	100.1	0.00	-19.0	0						
1.A.4.a Commercial/Institutional: Biomass	Cr	0.002	0.004	9.8	195.6	195.8	0.00	103.2	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.a Commercial/Institutional: Gasoline	Cr	0.000	0.000	5.0	100.0	100.1	0.00	-6.0	0						
1.A.4.a Commercial/Institutional: Liquid Fuels	Cr	0.018	0.001	7.3	75.1	75.4	0.00	-95.2	0						
1.A.4.a Commercial/Institutional: Other Fossil Fuels	Cr	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.4.b Residential: Biomass	Cr	0.117	0.099	10.0	199.9	200.2	1.80	-15.5	0.0049		6			3	
1.A.4.b Residential: Liquid Fuels	Cr	0.041	0.001	12.3	64.7	65.9	0.00	-97.6	0						
1.A.4.b Residential: Other Fossil Fuels	Cr	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	Cr	0.009	0.013	9.7	194.3	194.5	0.03	52.9	0.0001						
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	Cr	0.003	0.001	30.0	100.0	104.4	0.00	-71.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Fossil part of biodiesel and bio-gasoline	Cr	0.000	0.000	3.5	70.8	70.9	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	Cr	0.000	0.000	3.6	71.6	71.7	0.00	180.9	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	Cr	0.005	0.003	4.8	59.2	59.4	0.00	-27.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	Cr	0.017	0.000					-100.0							
2.A.3 Glass Production	Cr	0.021	0.001		100.0	100.0	0.00	-94.4	0						
2.B.10 Other	Cr	0.000	0.002		100.0	100.0	0.00	498.5	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.C.1 Iron and Steel Production	Cr	12.784	0.783	4.2	41.8	42.0	4.97	-93.9	0.0641	1	2	1	1	2	1
2.C.2 Ferroalloys production	Cr	8.407	1.872	5.0	75.0	75.2	91.00	-77.7	0.0259	2	1	2	2	1	2
2.C.3 Aluminium production	Cr	0.000	0.000	2.0	100.0	100.0	0.00	-21.7	0						
2.C.7 Other	Cr	0.029	0.055	4.0	45.0	45.2	0.03	90.6	0.0001		8				
2.G.4 Other	Cr	0.018	0.019	14.2	803.7	803.8	1.06	2.7	0.0031					4	
2.H.1 Pulp and paper	Cr	0.198	0.048	6.5	51.0	51.4	0.03	-75.6	0	4	9				
2.H.3 Other (NFR 2A6)	Cr	0.024	0.003		100.0	100.0	0.00	-86.0	0						
5.C.1 Waste Incineration	Cr	0.001	0.007	8.3	141.7	141.9	0.00	574.5	0						
5.E Other	Cr	0.001	0.001	50.0	70.0	86.0	0.00	-17.1	0						
Total		**22.62**	**3.816**			**38.7**	**100**	**-83.1**	**3.2011**						

Table A1-5. Summary of the key source and uncertainty analysis of Cu emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	Cu	0.123	1.147	1.5	74.7	74.7	0.12	835.9	0.0552		2	4		3	4
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	Cu	0.044	0.011	1.2	60.0	60.0	0.00	-75.4	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	Cu	0.014	0.043	2.0	100.0	100.0	0.00	214.2	0.0001						
1.A.1.a Public Electricity and Heat Production: Peat	Cu	0.088	0.009	2.0	98.6	98.6	0.00	-90.0	0.0001						
1.A.1.a Public Electricity and Heat Production: Solid Fuels	Cu	0.252	0.003	2.0	100.0	100.0	0.00	-99.0	0.0012	7		6			
1.A.1.a Public Electricity and Heat Production: Other Fuels	Cu	0.022	0.070	1.3	552.2	552.2	0.02	226.3	0.009						5
1.A.1.b Petroleum refining: Liquid Fuels	Cu	0.016	0.008	10.0	100.0	100.5	0.00	-48.2	0						
1.A.2.a Iron and Steel: Biomass	Cu	0.000	0.000					-100.0							
1.A.2.a Iron and Steel: Liquid Fuels	Cu	0.015	0.002	5.0	100.0	100.1	0.00	-90.2	0						
1.A.2.a Iron and Steel: Solid Fuels	Cu	0.001	0.000					-100.0							
1.A.2.b Non-ferrous metals: Liquid Fuels	Cu	0.002	0.001	5.0	100.0	100.1	0.00	-54.7	0						
1.A.2.b Non-ferrous metals: Solid Fuels	Cu	0.000	0.000					-100.0							

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.c Chemicals: Biomass	Cu	0.005	0.007	5.0	40.0	40.3	0.00	29.8	0						
1.A.2.c Chemicals: Liquid Fuels	Cu	0.007	0.001	5.0	100.0	100.1	0.00	-89.1	0						
1.A.2.c Chemicals: Other Fuels	Cu	0.000	0.000					-100.0							
1.A.2.c Chemicals: Solid Fuels	Cu	0.009	0.000	2.0	40.0	40.1	0.00	-98.2	0						
1.A.2.d Pulp, Paper and Print: Biomass	Cu	0.340	0.230	8.0	40.0	40.8	0.00	-32.2	0.0001	6	6				
1.A.2.d Pulp, Paper and Print: Liquid Fuels	Cu	0.065	0.014	5.0	100.0	100.1	0.00	-78.6	0						
1.A.2.d Pulp, Paper and Print: Other Fuels	Cu	0.001	0.000					-100.0							
1.A.2.d Pulp, Paper and Print: Solid Fuels	Cu	0.023	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	Cu	0.002	0.012	5.0	40.0	40.3	0.00	668.1	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	Cu	0.020	0.001	5.0	100.0	100.1	0.00	-97.0	0						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	Cu	0.000	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	Cu	0.008	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	Cu	0.001	0.014	4.7	18.9	19.5	0.00	1771.8	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	Cu	0.016	0.006	9.9	39.5	40.7	0.00	-60.9	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.f Non-metallic minerals: Solid Fuels	Cu	0.098	0.011	8.8	17.8	19.9	0.00	-89.3	0						
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	Cu	0.000	0.000	3.7	74.1	74.2	0.00		0						
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	Cu	0.002	0.003	4.9	98.7	98.8	0.00	79.7	0						
1.A.2.g.vii Off-road vehicles and other machinery: Other Fossil Fuels	Cu	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.2.g.viii Other: Biomass	Cu	0.215	0.084	4.6	18.4	18.9	0.00	-61.1	0	8		8			
1.A.2.g.viii Other: Liquid Fuels	Cu	0.059	0.020	3.9	15.6	16.1	0.00	-65.9	0						
1.A.2.g.viii Other: Solid Fuels	Cu	0.007	0.030	4.9	19.4	20.0	0.00	342.7	0						
1.A.3.b.i Road Transportation, Cars: Biomass	Cu	0.000	0.003	2.5	50.3	50.4	0.00		0						
1.A.3.b.i Road Transportation, Cars: Diesel oil	Cu	0.001	0.008	5.0	99.7	99.8	0.00	746.6	0						
1.A.3.b.i Road Transportation, Cars: Gasoline	Cu	0.017	0.007	3.0	99.5	99.6	0.00	-56.7	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	Cu	0.000	0.001	3.6	71.2	71.2	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	Cu	0.000	0.003	5.0	100.0	100.1	0.00	908.5	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	Cu	0.001	0.000	3.0	100.0	100.0	0.00	-88.3	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	Cu	0.000	0.002	2.6	51.9	52.0	0.00	31187.5	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	Cu	0.007	0.007	4.7	93.9	94.1	0.00	2.5	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	Cu	0.000	0.000	3.0	100.0	100.0	0.00	-87.1	0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	Cu	0.000	0.000	4.7	94.5	94.6	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	Cu	0.000	0.000	3.0	100.0	100.0	0.00	108.8	0						
1.A.3.b.vi Road Transportation: Automobile tyre and brake wear	Cu	9.099	12.44		200.0	200.0	99.18	36.7	21.288	2	1	2	1	1	2
1.A.3.c Railways: Liquid Fuels	Cu	0.054	0.020	5.0	95.0	95.1	0.00	-63.7	0						
1.A.3.d Domestic Navigation: Biomass	Cu	0.000	0.023	5.0	100.0	100.1	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	Cu	0.095	0.143	3.6	72.4	72.5	0.00	51.0	0.0004						
1.A.3.d Domestic Navigation: Gasoline	Cu	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.d Domestic Navigation: Residual Oil	Cu	0.172	0.047	15.0	100.0	101.1	0.00	-72.4	0.0001						
1.A.3.e Other Transportation: Biomass	Cu	0.000	0.000	3.7	74.9	75.0	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.e Other Transportation: Other Fossil Fuels	Cu	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.e Other Transportation: Total	Cu	0.001	0.000	5.0	100.0	100.1	0.00	-19.5	0						
1.A.4.a Commercial/Institutional: Biomass	Cu	0.004	0.007	9.9	495.4	495.5	0.00	100.5	0.0001						
1.A.4.a Commercial/Institutional: Gasoline	Cu	0.000	0.000	5.0	100.0	100.1	0.00	-6.0	0						
1.A.4.a Commercial/Institutional: Liquid Fuels	Cu	0.091	0.002	14.8	78.3	79.7	0.00	-98.3	0.0001						
1.A.4.a Commercial/Institutional: Other Fossil Fuels	Cu	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.4.b Residential: Biomass	Cu	0.195	0.165	10.0	499.9	500.0	0.11	-15.6	0.0101		7				
1.A.4.b Residential: Liquid Fuels	Cu	0.172	0.003	18.0	90.2	91.9	0.00	-98.4	0.0004			7			
1.A.4.b Residential: Other Fossil Fuels	Cu	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	Cu	0.014	0.021	9.9	494.2	494.2	0.00	50.3	0.0004						
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	Cu	0.101	0.029	30.0	100.0	104.4	0.00	-71.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Fossil part of biodiesel and bio-gasoline	Cu	0.000	0.000	3.5	70.8	70.9	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	Cu	0.000	0.000	3.6	71.6	71.7	0.00	180.9	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	Cu	0.014	0.005	13.0	69.1	70.4	0.00	-61.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	Cu	0.017	0.000					-100.0							
2.A.3 Glass Production	Cu	0.002	0.001		90.0	90.0	0.00	-43.9	0						
2.B.10 Other	Cu	0.001	0.001		100.0	100.0	0.00	-32.8	0						
2.C.1 Iron and Steel Production	Cu	3.541	0.426	3.0	30.0	30.1	0.00	-88.0	0.0127	3	5	3	4		3
2.C.3 Aluminium production	Cu	0.013	0.001	2.0	100.0	100.0	0.00	-93.1	0						
2.C.7 Other	Cu	18.54	1.134	4.0	50.0	50.2	0.05	-93.9	1.2953	1	3	1	2		1
2.G.4 Other	Cu	0.440	0.509	15.0	349.7	350.0	0.51	15.7	0.0895	4	4		3	2	
2.H.1 Pulp and paper	Cu	0.430	0.101	6.5	51.0	51.4	0.00	-76.6	0.0003	5		5			
2.H.3 Other (NFR 2A5a)	Cu	0.096	0.000		50.0	50.0	0.00	-99.6	0						
2.H.3 Other (NFR 2A6)	Cu	0.006	0.000		50.0	50.0	0.00	-97.2	0						
5.C.1 Waste Incineration	Cu	0.003	0.038	30.7	229.2	231.3	0.00	1068.8	0.0006						
5.E Other	Cu	0.003	0.003	50.0	68.0	84.4	0.00	-17.1	0						
Total		**34.58**	**16.88**			**148.0**	**100**	**-51.2**	**47.712**						

Table A1-6. Summary of the key source and uncertainty analysis of Dioxin emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	DIOX	0.010	0.086	1.5	222.5	222.5	0.01	799.7	0.0014						
1.A.1.a Public Electricity and Heat Production: Gaseous Fuels	DIOX	0.004	0.001	1.8	43.9	43.9	0.00	-75.7	0						
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	DIOX	0.036	0.005	1.2	29.7	29.7	0.00	-86.0	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	DIOX	3.858	0.271	2.0	300.0	300.0	0.10	-93.0	0.0404	3	8	3	4		4
1.A.1.a Public Electricity and Heat Production: Peat	DIOX	0.016	0.001	2.0	295.7	295.8	0.00	-92.0	0						
1.A.1.a Public Electricity and Heat Production: Solid Fuels	DIOX	3.151	0.003	2.0	50.0	50.0	0.00	-99.9	0.0024	4		4			
1.A.1.a Public Electricity and Heat Production: Other Fuels	DIOX	6.009	0.438	1.3	195.2	195.2	0.12	-92.7	0.0389	2	5	2	5		3
1.A.1.b Petroleum refining: Biomass	DIOX	0.000	0.000		100.0	100.0	0.00		0						
1.A.1.b Petroleum refining: Gaseous Fuels	DIOX	0.000	0.002	2.0	100.0	100.0	0.00	821.3	0						
1.A.1.b Petroleum refining: Liquid Fuels	DIOX	0.260	0.267	10.0	100.0	100.5	0.01	2.6	0.002		9				
1.A.2.a Iron and Steel: Biomass	DIOX	0.000	0.000	5.0	100.0	100.1	0.00	9269.1	0						
1.A.2.a Iron and Steel: Gaseous Fuels	DIOX	0.000	0.001	5.0	100.0	100.1	0.00	145.6	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.a Iron and Steel: Liquid Fuels	DIOX	0.014	0.004	5.0	100.0	100.1	0.00	-68.7	0						
1.A.2.a Iron and Steel: Solid Fuels	DIOX	0.012	0.000					-100.0							
1.A.2.b Non-ferrous metals: Gaseous Fuels	DIOX	0.000	0.000	5.0	50.0	50.2	0.00	57.5	0						
1.A.2.b Non-ferrous metals: Liquid Fuels	DIOX	0.002	0.001	5.0	100.0	100.1	0.00	-52.3	0						
1.A.2.b Non-ferrous metals: Solid Fuels	DIOX	0.001	0.000					-100.0							
1.A.2.c Chemicals: Biomass	DIOX	0.002	0.001	5.0	100.0	100.1	0.00	-7.7	0						
1.A.2.c Chemicals: Gaseous Fuels	DIOX	0.001	0.001	5.0	50.0	50.2	0.00	-50.0	0						
1.A.2.c Chemicals: Liquid Fuels	DIOX	0.007	0.001	5.0	100.0	100.1	0.00	-90.4	0						
1.A.2.c Chemicals: Other Fuels	DIOX	0.001	0.000					-100.0							
1.A.2.c Chemicals: Solid Fuels	DIOX	0.108	0.000	2.0	100.0	100.0	0.00	-99.9	0						
1.A.2.d Pulp, Paper and Print: Biomass	DIOX	0.117	0.034	8.0	100.0	100.3	0.00	-71.0	0						
1.A.2.d Pulp, Paper and Print: Gaseous Fuels	DIOX	0.001	0.000	5.0	50.0	50.2	0.00	-67.3	0						
1.A.2.d Pulp, Paper and Print: Liquid Fuels	DIOX	0.072	0.011	5.0	100.0	100.1	0.00	-84.7	0						
1.A.2.d Pulp, Paper and Print: Other Fuels	DIOX	0.049	0.000					-100.0							

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.d Pulp, Paper and Print: Solid Fuels	DIOX	0.266	0.000					-100.0				11			
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	DIOX	0.015	0.002	5.0	100.0	100.1	0.00	-88.2	0						
1.A.2.e Food Processing, Beverages and Tobacco: Gaseous Fuels	DIOX	0.002	0.001	5.0	50.0	50.2	0.00	-38.8	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	DIOX	0.015	0.001	5.0	100.0	100.1	0.00	-96.4	0						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	DIOX	0.008	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	DIOX	0.096	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	DIOX	0.000	0.002	4.4	142.0	142.0	0.00	2482.9	0						
1.A.2.f Non-metallic minerals: Gaseous Fuels	DIOX	0.001	0.001	4.1	19.1	19.6	0.00	5.4	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	DIOX	0.013	0.010	9.6	19.2	21.5	0.00	-20.2	0						
1.A.2.f Non-metallic minerals: Solid Fuels	DIOX	1.230	0.035	8.8	26.7	28.1	0.00	-97.1	0.0001	8		6			
1.A.2.g.viii Other: Biomass	DIOX	0.017	0.022	3.3	66.8	66.9	0.00	32.0	0						
1.A.2.g.viii Other: Gaseous Fuels	DIOX	0.001	0.000	2.6	10.3	10.6	0.00	-66.6	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.g.viii Other: Liquid Fuels	DIOX	0.029	0.004	3.0	11.9	12.3	0.00	-85.6	0						
1.A.2.g.viii Other: Solid Fuels	DIOX	0.084	0.291	5.0	19.8	20.4	0.00	247.4	0.0001		7				
1.A.3.b.i Road Transportation, Cars: Diesel oil	DIOX	0.010	0.205	5.0	1000	1000	0.66	1917.9	0.1591		12			7	
1.A.3.b.i Road Transportation, Cars: Gasoline	DIOX	1.673	0.229	3.0	1000	1000	0.83	-86.3	0.0051	6	10	5	3	5	2
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	DIOX	0.002	0.069	5.0	1000	1000	0.07	2827.3	0.0179						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	DIOX	0.095	0.004	3.0	1000	1000	0.00	-95.4	0.0004						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	DIOX	0.289	0.011	4.7	934.6	934.6	0.00	-96.4	0.0042			9			
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	DIOX	0.002	0.000	3.0	1000	1000	0.00	-86.9	0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	DIOX	0.013	0.014	3.0	1000	1000	0.00	6.1	0.0005						
1.A.3.d Domestic Navigation: Biomass	DIOX	0.000	0.002	5.0	1000	1000	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	DIOX	0.007	0.010	3.6	725.4	725.4	0.00	51.0	0.0002						
1.A.3.d Domestic Navigation: Residual Oil	DIOX	0.048	0.013	15.0	1000	1000	0.00	-72.4	0.0001						
1.A.4.a Commercial/Institutional: Biomass	DIOX	0.050	0.099	10.0	1000	1000	0.15	98.7	0.032		14				

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.b Residential: Biomass	DIOX	2.731	2.306	10.0	1000	1000	83.75	-15.6	13.5156	5	1	8	2	1	
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	DIOX	0.199	0.331	10.0	1000	1000	1.73	66.8	0.3465		6			4	
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	DIOX	0.009	0.003	30.0	1000	1000	0.00	-71.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	DIOX	0.172	0.000					-100.0							
2.B.10 Other	DIOX	0.017	0.111		200.0	200.0	0.01	566.7	0.0018		13				
2.C.1 Iron and Steel Production	DIOX	26.789	0.708	3.4	684.7	684.7	3.70	-97.4	22.436	1	4	1	1	3	1
2.C.3 Aluminium production	DIOX	0.070	0.000	2.0	2900	2900	0.00	-100.0	0.004						
2.C.7 Other	DIOX	0.905	0.208	4.0	1000	1000	0.68	-77.0	0.016	9	11	7	6	6	5
2.G.4 Other	DIOX	0.001	0.000	15.0	100.0	101.1	0.00	-65.7	0						
2.H.1 Pulp and paper	DIOX	0.052	0.037	6.7	1000	1000	0.02	-29.1	0.0032						
5.C.1 Waste Incineration	DIOX	0.619	0.835	9.9	850.0	850.1	7.94	34.9	1.5141	10	3			2	
5.E Other	DIOX	1.656	1.385	50.0	66.0	82.8	0.21	-16.4	0.0582	7	2	10		8	
Total		**50.91**	**8.07**			**312.0**	**100**	**-84.1**	**61.806**						

Table A1-7. Summary of the key source and uncertainty analysis of Hg emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	Hg	0.004	0.036	1.5	30.0	30.0	0.10	789.3	0.0046		4	9		4	
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	Hg	0.001	0.000	1.3	63.3	63.3	0.00	-56.8	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	Hg	0.138	0.038	2.0	40.0	40.1	0.20	-72.5	0.0003	6	3	6	5	2	5
1.A.1.a Public Electricity and Heat Production: Peat	Hg	0.022	0.002	2.0	39.4	39.5	0.00	-92.0	0.0001	10		11			
1.A.1.a Public Electricity and Heat Production: Solid Fuels	Hg	0.095	0.001	1.5	29.7	29.7	0.00	-98.9	0.0016	7		7			
1.A.1.a Public Electricity and Heat Production: Other Fuels	Hg	0.215	0.061	1.3	551.8	551.8	99.10	-71.4	0.1592	2	1	5	1	1	1
1.A.1.b Petroleum refining: Liquid Fuels	Hg	0.001	0.000	10.0	100.0	100.5	0.00	-63.5	0						
1.A.2.a Iron and Steel: Biomass	Hg	0.000	0.000					-100.0							
1.A.2.a Iron and Steel: Liquid Fuels	Hg	0.000	0.000	5.0	100.0	100.1	0.00	-88.0	0						
1.A.2.a Iron and Steel: Solid Fuels	Hg	0.000	0.000					-100.0							
1.A.2.b Non-ferrous metals: Liquid Fuels	Hg	0.000	0.000	5.0	100.0	100.1	0.00	-39.4	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.b Non-ferrous metals: Solid Fuels	Hg	0.000	0.000					-100.0							
1.A.2.c Chemicals: Biomass	Hg	0.000	0.000	5.0	40.0	40.3	0.00	53.8	0						
1.A.2.c Chemicals: Liquid Fuels	Hg	0.000	0.000	5.0	100.0	100.1	0.00	-85.0	0						
1.A.2.c Chemicals: Other Fuels	Hg	0.000	0.000					-100.0							
1.A.2.c Chemicals: Solid Fuels	Hg	0.003	0.000	2.0	40.0	40.1	0.00	-96.8	0						
1.A.2.d Pulp, Paper and Print: Biomass	Hg	0.014	0.011	8.0	40.0	40.8	0.02	-21.2	0.0005	13	11				
1.A.2.d Pulp, Paper and Print: Liquid Fuels	Hg	0.002	0.000	5.0	100.0	100.1	0.00	-81.2	0						
1.A.2.d Pulp, Paper and Print: Other Fuels	Hg	0.002	0.000					-100.0							
1.A.2.d Pulp, Paper and Print: Solid Fuels	Hg	0.008	0.000					-100.0		15		13			
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	Hg	0.001	0.001	5.0	40.0	40.3	0.00	-1.7	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	Hg	0.001	0.000	5.0	100.0	100.1	0.00	-95.3	0						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	Hg	0.000	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	Hg	0.003	0.000					-100.0							

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.f Non-metallic minerals: Biomass	Hg	0.000	0.001	4.7	18.8	19.4	0.00	2303.3	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	Hg	0.000	0.001	9.9	49.7	50.7	0.00	64.6	0						
1.A.2.f Non-metallic minerals: Solid Fuels	Hg	0.037	0.005	9.1	18.3	20.4	0.00	-87.6	0	8	15	8			
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	Hg	0.000	0.000	3.7	73.2	73.3	0.00		0						
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	Hg	0.002	0.003	4.9	97.4	97.5	0.01	78.1	0.0002		19				
1.A.2.g.vii Off-road vehicles and other machinery: Other Fossil Fuels	Hg	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.2.g.viii Other: Biomass	Hg	0.007	0.004	4.6	18.3	18.9	0.00	-41.7	0		16				
1.A.2.g.viii Other: Liquid Fuels	Hg	0.002	0.001	3.6	21.5	21.8	0.00	-63.5	0						
1.A.2.g.viii Other: Solid Fuels	Hg	0.003	0.009	4.8	19.4	20.0	0.00	255.3	0.0001		12				
1.A.3.b.i Road Transportation, Cars: Biomass	Hg	0.000	0.003	3.4	68.2	68.2	0.00		0.0001		18				
1.A.3.b.i Road Transportation, Cars: Diesel oil	Hg	0.001	0.008	5.0	99.7	99.8	0.05	746.6	0.0022		13			7	
1.A.3.b.i Road Transportation, Cars: Gasoline	Hg	0.033	0.014	3.0	99.5	99.6	0.18	-56.7	0.0018	9	9	12	9	3	
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	Hg	0.000	0.000	3.4	68.3	68.4	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	Hg	0.000	0.003	5.0	100.0	100.1	0.01	908.5	0.0003		17				
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	Hg	0.002	0.000	3.0	100.0	100.0	0.00	-88.3	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	Hg	0.000	0.002	2.6	51.8	51.8	0.00	14986.2	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	Hg	0.007	0.007	4.7	93.9	94.1	0.03	2.5	0.001		14			10	
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	Hg	0.000	0.000	3.0	100.0	100.0	0.00	-87.1	0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	Hg	0.000	0.000	4.7	94.5	94.6	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	Hg	0.000	0.000	3.0	100.0	100.0	0.00	108.8	0						
1.A.3.d Domestic Navigation: Biomass	Hg	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	Hg	0.000	0.000	3.9	77.7	77.8	0.00	54.8	0						
1.A.3.d Domestic Navigation: Gasoline	Hg	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.d Domestic Navigation: Residual Oil	Hg	0.000	0.000	15.0	100.0	101.1	0.00	-21.8	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.e Other Transportation: Biomass	Hg	0.000	0.000	3.7	74.9	75.0	0.00		0						
1.A.3.e Other Transportation: Other Fossil Fuels	Hg	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.e Other Transportation: Total	Hg	0.001	0.000	5.0	100.0	100.1	0.00	-26.8	0						
1.A.4.a Commercial/Institutional: Biomass	Hg	0.000	0.001	9.1	36.7	37.8	0.00	119.1	0						
1.A.4.a Commercial/Institutional: Gasoline	Hg	0.000	0.000	5.0	100.0	100.1	0.00	-6.0	0						
1.A.4.a Commercial/Institutional: Liquid Fuels	Hg	0.003	0.000	5.1	87.8	88.0	0.00	-86.2	0						
1.A.4.a Commercial/Institutional: Other Fossil Fuels	Hg	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.4.b Residential: Biomass	Hg	0.020	0.017	10.0	39.9	41.1	0.04	-15.3	0.0011	12	8			9	
1.A.4.b Residential: Liquid Fuels	Hg	0.008	0.001	4.6	49.0	49.3	0.00	-92.8	0			14			
1.A.4.b Residential: Other Fossil Fuels	Hg	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	Hg	0.001	0.002	9.0	36.2	37.3	0.00	65.6	0		20				
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	Hg	0.000	0.000	30.0	100.0	104.4	0.00	-71.5	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.c Agriculture/Forestry/Fisheries: Fossil part of biodiesel and bio-gasoline	Hg	0.000	0.000	3.5	70.8	70.9	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	Hg	0.000	0.000	3.6	71.6	71.7	0.00	180.9	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	Hg	0.002	0.002	3.4	64.3	64.4	0.00	-2.9	0						
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	Hg	0.007	0.000					-100.0				15			
2.A.3 Glass Production	Hg	0.006	0.001		1000	1000	0.07	-84.3	0.0007				4	6	4
2.B.10 Other	Hg	0.193	0.012		37.3	37.3	0.02	-93.6	0.0059	4	10	2	3		2
2.C.1 Iron and Steel Production	Hg	0.319	0.059	2.8	11.2	11.6	0.04	-81.4	0.0003	1	2	1	6	8	7
2.C.3 Aluminium production	Hg	0.000	0.000	2.0	20.0	20.1	0.00	-98.6	0						
2.C.7 Other	Hg	0.194	0.019	4.0	20.0	20.4	0.01	-90.5	0.0012	3	7	3	8		6
2.G.4 Other	Hg	0.001	0.000	12.6	167.9	168.3	0.00	-60.6	0						
2.H.1 Pulp and paper	Hg	0.013	0.019	6.6	50.3	50.8	0.08	38.3	0.0025	14	6			5	
2.H.3 Other (NFR 2A5a)	Hg	0.021	0.000					-100.0		11		10	2		
2.H.3 Other (NFR 2A6)	Hg	0.000	0.000					-100.0							
5.C.1 Waste Incineration	Hg	0.182	0.020	4.9	29.4	29.8	0.03	-88.8	0.0017	5	5	4	7		3
5.E Other	Hg	0.001	0.001	50.0	67.0	83.6	0.00	-16.8	0						
Total		**1.577**	**0.366**			**92.7**	**100**	**-76.8**	**4.3079**						

Table A1-8. Summary of the key source and uncertainty analysis of NH_3 emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	NH_3	0.027	0.136	1.5	14.9	14.9	0.00	400.0	0			21			
1.A.1.a Public Electricity and Heat Production: Gaseous Fuels	NH_3	0.017	0.002	1.8	35.1	35.2	0.00	-87.9	0						
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	NH_3	0.034	0.005	1.2	24.5	24.6	0.00	-85.8	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	NH_3	0.017	0.081	2.0	20.0	20.1	0.00	391.0	0						
1.A.1.a Public Electricity and Heat Production: Peat	NH_3	0.022	0.002	2.0	39.4	39.5	0.00	-92.0	0						
1.A.1.a Public Electricity and Heat Production: Solid Fuels	NH_3	0.025	0.009	1.9	18.5	18.6	0.00	-61.8	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	NH_3	0.029	0.131	1.3	24.9	24.9	0.00	356.0	0						
1.A.1.b Petroleum refining: Biomass	NH_3	0.000	0.000		40.0	40.0	0.00		0						
1.A.1.b Petroleum refining: Gaseous Fuels	NH_3	0.001	0.003	2.0	40.0	40.1	0.00	328.3	0						
1.A.1.b Petroleum refining: Liquid Fuels	NH_3	0.061	0.061	10.0	40.0	41.2	0.00	0.0	0						
1.A.2.a Iron and Steel: Biomass	NH_3	0.000	0.001	5.0	40.0	40.3	0.00	8098	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.a Iron and Steel: Gaseous Fuels	NH_3	0.001	0.001	5.0	40.0	40.3	0.00	22.8	0						
1.A.2.a Iron and Steel: Liquid Fuels	NH_3	0.023	0.008	5.0	40.0	40.3	0.00	-66.4	0						
1.A.2.a Iron and Steel: Solid Fuels	NH_3	0.000	0.000					-100.0							
1.A.2.b Non-ferrous metals: Gaseous Fuels	NH_3	0.000	0.000	5.0	40.0	40.3	0.00	-21.3	0						
1.A.2.b Non-ferrous metals: Liquid Fuels	NH_3	0.003	0.001	5.0	40.0	40.3	0.00	-59.1	0						
1.A.2.b Non-ferrous metals: Solid Fuels	NH_3	0.000	0.000					-100.0							
1.A.2.c Chemicals: Biomass	NH_3	0.001	0.003	5.0	40.0	40.3	0.00	346.7	0						
1.A.2.c Chemicals: Gaseous Fuels	NH_3	0.006	0.001	5.0	40.0	40.3	0.00	-75.0	0						
1.A.2.c Chemicals: Liquid Fuels	NH_3	0.013	0.006	5.0	40.0	40.3	0.00	-53.8	0						
1.A.2.c Chemicals: Other Fuels	NH_3	0.000	0.002	10.0	50.0	51.0	0.00	897.3	0						
1.A.2.c Chemicals: Solid Fuels	NH_3	0.001	0.000	2.0	40.0	40.1	0.00	-80.8	0						
1.A.2.d Pulp, Paper and Print: Biomass	NH_3	0.046	0.056	8.0	40.0	40.8	0.00	22.8	0						
1.A.2.d Pulp, Paper and Print: Gaseous Fuels	NH_3	0.002	0.000	5.0	40.0	40.3	0.00	-83.7	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.d Pulp, Paper and Print: Liquid Fuels	NH_3	0.047	0.007	5.0	40.0	40.3	0.00	-84.8	0						
1.A.2.d Pulp, Paper and Print: Other Fuels	NH_3	0.002	0.000	10.0	50.0	51.0	0.00	-82.5	0						
1.A.2.d Pulp, Paper and Print: Solid Fuels	NH_3	0.002	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	NH_3	0.000	0.003	5.0	40.0	40.3	0.00	715.8	0						
1.A.2.e Food Processing, Beverages and Tobacco: Gaseous Fuels	NH_3	0.009	0.003	5.0	40.0	40.3	0.00	-69.4	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	NH_3	0.016	0.001	5.0	40.0	40.3	0.00	-94.8	0						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	NH_3	0.000	0.000	10.0	50.0	51.0	0.00	-87.6	0						
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	NH_3	0.001	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	NH_3	0.000	0.003	4.5	18.0	18.6	0.00	3715.6	0						
1.A.2.f Non-metallic minerals: Gaseous Fuels	NH_3	0.002	0.001	4.1	12.8	13.4	0.00	-47.3	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	NH_3	0.017	0.004	8.0	8.1	11.3	0.00	-77.7	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.f Non-metallic minerals: Other Fuels	NH_3	0.000	C	10.0	30.0	31.6	0.00	C	C						
1.A.2.f Non-metallic minerals: Solid Fuels	NH_3	0.006	C	9.2	18.4	20.5	0.00	C	C						
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	NH_3	0.000	0.000	3.8	22.9	23.2	0.00		0						
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	NH_3	0.002	0.004	5.0	29.8	30.2	0.00	62.1	0						
1.A.2.g.viii Other: Biomass	NH_3	0.024	0.016	4.1	16.4	16.9	0.00	-34.2	0						
1.A.2.g.viii Other: Gaseous Fuels	NH_3	0.004	0.001	2.6	10.2	10.6	0.00	-83.6	0						
1.A.2.g.viii Other: Liquid Fuels	NH_3	0.056	0.010	3.2	6.3	7.1	0.00	-82.6	0						
1.A.2.g.viii Other: Other Fuels	NH_3	0.000	0.000	5.0	20.0	20.6	0.00		0						
1.A.2.g.viii Other: Solid Fuels	NH_3	0.001	0.006	4.9	19.5	20.1	0.00	760.3	0						
1.A.3.b.i Road Transportation, Cars: Biomass	NH_3	0.000	0.152	4.0	320.1	320.1	0.31		0.0053			19		14	8
1.A.3.b.i Road Transportation, Cars: Diesel oil	NH_3	0.003	0.097	5.0	399.7	399.7	0.20	3659.3	0.0032						12
1.A.3.b.i Road Transportation, Cars: Gasoline	NH_3	1.661	0.789	3.2	390.9	390.9	12.33	-52.5	0.1264	9	13	8	1	4	1
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	NH_3	0.000	0.009	2.7	207.0	207.0	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	NH_3	0.001	0.039	5.0	400.0	400.0	0.03	5610.1	0.0005						
1.A.3.b.ii Road Transportation, Light duty trucks: Gaseous Fuels	NH_3	0.000	0.000	5.0	400.0	400.0	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	NH_3	0.091	0.009	3.0	400.0	400.0	0.00	-90.1	0.0016						16
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	NH_3	0.000	0.014	2.6	211.9	211.9	0.00		0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	NH_3	0.009	0.064	4.7	374.2	374.2	0.08	603.0	0.001						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	NH_3	0.000	0.000	3.0	400.0	400.0	0.00	-87.8	0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	NH_3	0.000	0.000	4.6	367.8	367.8	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	NH_3	0.001	0.001	3.0	400.0	400.0	0.00	95.3	0						
1.A.3.c Railways: Liquid Fuels	NH_3	0.000	0.000	5.0	75.0	75.2	0.00	-63.7	0						
1.A.3.d Domestic Navigation: Biomass	NH_3	0.000	0.000	5.0	40.0	40.3	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	NH_3	0.001	0.002	3.1	24.8	25.0	0.00	128.4	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.d Domestic Navigation: Gasoline	NH_3	0.000	0.000	5.0	40.0	40.3	0.00		0						
1.A.3.d Domestic Navigation: Residual Oil	NH_3	0.002	0.003	15.0	40.0	42.7	0.00	81.4	0						
1.A.3.e Other Transportation: Biomass	NH_3	0.000	0.000	3.7	30.0	30.2	0.00		0						
1.A.3.e Other Transportation: Gaseous fuels	NH_3	0.000	0.000	5.0	40.0	40.3	0.00	-1.5	0						
1.A.3.e Other Transportation: Total	NH_3	0.006	0.002	5.0	40.0	40.3	0.00	-62.7	0						
1.A.4.a Commercial/Institutional: Biomass	NH_3	0.002	0.004	9.8	39.4	40.6	0.00	101.7	0						
1.A.4.a Commercial/Institutional: Gaseous Fuels	NH_3	0.003	0.003	10.0	40.0	41.2	0.00	9.3	0						
1.A.4.a Commercial/Institutional: Gasoline	NH_3	0.000	0.000	5.0	30.0	30.4	0.00	1.5	0						
1.A.4.a Commercial/Institutional: Liquid Fuels	NH_3	0.066	0.002	14.0	29.3	32.5	0.00	-97.7	0						
1.A.4.b Residential: Biomass	NH_3	0.117	0.099	10.0	40.0	41.2	0.00	-15.6	0						
1.A.4.b Residential: Gaseous Fuels	NH_3	0.003	0.001	10.0	40.0	41.2	0.00	-62.6	0						
1.A.4.b Residential: Liquid Fuels	NH_3	0.161	0.002	16.7	33.5	37.4	0.00	-99.0	0			18			

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	NH_3	0.009	0.012	9.8	39.1	40.3	0.00	41.1	0						
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	NH_3	0.001	0.000	30.0	40.0	50.0	0.00	-71.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Gaseous Fuels	NH_3	0.001	0.000	10.0	40.0	41.2	0.00	-95.3	0						
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	NH_3	0.000	0.000	3.5	21.2	21.5	0.00	327.2	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	NH_3	0.010	0.003	7.7	19.8	21.3	0.00	-65.7	0						
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	NH_3	0.003	0.000					-100.0							
1.B.1.b Coke production	NH_3	0.004	0.004	5.0	170.0	170.1	0.00	-14.9	0						
1.B.2.c Venting and flaring	NH_3	0.000	0.000	50.0	20.0	53.9	0.00	-53.5	0						
2.A.1 Cement Production	NH_3	0.000	0.005	2.0	400.0	400.0	0.00		0						
2.A.3 Glass Production	NH_3	0.250	0.048		400.0	400.0	0.05	-80.7	0.0094			16	11		6
2.B.10 Other	NH_3	0.195	0.023		38.1	38.1	0.00	-88.0	0.0001			17			
2.B.2 Nitric Acid Production	NH_3	0.007	0.001	2.0	5.0	5.4	0.00	-91.9	0						
2.C.1 Iron and Steel Production	NH_3	0.003	0.003	5.0	20.0	20.6	0.00	0.0	0						
2.G.4 Other	NH_3	0.035	0.012	15.0	6.0	16.2	0.00	-65.7	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.H.1 Pulp and paper	NH_3	1.636	0.965	7.0	49.8	50.2	0.30	-41.0	0.0011	10	12	9	12	15	14
2.H.3 Other (NFR 2A6)	NH_3	0.205	0.106		399.7	399.7	0.23	-48.4	0.0016						11
3.B.1 Dairy cattle	NH_3	9.512	3.596	20.0	50.0	53.9	4.86	-62.2	0.1316	3	5	1	2	6	2
3.B.1 Non-dairy cattle	NH_3	6.533	8.165	20.0	50.0	53.9	25.07	25.0	0.16	4	2	5	4	1	5
3.B.3 Swine	NH_3	4.896	2.636	20.0	50.0	53.9	2.61	-46.2	0.0247	5	7	4	6	8	3
3.B.4 Fur-bearing animals	NH_3	0.635	0.043	20.0	50.0	53.9	0.00	-93.3	0.0014			11			17
3.B.4 Goats	NH_3	0.009	0.024	20.0	50.0	53.9	0.00	174.7	0						
3.B.4 Horses	NH_3	2.664	3.000	20.0	50.0	53.9	3.38	12.6	0.0194	7	6	14	9	7	
3.B.4 Poultry	NH_3	1.135	2.047	14.7	36.7	39.5	0.85	80.3	0.0077	12	9	7		12	13
3.B.4 Sheep	NH_3	0.458	0.680	20.0	50.0	53.9	0.17	48.6	0.0013			15			
3.D.a.1 Inorganic N fertilizers	NH_3	10.459	7.783	5.0	14.0	14.9	1.74	-25.6	0.0073	2	3	3	8	11	10
3.D.a.2.a Animal manure applied to soils	NH_3	17.292	14.183	5.0	14.0	14.9	5.76	-18.0	0.0227	1	1	2	7	5	9
3.D.a.2.b Sewage sludge applied to soils	NH_3	0.153	0.774	5.0	100.0	100.1	0.78	404.3	0.0094		14	10		13	7
3.D.a.2.c Other organic fertilizers applied to soils	NH_3	0.136	1.249	5.0	100.0	100.1	2.03	818.5	0.0291		11	6		10	4
3.D.a.3 Urine and dung deposited by grazing animals	NH_3	4.050	3.990	20.0	100.0	102.0	21.46	-1.5	0.0364	6	4		3	2	

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
3.D.a.4 Crop residues applied to soils	NH_3	2.550	2.530	20.0	135.0	136.5	15.45	-0.8	0.0176	8	8		5	3	
5.B.1 Composting	NH_3	0.025	0.169		192.6	192.6	0.14	571.2	0.0018			20			
5.B.2 Anaerobic Digestion at Biogas Facilities	NH_3	0.000	0.515	10.0	38.0	39.3	0.05	126783	0.001			12			
5.C.1 Waste Incineration	NH_3	0.000	0.000	10.0	50.0	51.0	0.00		0						
5.D.1 Domestic wastewater	NH_3	0.003	0.003		102.0	102.0	0.00	0.0	0						
5.E Other	NH_3	1.193	1.611	0.7	79.1	79.1	2.10	35.1	0.0052	11	10	13	10	9	15
Total		**66.71**	**56.05**			**15.7**	**100**	**-16.0**	**7.9189**						

Table A1-9. Summary of the key source and uncertainty analysis of Ni emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	Ni	0.061	0.492	1.5	29.7	29.8	2.44	702.7	0.0026		3	12		9	
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	Ni	2.438	0.236	1.3	66.0	66.0	2.76	-90.3	0.0012	4	8	4	4	6	4
1.A.1.a Public Electricity and Heat Production: Other Fuels	Ni	0.011	0.054	2.0	40.0	40.1	0.05	391.0	0.0001		16				
1.A.1.a Public Electricity and Heat Production: Peat	Ni	0.437	0.004	2.0	39.4	39.5	0.00	-99.2	0.0001	13		11			
1.A.1.a Public Electricity and Heat Production: Solid Fuels	Ni	0.221	0.002	2.0	40.0	40.1	0.00	-99.1	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	Ni	0.017	0.088	1.3	257.6	257.6	5.79	409.9	0.006		12			4	
1.A.1.b Petroleum refining: Liquid Fuels	Ni	0.573	0.154	10.0	100.0	100.5	2.73	-73.1	0.0006	11	9	13	9	7	11
1.A.2.a Iron and Steel: Biomass	Ni	0.000	0.000					-100.0							
1.A.2.a Iron and Steel: Liquid Fuels	Ni	0.765	0.058	5.0	100.0	100.1	0.38	-92.5	0.0005	9	15	9	8	15	8
1.A.2.a Iron and Steel: Solid Fuels	Ni	0.000	0.000					-100.0							
1.A.2.b Non-ferrous metals: Liquid Fuels	Ni	0.092	0.020	5.0	100.0	100.1	0.05	-78.1	0						
1.A.2.b Non-ferrous metals: Solid Fuels	Ni	0.000	0.000					-100.0							
1.A.2.c Chemicals: Biomass	Ni	0.004	0.007	5.0	40.0	40.3	0.00	65.0	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.c Chemicals: Liquid Fuels	Ni	0.342	0.022	5.0	100.0	100.1	0.06	-93.5	0.0001	14		15	10		12
1.A.2.c Chemicals: Other Fuels	Ni	0.000	0.000					-100.0							
1.A.2.c Chemicals: Solid Fuels	Ni	0.007	0.000	2.0	40.0	40.1	0.00	-96.9	0						
1.A.2.d Pulp, Paper and Print: Biomass	Ni	0.274	0.254	8.0	40.0	40.8	1.22	-7.3	0.001	16	6			13	
1.A.2.d Pulp, Paper and Print: Liquid Fuels	Ni	3.637	0.662	5.0	100.0	100.1	50.02	-81.8	0.0014	2	2	2	2	1	2
1.A.2.d Pulp, Paper and Print: Other Fuels	Ni	0.004	0.000					-100.0							
1.A.2.d Pulp, Paper and Print: Solid Fuels	Ni	0.028	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	Ni	0.003	0.010	5.0	40.0	40.3	0.00	317.6	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	Ni	0.946	0.010	5.0	100.0	100.1	0.01	-98.9	0.0024	8		8	7		6
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	Ni	0.001	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	Ni	0.006	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	Ni	0.001	0.006	4.4	17.8	18.3	0.00	869.6	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	Ni	0.756	0.245	10.0	60.0	60.8	2.52	-67.6	0.0009	10	7	10		8	13
1.A.2.f Non-metallic minerals: Solid Fuels	Ni	0.080	0.011	8.8	17.8	19.9	0.00	-86.9	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	Ni	0.000	0.000	3.3	65.7	65.8	0.00		0						
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	Ni	0.000	0.000	4.2	85.5	85.6	0.00	63.4	0						
1.A.2.g.vii Off-road vehicles and other machinery: Other Fossil Fuels	Ni	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.2.g.viii Other: Biomass	Ni	0.167	0.096	4.6	18.5	19.1	0.04	-42.7	0		11				
1.A.2.g.viii Other: Liquid Fuels	Ni	1.753	0.335	4.8	38.0	38.3	1.88	-80.9	0.0001	6	5	6		11	9
1.A.2.g.viii Other: Solid Fuels	Ni	0.003	0.024	4.8	19.3	19.9	0.00	796.6	0						
1.A.3.b.i Road Transportation, Cars: Biomass	Ni	0.000	0.001	3.4	67.1	67.2	0.00		0						
1.A.3.b.i Road Transportation, Cars: Diesel oil	Ni	0.000	0.000	5.0	99.7	99.8	0.00	746.6	0						
1.A.3.b.i Road Transportation, Cars: Gasoline	Ni	0.009	0.004	3.0	99.5	99.6	0.00	-56.7	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	Ni	0.000	0.000	2.9	58.9	58.9	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	Ni	0.000	0.000	5.0	100.0	100.1	0.00	908.5	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	Ni	0.001	0.000	3.0	100.0	100.0	0.00	-88.3	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	Ni	0.000	0.000	2.5	50.4	50.4	0.00	2117.3	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	Ni	0.000	0.000	4.7	93.9	94.1	0.00	2.5	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	Ni	0.000	0.000	3.0	100.0	100.0	0.00	-87.1	0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	Ni	0.000	0.000	4.7	94.5	94.6	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	Ni	0.000	0.000	3.0	100.0	100.0	0.00	108.8	0						
1.A.3.b.vi Road Transportation: Automobile tyre and brake wear	Ni	0.016	0.026		1000	1000	7.51	64.0	0.0068		21			3	
1.A.3.c Railways: Liquid Fuels	Ni	0.002	0.001	5.0	95.0	95.1	0.00	-63.7	0						
1.A.3.d Domestic Navigation: Biomass	Ni	0.000	0.007	5.0	50.0	50.2	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	Ni	0.027	0.041	3.6	36.2	36.4	0.03	51.0	0		18				
1.A.3.d Domestic Navigation: Gasoline	Ni	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.d Domestic Navigation: Residual Oil	Ni	2.450	0.675	15.0	50.0	52.2	14.14	-72.4	0.0053	3	1	5	5	2	7
1.A.3.e Other Transportation: Biomass	Ni	0.000	0.000	3.7	74.5	74.6	0.00		0						
1.A.3.e Other Transportation: Other Fossil Fuels	Ni	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.e Other Transportation: Total	Ni	0.000	0.000	5.0	100.0	100.1	0.00	-62.4	0						
1.A.4.a Commercial/Institutional: Biomass	Ni	0.002	0.004	10.0	39.9	41.1	0.00	99.1	0						
1.A.4.a Commercial/Institutional: Gasoline	Ni	0.000	0.000	5.0	100.0	100.1	0.00	-6.0	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.a Commercial/Institutional: Liquid Fuels	Ni	2.225	0.001	19.4	97.0	99.0	0.00	-100.0	0.0143	5		3	3		3
1.A.4.a Commercial/Institutional: Other Fossil Fuels	Ni	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.4.b Residential: Biomass	Ni	0.098	0.082	10.0	40.0	41.2	0.13	-15.6	0.0001		13				
1.A.4.b Residential: Liquid Fuels	Ni	1.113	0.001	17.8	89.4	91.2	0.00	-99.9	0.003	7		7	6		5
1.A.4.b Residential: Other Fossil Fuels	Ni	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	Ni	0.007	0.011	10.0	39.9	41.2	0.00	48.7	0						
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	Ni	0.060	0.017	30.0	100.0	104.4	0.04	-71.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Fossil part of biodiesel and biogasoline	Ni	0.000	0.000	3.5	70.8	70.9	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	Ni	0.000	0.000	3.6	71.6	71.7	0.00	180.9	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	Ni	0.332	0.075	20.0	99.9	101.9	0.67	-77.3	0.0001	15	14		11	14	
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	Ni	0.014	0.000					-100.0							
2.A.3 Glass Production	Ni	0.182	0.039		300.0	300.0	1.58	-78.4	0.0001		19			12	10
2.B.10 Other	Ni	0.010	0.004		100.0	100.0	0.00	-56.0	0						
2.C.1 Iron and Steel Production	Ni	8.356	0.398	2.9	42.6	42.7	3.30	-95.2	0.0187	1	4	1	1	5	1
2.C.2 Ferroalloys production	Ni	0.000	0.008	5.0	75.0	75.2	0.00		0						
2.C.3 Aluminium production	Ni	0.003	0.001	2.0	100.0	100.0	0.00	-82.4	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.C.7 Other	Ni	0.033	0.032	4.0	53.0	53.2	0.03	-2.4	0		20				
2.G.4 Other	Ni	0.053	0.042	12.5	330.3	330.6	2.22	-19.6	0.0016		17			10	
2.H.1 Pulp and paper	Ni	0.467	0.112	6.5	51.0	51.4	0.37	-76.2	0.0001	12	10	14			
2.H.3 Other (NFR 2A5a)	Ni	0.000	0.000		50.0	50.0	0.00	12.1	0						
2.H.3 Other (NFR 2A6)	Ni	0.055	0.016		47.7	47.7	0.01	-71.7	0						
5.C.1 Waste Incineration	Ni	0.001	0.007	8.0	185.8	186.0	0.02	412.0	0						
Total		**28.138**	**4.392**			**21.3**	**100**	**-84.4**	**2.593**						

Table A1-10. Summary of the key source and uncertainty analysis of NMVOC emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	NMVOC	0.272	2.148	1.5	55.6	55.7	0.17	688.5	0.001		14	15			
1.A.1.a Public Electricity and Heat Production: Gaseous Fuels	NMVOC	0.017	0.003	1.8	27.0	27.0	0.00	-84.7	0						
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	NMVOC	0.048	0.011	1.2	18.0	18.1	0.00	-77.2	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	NMVOC	0.028	0.135	2.0	75.0	75.0	0.00	391.0	0						
1.A.1.a Public Electricity and Heat Production: Peat	NMVOC	0.547	0.044	2.0	49.3	49.3	0.00	-92.0	0						
1.A.1.a Public Electricity and Heat Production: Solid Fuels	NMVOC	0.246	0.011	1.6	32.0	32.0	0.00	-95.5	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	NMVOC	0.044	0.219	1.3	34.7	34.8	0.00	397.5	0						
1.A.1.b Petroleum refining: Biomass	NMVOC	0.000	0.000		40.0	40.0	0.00		0						
1.A.1.b Petroleum refining: Gaseous Fuels	NMVOC	0.001	0.005	2.0	30.0	30.1	0.00	589.2	0						
1.A.1.b Petroleum refining: Liquid Fuels	NMVOC	14.231	8.910	10.0	40.0	41.2	1.56	-37.4	0.0031	7	2	8	10	8	11
1.A.1.c Manufacture of Solid fuels and Other Energy Industries: Solid Fuels	NMVOC	0.009	0.009	5.0	30.0	30.4	0.00	-4.2	0						
1.A.2.a Iron and Steel: Biomass	NMVOC	0.000	0.001	5.0	75.0	75.2	0.00	1773.8	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.a Iron and Steel: Gaseous Fuels	NMVOC	0.001	0.002	5.0	30.0	30.4	0.00	73.3	0						
1.A.2.a Iron and Steel: Liquid Fuels	NMVOC	0.028	0.011	5.0	50.0	50.2	0.00	-62.0	0						
1.A.2.a Iron and Steel: Solid Fuels	NMVOC	0.009	0.005	2.0	50.0	50.0	0.00	-46.0	0						
1.A.2.b Non-ferrous metals: Gaseous Fuels	NMVOC	0.000	0.000	5.0	30.0	30.4	0.00	-21.3	0						
1.A.2.b Non-ferrous metals: Liquid Fuels	NMVOC	0.004	0.002	5.0	50.0	50.2	0.00	-48.7	0						
1.A.2.b Non-ferrous metals: Solid Fuels	NMVOC	0.000	0.000					-100.0							
1.A.2.c Chemicals: Biomass	NMVOC	0.058	0.020	5.0	50.0	50.2	0.00	-64.8	0						
1.A.2.c Chemicals: Gaseous Fuels	NMVOC	0.006	0.001	5.0	30.0	30.4	0.00	-75.0	0						
1.A.2.c Chemicals: Liquid Fuels	NMVOC	0.015	0.006	5.0	50.0	50.2	0.00	-58.4	0						
1.A.2.c Chemicals: Other Fuels	NMVOC	0.000	0.001	10.0	50.0	51.0	0.00	657.9	0						
1.A.2.c Chemicals: Solid Fuels	NMVOC	0.009	0.003	2.0	50.0	50.0	0.00	-70.0	0						
1.A.2.d Pulp, Paper and Print: Biomass	NMVOC	3.774	0.736	8.0	75.0	75.4	0.04	-80.5	0.0001	16	21	12	12		10
1.A.2.d Pulp, Paper and Print: Gaseous Fuels	NMVOC	0.002	0.000	5.0	30.0	30.4	0.00	-83.7	0						
1.A.2.d Pulp, Paper and Print: Liquid Fuels	NMVOC	0.069	0.016	5.0	50.0	50.2	0.00	-76.7	0						
1.A.2.d Pulp, Paper and Print: Other Fuels	NMVOC	0.003	0.000	10.0	50.0	51.0	0.00	-92.6	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.d Pulp, Paper and Print: Solid Fuels	NMVOC	0.033	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	NMVOC	0.016	0.031	5.0	50.0	50.2	0.00	95.4	0						
1.A.2.e Food Processing, Beverages and Tobacco: Gaseous Fuels	NMVOC	0.009	0.003	5.0	30.0	30.4	0.00	-69.4	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	NMVOC	0.021	0.001	5.0	50.0	50.2	0.00	-94.6	0						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	NMVOC	0.000	0.000	10.0	50.0	51.0	0.00	-96.9	0						
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	NMVOC	0.008	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	NMVOC	0.008	0.018	4.5	26.7	27.1	0.00	124.3	0						
1.A.2.f Non-metallic minerals: Gaseous Fuels	NMVOC	0.002	0.001	4.1	12.8	13.4	0.00	-47.3	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	NMVOC	0.022	0.010	9.2	18.4	20.6	0.00	-51.9	0						
1.A.2.f Non-metallic minerals: Other Fuels	NMVOC	0.000	0.002	10.0	30.0	31.6	0.00		0						
1.A.2.f Non-metallic minerals: Solid Fuels	NMVOC	0.098	0.029	8.9	26.8	28.2	0.00	-70.8	0						
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	NMVOC	0.000	0.091	3.2	12.6	13.0	0.00		0						
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	NMVOC	1.654	0.830	3.5	14.9	15.3	0.00	-49.8	0		20				

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.g.viii Other: Biomass	NMVOC	2.390	0.279	4.6	27.4	27.7	0.00	-88.3	0	19		13			
1.A.2.g.viii Other: Gaseous Fuels	NMVOC	0.004	0.001	2.6	5.1	5.7	0.00	-83.5	0						
1.A.2.g.viii Other: Liquid Fuels	NMVOC	0.072	0.020	3.4	6.7	7.5	0.00	-72.4	0						
1.A.2.g.viii Other: Other Fuels	NMVOC	0.000	0.000	5.0	20.0	20.6	0.00		0						
1.A.2.g.viii Other: Solid Fuels	NMVOC	0.007	0.025	4.6	18.3	18.8	0.00	272.9	0						
1.A.3.a Domestic Aviation: Aviation Gasoline	NMVOC	0.003	0.000	10.0	10.0	14.1	0.00	-95.6	0						
1.A.3.a Domestic Aviation: Biomass	NMVOC	0.000	0.001	10.0	10.0	14.1	0.00		0						
1.A.3.a Domestic Aviation: Jet Kerosene	NMVOC	0.108	0.015	10.0	10.0	14.1	0.00	-85.9	0						
1.A.3.b.i Road Transportation, Cars: Biomass	NMVOC	0.000	0.606	4.5	45.5	45.7	0.01		0.0001						
1.A.3.b.i Road Transportation, Cars: Diesel oil	NMVOC	0.637	0.208	5.0	49.3	49.6	0.00	-67.4	0						
1.A.3.b.i Road Transportation, Cars: Gasoline	NMVOC	85.82	4.307	3.0	49.7	49.8	0.53	-95.0	0.1168	2	8	1	1	11	1
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	NMVOC	0.000	0.022	3.6	36.0	36.2	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	NMVOC	0.089	0.044	5.0	50.0	50.2	0.00	-51.0	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gaseous Fuels	NMVOC	0.000	0.000	5.0	50.0	50.2	0.00		0						

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1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	NMVOC	5.568	0.159	3.0	50.0	50.1	0.00	-97.1	0.0006	12		7	14		8
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	NMVOC	0.010	0.041	2.2	22.4	22.5	0.00	333.7	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	NMVOC	5.215	0.154	4.7	46.6	46.8	0.00	-97.1	0.0004	14		9			9
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	NMVOC	0.150	0.018	3.0	50.0	50.1	0.00	-88.0	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: LNG	NMVOC	0.000	0.002	5.0	50.0	50.2	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	NMVOC	0.000	0.032	4.6	46.0	46.2	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	NMVOC	1.245	0.434	3.0	50.0	50.1	0.01	-65.1	0						
1.A.3.b.v Road Transportation, Motorcycles: Gasoline	NMVOC	44.98	2.353	3.0	50.0	50.1	0.16	-94.8	0.032	3	13	3	3		2
1.A.3.c Railways: Liquid Fuels	NMVOC	0.152	0.039	5.0	75.0	75.2	0.00	-74.4	0						
1.A.3.d Domestic Navigation: Biomass	NMVOC	0.000	0.009	5.0	20.0	20.6	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	NMVOC	5.216	4.238	4.8	19.3	19.9	0.08	-18.8	0.0002	13	9				
1.A.3.d Domestic Navigation: Gasoline	NMVOC	0.000	0.007	5.0	50.0	50.2	0.00		0						
1.A.3.d Domestic Navigation: LNG	NMVOC	0.000	0.057	10.0	50.0	51.0	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.d Domestic Navigation: Residual Oil	NMVOC	0.071	0.049	15.0	20.0	25.0	0.00	-30.9	0						
1.A.3.e Other Transportation: Biomass	NMVOC	0.000	0.005	3.8	38.3	38.5	0.00		0						
1.A.3.e Other Transportation: Gaseous fuels	NMVOC	0.000	0.000	5.0	30.0	30.4	0.00	-1.5	0						
1.A.3.e Other Transportation: Total	NMVOC	1.184	0.068	5.0	50.0	50.2	0.00	-94.3	0						
1.A.4.a Commercial/Institutional: Biomass	NMVOC	0.330	0.098	4.2	27.9	28.2	0.00	-70.2	0						
1.A.4.a Commercial/Institutional: Gaseous Fuels	NMVOC	0.002	0.003	10.0	30.0	31.6	0.00	113.3	0						
1.A.4.a Commercial/Institutional: Gasoline	NMVOC	1.778	0.597	5.0	20.0	20.6	0.00	-66.4	0	21		18			
1.A.4.a Commercial/Institutional: Liquid Fuels	NMVOC	0.432	0.159	4.9	19.5	20.1	0.00	-63.2	0						
1.A.4.b Residential: Biomass	NMVOC	17.57	6.067	9.7	72.6	73.2	2.28	-65.5	0.0005	4	6	5	7	7	4
1.A.4.b Residential: Gaseous Fuels	NMVOC	0.002	0.001	10.0	30.0	31.6	0.00	-31.3	0						
1.A.4.b Residential: Liquid Fuels	NMVOC	4.146	2.658	3.4	13.4	13.9	0.02	-35.9	0	15	12	16			
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	NMVOC	1.188	0.684	7.8	58.3	58.8	0.02	-42.5	0		23				
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	NMVOC	0.058	0.017	30.0	20.0	36.1	0.00	-71.5	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.c Agriculture/Forestry/Fisheries: Gaseous Fuels	NMVOC	0.001	0.000	10.0	30.0	31.6	0.00	-90.7	0						
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	NMVOC	0.755	0.693	4.2	16.8	17.4	0.00	-8.2	0		22				
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	NMVOC	2.665	1.260	2.6	17.1	17.3	0.01	-52.7	0	18	18	17			
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	NMVOC	0.172	0.000					-100.0							
1.B.1.b Coke production	NMVOC	0.009	0.008	5.0	900.0	900.0	0.00	-14.9	0						
1.B.1.c Fugitive emissions from Solid Fuels	NMVOC	0.000	0.001	50.0	30.0	58.3	0.00	146.0	0						
1.B.2.a Oil	NMVOC	14.65	2.995		53.0	53.0	0.29	-79.6	0.0009	5	11	4	8	12	7
1.B.2.b Natural gas	NMVOC	0.546	0.314		44.5	44.5	0.00	-42.6	0						
1.B.2.c Venting and flaring	NMVOC	0.000	0.000	0.0	50.0	50.0	0.00	64.4	0						
1.D International Aviation: Biomass	NMVOC	0.000	0.003	10.0	10.0	14.1	0.00		0						
1.D International Aviation: Jet Kerosene	NMVOC	0.088	0.072	10.0	10.0	14.1	0.00	-18.2	0						
2.A.3 Glass Production	NMVOC	0.035	C		400.0	400.0	0.00	C	C						
2.B.10 Other	NMVOC	5.974	1.638		39.9	39.9	0.05	-72.6	0	11	16	10	15		13
2.C.1 Iron and Steel Production	NMVOC	0.290	C	4.3	68.8	68.9	0.00	C	C						
2.C.3 Aluminium production	NMVOC	0.014	0.000	2.0	100.0	100.0	0.00	-100.0	0						
2.D.3 Other	NMVOC	89.951	44.358	10.0	10.0	14.1	4.52	-50.7	0.0304	1	1	2	6	5	6
2.G.4 Other	NMVOC	0.041	0.014	15.0	100.0	101.1	0.00	-65.7	0						
2.H.1 Pulp and paper	NMVOC	6.739	6.026	6.2	100.3	100.5	4.23	-10.6	0.0105	10	7		9	6	

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.H.2 Food and beverages industry	NMVOC	1.237	1.380	20.0	200.0	201.0	0.89	11.5	0.0028		17			10	
2.H.3 Other (NFR 2A6)	NMVOC	0.102	0.038		387.1	387.1	0.00	-62.6	0						
3.B.1 Dairy cattle	NMVOC	14.280	7.191	20.0	200.0	201.0	24.11	-49.6	0.0185	6	4	6	2	2	3
3.B.1 Non-dairy cattle	NMVOC	8.224	8.165	20.0	200.0	201.0	31.09	-0.7	0.0887	9	3		5	1	
3.B.3 Swine	NMVOC	1.397	0.677	20.0	200.0	201.0	0.21	-51.5	0.0001				13	14	
3.B.4 Fur-bearing animals	NMVOC	0.276	0.019	20.0	200.0	201.0	0.00	-93.3	0						
3.B.4 Goats	NMVOC	0.003	0.007	20.0	200.0	201.0	0.00	174.7	0						
3.B.4 Horses	NMVOC	2.906	3.274	20.0	200.0	201.0	5.00	12.6	0.016	17	10		11	4	
3.B.4 Poultry	NMVOC	1.509	1.995	13.9	139.0	139.7	0.90	32.1	0.0032		15			9	
3.B.4 Sheep	NMVOC	0.166	0.247	20.0	200.0	201.0	0.03	48.6	0.0001						
3.D.a.2.a Animal manure applied to soils	NMVOC	10.819	7.133	5.0	200.0	200.1	23.51	-34.1	0.0348	8	5	11	4	3	5
3.D.a.2.b Sewage sludge applied to soils	NMVOC	0.024	0.122	5.0	200.0	200.1	0.01	404.3	0						
3.D.a.3 Urine and dung deposited by grazing animals	NMVOC	0.259	0.250	20.0	200.0	201.0	0.03	-3.8	0.0001						
3.D.e Cultivated crops	NMVOC	1.208	0.967	5.0	150.0	150.1	0.24	-19.9	0.0005		19			13	
5.A.1 Managed waste disposal sites	NMVOC	2.249	0.219	55.0	92.0	107.2	0.01	-90.3	0.0002	20		14			12
5.C.1 Waste Incineration	NMVOC	0.012	0.016	56.7	162.8	172.4	0.00	31.4	0						
5.D.1 Domestic wastewater	NMVOC	0.020	0.017		233.2	233.2	0.00	-14.7	0						
5.D.2 Industrial wastewater	NMVOC	0.014	0.013		238.3	238.3	0.00	-9.9	0						
Total		**366.3**	**126.1**			**23.3**	**100**	**-65.6**	**6.0177**						

Table A1-11. Summary of the key source and uncertainty analysis of NO_X emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	NO_x	1.634	7.527	1.5	37.4	37.4	0.71	360.5	0.0083	29	3	8		5	7
1.A.1.a Public Electricity and Heat Production: Gaseous Fuels	NO_x	0.515	0.031	1.8	17.6	17.7	0.00	-93.9	0						
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	NO_x	2.696	0.324	1.2	12.3	12.4	0.00	-88.0	0	21		18			
1.A.1.a Public Electricity and Heat Production: Other Fuels	NO_x	0.496	1.353	2.0	50.0	50.0	0.04	172.8	0.0004		20	33		14	
1.A.1.a Public Electricity and Heat Production: Peat	NO_x	2.077	0.061	2.0	19.7	19.8	0.00	-97.1	0	26		20			
1.A.1.a Public Electricity and Heat Production: Solid Fuels	NO_x	6.011	0.077	1.7	17.0	17.1	0.00	-98.7	0.0001	10		7			18
1.A.1.a Public Electricity and Heat Production: Other Fuels	NO_x	0.910	2.189	1.3	16.4	16.5	0.01	140.6	0.0001		13	29			
1.A.1.b Petroleum refining: Biomass	NO_x	0.000	0.009		50.0	50.0	0.00		0						
1.A.1.b Petroleum refining: Gaseous Fuels	NO_x	0.038	0.104	2.0	50.0	50.0	0.00	176.3	0						
1.A.1.b Petroleum refining: Liquid Fuels	NO_x	2.610	0.947	10.0	50.0	51.0	0.02	-63.7	0	22	23	23	17	18	20
1.A.1.c Manufacture of Solid fuels and Other Energy Industries: Solid Fuels	NO_x	0.503	0.447	5.0	50.0	50.2	0.00	-11.3	0		37				
1.A.2.a Iron and Steel: Biomass	NO_x	0.001	0.033	5.0	50.0	50.2	0.00	5729.7	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.a Iron and Steel: Gaseous Fuels	NO_x	0.014	0.071	5.0	50.0	50.2	0.00	415.5	0						
1.A.2.a Iron and Steel: Liquid Fuels	NO_x	1.331	0.464	5.0	50.0	50.2	0.00	-65.1	0	30	35	32			
1.A.2.a Iron and Steel: Solid Fuels	NO_x	0.364	0.122	2.0	50.0	50.0	0.00	-66.6	0						
1.A.2.b Non-ferrous metals: Gaseous Fuels	NO_x	0.011	0.012	5.0	50.0	50.2	0.00	5.0	0						
1.A.2.b Non-ferrous metals: Liquid Fuels	NO_x	0.159	0.073	5.0	50.0	50.2	0.00	-54.1	0						
1.A.2.b Non-ferrous metals: Solid Fuels	NO_x	0.015	0.000					-100.0							
1.A.2.c Chemicals: Biomass	NO_x	0.069	0.115	5.0	50.0	50.2	0.00	66.6	0						
1.A.2.c Chemicals: Gaseous Fuels	NO_x	0.164	0.055	5.0	50.0	50.2	0.00	-66.6	0						
1.A.2.c Chemicals: Liquid Fuels	NO_x	0.643	0.337	5.0	50.0	50.2	0.00	-47.7	0						
1.A.2.c Chemicals: Other Fuels	NO_x	0.008	0.028	10.0	50.0	51.0	0.00	234.0	0						
1.A.2.c Chemicals: Solid Fuels	NO_x	0.205	0.003	2.0	50.0	50.0	0.00	-98.5	0						
1.A.2.d Pulp, Paper and Print: Biomass	NO_x	4.916	2.303	8.0	50.0	50.6	0.12	-53.2	0.0002	12	12	16	9	12	13
1.A.2.d Pulp, Paper and Print: Gaseous Fuels	NO_x	0.070	0.012	5.0	50.0	50.2	0.00	-82.6	0						
1.A.2.d Pulp, Paper and Print: Liquid Fuels	NO_x	3.692	0.434	5.0	50.0	50.2	0.00	-88.2	0.0002	16	38	14	12		9

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.d Pulp, Paper and Print: Other Fuels	NO_x	0.106	0.005	10.0	50.0	51.0	0.00	-94.9	0						
1.A.2.d Pulp, Paper and Print: Solid Fuels	NO_x	0.574	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	NO_x	0.029	0.152	5.0	50.0	50.2	0.00	427.8	0						
1.A.2.e Food Processing, Beverages and Tobacco: Gaseous Fuels	NO_x	0.269	0.110	5.0	50.0	50.2	0.00	-59.2	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	NO_x	1.086	0.046	5.0	50.0	50.2	0.00	-95.8	0			31			
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	NO_x	0.012	0.001	10.0	50.0	51.0	0.00	-95.7	0						
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	NO_x	0.184	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	NO_x	0.010	0.147	4.5	27.0	27.4	0.00	1364.1	0						
1.A.2.f Non-metallic minerals: Gaseous Fuels	NO_x	0.069	0.049	4.1	19.1	19.6	0.00	-29.7	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	NO_x	2.234	0.292	8.9	17.8	19.9	0.00	-86.9	0	24		22			
1.A.2.f Non-metallic minerals: Other Fuels	NO_x	0.000	0.073	10.0	30.0	31.6	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.f Non-metallic minerals: Solid Fuels	NO_x	4.505	0.843	9.7	29.0	30.5	0.01	-81.3	0.0001	14	27	13	16		17
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	NO_x	0.000	0.393	3.8	15.2	15.6	0.00		0		40				
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	NO_x	11.064	3.101	4.9	19.7	20.3	0.04	-72.0	0.0001	3	9	5	10	16	10
1.A.2.g.viii Other: Biomass	NO_x	2.871	0.897	4.3	17.2	17.7	0.00	-68.8	0	20	25	21			
1.A.2.g.viii Other: Gaseous Fuels	NO_x	0.119	0.026	2.6	10.2	10.6	0.00	-78.0	0						
1.A.2.g.viii Other: Liquid Fuels	NO_x	2.911	1.432	4.2	8.3	9.3	0.00	-50.8	0	19	19	26			
1.A.2.g.viii Other: Other Fuels	NO_x	0.000	0.003	5.0	20.0	20.6	0.00		0						
1.A.2.g.viii Other: Solid Fuels	NO_x	0.144	1.606	4.9	19.8	20.4	0.01	1017.4	0.0001		17	27			
1.A.3.a Domestic Aviation: Aviation Gasoline	NO_x	0.016	0.001	10.0	10.0	14.1	0.00	-92.2	0						
1.A.3.a Domestic Aviation: Biomass	NO_x	0.000	0.006	10.0	10.0	14.1	0.00		0						
1.A.3.a Domestic Aviation: Jet Kerosene	NO_x	0.672	0.166	10.0	10.0	14.1	0.00	-75.2	0						
1.A.3.b.i Road Transportation, Cars: Biomass	NO_x	0.000	2.110	3.1	30.6	30.8	0.04		0.0005		14	19		15	
1.A.3.b.i Road Transportation, Cars: Diesel oil	NO_x	2.172	12.358	5.0	49.7	50.0	3.40	469.0	0.0418	25	1	3		4	4
1.A.3.b.i Road Transportation, Cars: Gasoline	NO_x	69.891	3.519	3.2	49.2	49.3	0.27	-95.0	0.1286	2	7	2	2	9	1

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base [illegible]	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	NO_x	0.000	0.715	3.7	36.9	37.1	0.01		0.0001		30				
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	NO_x	1.021	5.392	5.0	50.0	50.2	0.65	428.1	0.008		5	12		6	8
1.A.3.b.ii Road Transportation, Light duty trucks: Gaseous Fuels	NO_x	0.000	0.000	5.0	50.0	50.2	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	NO_x	6.083	0.226	3.0	50.0	50.1	0.00	-96.3	0.0011	9		9	8		5
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	NO_x	0.017	1.601	2.4	23.5	23.6	0.01	9532.3	0.0002		18	24			
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	NO_x	72.835	5.366	4.5	45.2	45.4	0.53	-92.6	0.1003	1	6	1	3	7	2
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	NO_x	0.219	0.028	3.0	49.6	49.7	0.00	-87.4	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: LNG	NO_x	0.000	0.046	5.0	30.0	30.4	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	NO_x	0.000	0.007	4.6	46.0	46.2	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	NO_x	0.061	0.092	3.0	50.0	50.1	0.00	50.0	0						
1.A.3.c Railways: Liquid Fuels	NO_x	1.895	0.473	5.0	100.0	100.1	0.02	-75.1	0	27	34	28	11		12
1.A.3.d Domestic Navigation: Biomass	NO_x	0.000	0.389	5.0	10.0	11.2	0.00		0		41				

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.d Domestic Navigation: Gas/Diesel Oil	NO_x	2.354	3.137	2.8	5.5	6.2	0.00	33.3	0	23	8	34			
1.A.3.d Domestic Navigation: Gasoline	NO_x	0.000	0.002	5.0	10.0	11.2	0.00		0						
1.A.3.d Domestic Navigation: LNG	NO_x	0.000	0.407	10.0	30.0	31.6	0.00		0		39				
1.A.3.d Domestic Navigation: Residual Oil	NO_x	4.525	2.025	15.0	10.0	18.0	0.01	-55.3	0.0002	13	15	17			
1.A.3.e Other Transportation: Biomass	NO_x	0.000	0.029	3.8	38.3	38.5	0.00		0						
1.A.3.e Other Transportation: Gaseous fuels	NO_x	0.001	0.001	5.0	50.0	50.2	0.00	-1.5	0						
1.A.3.e Other Transportation: Total	NO_x	6.625	0.892	5.0	50.0	50.2	0.02	-86.5	0.0006	8	26	10	6		6
1.A.4.a Commercial/Institutional: Biomass	NO_x	0.057	0.193	5.3	25.8	26.4	0.00	238.4	0						
1.A.4.a Commercial/Institutional: Gaseous Fuels	NO_x	0.061	0.131	10.0	50.0	51.0	0.00	114.6	0						
1.A.4.a Commercial/Institutional: Gasoline	NO_x	0.092	0.117	5.0	20.0	20.6	0.00	26.9	0						
1.A.4.a Commercial/Institutional: Liquid Fuels	NO_x	5.227	0.746	4.9	18.9	19.5	0.00	-85.7	0.0001	11	29	11	13		19
1.A.4.b Residential: Biomass	NO_x	3.200	2.686	9.8	48.7	49.7	0.16	-16.1	0.0009	17	11		14	10	
1.A.4.b Residential: Gaseous Fuels	NO_x	0.061	0.043	10.0	50.0	51.0	0.00	-29.8	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.b Residential: Liquid Fuels	NO_x	7.205	0.926	3.1	11.4	11.8	0.00	-87.1	0	7	24	6	7		
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	NO_x	0.225	0.524	6.9	34.4	35.1	0.00	132.9	0		32				
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	NO_x	3.800	1.014	30.0	30.0	42.4	0.02	-73.3	0.0002	15	22	15	18		16
1.A.4.c Agriculture/Forestry/Fisheries: Gaseous Fuels	NO_x	0.023	0.002	10.0	50.0	51.0	0.00	-90.7	0						
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	NO_x	0.017	0.218	3.7	15.0	15.4	0.00	1213.8	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	NO_x	10.261	1.253	3.7	14.2	14.7	0.00	-87.8	0.0001	5	21	4	15		14
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	NO_x	0.339	0.000					-100.0							
1.B.1.b Charcoal production	NO_x	0.000	0.000	70.0	57.0	90.3	0.00	-33.3	0						
1.B.1.b Coke production	NO_x	0.000	0.000	5.0	400.0	400.0	0.00	-23.0	0						
1.B.1.c Fugitive emissions from Solid Fuels	NO_x	0.005	0.009	50.0	20.0	53.9	0.00	59.8	0						
1.B.2.c Venting and flaring	NO_x	0.000	0.000	50.0	20.0	53.9	0.00	-7.1	0						
1.D International Aviation: Biomass	NO_x	0.000	0.020	10.0	10.0	14.1	0.00		0						
1.D International Aviation: Jet Kerosene	NO_x	0.546	0.521	10.0	10.0	14.1	0.00	-4.6	0		33				
2.A.3 Glass Production	NO_x	0.725	0.000					-100.0							

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.B.10 Other	NO_x	1.285	0.586		54.5	54.5	0.01	-54.4	0	31	31				
2.B.2 Nitric Acid Production	NO_x	1.151	0.014	2.0	5.0	5.4	0.00	-98.7	0	32		30			
2.C.1 Iron and Steel Production	NO_x	0.988	0.790	3.0	45.5	45.6	0.01	-20.0	0.0001		28				
2.C.2 Ferroalloys production	NO_x	0.300	0.033	5.0	75.0	75.2	0.00	-89.1	0						
2.C.3 Aluminium production	NO_x	0.055	0.093	2.0	50.0	50.0	0.00	70.1	0						
2.C.7 Other	NO_x	0.349	0.243	4.0	50.0	50.2	0.00	-30.2	0						
2.G.4 Other	NO_x	0.016	0.006	14.2	7.8	16.2	0.00	-64.3	0						
2.H.1 Pulp and paper	NO_x	10.458	10.820	6.7	9.6	11.7	0.14	3.5	0.0019	4	2		19	11	
2.H.2 Food and beverages industry	NO_x	0.000	0.007	20.0	200.0	201.0	0.00	2629.3	0						
2.H.3 Other (NFR 2A5a)	NO_x	0.000	0.000		100.0	100.0	0.00		0						
3.B.1 Dairy cattle	NO_x	0.497	0.038	20.0	80.0	82.5	0.00	-92.4	0						
3.B.1 Non-dairy cattle	NO_x	0.258	0.120	20.0	80.0	82.5	0.00	-53.4	0						
3.B.3 Swine	NO_x	0.137	0.015	20.0	80.0	82.5	0.00	-88.8	0						
3.B.4 Fur-bearing animals	NO_x	0.039	0.003	20.0	80.0	82.5	0.00	-93.3	0						
3.B.4 Goats	NO_x	0.000	0.000	20.0	80.0	82.5	0.00	174.7	0						
3.B.4 Horses	NO_x	0.058	0.066	20.0	80.0	82.5	0.00	12.6	0						
3.B.4 Poultry	NO_x	0.058	0.103	16.8	67.3	69.3	0.00	79.7	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
3.B.4 Sheep	NO_x	0.008	0.012	20.0	80.0	82.5	0.00	48.6	0						
3.D.a.1 Inorganic N fertilizers	NO_x	8.980	7.397	5.0	400.0	400.0	77.94	-17.6	0.3582	6	4	25	1	1	3
3.D.a.2.a Animal manure applied to soils	NO_x	3.110	2.808	5.0	400.0	400.0	11.23	-9.7	0.0585	18	10		4	2	15
3.D.a.2.b Sewage sludge applied to soils	NO_x	0.047	0.238	5.0	400.0	400.0	0.08	404.3	0.001					13	
3.D.a.2.c Other organic fertilizers applied to soils	NO_x	0.068	0.454	5.0	400.0	400.0	0.29	567.6	0.0036		36			8	11
3.D.a.3 Urine and dung deposited by grazing animals	NO_x	1.720	1.704	20.0	400.0	400.5	4.14	-1.0	0.0243	28	16		5	3	
5.C.1 Waste Incineration	NO_x	0.094	0.171	14.5	345.1	345.4	0.03	81.5	0.0003					17	
Total		**285.24**	**99.41**			**33.7**	**100**	**-65.1**	**8.606**						

Table A1-12. Summary of the key source and uncertainty analysis of PAH 1-4 emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	PAH 1-4	0.041	0.320	1.5	74.2	74.2	0.00	683.2	0.0146		3	7			
1.A.1.a Public Electricity and Heat Production: Gaseous Fuels	PAH 1-4	0.000	0.000	1.8	61.5	61.5	0.00	-75.7	0						
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	PAH 1-4	0.004	0.002	1.3	63.9	63.9	0.00	-51.5	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	PAH 1-4	0.000	0.000	2.0	100.0	100.0	0.00	391.0	0						
1.A.1.a Public Electricity and Heat Production: Peat	PAH 1-4	0.033	0.003	2.0	98.6	98.6	0.00	-92.0	0						
1.A.1.a Public Electricity and Heat Production: Solid Fuels	PAH 1-4	0.002	0.000	1.4	69.3	69.3	0.00	-98.5	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	PAH 1-4	0.000	0.000	1.3	185.2	185.2	0.00	409.9	0						
1.A.1.b Petroleum refining: Liquid Fuels	PAH 1-4	0.001	0.000	10.0	100.0	100.5	0.00	-60.5	0						
1.A.2.a Iron and Steel: Biomass	PAH 1-4	0.000	0.000					-100.0							
1.A.2.a Iron and Steel: Liquid Fuels	PAH 1-4	0.002	0.000	5.0	100.0	100.1	0.00	-77.8	0						
1.A.2.a Iron and Steel: Solid Fuels	PAH 1-4	0.000	0.000					-100.0							
1.A.2.b Non-ferrous metals: Liquid Fuels	PAH 1-4	0.000	0.000	5.0	100.0	100.1	0.00	-36.4	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.b Non-ferrous metals: Solid Fuels	PAH 1-4	0.000	0.000					-100.0							
1.A.2.c Chemicals: Biomass	PAH 1-4	0.012	0.003	5.0	100.0	100.1	0.00	-73.1	0						
1.A.2.c Chemicals: Liquid Fuels	PAH 1-4	0.001	0.000	5.0	100.0	100.1	0.00	-84.0	0						
1.A.2.c Chemicals: Other Fuels	PAH 1-4	0.000	0.000					-100.0							
1.A.2.c Chemicals: Solid Fuels	PAH 1-4	0.000	0.000	2.0	100.0	100.0	0.00	111.6	0						
1.A.2.d Pulp, Paper and Print: Biomass	PAH 1-4	0.754	0.111	8.0	100.0	100.3	0.00	-85.3	0.0026	4	4	3			
1.A.2.d Pulp, Paper and Print: Liquid Fuels	PAH 1-4	0.006	0.002	5.0	100.0	100.1	0.00	-71.7	0						
1.A.2.d Pulp, Paper and Print: Other Fuels	PAH 1-4	0.000	0.000					-100.0							
1.A.2.d Pulp, Paper and Print: Solid Fuels	PAH 1-4	0.001	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	PAH 1-4	0.003	0.005	5.0	100.0	100.1	0.00	50.6	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	PAH 1-4	0.002	0.000	5.0	100.0	100.1	0.00	-94.9	0						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	PAH 1-4	0.000	0.000					-100.0							

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	PAH 1-4	0.000	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	PAH 1-4	0.002	0.003	4.5	45.2	45.5	0.00	78.9	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	PAH 1-4	0.002	0.001	9.6	38.5	39.7	0.00	-74.7	0						
1.A.2.f Non-metallic minerals: Solid Fuels	PAH 1-4	0.001	0.000	8.8	44.5	45.3	0.00	-71.5	0						
1.A.2.g.viii Other: Biomass	PAH 1-4	0.478	0.042	4.5	36.2	36.5	0.00	-91.2	0.0003	5		4			
1.A.2.g.viii Other: Liquid Fuels	PAH 1-4	0.010	0.004	3.6	21.4	21.7	0.00	-62.4	0						
1.A.2.g.viii Other: Solid Fuels	PAH 1-4	0.000	0.002	4.9	39.5	39.8	0.00	2472.6	0						
1.A.3.b.i Road Transportation, Cars: Diesel oil	PAH 1-4	0.030	0.013	5.0	1000	1000	0.00	-55.9	0.0007						
1.A.3.b.i Road Transportation, Cars: Gasoline	PAH 1-4	0.107	0.043	3.0	1000	1000	0.01	-59.9	0.005						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	PAH 1-4	0.008	0.005	5.0	1000	1000	0.00	-43.8	0.0001						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	PAH 1-4	0.006	0.000	3.0	1000	1000	0.00	-93.3	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	PAH 1-4	0.063	0.012	4.4	880.8	880.8	0.00	-81.8	0.0008						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	PAH 1-4	0.000	0.000	3.0	1000	1000	0.00	-91.3	0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	PAH 1-4	0.001	0.001	3.0	1000	1000	0.00	22.3	0						
1.A.3.b.vi Road Transportation: Automobile tyre and brake wear	PAH 1-4	0.004	0.007		1000	1000	0.00	67.8	0.001						
1.A.3.d Domestic Navigation: Biomass	PAH 1-4	0.000	0.000	5.0	1000	1000	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	PAH 1-4	0.001	0.002	3.6	36.3	36.4	0.00	51.0	0						
1.A.3.d Domestic Navigation: Residual Oil	PAH 1-4	0.010	0.003	15.0	50.0	52.2	0.00	-72.4	0						
1.A.4.a Commercial/Institutional: Biomass	PAH 1-4	0.210	0.058	10.0	1000	1000	0.02	-72.2	0		5				
1.A.4.a Commercial/Institutional: Liquid Fuels	PAH 1-4	0.014	0.000	20.0	100.0	102.0	0.00	-97.9	0						
1.A.4.b Residential: Biomass	PAH 1-4	12.622	4.123	10.0	1000	1000	99.03	-67.3	11.39	1	1	1	1	1	1
1.A.4.b Residential: Liquid Fuels	PAH 1-4	0.039	0.001	20.0	100.0	102.0	0.00	-98.4	0						
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	PAH 1-4	0.767	0.400	10.0	1000	1000	0.93	-47.9	0.9822	3	2	5	2	2	2
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	PAH 1-4	0.002	0.001	30.0	1000	1000	0.00	-71.5	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	PAH 1-4	0.002	0.001	20.0	100.0	102.0	0.00	-66.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	PAH 1-4	0.086	0.000					-100.0							
1.B.1.b Coke production	PAH 1-4	0.031	0.012	5.0	100.0	100.1	0.00	-62.8	0						
2.C.1 Iron and Steel Production	PAH 1-4	0.334	0.019	4.9	24.7	25.2	0.00	-94.3	0.0001	6	6				
2.C.3 Aluminium production	PAH 1-4	3.282	0.013	2.0	100.0	100.0	0.00	-99.6	0.2199	2	2				
2.G.4 Other	PAH 1-4	0.002	0.001	15.0	100.0	101.1	0.00	-65.7	0						
2.H.1 Pulp and paper	PAH 1-4	0.016	0.023	6.9	1000	1000	0.00	45.0	0.0097						
5.C.1 Waste Incineration	PAH 1-4	0.001	0.003	9.9	176.6	176.9	0.00	410.9	0						
Total		**18.990**	**5.237**			**791.2**	**100**	**-72.4**	**35.5347**						

Table A1-13. Summary of the key source and uncertainty analysis of Pb emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	Pb	0.177	1.617	1.5	75.2	75.2	54.50	813.3	0.0011	1				1	
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	Pb	0.180	0.026	1.2	59.5	59.5	0.01	-85.9	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	Pb	0.551	0.189	2.0	100.0	100.0	1.32	-65.6	0	9				9	
1.A.1.a Public Electricity and Heat Production: Peat	Pb	0.350	0.002	2.0	98.6	98.6	0.00	-99.5	0						
1.A.1.a Public Electricity and Heat Production: Solid Fuels	Pb	0.630	0.001	2.0	100.0	100.0	0.00	-99.8	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	Pb	0.858	0.306	1.3	65.1	65.1	1.47	-64.3	0	6				7	
1.A.1.b Petroleum refining: Liquid Fuels	Pb	0.042	0.011	10.0	100.0	100.5	0.00	-73.7	0						
1.A.2.a Iron and Steel: Biomass	Pb	0.000	0.000					-100.0							
1.A.2.a Iron and Steel: Liquid Fuels	Pb	0.059	0.005	5.0	100.0	100.1	0.00	-91.8	0						
1.A.2.a Iron and Steel: Solid Fuels	Pb	0.001	0.000					-100.0							
1.A.2.b Non-ferrous metals: Liquid Fuels	Pb	0.008	0.002	5.0	100.0	100.1	0.00	-69.4	0						
1.A.2.b Non-ferrous metals: Solid Fuels	Pb	0.000	0.000					-100.0							
1.A.2.c Chemicals: Biomass	Pb	0.009	0.017	5.0	100.0	100.1	0.01	82.0	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.c Chemicals: Liquid Fuels	Pb	0.027	0.002	5.0	100.0	100.1	0.00	-92.0	0						
1.A.2.c Chemicals: Other Fuels	Pb	0.000	0.000					-100.0							
1.A.2.c Chemicals: Solid Fuels	Pb	0.018	0.000	2.0	40.0	40.1	0.00	-99.4	0						
1.A.2.d Pulp, Paper and Print: Biomass	Pb	0.615	0.601	8.0	100.0	100.3	13.41	-2.2	0.0003	3				3	
1.A.2.d Pulp, Paper and Print: Liquid Fuels	Pb	0.267	0.051	5.0	100.0	100.1	0.10	-80.8	0	16					
1.A.2.d Pulp, Paper and Print: Other Fuels	Pb	0.007	0.000					-100.0							
1.A.2.d Pulp, Paper and Print: Solid Fuels	Pb	0.060	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	Pb	0.006	0.030	5.0	100.0	100.1	0.03	408.9	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	Pb	0.073	0.001	5.0	100.0	100.1	0.00	-98.3	0						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	Pb	0.001	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	Pb	0.016	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	Pb	0.001	0.031	4.7	93.9	94.0	0.03	2179.9	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	Pb	0.059	0.021	10.0	39.8	41.0	0.00	-65.2	0						
1.A.2.f Non-metallic minerals: Solid Fuels	Pb	0.223	C	8.8	17.8	19.9	0.00	C	C						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.g.viii Other: Biomass	Pb	0.383	0.222	4.6	92.2	92.4	1.55	-42.1	0		7			6	
1.A.2.g.viii Other: Liquid Fuels	Pb	0.161	0.037	4.2	24.9	25.2	0.00	-77.0	0						
1.A.2.g.viii Other: Solid Fuels	Pb	0.004	0.070	4.9	19.7	20.3	0.01	1673.5	0		13				
1.A.3.a Domestic Aviation: Aviation Gasoline	Pb	0.948	0.094	10.0	100.0	100.5	0.33	-90.1	0		12				
1.A.3.b.i Road Transportation, Cars: Gasoline	Pb	256.519	0.002	3.0	15.0	15.3	0.00	-100.0	0.0003	1		1	1		1
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	Pb	17.843	0.000	3.0	15.0	15.3	0.00	-100.0	0	4		4	4		4
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	Pb	0.407	0.000	3.0	15.0	15.3	0.00	-100.0	0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	Pb	0.838	0.000	3.0	15.0	15.3	0.00	-100.0	0						
1.A.3.b.vi Road Transportation: Automobile tyre and brake wear	Pb	1.081	0.186		200.0	200.0	5.11	-82.8	0.0001		10		5	4	
1.A.3.d Domestic Navigation: Biomass	Pb	0.000	0.002	5.0	100.0	100.1	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	Pb	0.007	0.011	3.6	72.5	72.6	0.00	51.0	0						
1.A.3.d Domestic Navigation: Residual Oil	Pb	0.015	0.004	15.0	100.0	101.1	0.00	-72.4	0						
1.A.3.e Other Transportation: Biomass	Pb	0.000	0.000	5.0	15.0	15.8	0.00		0						
1.A.3.e Other Transportation: Total	Pb	1.928	0.008	5.0	100.0	100.1	0.00	-99.6	0				6		5

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.a Commercial/Institutional: Biomass	Pb	0.011	0.021	10.0	50.0	51.0	0.00	98.7	0						
1.A.4.a Commercial/Institutional: Liquid Fuels	Pb	0.192	0.001	20.0	100.0	102.0	0.00	-99.3	0						
1.A.4.b Residential: Biomass	Pb	0.585	0.494	10.0	50.0	51.0	2.34	-15.6	0		4			5	
1.A.4.b Residential: Liquid Fuels	Pb	0.246	0.003	20.0	100.0	102.0	0.00	-98.8	0						
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	Pb	0.043	0.063	10.0	50.0	51.0	0.04	48.5	0		15				
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	Pb	0.009	0.003	30.0	100.0	104.4	0.00	-71.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	Pb	0.027	0.007	20.0	100.0	102.0	0.00	-74.3	0						
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	Pb	0.041	0.000					-100.0							
2.A.3 Glass Production	Pb	1.311	C		50.0	50.0	0.00	C	C						
2.B.10 Other	Pb	0.093	0.192		99.3	99.3	1.34	107.0	0		8			8	
2.C.1 Iron and Steel Production	Pb	24.447	0.368	3.0	28.3	28.4	0.40	-98.5	0	3	5	3	3	11	3
2.C.2 Ferroalloys production	Pb	0.026	0.010	5.0	100.0	100.1	0.00	-60.2	0						
2.C.3 Aluminium production	Pb	0.018	0.000	2.0	100.0	100.0	0.00	-99.5	0						
2.C.7 Other	Pb	52.034	1.341	4.0	50.0	50.2	16.68	-97.4	0	2	2	2	2	2	2
2.G.4 Other	Pb	0.000	0.000	15.0	100.0	101.1	0.00	-65.7	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.H.1 Pulp and paper	Pb	0.401	0.096	6.5	51.0	51.4	0.09	-76.2	0		11				
2.H.3 Other (NFR 2A5a)	Pb	0.318	0.000		50.0	50.0	0.00	-99.9	0						
2.H.3 Other (NFR 2A6)	Pb	0.144	0.001		50.0	50.0	0.00	-99.3	0						
5.C.1 Waste Incineration	Pb	0.007	0.068	35.2	263.5	265.9	1.20	911.0	0		14			10	
5.E Other	Pb	0.001	0.000	50.0	74.0	89.3	0.00	-16.8	0						
Total		**364.325**	**6.247**			**26.4**	**100**	**-98.3**	**0.4495**						

Table A1-14. Summary of the key source and uncertainty analysis of $PM_{2.5}$ emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	$PM_{2.5}$	0.572	0.664	1.5	29.7	29.8	0.40	16.0	0.0011	14	6		23	6	
1.A.1.a Public Electricity and Heat Production: Gaseous Fuels	$PM_{2.5}$	0.001	0.000	1.8	87.8	87.8	0.00	-75.7	0						
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	$PM_{2.5}$	0.051	0.014	1.2	24.6	24.6	0.00	-72.1	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	$PM_{2.5}$	0.022	0.005	2.0	40.0	40.1	0.00	-75.5	0						
1.A.1.a Public Electricity and Heat Production: Peat	$PM_{2.5}$	0.459	0.001	2.0	39.4	39.5	0.00	-99.8	0.0001	18		13			12
1.A.1.a Public Electricity and Heat Production: Solid Fuels	$PM_{2.5}$	0.916	0.002	1.8	36.5	36.6	0.00	-99.8	0.0005	8		7	11		9
1.A.1.a Public Electricity and Heat Production: Other Fuels	$PM_{2.5}$	0.386	0.009	1.3	25.5	25.6	0.00	-97.7	0	21		16	12		
1.A.1.b Petroleum refining: Biomass	$PM_{2.5}$	0.000	0.000		100.0	100.0	0.00		0						
1.A.1.b Petroleum refining: Gaseous Fuels	$PM_{2.5}$	0.023	0.001	2.0	100.0	100.0	0.00	-97.8	0						
1.A.1.b Petroleum refining: Liquid Fuels	$PM_{2.5}$	0.395	0.054	10.0	100.0	100.5	0.03	-86.4	0.0002	20	30	17	9	18	8
1.A.1.c Manufacture of Solid fuels and Other Energy Industries: Solid Fuels	$PM_{2.5}$	0.070	0.018	5.0	100.0	100.1	0.00	-75.1	0						
1.A.2.a Iron and Steel: Biomass	$PM_{2.5}$	0.000	0.000	5.0	100.0	100.1	0.00	45.7	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.a Iron and Steel: Gaseous Fuels	$PM_{2.5}$	0.000	0.000	5.0	100.0	100.1	0.00	209.1	0						
1.A.2.a Iron and Steel: Liquid Fuels	$PM_{2.5}$	0.049	0.008	5.0	100.0	100.1	0.00	-83.3	0						
1.A.2.a Iron and Steel: Solid Fuels	$PM_{2.5}$	0.007	0.002	2.0	100.0	100.0	0.00	-77.7	0						
1.A.2.b Non-ferrous metals: Gaseous Fuels	$PM_{2.5}$	0.000	0.000	5.0	100.0	100.1	0.00	57.5	0						
1.A.2.b Non-ferrous metals: Liquid Fuels	$PM_{2.5}$	0.007	0.002	5.0	100.0	100.1	0.00	-74.3	0						
1.A.2.b Non-ferrous metals: Solid Fuels	$PM_{2.5}$	0.006	0.000					-100.0							
1.A.2.c Chemicals: Biomass	$PM_{2.5}$	0.026	0.007	5.0	100.0	100.1	0.00	-72.3	0						
1.A.2.c Chemicals: Gaseous Fuels	$PM_{2.5}$	0.000	0.000	5.0	100.0	100.1	0.00	-50.0	0						
1.A.2.c Chemicals: Liquid Fuels	$PM_{2.5}$	0.022	0.002	5.0	100.0	100.1	0.00	-90.6	0						
1.A.2.c Chemicals: Other Fuels	$PM_{2.5}$	0.021	0.008	10.0	100.0	100.5	0.00	-60.4	0						
1.A.2.c Chemicals: Solid Fuels	$PM_{2.5}$	0.040	0.000	2.0	100.0	100.0	0.00	-99.9	0						
1.A.2.d Pulp, Paper and Print: Biomass	$PM_{2.5}$	1.735	0.194	8.0	100.0	100.3	0.39	-88.8	0.0048	5	11	5	3	7	2
1.A.2.d Pulp, Paper and Print: Gaseous Fuels	$PM_{2.5}$	0.000	0.000	5.0	100.0	100.1	0.00	-73.9	0						
1.A.2.d Pulp, Paper and Print: Liquid Fuels	$PM_{2.5}$	0.184	0.027	5.0	100.0	100.1	0.01	-85.4	0	34		27	20		14
1.A.2.d Pulp, Paper and Print: Other Fuels	$PM_{2.5}$	0.254	0.002	10.0	100.0	100.5	0.00	-99.4	0.0003	28		22	14		10

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.d Pulp, Paper and Print: Solid Fuels	$PM_{2.5}$	0.109	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	$PM_{2.5}$	0.008	0.010	5.0	100.0	100.1	0.00	32.0	0						
1.A.2.e Food Processing, Beverages and Tobacco: Gaseous Fuels	$PM_{2.5}$	0.000	0.000	5.0	100.0	100.1	0.00	-38.8	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	$PM_{2.5}$	0.055	0.001	5.0	100.0	100.1	0.00	-98.3	0						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	$PM_{2.5}$	0.027	0.000	10.0	100.0	100.5	0.00	-99.4	0						
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	$PM_{2.5}$	0.036	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	$PM_{2.5}$	0.004	0.002	3.8	37.5	37.7	0.00	-43.8	0						
1.A.2.f Non-metallic minerals: Gaseous Fuels	$PM_{2.5}$	0.000	0.000	4.1	38.3	38.5	0.00	5.4	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	$PM_{2.5}$	0.035	0.012	9.9	59.2	60.0	0.00	-66.7	0						
1.A.2.f Non-metallic minerals: Solid Fuels	$PM_{2.5}$	0.119	0.001	8.7	35.1	36.1	0.00	-99.6	0			34			
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	$PM_{2.5}$	0.000	0.020	3.8	22.6	22.9	0.00		0						
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	$PM_{2.5}$	0.687	0.156	4.8	29.1	29.5	0.02	-77.2	0	12	12	10	17		15
1.A.2.g.viii Other: Biomass	$PM_{2.5}$	1.088	0.091	4.4	35.1	35.4	0.01	-91.6	0.0003	7	18	6	7		7

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.g.viii Other: Gaseous Fuels	$PM_{2.5}$	0.000	0.000	2.5	20.3	20.5	0.00	-69.4	0						
1.A.2.g.viii Other: Liquid Fuels	$PM_{2.5}$	0.175	0.025	4.0	23.8	24.1	0.00	-85.5	0	35		31			
1.A.2.g.viii Other: Other Fuels	$PM_{2.5}$	0.000	0.001	5.0	40.0	40.3	0.00		0						
1.A.2.g.viii Other: Solid Fuels	$PM_{2.5}$	0.038	0.026	5.0	39.9	40.2	0.00	-31.0	0						
1.A.3.a Domestic Aviation: Aviation Gasoline	$PM_{2.5}$	0.001	0.000	10.0	10.0	14.1	0.00	-91.9	0						
1.A.3.a Domestic Aviation: Biomass	$PM_{2.5}$	0.000	0.000	10.0	10.0	14.1	0.00		0						
1.A.3.a Domestic Aviation: Jet Kerosene	$PM_{2.5}$	0.020	0.005	10.0	10.0	14.1	0.00	-74.4	0						
1.A.3.b.i Road Transportation, Cars: Biomass	$PM_{2.5}$	0.000	0.015	2.9	9.5	9.9	0.00		0						
1.A.3.b.i Road Transportation, Cars: Diesel oil	$PM_{2.5}$	0.367	0.066	5.6	18.6	19.4	0.00	-82.1	0	22	25	20			
1.A.3.b.i Road Transportation, Cars: Gasoline	$PM_{2.5}$	0.204	0.036	3.0	15.0	15.3	0.00	-82.6	0	33		26			
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	$PM_{2.5}$	0.000	0.011	3.5	10.4	10.9	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	$PM_{2.5}$	0.236	0.079	5.0	15.0	15.8	0.00	-66.3	0	29	19	28			
1.A.3.b.ii Road Transportation, Light duty trucks: Gaseous Fuels	$PM_{2.5}$	0.000	0.000	5.0	15.0	15.8	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	$PM_{2.5}$	0.045	0.003	3.0	15.0	15.3	0.00	-94.5	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	$PM_{2.5}$	0.000	0.019	2.4	7.2	7.6	0.00	7415.8	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	$PM_{2.5}$	3.168	0.070	4.5	13.6	14.4	0.00	-97.8	0.0007	4	24	4	8		6
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	$PM_{2.5}$	0.000	0.000	5.0	15.0	15.8	0.00	-77.0	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: LNG	$PM_{2.5}$	0.000	0.001	5.0	100.0	100.1	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	$PM_{2.5}$	0.000	0.002	4.6	13.8	14.5	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	$PM_{2.5}$	0.045	0.031	3.0	15.0	15.3	0.00	-30.0	0						
1.A.3.b.vi Road Transportation: Automobile tyre and brake wear	$PM_{2.5}$	0.220	0.361		15.0	15.0	0.03	64.1	0.0001	31	8	33		17	
1.A.3.b.vii Road Transportation: Automobile road abrasion	$PM_{2.5}$	0.560	0.892		15.0	15.0	0.18	59.3	0.0006	15	3	18		9	
1.A.3.c Railways: Liquid Fuels	$PM_{2.5}$	0.044	0.016	5.0	10.0	11.2	0.00	-63.7	0						
1.A.3.d Domestic Navigation: Biomass	$PM_{2.5}$	0.000	0.013	5.0	40.0	40.3	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	$PM_{2.5}$	0.408	0.338	3.2	25.8	26.0	0.08	-17.0	0.0002	19	9			14	
1.A.3.d Domestic Navigation: Gasoline	$PM_{2.5}$	0.000	0.000	5.0	40.0	40.3	0.00		0						
1.A.3.d Domestic Navigation: LNG	$PM_{2.5}$	0.000	0.004	10.0	300.0	300.2	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.d Domestic Navigation: Residual Oil	$PM_{2.5}$	0.460	0.151	15.0	50.0	52.2	0.06	-67.2	0.0001	17	13	19	18	15	13
1.A.3.e Other Transportation: Biomass	$PM_{2.5}$	0.000	0.000	3.8	23.0	23.3	0.00		0						
1.A.3.e Other Transportation: Gaseous fuels	$PM_{2.5}$	0.000	0.000	5.0	10.0	11.2	0.00	-1.5	0						
1.A.3.e Other Transportation: Total	$PM_{2.5}$	0.288	0.014	5.0	30.0	30.4	0.00	-95.3	0	25		21			
1.A.4.a Commercial/Institutional: Biomass	$PM_{2.5}$	0.227	0.071	8.7	9.0	12.5	0.00	-68.8	0	30	23	29			
1.A.4.a Commercial/Institutional: Gaseous Fuels	$PM_{2.5}$	0.001	0.002	10.0	10.0	14.1	0.00	113.3	0						
1.A.4.a Commercial/Institutional: Gasoline	$PM_{2.5}$	0.029	0.027	5.0	30.0	30.4	0.00	-8.4	0						
1.A.4.a Commercial/Institutional: Liquid Fuels	$PM_{2.5}$	0.465	0.060	4.9	29.1	29.5	0.00	-87.2	0	16	29	15			20
1.A.4.b Residential: Biomass	$PM_{2.5}$	12.351	4.198	10.0	64.9	65.7	77.78	-66.0	0.0271	1	1	1	1	1	1
1.A.4.b Residential: Gaseous Fuels	$PM_{2.5}$	0.001	0.001	10.0	65.0	65.8	0.00	-31.3	0						
1.A.4.b Residential: Liquid Fuels	$PM_{2.5}$	0.758	0.096	3.2	18.8	19.0	0.00	-87.3	0	11	16	9	10		19
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	$PM_{2.5}$	0.824	0.402	9.8	29.3	30.9	0.16	-51.3	0.0003	10	7	14	13	10	18
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	$PM_{2.5}$	0.058	0.017	30.0	40.0	50.0	0.00	-71.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Gaseous Fuels	$PM_{2.5}$	0.000	0.000	10.0	30.0	31.6	0.00	-90.7	0						

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1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	$PM_{2.5}$	0.017	0.020	4.5	26.8	27.2	0.00	18.8	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	$PM_{2.5}$	0.862	0.076	3.0	16.9	17.1	0.00	-91.2	0	9	20	8	21		17
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	$PM_{2.5}$	0.060	0.000					-100.0							
1.B.1.a Coal Mining	$PM_{2.5}$	0.001	0.001	6.0	900.0	900.0	0.00	-48.0	0						
1.B.1.c Fugitive emissions from Solid Fuels	$PM_{2.5}$	0.076	0.006	6.0	19.6	20.5	0.00	-92.5	0						
1.B.2.c Venting and flaring	$PM_{2.5}$	0.000	0.000	50.0	100.0	111.8	0.00	-7.1	0						
1.D International Aviation: Biomass	$PM_{2.5}$	0.000	0.001	10.0	10.0	14.1	0.00		0						
1.D International Aviation: Jet Kerosene	$PM_{2.5}$	0.012	0.015	10.0	10.0	14.1	0.00	30.3	0						
2.A.1 Cement Production	$PM_{2.5}$	0.573	0.062	2.0	30.0	30.1	0.00	-89.2	0	13	27	12	22		16
2.A.2 Lime Production	$PM_{2.5}$	0.265	0.063	5.4	51.5	51.8	0.01	-76.3	0	27	26	24			23
2.A.3 Glass Production	$PM_{2.5}$	0.218	0.035		100.0	100.0	0.01	-83.9	0	32		25	15		11
2.B.10 Other	$PM_{2.5}$	0.100	C		46.4	46.4	0.00	C	C						
2.B.5 Carbide production	$PM_{2.5}$	0.096	C	10.0	50.0	51.0	0.00	C	C		32				
2.C.1 Iron and Steel Production	$PM_{2.5}$	3.975	0.737	3.8	30.8	31.0	0.53	-81.5	0.0009	3	5	3	5	5	4
2.C.2 Ferroalloys production	$PM_{2.5}$	0.057	0.029	5.0	40.0	40.3	0.00	-48.8	0						
2.C.3 Aluminium production	$PM_{2.5}$	0.148	0.036	2.0	40.0	40.1	0.00	-75.3	0		33				

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.C.7 Other	$PM_{2.5}$	0.165	0.013	4.0	40.0	40.2	0.00	-92.4	0	36		30			
2.D.3 Other	$PM_{2.5}$	0.004	0.005	10.0	100.0	100.5	0.00	25.5	0						
2.G.4 Other	$PM_{2.5}$	0.280	0.138	10.7	35.0	36.6	0.03	-50.7	0	26	14	32			
2.H.1 Pulp and paper	$PM_{2.5}$	6.227	1.378	6.5	20.4	21.4	0.89	-77.9	0.0012	2	2	2	4	4	3
2.H.3 Other (NFR 2A5a)	$PM_{2.5}$	0.081	0.021		50.0	50.0	0.00	-74.0	0						
2.H.3 Other (NFR 2A5b)	$PM_{2.5}$	1.383	0.864		151.0	151.0	17.42	-37.5	0.0255	6	4	11	2	2	5
2.H.3 Other (NFR 2A6)	$PM_{2.5}$	0.300	0.071		50.0	50.0	0.01	-76.4	0	23	22	23	24		21
3.B.1 Dairy cattle	$PM_{2.5}$	0.142	0.071	20.0	150.0	151.3	0.12	-50.0	0.0001		21		16	12	22
3.B.1 Non-dairy cattle	$PM_{2.5}$	0.097	0.095	20.0	150.0	151.3	0.21	-2.6	0.0006		17		25	8	
3.B.3 Swine	$PM_{2.5}$	0.012	0.007	20.0	150.0	151.3	0.00	-39.0	0						
3.B.4 Fur-bearing animals	$PM_{2.5}$	0.001	0.000	20.0	200.0	201.0	0.00	-93.3	0						
3.B.4 Goats	$PM_{2.5}$	0.000	0.000	20.0	200.0	201.0	0.00	174.7	0						
3.B.4 Horses	$PM_{2.5}$	0.022	0.025	20.0	200.0	201.0	0.03	12.6	0.0001						
3.B.4 Poultry	$PM_{2.5}$	0.037	0.060	13.7	117.3	118.1	0.05	60.9	0.0002		28			16	
3.B.4 Sheep	$PM_{2.5}$	0.002	0.002	20.0	200.0	201.0	0.00	48.6	0						
3.D.c Farm-level agricultural operations	$PM_{2.5}$	0.299	0.233	20.0	150.0	151.3	1.27	-22.1	0.0027	24	10		6	3	
5.A Solid waste disposal	$PM_{2.5}$	0.000	0.000	10.0	385.0	385.1	0.00	-57.9	0						

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5.C.1 Waste Incineration	$PM_{2.5}$	0.041	0.053	58.9	168.8	178.8	0.09	31.6	0.0004	31				13	
5.E Other	$PM_{2.5}$	0.162	0.135	50.0	67.0	83.6	0.13	-16.7	0.0006	15		19		11	
Total		**44.116**	**12.674**			**24.7**	**100**	**-71.3**	**2.626**						

Table A1-15. Summary of the key source and uncertainty analysis of PM_{10} emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2020 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	PM_{10}	0.763	0.984	1.5	29.7	29.8	0.05	29.0	0.0006	15	7	30		7	
1.A.1.a Public Electricity and Heat Production: Gaseous Fuels	PM_{10}	0.001	0.000	1.8	87.8	87.8	0.00	-75.7	0						
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	PM_{10}	0.105	0.016	1.2	24.2	24.2	0.00	-85.2	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	PM_{10}	0.025	0.005	2.0	40.0	40.1	0.00	-78.2	0						
1.A.1.a Public Electricity and Heat Production: Peat	PM_{10}	0.601	0.001	2.0	39.4	39.5	0.00	-99.9	0.0002	18		13			14
1.A.1.a Public Electricity and Heat Production: Solid Fuels	PM_{10}	1.042	0.002	1.8	36.5	36.6	0.00	-99.8	0.0006	10		9	14		10
1.A.1.a Public Electricity and Heat Production: Other Fuels	PM_{10}	0.421	0.009	1.3	25.5	25.5	0.00	-97.9	0	22		19	15		
1.A.1.b Petroleum refining: Biomass	PM_{10}	0.000	0.000		40.0	40.0	0.00		0						
1.A.1.b Petroleum refining: Gaseous Fuels	PM_{10}	0.023	0.001	2.0	100.0	100.0	0.00	-97.8	0						
1.A.1.b Petroleum refining: Liquid Fuels	PM_{10}	0.417	0.074	10.0	100.0	100.5	0.00	-82.3	0.0003	23		20	10		11
1.A.1.c Manufacture of Solid fuels and Other Energy Industries: Solid Fuels	PM_{10}	0.103	0.042	5.0	100.0	100.1	0.00	-59.3	0						
1.A.2.a Iron and Steel: Biomass	PM_{10}	0.000	0.000	5.0	100.0	100.1	0.00	19.2	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2020 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.a Iron and Steel: Gaseous Fuels	PM_{10}	0.000	0.000	5.0	100.0	100.1	0.00	208.0	0						
1.A.2.a Iron and Steel: Liquid Fuels	PM_{10}	0.070	0.010	5.0	100.0	100.1	0.00	-86.2	0						
1.A.2.a Iron and Steel: Solid Fuels	PM_{10}	0.012	0.002	2.0	100.0	100.0	0.00	-87.6	0						
1.A.2.b Non-ferrous metals: Gaseous Fuels	PM_{10}	0.000	0.000	5.0	100.0	100.1	0.00	57.5	0						
1.A.2.b Non-ferrous metals: Liquid Fuels	PM_{10}	0.008	0.002	5.0	100.0	100.1	0.00	-74.8	0						
1.A.2.b Non-ferrous metals: Solid Fuels	PM_{10}	0.011	0.000					-100.0							
1.A.2.c Chemicals: Biomass	PM_{10}	0.036	0.009	5.0	100.0	100.1	0.00	-73.6	0						
1.A.2.c Chemicals: Gaseous Fuels	PM_{10}	0.000	0.000	5.0	100.0	100.1	0.00	-50.0	0						
1.A.2.c Chemicals: Liquid Fuels	PM_{10}	0.025	0.002	5.0	100.0	100.1	0.00	-91.0	0						
1.A.2.c Chemicals: Other Fuels	PM_{10}	0.023	0.009	10.0	100.0	100.5	0.00	-59.6	0						
1.A.2.c Chemicals: Solid Fuels	PM_{10}	0.046	0.000	2.0	100.0	100.0	0.00	-99.9	0						
1.A.2.d Pulp, Paper and Print: Biomass	PM_{10}	2.355	0.260	8.0	100.0	100.3	0.04	-89.0	0.0147	8	12	7	4	8	3
1.A.2.d Pulp, Paper and Print: Gaseous Fuels	PM_{10}	0.000	0.000	5.0	100.0	100.1	0.00	-73.9	0						
1.A.2.d Pulp, Paper and Print: Liquid Fuels	PM_{10}	0.220	0.032	5.0	100.0	100.1	0.00	-85.5	0.0001			33			17
1.A.2.d Pulp, Paper and Print: Other Fuels	PM_{10}	0.276	0.002	10.0	100.0	100.5	0.00	-99.4	0.0003	32		26	17		13

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2020 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.d Pulp, Paper and Print: Solid Fuels	PM_{10}	0.128	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	PM_{10}	0.010	0.014	5.0	100.0	100.1	0.00	33.2	0						
1.A.2.e Food Processing, Beverages and Tobacco: Gaseous Fuels	PM_{10}	0.000	0.000	5.0	100.0	100.1	0.00	-38.8	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	PM_{10}	0.064	0.001	5.0	100.0	100.1	0.00	-98.4	0						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	PM_{10}	0.029	0.000	10.0	100.0	100.5	0.00	-99.4	0						
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	PM_{10}	0.042	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	PM_{10}	0.005	0.003	3.8	37.6	37.8	0.00	-43.9	0						
1.A.2.f Non-metallic minerals: Gaseous Fuels	PM_{10}	0.000	0.000	4.1	38.3	38.5	0.00	5.4	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	PM_{10}	0.040	0.014	9.9	49.5	50.4	0.00	-65.2	0						
1.A.2.f Non-metallic minerals: Solid Fuels	PM_{10}	0.140	0.001	8.6	34.7	35.8	0.00	-99.6	0						
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	PM_{10}	0.000	0.021	3.8	22.6	22.9	0.00		0						
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	PM_{10}	0.725	0.165	4.8	29.1	29.5	0.00	-77.2	0.0001	16	14	15			19
1.A.2.g.viii Other: Biomass	PM_{10}	1.482	0.123	4.5	35.7	35.9	0.00	-91.7	0.0009	9	19	8	8		8

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2020 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.g.viii Other: Gaseous Fuels	PM_{10}	0.000	0.000	2.5	20.3	20.5	0.00	-69.4	0						
1.A.2.g.viii Other: Liquid Fuels	PM_{10}	0.192	0.028	4.0	24.2	24.5	0.00	-85.6	0						
1.A.2.g.viii Other: Other Fuels	PM_{10}	0.000	0.001	5.0	40.0	40.3	0.00		0						
1.A.2.g.viii Other: Solid Fuels	PM_{10}	0.049	0.061	5.0	40.0	40.3	0.00	22.6	0						
1.A.3.a Domestic Aviation: Aviation Gasoline	PM_{10}	0.001	0.000	10.0	10.0	14.1	0.00	-91.9	0						
1.A.3.a Domestic Aviation: Biomass	PM_{10}	0.000	0.000	10.0	10.0	14.1	0.00		0						
1.A.3.a Domestic Aviation: Jet Kerosene	PM_{10}	0.020	0.005	10.0	10.0	14.1	0.00	-74.4	0						
1.A.3.b.i Road Transportation, Cars: Biomass	PM_{10}	0.000	0.015	2.9	9.5	9.9	0.00		0						
1.A.3.b.i Road Transportation, Cars: Diesel oil	PM_{10}	0.367	0.066	5.6	18.6	19.4	0.00	-82.1	0	27		22			
1.A.3.b.i Road Transportation, Cars: Gasoline	PM_{10}	0.204	0.036	3.0	15.0	15.3	0.00	-82.6	0			34			
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	PM_{10}	0.000	0.011	3.5	10.4	10.9	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	PM_{10}	0.236	0.079	5.0	15.0	15.8	0.00	-66.3	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gaseous Fuels	PM_{10}	0.000	0.000	5.0	15.0	15.8	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	PM_{10}	0.045	0.003	3.0	15.0	15.3	0.00	-94.5	0						

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1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	PM_{10}	0.000	0.019	2.4	7.2	7.6	0.00	7415.8	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	PM_{10}	3.168	0.070	4.5	13.6	14.4	0.00	-97.8	0.0008	6		6	12		9
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	PM_{10}	0.000	0.000	5.0	100.0	100.1	0.00	-77.0	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: LNG	PM_{10}	0.000	0.001	5.0	100.0	100.1	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	PM_{10}	0.000	0.002	4.6	13.8	14.5	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	PM_{10}	0.045	0.031	3.0	15.0	15.3	0.00	-30.0	0						
1.A.3.b.vi Road Transportation: Automobile tyre and brake wear	PM_{10}	0.858	1.431		15.0	15.0	0.03	66.8	0.0004	13	6	14			
1.A.3.b.vii Road Transportation: Automobile road abrasion	PM_{10}	7.005	11.147		15.0	15.0	1.55	59.1	0.0246	4	1	4	7	4	7
1.A.3.c Railways: Liquid Fuels	PM_{10}	0.046	0.017	5.0	10.0	11.2	0.00	-63.7	0						
1.A.3.d Domestic Navigation: Biomass	PM_{10}	0.000	0.013	5.0	40.0	40.3	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	PM_{10}	0.408	0.338	3.2	25.8	26.0	0.00	-17.0	0	24	11				
1.A.3.d Domestic Navigation: Gasoline	PM_{10}	0.000	0.000	5.0	40.0	40.3	0.00		0						
1.A.3.d Domestic Navigation: LNG	PM_{10}	0.000	0.004	10.0	300.0	300.2	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2020 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.d Domestic Navigation: Residual Oil	PM_{10}	0.498	0.164	15.0	50.0	52.2	0.00	-67.0	0.0001	20	15	21			18
1.A.3.e Other Transportation: Biomass	PM_{10}	0.000	0.000	3.8	23.0	23.3	0.00		0						
1.A.3.e Other Transportation: Gaseous fuels	PM_{10}	0.000	0.000	5.0	10.0	11.2	0.00	-1.5	0						
1.A.3.e Other Transportation: Total	PM_{10}	0.297	0.014	5.0	30.0	30.4	0.00	-95.4	0	31		25			
1.A.4.a Commercial/Institutional: Biomass	PM_{10}	0.239	0.074	8.7	9.0	12.5	0.00	-68.9	0	35		35			
1.A.4.a Commercial/Institutional: Gaseous Fuels	PM_{10}	0.001	0.002	10.0	10.0	14.1	0.00	113.3	0						
1.A.4.a Commercial/Institutional: Gasoline	PM_{10}	0.031	0.028	5.0	30.0	30.4	0.00	-8.4	0						
1.A.4.a Commercial/Institutional: Liquid Fuels	PM_{10}	0.499	0.063	4.9	29.1	29.6	0.00	-87.4	0.0001	19		18			
1.A.4.b Residential: Biomass	PM_{10}	13.01	4.422	10.0	64.9	65.7	4.68	-66.0	0.0366	2	3	1	2	3	2
1.A.4.b Residential: Gaseous Fuels	PM_{10}	0.001	0.001	10.0	65.0	65.8	0.00	-31.3	0						
1.A.4.b Residential: Liquid Fuels	PM_{10}	0.779	0.101	3.2	18.8	19.0	0.00	-87.0	0.0001	14		11	11		
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	PM_{10}	0.868	0.423	9.8	29.3	30.9	0.01	-51.3	0.0001	12	10	16	18		
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	PM_{10}	0.058	0.017	30.0	40.0	50.0	0.00	-71.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Gaseous Fuels	PM_{10}	0.000	0.000	10.0	30.0	31.6	0.00	-90.7	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2020 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	PM_{10}	0.018	0.021	4.5	26.8	27.2	0.00	18.8	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	PM_{10}	0.912	0.080	3.0	16.8	17.1	0.00	-91.2	0.0001	11		10			
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	PM_{10}	0.120	0.000					-100.0							
1.B.1.a Coal Mining	PM_{10}	0.011	0.006	6.0	900.0	900.0	0.00	-48.0	0						
1.B.1.c Fugitive emissions from Solid Fuels	PM_{10}	0.112	0.018	6.0	19.8	20.7	0.00	-83.8	0						
1.B.2.c Venting and flaring	PM_{10}	0.000	0.000	50.0	100.0	111.8	0.00	-7.1	0						
1.D International Aviation: Biomass	PM_{10}	0.000	0.001	10.0	10.0	14.1	0.00		0						
1.D International Aviation: Jet Kerosene	PM_{10}	0.012	0.015	10.0	10.0	14.1	0.00	30.3	0						
2.A.1 Cement Production	PM_{10}	0.706	0.070	2.0	30.0	30.1	0.00	-90.1	0.0001	17		12			16
2.A.2 Lime Production	PM_{10}	0.298	0.071	5.4	51.5	51.8	0.00	-76.3	0	30		29			
2.A.3 Glass Production	PM_{10}	0.262	0.046		100.0	100.0	0.00	-82.7	0.0001	33		31	19		15
2.B.10 Other	PM_{10}	0.114	C		65.3	65.3	0.00	C	C						
2.B.5 Carbide production	PM_{10}	0.108	C	10.0	50.0	51.0	0.00	C	C						
2.C.1 Iron and Steel Production	PM_{10}	4.792	0.847	3.7	29.5	29.7	0.04	-82.3	0.0036	5	8	5	6	9	5
2.C.2 Ferroalloys production	PM_{10}	0.081	0.042	5.0	40.0	40.3	0.00	-48.8	0						
2.C.3 Aluminium production	PM_{10}	0.328	0.081	2.0	40.0	40.1	0.00	-75.3	0	28		27			

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2020 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.C.7 Other	PM_{10}	0.222	0.015	4.0	40.0	40.2	0.00	-93.2	0			32			
2.D.3 Other	PM_{10}	0.020	0.026	10.0	97.0	97.5	0.00	31.7	0						
2.G.4 Other	PM_{10}	0.328	0.193	10.8	35.9	37.5	0.00	-41.1	0	29	13				
2.H.1 Pulp and paper	PM_{10}	8.622	1.746	6.5	20.4	21.4	0.08	-79.8	0.0052	3	5	2	5	6	4
2.H.3 Other (NFR 2A5a)	PM_{10}	0.405	0.107		49.0	49.0	0.00	-73.5	0	25	21	23			
2.H.3 Other (NFR 2A5b)	PM_{10}	13.834	8.640		145.0	145.0	87.21	-37.5	0.1329	1	2	3	1	1	1
2.H.3 Other (NFR 2A6)	PM_{10}	0.386	0.091		49.0	49.0	0.00	-76.4	0	26		24			
3.B.1 Dairy cattle	PM_{10}	0.218	0.109	20.0	150.0	151.3	0.02	-50.0	0		20		16		20
3.B.1 Non-dairy cattle	PM_{10}	0.150	0.145	20.0	150.0	151.3	0.03	-2.8	0.0002		17				
3.B.3 Swine	PM_{10}	0.261	0.160	20.0	150.0	151.3	0.03	-38.6	0.0001	34	16		13		21
3.B.4 Fur-bearing animals	PM_{10}	0.002	0.000	20.0	200.0	201.0	0.00	-93.3	0						
3.B.4 Goats	PM_{10}	0.000	0.000	20.0	200.0	201.0	0.00	174.7	0						
3.B.4 Horses	PM_{10}	0.035	0.039	20.0	200.0	201.0	0.00	12.6	0						
3.B.4 Poultry	PM_{10}	0.447	0.694	14.3	117.9	118.7	0.38	55.2	0.0061	21	9	28	9	5	12
3.B.4 Sheep	PM_{10}	0.005	0.007	20.0	200.0	201.0	0.00	48.6	0						
3.D.c Farm-level agricultural operations	PM_{10}	2.577	2.139	20.0	150.0	151.3	5.82	-17.0	0.0384	7	4	17	3	2	6
5.A Solid waste disposal	PM_{10}	0.002	0.001	10.0	379.0	379.1	0.00	-57.9	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2020 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
5.C.1 Waste Incineration	PM_{10}	0.044	0.058	58.7	167.9	177.9	0.01	32.3	0.0001						
5.E Other	PM_{10}	0.162	0.135	50.0	67.0	83.6	0.01	-16.7	0.0002		18				
Total		**73.757**	**36.158**			**37.1**	**100**	**-51.0**	**5.1777**						

Table A1-16. Summary of the key source and uncertainty analysis of Se emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	Se	0.026	0.101	1.5	75.3	75.3	0.04	290.9	0.3201	10	3	4			4
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	Se	0.019	0.003	1.2	60.2	60.2	0.00	-87.0	0.0095	11		12			
1.A.1.a Public Electricity and Heat Production: Other Fuels	Se	0.006	0.014	2.0	100.0	100.0	0.00	145.5	0.0065		8	17			
1.A.1.a Public Electricity and Heat Production: Peat	Se	0.049	0.001	2.0	98.6	98.6	0.00	-98.6	0.2131	6		5			5
1.A.1.a Public Electricity and Heat Production: Solid Fuels	Se	0.079	0.000	2.0	100.0	100.0	0.00	-99.8	0.5763	4		3	4		3
1.A.1.a Public Electricity and Heat Production: Other Fuels	Se	0.009	0.022	1.3	264.5	264.5	0.02	154.9	0.125	16	6	14			
1.A.1.b Petroleum refining: Liquid Fuels	Se	0.006	0.002	10.0	100.0	100.5	0.00	-60.3	0.0011						
1.A.2.a Iron and Steel: Biomass	Se	0.000	0.000					-100.0							
1.A.2.a Iron and Steel: Liquid Fuels	Se	0.006	0.001	5.0	100.0	100.1	0.00	-91.9	0.003			20			
1.A.2.a Iron and Steel: Solid Fuels	Se	0.000	0.000					-100.0							
1.A.2.b Non-ferrous metals: Liquid Fuels	Se	0.001	0.000	5.0	100.0	100.1	0.00	-71.4	0						
1.A.2.b Non-ferrous metals: Solid Fuels	Se	0.000	0.000					-100.0							

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.c Chemicals: Biomass	Se	0.001	0.001	5.0	40.0	40.3	0.00	-16.2	0						
1.A.2.c Chemicals: Liquid Fuels	Se	0.003	0.000	5.0	100.0	100.1	0.00	-92.4	0.0006						
1.A.2.c Chemicals: Solid Fuels	Se	0.002	0.000	2.0	40.0	40.1	0.00	-98.9	0.0001						
1.A.2.d Pulp, Paper and Print: Biomass	Se	0.072	0.031	8.0	40.0	40.8	0.00	-56.7	0.0249	5	5	6			
1.A.2.d Pulp, Paper and Print: Liquid Fuels	Se	0.029	0.005	5.0	100.0	100.1	0.00	-81.1	0.0499	8		9			
1.A.2.d Pulp, Paper and Print: Solid Fuels	Se	0.008	0.000					-100.0		18		18			
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	Se	0.000	0.002	5.0	40.0	40.3	0.00	339.6	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	Se	0.008	0.000	5.0	100.0	100.1	0.00	-98.4	0.0054	17		19			
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	Se	0.002	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	Se	0.000	0.002	4.7	18.9	19.5	0.00	1140.7	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	Se	0.006	0.002	10.0	39.9	41.1	0.00	-63.1	0.0002						
1.A.2.f Non-metallic minerals: Solid Fuels	Se	0.028	0.002	8.8	17.8	19.9	0.00	-92.5	0.002	9		8			
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	Se	0.000	0.000	3.6	72.9	73.0	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	Se	0.000	0.000	4.8	96.9	97.0	0.00	77.4	0						
1.A.2.g.vii Off-road vehicles and other machinery: Other Fossil Fuels	Se	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.2.g.viii Other: Biomass	Se	0.045	0.011	4.5	18.2	18.7	0.00	-75.2	0.0036	7	9	7			
1.A.2.g.viii Other: Liquid Fuels	Se	0.016	0.003	4.2	25.3	25.7	0.00	-78.9	0.001	15		15			
1.A.2.g.viii Other: Solid Fuels	Se	0.001	0.009	4.9	19.6	20.2	0.00	1432.1	0.0003			16			
1.A.3.b.i Road Transportation, Cars: Biomass	Se	0.000	0.000	3.6	71.1	71.2	0.00		0						
1.A.3.b.i Road Transportation, Cars: Diesel oil	Se	0.000	0.000	5.0	99.7	99.8	0.00	746.6	0						
1.A.3.b.i Road Transportation, Cars: Gasoline	Se	0.001	0.000	3.0	99.5	99.6	0.00	-56.7	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	Se	0.000	0.000	3.4	67.2	67.3	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	Se	0.000	0.000	5.0	100.0	100.1	0.00	908.5	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	Se	0.000	0.000	3.0	100.0	100.0	0.00	-88.3	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	Se	0.000	0.000	2.6	51.7	51.8	0.00	12295.5	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	Se	0.000	0.000	4.7	93.9	94.1	0.00	2.5	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	Se	0.000	0.000	3.0	100.0	100.0	0.00	-87.1	0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	Se	0.000	0.000	4.7	94.5	94.6	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	Se	0.000	0.000	3.0	100.0	100.0	0.00	108.8	0						
1.A.3.c Railways: Liquid Fuels	Se	0.000	0.000	5.0	95.0	95.1	0.00	-63.7	0						
1.A.3.d Domestic Navigation: Biomass	Se	0.000	0.000	5.0	10.0	11.2	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	Se	0.000	0.000	3.1	60.3	60.4	0.00	52.4	0						
1.A.3.d Domestic Navigation: Gasoline	Se	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.d Domestic Navigation: Residual Oil	Se	0.002	0.001	15.0	100.0	101.1	0.00	-72.4	0.0002						
1.A.3.e Other Transportation: Biomass	Se	0.000	0.000	3.7	74.9	75.0	0.00		0						
1.A.3.e Other Transportation: Other Fossil Fuels	Se	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.e Other Transportation: Total	Se	0.000	0.000	5.0	100.0	100.1	0.00	-29.5	0						
1.A.4.a Commercial/Institutional: Biomass	Se	0.002	0.003	10.0	40.0	41.2	0.00	98.8	0.0001						
1.A.4.a Commercial/Institutional: Gasoline	Se	0.000	0.000	5.0	100.0	100.1	0.00	-6.0	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.a Commercial/Institutional: Liquid Fuels	Se	0.018	0.000	18.6	93.2	95.0	0.00	-99.4	0.0244	14		11			
1.A.4.a Commercial/Institutional: Other Fossil Fuels	Se	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.4.b Residential: Biomass	Se	0.086	0.073	10.0	40.0	41.2	0.01	-15.6	0.0123	3	4	13			
1.A.4.b Residential: Liquid Fuels	Se	0.019	0.000	19.0	94.8	96.7	0.00	-98.9	0.0289	12		10			
1.A.4.b Residential: Other Fossil Fuels	Se	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	Se	0.006	0.009	10.0	40.0	41.2	0.00	48.6	0.0003	19	10				
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	Se	0.000	0.000	30.0	100.0	104.4	0.00	-71.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Fossil part of biodiesel and bio-gasoline	Se	0.000	0.000	3.5	70.8	70.9	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	Se	0.000	0.000	3.6	71.6	71.7	0.00	180.9	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	Se	0.003	0.001	19.0	94.9	96.8	0.00	-74.1	0.0003						
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	Se	0.005	0.000					-100.0							
1.B.1.b Coke production	Se	0.019	0.016	5.0	900.0	900.0	0.13	-14.9	0.0434	13	7		3		
2.A.3 Glass Production	Se	0.135	0.245		500.0	500.0	9.76	81.5	31.3621	2	2	2	2	2	2

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.C.1 Iron and Steel Production	Se	0.293	0.424	4.9	879.2	879.2	90.03	44.5	142.0008	1	1	1	1	1	1
5.C.1 Waste Incineration	Se	0.002	0.003	21.4	572.6	573.0	0.00	37.8	0.0017						
Total		**1.010**	**0.987**			**397.7**	**100**	**-2.4**	**132.2184**						

Table A1-17. Summary of the key source and uncertainty analysis of SO_2 emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	SO_2	0.545	1.883	1.5	15.2	15.3	5.19	245.5	0.0007	30	3	18		6	
1.A.1.a Public Electricity and Heat Production: Gaseous Fuels	SO_2	0.017	0.000					-100.0							
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	SO_2	3.450	0.203	1.2	11.8	11.9	0.04	-94.1	0	12	13	10	17		19
1.A.1.a Public Electricity and Heat Production: Other Fuels	SO_2	0.138	0.054	2.0	20.0	20.1	0.01	-60.7	0						
1.A.1.a Public Electricity and Heat Production: Peat	SO_2	2.405	0.058	2.0	19.7	19.8	0.01	-97.6	0	15	26	14	21		17
1.A.1.a Public Electricity and Heat Production: Solid Fuels	SO_2	8.386	0.058	1.6	15.8	15.9	0.01	-99.3	0.0003	2	27	2	9		9
1.A.1.a Public Electricity and Heat Production: Other Fuels	SO_2	0.383	0.088	1.3	13.0	13.1	0.01	-77.1	0		23				
1.A.1.b Petroleum refining: Gaseous Fuels	SO_2	0.090	0.000					-100.0							
1.A.1.b Petroleum refining: Liquid Fuels	SO_2	6.705	0.422	10.0	70.0	70.7	5.58	-93.7	0.0012	4	7	4	2	5	2
1.A.1.c Manufacture of Solid fuels and Other Energy Industries: Solid Fuels	SO_2	0.536	0.194	5.0	70.0	70.2	1.17	-63.7	0.0001	32	15		22	10	
1.A.2.a Iron and Steel: Biomass	SO_2	0.001	0.000					-100.0							
1.A.2.a Iron and Steel: Gaseous Fuels	SO_2	0.001	0.000					-100.0							

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.a Iron and Steel: Liquid Fuels	SO_2	1.325	0.082	5.0	70.0	70.2	0.21	-93.8	0	19	24	21	14	16	14
1.A.2.a Iron and Steel: Solid Fuels	SO_2	0.296	0.155	2.0	70.0	70.0	0.74	-47.6	0.0001		20			11	
1.A.2.b Non-ferrous metals: Gaseous Fuels	SO_2	0.000	0.000					-100.0							
1.A.2.b Non-ferrous metals: Liquid Fuels	SO_2	0.138	0.018	5.0	70.0	70.2	0.01	-87.3	0						
1.A.2.b Non-ferrous metals: Solid Fuels	SO_2	0.022	0.000					-100.0							
1.A.2.c Chemicals: Biomass	SO_2	0.023	0.057	5.0	70.0	70.2	0.10	147.6	0					22	
1.A.2.c Chemicals: Gaseous Fuels	SO_2	0.006	0.000					-100.0							
1.A.2.c Chemicals: Liquid Fuels	SO_2	0.496	0.016	5.0	70.0	70.2	0.01	-96.7	0				23		
1.A.2.c Chemicals: Other Fuels	SO_2	0.010	0.002	10.0	70.0	70.7	0.00	-81.7	0						
1.A.2.c Chemicals: Solid Fuels	SO_2	0.387	0.004	2.0	70.0	70.0	0.00	-99.0	0						
1.A.2.d Pulp, Paper and Print: Biomass	SO_2	2.057	0.530	8.0	70.0	70.5	8.75	-74.2	0.0003	16	5	17	8	4	11
1.A.2.d Pulp, Paper and Print: Gaseous Fuels	SO_2	0.002	0.000					-100.0							
1.A.2.d Pulp, Paper and Print: Liquid Fuels	SO_2	4.980	0.201	5.0	70.0	70.2	1.24	-96.0	0.0011	7	14	7	3	9	3
1.A.2.d Pulp, Paper and Print: Other Fuels	SO_2	0.123	0.000	10.0	70.0	70.7	0.00	-99.8	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.d Pulp, Paper and Print: Solid Fuels	SO_2	1.005	0.000					-100.0		22		22	16		
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	SO_2	0.017	0.039	5.0	70.0	70.2	0.05	131.8	0						
1.A.2.e Food Processing, Beverages and Tobacco: Gaseous Fuels	SO_2	0.009	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	SO_2	1.334	0.010	5.0	70.0	70.2	0.00	-99.3	0.0001	18		19	13		13
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	SO_2	0.013	0.000	10.0	70.0	70.7	0.00	-99.7	0						
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	SO_2	0.347	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	SO_2	0.004	0.005	3.5	21.2	21.5	0.00	34.5	0						
1.A.2.f Non-metallic minerals: Gaseous Fuels	SO_2	0.002	0.000					-100.0							
1.A.2.f Non-metallic minerals: Liquid Fuels	SO_2	0.785	0.206	10.0	40.0	41.2	0.45	-73.8	0	25	12	30		13	
1.A.2.f Non-metallic minerals: Solid Fuels	SO_2	0.797	0.215	4.6	22.8	23.2	0.16	-73.0	0	24	11	29		18	
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	SO_2	1.008	0.003	4.9	19.5	20.1	0.00	-99.7	0	21		23			
1.A.2.g.vii Off-road vehicles and other machinery: Other Fossil Fuels	SO_2	0.000	0.000	5.0	20.0	20.6	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.g.viii Other: Biomass	SO_2	0.960	0.191	3.6	21.4	21.7	0.11	-80.1	0	23	16	24		20	
1.A.2.g.viii Other: Gaseous Fuels	SO_2	0.004	0.000					-100.0							
1.A.2.g.viii Other: Liquid Fuels	SO_2	3.101	0.190	3.8	15.3	15.7	0.06	-93.9	0	14	17	13			18
1.A.2.g.viii Other: Other Fuels	SO_2	0.000	0.000	5.0	30.0	30.4	0.00		0						
1.A.2.g.viii Other: Solid Fuels	SO_2	0.325	0.218	3.5	14.2	14.6	0.06	-33.0	0		10				
1.A.3.a Domestic Aviation: Aviation Gasoline	SO_2	0.001	0.000	10.0	50.0	51.0	0.00	-90.1	0						
1.A.3.a Domestic Aviation: Biomass	SO_2	0.000	0.001	10.0	50.0	51.0	0.00		0						
1.A.3.a Domestic Aviation: Jet Kerosene	SO_2	0.053	0.017	10.0	50.0	51.0	0.00	-68.5	0						
1.A.3.b.i Road Transportation, Cars: Biomass	SO_2	0.000	0.001	3.2	75.7	75.8	0.00		0						
1.A.3.b.i Road Transportation, Cars: Diesel oil	SO_2	0.617	0.009	5.0	19.9	20.6	0.00	-98.6	0	29		28			
1.A.3.b.i Road Transportation, Cars: Gasoline	SO_2	0.684	0.014	3.0	19.9	20.2	0.00	-97.9	0	26		25			
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	SO_2	0.000	0.000	3.7	15.0	15.4	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	SO_2	0.205	0.003	5.0	20.0	20.6	0.00	-98.4	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gaseous Fuels	SO_2	0.000	0.000	5.0	20.0	20.6	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	SO_2	0.048	0.000	3.0	20.0	20.2	0.00	-99.4	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	SO_2	0.000	0.001	2.3	12.8	13.0	0.00		0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	SO_2	4.499	0.008	4.7	18.8	19.4	0.00	-99.8	0.0001	9		8	15		15
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	SO_2	0.001	0.001	5.0	39.8	40.1	0.00	5.5	0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	SO_2	0.002	0.000	3.0	20.0	20.2	0.00	-90.0	0						
1.A.3.c Railways: Liquid Fuels	SO_2	0.115	0.000					-100.0							
1.A.3.d Domestic Navigation: Biomass	SO_2	0.000	0.000	5.0	10.0	11.2	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	SO_2	0.666	0.044	4.9	39.5	39.8	0.02	-93.3	0	27		27			
1.A.3.d Domestic Navigation: Gasoline	SO_2	0.000	0.000	5.0	40.0	40.3	0.00		0						
1.A.3.d Domestic Navigation: LNG	SO_2	0.000	0.000	10.0	200.0	200.2	0.00		0						
1.A.3.d Domestic Navigation: Residual Oil	SO_2	3.312	0.091	15.0	40.0	42.7	0.09	-97.3	0.0002	13	22	12	10		8
1.A.3.e Other Transportation: Gaseous fuels	SO_2	0.000	0.000	5.0	70.0	70.2	0.00	-1.5	0						
1.A.3.e Other Transportation: Other Fossil Fuels	SO_2	0.000	0.000	5.0	20.0	20.6	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.e Other Transportation: Total	SO_2	0.538	0.043	5.0	30.0	30.4	0.01	-92.0	0	31					
1.A.4.a Commercial/Institutional: Biomass	SO_2	0.007	0.014	10.0	75.0	75.7	0.01	98.7	0						
1.A.4.a Commercial/Institutional: Gaseous Fuels	SO_2	0.003	0.000					-100.0							
1.A.4.a Commercial/Institutional: Gasoline	SO_2	0.005	0.000	5.0	20.0	20.6	0.00	-95.5	0						
1.A.4.a Commercial/Institutional: Liquid Fuels	SO_2	4.202	0.015	19.4	68.0	70.7	0.01	-99.7	0.0014	10		9	4		4
1.A.4.a Commercial/Institutional: Other Fossil Fuels	SO_2	0.000	0.000	5.0	20.0	20.6	0.00		0						
1.A.4.b Residential: Biomass	SO_2	0.422	0.361	10.0	75.0	75.7	4.68	-14.4	0.0005		8			7	
1.A.4.b Residential: Gaseous Fuels	SO_2	0.003	0.000					-100.0							
1.A.4.b Residential: Liquid Fuels	SO_2	7.169	0.031	19.7	68.9	71.7	0.03	-99.6	0.0042	3		3	1		1
1.A.4.b Residential: Other Fossil Fuels	SO_2	0.000	0.000	5.0	20.0	20.6	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	SO_2	0.028	0.070	10.0	75.0	75.7	0.17	146.1	0		25			17	
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	SO_2	1.271	0.022	30.0	40.0	50.0	0.01	-98.3	0	20		20	18		16
1.A.4.c Agriculture/Forestry/Fisheries: Fossil part of biodiesel and bio-gasoline	SO_2	0.000	0.000	3.5	14.2	14.6	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.c Agriculture/Forestry/Fisheries: Gaseous Fuels	SO_2	0.001	0.000					-100.0							
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	SO_2	0.001	0.000	3.6	14.3	14.8	0.00	-86.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	SO_2	1.588	0.052	19.3	67.4	70.1	0.08	-96.7	0.0001	17		16	20		10
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	SO_2	0.628	0.000					-100.0		28		26	19		
1.B.1.b Coke production	SO_2	0.076	0.024	5.0	50.0	50.2	0.01	-69.0	0						
1.B.1.c Fugitive emissions from Solid Fuels	SO_2	0.022	0.013	50.0	50.0	70.7	0.00	-42.5	0						
1.B.2.c Venting and flaring	SO_2	0.000	0.000					-100.0							
1.D International Aviation: Biomass	SO_2	0.000	0.002	10.0	50.0	51.0	0.00		0						
1.D International Aviation: Jet Kerosene	SO_2	0.043	0.048	10.0	50.0	51.0	0.04	11.2	0						
2.A.1 Cement Production	SO_2	5.259	0.157	2.0	20.0	20.1	0.06	-97.0	0.0001	6	19	6	11		12
2.A.2 Lime Production	SO_2	0.085	0.289	5.1	19.8	20.4	0.22	238.2	0		9			15	
2.A.3 Glass Production	SO_2	0.256	0.134		30.0	30.0	0.10	-47.8	0		21			21	
2.B.10 Other	SO_2	5.918	0.527		34.2	34.2	2.03	-91.1	0.0001	5	6	5	7	8	7
2.C.1 Iron and Steel Production	SO_2	4.110	0.879	3.2	64.9	65.0	20.47	-78.6	0.0004	11	4	11	6	2	5
2.C.2 Ferroalloys production	SO_2	0.300	0.040	5.0	30.0	30.4	0.01	-86.8	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.C.3 Aluminium production	SO_2	0.263	0.157	2.0	30.0	30.1	0.14	-40.4	0		18			19	
2.C.7 Other	SO_2	4.892	3.199	4.0	20.0	20.4	26.70	-34.6	0.0027	8	1	15	12	1	20
2.G.4 Other	SO_2	0.003	0.004	15.0	50.0	52.2	0.00	16.0	0						
2.H.1 Pulp and paper	SO_2	12.819	2.744	5.8	19.8	20.6	20.04	-78.6	0.0008	1	2	1	5	3	6
2.H.2 Food and beverages industry	SO_2	0.001	0.053	20.0	200.0	201.0	0.70	6185.6	0.0001					12	
5.C.1 Waste Incineration	SO_2	0.054	0.013	7.5	623.6	623.7	0.40	-76.0	0					14	
Total		**102.399**	**14.177**			**8.9**	**100**	**-86.2**	**1.2315**						

Table A1-18. Summary of the key source and uncertainty analysis of TSP emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	TSP	0.817	0.984	1.5	14.9	14.9	0.00	20.4	0	16	9				
1.A.1.a Public Electricity and Heat Production: Gaseous Fuels	TSP	0.001	0.000	1.8	87.8	87.8	0.00	-75.7	0						
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	TSP	0.132	0.022	1.2	11.8	11.8	0.00	-83.4	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	TSP	0.028	0.005	2.0	20.0	20.1	0.00	-80.4	0						
1.A.1.a Public Electricity and Heat Production: Peat	TSP	0.711	0.001	2.0	19.7	19.8	0.00	-99.9	0	20		14			
1.A.1.a Public Electricity and Heat Production: Solid Fuels	TSP	1.105	0.002	1.8	18.3	18.4	0.00	-99.8	0.0001	12		9			
1.A.1.a Public Electricity and Heat Production: Other Fuels	TSP	0.425	0.009	1.3	12.9	13.0	0.00	-97.9	0	27		21			
1.A.1.b Petroleum refining: Biomass	TSP	0.000	0.000		20.0	20.0	0.00		0						
1.A.1.b Petroleum refining: Gaseous Fuels	TSP	0.023	0.001	2.0	100.0	100.0	0.00	-97.8	0						
1.A.1.b Petroleum refining: Liquid Fuels	TSP	0.483	0.081	10.0	100.0	100.5	0.00	-83.2	0.0003	24		22			12
1.A.1.c Manufacture of Solid fuels and Other Energy Industries: Solid Fuels	TSP	0.361	0.134	5.0	100.0	100.1	0.00	-62.8	0	30					

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.a Iron and Steel: Biomass	TSP	0.000	0.000	5.0	100.0	100.1	0.00	19.2	0						
1.A.2.a Iron and Steel: Gaseous Fuels	TSP	0.000	0.000	5.0	100.0	100.1	0.00	294.6	0						
1.A.2.a Iron and Steel: Liquid Fuels	TSP	0.134	0.015	5.0	100.0	100.1	0.00	-88.7	0						
1.A.2.a Iron and Steel: Solid Fuels	TSP	0.031	0.004	2.0	50.0	50.0	0.00	-88.8	0						
1.A.2.b Non-ferrous metals: Gaseous Fuels	TSP	0.000	0.000	5.0	100.0	100.1	0.00	57.5	0						
1.A.2.b Non-ferrous metals: Liquid Fuels	TSP	0.008	0.002	5.0	100.0	100.1	0.00	-74.8	0						
1.A.2.b Non-ferrous metals: Solid Fuels	TSP	0.017	0.000					-100.0							
1.A.2.c Chemicals: Biomass	TSP	0.037	0.010	5.0	100.0	100.1	0.00	-74.0	0						
1.A.2.c Chemicals: Gaseous Fuels	TSP	0.000	0.000	5.0	100.0	100.1	0.00	-50.0	0						
1.A.2.c Chemicals: Liquid Fuels	TSP	0.025	0.002	5.0	100.0	100.1	0.00	-91.0	0						
1.A.2.c Chemicals: Other Fuels	TSP	0.023	0.009	10.0	100.0	100.5	0.00	-59.6	0						
1.A.2.c Chemicals: Solid Fuels	TSP	0.048	0.000	2.0	100.0	100.0	0.00	-99.9	0						
1.A.2.d Pulp, Paper and Print: Biomass	TSP	2.468	0.271	8.0	100.0	100.3	0.00	-89.0	0.0097	7	14	7	6		4

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.d Pulp, Paper and Print: Gaseous Fuels	TSP	0.000	0.000	5.0	100.0	100.1	0.00	-73.9	0						
1.A.2.d Pulp, Paper and Print: Liquid Fuels	TSP	0.220	0.032	5.0	100.0	100.1	0.00	-85.5	0.0001						
1.A.2.d Pulp, Paper and Print: Other Fuels	TSP	0.276	0.002	10.0	100.0	100.5	0.00	-99.4	0.0002			27			
1.A.2.d Pulp, Paper and Print: Solid Fuels	TSP	0.134	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	TSP	0.011	0.014	5.0	100.0	100.1	0.00	32.6	0						
1.A.2.e Food Processing, Beverages and Tobacco: Gaseous Fuels	TSP	0.000	0.000	5.0	100.0	100.1	0.00	-38.8	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	TSP	0.064	0.001	5.0	100.0	100.1	0.00	-98.4	0						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	TSP	0.029	0.000	10.0	100.0	100.5	0.00	-99.4	0						
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	TSP	0.043	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	TSP	0.005	0.003	3.8	37.7	37.9	0.00	-44.1	0						
1.A.2.f Non-metallic minerals: Gaseous Fuels	TSP	0.000	0.000	4.1	38.3	38.5	0.00	5.4	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.f Non-metallic minerals: Liquid Fuels	TSP	0.040	0.014	9.9	59.4	60.2	0.00	-65.2	0						
1.A.2.f Non-metallic minerals: Solid Fuels	TSP	0.147	0.001	8.5	34.6	35.6	0.00	-99.6	0						
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	TSP	0.000	0.022	3.8	22.6	22.9	0.00		0						
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	TSP	0.763	0.174	4.8	29.1	29.5	0.00	-77.2	0	19		18			
1.A.2.g.viii Other: Biomass	TSP	1.554	0.128	4.5	35.7	36.0	0.00	-91.7	0.0005	10		8			10
1.A.2.g.viii Other: Gaseous Fuels	TSP	0.000	0.000	2.5	20.3	20.5	0.00	-69.4	0						
1.A.2.g.viii Other: Liquid Fuels	TSP	0.192	0.028	4.0	24.2	24.5	0.00	-85.6	0						
1.A.2.g.viii Other: Other Fuels	TSP	0.000	0.001	5.0	40.0	40.3	0.00		0						
1.A.2.g.viii Other: Solid Fuels	TSP	0.058	0.087	5.0	40.0	40.3	0.00	49.8	0						
1.A.3.a Domestic Aviation: Aviation Gasoline	TSP	0.001	0.000	10.0	10.0	14.1	0.00	-91.9	0						
1.A.3.a Domestic Aviation: Biomass	TSP	0.000	0.000	10.0	10.0	14.1	0.00		0						
1.A.3.a Domestic Aviation: Jet Kerosene	TSP	0.020	0.005	10.0	10.0	14.1	0.00	-74.4	0						
1.A.3.b.i Road Transportation, Cars: Biomass	TSP	0.000	0.015	2.9	9.5	9.9	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.i Road Transportation, Cars: Diesel oil	TSP	0.367	0.066	5.6	18.6	19.4	0.00	-82.1	0	29		25			
1.A.3.b.i Road Transportation, Cars: Gasoline	TSP	0.204	0.036	3.0	15.0	15.3	0.00	-82.6	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	TSP	0.000	0.011	3.5	10.4	10.9	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	TSP	0.236	0.079	5.0	15.0	15.8	0.00	-66.3	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gaseous Fuels	TSP	0.000	0.000	5.0	15.0	15.8	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	TSP	0.045	0.003	3.0	15.0	15.3	0.00	-94.5	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	TSP	0.000	0.019	2.4	7.2	7.6	0.00	7415.8	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	TSP	3.168	0.070	4.5	13.6	14.4	0.00	-97.8	0.0004	6		6			11
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	TSP	0.000	0.000	5.0	100.0	100.1	0.00	-77.0	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: LNG	TSP	0.000	0.001	5.0	100.0	100.1	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	TSP	0.000	0.002	4.6	13.8	14.5	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	TSP	0.045	0.031	3.0	15.0	15.3	0.00	-30.0	0						
1.A.3.b.vi Road Transportation: Automobile tyre and brake wear	TSP	1.265	2.116		15.0	15.0	0.01	67.3	0.0003	11	5	11			
1.A.3.b.vii Road Transportation: Automobile road abrasion	TSP	14.010	22.294		15.0	15.0	0.61	59.1	0.0309	2	2	3	7	3	7
1.A.3.c Railways: Liquid Fuels	TSP	0.049	0.018	5.0	10.0	11.2	0.00	-63.7	0						
1.A.3.d Domestic Navigation: Biomass	TSP	0.000	0.013	5.0	40.0	40.3	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	TSP	0.408	0.338	3.2	25.8	26.0	0.00	-17.0	0	28	12				
1.A.3.d Domestic Navigation: Gasoline	TSP	0.000	0.000	5.0	40.0	40.3	0.00		0						
1.A.3.d Domestic Navigation: LNG	TSP	0.000	0.004	10.0	300.0	300.2	0.00		0						
1.A.3.d Domestic Navigation: Residual Oil	TSP	0.498	0.164	15.0	50.0	52.2	0.00	-67.0	0	23		23			
1.A.3.e Other Transportation: Biomass	TSP	0.000	0.000	3.8	23.0	23.3	0.00		0						
1.A.3.e Other Transportation: Total	TSP	0.306	0.014	5.0	30.0	30.4	0.00	-95.4	0			26			
1.A.4.a Commercial/Institutional: Biomass	TSP	0.244	0.076	8.7	9.0	12.5	0.00	-68.7	0						
1.A.4.a Commercial/Institutional: Gaseous Fuels	TSP	0.001	0.002	10.0	10.0	14.1	0.00	113.3	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.a Commercial/Institutional: Gasoline	TSP	0.033	0.030	5.0	30.0	30.4	0.00	-8.4	0						
1.A.4.a Commercial/Institutional: Liquid Fuels	TSP	0.509	0.066	4.9	29.2	29.6	0.00	-87.1	0	22		20			
1.A.4.b Residential: Biomass	TSP	13.268	4.514	10.0	64.9	65.7	0.48	-66.0	0.0345	3	3	2	2	5	2
1.A.4.b Residential: Gaseous Fuels	TSP	0.001	0.001	10.0	65.0	65.8	0.00	-31.3	0						
1.A.4.b Residential: Liquid Fuels	TSP	0.789	0.106	3.2	18.8	19.1	0.00	-86.5	0	18		15			
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	TSP	0.886	0.431	9.8	29.3	30.9	0.00	-51.3	0	14	10	19			
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	TSP	0.058	0.017	30.0	40.0	50.0	0.00	-71.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Gaseous Fuels	TSP	0.000	0.000	10.0	30.0	31.6	0.00	-90.7	0						
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	TSP	0.019	0.022	4.5	26.8	27.2	0.00	18.8	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	TSP	0.958	0.084	3.0	16.9	17.1	0.00	-91.2	0	13		10			
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	TSP	0.240	0.000					-100.0				32			
1.B.1.a Coal Mining	TSP	0.027	0.014	6.0	900.0	900.0	0.00	-48.0	0						
1.B.1.c Fugitive emissions from Solid Fuels	TSP	0.240	0.043	6.0	19.9	20.7	0.00	-82.2	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.B.2.c Venting and flaring	TSP	0.000	0.000	50.0	100.0	111.8	0.00	-7.1	0						
1.D International Aviation: Biomass	TSP	0.000	0.001	10.0	10.0	14.1	0.00		0						
1.D International Aviation: Jet Kerosene	TSP	0.012	0.015	10.0	10.0	14.1	0.00	30.3	0						
2.A.1 Cement Production	TSP	0.882	0.078	2.0	30.0	30.1	0.00	-91.2	0.0001	15		12			
2.A.2 Lime Production	TSP	0.331	0.078	5.4	51.5	51.8	0.00	-76.3	0			29			
2.A.3 Glass Production	TSP	0.292	0.051		100.0	100.0	0.00	-82.7	0.0001			31			
2.B.10 Other	TSP	0.165	0.031		52.7	52.7	0.00	-81.5	0						
2.B.5 Carbide production	TSP	0.120	C	10.0	50.0	51.0	0.00	C	C						
2.C.1 Iron and Steel Production	TSP	6.162	1.003	3.6	29.1	29.3	0.00	-83.7	0.0041	5	8	5	9		6
2.C.2 Ferroalloys production	TSP	0.086	0.042	5.0	40.0	40.3	0.00	-51.3	0						
2.C.3 Aluminium production	TSP	0.347	0.086	2.0	40.0	40.1	0.00	-75.2	0	31		28			
2.C.7 Other	TSP	0.255	0.016	4.0	40.0	40.2	0.00	-93.7	0			33			
2.D.3 Other	TSP	0.107	0.142	10.0	109.0	109.5	0.00	32.9	0.0001						
2.G.4 Other	TSP	0.337	0.204	10.9	31.1	32.9	0.00	-39.4	0						
2.H.1 Pulp and paper	TSP	9.580	1.838	6.5	20.4	21.4	0.01	-80.8	0.0044	4	6	4	8		5
2.H.3 Other (NFR 2A5a)	TSP	0.809	0.214		49.0	49.0	0.00	-73.5	0.0001	17		17			

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.H.3 Other (NFR 2A5b)	TSP	46.283	28.876		146.0	146.0	97.35	-37.6	0.0401	1	1	1	1	1	1
2.H.3 Other (NFR 2A6)	TSP	0.429	0.101		49.0	49.0	0.00	-76.4	0	26		24			
2.I Wood processing	TSP	0.668	0.421	15.0	900.0	900.1	0.79	-36.9	0.0005	21	11	30	3	2	3
3.B.1 Dairy cattle	TSP	0.477	0.239	20.0	150.0	151.3	0.01	-50.0	0.0001	25					13
3.B.1 Non-dairy cattle	TSP	0.323	0.315	20.0	150.0	151.3	0.01	-2.7	0.0003		13				
3.B.3 Swine	TSP	1.720	1.081	20.0	150.0	151.3	0.15	-37.1	0.0007	9	7	16	4		8
3.B.4 Fur-bearing animals	TSP	0.005	0.000	20.0	200.0	201.0	0.00	-93.3	0						
3.B.4 Goats	TSP	0.000	0.001	20.0	200.0	201.0	0.00	174.7	0						
3.B.4 Horses	TSP	0.076	0.085	20.0	200.0	201.0	0.00	12.6	0.0001						
3.B.4 Poultry	TSP	1.826	2.540	16.4	125.6	126.7	0.57	39.1	0.026	8	4	13	5	4	9
3.B.4 Sheep	TSP	0.011	0.017	20.0	200.0	201.0	0.00	48.6	0						
5.A Solid waste disposal	TSP	0.005	0.002	10.0	377.0	377.1	0.00	-57.9	0						
5.C.1 Waste Incineration	TSP	0.045	0.059	58.8	168.7	178.6	0.00	31.7	0						
5.E Other	TSP	0.162	0.135	50.0	67.0	83.6	0.00	-16.7	0.0001						
Total		**119.819**	**70.483**			**60.6**	**100**	**-41.2**	**3.9277**						

Table A1-19. Summary of the key source and uncertainty analysis of Zn emissions 1990 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	Zn	5.448	11.473	1.5	74.7	74.7	0.17	110.6	0.1481	7	3	6			
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	Zn	0.152	0.021	1.2	59.6	59.6	0.00	-86.1	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	Zn	0.011	0.054	2.0	100.0	100.0	0.00	391.0	0						
1.A.1.a Public Electricity and Heat Production: Peat	Zn	0.328	0.026	2.0	98.6	98.6	0.00	-92.0	0						
1.A.1.a Public Electricity and Heat Production: Solid Fuels	Zn	0.315	0.003	2.0	100.0	100.0	0.00	-99.2	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	Zn	0.017	0.088	1.3	490.9	490.9	0.00	409.9	0.0005						
1.A.1.b Petroleum refining: Liquid Fuels	Zn	0.056	0.026	10.0	100.0	100.5	0.00	-53.2	0						
1.A.2.a Iron and Steel: Biomass	Zn	0.000	0.000					-100.0							
1.A.2.a Iron and Steel: Liquid Fuels	Zn	0.049	0.004	5.0	100.0	100.1	0.00	-91.9	0						
1.A.2.a Iron and Steel: Solid Fuels	Zn	0.001	0.000					-100.0							
1.A.2.b Non-ferrous metals: Liquid Fuels	Zn	0.006	0.002	5.0	100.0	100.1	0.00	-70.1	0						
1.A.2.b Non-ferrous metals: Solid Fuels	Zn	0.000	0.000					-100.0							
1.A.2.c Chemicals: Biomass	Zn	0.231	0.101	5.0	40.0	40.3	0.00	-56.3	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.c Chemicals: Liquid Fuels	Zn	0.022	0.002	5.0	100.0	100.1	0.00	-92.1	0						
1.A.2.c Chemicals: Other Fuels	Zn	0.000	0.000					-100.0							
1.A.2.c Chemicals: Solid Fuels	Zn	0.011	0.000	2.0	700.0	700.0	0.00	-96.1	0						
1.A.2.d Pulp, Paper and Print: Biomass	Zn	15.104	3.683	8.0	40.0	40.8	0.01	-75.6	0.0016	4	5	3			5
1.A.2.d Pulp, Paper and Print: Liquid Fuels	Zn	0.227	0.043	5.0	100.0	100.1	0.00	-81.0	0						
1.A.2.d Pulp, Paper and Print: Other Fuels	Zn	0.033	0.000					-100.0							
1.A.2.d Pulp, Paper and Print: Solid Fuels	Zn	0.028	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	Zn	0.076	0.174	5.0	40.0	40.3	0.00	130.0	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	Zn	0.061	0.001	5.0	100.0	100.1	0.00	-98.3	0						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	Zn	0.006	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	Zn	0.010	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	Zn	0.033	0.151	4.6	18.6	19.2	0.00	358.0	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	Zn	0.050	0.021	10.0	39.9	41.1	0.00	-57.1	0						
1.A.2.f Non-metallic minerals: Solid Fuels	Zn	0.123	0.035	8.8	320.2	320.3	0.00	-71.5	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	Zn	0.000	0.001	3.7	73.1	73.1	0.00		0						
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	Zn	0.005	0.009	4.9	97.1	97.2	0.00	77.7	0						
1.A.2.g.vii Off-road vehicles and other machinery: Other Fossil Fuels	Zn	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.2.g.viii Other: Biomass	Zn	9.561	1.382	4.6	18.5	19.0	0.00	-85.6	0.0004	6	8	5			
1.A.2.g.viii Other: Liquid Fuels	Zn	0.133	0.028	4.1	24.9	25.2	0.00	-78.7	0						
1.A.2.g.viii Other: Solid Fuels	Zn	0.008	0.032	4.6	228.7	228.7	0.00	277.9	0						
1.A.3.b.i Road Transportation, Cars: Biomass	Zn	0.000	0.066	3.9	77.3	77.4	0.00		0						
1.A.3.b.i Road Transportation, Cars: Diesel oil	Zn	0.003	0.026	5.0	99.7	99.8	0.00	746.6	0						
1.A.3.b.i Road Transportation, Cars: Gasoline	Zn	0.126	0.055	3.0	99.5	99.6	0.00	-56.7	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	Zn	0.000	0.002	3.4	67.7	67.8	0.00		0						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	Zn	0.001	0.010	5.0	100.0	100.1	0.00	908.5	0						
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	Zn	0.009	0.001	3.0	100.0	100.0	0.00	-88.3	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	Zn	0.000	0.005	2.6	51.7	51.8	0.00	13415.5	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	Zn	0.022	0.023	4.7	93.9	94.1	0.00	2.5	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	Zn	0.000	0.000	3.0	100.0	100.0	0.00	-87.1	0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	Zn	0.000	0.000	4.7	94.5	94.6	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	Zn	0.000	0.001	3.0	100.0	100.0	0.00	108.8	0						
1.A.3.b.vi Road Transportation: Automobile tyre and brake wear	Zn	12.248	20.499		1000.0	1000.0	98.14	67.4	76.1803	5	1	4	1	1	1
1.A.3.c Railways: Liquid Fuels	Zn	0.032	0.012	5.0	95.0	95.1	0.00	-63.7	0						
1.A.3.d Domestic Navigation: Biomass	Zn	0.000	0.010	5.0	50.0	50.2	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	Zn	0.042	0.064	3.5	35.5	35.6	0.00	51.1	0						
1.A.3.d Domestic Navigation: Gasoline	Zn	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.d Domestic Navigation: Residual Oil	Zn	0.167	0.046	15.0	100.0	101.1	0.00	-72.4	0						
1.A.3.e Other Transportation: Biomass	Zn	0.000	0.000	3.7	74.9	75.0	0.00		0						
1.A.3.e Other Transportation: Other Fossil Fuels	Zn	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.e Other Transportation: Total	Zn	0.002	0.001	5.0	100.0	100.1	0.00	-28.3	0						
1.A.4.a Commercial/Institutional: Biomass	Zn	0.285	0.566	10.0	199.9	200.2	0.00	98.8	0.0025						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.a Commercial/Institutional: Gasoline	Zn	0.001	0.001	5.0	100.0	100.1	0.00	-6.0	0						
1.A.4.a Commercial/Institutional: Liquid Fuels	Zn	0.147	0.002	8.8	71.7	72.2	0.00	-98.5	0						
1.A.4.a Commercial/Institutional: Other Fossil Fuels	Zn	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.4.b Residential: Biomass	Zn	15.607	13.175	10.0	200.0	200.2	1.63	-15.6	0.7035	3	2	7	3	2	4
1.A.4.b Residential: Liquid Fuels	Zn	0.175	0.004	10.5	58.5	59.5	0.00	-97.8	0						
1.A.4.b Residential: Other Fossil Fuels	Zn	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	Zn	1.132	1.683	10.0	199.9	200.2	0.03	48.6	0.0194		7				
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	Zn	0.060	0.017	30.0	100.0	104.4	0.00	-71.5	0						
1.A.4.c Agriculture/Forestry/Fisheries: Fossil part of biodiesel and bio-gasoline	Zn	0.000	0.000	3.5	70.8	70.9	0.00		0						
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	Zn	0.000	0.000	3.6	71.6	71.7	0.00	180.9	0						
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	Zn	0.026	0.011	9.5	58.9	59.7	0.00	-56.9	0						
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	Zn	0.361	0.000					-100.0							
2.A.3 Glass Production	Zn	0.008	0.000		50.0	50.0	0.00	-99.1	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.C.1 Iron and Steel Production	Zn	86.079	6.308	2.9	39.3	39.4	0.01	-92.7	0.2472	1	4	1	2		2
2.C.2 Ferroalloys production	Zn	1.213	0.706	5.0	50.0	50.2	0.00	-41.8	0.0001		9				
2.C.3 Aluminium production	Zn	0.012	0.001	2.0	100.0	100.0	0.00	-89.7	0						
2.C.7 Other	Zn	33.644	3.198	4.0	50.0	50.2	0.01	-90.5	0.0521	2	6	2	4		3
2.G.4 Other	Zn	0.280	0.306	14.6	682.1	682.2	0.01	9.3	0.0059						
2.H.1 Pulp and paper	Zn	0.801	0.191	6.5	51.0	51.4	0.00	-76.2	0						
2.H.3 Other (NFR 2A5a)	Zn	1.100	0.005		50.0	50.0	0.00	-99.6	0.0001						
2.H.3 Other (NFR 2A6)	Zn	0.109	0.011		50.0	50.0	0.00	-89.8	0						
5.C.1 Waste Incineration	Zn	0.169	0.274	49.4	164.0	171.3	0.00	62.4	0.0005						
Total		**185.967**	**64.638**			**320.1**	**100**	**-65.2**	**87.9558**						

Table A1-20. Summary of the key source and uncertainty analysis of Black Carbon (BC) emissions 2000 and 2024, submission 2026.

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.1.a Public Electricity and Heat Production: Biomass	BC	0.046	0.023	1.5	223.1	223.1	0.09	-50.3	0.0017	15	14	19		14	
1.A.1.a Public Electricity and Heat Production: Gaseous Fuels	BC	0.000	0.000	1.8	309.1	309.2	0.00	-82.5	0						
1.A.1.a Public Electricity and Heat Production: Liquid Fuels	BC	0.008	0.004	1.3	164.9	164.9	0.00	-52.0	0						
1.A.1.a Public Electricity and Heat Production: Other Fuels	BC	0.000	0.000	2.0	300.0	300.0	0.00	-38.8	0						
1.A.1.a Public Electricity and Heat Production: Peat	BC	0.005	0.000	2.0	498.8	498.8	0.00	-99.7	0.0001						
1.A.1.a Public Electricity and Heat Production: Solid Fuels	BC	0.005	0.000	1.8	428.4	428.4	0.00	-99.1	0.0001						
1.A.1.a Public Electricity and Heat Production: Other Fuels	BC	0.002	0.000	1.3	309.1	309.1	0.00	-88.1	0						
1.A.1.b Petroleum refining: Biomass	BC	0.000	0.000		297.0	297.0	0.00		0						
1.A.1.b Petroleum refining: Gaseous Fuels	BC	0.027	0.000	2.0	297.0	297.0	0.00	-99.8	0.0019	21		17			
1.A.1.b Petroleum refining: Liquid Fuels	BC	0.008	0.010	10.0	297.0	297.2	0.03	27.7	0.002		21				
1.A.2.a Iron and Steel: Biomass	BC	0.000	0.000	5.0	239.0	239.1	0.00	1502.5	0						
1.A.2.a Iron and Steel: Gaseous Fuels	BC	0.000	0.000	5.0	275.0	275.0	0.00	377.8	0						
1.A.2.a Iron and Steel: Liquid Fuels	BC	0.024	0.005	5.0	239.0	239.1	0.00	-81.1	0.0001	22		21			

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.a Iron and Steel: Other Fuels	BC	0.000	0.000					-100.0							
1.A.2.a Iron and Steel: Solid Fuels	BC	0.000	0.000	2.0	506.0	506.0	0.00	148.3	0						
1.A.2.b Non-ferrous metals: Biomass	BC	0.000	0.000					-100.0							
1.A.2.b Non-ferrous metals: Gaseous Fuels	BC	0.000	0.000	5.0	275.0	275.0	0.00	-24.9	0						
1.A.2.b Non-ferrous metals: Liquid Fuels	BC	0.002	0.001	5.0	239.0	239.1	0.00	-60.3	0						
1.A.2.b Non-ferrous metals: Other Fuels	BC	0.000	0.000					-100.0							
1.A.2.c Chemicals: Biomass	BC	0.001	0.002	5.0	239.0	239.1	0.00	255.6	0.0001						
1.A.2.c Chemicals: Gaseous Fuels	BC	0.000	0.000	5.0	275.0	275.0	0.00	-58.3	0						
1.A.2.c Chemicals: Liquid Fuels	BC	0.011	0.001	5.0	239.0	239.1	0.00	-91.7	0.0001						
1.A.2.c Chemicals: Other Fuels	BC	0.003	0.001	10.0	506.0	506.1	0.00	-81.8	0						
1.A.2.c Chemicals: Solid Fuels	BC	0.000	0.000	2.0	506.0	506.0	0.00	-99.4	0						
1.A.2.d Pulp, Paper and Print: Biomass	BC	0.305	0.056	8.0	239.0	239.1	0.60	-81.7	0.02	4	4	6	4	3	5
1.A.2.d Pulp, Paper and Print: Gaseous Fuels	BC	0.000	0.000	5.0	275.0	275.0	0.00	-78.0	0						
1.A.2.d Pulp, Paper and Print: Liquid Fuels	BC	0.134	0.015	5.0	239.0	239.1	0.04	-88.8	0.0109	10	16	9	9	16	8
1.A.2.d Pulp, Paper and Print: Other Fuels	BC	0.004	0.000	10.0	506.0	506.1	0.00	-97.5	0.0001						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.d Pulp, Paper and Print: Solid Fuels	BC	0.001	0.000					-100.0							
1.A.2.e Food Processing, Beverages and Tobacco: Biomass	BC	0.001	0.003	5.0	239.0	239.1	0.00	533.2	0.0002						
1.A.2.e Food Processing, Beverages and Tobacco: Gaseous Fuels	BC	0.000	0.000	5.0	275.0	275.0	0.00	-42.6	0						
1.A.2.e Food Processing, Beverages and Tobacco: Liquid Fuels	BC	0.017	0.001	5.0	239.0	239.1	0.00	-96.8	0.0004						
1.A.2.e Food Processing, Beverages and Tobacco: Other Fuels	BC	0.000	0.000	10.0	506.0	506.1	0.00	-95.7	0						
1.A.2.e Food Processing, Beverages and Tobacco: Solid Fuels	BC	0.001	0.000					-100.0							
1.A.2.f Non-metallic minerals: Biomass	BC	0.001	0.001	3.7	45.6	45.8	0.00	-30.9	0						
1.A.2.f Non-metallic minerals: Gaseous Fuels	BC	0.000	0.000	4.1	47.8	48.0	0.00	35.4	0						
1.A.2.f Non-metallic minerals: Liquid Fuels	BC	0.019	0.007	9.9	74.0	74.7	0.00	-65.6	0		28				
1.A.2.f Non-metallic minerals: Other Fuels	BC	0.000	0.000					-100.0							
1.A.2.f Non-metallic minerals: Solid Fuels	BC	0.005	0.000	8.7	268.0	268.1	0.00	-99.3	0.0001						
1.A.2.g.vii Off-road vehicles and other machinery: Biomass	BC	0.001	0.014	3.8	182.8	182.9	0.02	2879.5	0.0023		18				
1.A.2.g.vii Off-road vehicles and other machinery: Liquid Fuels	BC	0.297	0.110	5.0	238.4	238.5	2.32	-63.1	0.0125	6	3	7	5	2	6

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.2.g.viii Other: Biomass	BC	0.158	0.026	4.4	210.9	210.9	0.10	-83.5	0.0058	8	13	8	8	13	9
1.A.2.g.viii Other: Gaseous Fuels	BC	0.000	0.000	2.5	139.8	139.8	0.00	-57.7	0						
1.A.2.g.viii Other: Liquid Fuels	BC	0.039	0.014	4.0	189.6	189.6	0.02	-64.1	0.0001	19	17	18			
1.A.2.g.viii Other: Other Fuels	BC	0.000	0.000	5.0	506.0	506.0	0.00	541.6	0						
1.A.2.g.viii Other: Solid Fuels	BC	0.006	0.002	5.0	505.0	505.1	0.00	-71.9	0						
1.A.3.a Domestic Aviation: Aviation Gasoline	BC	0.000	0.000	10.0	30.0	31.6	0.00	-89.6	0						
1.A.3.a Domestic Aviation: Biomass	BC	0.000	0.000	10.0	20.0	22.4	0.00		0						
1.A.3.a Domestic Aviation: Jet Kerosene	BC	0.007	0.003	10.0	20.0	22.4	0.00	-66.4	0						
1.A.3.b.i Road Transportation, Cars: Biomass	BC	0.001	0.005	4.3	140.0	140.1	0.00	802.4	0.0002						
1.A.3.b.i Road Transportation, Cars: Diesel oil	BC	0.342	0.034	6.8	218.1	218.2	0.19	-90.0	0.0678	3	10	3	3	9	3
1.A.3.b.i Road Transportation, Cars: Gasoline	BC	0.045	0.006	3.0	237.7	237.7	0.01	-87.0	0.001	16		15			
1.A.3.b.ii Road Transportation, Light duty trucks: Biomass	BC	0.001	0.006	3.7	177.3	177.3	0.00	1111.2	0.0004						
1.A.3.b.ii Road Transportation, Light duty trucks: Diesel oil	BC	0.296	0.044	5.0	239.0	239.1	0.37	-85.2	0.0337	7	7	5	6	6	4
1.A.3.b.ii Road Transportation, Light duty trucks: Gaseous Fuels	BC	0.000	0.000	5.0	239.0	239.1	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.b.ii Road Transportation, Light duty trucks: Gasoline	BC	0.008	0.000	3.0	239.0	239.0	0.00	-94.3	0.0001						
1.A.3.b.iii Road Transportation, Heavy duty trucks: Biomass	BC	0.002	0.008	2.5	121.4	121.4	0.00	270.9	0.0003		25				
1.A.3.b.iii Road Transportation, Heavy duty trucks: Diesel oil	BC	1.146	0.031	4.5	215.9	215.9	0.15	-97.3	1.4437	2	11	1	2	10	1
1.A.3.b.iii Road Transportation, Heavy duty trucks: Gaseous Fuels	BC	0.000	0.000	5.0	239.0	239.1	0.00	-99.7	0						
1.A.3.b.iii Road Transportation, Heavy duty trucks: LNG	BC	0.000	0.000	5.0	239.0	239.1	0.00		0						
1.A.3.b.iv Road Transportation, Motorcycles: Biomass	BC	0.000	0.000	4.6	219.8	219.8	0.00	5424.6	0						
1.A.3.b.iv Road Transportation, Motorcycles: Gasoline	BC	0.007	0.006	3.0	239.0	239.0	0.01	-9.7	0.0004						
1.A.3.b.vi Road Transportation: Automobile tyre and brake wear	BC	0.140	0.212		41.0	41.0	0.25	51.1	0.0175	9	2	13		8	
1.A.3.c Railways: Liquid Fuels	BC	0.024	0.012	5.0	922.0	922.0	0.38	-51.8	0.0066		20		13	5	13
1.A.3.d Domestic Navigation: Biomass	BC	0.000	0.001	5.0	100.0	100.1	0.00		0						
1.A.3.d Domestic Navigation: Gas/Diesel Oil	BC	0.042	0.047	3.4	67.2	67.3	0.03	13.1	0.002	18	6			17	
1.A.3.d Domestic Navigation: Gasoline	BC	0.000	0.000	5.0	100.0	100.1	0.00		0						
1.A.3.d Domestic Navigation: LNG	BC	0.000	0.001	10.0	100.0	100.5	0.00		0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.3.d Domestic Navigation: Residual Oil	BC	0.022	0.010	15.0	100.0	101.1	0.00	-53.5	0.0001		22				
1.A.3.e Other Transportation: Biomass	BC	0.000	0.000	3.8	183.1	183.1	0.00	123.1	0						
1.A.3.e Other Transportation: Total	BC	0.111	0.007	5.0	239.0	239.1	0.01	-93.5	0.0121	13	27	10	11		10
1.A.4.a Commercial/Institutional: Biomass	BC	0.010	0.014	5.6	152.7	152.8	0.02	37.5	0.001		19				
1.A.4.a Commercial/Institutional: Gaseous Fuels	BC	0.000	0.000	10.0	275.0	275.2	0.00	118.4	0						
1.A.4.a Commercial/Institutional: Gasoline	BC	0.002	0.002	5.0	239.0	239.1	0.00	-8.3	0						
1.A.4.a Commercial/Institutional: Liquid Fuels	BC	0.134	0.051	4.9	234.4	234.4	0.49	-61.7	0.0033	11	5	11	12	4	12
1.A.4.b Residential: Biomass	BC	1.221	0.556	10.0	299.6	299.7	94.13	-54.4	1.384	1	1	2	1	1	2
1.A.4.b Residential: Gaseous Fuels	BC	0.000	0.000	10.0	104.0	104.5	0.00	-69.7	0						
1.A.4.b Residential: Liquid Fuels	BC	0.067	0.008	2.8	131.6	131.7	0.00	-87.3	0.0007	14	24	14			
1.A.4.c Agriculture/Forestry/Fisheries: Biomass	BC	0.017	0.031	8.6	206.0	206.2	0.14	87.3	0.0103		12			11	
1.A.4.c Agriculture/Forestry/Fisheries: Domestic Heating Oil	BC	0.029	0.009	30.0	100.0	104.4	0.00	-68.9	0.0001	20	23	20			
1.A.4.c Agriculture/Forestry/Fisheries: Gaseous Fuels	BC	0.000	0.000	10.0	275.0	275.2	0.00	-94.6	0						
1.A.4.c Agriculture/Forestry/Fisheries: Gasoline	BC	0.001	0.001	4.5	213.9	213.9	0.00	-22.0	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
1.A.4.c Agriculture/Forestry/Fisheries: Liquid Fuels	BC	0.299	0.038	3.9	163.9	163.9	0.13	-87.3	0.0213	5	8	4	7	12	7
1.A.4.c Agriculture/Forestry/Fisheries: Solid Fuels	BC	0.000	0.000					-100.0							
1.B.2.c Venting and flaring	BC	0.000	0.000	50.0	237.0	242.2	0.00		0						
1.D International Aviation: Biomass	BC	0.000	0.000	10.0	30.0	31.6	0.00		0						
1.D International Aviation: Jet Kerosene	BC	0.009	0.007	10.0	30.0	31.6	0.00	-17.6	0		26				
2.A.1 Cement Production	BC	0.005	0.002	2.0	100.0	100.0	0.00	-65.8	0						
2.A.2 Lime Production	BC	0.001	0.000	5.4	184.4	184.4	0.00	-65.2	0						
2.A.3 Glass Production	BC	0.001	0.001		294.0	294.0	0.00	20.5	0						
2.B.10 Other	BC	0.044	C		265.1	265.1	0.01	C	C	17		16			
2.B.5 Carbide production	BC	0.004	C	10.0	300.0	300.2	0.00	C	C						
2.C.1 Iron and Steel Production	BC	0.008	0.005	4.0	239.3	239.4	0.00	-41.6	0.0001						
2.C.2 Ferroalloys production	BC	0.007	0.003	5.0	100.0	100.1	0.00	-56.6	0						
2.C.3 Aluminium production	BC	0.002	0.001	2.0	300.0	300.0	0.00	-65.1	0						
2.C.7 Other	BC	0.000	0.000	4.0	300.0	300.0	0.00	-73.8	0						
2.D.3 Other	BC	0.000	0.000	10.0	293.0	293.2	0.00	40.6	0						
2.G.4 Other	BC	0.001	0.000	15.0	101.0	102.1	0.00	-48.1	0						

IPCC Source Category	Substance	Base year emissions or removals (t)	Year 2024 emissions or removals (t)	Activity data uncertainty in 2024 (%)	Emission factor uncertainty in 2024 (%)	Combined uncertainty in 2024 (%)	Contribution to variance in 2024 (%)	Inventory trend for 2024 with respect to base year (%)	Uncertainty introduced into the trend (%)	Level in base year	Level in 2024	Trend	Level in base year (Approach 2)	Level in 2024 (Approach 2)	Trend (Approach 2)
2.H.1 Pulp and paper	BC	0.112	0.036	6.5	278.2	278.3	0.34	-68.1	0.0004	12	9	12	10	7	11
5.C.1 Waste Incineration	BC	0.016	0.018	73.8	262.7	272.9	0.08	9.3	0.0055		15			15	
Total		**5.314**	**1.519**			**113.2**	**100**	**-71.4**	**17.5279**						

2 Annex 2: Detailed discussion of methodology and data for estimating emissions from fossil fuel combustion.

2.1 Sources for activity data in NFR 1A and parts of NFR 1B

Activity data used in the energy sector is mainly based on statistics on fuel consumption. In the sections below, the various energy surveys, produced by Statistics Sweden and other data sources are described. For stationary combustion within Other sector, activity data from the annual energy balances is used in order to ensure that all activities are covered, and no activities are double-counted. The energy balances are based on a number of surveys, which are all described below.

A number of activity data sources are used and the UNFCCC-ERT has asked for the rationale for choosing a certain data source, an explanation of how these sources are deemed accurate or inaccurate, and how time series consistency is ensured. In numerous development projects during the last ten years, several of them quoted in IIR section 3, different data sources have been compared and checked against each other, and in some of these projects industrial facilities have been contacted by phone or e-mail to verify data. Generally, the quarterly fuel statistics is considered to be more complete than the Energy use in manufacturing industry, because the industrial energy survey has not always included all back pressure power. In recent years, the main reason for choosing the quarterly fuel statistics is that the annual industrial energy survey is not ready in time for the emission inventory. On an aggregate level, the final results for the two surveys are very coherent. In a study performed by Statistics Sweden in 2009[1], a detailed comparison between the quarterly fuel statistics, the annual industrial energy survey and the energy balances was made. This study showed some differences between the two surveys, but the differences did not indicate systematic errors in any of the surveys, and hence it gave no reason to believe that the quarterly fuel statistics would not be of sufficient quality.

Environmental reports are often a good source for emission data, but generally they do not contain sufficient activity data for the energy sector, and facilities with small emissions are not obliged to submit environmental reports. The EU ETS system has very good coverage of the trading facilities, but presently it is not possible to use as main data source due to several reasons. Firstly, the database is not adapted to automated data processing, and secondly, some facilities only report carbon

[1] Statistics Sweden, 2009

balances. Furthermore, to produce correct estimates for the non-trading facilities, one must be able to separate trading facilities from non-trading ones in the Quarterly fuel statistics, and this is currently not possible due to different definitions of administrative units in the energy statistics and the EU-ETS, respectively.

For the Other sector, energy balances are used because none of the underlying surveys covers all emission sources in the different sub-sectors, but in the energy balances, complementary calculations are made in order to obtain full coverage and avoid double counting. Data for NFR 1A4 has been verified against the underlying surveys described in the sections below, and the coherence was good for biomass fuels and oils, whereas the coverage of use of e.g. LPG was considered to be better in the energy balances.

In Tables A2-1 and Table A2-2 below, the descriptions of the different data sources and reasons for the choice of certain data sources are summarized.

Table A2-1. Summary of the main activity data sources used in the inventory for stationary combustion.

NFR	Main activity data sources	Comments
1A2	Energy use in the manufacturing industry (ISEN), Quarterly fuel statistics (KvBr) and environmental reports.	1990-1996 and 2000-2002: ISEN. 1997-1999 and 2003 and onwards: KvBr.
1A2g + 1A4	Energy balances.	For the parts of 1A2g and 1A4 that are not covered by regular surveys.
1A1b and 1A2c	Emissions reported to EU ETS.	Parts of 1A2c since 2005/2008.
1A1c + 1A2a	Environmental reports	AD and CO_2 for the two integrated iron and steel plants (see Annex 3.5).

Table A2-2. Summarized properties of activity data sources used in the inventory for stationary combustion.

Activity data source	Description	Comments
Energy use in manufacturing industry (ISEN)	Total survey of industrial facilities with 10 or more employees.	Data for year t finalized in February/March year t+2, which is too late for the inventory. Used as main AD source for 1A2 for earlier years.
Quarterly fuel statistics (KvBr)	Total survey for the energy sector, cut-off sample survey for manufacturing industry (ISEN is the sample frame)	Data for year t finalized in March year t+1. Several studies have shown that this data source is complete and consistent.
Emissions reported to EU ETS	Facilities included in the EU Emission trading scheme 2005-. Emission data is complete, activity data and/or NCVs not always reported.	The definition of "facility" is different from the one used in official energy statistics (KvBr or ISEN). Population definitions changes between trading periods. No standardization of fuel types.
Environmental reports	All operators whose activities have an impact on the environment are obliged to report environmental reports to the authority responsible for the emission permits.	Quality and completeness is very variable. Activity data is not always included. Most of the information is only available in text reports, which means that data cannot be processed in an automatized way. The reports are also used for verification and occasionally for plant specific NCVs
Energy balances	Includes all supply and use of fuels and other energy types on aggregated levels.	See discussions in later sections.

2.1.1 Quarterly fuel statistics

Quarterly fuel statistics are used as follows:

- All years for data on stationary combustion in the NRF sector 1A1a, parts of 1A1c 1A2, with the exception of 1A2 for the years 1990-1996 and 2000-2002 (where Energy use in manufacturing industry (ISEN) is used) and for some sub-categories in 1A2g (where the Energy Balances is used).
- 1990-1996 for information on in-house (own-produced) fuels in NRF 1A1b and 1A2 since the statistics on energy use in manufacturing industry did not cover own-produced fuels during these years.
- 2000-2002 for data on fuel combustion for back pressure power in NRF 1A2c-e, both sold and consumed at the producing plant. This is due to that the Energy use in manufacturing industry (which is the main data source for industries 2000-2002) has been found not to cover fuel consumption for back pressure power.

Quarterly fuel statistics are carried out as a as a web-based sample survey sent to all working units[2]. The sample to the quarterly fuel statistics is based on the sample

[2] A company may consist of several working units, that is could be located in several places (factories).

for the yearly statistics of energy use in manufacturing industry, except for electricity and heat production for which the quarterly fuel statistics is a total survey. Data are collected from all companies in electricity and heat production and all companies in the manufacturing industry with more than nine employees and annual fuel combustion of more than 325 tonne oil equivalents.

The survey should cover all fuel consumption, both own-produced and purchased fuels. However, in some cases it has been noted by the inventory staff that not all in house fuels are covered. In those cases, supplementary data has been collected to assure complete time series. In the survey form, respondents are also asked to specify whether fuels are used as raw materials or for energy purposes.
The sample frame is updated annually based on the latest results of the Energy use in manufacturing industry (ISEN). The response rate to the quarterly fuel statistics is almost 100 % for ISIC 40 (that is, NFR 1A1a) and about 90 % for manufacturing industries. The non-respondents among the industries are often small companies, which means that much more than 90 % of consumed energy is covered in responses to the survey. To compensate for companies not included in the sample and companies not responding to the survey, all fuel consumption is raised with a factor which is produced from information on the line of business, number of employees and business volume from the most recent year when the statistics on energy use in manufacturing industry was a total survey (as discussed above). By definition, the survey does not cover energy consumption in working units with less than ten employees. The energy consumption in these “small industries” is estimated with a calculation model and published in the energy balances. This estimate covers all industrial branches, and the fuel consumption and emissions are reported under NFR 1A2g.

The quarterly fuel statistics for each year are compiled and ready for use at approximately the end of March the year after. This gives enough time to process the data for the greenhouse gas inventory.

2.1.2 Annual statistics on energy use in manufacturing industry

The statistics on energy use in manufacturing industry is used for emissions from stationary combustion in the NFR sectors 1A1b, 1A1c and 1A2 1990-1996 and 2000-2002. The Quarterly fuel statistics (KvBr) for these years did not include fuel consumption for back pressure power, because data on that activity was collected via a different survey (Electricity supply, district heating and supply of natural and gasworks gas (AREL)).

Since submission 2005, for calculation of emissions in 2003 and later years, energy use in manufacturing industry statistics is not used as a base for estimating emissions in the inventory. This is, as discussed above, mainly because the inventory must be submitted before the energy use in manufacturing industry statistics is completed. The energy use in manufacturing industry statistics is only used to

verify or correct data for single plants if errors are suspected in the quarterly fuel statistics for specific years described before.

The energy use in manufacturing industry statistics is based on an annual survey of manufacturing companies. In 1990-1996, 2000 and from 2004, all companies with more than 9 employees are included. In 1997-1999 and in 2001-2003 it was conducted as a sample survey to companies with less than 50 and more than 9 employees, and as a total survey to all companies with more than 50 employees. In 1990-1996, only purchased fuels were surveyed but, since 1997, information on all fuel consumption has been collected.

The response rate to the energy use in manufacturing industry statistics in the years for which this survey is used in the GHG emission inventory was about 85 %. To compensate for non-response, fuel consumption is raised with a raising factor based on the line of business, number of employees and business volume. There is no adjustment for manufacturing industries with less than 10 employees.

A special form is sent to electricity producing companies within manufacturing industries, where the amounts of fuels used for electricity production and manufacturing purposes are specified. All manufacturing industries with electricity production are included in the survey every year. In the inventory, all data used are on plant level and by fuel type. An overview of the activity data on energy consumption used in the inventory for 1990-2002 is given in Table A2-3.

Table A2-3. Summarized properties of the Annual statistics on energy use in manufacturing industry used in the inventory.

Year	Type of survey	Coverage	Adjustments	Quality
1990-1996	Annual total survey to all companies with more than nine employees	Working units, purchased fuels, quantity and economic value of purchased fuels	Raising to represent all companies with more than 9 employees	Not so good quality for quantity, good quality for economic value
1997-1999	Annual total survey to all companies with at least 50 employees and a stratified sample of companies with 10-49 employees	Working units purchased and own-produced fuels	Raising to represent all companies with more than 9 employees	Good on national level and on coarse branch level, poor for single fuel types and single branches
2000	Annual total survey to all companies with more than nine employees	Working units, purchased and own-produced fuels	No adjustments	Excellent
2001-2002	Annual total survey to all companies with at least 50 employees and a stratified sample of companies with 10-49 employees	Working units, purchased and own-produced fuels	Raising to represent all companies with more than 9 employees	Good

2.1.3 One- and two-dwelling statistics

One- and two-dwelling statistics are, together with holiday cottages statistics and multi-dwelling statistics, the main data sources for biomass combustion in households in the energy balances, which in turn are used to calculate emissions from stationary combustion in households, NFR 1A4b i.

This sample survey is conducted every second or third year to collect data on the use of electricity and heat for a total of 7,000 one- and two-dwellings. The years in between, the energy use is modelled based on changes in temperature between the years. Until 1999, the survey has a random sample from a real estate assessment, which includes all dwellings with a value higher than 50,000 SEK (about 5,600 €). From 2000, all dwellings used as permanent dwelling are included in the sample. Every third year, a postal survey collects data from agricultural properties. The sample in this sector is 3,000 objects. Activity data in the inventory is taken from annual reports prepared by Statistics Sweden[3]. Data is on national level by fuel type and considered to be of relatively good quality. To make sure that all emissions from households are included and that no double-counting occurs, activity data is taken from the annual energy balance sheets. However, the fuel consumption reported under the household category in the energy balance is based on the surveys described here.

2.1.4 Holiday cottages statistics

Holiday cottages statistics, together with one- and two-dwelling statistics and multi-dwelling statistics, is used to calculate emissions from stationary combustion in households, NFR 1A4b. As described above, an aggregate from the energy balances is used as activity data for stationary combustion in NFR 1A4b i.

Holiday cottages are defined as residences with no permanent residents. Energy consumption in holiday cottages has been surveyed with large time intervals, i.e. in 1976, 2001 and 2012. In 2012, Statistics Sweden carried out a stratified sample survey to house owners, covering 4,500 of the 589,525 objects in the sample frame. The net sample, excluding over coverage, included 4024 objects and the response rate was 44%. Because of difficulties regarding classification, houses with type codes other than recreational dwellings were also included in the sample frame. The questionnaire form used in 2012 was based on the one used in 2002. Results show that electricity and biomass combustion are the two predominating heating sources in holiday cottages, both in 2001 and 2011[4].

[3] Statistics Sweden. Yearly Energy Balances.

[4] Statistic Sweden ES, 2012:03.

2.1.5 Multi-dwelling statistics

Multi-dwelling statistics, together with one- and two-dwelling statistics and holiday cottages statistics, is used to calculate emissions from stationary combustion of biomass in households, NFR 1A4b.

This is a sample survey carried out every second or third year, sent to the owners of 7,000 multi-dwelling buildings, covering the use of electricity and heat. For the years in between, the energy use is modelled based on changes in temperature between the years. The survey is based on a random sample from a real estate assessment. The real estate assessment includes all dwellings with an economic value higher than 50,000 SEK (about 5,600 €). Data is on national level by fuel type and of relatively good quality. Statistics on biomass consumption in multi-dwelling buildings was not included in the survey until 2001. However, the time series for 1A4b indicates that this data gap does not lead to any significant under-estimation as biomass use in multi-dwellings is sparse compared to the consumption in one- and two-dwellings.

2.1.6 Premises statistics

Premises statistics are used to calculate emissions from stationary combustion in the commercial and institutional sector, NFR 1A4a i.

This survey is a sample survey carried out each second or third years, covering the use of electricity, heat and fuel combustion for heat production of about 8,000 premises. For the years in-between, the energy use is modelled based on change in temperature between the years. Premises situated in an industrial area are not covered in the dataset. Some of these premises are covered in the Annual statistics on energy use in manufacturing industry as well as in the quarterly fuel statistics and are reported in Manufacturing Industries and Construction (NFR 1A2). To get full coverage, supplementary corrections are made for under or over coverage based on the assumption that these are distributed on over and under cover are as in the answers in the energy balance[5]. Data is on national level by fuel type and of relatively good quality. Statistics on biomass consumption in premises was not included in the survey until 2001.

2.1.7 Monthly fuel gas and inventory statistics

Statistics on supply and delivery of petroleum products[6] has in previous submission (until submission 2019) been one of the main sources used to estimate the emissions from mobile combustion in NFR 1A2gii, 1A3a-e, 1A4b-c ii, 1A4ciii and 1A5b. Data from the survey is used at a national level and by fuel type.

[5] Statistics Sweden EN20SM, 1990-2010, and Swedish Energy Agency (2011 and later)

[6] Monthly fuel, gas and inventory statistics. https://www.scb.se/en/finding-statistics/statistics-by-subject-area/energy/energy-supply-and-use/monthly-fuel-gas-and-inventory-statistics/

The survey is also the data source for stationary combustion of heating oils in households and premises reported in the energy balances, which is used as activity data source for NFR 1.A.4.a and 1.A.4.b, stationary. The data from the survey is also used for reference approach in NFR 1Ab for all fuels except biomass, waste and peat.

Data in the survey is collected from all oil companies and other sellers who keep stocks of petroleum products, biofuels and coal. The survey also collects stock data from companies with a large consumption of oil in the manufacturing industries and energy industries. The survey covers around 70 companies.

A revised version of the survey was introduced in 2018 (submission 2020) and some uncertainties regarding the quality of the statistics were identified, resulting in the use of an alternative data source, the Swedish Fuel Quality Act.

2.1.8 The Swedish Fuel Quality Act

As the same oil companies covered by the monthly fuel, gas and inventory survey are obliged to collect and report fuel data under the "Swedish fuel quality act", this data source was used for diesel, gasoline and liquid biofuels in 2018-2024 The amount of diesel and gasoline collected and reported by the "Monthly fuel, gas and inventory" survey and the "Swedish fuel quality act" only differed around 1 percent for the 3-4 years preceding the change of data source. So, despite the change of data source that took place in 2018, the activity data used in submission 2026 is considered to be consistent and of good quality.

2.1.9 Statistics on the delivery of gas products

Statistics on the delivery of gas products are used to calculate emissions from natural gas and biogas from road transport (NFR 1A3b), pressure levelling losses of natural gas (NFR 1A5a) and transfer losses of gas works gas (NFR 1B2avi). Annual questionnaires are sent to all companies in Sweden that deliver natural gas, biogas and gasworks gas (less than ten companies). Consumption purposes are specified in the survey. Results of this survey are published by Statistics Sweden[7].

2.1.10 Other statistics from Statistics Sweden

Data used in the inventory for stationary fuel consumption in the construction sector, in all companies with less than 10 employees (NFR 1A2g) and stationary combustion in NFR 1A4a-1A4c is taken from the annual energy balances[8]. Data is on national level and by fuel type. Total consumption for these sectors is checked against fuel deliveries, so that possible errors only occur in the allocation between these sectors.

[7] Statistics Sweden. *Delieveries of motor fuel gas*. http://www.scb.se/en_/Finding-statistics/Statistics-by-subject-area/Energy/Energy-supply-and-use/Delieveries-of-motor-fuel-gas/

[8] Statistics Sweden 1990-2012, EN0202

Data on fuel consumption for the construction sector 1990-2003 is based on a survey from 1985[9], adjusted according to the number of working hours for each year. The fuel consumption for the construction sector 2004 and later is based on a survey from 2005[10]. Data on fuel consumption in the agricultural sector is based on two intermittent surveys, for gardening[11] and agriculture[12]. The first survey is a sample survey that collects data on energy use in greenhouses and has been carried out for 1990, 1993, 1996, 1999, 2002 and 2008. Data for intermediate years is estimated using number of working hours. The second sample survey collects data for energy use in the other parts of the agricultural business and has been performed for 1994, 2002 and 2007 (fuel consumption in households in the agricultural sector is not included here but is included in the one- and two-dwellings statistics). Data for intermediate years is estimated using annual changes in value added.

Fuel consumption in the forestry sector has been studied thoroughly in 1985 and 2007[13]. Estimates for the years before 2005 are upgraded from the 1985 study with available statistics on the annual felling volume 1990-1995 and from 1996 value added are used.

Fuel consumption in small companies (9 employees or less) reported in the annual energy balances is estimated using a model for the years 1990-2010. Fuel consumption for companies with 10-49 employees is taken from Annual statistics on energy use in manufacturing industry and the average use of fuel per employee is calculated. The two information sources are combined to estimate the fuel consumption in small companies. In 2012, the annual statistics on energy use in manufacturing industries (ISEN) for the reference year 2011 included a sample survey to small companies as well. The results were not published in ISEN but in the annual energy balance for 2011, which was published in 2013 and used in submission 2014 as activity data source for small enterprises.

2.1.11 European Union Emission Trading System (EU-ETS)

Data from the EU Emission Trading System (EU-ETS) is used, since submission 2007 and emission years 2005 and later, for oil refineries (NFR 1A1b, 1B2a and 1B2C21), as a SMED study during 2006[14] showed that this is the most accurate data source for these facilities. In addition, EU-ETS data is used for the three cement producing facilities for 2008 and onwards, one plant in NFR 1A2e for 2006 and one plant in NFR 1A2c for 2008 and onwards, since the EU-ETS data contains more detailed information on fuel types for these facilities. EU-ETS data is also

[9] Statistics Sweden, 1986

[10] Statistics Sweden, 2005

[11] Statistics Sweden JO36SM, 1991, 94, 97, 2000, 2003, 2006, 2010

[12] Statistics Sweden JO63SM, 1995, 2003, 2008

[13] ER 2007:15. Energianvändningen inom skogsbruket 2005

[14] Backman & Gustafsson, 2006

used for verification of other data sources, e.g. Quarterly fuel statistics and environmental reports. For example, Quarterly fuel statistics for large facilities within the chemical industry and the steel producing industry are regularly compared with ETS data, and if major differences should be discovered, further investigations are made. As mentioned above, for technical reasons, it is not possible to use EU-ETS data as major source of activity data for stationary combustion. Another reason not to use EU-ETS data, for stationary combustion, as the main data source is that in some facilities, only some of the installations within the facility are included in the trading scheme, and the definition of which installations that should be included has changed between the first and second trading periods.

2.1.12 Environmental reports

Before the EU-ETS was launched, data on fuel consumption in refineries, NFR 1A1b and 1B2, was often collected from environmental reports in cases when the data sources mentioned above (i.e. various energy surveys) were not considered to be accurate. For one refinery, environmental reports are the only data source for the years 2002-2007. For earlier years, environmental reports are also an important data source for fuel consumption in chemical industries, NFR 1A2c. For 2007, environmental report data was partly used for one plant in the primary steel industry, NFR 1A2a. NMVOC emissions from gasoline handling and storage reported in NFR 1B2av are based on environmental reports as well.

2.1.13 Contacts with operators

For earlier years, i.e. 2005 and before, data on fuel consumption in refineries, NFR 1A1b, and chemical industries, NFR 1A2c, was in many cases collected by means of direct contacts with the operators, as activity data was not sufficiently covered in regular surveys or administrative sources. Operators are sometimes also contacted to verify or correct data that is suspected to contain errors. Since submission 2010, the largest iron and steel company has been involved in the improvements in methodology and data for these sectors (1A1c, 1A2a, 1B1b, 1B1c, 2C1). The operator of the gas transmission pipeline and storage in Sweden is contacted each year for information on amounts of vented and flared natural gas (NFR 1B2c) as well as on number of facilities included in the transmission and storage network (NFR 1B2b). They also provide us with information regarding the amount of gas combusted for transportation of natural gas in pipelines (NFR 1A3ei).

2.1.14 Data sources for navigation

The fuel consumption for both national and international navigation, except for leisure boats, has in previous submissions (prior to submission 2019) been based on the monthly survey on supply and delivery of petroleum products[15]. However, it has been problematic for the suppliers of fuel to separate the fuel used by national respectively international navigation. As the monthly survey of fuel supply

[15] Statistic Sweden. Monthly fuel, gas and inventory statistics. See annex 2 for more information regarding different surveys.

statistics was revised[16], the fuel for national and international navigation was no longer split up in the survey. Instead, the result from the survey showed the total supply of fuel in Sweden for both national and international navigation.

The fuel consumption for domestic navigation[17] is estimated by the Shipair model as from submission 2020. Shipair is developed by the Swedish meteorological and hydrological institute (SMHI) and collects AIS (Automatic Identification System) data, which is used by the ships to transmit identity and position information and shows how the ships move between Swedish ports. Information regarding the ships such as size, engine power and type of vessel is also collected. This enables the Shipair model to estimate the energy consumption and the amount of fuel.

Beside the Shipair model, the energy consumption from domestic navigation is based on a survey of the largest shipping actors for national navigation, with the exception of cargo ships.[18] The survey asks for the fuel consumption by fuel type since Shipair does not have any specific information regarding which type of fuel is used. The difference between the energy consumption estimated by Shipair and by the survey, is assumed to be the energy consumption by cargo ships.

The consumption of LNG (liquid natural gas) by navigation was first included in submission 2021 for the year 2019. In submission 2025, data for the years 2018-2023 is included. The data for domestic navigation for the years 2018-2020 and all years for international navigation is based on a survey, which has taken place annually since 2020, aiming to map the consumption of LNG by both national and international navigation[19][20][21][22]. Data for domestic navigation in the years 2021-2023 is calculated using the energy consumption of LNG capable ships from Shipair and the LNG/MGO ratio of the vessels with the highest LNG consumption in domestic navigation. The emission factors for LNG are based on a study from 2020.[23]

The fuel consumption of international navigation is estimated as the difference between the total supply of fuel for navigation in the monthly survey of fuel supply statistics and the estimated energy consumption for domestic navigation.

[16] The revised monthly survey of fuel supply statistics was implemented in January 2018.

[17] Excluding leisure boats.

[18] EN0118, Transportsektorns energianvändning (inrikes sjöfart). Eklund, V. et al. 2019. Analys och implementering av data från nya MåBra.

[19] Eklund et al. 2021. Sjöfartens förbrukning av LNG 2020

[20] Eklund, et al. 2020. Sjöfartens förbrukning av LNG.

[21] Eklund et al. 2022 Sjöfartens förbrukning av LNG 2021

[22] Eklund et al. 2023 Sjöfartens förbrukning av LNG 2022

[23] Hult, C. et al. 2020. Emission factors for methane engines on vehicles and ships

2.1.15 Fuel allocation

Activity data for stationary combustion is based on fuels consumption at fuel type level and is for the inventory aggregated into fuel groups according to Table A2-4.

Table A2-4. Fuel type allocation.

Activity Data Fuel Type	NFR Fuel Group
Domestic fuel oil, Residual fuel oil, LPG, Kerosene, Petroleum coke, Other petroleum fuels, Refinery gas, Fuel oil, Methane and fuel gases	Liquid Fuels
Natural gas & LNG	Gaseous Fuels
Coke oven gas, Blast furnace gas, LD-gas, Coking coal, Coke, Coal, Other solid fuels, Carbide furnace gas, Charcoal,	Solid Fuels
Fossil fraction of waste & Other non-specified fossil fuels	Other fossil Fuels
Peat	Peat
Wood Fuels, Spent Liquor, Tall and Pitch Oil, Land fill gas, Other Biomass, Biogenic fraction of waste	Biomass

2.1.16 Other data sources for mobile combustion

Beside using statistics on supply and delivery of petroleum products[24], data reported according to the Swedish fuel quality act, data from the Shipair model (SMHI) and the survey of the largest shipping actors for national navigation, the following sources are used:

- Swedish Transport Administration (emission data for road traffic and railways),
- the Swedish Transport Agency (emission data for aviation),
- the Swedish Energy Agency (net calorific values and emission factors),
- the Swedish Armed Forces (fuel consumption),
- the Swedish Biogas Association (consumption of biogas)
- and several official reports.

2.2 Net calorific values

Unless otherwise stated, NCVs for each fuel type are produced by Statistics Sweden based on information from energy surveys. All NCVs refer to net calorific values (NCV) as recommended by the IPCC Guidelines. All NCVs are shown in Table A2-5. Most NCVs are calculated on basis of chemical qualities and are considered to be of good quality.

In the inventory, activity data for 1990-2006 on many fuel types are reported in tonne oil equivalents (toe), which is an energy unit. For these fuels the conversion factor of 41.87 GJ/toe is applied. In the energy surveys done by Statistics Sweden, these fuels are reported in mass unit/volume unit as well as the energy content (due

[24] Monthly fuel, gas and inventory statistics. https://www.scb.se/en/finding-statistics/statistics-by-subject-area/energy/energy-supply-and-use/monthly-fuel-gas-and-inventory-statistics/

to that the NCV often varies a lot for these fuel types). To facilitate data processing, Statistics Sweden calculates the energy content in toe from this information and the result is then used in the greenhouse gas inventory. This implies that the energy content of fuels concerned is very precise.

For 2007 and later years, energy data are taken directly from the Quarterly fuel statistics bases, enabling the use of facility specific NCVs in the inventory without performing the calculation of toe. NCVs for 2007 and later years are considered to be of excellent quality. The time series is considered to be consistent, since the conversions to toe made 2006 and earlier, made use of the same information that is used to calculate energy amounts 2007 and onwards. The only difference is that prior to 2007, the energy statistics department made these calculations, and 2007 and later, the calculations are made by the inventory staff.

Fuels that are standardized products, such as for instance residual fuel oil or liquefied petroleum gas (LPG) have calorific values that do not change between years. In submission 2010 some revisions were made. In earlier submissions, the NCV for biogas used for transports (this amount increases each year) was not known and therefore the NCV for natural gas was used for this fuel. In a SMED study[25] performed in 2009, a correct NCV for biogas was provided from the biogas supplier AGA. The same study also resulted in revision of the NCVs for ethanol (new NCV taken from Handbook of Chemistry and Physics) and Fatty Acid Methyl Ester (FAME).

An overview of NCVs used is shown below in Table A2-5. For all mobile combustion, and for standard fuels for stationary combustion, national emission factors are used. For non-standard fuels, median, maximum and minimum NCVs are shown.

Table A2-5. Thermal values (NCV) used in submission 2026.

Fuel type	Unit	Median	Min	Max	Remark
Blast furnace gas	GJ/1000m3	2.88	2.88	2.95	Less than 20 observations 1990-2024
Coke	GJ/tonne	28.04	28.04	29.36	Less than 20 observations 1990-2024
Coke oven gas	GJ/1000m3	17.51	17.39	18.21	Less than 20 observations 1990-2024
Coking coal	GJ/tonne	26.16	24.7	28.3	Less than 20 observations 1990-2024
Diesel Oil	GJ/m3	35.29	35.29	35.29	
Domestic Heating Oil	GJ/m3	35.82	35.82	35.82	
Kerosene	GJ/m3	34.34	34.34	34.34	Less than 20 observations 1990-2024

[25] Paulrud et al. 2010

Fuel type	Unit	Median	Min	Max	Remark
LNG	GJ/tonne	48.89	48.89	48.89	Less than 20 observations 1990-2024
LPG	GJ/tonne	46.04	46.04	46.05	
Landfill gas	GJ/1000m3	35.31	11.48	39.78	20-99 observations 1990-2024
Landfill gas	GJ/tonne	49.12	48.48	49.14	Less than 20 observations 1990-2024
Natural Gas	GJ/1000m3	39.6	39.6	39.6	Year specific NCV:s, www.ens.dk
Other biomass	GJ/m3	33.5	29.99	45.36	20-99 observations 1990-2024
Other biomass	GJ/tonne	34.08	4.14	38.92	20-99 observations 1990-2024
Other non specified	GJ/1000m3	36	36	36	Less than 20 observations 1990-2024
Other non specified	GJ/m3	21.97	21.97	21.97	Less than 20 observations 1990-2024
Other petroleum fuels	GJ/m3	42.37	41.29	43.44	Less than 20 observations 1990-2024
Other petroleum fuels	GJ/tonne	11.95	9.91	12.66	Less than 20 observations 1990-2024
Other solid fuels	GJ/m3	32	32	32	Less than 20 observations 1990-2024
Peat	GJ/tonne	38.34	37.44	38.34	
Petroleum coke	GJ/tonne	9.42	9.37	9.43	Less than 20 observations 1990-2024
Residual Fuel Oil	GJ/m3	49.12	48.48	49.14	Less than 20 observations 1990-2024
Steel converter gas	GJ/1000m3	39.6	39.6	39.6	Year specific NCV:s, www.ens.dk
Tall oil	GJ/m3	37.4	35.42	38.34	Less than 20 observations 1990-2024
Tall oil	GJ/tonne	37.73	37.08	38.51	Less than 20 observations 1990-2024
Waste	GJ/tonne	11.36	2.88	14.12	
Wooden fuels	GJ/m3	2.81	1.16	17.64	
Wooden fuels	GJ/tonne	17.1	5.37	18.18	
Gasoline	GJ/m^3	32.78			Mobile combustion, all sources
Biogas	GJ/1000 m^3	34.9			Mobile combustion, all sources
Diesel oil	GJ/m^3	35.28			Railways
Diesel oil	GJ/m^3	35.28			Navigation
Marine Gasoil	GJ/m^3	35.868			Navigation
Diesel oil	GJ/m^3	*			Year specific NCVs, see separate table
Residual fuel oil	GJ/m^3	39.53			Navigation
Ethanol	GJ/m^3	21.20			Road traffic
ETBE	GJ/m^3	25.99			Road traffic
FAME	GJ/m^3	33.00			Road traffic
HVO	GJ/m^3	33.98			Road traffic

Fuel type	Unit	Median	Min	Max	Remark
Bio-gasoline	GJ/m^3	31.96			Road traffic
Aviation Gasoline	GJ/m^3	31.45			Aviation
Aviation Kerosene fossil	GJ/m^3	34.85			Aviation
Aviation Kerosene bio	GJ/m^3	34.0			Aviation
Jet Gasoline	GJ/m^3	32.7			Aviation
Natural gas (CNG)	GJ/ 1000 m^3	39.6			Road traffic
LNG	GJ/ m^3	22.19			Navigation
LNG	GJ/ m^3	22.19			Road traffic
LBG	GJ/ m^3	21.55			Navigation
LBG	GJ/ m^3	21.55			Road traffic

Note: refinery gas and petrochemical by product gases are reported in various units and plant specific NCVs are used.

2.2.1 Liquid fuels

For diesel oil the NCV used in the inventory shows a decreasing trend. In Sweden, this fuel type is separated into three different fuel classes: diesel of environmental classes (EC) 1-3. EC 1 has the best environmental qualities, for instance lower content on aromatic hydrocarbons. EC 1 also has a lower NCV. EC 3 affects the environment most and has a higher NCV[26]. In 1990, EC 3 was the most common type of diesel. Over the years, the use of environmental class 3 has decreased and instead environmental class 2 and 1 are more common. In the inventory the mix of environmental class 1-3 used each year is taken into account when calculating NCV, which is appropriate for each year. Year specific NCVs for diesel are shown in Table A2-6.

Table A2-6. Thermal values (NCVs) for diesel.

Years	NCV (GJ/m^3)
1990	35.82
1991	35.69
1992	35.55
1993	35.40
1994	35.43
1995	35.44
1996	35.36
1997	35.34
1998	35.33
1999-2000	35.31
2001-2006	35.29
2007-2024	35.28

[26] https://drivkraftsverige.se/uppslagsverk/fakta/berakningsfaktorer/energiinnehall-densitet-och-koldioxidemission/ 2023-01-04

NCVs for different oils (except oils used in navigation) are based on information from Drivkraft Sverige (formerly the Swedish Petroleum and Biofuel Institute, SPBI), which in turn is based on information from oil companies and is cross-checked with Swedish standards for calculating NCVs. NCVs for marine diesel oil, marine gas oil and residual fuel oil used for navigation are based on a SMED study from 2004[27].

NCVs for refinery gases and other oils in refineries are specific for each operator and fuel. Data on consumption of fuels in t (or sometimes m^3) and corresponding NCVs are collected. Activity data for these fuels, used by refineries and chemical industries, is for 2007 and later mainly taken from the EU ETS system, and in most cases plant specific NCVs of excellent quality are also reported and used in the GHG inventory. In other cases, NCVs from the environmental reports are used.

In submission 2010, the NCVs for gasoline and aviation gasoline were revised following a SMED Study. The conclusion of the study was that NCVs used for these fuels before submission 2010 were not well documented. NCVs according to the 2006 IPCC Guidelines are now used, since the NCVs used earlier for these fuels were concluded to be of questionable quality. During 2024 Sweden undertook a project[28] to validate certain NCVs and emission factors used in the reporting. This project led to a revision of the NCV in order to synchronise the value used by SMED with the one used by the Swedish defence research institute. The NCV for gasoline used since submission 2010 is from Drivkraft Sverige and relies on fuel analyses[29].

The NCV for petroleum coke is based on information from consumers taken from the different energy surveys done by Statistics Sweden and is therefore considered to be of good quality. The NCV for diesel used for stationary combustion is according to SPI likely approximately the same mix of environmental classes as mobile diesel for each year. Using the same NCVs as for mobile diesel therefore give correct time series.

In 1990-2010, naphtha was used as raw material for production of gas works gas. Since 2011, liquefied natural gas is used instead. However, the gas is mixed with air and the quality of the gas delivered to the transmission net (in terms of methane content and NCV) is stated to be similar to how it was before the change of feedstock[30]. Hence, the same NCVs and emission factors are used for gas works gas for 2011 as for earlier years. Since natural gas liquids are allocated to liquid fuels in

[27] Cooper & Gustafsson, 2004.

[28] Kellner & Eklund 2024

[29] Paulrud et al. 2010

[30] Stockholm Gas, 2012

the NFR code 1Ab, we have chosen to allocate the gas works gas consumed in 2011 to liquid fuels also in the sectoral approach.

2.2.2 Solid fuels and peat

For coke oven gas, blast furnace gas and steel converter gas the NCVs change between years, but there is no trend in the changes, just annual fluctuations due to the quality of used primary fuels each year. NCVs used in the inventory are based on annual information from the consumers (quite few) on actual energy content, and the quality of the NCV is considered to be very good.

For carbon products such as coal and coke, it is difficult to establish the NCV due to lack of information on energy content in imported fuels. For 2007, NCVs reported from the consumers are used when available. Slightly more than half of the reported observations of combusted coal in the Quarterly fuel statistics include specific NCVs. For coke, this share is about 75 %.

Where no NCV is reported, the standard NCV provided from the Swedish Energy Agency is used.

2.2.3 Gaseous fuels

Natural gas is a non-processed primary fuel, and hence the NCV changes between years, however without any trend. All natural gas consumed in Sweden is imported from Denmark, except for LNG which is imported from Norway and northern Europe.

Since submission 2019, Sweden uses the same NCVs for the natural gas imported from Denmark as reported in Denmark's National Inventory[31]. The NCVs used are shown in Table A2-7. The NCV used for LNG is based on values from the Swedish Energy Agency.

[31] Energistyrelsen, 2023-01-10 (https://ens.dk/sites/ens.dk/files/CO2/energistyrelsens_standardfaktorer_for_2021-25-01-2022.pdf)

Table A2-7. Net calorific values (NCVs) for natural gas, all consumption.

Years	NCV CNG (GJ/1000 m^3)	NCV LNG (GJ/m^3)
1990-1992	39	-
1993-1996	39.3	-
1997	39.6	-
1998	39.9	-
1999	40	-
2000	40.15	-
2001	39.97	-
2002	40.03	-
2003	39.94	-
2004	39.77	-
2005	39.67	-
2006	39.54	-
2007	39.59	-
2008	39.49	-
2009-2016	39.46	-
2017	39.62	-
2018	39.60	-
2019-2021	39.60	22.194
2022	37.41	22.194
2023	38.03	22.194
2024	37.95	22.194

2.2.4 Biomass

Data for 2006 and earlier for wood, black liquor, tall oil, landfill gas and other biomass, other petroleum fuels, other solid fuels and other not specified fuels is reported to Statistics Sweden by surveyed consumers in toe, and the conversion factors are thereby set to 41.87 GJ/toe for these fuels. For 2007 and later years, this is true for NFR 1A4. For the other sectors, only black liquor is reported in toe. Other biomass is reported in several different units, e.g. t, m^3 or MWh, and thermal values are often reported together with the quantity. These NCVs are considered to be accurate.

The net calorific value for ethanol is provided by Drivkraft Sverige[32] and is 21.2 GJ/m3 or 26.9 MJ/kg. The net calorific values for ETBE (25.992 GJ/m3) and HVO (33.984 GJ/m3) are based on information from the Swedish Energy Agency33. The net calorific value for FAME (33 GJ/m^3) is based on a SMED report[34].

[32] Drivkraft Sverige (drivkraftsverige.se)

[33] http://www.energimyndigheten.se/statistik/den-officiella-statistiken/statistikprodukter/varmevarden-och-densiteter/

[34] Paulrud, S, Fridell, E, Stripple, H, Gustafsson, T. 2010. *Uppdatering av klimatrelaterade emissionsfaktorer.* SMED report 92:2010

2.2.5 Other fuels

Data for waste and other not specified fuels is reported to Statistics Sweden through a survey to consumers in toe, and the conversion factors are thereby set to 41.87 GJ/toe for these fuels. In 2007 and later, waste was combusted within NFR 1A1a only and the reporting units used were t and MWh. The NCVs for waste reported by the consumers are considered to be accurate, and thus these thermal values were used for 2007 and later. For other not specified fuels the reporting units vary, and reported NCVs are used (sometimes, the fuel quantities are reported in an energy unit, e.g. MWh).

2.3 Emission factors

Emission factors for SO_2 depend on the content of sulphur in the fuels and on the efficiency of existing emission abatement equipment, for instance if scrubbers are used.

Other emission factors depend on area of consumption and/or the combustion technique used. The efficiency of emission control in the plant or vehicle is also important. Therefore, these emission factors change over the years as ovens, combustion techniques and emission control used becomes better. All emission factors used in stationary combustion are published on Swedish EPA's website[35].

The spread sheets also contain implied emission factors for mobile combustion. Emission factors for selected substances and years are also shown in tables in the following section.

2.3.1 Stationary combustion and fugitive emissions

National emission factors are mainly used for all years. The values of the emission factors have been continuously developed and updated since 2004[36], [37]. The emission factors are based on results of measurements and national studies as well as studies of international emission factors and judgements of their relevance to national conditions. Emission factors depend on the type of fuel, and the type of plant and abatement equipment. Often and in cases where information is available, the emission factors are updated for the whole time series in order to avoid inconsistencies.

For some fuels, no specific emission factors are available and thus emission factors from similar, more common fuels are used. Fuels concerned are specified in Table A2-8. For all substances, the emission factors for combustion of solid waste are the same for the biogenic and the fossil fraction.

[35] www.naturvardsverket.se

[36] Boström et al., 2004

[37] Nyström & Skårman, 2006

Table A2-8. Fuel types for which specific emission factors are not available in the inventory.

Fuel type	Emission factor used
Kerosene	Gas/diesel oil
Landfill gas	Natural gas
Other biomass	Wood
Other petroleum fuels	Swedish default for “other fuels”
Other solid fuels	Swedish default for “other fuels”
Other not specified fuels	Swedish default for “other fuels”
Refinery gases	Swedish default for “other fuels” except for SO_2 and NO_X where national values are used

In submission 2023, a major revision of emission factors was made affecting almost all fuel types for all emissions. The focus on the revision was on emission factors for biomass and other fuels, and to update factors with non-transparent references[38]. The emission factors and fuels that were revised are summarized in table A2-9. Further effects of the revision of emission factors on the emissions are further discussed and explained under each chapter of emission factors.

[38] Mawdsley, I., Danielsson, H., Yaramenka, K., Josefsson Ortiz, C., Guban, P. 2022. Översyn av emissionsfaktorer inom stationär förbränning. SMED rapport nr 8. Avtal: 250-21-001.

Table A2-9. Revision of emission factors in submission 2023

Emission factors re-vised	Fuel type
CO	Black liquor, domestic heating oil, Kerosene, refinery gas, Other solid fuels, Other petroleum fuels, Other non-specified fuels, Other biomass
NH3	Black liquor, solid waste, Other biomass, Other petroleum fuels
NMVOC	Black liquor, Other solid fuels, Other petroleum fuels, Other non-specified fuels, Other biomass
NOx	Black liquor, Land fill gas, Diesel oil, domestic heating oil, Residual fuel oil, Coke, Coking coal, Other solid fuels, Other petroleum fuels, Other non-specified fuels, Other biomass
SO2	Other solid fuels, Other petroleum fuels, Other non-specified fuels, Other biomass
TSP	Other solid fuels, Other petroleum fuels, Other non-specified fuels, Other biomass
PM10	Other solid fuels, Other petroleum fuels, Other non-specified fuels, Other biomass
PM2.5	Other solid fuels, Other petroleum fuels, Other non-specified fuels, Other biomass
BC	Other solid fuels, Other petroleum fuels, Other non-specified fuels, Other biomass
BaP	Other biomass
Bbf	Other biomass
BkF	Other biomass
Cd	Other biomass
Cr	Other biomass
Cu	Other biomass
Hg	Other biomass
InP	Other biomass
Ni	Other biomass
PAH 1-4	Other biomass
Pb	Other biomass
PCB	Other biomass
Se	Other biomass
Zn	Other biomass
Dioxin	Wooden fuels, peat, Other biomass

2.3.1.1 NMVOC

Emission factors for stationary combustion within the energy sector for 1990 to 2001 were derived and used together with activity data from the official national Quarterly fuel statistics to calculate emissions and are based on knowledge on the technical development and he general effects of that[39]. The known effects of this general development have been combined with information from companies legal Environmental Reports, where actual emission factors can be derived, and information from trade associations where experts have contributed their specific knowledge on the different sectors where combustion occurs. These emission factors have been used since submission 2003.

The revision of emission factors for NMVOC in submission 2023, resulted in a decrease of NMVOC emission at the most by 55% (1.4 kt NMVOC) in 1990 in NFR

[39] Kindbom et al., 2003.

1A1a. The effect of the revision was lower in more recent years between 0 and 3% for all stationary NF codes (1A1, 1A2 and 1A4).

Emission factors used in submission 2026, are shown below in Table A2-10 (selected years). Emission factors for small scale biomass combustion in households are additionally described in a separate table (Table A2-20). All the emission factors for Other biomass are presented in Table A2-21, occurring mainly in 1A4c.

Table A2-10. Emission factors for NMVOC (kg/GJ), stationary combustion.

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Blast furnace gas	Power plants, district heating, industry (1A1-2)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Charcoal	Other consumption (1A4)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Coke	Industry (1A2)	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008
Coke	Other consumption (1A4)	0.1	NO	NO	NO	NO	NO	NO	NO
Coke oven gas	Power plants, district heating, industry (1A1-2)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Coal	District heating (1A1a)	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008
Coal	Publ. electricity and power plants (1A1a)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Coal	Industry (1A2)	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008
Coal	Other consumption (1A4)	0.1	0.1	NO	NO	NO	NO	NO	NO
Diesel Oil	Power plants, district heating, industry (1A1-2)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Domestic heating oil	Power plants, district heating, industry (1A1-2)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Domestic heating oil	Other consumption (1A4)	0.003	0.006	0.006	0.006	0.006	0.006	0.006	0.006
Gas works gas	All consumption (1A1, 1A2, 1A4)	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Kerosene	Power plants, district heating, industry (1A1-2)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
LNG	Power plants, district heating and industries (1A1, 1A2)	NO	NO	NO	0.001	0.001	0.001	0.001	0.001
LPG	District heating (1A1a)	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
LPG	Industry (1A2)	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
LPG	Other consumption (1A4)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
LPG	Publ. electricity and power plants (1A1a)	0.002	0.002	NO	NO	NO	NO	NO	NO
Landfill gas	District heating (1A1a)	NO	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Landfill gas	Industry (1A2)	NO	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Landfill gas	Publ. electricity and power plants (1A1a)	NO	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Landfill gas	Other consumption (1A4)	NO	NO	0.001	0.001	0.001	0.001	0.001	0.001
Methane etc.	Industry (1A2)	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Natural gas	District heating (1A1a)	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Natural gas	Industry (1A2)	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Natural gas	Other consumption (1A4)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Natural gas	Publ. electricity and power plants (1A1a)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Other biomass	Power plants, district heating, industry (1A1-2)	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Other biomass	Other consumption (1A4)	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
Other non specified	Power plants, district heating, industry (1A1-2)	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Other petroleum fuels	Power plants, district heating, industry (1A1-2)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Other solid fuels	Power plants, district heating, industry (1A1-2)	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Peat	Power plants, district heating, industry (1A1-2)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Petroleum coke	Industry (1A2)	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008
Refinery gas	Industry (1A1b)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Refinery oil	Industry (1A1b)	0.003	0.003	0.003	NO	NO	NO	NO	NO
Residual fuel oil	Other consumption (1A4)	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
Residual fuel oil	Power plants, district heating, industry (1A1,1A2)	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Steel converter gas	Power plants, district heating (1A1)	NO	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Solid waste	District heating (1A1a)	0.025	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Solid waste	Industry (1A2)	0.025	0.01	NO	NO	NO	NO	NO	NO
Tall oil	Power plants, district heating, industry (1A1-1A2)	0.0108	0.0108	0.0108	0.0108	0.0108	0.0108	0.0108	0.0108
Wooden fuels	District heating (1A1a)	0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Wooden fuels	Industry (1A2)	0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Wooden fuels	Publ. electricity and power plants (1A1a)	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Wooden fuels	Other consumption: Boilers: pellets	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017
Wooden fuels	Other consumption: Boilers: wood chips	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
Wooden fuels	Other consumption: Boilers: wood logs Modern	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087
Wooden fuels	Other consumption: Boilers: wood logs Traditional	0.552	0.552	0.552	0.552	0.552	0.552	0.552	0.552
Wooden fuels	Other consumption: Stoves: pellets	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
Wooden fuels	Other consumption: Stoves: wood logs Modern	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.084
Wooden fuels	Other consumption: Stoves: wood logs Traditional	0.199	0.199	0.199	0.199	0.199	0.199	0.199	0.199
Wooden fuels	Other consumption: Open fireplaces	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22

2.3.1.2 EMISSION FACTORS FOR SO_2 AND NO_X

Normally, national emission factors for SO_2, NO_X and particles are used for stationary combustion of all fuels in NFR 1A1 and 1A2, see Table A2-11 and Table A2-12. For the pulp and paper industry, however, a study performed in 2009 showed that these emission factors give systematic overestimations of the emissions of SO_2, NO_X and particles in this industry. The study covered the years 2001-2007 and plants accounting for 80-90% of the emissions within NFR 1A2d. As there was not enough information to trace the overestimation to certain fuels, it was decided to apply "reduction factors" calculated in the study for emissions of SO_2, NO_X and particles from the pulp and paper industry for emission years 2000 and later. These reduction factors are used for all fuels and calculated as the average ratio between total combustion-related emissions from environmental reports and the corresponding emissions calculated with national emission factors. The average ratios over the period 2002-2007 are used since submission 2010 for all years 2000 and later[40]. However, when implementing the revised emission factors for NFR 1A2[41] in submission 2018, these reduction factors were adjusted accordingly, in order to not underestimate the emissions.

In submission 2023, a major revision of emission factors affected SO_2 and NO_x emissions in all stationary sectors[42].

Detailed description and effects of revisions of emission factors at fuel type level are found in Mawdsley et al. 2022.

Emission factors for SO_2 and NO_x emissions are presented in tables A2-11 and A2-12.

[40] The study was never published but the results were documented in Excel files submitted to SEPA in 2009.

[41] Mawdsley & Stripple, 2017

[42] Mawdsley, I., Danielsson, H., Yaramenka, K., Josefsson Ortiz, C., Guban, P. 2022. Översyn av emissionsfaktorer inom stationär förbränning. SMED rapport nr 8. Avtal: 250-21-001.

Table A2-11. Emission factors for NO_X (kg/GJ), stationary combustion.

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Black liquor	Industry	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Charcoal	Other consumption (1A4)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Coke	All consumption	0.15	0.12	0.09	0.07	0.07	0.07	0.07	0.07
Coal	Industry (1A2)	0.2	0.12	0.09	0.07	0.07	0.07	0.07	0.07
Coal	Lime production (part of 1A2g)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Coal	Mining industry (part of 1A2g)	NO	0.6	0.55	0.55	0.55	0.55	0.55	0.55
Coal	Other consumption (1A4)	0.2	0.15	NO	NO	NO	NO	NO	NO
Coal	Power plants and district heating (1A1a)	0.2	0.04	0.03	0.03	0.03	0.03	0.03	0.03
Domestic heating oil	Gas turbine/diesel Power generation (part of 1A1a)	0.6	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Domestic heating oil	Power plants and district heating (part of 1A1a)	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Domestic heating oil	Industry(1A1b,1A2)	0.07	0.09	0.09	0,09	0,09	0,09	0,09	0,09
Gas works gas	Other consumption (1A4)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Gas works gas	Power plants, district heating (1A1)	0.07	0.04	0.02	NO	NO	NO	NO	NO
Gas works gas	Industries (1A2)	0.07	0.06	0.047	0.04	0.04	0.04	0.04	0.04
Hydrogen	Industry (1A2)	NO	NO	NO	NO	NO	NO	NO	NO
Kerosene	Power plants, district heating and industries (1A1, 1A2)	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
LNG	Power plants, district heating (1A1)	NO	NO	NO	0.015	0.015	0.015	0.015	0.015
LNG	Industries (1A2)	NO	NO	NO	0.04	0.04	0.04	0.04	0.04
LPG	Other consumption (1A4)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
LPG	Power plants, district heating (1A1)	0.07	0.07	0.02	0.015	0.015	0.015	0.015	0.015
LPG	Industries (1A2)	0.07	0.06	0.047	0.04	0.04	0.04	0.04	0.04
Landfill gas	Other consumption	NO	NO	NO	0.05	0.05	0.05	0.05	0.05
Landfill gas	Power plants, district heating (1A1)	NO	0.04	0.02	0.015	0.015	0.015	0.015	0.015
Landfill gas	Industries (1A2)	NO	0.06	0.047	0.04	0.04	0.04	0.04	0.04
Methane etc.	Industry (1A2)	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05
Natural gas	Power- and heating plants and industries (1A1, 1A2)	NO	NO	0.05	0.05	0.05	0.05	0.05	0.05

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Other biomass	Power plants, district heating (1A1)	NO	NO	0.08	0.07	0.07	0.07	0.07	0.07
Other biomass	Industry (1A2)	0.09	0.08	0.07	0.07	0.07	0.07	0.07	0.07
Other biomass	Other consumption (1a4)	NO	NO	0.1	0.08	0.08	0.08	0.08	0.08
Other biomass	Other consumption Agriculture (1a4c)	0.08	0.08	0.11	0.11	0.11	0.11	0.11	0.11
Other biomass	Industry (1A2)	0.09	0.08	0.07	0.07	0.07	0.07	0.07	0.07
Other biomass	Power plants, district heating (1A1)	NO	0.08	0.07	0.07	0.07	0.07	0.07	0.07
Other non specified	Power plants, district heating (1A1)	0.09	0.05	0.04	0.03	0.03	0.03	0.03	0.03
Other non specified	Other consumption (1A4)	NO	NO	0.18	0.14	0.14	0.14	0.14	0.14
Other petroleum fuels	Industry (1A2)	0.1	0.08	NO	NO	NO	NO	NO	NO
Other solid fuels	Power plants, district heating (1A1)	NO	NO	0.05	0.04	0.04	0.04	0.04	0.04
Other solid fuels	Industry (1A2)	0.12	0.06	NO	NO	0.04	0.04	0.04	0.04
Peat	Industry (1A2)	0.19	0.073	0.065	0.06	0.06	0.06	0.06	0.06
Peat	Power plants, district heating (1A1)	0.19	0.08	0.07	0.07	0.07	0.07	0.07	0.07
Petroleum coke	All consumption	0.15	0.12	0.12	NO	0.12	0.12	0.12	0.12
Refinery gas	All consumption	0.0456	0.036	0.0282	0.024	0.024	0.024	0.024	0.024
Refinery oil	Industry	0.353	0.16	0.06	0.06	0.06	0.06	0.06	0.06
Residual fuel oil	Gas turbine/diesel Power generation (part of 1A1a)	0.6	NO	NO	NO	NO	NO	NO	NO
Residual fuel oil	Mining industry (part of 1A2g)	0.17	0.25	0.28	NO	NO	NO	NO	NO
Residual fuel oil	Power- and heating plants and industries (1A1, 1A2)	0.17	0.07	0.06	0.06	0.65	0.65	0.65	0.65
Residual fuel oil	Other consumption (1A4)	0.17	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Solid waste	Industry (1A2)	0.09	0.06	NO	NO	NO	NO	NO	NO
Solid waste	Power plants and district heating (1A1a)	0.09	0.06	0.05	0.05	0.05	0.05	0.05	0.05
Tall oil	Industry (1A2)	0.1	0.09	0.07	0.07	0.07	0.07	0.07	0.07
Tall oil	Power plants and district heating (1A1a)	NO	0.09	0.07	0.07	0.07	0.07	0.07	0.07
Wooden fuels	Industry (1A2)	0.12	0.073	0.065	0.06	0.06	0.06	0.06	0.06
Wooden fuels	Other consumption (1A4)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Wooden fuels	Power plants and district heating (1A1a)	0.12	0.07	0.06	0.06	0.06	0.06	0.06	0.06

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Wooden fuels	Other consumption: Boilers: pellets	NO	0.065	0.065	0.065	0.065	0.065	0.065	0.065
Wooden fuels	Other consumption: Boilers: wood chips	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Wooden fuels	Other consumption: Stoves: pellets	NO	0.065	0.065	0.065	0.065	0.065	0.065	0.065
Wooden fuels	Other consumption: Stoves: wood chips	NO	0.08	NO	NO	NO	NO	NO	NO
Wooden fuels	Other consumption: Open fireplaces	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08

Table A2-12. Emission factors for SO_2 (kg/GJ), stationary combustion.

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Charcoal	Other consumption (1A4)	NO	NO	0.04	0.04	0.04	0.04	0.04	0.04
Coke	Other consumption (1A4)	0.48	NO	NO	NO	NO	NO	NO	NO
Coke	Power plants, district heating and industries (1A1, 1A2)	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Coal	Power plants and district heating (1A1)	0.36	0.081	0.033	0.009	0.009	0.05	0.05	0.05
Coal	Lime production (part of 1A2g)	0.1	0.05	0.05	0.05	0.05	0.04	0.04	0.04
Coal	Mining industry (part of 1A2g)	NO	0.12	0.12	0.04	0.04	0.009	0.009	0.009
Coal	Other consumption (1A4)	0.36	0.2	NO	NO	NO	NO	NO	NO
Coal	Other industries, Power plants and district heating (1A1, 1A2)	0.36	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Diesel oil	All consumption	0.083	0.0008	0.00011	0.00022	0.00022	0.00022	0.00022	0.00022
Domestic heating oil	All consumption	0.04	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Kerosene	All consumption	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
Landfill gas	Power plants and district heating	NO	0.008	0.008	0.008	0.008	0.008	0.008	0.008
Methane etc.	Industry (1A2)	0.002	NA	NA	NA	NA	NA	NA	NA
Natural gas	All consumption	0.002	NA	NA	NA	NA	NA	NA	NA
Other biomass	Other consumption Agriculture (1A4c)	0.01	0.01	0.04	0.04	0.04	0.04	0.04	0.04
Other biomass	Other consumption (1A4)	NO	NO	0.1	0.1	0.1	0.1	0.1	0.1
Other biomass	Power plants and district heating (1a1a)	NO	0.07	0.05	0.04	0.04	0.04	0.04	0.04
Other biomass	Industry (1A2)	0.01	0.07	0.05	0.04	0.04	0.04	0.04	0.04
Other non specified	Other consumption (1A4)	NO	NO	0.01	0.2	0.2	NO	NO	NO
Other non specified	Power plants and district heating (1a1a)	0.11	0.03	0.01	0.002	0.002	NO	NO	NO
Other petroleum fuels	Industry (1A2)	0.006	0.006	NO	NO	NO	NO	NO	NO
Other solid fuels	Power plants and district heating (1a1a)	NO	NO	0.14	0.003	0.003	0.003	0.003	0.003
Other solid fuels	Industry (1A2)	0.17	0.04	NO	NO	0.003	0.003	0.003	0.003
Peat	Power plants and district heating (1a1a)	0.22	0.12	0.084	0.066	0.066	0.066	0.066	0.066
Peat	Industry (1A2)	0.22	0.12	0.08	0.07	0.07	0.07	0.07	0.07

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Petroleum coke	Industry (1A2)	0.36	0.360	NO	NO	0.36	0.36	0.36	0.36
Refinery gas	All consumption	0.011	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Refinery oil	All consumption	0.71	0.32	0.2	0.2	0.2	0.2	0.2	0.2
Residual fuel oil	Power- and heating plants and industries and Other consumption (1A1, 1A2, 1A4)	0.24	0.12	0.09	0.09	0.09	0.09	0.09	0.09
Residual fuel oil	Gas turbine/diesel Power generation (part of 1A1a)	0.48	NO	NO	NO	NO	NO	NO	NO
Residual fuel oil	Lime production (part of 1A2f)	NO	NO	0.15	0.15	0.15	0.15	0.15	0.15
Residual fuel oil	Mining industry (part of 1A2g)	NO	NO	0.09	0.09	0.09	0.09	0.09	0.09
Solid waste	Industry (1A2)	0.025	0.025	NO	NO	NO	NO	NO	NO
Solid waste	Power plants and district heating (1A1a)	0.025	0.025	0.01	0.002	0.002	0.002	0.002	0.002
Tall oil	All consumption	0.14	0.1	0.073	0.06	0.06	0.06	0.06	0.06
Wooden fuels	Other consumption (1A4)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Wooden fuels	Power plants, district heating and industries (1A1, 1A2)	0.04	0.018	0.013	0.01	0.01	0.01	0.01	0.01

2.3.1.3 PARTICLES, METALS, DIOXIN

The emission factors developed by SMED for calculation of emissions of particles, metals, dioxin from stationary combustion are based on information from many different sources[43]. The emission factors for 1990-2003 are based on knowledge on the general effects of technical development combined with information from companies' environmental reports (where actual emission factors can be derived), and information from trade associations where experts on different sectors have contributed with their specific knowledge. The emission factors from 2004 are derived through extrapolation of the 2003 values.

From approximately 1990, emissions have decreased for most stationary sources due to the technical development of abatement measures in combination with regulations and requirements from authorities. Installation of electrostatic precipitator or bag house filters, as an example, has become standard on large combustion sources. This primarily reduces the TSP emissions. Combustion of MSW also became strictly regulated, and as a consequence of that, flue gas cleaning equipment of different types was installed to reduce emissions primarily of dioxins and mercury. In the district heating sector, installation of flue gas condensation equipment has become common since the beginning of the 1990´s to increase the heat output, but it also reduces emissions to air of many substances.

Reporting of BaP emissions was introduced in the Swedish inventory for 1990 and later years in submission 2008. Emission factors were developed by SMED[44] and are applied to the Quarterly fuel statistics since submission 2008.

In submission 2023, a major revision of emission factors affected particles, metals, and dioxin emissions in all stationary sectors[45]. Detailed description and effects of revisions of emission factors at fuel type level are found in Mawdsley et al. 2022.

Emission factors for Metals used for stationary combustion in submission 2026 are in Table A2-13.

[43] Boström et al., 2004

[44] Paulrud et al., 2010

[45] Mawdsley, I., Danielsson, H., Yaramenka, K., Josefsson Ortiz, C., Guban, P. 2022. Översyn av emissionsfaktorer inom stationär förbränning. SMED rapport nr 8. Avtal: 250-21-001.

Table A2-13. Emission factors for other biomass in stationary combustion for metals

Metal	NFR	Emission factor
Cd (t/GJ)	1A1, 1A2	0.0000009
Cd (t/GJ)	1A4	0.000003
Cr (t/GJ)	1A1	0.000003
Cr (t/GJ)	1A4	0.000003
Cu (t/GJ)	1A1	0.000007
Cu (t/GJ)	1A2	0.000007
Cu (t/GJ)	1A4	0.000007
Hg (t/GJ)	1A4	0.0000005
Ni (t/GJ)	1A1	0.000002
Ni (t/GJ)	1A2	0.000002
Ni (t/GJ)	1A4	0.000002
Pb (t/GJ)	1A1	0.000015
Pb (t/GJ)	1A2	0.000015
Pb (t/GJ)	1A4	0.000014
Se (t/GJ)	1A1, 1A2	0.000001
Se (t/GJ)	1A4	0.000002
Zn (t/GJ)	1A1	0.00007
Zn (t/GJ)	1A2	0.00007
Zn (t/GJ)	1A4	0.0001

Dioxin: Emission factors for Dioxin emission were during submission 2023 revised for NFR 1A1 and 1A2 for combustion of biomass fuels wooden fuels, other biomass, and peat[46]. The effects of the revised emissions of Dioxin in submission 2023 were large. For all stationary NFR codes, the total effect was a decrease from 34 % (in 2990) to 70 % (in 2006). Detailed description and effects of revisions of emission factors at fuel type level are found in Mawdsley et al. 2022.

In submission 2026, emission factors for dioxin from waste incineration were updated.[47] This resulted in changes in the time series from 2007 and onwards in the energy sector, with an increase from 2007-2011, and a decrease from 2011-2023.

Emission factors for TSP, PM_{10} and $PM_{2.5}$ used for stationary combustion are shown in Table A2-14 to Table A2-16. Emission factors for small scale biomass combustion in households are additionally shown in a separate table (Table A2-21).

[46] Mawdsley, I., Danielsson, H., Yaramenka, K., Josefsson Ortiz, C., Guban, P. 2022. Översyn av emissionsfaktorer inom stationär förbränning. SMED rapport nr 8. Avtal: 250-21-001.

[47] Sjöblom, A., Mawdsley, I. & Guban, P. 2025**.** Översyn av emissionsfaktor för dioxin inom stationär förbränning av avfall. SMED, PM 2025-03-03

Table A2-14. Emission factors for TSP (kg/GJ), stationary combustion.

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Black liquor	Industry (1A2)	0.070	0.060	0.060	0.060	0.060	0.060	0.060	0.060
Coke	Industry (1A2)	0.045	0.03	0.01	0.0002	0.0002	0.0002	0.0002	0.0002
Coke	Other consumption (1A4)	0.14	NO	NO	NO	NO	NO	NO	NO
Coal	Industry (1A2)	0.045	0.03	0.01	0.0002	0.0002	0.0002	0.0002	0.0002
Coal	Other consumption (1A4)	0.14	0.10	NO	NO	NO	NO	NO	NO
Coal	Power plants and district heating	0.035	0.02	0.007	0.0002	0.0002	0.0002	0.0002	0.0002
Diesel Oil	All consumption	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Domestic heating oil	Other consumption (1A4)	0.007	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Domestic heating oil	Power plants, district heating	0.006	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Domestic heating oil	Industry	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Gas works gas	Other consumption (1A4)	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Gas works gas	Power plants, district heating and industries and industry (1A1, 1A2)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Kerosene	All consumption	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002
LNG	Power plants, district heating and industries (1A1, 1A2)	NO	NO	NO	0.0001	0.0001		0.0001	0.0001
LPG	Other consumption (1A4)	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
LPG	Power plants, district heating and industries	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Landfill gas	Power plants, district heating and industries	NO	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Methane etc.	Industry (1A2)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Natural gas	Other consumption (1A4)	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Natural gas	Power plants, district heating and industries	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Other biomass	Power plants and district heating and Industry (1A1, 1A2)	0.011	0.006	0.005	0.004	0.004	0.004	0.004	0.004
Other biomass	Other consumption (1A4)	NO	NO	0.04	0.04	0.04	0.04	0.04	0.04
Other biomass	Other consumption Agriculture (1A4c)	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063
Other non specified	All consumption	0.250	0.060	0.030	0.010	0.010	NO	NO	NO

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Other petroleum fuels	All consumption	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Other solid fuels	All consumption	0.150	0.040	0.020	0.006	0.006	0.006	0.006	0.006
Peat	Power plants, district heating and industries, Industry (1A1, 1A2)	0.065	0.030	0.008	0.001	0.001	0.001	0.001	0.001
Petroleum coke	Industry (1A2)	0.045	0.03	0.01	0.0002	0.0002	0.0002	0.0002	0.0002
Refinery gas	Industry (1A1b)	0.012	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Refinery oil	Industry (1A1b)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Residual fuel oil	Other consumption (1A4)	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Residual fuel oil	Power plants and district heating	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009
Residual fuel oil	Industry	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Solid waste	Power plants and district heating and Industry (1A1, 1A2)	0.005	0.0012	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002
Tall oil	All consumption	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Wooden fuels	Industry (1A2)	0.065	0.043	0.020	0.009	0.009	0.009	0.009	0.009
Wooden fuels	Power plants and district heating	0.06	0.034	0.015	0.009	0.009	0.009	0.009	0.009
Wooden fuels	Other consumption: Boilers: pellets	NO	0.043	0.043	0.043	0.043	0.043	0.043	0.043
Wooden fuels	Other consumption: Boilers: wood chips	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063
Wooden fuels	Other consumption: Boilers: wood logs Modern	NO	0.039	0.039	0.039	0.039	0.039	0.039	0.039
Wooden fuels	Other consumption: Boilers: wood logs Traditional	0.404	0.404	0.404	0.404	0.404	0.404	0.404	0.404
Wooden fuels	Other consumption: Stoves: pellets	NO	0.118	0.118	0.118	0.118	0.118	0.118	0.118
Wooden fuels	Other consumption: Stoves: wood chips	NO	0.099	NO	NO	NO	NO	NO	NO
Wooden fuels	Other consumption: Stoves: wood logs Modern	NO	0.099	0.099	0.099	0.099	0.099	0.099	0.099
Wooden fuels	Other consumption: Stoves: wood logs Traditional	0.204	0.204	0.204	0.204	0.204	0.204	0.204	0.204
Wooden fuels	Other consumption: Open fireplaces	0.204	0.204	0.204	0.204	0.204	0.204	0.204	0.204

Table A2-15. Emission factors for PM_{10} (kg/GJ), stationary combustion.

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Black liquor	Industry (1A2)	0.070	0.060	0.060	0.060	0.060	0.060	0.060	0.060
Coke	Industry (1A2)	0.043	0.029	0.010	0.00019	0.00019	0.00019	0.00019	0.00019
Coke	Other consumption (1A4)	0.07	NO	NO	NO	NO	NO	NO	NO
Coal	Industry (1A2)	0.043	0.029	0.010	0.00019	0.00019	0.00019	0.00019	0.00019
Coal	Other consumption (1A4)	0.07	0.05	NO	NO	NO	NO	NO	NO
Coal	Power plants and district heating	0.0333	0.019	0.0065	0.0002	0.0002	0.0002	0.0002	0.0002
Diesel oil	All consumption	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Domestic heating oil	Other consumption (1A4)	0.007	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Domestic heating oil	Power plants, district heating (1A1)	0.006	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Domestic heating oil	Industry (1A2)	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Gas works gas	Other consumption (1A4)	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Gas works gas	Power plants, district heating and industries (1A1, 1A2)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Kerosene	All consumption	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002
LNG	Power plants, district heating and industries (1A1, 1A2)	NO	NO	NO	0.0001	0.0001	0.0001	0.0001	0.0001
LPG	Other consumption (1A4)	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
LPG	Power plants, district heating and industries (1A1, 1A2)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Landfill gas	Power plants, district heating and industries	NO	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Methane etc.	Industry (1A2)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Natural gas	Other consumption (1A4)	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Natural gas	Power plants, district heating and industries (1A1, 1A2)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Other biomass	Power plants and district heating and Industry (1A1, 1A2)	0.011	0.006	0.005	0.004	0.004	0.004	0.004	0.004
Other biomass	Other consumption Agriculture (1A4)	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Other biomass	Other consumption (1A4)	NO	NO	0.040	0.040	0.040	0.040	0.040	0.040
Other non specified	All consumption	0.250	0. 060	0.030	0.010	0.010	0.010	0.010	0.010
Other petroleum fuels	All consumption	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Other solid fuels	All consumption	0.100	0. 020	0.011	0.004	0.004	0.004	0.004	0.004
Peat	Power plants, district heating (1A1)	0.055	0.027	0.007	0.001	0.001	0.001	0.001	0.001
Peat	Industry (1A2)	0.059	0.035	0.012	0.0009	0.0009	0.0009	0.0009	0.0009
Petroleum coke	Industry (1A2)	0.043	0.029	0.010	0.00019	0.00019	0.00019	0.00019	0.00019
Refinery gas	Industry (1A1b)	0.012	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Refinery oil	Industry (1A1b)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Residual fuel oil	Other consumption (1A4)	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Residual fuel oil	Power plants, district heating (1A1)	0.007	0.007	0.004	0.004	0.004	0.004	0.004	0.004
Residual fuel oil	Industry (1A2)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Solid waste	Industry (1A2)	0.005	0.0012	NO	NO	NO	NO	NO	NO
Solid waste	Power plants and district heating	0.0045	0.0011	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002
Tall oil	All consumption	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Wooden fuels	Industry (1A2)	0.062	0.040	0.019	0.0086	0.0086	0.0086	0.0086	0.0086
Wooden fuels	Power plants and district heating	0.056	0.032	0.015	0.009	0.009	0.009	0.009	0.009
Wooden fuels	Other consumption: Boilers: pellets	NO	0.042	0.042	0.042	0.042	0.042	0.042	0.042
Wooden fuels	Other consumption: Boilers: wood chips	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062
Wooden fuels	Other consumption: Boilers: wood logs Modern	NO	0.038	0.038	0.038	0.038	0.038	0.038	0.038
Wooden fuels	Other consumption: Boilers: wood logs Tradi-tional	0.396	0.396	0.396	0.396	0.396	0.396	0.396	0.396
Wooden fuels	Other consumption: Stoves: pellets	NO	0.116	0.116	0.116	0.116	0.116	0.116	0.116
Wooden fuels	Other consumption: Stoves: wood chips	NO	0.097	NO	NO	NO	NO	NO	NO
Wooden fuels	Other consumption: Stoves: wood logs Modern	NO	0.097	0.097	0.097	0.097	0.097	0.097	0.097
Wooden fuels	Other consumption: Stoves: wood logs Tradi-tional	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Wooden fuels	Other consumption: Open fireplaces	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200

Table A2-16. Emission factors for $PM_{2.5}$ (kg/GJ), stationary combustion.

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Black liquor	Industry (1A2)	0.056	0.048	0.048	0.048	0.048	0.048	0.048	0.048
Coke	Industry (1A2)	0.037	0.025	0.0084	0.00017	0.00017	0.00017	0.00017	0.00017
Coke	Other consumption (1A4)	0.035	NO	NO	NO	NO	NO	NO	NO
Coking coal	Power plants, district heating (1A1)	0.029	0.017	0.0056	0.0002	0.0002	0.0002	0.0002	0.0002
Coking coal	Industry (1A2)	0.037	0.025	0.0084	0.00017	0.00017	0.00017	0.00017	0.00017
Coking coal	Other consumption (1A4)	0.035	0.025	NO	NO	NO	NO	NO	NO
Coal	Industry (1A2)	0.037	0.025	0.0084	0.00017	0.00017	0.00017	0.00017	0.00017
Coal	Other consumption (1A4)	0.035	0.025	NO	NO	NO	NO	NO	NO
Coal	Power plants and district heating (1A1)	0.029	0.017	0.0056	0.0002	0.0002	0.0002	0.0002	0.0002
Diesel oil	Power plants and district heating and Industry (1A1, 1A2)	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Domestic heating oil	Power plants, district heating and Other consumption (1A1, 1A4)	0.006	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Domestic heating oil	Industry (1A2)	0.007	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Gas works gas	Other consumption (1A4)	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Gas works gas	Power plants, district heating and industries (1A1)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Kerosene	All consumption	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002
LNG	Power plants, district heating and industries (1A1, 1A2)	NO	NO	NO	0.0001	0.0001	0.0001	0.0001	0.0001
LPG	Other consumption (1A4)	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
LPG	Power plants, district heating and industries (1A1)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Landfill gas	All consumption	NO	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Methane etc.	Industry (1A2)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Natural gas	Other consumption (1A4)	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Natural gas	Power plants, district heating and industries (1A1, 1A2)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Other biomass	Power plants and district heating and Industry (1A1, 1A2)	0.009	0.005	0.003	0.003	0.003	0.003	0.003	0.003
Other biomass	Other consumption (1A4)	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
Other non specified	All consumption	0.230	0.050	0.020	0.009	0.009	0.009	0.009	0.009
Other petroleum fuels	All consumption	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Other solid fuels	All consumption	0.050	0.012	0.005	0.002	0.002	0.002	0.002	0.002
Peat	Power plants, district heating	0.042	0.021	0.005	0.001	0.001	0.001	0.001	0.001
Peat	Industry (1A2)	0.046	0.028	0.001	0.0007	0.0007	0.0007	0.0007	0.0007
Petroleum coke	Industry (1A2)	0.037	0.025	0.0084	0.00017	0.00017	0.00017	0.00017	0.00017
Refinery gas	Industry (1A1b)	0.012	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Refinery oil	Industry (1A1b)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Residual fuel oil	Other consumption (1A4)	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Residual fuel oil	Power plants, district	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Residual fuel oil	Industry (1A2)	0.0083	0.0083	0.0083	0.0083	0.0083	0.0083	0.0083	0.0083
Solid waste	Industry (1A2)	0.004	0.0011	NO	NO	NO	NO	NO	NO
Solid waste	Power plants and district heating	0.004	0.0011	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002
Tall oil	All consumption	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Wooden fuels	Power plants and district heating and Industry (1A1, 1A2)	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Wooden fuels	Other consumption: Boilers: pellets	NO	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Wooden fuels	Other consumption: Boilers: wood chips	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
Wooden fuels	Other consumption: Boilers: wood logs Modern	NO	0.036	0.036	0.036	0.036	0.036	0.036	0.036
Wooden fuels	Other consumption: Boilers: wood logs Traditional	0.376	0.376	0.376	0.376	0.376	0.376	0.376	0.376
Wooden fuels	Other consumption: Stoves: pellets	NO	0.110	0.110	0.110	0.110	0.110	0.110	0.110
Wooden fuels	Other consumption: Stoves: wood logs Modern	NO	0.092	0.092	0.092	0.092	0.092	0.092	0.092

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Wooden fuels	Other consumption: Stoves: wood logs Traditional	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190
Wooden fuels	Other consumption: Open fireplaces	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190

2.3.1.4 EMISSION FACTORS FOR BLACK CARBON

An inventory of emissions of black carbon in Sweden was made for the first time in 2014. Emissions are reported for the years 2000 and later. BC emissions from stationary combustion were estimated according to the EMEP/EEA guidebook[48] throughout the sectors 1.A.1, 1.A.2 and 1.A.4. The general approach is to multiply the emission factor for $PM_{2.5}$ with a fraction as specified in the guidebook[49].

Emission factors for BC were during submission 2023 revised for NFR 1A1 and 1A2 for combustion of other fuel types, other fossil fuels, other biomass, other petroleum fuels and other solid fuels[50]. The effects on the BC emissions were for all stationary NFR codes around 0 to 3% decrease at the maximum. The revision was mainly in NFR codes 1A1 and 1A2.

2.3.1.5 EMISSONS FACTORS FOR PCB, HCB AND PAH

Emission factors for PAHs were estimated according to the sum of PAH1-4[51]. The sum of PAH-4 and benzo(a)pyrene was fractionised in benzo(b)flourathene, benzo(k)flourathene and indeno(1,2,3-cd)pyrene according to the EMEP/EEA guidebook[52]. Thus, the emissions for the total PAHs will be the same as reported before but the fraction is now enabled. Emission factors for PCB and HFC were taken from the EMEP/EEA guidebook.

Emission factors for PAH 1-4 were during submission 2023 revised for NFR 1A1 and 1A2 for combustion of other fuel types, other fossil fuels, other biomass, other petroleum fuels and other solid fuels[53]. The revision resulted in a decrease of PAH 1-4 emissions of around 1-2 % for all stationary NFR codes. The effects on NFR 1A1 was a decrease between 0 and 8% decrease and for NFR 1A2 a decrease between 0% and 25%.

Emission factors for PCB are found in Table A2-17. New emission factors for HCB are found in Table A2-18. Emission factors for PAHs in submission 2025 are found in Table A2-19.

[48] EEA, 2019

[49] Skårman et.al., 2014

[50] Mawdsley, I., Danielsson, H., Yaramenka, K., Josefsson Ortiz, C., Guban, P. 2022. Översyn av emissionsfaktorer inom stationär förbränning. SMED rapport nr 8. Avtal: 250-21-001.

[51] Allerup et al., 2015

[52] EEA, 2019

[53] Mawdsley, I., Danielsson, H., Yaramenka, K., Josefsson Ortiz, C., Guban, P. 2022. Översyn av emissionsfaktorer inom stationär förbränning. SMED rapport nr 8. Avtal: 250-21-001.

Table A2-17. Emission factors for PCB (µg/GJ), stationary combustion.

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Coke	Industry (1A2)	170	170	170	170	170	170	170	170
Coking coal	Industry (1A2)	170	170	170	170	170	170	170	170
Coking coal	Power pl. and district heating	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033
Other biomass	Industry (1A2)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Other biomass	Power pl. and district heating (1A1)	NA	3	3	3	3	3	3	3
Other biomass	Small scale combustion	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05
Other non specified	All consumption	0.00034	0.00034	0.00034	0.00034	0.00034	0.00034	0.00034	0.00034
Other solid fuels	All consumption	0.00034	0.00034	0.00034	0.00034	0.00034	0.00034	0.00034	0.00034
Peat	Industry (1A2)	170	170	170	170	170	170	170	170
Peat	Power pl. and district heating (1A1)	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033
Tall oil	Industry (1A2)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Tall oil	Power pl. and district heating (1A1)	NA	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Waste	Power pl. and district heating and Industry (1A1, 1A2)	0.00034	0.00034	0.00034	0.00034	0.00034	0.00034	0.00034	0.00034
Wooden fuels	Industry (1A2)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Wooden fuels	Power pl. and district heating (1A1)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Wooden fuels	Household combustion	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06

Table A2-18. Emission factors for HCB (µg/GJ), stationary combustion.

Fuel type	Sector	1990	2000	2010	2020	2021	2022	2023	2024
Coke	Industry (1A2)	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Coking coal	Industry (1A2)	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Coking coal	Power plants and district heating (1A1)	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
Other biomass	All consumption	5	5	5	5	5	5	5	5
Other non specified	All consumption	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52
Other solid fuels	Power plants and district heating and Industry (1A1, 1A2)	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52
Peat	Industry (1A2)	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Peat	Power plants and district heating (1A1)	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
Tall oil	Power plants and district heating and Industry (1A1, 1A2)	5	5	5	5	5	5	5	5
Waste	Power plants and district heating and Industry (1A1, 1A2)	4.52	4.52	4.52	4.52	4.52	4.52	4.52	4.52
Wooden fuels	All consumption	5	5	5	5	5	5	5	5

Table A2-19. Emission factors for PAH (µg/GJ), stationary combustion.

Fuel type	Sector	Benzo(a)pyrene	Benzo(b)fluoran-thene	Benzo(k)flourathene	In-denopy-rene	PAH_1-4
Coke	Industry (1A2)	0.7	37	29	1.1	67.8
Coking coal	Power pl. and district heating and Industry (1A1, 1A2)	0.7	37	29	1.1	67.8
Coking coal	Mining industry (parts of 1A2g)	250	146	59	46	500
Diesel Oil	Power pl. and district heating (1A1)	30	388	44	39	500
Diesel Oil	Industry (1A2)	30	133	133	204	500
Domestic heating oil	Power pl. and district heating (1A1)	30	133	133	204	500
Domestic heating oil	Industry (1A2)	30	388	44	39	500
Domestic heating oil	Small scale combustion	30	70	122	279	500
Kerosene	Power pl. and district heating (1A1)	250	71	71	109	500
Landfill gas	Power pl. and district heating (1A1)	0.56	0.84	0.84	0.84	3.1
LNG	Power pl. and district heating (1A1)	0.56	0.84	0.84	0.84	3.1
LPG	Power pl. and district heating (1A1)	0.56	0.84	0.84	0.84	3.1
Natural gas	Power pl. and district heating (1A1)	0.56	0.84	0.84	0.84	3.1
Other biomass	Power pl. and district heating (1A1)	400	300	110	150	960
Other biomass	Industry (1A2)	400	400	140	230	1170
Other biomass	Small scale combustion	2800	4300	1300	1100	9500
Other biomass	Other consumption Agriculture	20000	32000	10000	8000	70000
Peat	Industry (1A2)	1000	1280	400	320	3000
Peat	Power pl. and district heating (1A1)	1000	897	323	780	3000
Residual fuel oil	Power pl. and district heating (1A1)	15	66	66	102	250
Residual fuel oil	Industry and other consumption (1A2, 1A4)	15	194	22	19	250
Tall oil	Industry (1A2)	250	160	50	40	500
Tall oil	Power pl. and district heating (1A1)	250	112	40.4	98	50
Waste	Industry (1A2)	NA	NA	NA	NA	NA
Waste	Power pl. and district heating (1A1)	0.8	1.7	0.9	1.1	4.5
Wooden fuels	Industry (1A2)	1000	1280	400	320	3000
Wooden fuels	Power pl. and district heating (1A1)	1000	897	323	780	3000
Wooden fuels	Other consumption: Boilers: pellets	10	16	5	4	35
Wooden fuels	Other consumption: Boilers: wood chips	20	32	10	8	70

Fuel type	Sector	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)flourathene	Indenopyrene	PAH_1-4
Wooden fuels	Other consumption: Boilers: wood logs Modern	10	16	5	4	35
Wooden fuels	Other consumption: Boilers: wood logs Traditional	121	111	42	71	345
Wooden fuels	Other consumption: Stoves: pellets	10	16	5	4	35
Wooden fuels	Other consumption: Stoves: wood logs Modern	10	16	5	4	35
Wooden fuels	Other consumption: Stoves: wood logs Traditional	121	111	42	71	345
Wooden fuels	Other consumption: Open fireplaces	121	111	42	71	345

2.3.1.6 EMISSION FACTORS FOR COMBUSTION OF BIOMASS IN HOUSEHOLDS

Emission factors for combustion of biomass in households for each emission include all technologies and all biomass fuel types.

Emission factors for CO, NMVOC, particles, metals and PAHs for small scale wood combustion were developed in 2018 and largely based on a Nordic collaboration measurement programme[54]. Emission factors for other pollutants (NOx, SO_2, NH_3 and dioxin), are based on Paulrud et al. 2006[55]. All emission factors are presented in Table A2-20. Emission factors for PCB and HCB are default values from the EMEP/EEA Guidebook 2019.

[54] Helbig et al., 2018

[55] Paulrud et al., 2006

Table A2-20. Emission factors for small scale combustion of wood logs, pellets and wood chip using different combustion technologies.

Technology	Unit	Boiler - pellets	Boiler - wood chips	Traditional boiler - wood	Modern boiler - wood	Stove - pellets	Stove - wood chips	Traditional stove - wood	Modern stove - wood	Open fireplace
CO	g/GJ	339	430	3842	1189	208	208	2371	1740	2610
NMVOC	g/GJ	17	59	552	87	4	4	199	83	220
TSP (total particles)	g/GJ	43	63	404	39	118	118	204	99	225
PM_{10} (total particles)	g/GJ	42	62	395	38	116	116	200	97	220
$PM_{2.5}$ (total particles)	g/GJ	40	59	376	36	110	110	190	92	210
BC (based on total particles)	g/GJ	6	2	26	6	11	11	74	22	82
Pb	mg/GJ	15	15	15	15	15	15	15	15	15
Cd	mg/GJ	3	3	3	3	3	3	3	3	3
Hg	mg/GJ	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
As	mg/GJ	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Cr	mg/GJ	3	3	3	3	3	3	3	3	3
Cu	mg/GJ	5	5	5	5	5	5	5	5	5
Ni	mg/GJ	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Se	mg/GJ	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Zn	mg/GJ	400	400	400	400	400	400	400	400	400
Benzo(a)pyrene	mg/GJ	10	20	121	10	10	10	121	10	121
Benzo(b)fluoranthene	mg/GJ	16	32	111	16	16	16	111	16	111
Benzo(k)fluoranthene	mg/GJ	5	10	42	5	5	5	42	5	42
Indeno(1,2,3-cd)pyrene	mg/GJ	4	8	71	4	4	4	71	4	71
PAH	g/GJ	0.035	0.07	0.345	0.035	0.035	0.035	0.345	0.035	0.345
SO_2	g/GJ	10	10	10	10	10	10	10	10	10
NOx	g/GJ	65	80	80	80	65	80	80	80	80
NH_3	g/GJ	3	3	3	3	3	3	3	3	3
Dioxin	µg/GJ	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07

2.3.1.7 EMISSION FACTORS FOR COMBUSTION OF BIOMASS IN THE COMMERCIAL/INSTITUTIONAL SECTOR AND AGRICULTURE/FORESTRY/FISHERY SECTOR

Emissions from combustion of biomass are based on technology-specific emission factors. To apply these technology-specific emission factors, shares of firewood, wood chips and wood pellets in total wood fuel amount were calculated per subsector and across the entire time series. For the 1A4 sector emissions from firewood are calculated by considering different shares of modern and traditional combustion units over time. The effect of these using technology specific emission factors are lower emissions and a more stable time series with lower year-by-year variation[56].

The emission factors for submission 2026 combustion of wood logs, pellets and wood chip using different combustion technologies for Commercial/Institutional sector and Agriculture/Forestry/Fishery sector are presented in Table A2-21[57].

[56] Helbig et al., 2019

[57] Helbig, T. & Josefsson Ortiz, C. 2021. Uppdateringar av utsläppsberäkningar för småskalig biomassaeldning inom övrigsektorn (CRF/NFR 1A4) 2017-2021. SMED Rapport Nr 19 2021.

Table A2-21. Emission factors for particulate matter, CO, NMVOC, PAHs determined - combustion of wood logs, pellets and wood chip using different combustion technologies for Commercial/Institutional sector and Agriculture/Forestry/Fishery sector.

Technology	Unit	1A4a COMMERCIAL/INSTITUTIONAL				1A4c AGRICULTURE/FORESTRY/FISHERY			
		Boiler - pellets	Boiler - wood chips	Traditional boiler - wood	Modern boiler - wood	Boiler - pellets	Boiler - wood chips	Traditional boiler - wood	Modern boiler - wood
CO	g/GJ	339	430	3842	1189	339	430	3842	1189
NMVOC	g/GJ	17	59	552	87	17	59	552	87
CH4	g/GJ	6	6	88	15	6	6	88	15
TSP (total particles)	g/GJ	43	63	404	39	43	63	404	39
PM_{10} (total particles)	g/GJ	42	62	395	38	42	62	395	38
$PM_{2.5}$ (total particles)	g/GJ	40	59	376	36	40	59	376	36
BC (based on total particles)	g/GJ	6	2	26	6	6	2	26	6
Pb	mg/GJ	15	15	15	15	15	15	15	15
Cd	mg/GJ	3	3	3	3	3	3	3	3
Hg	mg/GJ	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
As	mg/GJ	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Cr	mg/GJ	3	3	3	3	3	3	3	3
Cu	mg/GJ	5	5	5	5	5	5	5	5
Ni	mg/GJ	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Se	mg/GJ	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Zn	mg/GJ	400	400	400	400	400	400	400	400
Benzo(a)pyrene	mg/GJ	10	20	121	10	10	20	121	10
Benzo(b)fluoranthene	mg/GJ	16	32	111	16	16	32	111	16
Benzo(k)fluoranthene	mg/GJ	5	10	42	5	5	10	42	5
Indeno(1,2,3-cd)pyrene	mg/GJ	4	8	71	4	4	8	71	4
PAH	g/GJ	0.035	0.07	0.345	0.035	0.035	0.07	0.345	0.035

2.3.2 Mobile combustion

Emission factors used for mobile combustion calculations are both country-specific and default values from the IPCC Guidelines and the EMEP/EEA air pollutant emission inventory guidebook. These emission factors are further described in IIR section 3.2.

2.3.3 Inclusion/exclusion of the condensable component from PM_{10} and $PM_{2.5}$ emission factors

The size of $PM_{2.5}$ and PM_{10} emissions depends on whether combustion emissions are measured in hot or cold flue gases, where measurements in cold flue gases include the condensable component and measurements in hot flue gases do not. Information on whether the emission factors used in the Swedish emission inventory include the condensable component is presented in Table A2-22 below. In many cases it is not known for certain whether the measurements that the emission factors are based on include the condensable component.

Table A2-22. Inclusion /exclusion of the condensable component from $PM_{2.5}$ and PM_{10} in emission factors.

NFR	Source/sector name	Reported emissions represent:			EF reference	Comment
		Filterable + condensable	Only filterable	Uncertain		
1A1a	Public electricity and heat production		X*			
1A1b	Petroleum refining		X*			
1A1c	Manufacture of solid fuels and other energy industries		X*			
1A2g, 1a3e, 1A4a, 1A4b, 1A4c	Non-road mobile machinery			X	National model for Non-Road Mobile Machinery	
1A3b	Road Transportation	X			HBEFA	Considering the measuring procedure and the maximum temperature of 52°C, it can be assumed that PM condensables are also included in the measurements. The installed technology also plays a role in this context (petrol engines with/without catalytic converter, diesel engines with/without particulate filter, etc.)[58]
1A3c	Railways			X	EMEP/EEA Guidebook 2023, threshold values	
1A3d	Domestic navigation	X			Country-specific emission values produced by IVL Swedish Environmental Research Institute.	
1A4a, 1A4b, 1A4c	Other stationary combustion	X			Country-specific emission factors based on measurements from NKL project	
1B excluding 1B1c			X*		1B2C21, 1B2C22 – national EF 1B2A4 – env. reports	

[58] FOEN, 2021

NFR	Source/sector name	Reported emissions represent:			EF reference	Comment
		Filterable + condensable	Only filterable	Uncertain		
1B1a	Handling of coal	X	X		EMEP/EEA Guidebook 2023	No condensable component exists (no combustion). Total PM=filterable PM
1B1c	COG flaring		X*		Emissions from env. reports (no EF) (Nuutinen et al., 2007	
1B1c	Handling of other solid fuels	X	X		Emission factors from TNO	No condensable component exists (no combustion). Total PM=filterable PM
2A excluding 2A5a and 2A5b	Mineral products		X*		2A1 – TSP emissions from env. reports (no EF), PM fractions – from personal communication with the company. 2A2 – national EF 2A3 – emissions from env. reports (no EF)	
2A5a	Quarrying and mining of minerals other than coal	X	X		Emission factors from TNO	No condensable component exists (no combustion). Total PM=filterable PM
2A5b	Construction and demolition	X	X		EMEP/EEA Guidebook 2023	No condensable component exists (no combustion). Total PM=filterable PM
2A5c	Mineral wool production		X*		Env. reports	
2B5	Carbide production		X*		Env. reports	
2B10	Other chemical industry			X	Env. reports and EMEP/EEA Guidebook 2023	Some emissions may include condensable component and some not.
2C	Metal production		X*		TSP emissions from env. reports (no EF)	
2D3b	Other solvent and product use – Road paving		X		EF from EMEP/EEA Guidebook 2023	According to EMEP/EEA, EF represents filterable PM emissions.
2D3c	Other solvent and product use – Asphalt roofing	X	X		Expert judgement	No condensable component exists (no combustion). Total PM=filterable PM

NFR	Source/sector name	Reported emissions represent:			EF reference	Comment
		Filterable + condensable	Only filterable	Uncertain		
2G4	Other product use			X	EF from EMEP/EEA Guidebook 2023	
2H1	Pulp and paper industry		X*		Env. reports	
5A	Solid waste disposal on land			X	EF from EMEP/EEA Guidebook 2019	
5C1bii	Incineration of hazardous waste		X*		Env. reports	
5C1bv	Cremation, carcasses			X	EF from EMEP/EEA Guidebook 2023	
5E	House and car fires			X	EF from EMEP/EEA Guidebook 2023	

* Condensable component is most likely excluded since emission factors/estimates in general are based on measurements in the flue stack, i.e. not in diluted flue gases.

2.3.4 References Annex 2.1 – 2.3

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Drivkraft Sverige (drivkraftsverige.se)

2.4 Allocation of fuels for mobile combustion

This section describes the allocation and distribution of the delivered amount of fuels on subsectors.

2.4.1 Gasoline

Data on the delivered amounts of gasoline at a national level is provided by the national statistics on supply and delivery of petroleum products for 1990-2017 and data reported under the Swedish fuel quality act is used for 2018-2024 (see chapter 2.1.7).

National total delivered amounts of gasoline includes low blended ethanol and ETBE. To separate biofuel emissions from fossil fuel emissions, all ethanol used by road traffic is reported as biomass under NFR 1.A.3.b. But a small part of ETBE is considered fossil and the energy consumption and the emissions of CO_2 from the fossil part are included in the national total of CO_2.

Ethanol has been used by buses since 1990, but low blended ethanol started in 2000 and increased significantly in 2003. The gasoline sold at gas stations consisted of 95% fossil petrol and 5% ethanol until the 1’st of August 2021, when the ethanol fraction increased to 10%. In 2024, the reduction mandate was lowered to 6% for biofuels in gasoline. The total amount of ethanol reported as biomass includes, besides low blended ethanol, the volume of ethanol used by E85 vehicles and ethanol buses.

The allocation of gasoline to different subsectors takes place in three steps and is illustrated in Figure A2-1 below.

1. In the first step, the low blended ethanol/ETBE in gasoline is subtracted from the total delivered amounts of gasoline at a national level.
2. In the next step, the gasoline consumption by domestic navigation as well as the estimated consumption by road traffic (HBEFA data) and off-road vehicles (model estimated) is subtracted.

3. The remaining volume of gasoline is proportionally distributed to civil road traffic and to off-road vehicles.

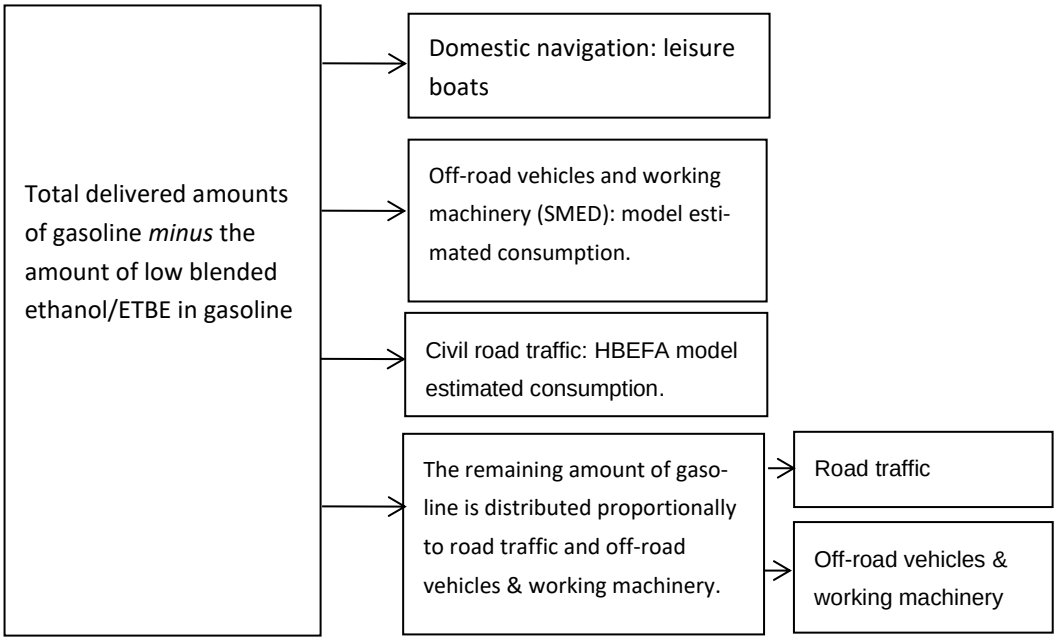

Figure A2-1. Gasoline distribution by subsector and source.

The gasoline consumption by road traffic is estimated by the European road vehicle emission model HBEFA (se chapter 2.5). The gasoline consumption by off-road vehicles (NFR 1.A.2.gvii, 1.A.3.eii, 1.A.4.aii, 1.A.4.bii and 1.A.4.cii) is estimated using a model based on a study carried out in 2008 (se chapter 2.6)[59].

The consumption of gasoline by domestic navigation is dominated by leisure boats and is based on four different surveys[60]. The last three studies have only indicated a range for the fuel consumption, which has led to separate analyzes to determine the fuel consumption [61, 62, 63]. The gasoline consumption in between the studies is estimated by interpolation based on the assessed consumption in each survey[64]. No domestic ferries or bigger ships run on gasoline.

[59] Fridell, Jernström & Lindgren, 2008

[60] https://www.transportstyrelsen.se/sv/sjofart/Fritidsbatar/Statistik-och-fakta--fritidsbatar/batlivsundersokningen/

[61] Gustafsson, 2005.

[62] Eklund V. 2014.

[63] Fridell, Mawdsley & Wisell. SMED Report No 9 2017.

[64] 2005-2009, 2010-2014 and 2016-2020

Figure A2-2 shows a comparison between the volume of fossil and biogenic gasoline through a top-down and bottom-up approach; where the top-down approach shows the total estimated gasoline consumption for all sectors while the top-down approach shows the total deliveries of gasoline. The residual is distributed proportionally to road traffic and off-road vehicles.

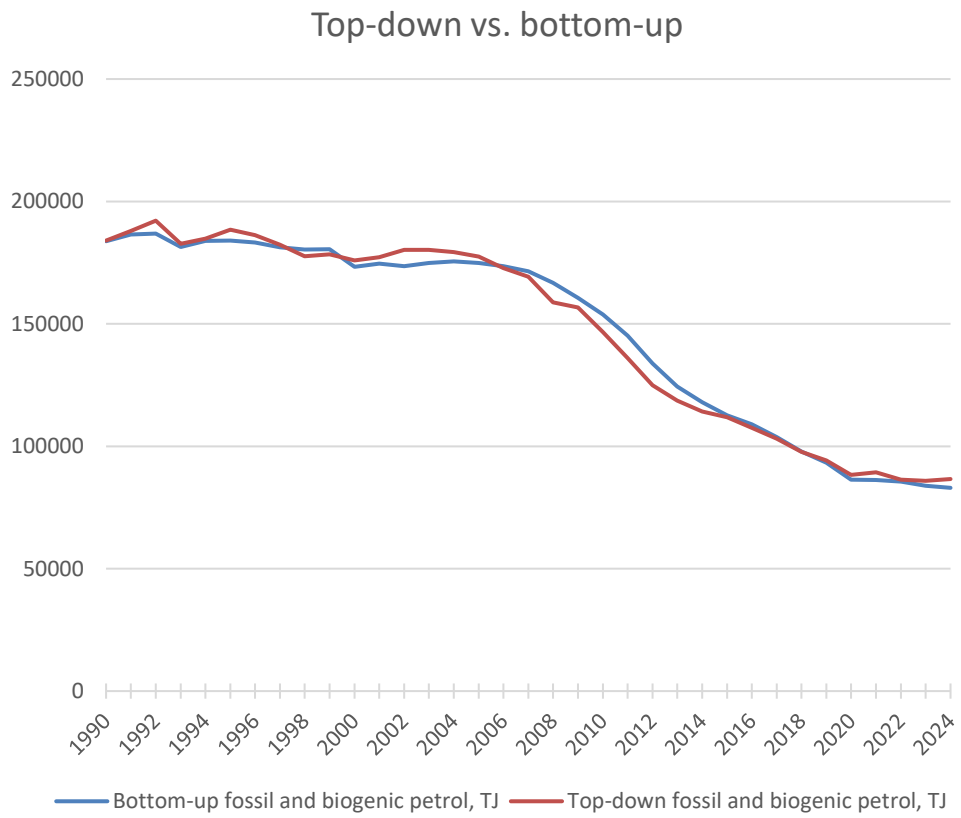

Figure A2-2. Bottom-up vs. top-down approach for petrol in submission 2026.

The approximate distribution of gasoline deliveries allocated to the civil road traffic to subsectors in 2024 is shown in Figure A2-3. Civil road traffic accounts for almost all gasoline consumption, followed by off-road vehicles and other machinery. Gasoline consumption by domestic navigation activities is relatively low.

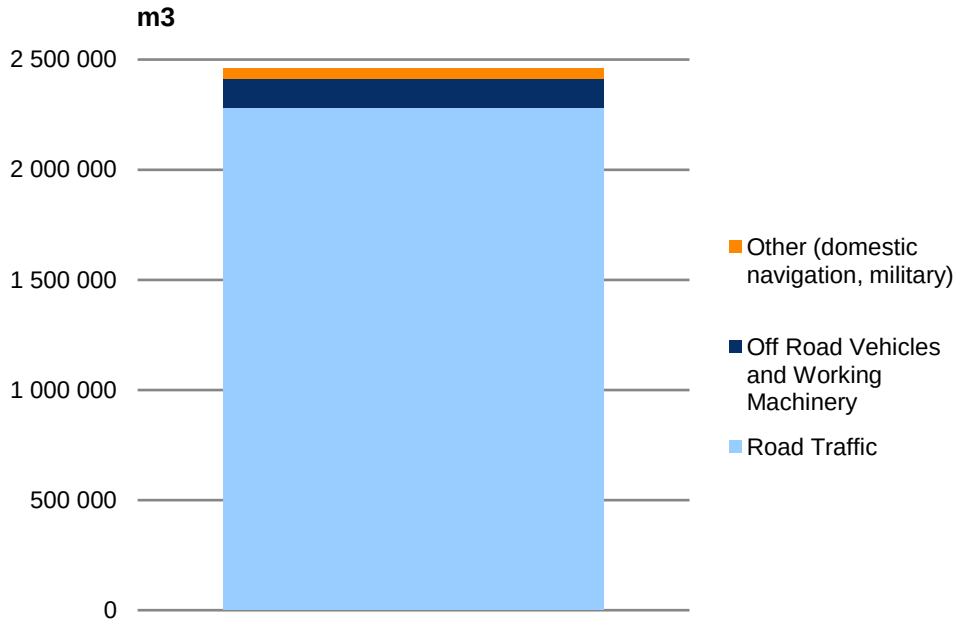

Figure A2-3. Distribution of gasoline by subsector in 2024.

2.4.2 Diesel

Data on the total amount of diesel oil delivered at a national level is provided by the statistics on supply and delivery of petroleum products[65] for 1990-2017 while data reported under the Swedish fuel quality act is used for 2018-2022 (See section 2.1.7). The use of diesel by international bunkers is specified as discussed in IIR section 3.2.9.

The diesel for national consumption is distributed to different subsectors following a three-step process and is illustrated in figure A2.4 below.

1. *In the first step*, the diesel used for stationary combustion and the low blended FAME/HVO is subtracted from the total delivered amounts of diesel.

    - The total volume of HVO is reported as biomass under NFR 1.A.3.b, but a small part of FAME is considered fossil and the emissions of CO_2 from the fossil part of FAME is included in the national emissions of GHG.

2. In the *second* step, the diesel consumption by road traffic (model estimated (HBEFA)), off road vehicles (model estimated), railways and domestic navigation including leisure boats is subtracted.

3. *In the third and last step*, the remaining volume of diesel is proportionally distributed between road traffic and off-road vehicles. The allocation is made in proportion to the estimated consumption of diesel in each subsector. As of

[65] Statistic Sweden. Monthly fuel, gas and inventory statistics. http://www.scb.se/en_/Finding-statistics/Statistics-by-subject-area/Energy/Energy-supply-and-use/Monthly-fuel-gas-and-inventory-statistics/

submission 2022, the fishing sector is no longer included in this step, since a SMED study in 2021[66] showed that the fuel used by the fishing fleet is domestic heating oil and not diesel as was previously assumed.

The consumption estimates of each subsector is based on the sources according to table A2-23.

Table A2-23. Subsectors with a diesel consumption that is subtracted in the 2'nd step.

Subsector	NFR	Estimation of amount of diesel consumed
Road traffic	1A3b	HBEFA: road emission model 4.2
Working machinery	1A2gvii, 1A3eii, 1A4aii-1A4cii	Model for off road vehicles
Railway	1A3c	Survey by the Swedish Energy Agency
Domestic navigation	1A3d	Shipair (SMHI) and a survey of fuel consumption for domestic navigation (Swedish Energy Agency).
Leisure boats	1A3d	SMED report, 2005. SMED PM, 2014. SMED Report No 9 2017

Figure A2-4 gives a brief overview of the distribution of diesel among different subsectors.

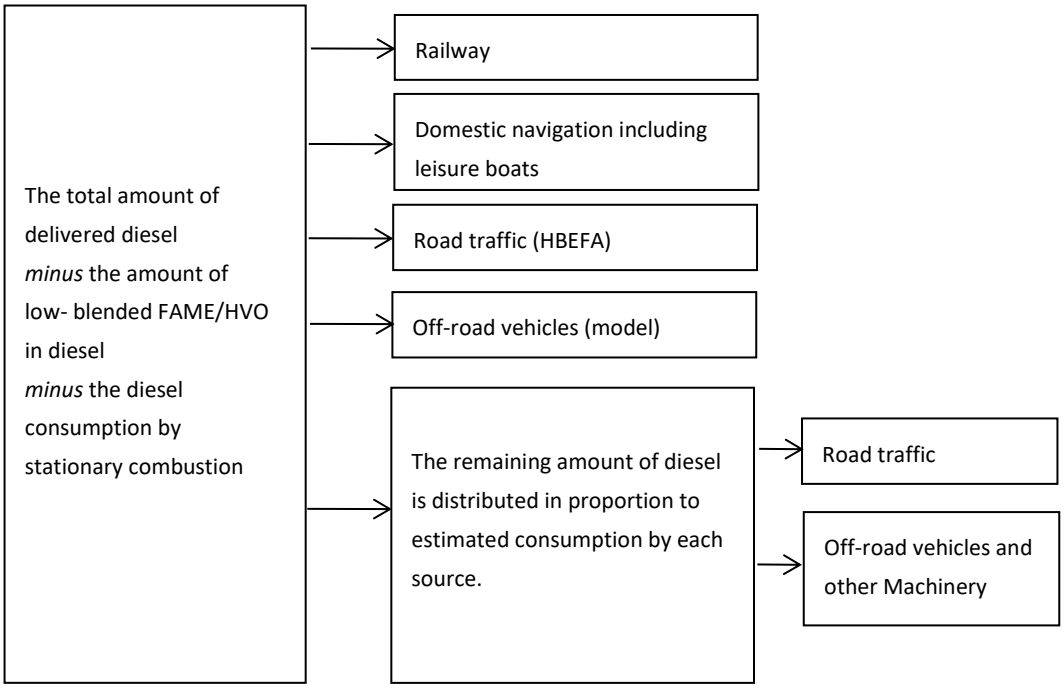

Figure A2-4. Model for allocating the total amount of delivered diesel on subsectors.

[66] Eklund, V. Kellner, M. Parsmo, R. 2021. Fiskenäringen – uppdatering av bränsleförbrukning samt emissionsfaktorer

Just as for petrol, Figure A2-5 shows a comparison between the volume of fossil and biogenic diesel oil through a top-down and a bottom-up approach; where the top-down approach shows the total estimated diesel consumption of diesel by all sectors while the top-down approach shows the total deliveries of diesel. The is distributed proportionally to road traffic and off-road vehicles. The discrepancy between the bottom-up approach and the top-down approach is bigger for diesel oil than for petrol.

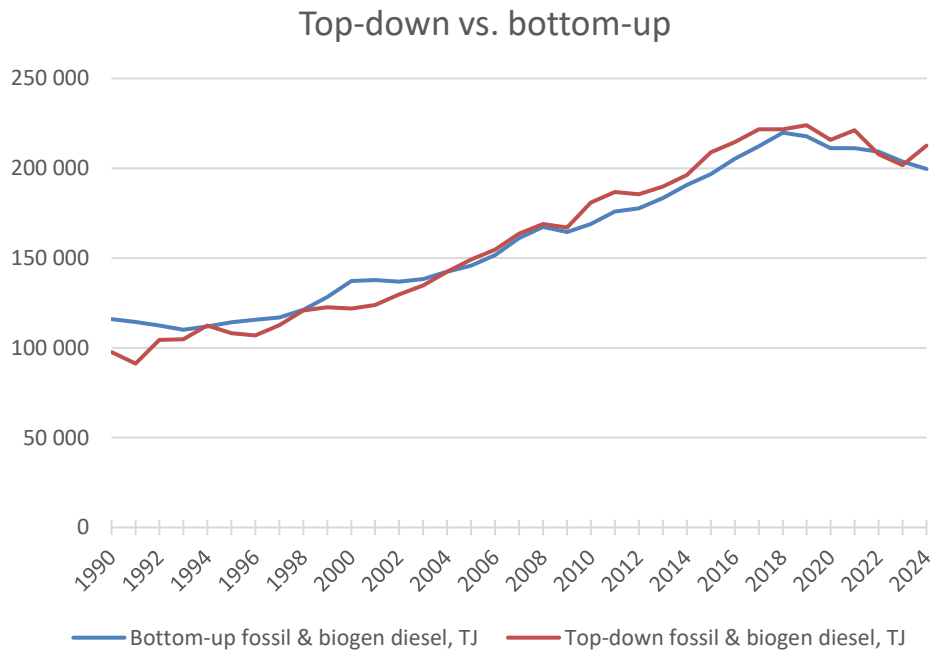

Figure A2-5. Bottom-up vs. top-down approach for diesel in submission 2026.

The diesel consumption by off-road vehicles and other machinery is estimated by a model, which is based on a SMED study from 2008[67], and was implemented in submission 2009. The model has been updated with new data and improved by each submission. See section 2.6 for more information.

Before submission 2020, the estimate for diesel consumption from domestic navigation[68] (also called marine diesel oil) was provided by the statistics on supply and delivery of petroleum products[69]. As from submission 2020, the energy consumption from domestic navigation is based on a model called Shipair, developed by the Swedish meteorological and hydrological institute (SMHI), and information

[67] Fridell, Jernström & Lindgren 2008

[68] Except for leisure boats.

[69] Statistic Sweden. Monthly fuel, gas and inventory statistics. http://www.scb.se/sv_/Hitta-statistik/Statistik-efter-amne/Energi/Tillforsel-och-anvandning-av-energi/Manatlig-bransle--gas--och-lagerstatistik/

collected from the largest shipping actors for domestic navigation[70]. See section 2.4.3 below for more information.

The consumption of diesel by recreational boats is based on four different surveys[71]. The last three studies have only indicated different ranges for fuel consumption, which has led to separate analyzes to determine the fuel consumption [72, 73, 74]. The consumption of diesel in between the studies was estimated by interpolation based on the assessed consumption in each survey[75].

Figure A2-6 shows the approximate distribution of the delivered amount of fossil diesel oil in 2023. As for gasoline, diesel from civil road traffic accounts for most of the consumption. However, diesel from off-road vehicles and other machinery also contributes to a considerable amount (20%) of the total consumption.

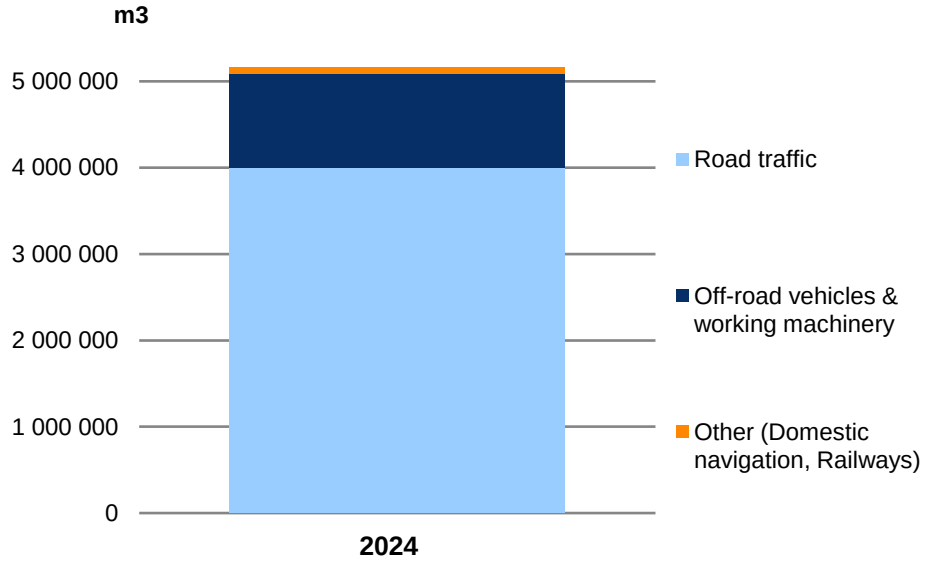

Figure A2-6. Distribution of diesel oil by subsector in 2024.

2.4.2.1 ENVIRONMENTAL CLASSES OF DIESEL OIL

Diesel oil is refined into three categories, so called environmental classes 1-3. These have been gradually introduced from 1991. Between the early 2000s and 2022, environmental class 1 diesel accounted for about 99 % of the total delivered amount of diesel. In 2023 and 2024 however, diesel class 3 has made a comeback and in 2024 accounts for approximately 12% of the diesel consumed. The shift in

[70] Eklund, V. et al. 2019. Analys och implementering av data från nya MåBra.

[71] https://www.transportstyrelsen.se/sv/sjofart/Fritidsbatar/Statistik-och-fakta--fritidsbatar/batlivsundersokningen/

[72] Gustafsson, 2005.

[73] Eklund V. 2014.

[74] Fridell, Mawdsley & Wisell. SMED Report No 9 2017.

[75] 2005–2009, 2010–2014 and 2016–2020

consumption of diesels of different environmental classes has a significant impact on the emissions. However, this shift was noticed too late to be included in the calculations for submission 2026. Sweden intends to include them in submission 2027.

Table A2-24 shows the characteristics for environmental class 1-3 regarding thermal values. Information on the diesel distribution on environmental classes has been collected from the Swedish National Road Administration for the years 1990-1993 and from Statistics Sweden for 1994 and later years. Drivkraft Sverige (formerly known as The Swedish Petroleum and Biofuel Institute, SPBI) have assisted with information regarding thermal values[76]. SMED has calculated yearly averages of thermal values and emission factors.

Information on the diesel distribution on environmental classes has been collected from the former Swedish National Road Administration for the years 1990-1993 and from Statistics Sweden for 1994 and later years. Drivkraft Sverige has assisted with information regarding NCVs and emission factors for CO_2[77]. SMED has calculated yearly averages of NCVs and emission factors.

Table A2-24. Impact from different environmental class diesel on NCV and emission factors for CO_2.

Diesel	NCV (GJ/m^3)	Emission factor CO_2 (t/TJ)	Weight 1990 (%)	Weight 2000 (%)	Weight 2013 (%)
Environmental class 1	35.28	72.2	0	94	99
Environmental class 2	35.28	72.2	0	0	0
Environmental class 3	35.82	72.2	100	6	1
Average 1990	35.82	72.2			
Average 2000	35.31	72.2			
Average 2010	35.28	72.2			
Average 2018	35.28	72.2			
Average 2020	35.28	72.2			

2.4.3 Marine distillate fuel

Marine distillate fuel is a group name covering diesel oil used for navigation and marine gasoil. Emissions from these fuels are reported as gas/diesel oil in the NFR. The source for the activity data (AD) used for national navigation changed in submission 2020. Before submission 2020, the AD was based on the monthly survey on supply and delivery of petroleum products[78]. As from submission 2020, the

[76] https://drivkraftsverige.se/

[77] https://drivkraftsverige.se/

[78] Statistic Sweden. Monthly fuel, gas and inventory statistics. See annex 2 for more information regarding different surveys.

energy consumption by domestic shipping is mainly based on a methodology called Shipair, which was developed by the Swedish meteorological and hydrological institute (SMHI). The Shipair model collects data from AIS (Automatic Identification System), which ships use to continuously transmit identity and position information. The AIS data shows how the ships move between Swedish ports. Information regarding the ships, such as size, engine power and type of vessel is also collected. This enables the Shipair model to estimate the amount of energy needed for the ships to move and the amount of fuel consumed.

Beside the Shipair model, the energy consumption from domestic navigation is based on information collected from the largest shipping actors for national navigation, with the exception for cargo ships.[79] Information regarding the fuel consumption, by fuel type, is collected as Shipair only estimate the energy consumption. Shipair does not know which fuel types are used. The difference between the energy consumption estimated by Shipair and the survey, is assumed to be the energy consumption by cargo ships

The diesel consumption by leisure boats is based on four different surveys regarding leisure boats from 2004, 2010, 2015 and 2021[80] and three different studies by SMED[81]. Marine diesel oil for domestic navigation is discussed under the diesel section, 2.4.2. The statistics on marine distillate fuels are reported separately for domestic and international navigation and the split is based on the information provided by the respondents to the survey on supply and delivery of petroleum products.

The estimated fuel consumption by the Swedish fishing fleet in 2005, is based on a survey to the fishing industry carried out by Statistics Sweden[82]. The estimated fuel consumption for 2005 serves as a reference year. The fuel consumption in 1995-2004 and 2006-2023 are adjusted relative to the total installed effect for each year. In submission 2025, a correction factor describing fuel consumption per installed effect was also introduced[83] to accommodate the fact that the consumption in the last two surveys has been lower than expected. Information of the Swedish fishing fleet's installed effect is provided by the Swedish Agency for Marine and Water Management (SwAM). The installed effect is available from 1995 and for the years prior to 1995, it is estimated through extrapolation.

[79] Eklund, V. et al. 2019. Analys och implementering av data från nya MåBra.

[80] Statistics Sweden, 2005. Transportsstyrelsen. 2010. Transportstyrelsen 2015.

[81] Gustafsson, T. 2005. Eklund, V. 2014. Fridell, E., Mawdsley, I., Wisell T. 2017

[82] Statistics Sweden 2006

[83] Kellner & Eklund 2024

The amount of marine distillate fuel used for domestic navigation and leisure boats (NFR 1.A.3.d) is shown in figure A2.7. The stricter rules regarding the sulphur content in marine fuels, which took effect in January 2015, led to a shift from heavy oil fuel oil to lighter oil products with a lower sulphur content in 2015. But in 2018 there was a shift to heavy marine oils again but with a reduced sulphur content, so called “hybrid oils” and LNG. This can be seen in Figures A2-7 and A2-8. Since virtually all LNG capable ships can also run on marine gasoil, LNG and marine distillate fuels are communicating vessels. In 2024, the amount of LNG increases again after a few years of smaller consumption.

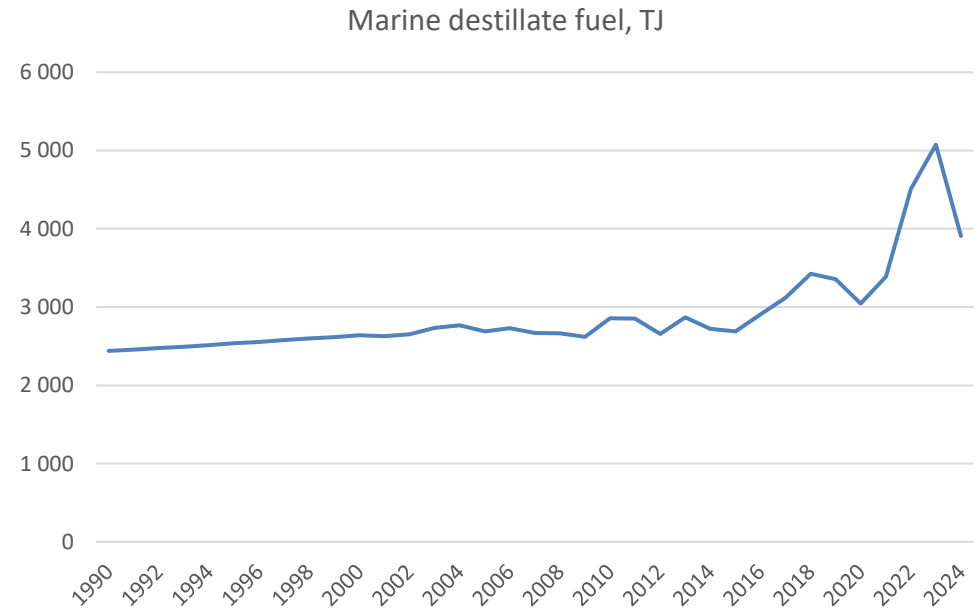

Figure A2-7. Total consumption of diesel and marine gasoil used by domestic navigation (marine distillate fuel) 1990-2024.

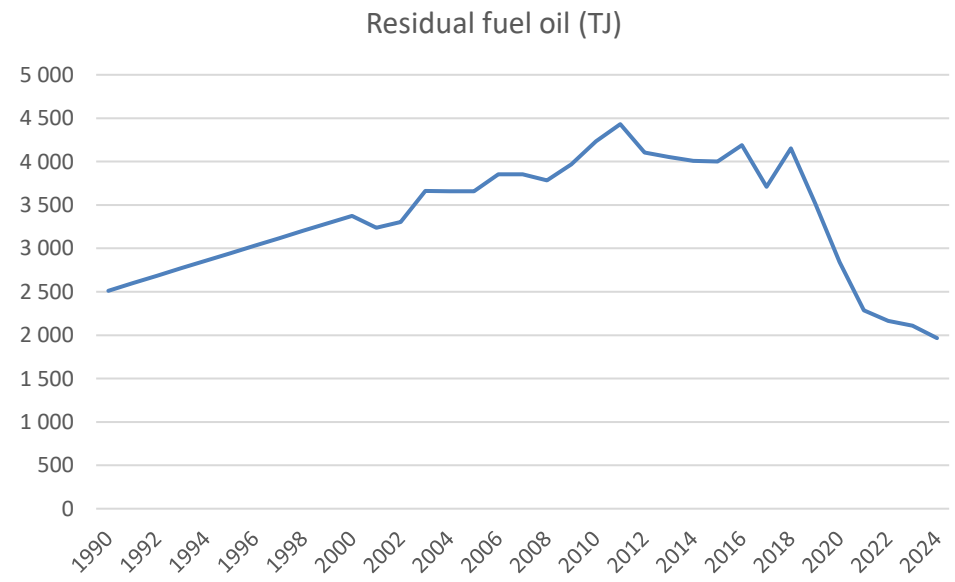

Figure A2-8. Consumption of marine Residual fuel TJ by domestic navigation for 1990-2024

2.4.4 Residual fuel oils

As from submission 2020, the energy consumption from domestic shipping is mainly based on a methodology called Shipair and the fuel consumption by fuel type collected from the largest shipping actors for national navigation, with the exception for cargo ships.[84] See section 2.4.3 and figure A2.8 above for more information.

2.4.5 Jet kerosene, jet gasoline and aviation gasoline

All jet kerosene, jet gasoline and aviation gasoline are assumed to be used for aviation. Delivered amounts of these fuels are provided at national level by the statistics on supply and delivery of petroleum products (see section 2.1.7).

2.4.6 Natural Gas and biofuels

Other fuels used for transport are ethanol, FAME, HVO, natural gas, liquid natural gas (LNG) and biogas. Ethanol and FAME/HVO are partly used as admixtures in gasoline and diesel, and partly used in more pure forms in bi-fuel vehicles. Information on delivered amounts of ethanol and FAME/HVO are provided at national level by the statistics on supply and delivery of petroleum products. Data on delivered amount of natural gas for transport is provided by the statistics on the delivery of gas products (see above). The LNG data is based on a survey[85],[86],[87],[88], which was performed in 2020, 2021, 2022, 2023, 2024 and 2025 aiming to map the consumption of LNG by both national and international navigation. Data on the consumption of biogas from 1996 is provided by the Swedish Biogas Association. Data for 1990-1995 is not available.

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[84] Eklund, V. et al. 2019. Analys och implementering av data från nya MåBra.

[85] Eklund, et al. 2021. Sjöfartens förbrukning av LNG 2020

[86] Eklund, et al. 2020. Sjöfartens förbrukning av LNG.

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2.5 The HBEFA road model

The HBEFA (Handbook of Emissions Factors) emission model builds on the former ARTEMIS road model (used from submission 2006 to submission 2011). To a large extent, the two models are principally the same, since the HBEFA road model was developed from a merging of the ARTEMIS road model and the former version of HBEFA. 2.1. Since then the model has undergone many updates and the most recent version named 4.2[89] was used for the first time in submission 2023.

HBEFA provides emission factors and calculates emissions for segments and subsegments of six main vehicle categories - passenger cars (PC), light commercial

[89] Infras, 2022

vehicles (LCV), heavy goods vehicles (HGV), urban busses, coaches, and motorcycles including mopeds (MC). Segments are defined as groups of vehicles of similar size (e.g. light commercial vehicles with kerb weight less than 1305 kg and rigid trucks with weight between 14 and 20 tonnes) which are using the same type of fuel/technology (petrol, diesel, CNG/petrol, LNG, electricity, etc.), whereas subsegments are defined as groups of vehicles of similar size, fuel/technology and emission concept (e.g. pre-Euro, Euro 1, 2, 3, etc.).

HBEFA calculates emissions separated into hot emissions, cold start emissions and evaporative emissions. An overview of the model structure with input and output parameters is given by Figure A2.9. The hot emission factors are calculated with the PHEM model[90] and are representative for typical European driving conditions.

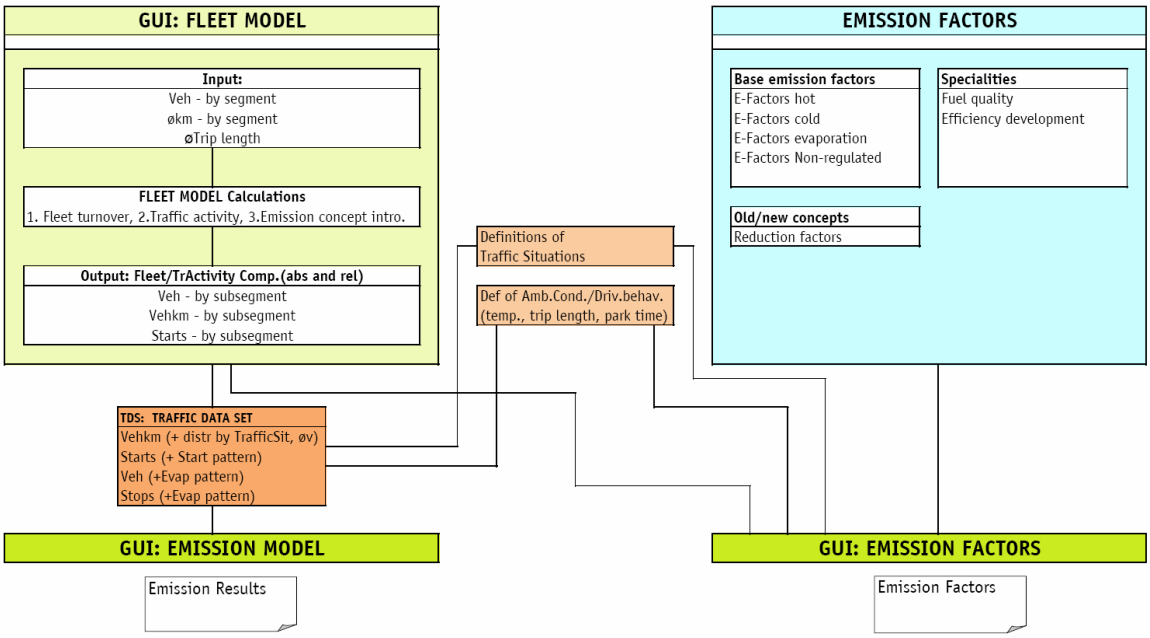

Figure A2-9. HBEFA model structure.

2.5.1 National fleet data

The Swedish vehicle fleet is in HBEFA described by means of the number of vehicles on segment level and age distributions on segment level derived from the Swedish national vehicle register.

For buses HBEFA distinguishes between two types of buses: urban buses, mainly used for urban driving, and coaches, mainly used for rural and motorway driving. Over the years different methods have been used to determine which HBEFA category each bus registered in Sweden should belong to. In the current method buses classified as Class I, Class II or Class A in the national register is considered to be Urban buses in HBEFA and Class III and class B buses are considered to be coaches.

[90] FVT, 2022

Trucks are in HBEFA split into two main categories 1) rigid trucks and 2) articulated trucks/trucks with trailers. Since there is no information in the Swedish vehicle register on the use of trailers this is described by means of so called vehicle transformation patterns in HBEFA. A transformation pattern defines the mileage distributions for each weight class, with and without trailer, respectively. The truck category "with trailer" is split further into different sizes of trailers expressed as the maximum permissible (i.e. weight range, e.g. 20-28 tonne) of the truck and trailer combination. The transformation patterns for Sweden were derived from traffic measurements on Swedish roads. Vehicle fleet data is shown in Figure A2.10.

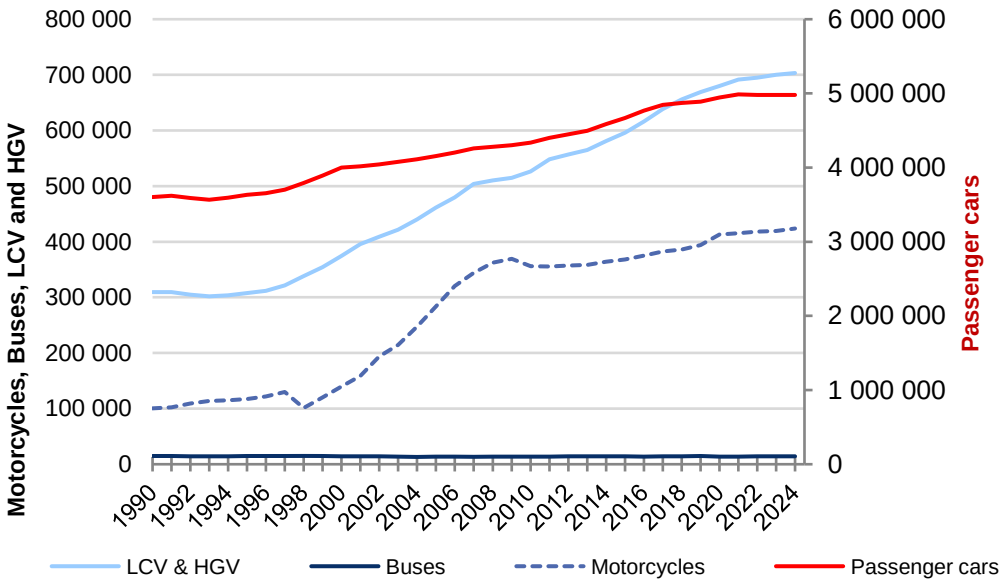

Figure A2-10. Vehicle fleet data by December 31, numbers, 1990-2024 according to the car register available at Statistics Sweden.

2.5.2 Traffic activity data

2.5.2.1 VEHICLE MILEAGES, LOADS, TRIP LENGTHS AND FUELS

The HBEFA model requires annual average vehicle kilometers travelled per vehicle category (Figure A2.11). The source used for this data later years is the official statistics on Vehicle mileage for Swedish registered vehicles[91]. This statistic gives the total vehicle kilometers travelled in Sweden per vehicle category. For trucks the data takes into account the kilometers driven with foreign trucks in Sweden and the kilometers driven abroad with trucks registered in Sweden. For the other vehicle categories it is assumed that the total number of kilometers driven abroad by Swedish vehicles is the same as the total kilometers driven by foreign vehicles in Sweden, and thus these driving distances are considered to cancel each other out.

HBEFA also required average annual driving distances per vehicle segments which is used to distribute the total vehicle kilometers travelled on the different segments.

[91] Trafikanalys, 2022

To do this, data on annual milage on a vehicle level is used. This data is provided by the Swedish Transport Analysis and is based on yearly odometer readings within the Swedish inspection & maintenance (I/M) program[92]. This data is used for deriving both mileage per vehicle segment, and mileage as a function of vehicle age.

For heavy duty vehicles, HBEFA requires a distributions of load between empty (0% load), half-load (50% load), and fully loaded (100% load) vehicles by segment and age. This data was derived from a major national survey on Swedish domestic road goods transport[93].

In order to estimate evaporative and cold start emissions, information on distributions of trip lengths and parking times, and on the seasonal and diurnal variation of ambient temperature is needed. Trip lengths and parking times can be derived from surveys, or from data from instrumented cars. For Sweden, an average trip length according to surveys is 12 km, and according to instrumented cars 7 km[94]. Instrumented cars provide the trip length from engine start to engine stop. Even if instrumented car data just represents a few vehicles and use in few families, this data set has been considered more representative than the survey data, since the information requested is the distance travelled from engine start to engine stop[95]. Thus, available instrumented vehicle data was used to estimate trip lengths and parking times in Sweden.

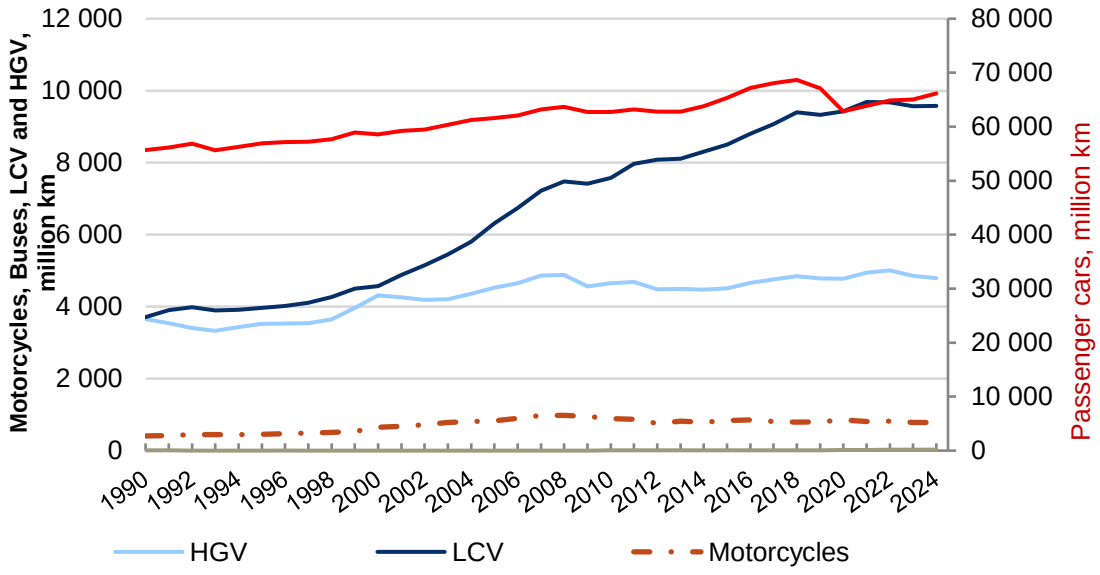

Figure A2-11. Vehicle mileages 1990-2024 according to HBEFA 4.2.

[92] Trafikanalys, 2011

[93] Hammarström and Yahya, 2000

[94] SNRA 1999

[95] André et al., 1999

2.5.2.2 TRAFFIC SITUATIONS

The HBEFA 4.2 model includes 365 traffic situations, i.e. combinations of road type, speed limit, area (rural and urban) and level of service. The level of service describes how disturbed the traffic is relative to undisturbed traffic and there are five different levels - 1) Free Flow, 2) Heavy Traffic, 3) Saturated 4) Stop and Go and 5) Heavy Stop and Go conditions (see Table A2-25). Furthermore, different level of road grade can be attributed to each traffic situation.

Table A2-25. Definition of the five classes of traffic conditions.

Class	Definition
Freeflow	Free flowing conditions, low and steady traffic flow. Constant and quite high speed. Indicative speeds: 90-120 km/h on motorways, 45-60 km/h on a road with speed limit of 50 km/h. LOS A-B according to HCM.
Heavy	Free flow conditions with heavy traffic, fairly constant speed. Indicative speeds: 70-90 km/h on motorways, 30-45 km/h on a road with a speed limit of 50 km/h. LOS C-D according to HCM.
Saturated	Unsteady flow, saturated traffic. Variable intermediate speeds, with possible stops. Indicative speeds: 30-70 km/h on motorways, 15-30 km/h on a road with speed limit of 50 km/h. LOS E according to HCM.
Stop + go	Stop and go. Congested flow, stop and go or gridlock. Variable and low speed and stops. Indicative speeds: 30-70 km/h on motorways, 15-30 km/h on a road with speed limit of 50 km/h. LOS E according to HCM.
Heavy stop+go	Heavily congested flow. Average speed range from 5.5 km/h to 7.2 km/h

Distributions of total vehicle kilometers travelled over the traffic situations have been produced for periods of two or three years since 1990. The method has changes slightly over the years and the work has been documented in reports available in Swedish. The most recent report describes the process used for producing a distribution for 2023[96].

Of all traffic situations in HBEFA, 168 were considered in Sweden 2023. In those traffic situations 62 different road categories were represented, for which the traffic condition "Free Flow" was predominant. In fact, as much as 96.9% of the overall vehicle kilometers travelled by passenger cars was characterised by free flow conditions. In Table A2-26 the ten most abundant HBEFA traffic situations for passenger cars are presented. 53% of the vehicle kilometers travelled with passenger cars in 2023 was allocated to 0% road gradient and 37% to ± 2% road gradient.

[96] Persson, Sahlgren and Vuorenmaa Berdica (2024)

Table A2-26. The ten most common traffic situations in Sweden in 2023, and their share of the total vehicle mileage for passenger cars.

Description of traffic situations	Share of national vehicle kilometers travelled
Rural / Motorway / 110 / Freeflow / 0%	7.4%
Rural / Trunk / 70 / Freeflow / +/-2%	6.1%
Rural / Trunk / 80 / Freeflow / 0%	5.3%
Rural / Trunk / 100 / Freeflow / 0%	4.8%
Rural / Trunk / 80 / Freeflow / ± 2%	4.5%
Rural / Trunk / 70 / Freeflow / 0%	4.2%
Rural / Motorway / 110 / Freeflow / ± 2%	3.8%
URB/Access/40/Freeflow/ 0%	3.8%
RUR/Trunk/100/Freeflow / +/-2%	3.7%
RUR/MW/120/Freeflow/ 0%	2.5%
Total	**46.1%**

2.5.3 Most recent updates

In submission 2026 the following updates were made:

- Load patterns for heavy-duty goods vehicles were updated from 2021 to 2024, based on data from the Swedish road good transport survey for 2021-2023. The impact is a 0.4-0.5% decrease in diesel fuel consumption, a 0.2-0.3% decrease on NO_X, a 0.2-0.3% increase in PM, a 0.6-0.7 increase in BC, and a 0.3-0.7% decrease in NMVOC between 2021 and 2023.
- The allocation of traffic work among traffic situations was updated, including a change in methodology in road grade calculations and traffic flow range calculations. These methodological changes are used from 2023 due to better data availability of road height data. It is not possible to retrieve historical data with the needed data accuracy, and hence no timeseries adjustment before 2022 has been made. The change in 2023 is +1.9% for NO_X, +0.3% in $PM_{2.5}$, + 1.1% in diesel fuel consumption and -0.1% in petrol fuel consumption due to the combined change of methodological development and updated traffic situation method for allocating traffic activity.

2.5.4 References

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2.6 Methodology for off-road vehicles and working machinery

Fuel consumption and emissions from working machinery are estimated with a model developed by SMED in 2008. The model is considered to correspond to Tier 3. Working machinery in this context means mobile machinery with a combustion engine that is not used on roads, waterways or railways. Included are e.g. construction machinery, handheld garden machines and snow mobiles.

Emissions and fuel consumption are calculated in the model with the equations below:[97]

$$E = N \times Hr \times P \times Lf \times EF_{adj} \quad (1)$$

- E = Emissions in Gg
- N = number of vehicles,
- Hr = yearly running time in hours,
- P = engine power in kW,
- Lf = load factor, and
- EF_{adj} =adjusted emission factors in g kWh^{-1} according to equation below (applied for larger off-road vehicles and snow scooters).

$$EF_{adj} = EF_l \times CAF \times TAF \times DF \times FAF \quad (2)$$

- EF_l = emission regulations according to EU legislation in g kWh^{-1},

[97] Fridell, Jernström and Lindgren, 2008

- CAF = adjustment factor for difference between regulation and value measured at certification,
- TAF = adjustment factor for transient (i.e. difference between static test cycle and real use of the machine),
- DF = adjustment factor for decline of the motor by increasing age, and
- FAF = adjustment factor for difference between certification fuel and Swedish diesel of type "MK1".

All variables in the equations are described as vectors with data for every model year the last 25 years.

2.6.1 Emission factors

Emissions of SO_2 are estimated using the same emission factors as for diesel and gasoline used for road traffic and are considered to correspond to Tier 2. The emission factors for SO_2 are adjusted according to fuel specifications for each year.

Emission factors for diesel and gasoline machinery are taken from EMEP/EEA Guidebook 2023. An exception is emission factors for snow mobiles that are taken from Winther and Nielsen 2006.[98] except the emission factors for hydrocarbons, carbon monoxide and particles which are taken from USEPA (2005).

2.6.2 Vehicle Stocks

The number of diesel machinery 37 – 560 kW of different types is mainly based on a bottom-up inventory for the year 2006. [99] The number of machines and information on vehicle lifetime for some of the diesel vehicles in the range of 37 kW – 560 kW is based on an investigation from 2013[100]. Sales data for some off-road vehicles for 2005-2016 has been provided by the Swedish trade association for suppliers of mobile machines.[101] Sales data is used annually for updating the model with number of new machineries.

The number of tractors per sector, model year and engine power interval are for most of the years taken from Statistics Sweden's registers. For some years where statistical data is not available, numbers are interpolated (the proportions of different vehicle types are assumed to be constant).

The total number of machines >560 kW for earlier years is taken from an IVL study conducted on behalf of the Swedish Transport Agency[102]. The total number of machines < 37 kW are based on a bottom-up inventory for the year 2002[103]. Number of machines for other years are estimated on e.g. sales data provided by

[98] Winther, M., Nielsen, O.-K., 2006.

[99] Wetterberg C, Magnusson R, Lindgren M, Åström S. 2007.

[100] Jerksjö, M. 2013.

[101] Eklund, V., Lidén, M., Jerksjö, M., 2017.

[102] Transportstyrelsen 2014

[103] Flodström, E., Sjödin, Å., Gustafsson, T. 2004.

the Swedish trade association for suppliers of garden machinery, estimates of life-time or set as unchanged from 2002. Different methods are used for different types of machines.

The number of snow mobiles and all-terrain vehicles (ATVs) is taken from Statistics Sweden's register for each year.

2.6.3 Other parameters

Yearly running time, engine power and the load factor in equation (1) above are taken from Jerksjö[104] Wetterberg[105] and Flodström[106]. Load factors for some of the machines are from an IVL study made in 2015[107]. The fuel adjustment factor, FAF, and the certification adjustment factor, CAF, for larger vehicles in equation (2) are taken from Lindgren (2007).[108] The TAF and DF factors are taken from EMEP/EEA Guidebook 2016.

2.6.4 Allocation to NFR sectors

Allocation of emissions from working machinery is mainly based on a report by Flodström et al[109]. This is the most recent Swedish inventory including an allocation of working machinery to the different NFR-sectors. There have also been some changes of the allocation proposed in Flodström et. al. Most of these changes have been done by expert judgements in cases where the allocation did not seem to be accurate. Emissions from tractors are allocated to the sector where the machines are used due to the national vehicle register.

Table A2-27 shows emissions of NO_X, CO, $PM_{2.5}$ and NMVOC from all working machinery in 2024, split by sector and fuel type.

[104] Jerksjö M. Genomsnittlig årlig driftstid för entreprenadmaskiner och traktorer. SMED PM 2024.

[105] Wetterberg C, Magnusson R, Lindgren M, Åström S. 2007.

[106] Flodström, E., Sjödin, Å., Gustafsson, T. 2004.

[107] Jerksjö, M., Fridell, E., Wisell, T. 2015

[108] Lindgren M. 2007.

[109] Flodström, E., Sjödin, Å., Gustafsson, T. 2004.

Table A2-27. Emissions of NO_X, CO, $PM_{2.5}$ and NMVOC from working machinery 2024.

NFR code	Category	Fuel type	NO_X (Gg)	CO (Gg)	$PM_{2.5}$ (Gg)	NMVOC (Gg)
1A2g vii	Industry	Diesel	3.44	4.7	0.2	0.6
1A4a ii	Commercial/institutional	Diesel	0.8	0.6	0.1	0.2
1A4b ii	Residential	Diesel	0.1	0.1	0.01	0.1
1A4c ii	Agriculture	Diesel	0.9	0.7	0.04	0.1
1A4c ii	Forestry	Diesel	0.4	0.7	0.01	0.1
1A2g vii	Industry	Gasoline	0.06	7	0.01	0.3
1A4a ii	Commercial/institutional	Gasoline	0.1	21	0.03	0.6
1A4b ii	Residential	Gasoline	0.8	32	0.1	2.8
1A4c ii	Agriculture	Gasoline	0.2	4.7	0.02	0.8
1A4c ii	Forestry	Gasoline	0.02	6.4	0.03	1.1
1A3e ii	Other Transport	Diesel + Gasoline	0.26	0.3	0.003	0.04
Total	**Total**	**Total**	**7.1**	**78**	**0.6**	**6.7**

2.6.5 Most recent updates

In submission 2026 a major revision of NFR 1A3e was carried out[110]. Previous emission calculations for this NFR category were heavily influenced by old machinery. Old machinery in this case refers to the aggregated group of machinery that is 24 years or older. This part of the machine population was heavily overestimated in terms of both number of machines and operating hours. As the number of high emitting old machines was revised the recalculations are substantial for the latter part of the time series in particular. There were also some revision of scrapping rates and age distribution of the machine stock for a few machine types included in the Swedish Road Traffic Register.

2.6.6 References

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[110] Hammerlid, 2025

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3 Annex 3: Other detailed methodological descriptions for individual sources

Annex 3.1. Methodological issues for emissions from solvent use (in NFR sector 2D3)

The calculation model for estimating the national emissions of NMVOC from use of solvents in Sweden is designed to meet international reporting requirements according to CLRTAP and UNFCCC as well as to support national needs. The model makes it possible to test different sets of emission factors within the solvent use sector. This function can be used to assess different actions and emission reduction potentials. Furthermore, the model can generate emissions per user category and product group. This information can be used when following up the Swedish environmental quality objectives.

The calculation model is consumption-based with a product-related approach. Amounts of NMVOC and C in solvents and solvent-based products, produced in, imported to, used in, and exported from Sweden, were derived from the Swedish Product Register hosted by the Swedish Chemicals Agency. Emission factors from the literature have been used as far as possible, but in the case when emission factors are unavailable, country specific emission factors have been developed.

3.1.1 Definition of NMVOC

According to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 2006), NMVOCs are defined as:

"any non-methane organic compound having at 293.15 K a vapour pressure of 0.01 kP or more or having a corresponding volatility under the particular conditions of use."

3.1.2 Substance list

A manual selection has been made in order to select each substance with vapour pressure of 0.01 kPa or more at 293.15° K according to the chosen definition of NMVOC. The final substance list for 2013 contains 427 substances defined as NMVOC. The list includes CAS-number, name, molecular formula and carbon share for each substance. The carbon share for each substance has been calculated based on the molecular formula. In some cases, a mixture of substances is included in the substance list, and for the mixtures the carbon content has been estimated by the Swedish Chemicals Agency as 85% of NMVOC, based on information in the Products Register. In cases where the carbon content cannot be derived from the Products Register, the default value of 60%, given in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, has been used.

3.1.3 Activity data

The substance list has been used to extract quantities of NMVOC and C in substances found in the Products Register. Data extractions have been made for each year from 1992. The extractions show for each year:

- The intended use of the product, the product type (functional code)
- Industry to which the product is sold (industry category)
- Quantity NMVOC
- Quantity C
- Number of products

When analysing the extractions from the Products Register, data for 1992-1994 showed not to be reliable to use for quantitative estimates of NMVOC and C emissions. The reason is that during this period the emissions of many substances still were reported as intervals, even if work has been done by the Swedish Chemicals Agency in order to further specify the amounts. There were also changes in the code system during this period. Therefore, data from the Products Register are only used for 1995 and onwards.

Due to the two-year delay in official statistics from the Products Register, activity data for the last year in the reported time series is not published in time to be used in the latest submission and hence Sweden has chosen to equal data for the last year with data for the year before that. Estimated values for last year of one submission will always be updated with official data in the next submission.

Table A3-1. Activity data and emission factors for the individual SNAP codes 060412i (not diluted), 060412i (not diluted, raw material), 060412ii (diluted and 060412ii (diluted, raw material).

Year	AD 060412i (kt, not diluted)	AD: 060412ii (kt, diluted)	AD 060412i (kt not diluted, raw material)	AD 060412ii (kt, diluted, raw material)	EF 060412i (not diluted)	EF 060412ii (diluted)	EF 060412 (raw material)
1997	10	6	3	0	0.95[1]	0.275[2]	0.001
1998	11	7	4	0	0.95[1]	0.275[2]	0.001
1999	11	7	3	0	0.95[1]	0.275[2]	0.001
2000	11	7	2	0	0.95[1]	0.275[2]	0.001
2001	11	8	1	0	0.95[1]	0.275[2]	0.001
2002	15	11	1	0	0.95[1]	0.275[2]	0.001
2003	16	14	2	0	0.95[1]	0.275[2]	0.001
2004	18	15	1	0	0.95[1]	0.275[2]	0.001
2005	18	15	1	0	0.95[1]	0.275[2]	0.001
2006	20	15	1	0	0.95[1]	0.275[2]	0.001
2007	20	16	1	0	0.95[1]	0.275[2]	0.001
2008	21	15	1	0	0.95[1]	0.275[2]	0.001
2009	20	16	1	0	0.95[1]	0.275[2]	0.001
2010	22	15	3	0	0.95[1]	0.275[2]	0.001
2011	25	18	3	0	0.95[1]	0.275[2]	0.001
2012	25	18	1	0	0.95[1]	0.275[2]	0.001
2013	24	17	3	0	0.95[1]	0.275[2]	0.001
2014	27	15	1	0	0.95[1]	0.275[2]	0.001
2015	30	14	<1	0	0.95[1]	0.275[2]	0.001
2016	23	16	<1	0	0.95[1]	0.275[2]	0.001
2017	21	14	<1	0	0.95[1]	0.275[2]	0.001
2018	23	15	<1	0	0.95[1]	0.275[2]	0.001
2019	27	16	<1	0	0.95[1]	0.275[2]	0.001
2020	30	12	<1	0	0.95[1]	0.275[2]	0.001
2021	28	14	<1	0	0.95[1]	0.275[2]	0.001
2022	35	13	<1	0	0.95[1]	0.275[2]	0.001
2023	29	14	<1	0	0.95[1]	0.275[2]	0.001
2024	24	14	<1	0	0.95[1]	0.275[2]	0.001

[1] Skårman, T., Danielsson, H., Henningsson, E., Östman, M. 2006. Revised Method for Estimating Emissions of NMVOC from Solvent and Other Product Use in Sweden. SMED Report no 75

[2] EMEP/EEA air pollutant emission inventory guidebook - 2019. 2.D.3.a Domestic solvent use including fungicides.

3.1.4 Allocation

The extractions from the Products Register for 1995 and onwards have been used in order to compile a connection diagram with all combinations of "product codes" and "industry categories". For all combinations, decisions whether to include or exclude from reporting are based on expert judgements in order to avoid double-counting. If the combination should be included, it has been given a specific:

- SNAP-code (according to EMEP/EEA guidebook)
- Industry group (grouping industry categories)
- Product group (grouping of product codes)
- Use category (industry, consumer and other)

Furthermore, it has to be determined if the product is used as raw material or not. Quantities of NMVOC used as raw material have been identified and handled separately from other quantities, since most of the solvents used as raw material will not be emitted but bound in products.

In order to avoid double-counting of reported emissions within other sectors an expert judgement has been made on both industry category and product function. All industrial activities reported in other NFR codes are excluded from the extractions from the Products Register.

The sold amount of solvent is not always identical to the amount of solvent used, i.e. stock of solvents. Activity data is therefore based on the assumption that sold amounts of solvents in a specific year are not used entirely within the same year[111]. For a sold amount of a specific solvent, the amounts of this specific solvent used, and the corresponding emissions are distributed over three consecutive years, the first year being the year where the respective solvents are sold. This is done by defining consumption rates of solvents per NFR subcategory sector (see Table A3-2).

Table A3-2. Consumption rates for product groups sold in year X, estimated per NFR category.

NFR category	X	X+1	X+2
2D3a Domestic solvent use including fungicides	70%	20%	10%
2D3d Coating applications	80%	15%	5%
2D3e Degreasing	85%	10%	5%
2D3f Dry cleaning	85%	10%	5%
2D3g Chemical products	85%	10%	5%
2D3h Printing	85%	10%	5%
2D3i Other solvent use	75%	15%	10%

When calculating amounts used and emissions from products containing solvents sold in 2016 allocated to domestic solvent use including fungicides, 70 % of these solvents are assumed be used in 2016, 20 % in 2017 and 10 % in 2018. Calculated

[111] Helbig, T., Danielsson, H. (2019)

emissions from usage of these solvents are distributed likewise. Therefore, reported emissions for a certain year after 1996 always include emissions from solvent use from solvents sold within the two previous years. Emissions and activity data for 1995 and 1996 have been interpolated due to the calculation approach suggesting allocating a share of emissions from solvent use in 1993 and 1994 to 1995 and 1996 respectively. However, based on expert judgement it was decided that emissions and activity data for the years 1990-1994 are not changed.

3.1.5 Emission factors

Emission factors given in the literature, for example the EMEP/EEA guidebook (EEA, 2023), EU legislations and other countries IIR´s, have been compiled and included in the model. Two emission factors have been developed for each activity; one for solvents used as raw material and one for the remaining quantities. The emission factors for raw material have been set to 0.001 for all SNAP codes, since most of the solvents will end up in the product and will not be emitted during production. A new emission factor for products used diluted in water or removed with water has been introduced in the new model for NFR 2D3a and 2D3i. The new emission factor is set to 0.275 and it has been calculated as average of 0.05 and 0.5 according to the information in the EMEP/EEA Guidebook 2023 for NFR 2D3a. In the previous estimates these products were not treated separately and consequently the emission factor of 0.95 was used also for water diluted products. The country specific emission factors have been developed in order to adjust to the old time series 1990-2001, developed by SMED in 2002[112]. However, for some activities errors have been identified in previously reported data for 1990, and consequently those emissions have been corrected. Furthermore, application techniques, available information in the environmental reports for specific industries, as well as other pathways of release (e.g., water), have been considered when developing the country specific emission factors.

Table A3-3. Country specific emission factors for SNAP codes in NFR 2D3a "Domestic solvent use including fungicides". Emission factor references given at the end of Annex 3.1. All emissions factors constant throughout the timeseries.

Year	060408ei	060408eii	060408fi	060408fii	060408gi	060408gii	060408hi	060408hii	060408i	060411
1995	0.95[1]	0.275[2]	0.95[1]	0.275[2]	0.95[1]	0.275[2]	0.95[1]	0.275[2]	0.95[1]	0.95[1]
2000	0.95[1]	0.275[2]	0.95[1]	0.275[2]	0.95[1]	0.275[2]	0.95[1]	0.275[2]	0.95[1]	0.95[1]
2010	0.95[1]	0.275[2]	0.95[1]	0.275[2]	0.95[1]	0.275[2]	0.95[1]	0.275[2]	0.95[1]	0.95[1]
2015-2024	0.95[1]	0.275[2]	0.95[1]	0.275[2]	0.95[1]	0.275[2]	0.95[1]	0.275[2]	0.95[1]	0.95[1]

[112] Kindbom et. al., 2004

Table A3-4. Country specific emission factors for SNAP codes in NFR 2D3d "Coating applications". Emission factor references given at the end of Annex 3.1. EFs in italic are interpolated.

Year	060101	060102	060103	060104	060105	060106	060107	060108	060109
1995	0.95[1]	0.95[1]	0.95[1]	0.95[1]	0.25[4]	0.84[3]	0.29[1]	0.95[1]	0.95[1]
2000	0.79	0.79	0.95[1]	0.95[1]	0.25[4]	0.84[3]	0.17[3]	*0.83*	0.95[1]
2010	0.54	0.54	0.95[1]	0.95[1]	0.25[4]	0.84[3]	0.17[3]	*0.59*	0.95[1]
2015-2024	0.45[3]	0.45[3]	0.95[1]	0.95[1]	0.25[4]	0.84[3]	0.17[3]	0.50[3]	0.95[1]

Table A3-5. Country specific emission factors for SNAP codes in NFR 2D3e "Degreasing", NFR 2D3f "Dry cleaning" and NFR 2D3h "Printing". Emission factor references given at the end of Annex 3.1. EFs in italic are interpolated.

Year	060201	060203	060204	060202	060403
1995	0.61[5]	0.61[5]	0.61[5]	0.30[6]	0.65[1]
2000	0.47[5]	0.47[5]	0.47[5]	0.30[6]	0.59
2015-2024	0.19[5]	0.19[5]	0.19[5]	0.30[6]	0.30[3]

Table A3-6. Country specific emission factors for SNAP codes in NFR 2D3g "Chemical products". Emission factor references given at the end of Annex 3.1. EFs in italic are interpolated.

Year	060305	060307	060308	060309	060311	060312	060313	060314
1995	0.30[1]	0.004[1]	0.004[1]	0.004[1]	0.004[1]	0.03[3]	0.010[1]	0.50[1]
2000	0.27[1]	0.003[3]	0.003[3]	0.003[3]	0.003[3]	0.03[3]	0.008[1]	0.29[1]
2010	0.25[1]	0.003[3]	0.003[3]	0.003[3]	0.003[3]	0.03[3]	0.003[3]	0.20[1]
2015-2024	0.25[1]	0.003[3]	0.003[3]	0.003[3]	0.003[3]	0.03[3]	0.002[3]	0.20[1]

Table A3-7. Country specific emission factors for SNAP codes in NFR 2D3i "Other solvent and product use". Emission factor references given at the end of Annex 3.1. EFs in italic are interpolated.'

Year	060405	060406	060407	060409	060412i	060412ii
1995	0.56[7]	0.64[1]	0.95[1]	0.95[1]	0.95[1]	0.275[2]
2000	0.56[7]	*0.59*	0.95[1]	0.95[1]	0.95[1]	0.275[2]
2010	0.56[7]	*0.33*	0.95[1]	0.95[1]	0.95[1]	0.275[2]
2015-2024	0.56[7]	0.22[3]	0.95[1]	0.95[1]	0.95[1]	0.275[2]

[1] Skårman, T., Danielsson, H., Henningsson, E., Östman, M. 2006. Revised Method for Estimating Emissions of NMVOC from Solvent and Other Product Use in Sweden. SMED Report no 75

[2] EMEP/EEA air pollutant emission inventory guidebook - 2019. 2.D.3.a Domestic solvent use including fungicides.

[3] Environmental reports

[4] EMEP/EEA air pollutant emission inventory guidebook - 2019. 2.D.3.d Coating applications. Table 3-20.

[5] EMEP/EEA air pollutant emission inventory guidebook - 2019. 2.D.3.e Degreasing. Table 3-4. Abatement efficiency from the GAINS model.

[6] EMEP/EEA air pollutant emission inventory guidebook - 2019. 2.D.3.f Dry cleaning. Table 3-3.

[7] EMEP/EEA air pollutant emission inventory guidebook - 2019. 2.D.3.i, 2.G Other solvent and product use. Table 3-11.

Annex 3.2. Size distribution for PM_{10} and $PM_{2.5}$ as fraction of TSP

Table A3-8. Size distribution for PM_{10} and $PM_{2.5}$ as fraction of TSP.

NFR code	Fraction of TSP	
	PM_{10}	$PM_{2.5}$
2A1 - Cement production	0.90	0.80
2A2 - Lime production (Carbide production)	0.90	0.80
2A2 - Lime production (Lime production plants)	0.90	0.80
2A2 - Lime production (Sugar industry)	0.90	0.80
2A2 - Lime production (Pulp and paper industry)	IE*	IE*
2A3 - Glass wool production	0.90	0.70
2A3 – Other glass production	0.90	0.80
2A5a - Quarrying and mining of minerals other than coal	0.50	0.07
2A5b - Construction and demolition	0.30	0.03
2A5c - Storage, handling and transport of mineral products	IE**	IE**
2A6 - Mineral wool production	0.90	0.70
2B10a – Other organic chemical production***	1	1
2B10a - Other inorganic chemical production***	0.90	0.80
2B10a - Other inorganic chemical production***	0.38	0.02
2B10a - Other inorganic chemical production***	Based on production of phos-phate fertilizers	
2C1 - Iron and steel production (secondary)	0.80	0.70
2C1 - Iron and steel production (primary)	Based on data from producers	
2C1 - Iron and steel production (iron sponge)	0.60	0.47
2C1 - Iron ore mining, dressing and concentration	0.50	0.07
2C1 - Iron ore pellets production	1.00	1.00
2C2 - Ferroalloy production	1.00	0.71
2C3 - Aluminium production	0.95	0.43
2C7c - Other metal production	0.95	0.80
2D3b - Road paving with asphalt	0.18	0.03
2D3c - Asphalt Roofing	0.90	0.85
2G - Other product use (fireworks)	0.91	0.47
2G - Other product use (tobacco smoking)	1.00	1.00
2H1 - Pulp and paper	0.95	0.75

*= Included in 2H1
**= included in respective source category
***= different EFs for different types of production

4 Annex 4: Environmental reports in Sweden

In Sweden, approximately 6,000 “environmental hazardous activities” must have a permit to operate. Such activities are conducted on a real estate and result or may result in discharges or other disturbances to the environment, e.g. water and air pollution or noise. The number includes activities regulated in EC-directives, e.g. under the Industrial Emissions Directive (IED)[113] and Seveso directive[114].

According to chapter 9 of the Environmental Code (SFS 1998:808)[115] permits must be obtained for the establishment, operation and in some cases modification of environmentally hazardous activities on a certain scale. The structures and operations for which permits must be obtained are covered by two ordinances:

- Ordinance on Environmental Assessment (SFS 2013:251)[116]
- Ordinance on Environmentally Hazardous Activities and the Protection of Public Health (SFS 1998:899)[117]

For permitting procedures the Code divides competence between the regional administrations and the Environmental Courts. Permits are granted by the Environmental Courts and the Environmental Permitting Committees (EPC). The EPC is a special function at the County Administrative Board (CAB). There are 21 EPCs, one in each county, and five Environmental Courts. The allocation of licensing tasks between the EPCs and the Courts is regulated in the Ordinance on Environmental Assessment. For activities that entail a significant environmental impact (classed as A-activities in the list and totalling less than 400), the proponent must apply for a permit to the Court. For activities with less impact on the environment (classed as B-activities in the list and totally around 5,500) the proponent must apply for a permit to the CAB.

Rules on the operator's responsibility for self-monitoring and environmental reports are given in chapter 26 of the Environmental Code. All operations regulated by permit must return an annual environmental report. All activities and measures that require permission or notification are subject to the Ordinance on Operators’ self-monitoring (SFS 1998:901)[118]. The requirements concerning environmental reports

[113] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

[114] Directive 2003/105/EC of the European Parliament and of the Council of 16 December 2003 amending Council Directive 96/82/EC on the control of major-accident hazards involving dangerous substances.

[115] SFS 1998:808. Miljöbalken

[116] SFS 2013:251, Miljöprövningsförordning

[117] SFS 1998:899, Förordning om miljöfarlig verksamhet och hälsoskydd

[118] SFS 1998:901, Förordning om verksamhetsutövares egenkontrol

are given in the regulation on environmental reports (NFS 2016:8)[119] issued by the Swedish Environmental Protection Agency (Swedish EPA). The environmental report consists of three parts:

- Administrative information about the facility.
- Text section (for example, a description of the facility and the processes, the use of energy, chemicals and raw materials, emissions and conditions in the permit).
- Emission declaration (for example, production data, fuel consumption data, emission data and, information on how emission data have been determined i.e. measured, calculated or estimated).

The data in the environmental reports often originates from measurements or mass balances. The use of default emission factors is limited.

All environmental reports have to be submitted electronically via the Swedish Portal for Environmental Reporting (SMP)[120].

The environmental reporting system is essential to the credibility of the self-monitoring. The authority checks the operator performance, asks for additional measures and monitoring. The operator is obliged to keep himself informed about the activity's impact on the environment. This is done by initiating studies and measurements, or by other means. The operator should also have routines for responding to new knowledge and new information, e.g. by taking appropriate countermeasures.

4.1 References

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control). https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:334:0017:0119:en:PDF 2021-12-02

Directive 2003/105/EC of the European Parliament and of the Council of 16 December 2003 amending Council Directive 96/82/EC on the control of major-accident hazards involving dangerous sub-stances. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32003L0105&from=EN 2021-12-02

NFS 2016:8. Naturvårdsverkets föreskrifter om miljörapport för tillståndspliktiga miljöfarliga verksamheter. https://www.naturvardsverket.se/lagar-och-regler/foreskrifter-och-allmanna-rad/2016/nfs-20168/ 2021-12-02

[119] NFS 2016:8, Naturvårdsverkets föreskrifter om miljörapport https://www.naturvardsverket.se/Documents/foreskrifter/nfs2016/nfs-2016-8.pdf 2019-01-30

[120] Svenska Miljörapporteringsportalen. https://smp.lansstyrelsen.se

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Swedish Portal for Environmental Reporting, Svenska Miljörapporteringsportalen. https://smp.lansstyrelsen.se// 2013-10-16

5 Annex 5: Units and Abbreviations

t	1 (metric) tonne = 1 megagram (Mg) = 10^6 g
g	1 gram
Mg	1 megagram = 10^6 g = 1 tonne
Gg	1 gigagram = 10^9 g = 1 kilotonne (kt)
Tg	1 teragram = 10^{12} g = 1 megatonne (Mt)
TJ	1 terajoule
ARTEMIS	Assessment and Reliability of Transport Emission Models and Inventory Systems
EMIR	Emission database of the County Administrative Boards
CEPMEIP	Coordinated European Programme on Particulate Matter Emission Inventories. Projections and Guidance
CLRTAP	Convention on Long-Range Transboundary Air Pollution
CO	Carbon monoxide
COP	Conference of the Parties
CORINAIR	CORe Inventory of AIR emissions. EMEP/CORINAIR Emission Inventory Guidebook - 3rd edition
CTMP	Chemo Thermo Mechanical Pulp
CV	Calorific value
EC	European Community
EC	Environmental Class
EEA	European Environment Agency
EF	Emission Factor
EU	European Union
EMV	Emission Model for Road Traffic
EMEP	Co-operative Programme for Monitoring and Evaluation of Long-Range Transmission of Air pollutants in Europe
FAME	Fatty Acid Methyl Ester (earlier called RME)
FMV	Swedish Defence Material Administration
FOI	Swedish Defence Research Agency
FORTV	Swedish Fortification Department
FRA	National Defence Radio Institute
GHG	Greenhouse gases
Good Practice Guidance	Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories IPCC-NGGIP
HARP	Hasselrot's Reviewed Pollutions
HBEFA	The Handbook Emission Factors for Road Transport
HELCOM	The Helsinki Commission
ICAO	International Civil Aviation Organization
IE	Included Elsewhere'
IEF	Implied emission Factor
IIR	Informative Inventory Report
Industrial statistics	Industrial energy statistics
IPCC	Intergovernmental Panel on Climate Change
IVL	Swedish Environmental Research Institute Ltd
ISEN	Energy use in manufacturing industry
JTI	Swedish Institute of Agricultural and Environmental Engineering

Jernkontoret	Swedish Steel Producers' Association
KEMI	Swedish Chemicals Inspectorate
LD-gas	Steel converter gas
LPG	Liquefied Petroleum Gas
LTO	Landing and Take-Off
MSW	Municipal solid waste
MTC	Motor Test Center
NA	Not Applicable
NACE	Pan-European classification system grouping organisations according to their business activities
NASN	National Administration of Shipping and Navigation
NBF	National Board of Forestry
NE	Not Estimated
NFR	Nomenclature for Reporting
NH_3	Ammonia
NMVOC	Non methane volatile organic compounds
NO	Not Occurring
NO_X	Nitrogen oxides
O3	Ozone
PAH	Polycyclic Aromatic Hydrocarbons
PAH-4	Polycyclic Aromatic Hydrocarbons (4 species as defined in the Reporting Guidelines)
PIANO	Project Interactive Analysis and Optimization
PM_{10}	Particulate matter less than 10 micrometers
$PM_{2.5}$	Particulate matter less than 2.5 micrometers
QA/QC	Quality assurance and Quality control
Quarterly fuel statistics	Quarterly fuel statistics
RME	Rapeseed Methyl Ester fuel
RVF	Swedish Association of Waste Management
SCAA	Swedish Civil Aviation Authority
SJV	Swedish Board of Agriculture
SGU	Geological Survey of Sweden
SLU	Swedish University of Agricultural Sciences
SMED	Swedish Environmental Emissions Data
SMHI	Swedish Meteorological and Hydrological Institute
SNRA	Swedish National Road Administration
SO_2	Sulphur dioxide
SPI	Swedish Petroleum Institute
SVEFF	Swedish Paint and Print Ink Makers Association
Swedish EPA	Swedish Environmental Protection Agency
TEQ	Toxic Equivalents. Used to report the toxicity-weighted masses of dioxins and furans
TIM	Times in Mode
TMP	Thermo Mechanical Pulp
TNO	The Netherlands Organisation for Applied Scientific Research
TSP	Total suspended particulate matter
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USEPA	United States Environmental Protection Agency
VETO	Mechanistic model for simulations on road traffic
VTI	Swedish Road- and Transport Research Institute