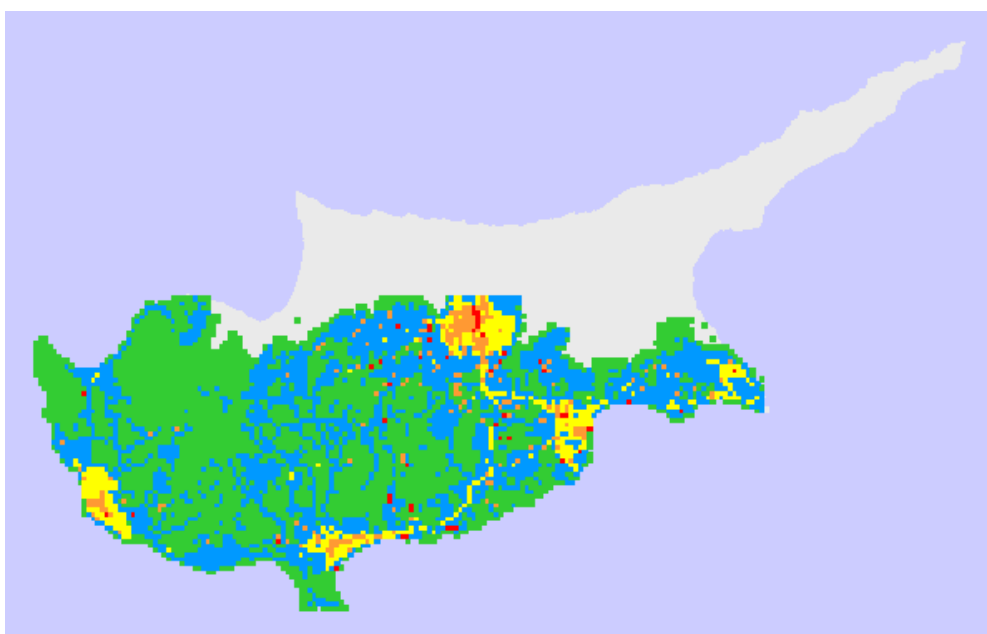




Ministry of Labour, Welfare and Social Insurance
Department of Labour Inspection

Cyprus Informative Inventory
Report for 2019



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1. List of Abbreviations

BC	- Black Carbon
CCGT	- Combined Cycle Gas Turbine
CDR	- Central Data Repository
CERA	- Cyprus Energy Regulatory Authority
CLRTAP	- Convention on Long-range Transboundary Air Pollution
CO	- Carbon Monoxide
COPERT	- Computer Programme to Calculate Emissions from Road Transport
DLI	- Department of Labour Inspection
EAC	- Electricity Authority of Cyprus
EEA	- European Environment Agency
EIONET	- European Environment Information and Observation Network
EMEP	- Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
E-PRTR	- European Pollutant Release and Transfer Registry
ERT	- Expert Review Team
ETC/ACC	- European Topic Centre on Air and Climate Change
FAO	- Food and Agriculture Organisation of the United Nations
GIS	- Geographical Information System
HCB	- Hexachlorobenzene
ICE	- Internal Combustion Engine
IE	- Included Elsewhere
IIR	- Informative Inventory Report
I -Teq	- International Toxic Equivalent
LPSs	- Large Point Source Plants
LRTAP	- Long-range Transboundary Air Pollution
LTO	- Land, Take Off
NA	- Not Applicable
NE	- Not Estimated
NEC	- National Emission Ceilings
NECD	- National Emission Ceilings Directive (Directive (EU) - 2016/2284)
NEI	- National Emission Inventory
NFR	- Nomenclature for Reporting
NH ₃	- Ammonia
NMVOC	- Non Methane Volatile Organic Compounds
NO	- Not Occurring
NO _x	- Nitrogen Oxides
NR	- Not Relevant
MARDE	- Ministry of Agriculture, Rural Development and Environment
MLWSI	- Ministry of Labour, Welfare and Social Insurance
PAHs	- Polycyclic Aromatic Hydrocarbons
PCBs	- Poly Chlorinated Biphenyls
PCDD/F	- Polychlorinated DibenzoDioxin and dibenzoFuran
PM	- Particulate Matter
PM ₁₀	- Particulate matter with aerodynamic diameter less than 10 micrometres

PM _{2.5}	- Particulate matter with aerodynamic diameter less than 2.5 micrometres
PS	- Power Station
POPs	- Persistent Organic Pollutants
RES	- Renewable Energy Sources
SO _x	- Sulphur Oxides
TFEIP	- Task Force on Emission Inventories and Projections
TERT	- Technical Emission Review Team
TSP	- Total Suspended Particulates
QA/QC	- Quality Assurance/Quality Control
UNECE	- United Nations Economic Commission for Europe
UNFCCC	- United Nations Framework Convention on Climate Change

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4. Executive summary

This report, constituting the Cyprus Informative Inventory Report (IIR), contains information on the inventories of Cyprus up to 2019. It includes descriptions of methods and data sources. Similar reports were submitted annually to the Convention's Secretariat the period 2010 - 2018 [1- 9]. In addition, these reports were uploaded in the CDR (<http://cdr.eionet.europa.eu>).

One of the main difference in this year inventory is the fact that for the preparation of the 2019 National Emission Inventory, the relevant emission factors from EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019 (Corinair Guidebook) [10] were used. Please also note that National Emission Inventories recalculations were made for the years 1990 to 2018 and re-submitted since the new emission factors of the new Emission Inventory Guidebook 2019 and the last version of NFR template (NFR19) were used for the whole time series.

Other differences, or better to say inventory improvements, are that for the calculations of the 3B, 3Da2a,3Da3 and 5B2 categories we used the relevant EMEP tool of 2019 Guidebook, for the categories 1A4bi, 3Da2c, 3Df, 1A3d and 3Da1 we used the TERT suggested methods / excel tools.

A major improvement that is needed is referred to category 3Da2a (Solvents). Even though this category is a key source for Cyprus we are still using Tier 1. This year we made a lot of effort to find relevant analytical data but unfortunately we could not manage to find a complete series of these data. We expect that in the next few years, we will succeed.

Last year, we made a lot of effort to eliminate any differences in reported national totals for the entire territory with NECD and UNFCCC reports. We expect that this problem was solved. In case, there are still any differences, they will be corrected with the next's year submission.

Key information on the activities required to prepare the inventory are the:

- National energy balance,
- national statistics publications,
- annual reports of industrial installations,
- national database for road vehicles and
- the E-PRTR national database.

A key category analysis level assessment was carried out for the time series 1990-2018 showing the relevant key sources of air pollution in Cyprus. In addition, a key category analysis trend assessment is carried out for the year 2019 showing categories whose trend is different from the trend of the overall inventory.

Finally, the 2021 submission for the inventory of 2019 includes an uncertainty analysis of the Cyprus emission inventory.

5 Introduction

The United Nations, Economic Commission for Europe (UNECE), adopted in 1979 the Convention on Long-range Transboundary Air Pollution (LRTAP Convention). The LRTAP Convention entered into force in 1983 and has been extended by eight specific Protocols. Cyprus ratified the Convention on 20.11.1991. The Cyprus status of ratification to the Protocols is shown in Table 1.

Table 1: Protocols to the UNECE Convention on Long-range Transboundary Air Pollution.

Year	Protocols	Cyprus status of Ratification
1984	Geneva Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP)	20.11.1991 (Ac)
1985	Helsinki Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 percent (%)	Not ratified
1988	Sofia Protocol concerning the Control of Nitrogen Oxides or their Transboundary Fluxes	2.9.2004 (Ac)
1991	Geneva Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes	Not ratified
1994	Oslo Protocol on Further Reduction of Sulphur Emissions	26.4.2006 (Ac)
1998	Aarhus Protocol on Heavy Metals and its 2012 amended version	24.6.1998 (Signed) 2.9.2004 (R)
1998	Aarhus Protocol on Persistent Organic Pollutants	24.6.1998 (Signed) 2.9.2004
1998	Aarhus Protocol on persistent Organic Pollutants and its 2009 amendments to the Text and to Annexes I, II, III, IV, VI and VIII to the 1998 Protocol on Persistent Organic Pollutants	5.3.2013 (R)
1998	Aarhus Protocol on Persistent Organic Pollutants and its amendments 2009 to Annexes I and II to the 1998 Protocol on Persistent Organic Pollutants	11.9.2017 (A)
1999	Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone	11.4.2007 (Ac)
1999	Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone - 2012 amended version	13.3.2019 (A)

Reporting emissions data to the Executive Body of the LRTAP Convention is required to fulfill the obligations of the parties in compliance with the implementation of Protocols under the Convention.

This report has been prepared by the Department of Labour Inspection (DLI) of the Ministry of Labour, Welfare and Social Insurance (MLWSI) on behalf of the Republic of Cyprus, as required by the new NECD Directive [21], the LRTAP Convention and the relevant Protocols.

5.1 National Inventory Background

In Cyprus a national database is used by the DLI to monitor pollutants within the framework of the National Emission Ceilings Directive (NECD) and the LRTAP Convention.

Emission estimates are based mainly on official statistics, e.g. energy, agricultural and industrial statistics, environmental reports of operators of industrial installations and emission factors either from the Corinair Guidebook (mainly) or from studies conducted in Cyprus (rarely).

Cyprus applies the "Guidelines for Reporting Emission Data under the Convention on Long-range Transboundary Air Pollution" [13] for reporting to the UNECE LRTAP Convention and the "EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019" [10].

The methodology followed for the preparation of the 2019 National Emission Inventory is the top-down approach **based on fuel used** in each main sector. In some cases, sectors are reported as Included Elsewhere (IE) due to the fact that the amount of fuel used in these sectors is unknown and therefore the emissions of these sectors are included in other NFR sectors. Additionally, for the "Public Electricity and heat production" sector, actual emission pollutants measurements from the power plant stacks are used.

In the 2021 (for 2019) there were two emission inventory submissions. One for the UNECE LRTAP Convention and one to EEA under the NECD obligations. There are no any differences between the two submissions since they are the same reports. Last year, we made a lot of effort to eliminate any differences in reported national totals for the entire territory with NECD and UNFCCC reports. We assume that this problem was solved. In case, there are still any differences, they will be corrected with the next's year submission. Please also note that the UNFCCC report is generated by another Department (Department of Environment of the Ministry of Agriculture, Rural Development and Environment).

5.2 Institutional Arrangements

The Department of Labour Inspection (DLI) of the Ministry of Labour, Welfare and Social Insurance (MLWSI) of Cyprus is the Competent Authority for the control of atmospheric pollution and for the safeguarding of air quality in Cyprus.

The DLI has the overall responsibility for the preparation of the emission inventory and submissions to European Commission and LRTAP Convention secretariat, through its specialized section the «Air Quality Section».

The Emission Inventory is produced on an annual basis and various Government Departments contribute to that by submitting activity data. DLI collects data from:

- The Statistical Service,
- the Department of Agriculture,
- the EUROCONTROL,
- the Water Development Department,
- the Port Authority of Cyprus,
- the Department of Road Transport and
- the Energy Service.

5.3 Inventory Preparation Process

For the collection of data, a checklist is used by the inventory officers to contact, either by telephone or in writing (mainly), with the relevant officers from other authorities to collect the activity data. The emission data collected are stored in a database managed by the DLI.

In addition, the emission officers review methods and emission factors and suggest changes. After each review process, it is decided whether the suggestions are to be applied.

Every year, after the collection of activity data, a draft inventory is prepared, reviewed and finalized.

In 2010, a project titled “**Development of an emission inventory including formation of a database for atmospheric pollutant emissions and software for simulation and forecast of air quality in Cyprus**” was implemented, by the DLI. Within this project, a new software tool is established for the inventory preparation.

The general objectives of the project were the:

- Collection of activity data from all emission-generating sources.
- Development of an emission database based on methodology of the EMEP/EEA Emission Inventory Guidebook.
- Development of a GIS application for the presentation of activity data and emissions on digital maps.
- Development of a web-based application for the evaluation and management of air quality.

In **Figure 1**, the software flowchart of the project is presented. In **Figure 2 - 8**, digital maps present the 1km*1km total annual emission distributions (year 2015) of different pollutants.

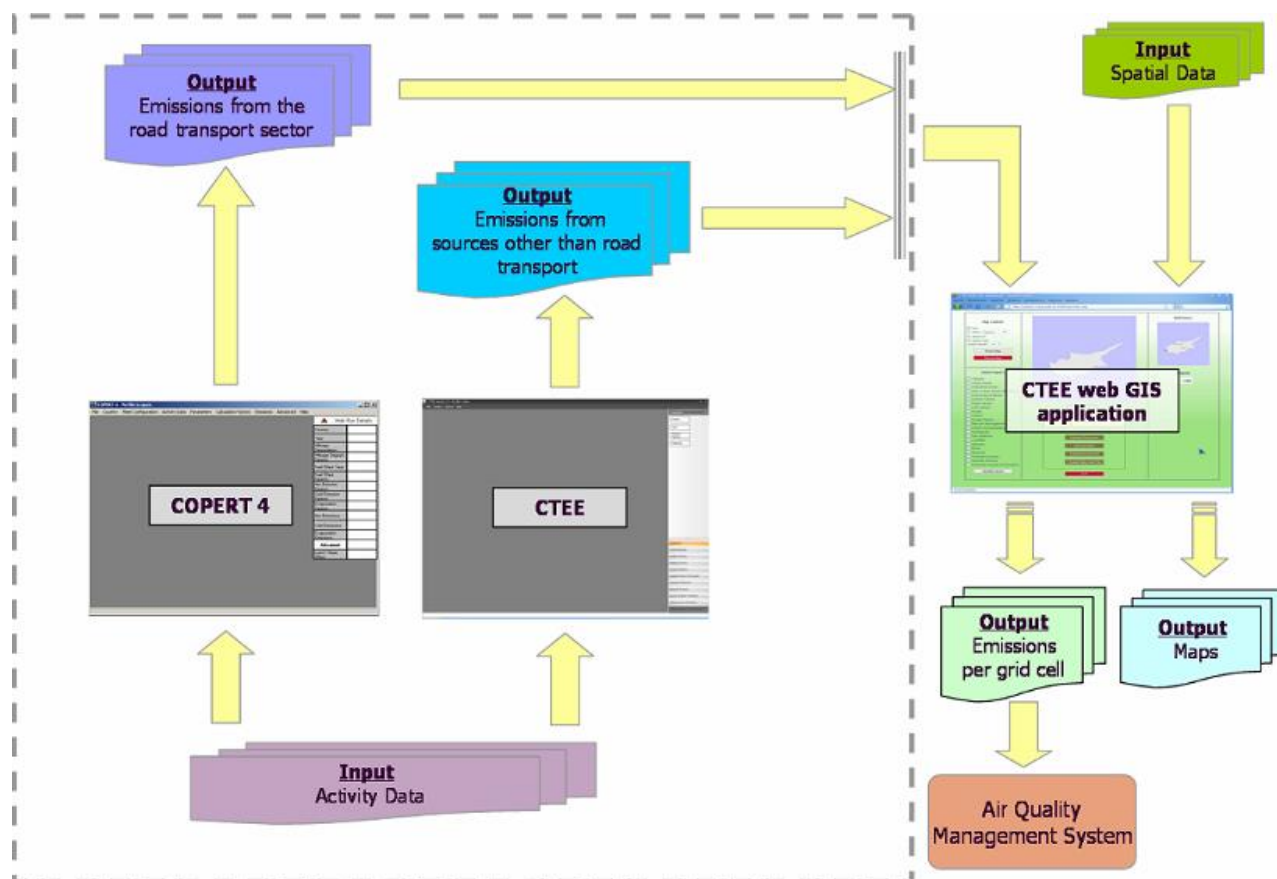


Figure 1: Project Software Flowchart

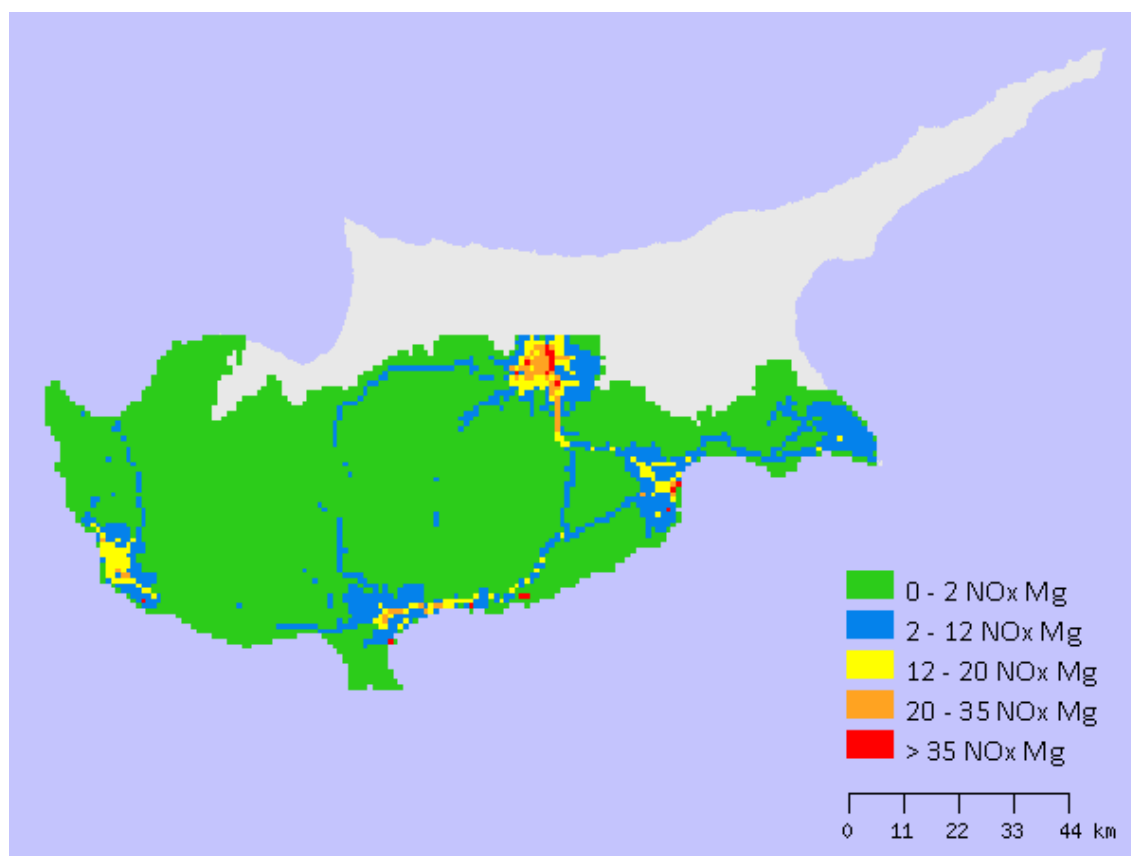


Figure 2: Geographical Distribution of 2015 NO_x emissions.

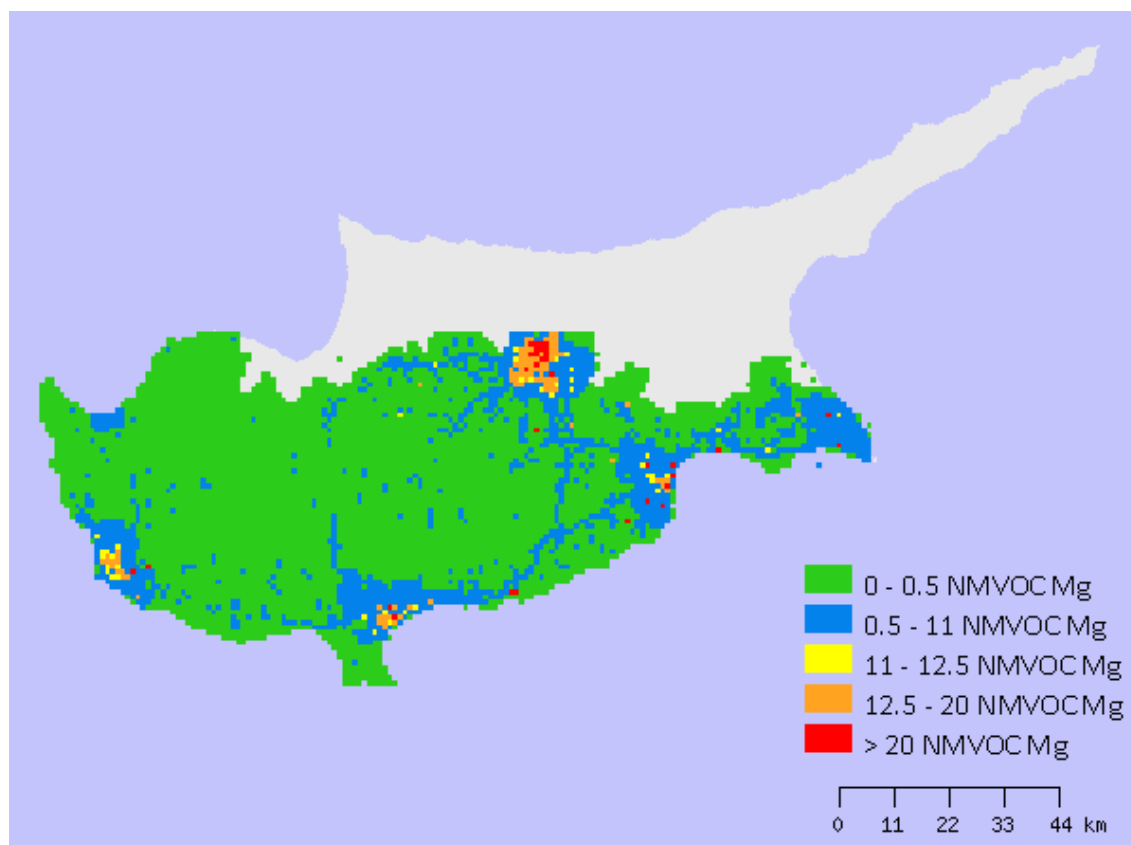


Figure 3: Geographical Distribution of 2015 NMVOC emissions.

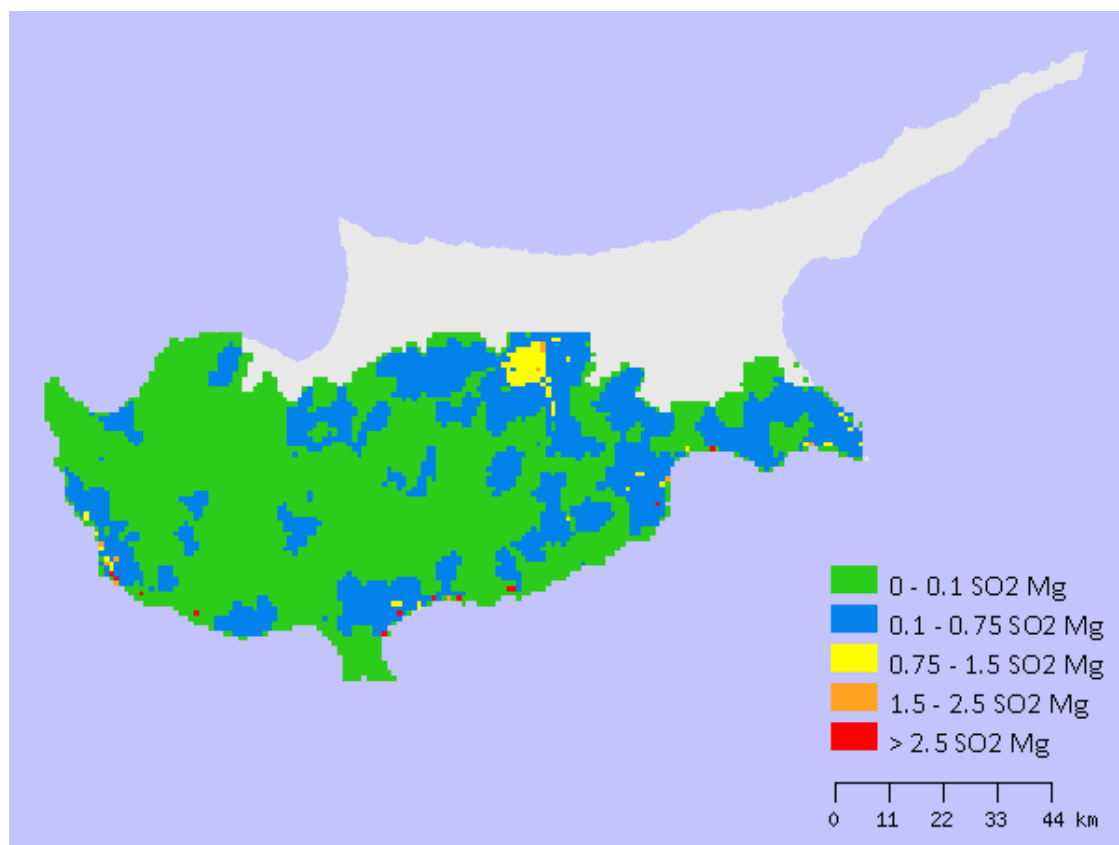


Figure 4: Geographical Distribution of 2015 SO_x emissions.

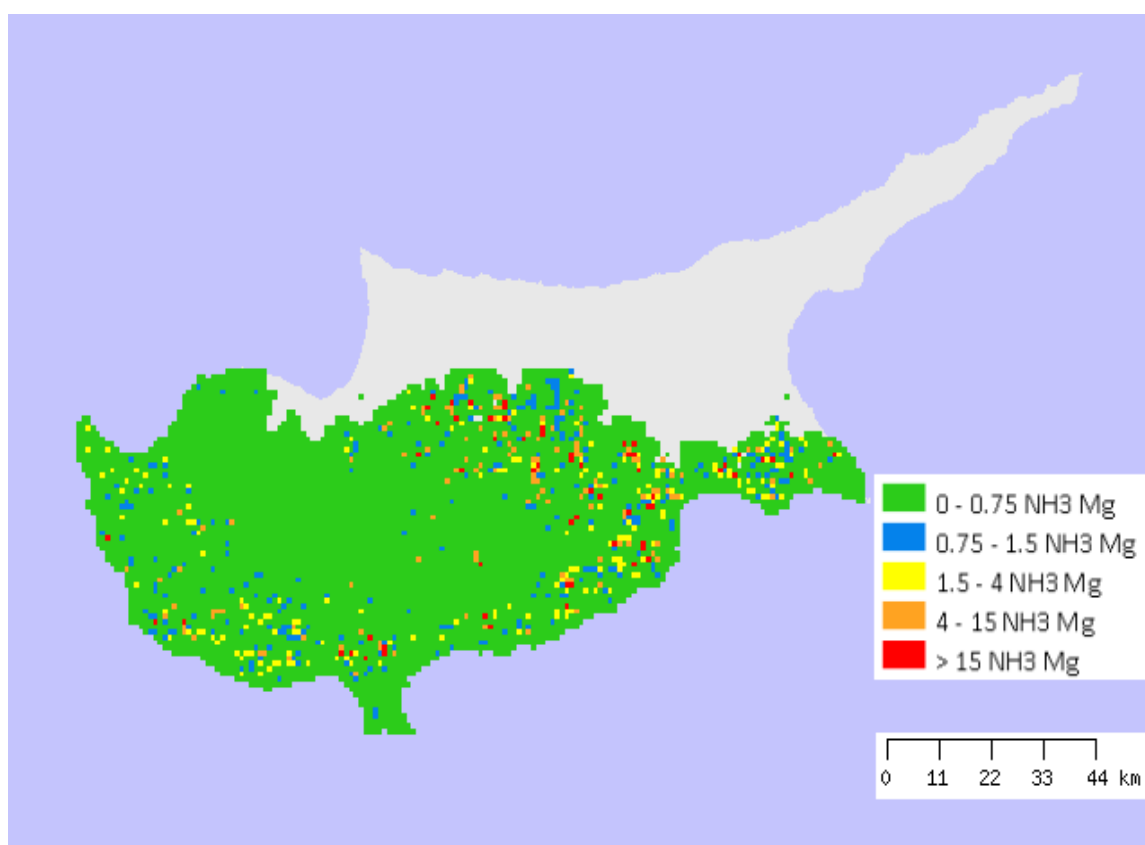


Figure 5: Geographical Distribution of 2015 NH₃ emissions.

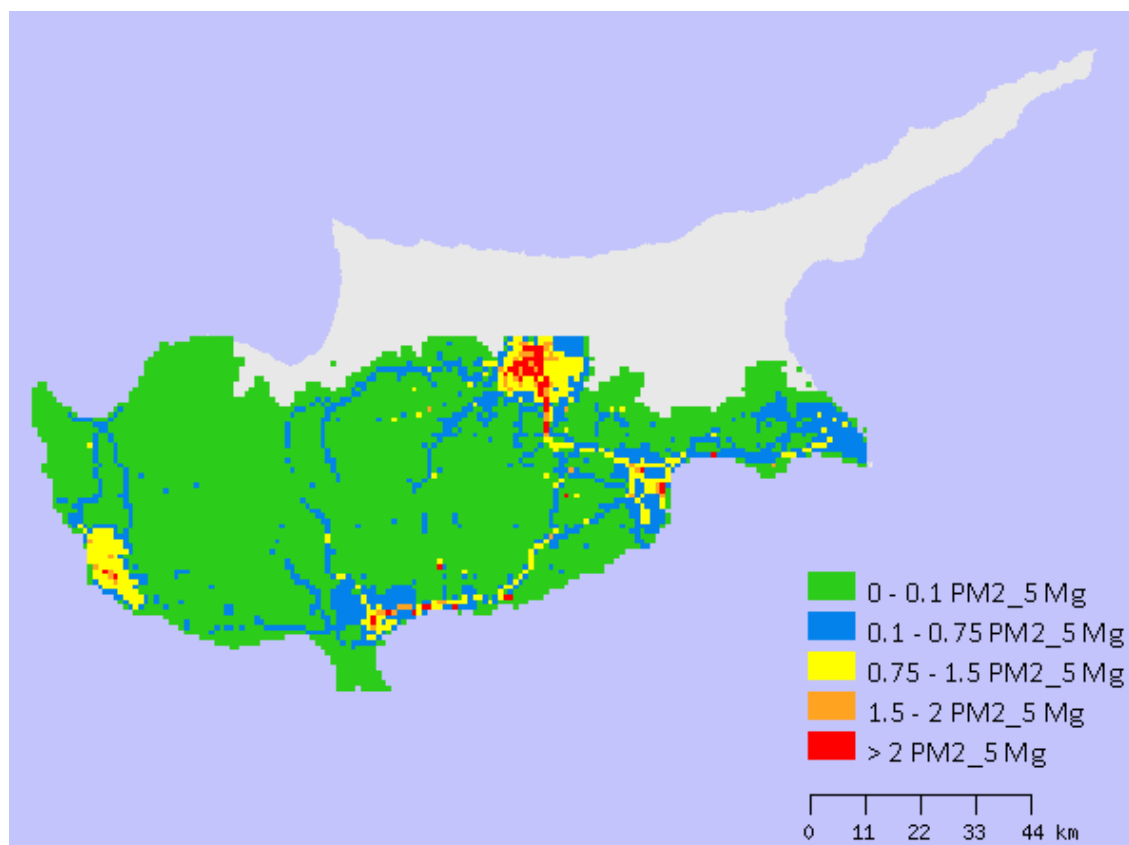


Figure 6: Geographical Distribution of 2015 PM_{2.5} emissions.

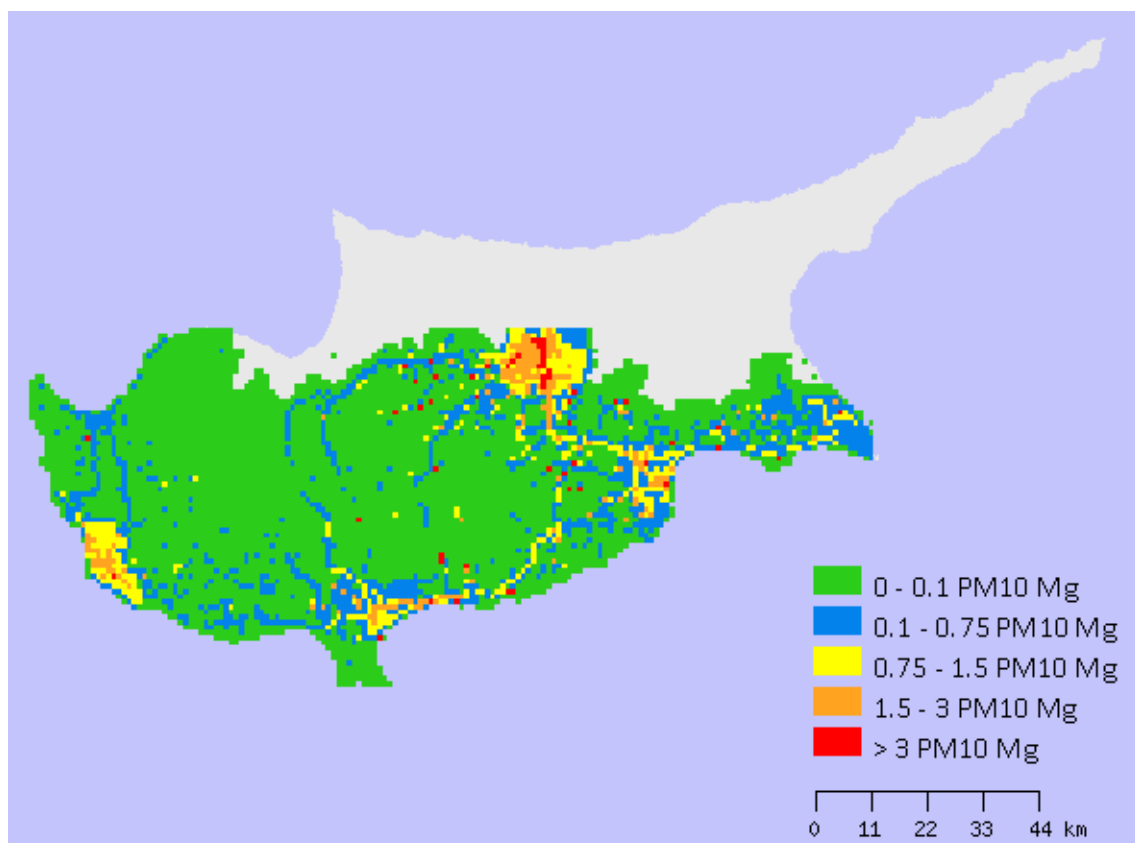


Figure 7: Geographical Distribution of 2015 PM₁₀ emissions.

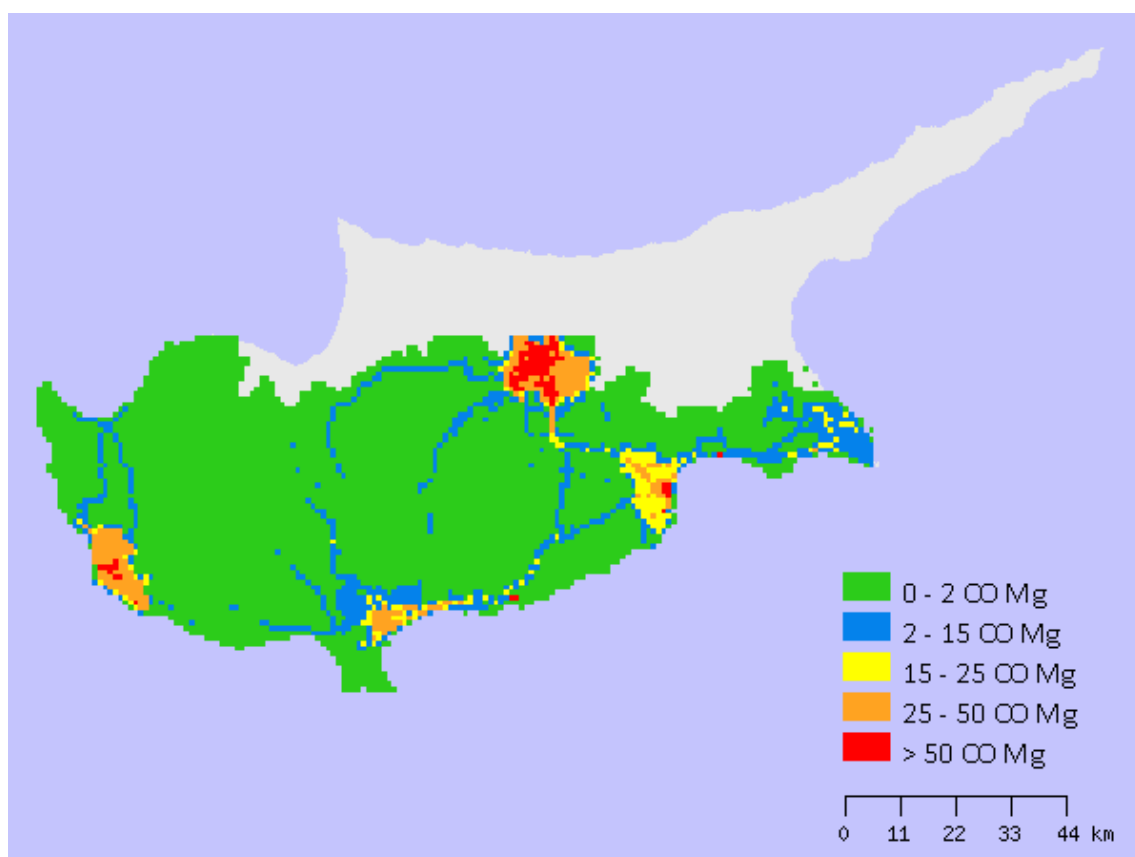


Figure 8: Geographical Distribution of 2015 CO emissions.

5.4 Methods and Data Sources

The methodology described in the EMEP/EEA Emission Inventory Guidebook 2019 [10] was used for the estimation of the emissions. The bulk of the emission inventory is compiled by collecting activity data and appropriate emission factors according to the following equation:

$$Emission_{pollutant} = \sum Activity Rate_{activity} * Emission factor_{activity, pollutant}$$

The activity data used are mainly statistical data provided by the Statistical Service (Ministry of Finance) as well as by other Ministries and governmental authorities. Data are also provided directly by industrial installations through their reporting obligations specified in their air emission permits.

As a general comment, we would like to inform you that for the preparation of the Cyprus emission inventory the Tier 2 methodology was used for almost the key source sectors and the Tier 1 for non-key source sectors. Apart from these, COPERT 5 tool was used (Tier 3) for the estimation of emissions from the transport sector. Please also note that for the A_PublicPower sector for the pollutants NO_x, CO and particulates, Tier 3 method was also used since 2008 when actual measurements on the stacks were used.

5.5 Summary of Notation Keys

Emission Inventory (Annex IV – Table 1) includes 26 pollutants and 127 NFR categories resulting to 3302 cells. In Cyprus's National Emission Inventory (NEI) for the year 2019, only 597 cells have values. All others are filled in with notation keys as follows:

Notation key	No of cells
IE	136
NO	1385
NA	725
NE	378
NR	0
Values	678
Total	3302

The process to reduce to the activities with notation keys “NE” is ongoing effort.

5.6 Key Categories

For the identification of the key categories, Approach 1, described in the «Key Category Analysis and Methodological Choice» of the EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019

[10], was used. With this approach the influence of various categories of sources on the level of the national inventory was identified.

1.1.1 Level Assessment

The contribution of each source category to the total national inventory level is calculated according to the following equation:

$$\text{Key category level assessment} = \frac{\text{Source category estimate}}{\text{Total contribution}}$$

Key categories, according to the above equation, are those that when summed together in descending order of magnitude, add up to **80 percent** (80%) of the national total.

The results of the Approach 1 Level Assessment per pollutant for the year 2019 are shown in the following

Table 2-17 (Sorted from high to low and highlighted using the following color codes).

Color Codes:

A_PublicPower	Yellow
B_Industry	Light Green
C_OtherStationaryComb	Yellow
D_Fugitive	Pink
E_Solvents	Light Blue
F_RoadTransport	Red
H_Aviation	Blue

G_Shipping	Grey
I_Offroad	Orange
J_Waste	Orange
K_AgriLivestock	Light Green
L_AgriOther	Green
M_Other	Dark Blue

Table 2: Key Categories for NO_x.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	3905,57	27,81%	27,81%
1A3biii	Road transport: Heavy duty vehicles and buses	2609,11	18,58%	46,39%
1A3bii	Road transport: Light duty vehicles	1797,02	12,80%	59,19%
1A3bi	Road transport: Passenger cars	1241,44	8,84%	68,03%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	954,69	6,80%	74,83%
3Da2a	Animal manure applied to soils	691,91	4,93%	79,76%
1A3ai(i)	International aviation LTO (civil)	473,79	3,37%	83,13%

Table 3: Key Categories for NMVOC.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
2D3d	Coating applications	2297,19	24,58%	24,58%
1A3bv	Road transport: Gasoline evaporation	1173,46	12,56%	37,14%
2D3a	Domestic solvent use including fungicides	1065,60	11,40%	48,54%
2D3i	Other solvent use (please specify in the IIR)	813,22	8,70%	57,24%
3B1a	Manure management - Dairy cattle	655,52	7,01%	64,26%
1B2av	Distribution of oil products	429,26	4,59%	68,85%
1A3biv	Road transport: Mopeds & motorcycles	419,81	4,49%	73,34%
1A3bi	Road transport: Passenger cars	393,64	4,21%	77,56%
5A	Biological treatment of waste - Solid waste disposal on land	315,77	3,38%	80,94%

Table 4: Key Categories for SO_x.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	14194,49	89,90%	89,90%

Table 5: Key Categories for NH₃.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3Da2a	Animal manure applied to soils	3040,57	44,57%	44,57%
3B3	Manure management - Swine	1340,93	19,66%	64,23%
3B1a	Manure management - Dairy cattle	703,20	10,31%	74,54%
3B1b	Manure management - Non-dairy cattle	418,24	6,13%	80,67%
3Da1	Inorganic N-fertilizers (includes also urea application)	358,20	5,25%	85,92%

Table 6: Key Categories for PM_{2.5}.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	237,93	22,28%	22,28%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	127,72	11,96%	34,24%
1A3bvi	Road transport: Automobile tyre and brake wear	98,35	9,21%	43,45%
1A3bii	Road transport: Light duty vehicles	83,70	7,84%	51,29%
1A3biii	Road transport: Heavy duty vehicles and buses	53,15	4,98%	56,27%
2A1	Cement production	52,03	4,87%	61,14%
1A3bvii	Road transport: Automobile road abrasion	42,17	3,95%	65,09%
1A4bi	Residential: Stationary	41,72	3,91%	69,00%
2G	Other product use (please specify in the IIR)	33,05	3,10%	72,09%
2A5a	Quarrying and mining of minerals other than coal	31,02	2,90%	75,00%
1A3bi	Road transport: Passenger cars	29,79	2,79%	77,79%
3B3	Manure management - Swine	24,43	2,29%	80,08%

Table 7: Key Categories for PM₁₀.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	347,78	16,44%	16,44%
2A5a	Quarrying and mining of minerals other than coal	224,23	10,60%	27,05%
2A5b	Construction and demolition	222,38	10,51%	37,56%
1A3bvi	Road transport: Automobile tyre and brake wear	185,35	8,76%	46,32%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	130,43	6,17%	52,49%
3B3	Manure management - Swine	129,48	6,12%	58,61%
3B4gii	Manure management - Broilers	103,03	4,87%	63,49%
1A3bii	Road transport: Light duty vehicles	83,70	3,96%	67,44%
2A1	Cement production	83,20	3,93%	71,38%
1A3bvii	Road transport: Automobile road abrasion	78,10	3,69%	75,07%
1A4bi	Residential: Stationary	55,37	2,62%	77,69%
1A3biii	Road transport: Heavy duty vehicles and buses	53,15	2,51%	80,20%

Table 8: Key Categories for TSP.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
2A5b	Construction and demolition	749,88	21,29%	21,29%
1A1a	Public electricity and heat production	456,61	12,97%	34,26%
2A5a	Quarrying and mining of minerals other than coal	432,02	12,27%	46,53%
3B3	Manure management - Swine	290,63	8,25%	54,78%
1A3bvi	Road transport: Automobile tyre and brake wear	241,74	6,86%	61,65%
2D3c	Asphalt roofing	178,60	5,07%	66,72%
1A3bvii	Road transport: Automobile road abrasion	156,20	4,44%	71,15%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	130,12	3,70%	74,85%
3B4gii	Manure management - Broilers	103,03	2,93%	77,77%
2A5c	Storage, handling and transport of mineral products	92,06	2,61%	80,39%

Table 9: Key Categories for BC.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3bii	Road transport: Light duty vehicles	63,03	27,28%	27,28%
1A3biii	Road transport: Heavy duty vehicles and buses	34,51	14,94%	42,21%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	32,75	14,17%	56,39%
1A3bi	Road transport: Passenger cars	19,62	8,49%	64,88%
1A1a	Public electricity and heat production	12,70	5,50%	70,37%
1A4ci	Agriculture/Forestry/Fishing: Stationary	10,03	4,34%	74,72%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	9,83	4,26%	78,97%
1A3bvi	Road transport: Automobile tyre and brake wear	9,80	4,24%	83,21%

Table 10: Key Categories for CO.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3bi	Road transport: Passenger cars	4305,55	39,80%	39,80%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	2244,26	20,74%	60,54%
1A3biv	Road transport: Mopeds & motorcycles	1038,38	9,60%	70,14%
1A3bii	Road transport: Light duty vehicles	832,58	7,70%	77,83%
1A3biii	Road transport: Heavy duty vehicles and buses	631,58	5,84%	83,67%

Table 11: Key Categories for Pb.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3bvi	Road transport: Automobile tyre and brake wear	0,2612	64,81%	64,81%
1A1a	Public electricity and heat production	0,0929	23,05%	87,87%

Table 12: Key Categories for Cd.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	0,024	72,83%	72,83%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0,002	7,41%	80,24%

Table 13: Key Categories for Hg.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0,01475	52,09%	52,09%
1A1a	Public electricity and heat production	0,00752	26,58%	78,67%

Table 14: Key Categories for PCDD/F.

NFR Code	Longname	Emissions (g I-TEQ)	Level Assessment	Cumulative Total
5E	Other waste (please specify in IIR)	0,2242	39,12%	39,12%
1A1a	Public electricity and heat production	0,0884	15,42%	54,54%
1A3bi	Road transport: Passenger cars	0,0781	13,62%	68,16%
1A4bi	Residential: Stationary	0,0631	11,02%	79,18%
1A3bii	Road transport: Light duty vehicles	0,0595	10,38%	89,56%

Table 15: Key Categories for PAHs.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3F	Field burning of agricultural residues	0,00055	83,69%	83,69%

Table 16: Key Categories for HCB.

NFR Code	Longname	Emissions (Kg)	Level Assessment	Cumulative Total
3Df	Use of pesticides	0,0143	62,43%	62,43%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0,00690	30,22%	92,66%

Table 17: Key Categories for PCBs.

NFR Code	Longname	Emissions (Kg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0,03088	88,30%	88,30%

1.1.2 Trend Assessment

The purpose of the trend assessment is to identify categories that may not be large enough to be identified by the level assessment, but whose trend is significantly different from the trend of the overall inventory and should therefore receive particular attention,

The trend assessment for the year 2019 was calculated according to the following equation:

$$T_{x,2019} = \frac{E_{x,2019}}{\sum E_{2019}} \left(\frac{E_{x,2019} - E_{x,1990}}{E_{x,1990}} - \frac{\sum E_{2019} - \sum E_{1990}}{\sum E_{1990}} \right)$$

Whereas:	$T_{x,2019} =$	Trend assessment of source category x in 2019 as compared to the base year (1990),
	$E_{x,2019}$ and $E_{x,1990} =$	Values of estimates of source category x in year 2019 and 1990, respectively,
	$\sum E_{2019}$ and $\sum E_{1990} =$	Total inventory estimates in years 2019 and 1990, respectively,

Please note that for PM_{2.5}, PM₁₀, TSP and BC the base year is the year 2000.

The trend assessment identifies categories whose trend is different from the trend of the total inventory, regardless whether the category trend is increasing or decreasing, or is a sink or source. Categories whose trend diverges most from the total trend should be identified as key, when this difference is weighted by the level of emissions of the category in the base year.

The results of the approach 1 trend assessment per pollutant for the year 2019 are shown in **Annex 3**.

Concluding, the results of the establishment of key source analysis in Cyprus national emission inventory are presented in Annexes 1-3 as described below:

Annex 1: Key Category Analysis – Level Assessment 2019, concerning key category analysis (level assessment) per pollutant for the year 2019.

Annex 2: Key Category Analysis – Level Assessment 1990-2018, concerning key source categories (level assessment) for the whole time series 1990 -2018, per pollutant and per year.

Annex 3: Key Category Analysis – Trend Assessment 2019, concerning key source categories (trend assessment) per pollutant for the year 2019.

5.7 QA/QC and Verification Methods

The DLI is responsible for the Quality Assurance / Quality Control procedures which include the following steps:

- Preparation of a check list for checking the completeness of input data (data from large point sources, data from statistical service, activity data, emission factors etc.).
- Evaluation of the emission factors of previous year emissions estimations to determine if there is any reason to change them.
- Comparison of the value of input data with the previous years' value. If there are large deviations, the value is checked for any errors such as typing or unit errors. If necessary, the primary data providers are contacted for clarifications.

Data provided by the Statistical Service of Cyprus are characterized by independence, integrity and accountability. Hence, these data are not subjected to any checking.

A number of general quality control checks have been introduced as part of the annual work plan. The quality control checks aim at covering such issues as consistency, completeness and accuracy of the NFR data.

For the A_Public Power and B_Industry sectors, emission calculations are based mainly on annual environmental reports submitted by operators of industrial installations. The operators themselves are responsible for the data quality. The emission inventory experts are responsible for checking and approving the reported data, as part of the quality assurance procedure.

After the initial estimation of the emissions and the completion of the Informative Inventory Report carried out by the officers in charge, the Head of the Air Quality Section of the DLI conducts a review of the inventory estimates, methodology and emission factors used. The national emission inventory is finally approved by the Director of the DLI.

Furthermore, within the framework of the LRTAP Convention, the year 2008 began with a review and check in detail of each Party (so-called Stage 3 in depth reviews) in accordance with the model established under the UN Framework Convention on Climate Change (UNFCCC), Based on the long term plan scheduled, which was approved by the EMEP Steering Body in September 2009, Cyprus' inventory was reviewed for the first time in 2010, The second in depth review (stage 3) of Cyprus Inventory took place between 23-27 of June 2014 in Copenhagen by 2 expert review teams (ERTs), Some of the suggestions of the ERTs have already been implemented and the rest of them will be implemented as soon as DLI finds the necessary information / tools **[15]**.

In addition, due to the implementation of the new NECD, an in depth review of the Cyprus' emission inventory was taking place the last four years. Reports with recommendations / technical corrections were produced **[22] [23] [25] and [26]**.

5.8 General Uncertainty Evaluation

The uncertainties of the Cyprus emission inventory were evaluated for the first time in 2009. The uncertainty estimations are developed to be in accordance with the Tier 1 methodology described in the EMEP/EEA Guidebook 2019 [10].

Undertaking a quantitative estimate of emissions uncertainty requires a substantial amount of detailed data on the uncertainty of both activity data and emission factors. An uncertainty analysis has been used to determine the overall emissions uncertainty for a number of pollutants for 2019 data using as a base year the 1990 and the year 2000 for PM_{2.5}, PM₁₀, TSP and BC. The uncertainty assigned to the activity data and emission factor for each individual source is obtained from a combination of expert judgment and ranges of uncertainty obtained from the EMEP/EEA Emission Guidebook 2016 [11]. The results provide good indication which sources are contributing the most to the overall uncertainty and therefore where improvement effort should be targeted.

The results of the Tier 1 uncertainty analysis are presented in detail in Annex 4. The results are summarized in **Table 18**.

Table 18: Emissions Uncertainties.

Pollutant	Emissions (2019)	Uncertainty (%)	Trend Uncertainty (1990-2019) (%)
NO _x	14,042	44,70	19,32
NM VOC	9,345	47,79	27,16
SO _x	15,789	13,69	8,33
NH ₃	6,822	142,98	73,94
PM _{2.5}	1,068	61,43	19,76
PM ₁₀	2,115	100,96	29,52
TSP	3,365	125,02	32,64
BC	0,231	39,02	8,76
CO	10,819	39,63	8,48
Pb	0,403	6,41	0,58
Cd	0,032	23,35	29,02
Hg	0,028	17,00	6,07
PCDD/PCDF	0,573	79,54	3,07
PAHs	0,654	198,86	6,37
HCB	0,023	9,21	0,89
PCBs	0,035	6,11	2,61

Note 1: For PM_{2.5}, PM₁₀ and TSP the Trend Uncertainty was calculated for the years 2000 and 2019.

5.9 General Assessment of Completeness

The emission inventory covers all relevant sources as specified in the LRTAP Convention that determine the emissions to the atmosphere in Cyprus. It is not always possible to specify all sub sectors in detail. Based on that, in the emission tables (NFR), notation keys are used.

In **Table 19** the explanation on the use of Notation keys in the Emission Inventory is given. Definitions given in the table below (2nd Column) are derived from the “Guidelines for Reporting Emission Data under the Convention LRTAP” ECE/EB.AIR/97 dated 27 January 2009 [13].

Table 19: Definition of Notation Keys.

Notation Key	UNECE/EMEP explanation	Use of notation key in national inventory
Not estimated (NE)	Emissions occur, but have not been estimated or reported.	Used
Included elsewhere (IE)	Emissions for this source are estimated and included in the inventory but not presented separately for this source. The source where these emissions are included should be indicated.	Used
Confidential information (C)	Emissions are aggregated and included elsewhere in the inventory because reporting at a disaggregated level could lead to the disclosure of confidential information.	Not Used
Not applicable (NA)	The source exists but relevant emissions are considered never to occur.	Used
Not occurring (NO)	A source or process does not exist within a country.	Used
Not relevant (NR)	According to paragraph 9 in the Emission Reporting Guidelines, emission inventory reporting should cover all years from 1980 onwards if data are available. However, «NR» (not relevant) is introduced to ease the reporting where emissions are not strictly required by the different protocols, e.g. for some Parties emissions of NMVOCs prior to 1988.	NR used for particulate emissions and BC for the period 1990-1999

1.1.3 Sources Not Estimated (NE)

In **Table 20** sources reported as NE (Not Estimated) are presented.

Table 20: Sources reported with the Notation Key NE (Not Estimated)

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NFR	Substance (s)
1A1a	NH3
1A2a	NH3
1A2b	NH3, HCB, PCBs
1A2d	NH3, HCB, PCBs
1A2gvii	Pb, Hg, As, PCDD/ PCDF (dioxins/ furans)
1A3ai(i)	NH3, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4
1A3aii(i)	NH3, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4
1A3bvi	PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1A3bvii	Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1A3dii	benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4
1A4ci	NH3
1A4cii	Pb, Hg, As, PCDD/ PCDF (dioxins/ furans)
1A4ciii	NH3, benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4
1A5b	NH3, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4
1B2av	SOx , PCDD/ PCDF (dioxins/ furans)
2A1	NH3, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB
2A2	CO, Pb, Cd, Hg
2A5b	NMVOC
2D3a	PM2.5, PM10, TSP
2D3b	NOx, SOx , CO, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB
2D3c	NOx, Pb, Cd, Hg, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB
2D3f	PM2.5, PM10, TSP
2D3g	NOx, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2D3h	PM2.5, PM10, TSP, BC
2D3i	NOx, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2G	Se, HCB, PCBs
2H2	PM2.5, PM10, TSP, BC
3Da2a	PM2.5, PM10, TSP, BC
3Da2b	PM2.5, PM10, TSP, BC

NFR	Substance (s)
3Da2c	NMVOC, SO _x , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
3Da3	SO _x , PM _{2.5} , PM ₁₀ , TSP, BC
3Da4	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
3Db	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
3F	HCB, PCBs
5A	NH ₃ , CO, Hg
5B1	NO _x , NMVOC, SO _x , PM _{2.5} , PM ₁₀ , TSP, BC, CO
5C1bv	NO _x , NMVOC, SO _x , NH ₃ , BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
5C2	NH ₃ , Hg, Ni, Indeno (1,2,3-cd) pyrene, HCB
5D1	NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn
5E	NO _x , NMVOC, SO _x , NH ₃ , BC, CO, Ni, Se, Zn, benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs

1.1.4 Sources Included Elsewhere (IE)

In **Table 21** sources reported as IE (Included Elsewhere) are presented.

Table 21: Sources reported with the Notation Key IE (Included Elsewhere).

NFR	Substance (s)
1A4ai	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1A4ai	The emissions of this category were included in category 1A4b.
1A4aii	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1A4aii	The emissions of this category were included in category 1A3bvii.
1A4bii	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1A4bii	The emissions of this category were included in categories 1A4bi and 1A4c1.

NFR	Substance (s)
1A5a	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1A5a	The emissions of this category were included in categories 1A4bi and 1A4c1.
2A1	NO _x , NMVOC, SO _x
2A1	The emissions of the above mentioned pollutants are included in category 1A2f.
2A2	NO _x , NMVOC, SO _x
5D2	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
5D2	The emissions of this category were included in category 5D1.

1.1.5 Sources Not Applicable (NA)

In the reporting template “Annex IV-Table 1” there are several cells pre-filled with the Notation Key NA. Apart from those, NA was used in some other pollutant sources that in the Guidebook are mentioned as NA.

In the following **Table 22** these sources are presented.

Table 22: Additional NFR Sources Reported as NA.

NFR	Substance (s)
1A2gvii	HCB, PCBs
1A3ai(i)	BC, HCB, PCBs
1A3aii(i)	BC, HCB, PCBs
1A3bv	NO _x , SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1A3bvi	NO _x , NMVOC, SO _x , NH ₃ , CO, Hg
1A3bvii	NO _x , NMVOC, SO _x , NH ₃ , CO
1A4cii	HCB, PCBs
1A5b	BC, HCB, PCBs
1B2av	NO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2A1	PCBs
2A2	NH ₃ , As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2A5a	NO _x , NMVOC, SO _x , NH ₃ , BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2A5b	NO _x , SO _x , NH ₃ , BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs

[illegible]

NFR	Substance (s)
3Da2a	NMVOC, SO _x , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
3Da2b	NMVOC, SO _x , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
3Da3	NMVOC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
3Dc	NO _x , NMVOC, SO _x , NH ₃ , BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
3Dd	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
3De	NO _x , SO _x , NH ₃ , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
5A	NO _x , SO _x , BC, Pb, Cd, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
5B1	Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
5B2	NO _x , NMVOC, SO _x , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
5C2	PCBs
5D1	NO _x , SO _x , CO, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs

1.1.6 Sources Not Occurring (NO)

In **Table 23** sources reported as NO (Not Occuring) are presented.

Please note that for the categories shown in Table 24, all the substances have the Notation Key NO (Not Occuring).

Table 23: Sources reported with the notation key NO (Not Occuring)

NFR	Substance (s)
1A1b	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1A1c	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1A2a	TSP, BC, Total 1-4, HCB, PCBs

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NFR	Substance (s)
1A3c	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1A3di(ii)	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1A3ei	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1A3eii	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1B1a	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1B1b	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1B1c	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1B2ai	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1B2aiv	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1B2b	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1B2c	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
1B2d	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2A3	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2A6	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs

[illegible]

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NFR	Substance (s)
2C7a	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2C7b	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2C7c	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2C7d	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2D3e	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2H1	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2H3	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2I	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2J	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
2L	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
3B4a	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
3B4giv	NOx, NMVOC, SOx , PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
3B4h	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
3De	PM2.5, PM10, TSP, BC
3Df	NOx, NMVOC, SOx , NH3, PM2.5, PM10, TSP, BC , CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/ PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, PCBs

NFR	Substance (s)
3I	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
5C1a	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
5C1bi	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
5C1bii	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
5C1biii	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
5C1biv	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
5C1bvi	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
5D3	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs
6A	NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, BC, CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/PCDF (dioxins/ furans), benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB, PCBs

1.1.7 Sources Not Relevant (NR)

Notation key NR is used for particulate matter emissions for the period 1990 – 1999.

1.1.8 Other Notation Keys

No other notation keys were used in the emission inventory.

6 Explanation of Key Trends

The emissions of the majority of the pollutants showed variable trends in the period 1990 – 2019 (**Table 24** and **Figure 9-11**). Generally, an upward trend is observed for the period 1990 – 2000, a downward trend for the period 2000 – 2014 and a small upward trend for the period 2014 - 2019. The trend of Lead, after 2004, is downward because the gasoil used is unleaded.

The major overall drivers for the downward trend observed for the period after 2000 are cleaner fuels, cleaner cars, emission reductions in the industrial sector and application of the provisions of the relevant EU Directives.

Table 24: Total National Emissions 1990 - 2019.

Year	Main Pollutants				Particulate Matter				Priority Heavy Metals			
	NO _x	VOC	SO _x	NH ₃	CO	TSP	PM ₁₀	PM _{2.5}	BC	Pb	Cd	Hg
	Gg	Gg	Gg	Gg	Gg	Gg	Gg	Gg	Gg	Mg	Mg	Mg
1990	17.81	12.96	31.93	7.97	43.57	-	-	-	-	24.91	0.08	0.10
1991	17.63	12.64	32.79	8.04	42.30	-	-	-	-	25.97	0.08	0.10
1992	19.66	12.78	37.62	8.66	41.16	-	-	-	-	25.89	0.09	0.10
1993	20.07	12.75	39.92	8.91	39.38	-	-	-	-	25.09	0.09	0.11
1994	20.63	13.19	41.86	8.92	39.67	-	-	-	-	26.44	0.09	0.12
1995	20.44	13.45	39.64	9.12	38.01	-	-	-	-	26.25	0.08	0.11
1996	21.01	13.35	41.64	9.53	36.84	-	-	-	-	25.61	0.09	0.12
1997	21.32	13.34	43.99	9.74	35.34	-	-	-	-	24.85	0.09	0.12
1998	21.73	12.97	47.35	9.87	33.06	-	-	-	-	23.42	0.09	0.11
1999	22.04	13.66	49.58	9.84	31.69	-	-	-	-	22.43	0.09	0.12
2000	22.42	13.28	47.61	9.93	29.91	9.50	4.77	2.54	0.62	20.19	0.10	0.12
2001	22.48	13.10	45.26	10.78	28.96	8.12	4.33	2.29	0.62	19.39	0.09	0.12
2002	22.12	13.83	45.43	11.42	28.12	7.94	4.30	2.22	0.59	17.62	0.09	0.12
2003	22.45	14.87	47.00	10.88	28.09	7.50	4.29	2.24	0.60	15.51	0.09	0.10
2004	22.49	15.30	40.32	10.58	27.51	7.29	4.29	2.24	0.59	5.96	0.08	0.10
2005	22.46	16.02	37.85	9.82	26.38	6.61	4.13	2.19	0.58	0.63	0.08	0.10
2006	22.11	15.81	31.45	10.11	24.46	6.29	3.95	2.09	0.54	0.62	0.08	0.10
2007	21.52	15.91	29.38	10.25	18.72	6.14	3.78	1.92	0.46	0.65	0.08	0.10
2008	19.89	14.53	22.25	9.66	16.47	6.09	3.73	1.89	0.44	0.67	0.08	0.10
2009	20.03	13.38	17.58	9.44	15.03	5.46	3.26	1.67	0.40	0.61	0.07	0.08
2010	18.85	12.99	21.75	9.56	14.21	5.41	3.15	1.58	0.38	0.54	0.05	0.07
2011	21.54	10.98	20.74	9.44	13.28	4.85	2.84	1.42	0.33	0.56	0.06	0.07
2012	20.96	10.48	16.03	8.92	12.74	3.67	2.18	1.12	0.25	0.48	0.06	0.04
2013	15.36	8.88	13.51	8.24	11.91	2.83	1.79	0.97	0.22	0.36	0.03	0.03
2014	16.14	8.43	16.71	8.27	12.28	2.49	1.67	0.91	0.22	0.36	0.03	0.03
2015	13.86	8.78	12.83	8.13	11.95	2.56	1.72	0.95	0.22	0.37	0.03	0.03

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Year	Main Pollutants				Particulate Matter				Priority Heavy Metals			
	NO _x	VOC	SO _x	NH ₃	CO	TSP	PM ₁₀	PM _{2.5}	BC	Pb	Cd	Hg
	Gg	Gg	Gg	Gg	Gg	Gg	Gg	Gg	Gg	Mg	Mg	Mg
2016	13.67	8.91	16.06	8.41	12.14	2.84	1.89	1.04	0.23	0.40	0.04	0.03
2017	13.48	11.01	16.26	8.46	11.80	3.05	1.94	1.02	0.23	0.40	0.04	0.03
2018	13.44	9.64	16.94	8.60	11.06	3.21	1.99	1.03	0.23	0.41	0.04	0.03
2019	14.04	9.35	15.79	6.82	10.82	3.52	2.11	1.07	0.23	0.40	0.03	0.03
2019-1990	-21%	-28%	-51%	-14%	-75%	-	-	-	-	-98%	-61%	-71%
2019 - 2000	-37%	-30%	-67%	-31%	-64%	-63%	-56%	-58%	-63%	-98%	-67%	-76%
2019-2005	-37%	-42%	-58%	-31%	-59%	-47%	-49%	-51%	-60%	-36%	-61%	-70%

Year	Other Heavy Metals						POPs			
	As	Cr	Cu	Ni	Se	Zn	PCDD/F	PAHs	HCB	PCBs
	Mg	Mg	Mg	Mg	Mg	Mg	g I-Teq	Mg	kg	kg
1990	0.13	0.19	1.58	5.93	0.09	3.22	17.49	13.75	0.05	0.03
1991	0.13	0.19	1.59	6.15	0.09	3.26	17.95	13.36	0.05	0.03
1992	0.15	0.21	1.78	7.18	0.10	3.71	18.44	14.01	0.05	0.04
1993	0.16	0.23	1.80	7.64	0.11	3.93	18.87	14.05	0.05	0.04
1994	0.17	0.24	1.88	7.98	0.11	4.09	19.23	12.16	0.05	0.04
1995	0.16	0.23	1.98	7.35	0.11	3.89	19.56	10.95	0.05	0.04
1996	0.17	0.24	2.06	7.77	0.11	4.10	19.87	9.90	0.06	0.04
1997	0.17	0.25	2.14	8.21	0.12	4.25	20.16	9.06	0.06	0.04
1998	0.18	0.26	2.24	9.00	0.12	4.52	20.41	8.52	0.06	0.04
1999	0.19	0.27	2.32	9.59	0.13	4.74	20.65	7.81	0.06	0.04
2000	0.20	0.27	2.41	10.06	0.13	4.94	21.11	6.22	0.06	0.04
2001	0.20	0.27	2.42	9.80	0.13	4.85	21.36	6.09	0.06	0.04
2002	0.20	0.27	2.39	10.18	0.13	4.98	21.60	5.73	0.06	0.04
2003	0.21	0.28	2.47	10.95	0.14	5.27	5.71	6.15	0.02	0.03
2004	0.22	0.29	2.56	11.42	0.14	5.51	0.70	4.84	0.01	0.03
2005	0.23	0.30	2.60	12.15	0.14	5.78	0.71	3.80	0.01	0.03
2006	0.22	0.29	2.53	11.32	0.14	5.51	0.68	2.92	0.01	0.04
2007	0.22	0.31	2.85	11.68	0.14	5.78	0.74	1.68	0.08	0.04
2008	0.23	0.31	2.92	12.20	0.14	5.95	0.72	1.04	0.01	0.03
2009	0.20	0.29	2.85	10.70	0.13	5.31	0.69	0.85	0.01	0.03
2010	0.14	0.25	2.80	7.21	0.09	4.05	0.66	0.88	0.02	0.03
2011	0.18	0.26	2.74	8.98	0.12	4.60	0.65	0.95	0.01	0.03
2012	0.17	0.23	2.49	9.45	0.12	4.35	0.64	1.01	0.02	0.02

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Year	Other Heavy Metals						POPs			
	As	Cr	Cu	Ni	Se	Zn	PCDD/F	PAHs	HCB	PCBs
	Mg	Mg	Mg	Mg	Mg	Mg	g I-Teq	Mg	kg	kg
2013	0.09	0.17	2.14	5.22	0.05	2.84	0.76	0.82	0.02	0.04
2014	0.09	0.17	2.07	5.21	0.06	2.83	0.52	0.69	0.01	0.04
2015	0.10	0.17	2.15	5.30	0.06	2.88	0.56	0.89	0.01	0.04
2016	0.10	0.18	2.30	5.68	0.06	3.08	0.62	0.68	0.01	0.04
2017	0.10	0.19	2.35	5.63	0.06	3.10	0.60	0.60	0.03	0.04
2018	0.10	0.19	2.39	5.69	0.06	3.10	0.62	0.68	0.02	0.04
2019	0.09	0.19	2.41	5.12	0.05	2.90	0.57	0.65	0.02	0.03
2019-1990	-29%	-3%	52%	-14%	-38%	-10%	-97%	-95%	-53%	1%
2019 - 2000	-54%	-31%	0%	-49%	-58%	-41%	-97%	-89%	-61%	-12%
2019-2005	-60%	-37%	-7%	-58%	-62%	-50%	-19%	-83%	206%	6%

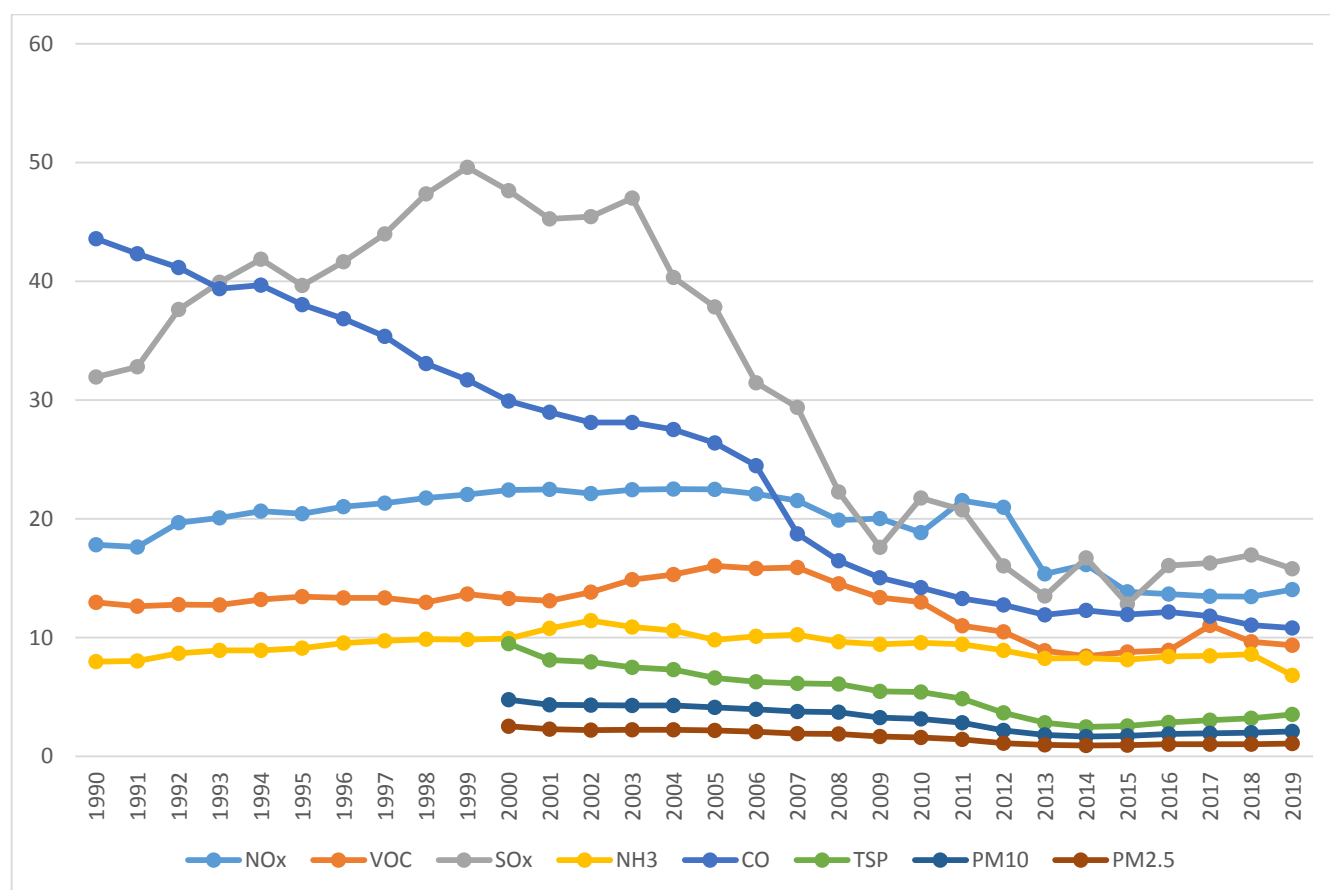


Figure 9: Emission trends 1990-2019 (Main Pollutants and Particulates).

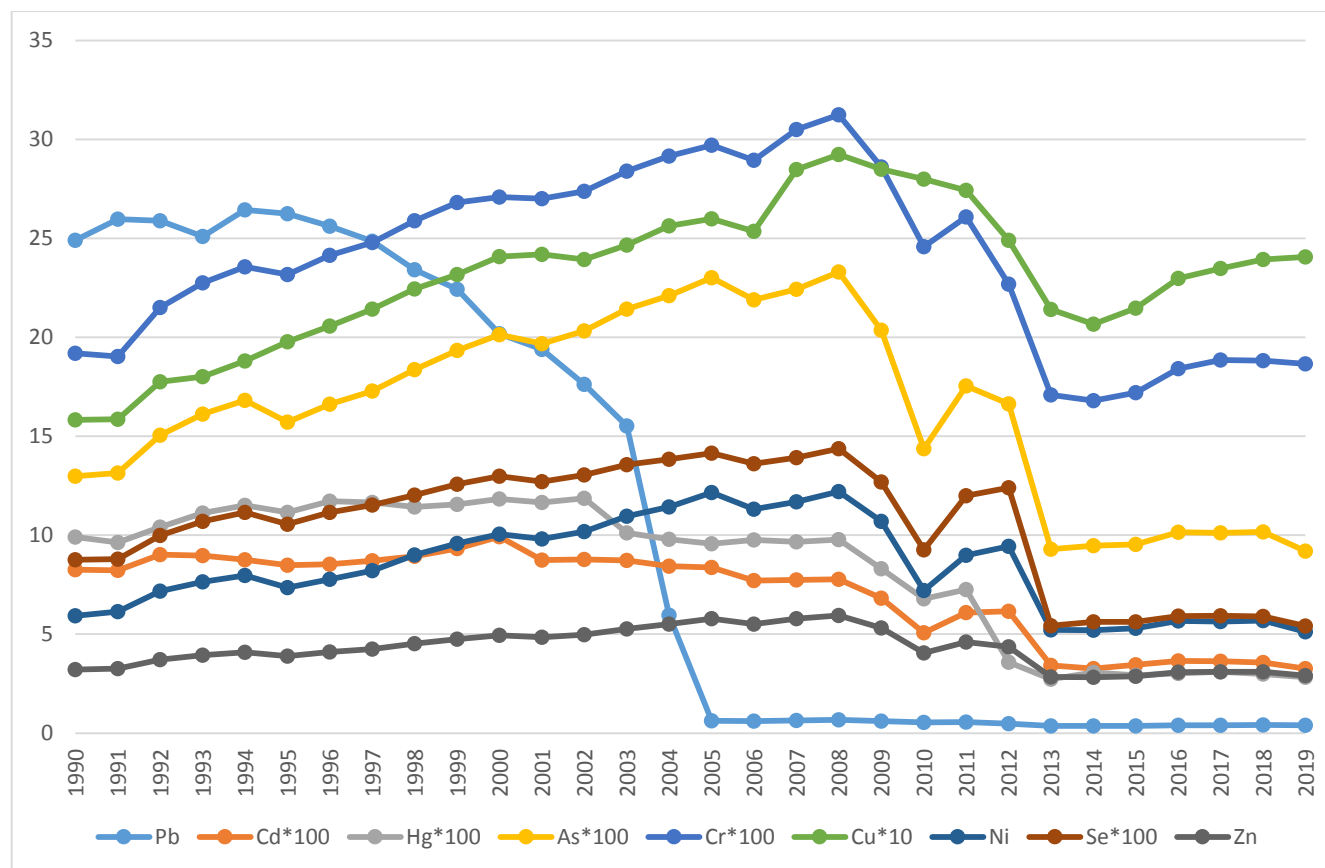


Figure 10: Emission trends 1990-2019 (Heavy Metals).

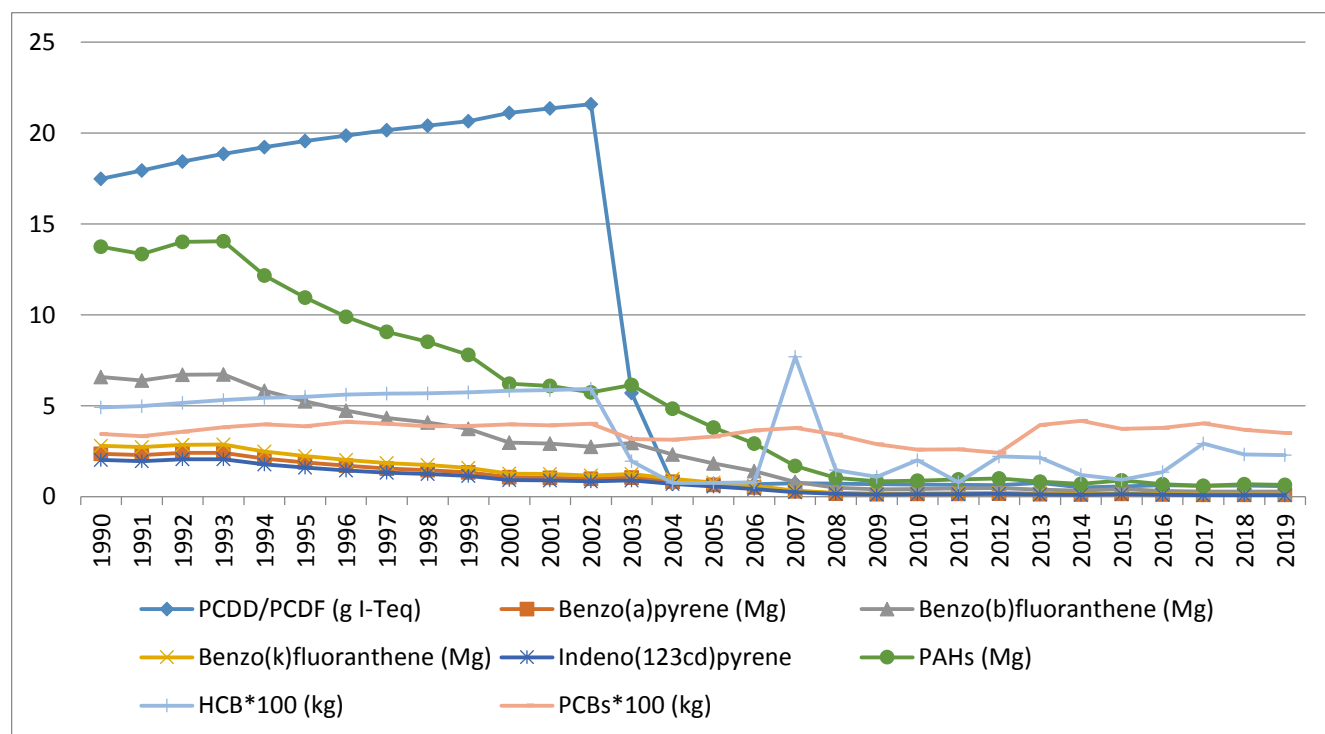


Figure 11: Emission trends 1990-2019 (Persistent Organic Pollutants).

6.1 Trends for Nitrogen Oxides (NO_x)

The Cyprus NO_x emissions (NO and NO₂) decreased by 3.77 Gg in the 1990 – 2019 period, corresponding to 21% of the national total in 1990 and decreased by 8.38 Gg in the 2005 – 2019 period, corresponding to 37% of the national total in 2005 (**Figure 12-13**). The main contributors to the National total NO_x emissions are the F_Road transport, the A_Public Power and the B - Industry sectors. The emissions due to the Industry Sector remains almost constant throughout the years.

Regarding the emissions from the F_Road transport sector, the emissions per vehicle decreased significantly during this period (1990 – 2019) due to the implementation of new car technologies and the usage of better quality fuels, but were, somehow, counterbalanced by an increase in the number of vehicles and mileage per year per vehicle.

As regards to the A_Public Power sector, the NO_x emissions were increased by 4.83 Gg for the period between 2010 – 2012 compared to 1990 emissions, corresponding on average to 20.9% of the national total. This was due to the installation and operation of a number of temporary-mobile units (Internal Combustion Engines) in the island. The installation was a result of the reduction in generating capacity of the Electricity Authority of Cyprus (EAC) due to the extensive damage of the Vassilikos PS caused by an explosion on July 11th, 2011. As it is well known, the temporary-mobile ICE engines installed in all three Power Stations have high NO_x emissions. These small capacity mobile units, at the time of installation, did not have any NO_x abatement technology installed. In addition, the 5×30 MWe HFO plants that operate at the Moni PS, and the 6×60 MWe HFO plants along with the 6×17 MWe HFO Internal Combustion Engines operating at the Dhekelia PS, have higher NO_x emissions compared to the newest power plants installed at the Vassilikos PS that were not in operation due to the damages. Therefore, a significant increase in the total NO_x emissions at a national level is observed for the years 2011 and 2012. More details were given in the Cyprus Informative Inventory Report published for year 2013 in the EIONET Central Data Repository (CDR) (http://cdr.eionet.europa.eu/cy/un/UNECE_CLRTAP_CY/envvqgjug/) [6].

The big decrease observed in 2013, regarding NO_x emissions, was due to the complete restoration of the Vassilikos PS. This plant uses a newer technology for combustion, with lower NO_x emissions compared to the temporary installed ICE plants and as a consequence the NO_x emissions from the energy sector was significantly decreased. A small increase was observed in 2014 due to the increased energy demand as a consequence of the relevant Cyprus economy recovery. A small decrease was observed in 2015 and 2016 due to a lower use of ICE temporary plants in Dhekelia PS and the implementation of a DeNO_x system for the ICE1 plant. A DeNO_x system was implemented for ICE2 plant at the beginning of its operation.

Another reason for the overall decrease of the NO_x emissions that occurred in recent years was the increase of the penetration of the Renewable Energy Sources, In 2010 the electricity produced from RES was 61 GWh compared to 408 GWh produced in 2019 [18]. This is an increase of 567%.

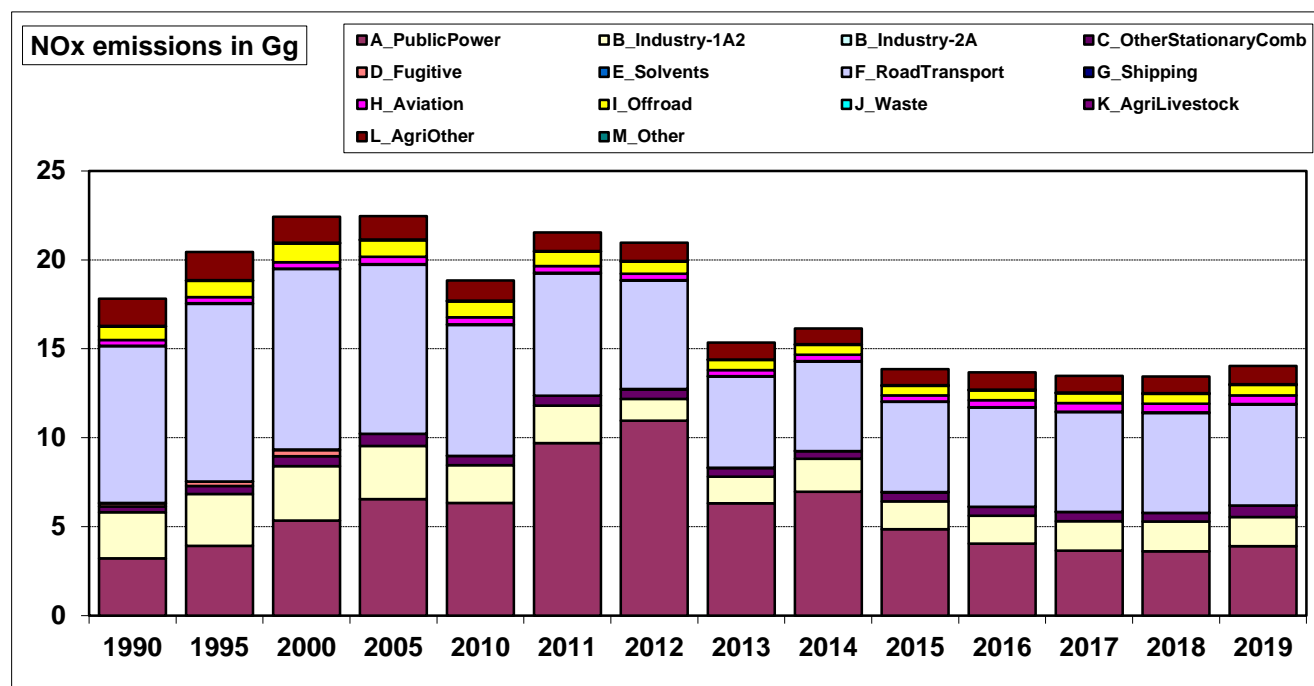


Figure 12: NO_x emissions trend 1990 – 2019

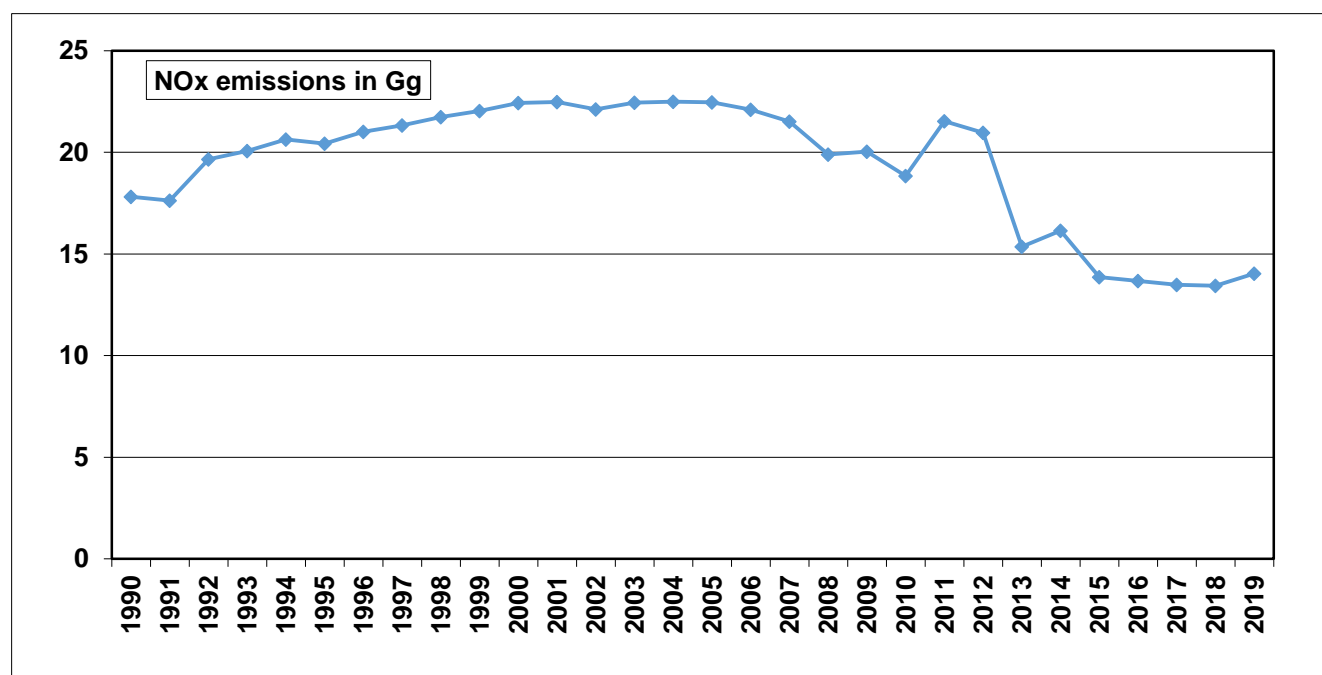


Figure 13: National total NO_x emissions for the period 1990 – 2019.

The variations observed during the years 2008 to 2011 are due to the following reasons:

- 1) The methodology used to calculate emissions differs both per year and per pollutant. Actually, from 2008 and on, we are using Tier 3 as a methodology to estimate the NO_x, CO and TSP emissions from Power stations. This is due to the fact that in 2008 the Electricity Authority of Cyprus installed automatic instruments for on-line measurements

and the jumps observed between 2008 -2010 are due to the fact that Electricity Authority of Cyprus used for electricity production various combinations of its power plants.

- 2) The explosion happened in 2011 and the need for the Electricity Authority of Cyprus to use of temporary-mobile units (Internal Combustion Engines) with higher pollutants emissions. For more details, please refer to IIR of 2015 [6].

6.2 Trends for Non-Methane Volatile Organic Compounds (NMVOC)

The Cyprus NMVOC emissions decreased by 3.62 Gg in the 1990 – 2019 period, corresponding to 28% of the national total in 1990 and decreased by 6.68 Gg in the 2005 – 2019 period, corresponding to 30% of the national total in 2005 (**Figures 14-15**). The main contributors to this decrease were the F - Road Transport sector, which from 6.93 Gg in 1990 went to 2.21 Gg in 2019 and the E - Solvents sector from 8.02 Gg in 2005 went to 4.47 Gg in 2019. The latter was due to the full implementation of relevant the EU Directive 2004/42/EC.

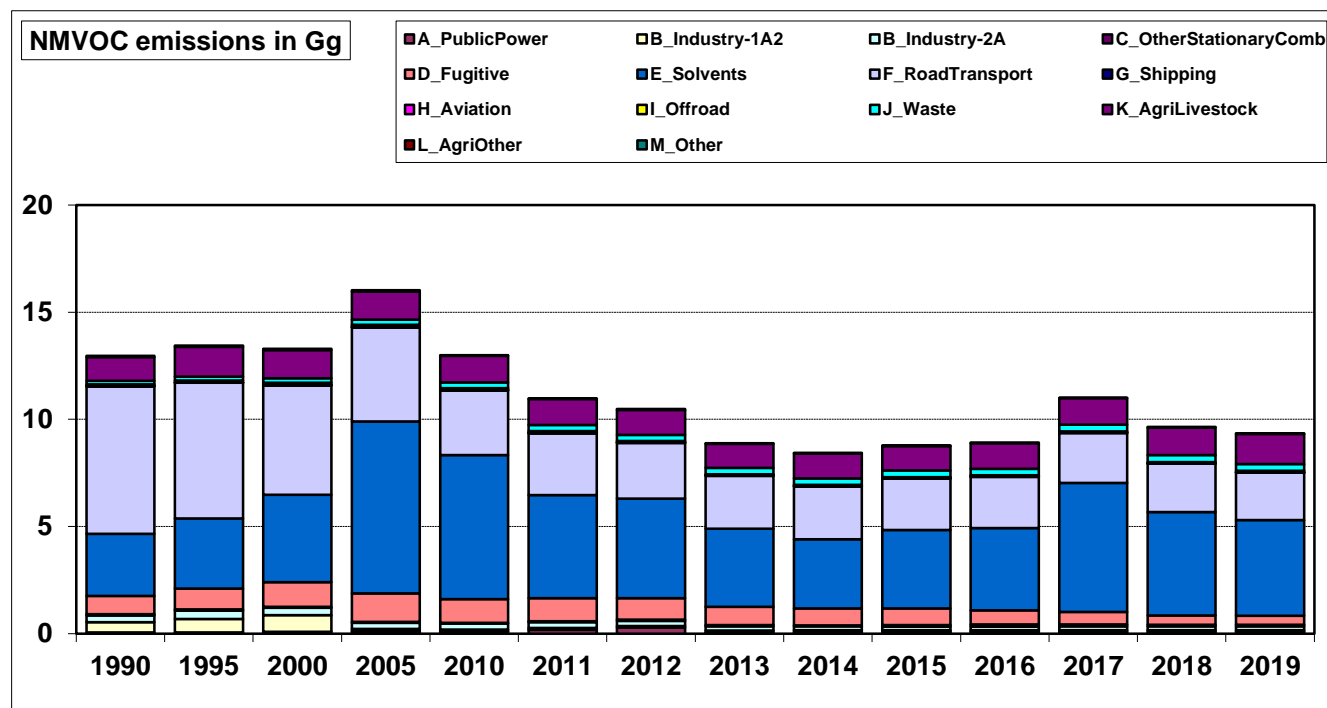


Figure 14: NMVOC emissions trend 1990 – 2019.

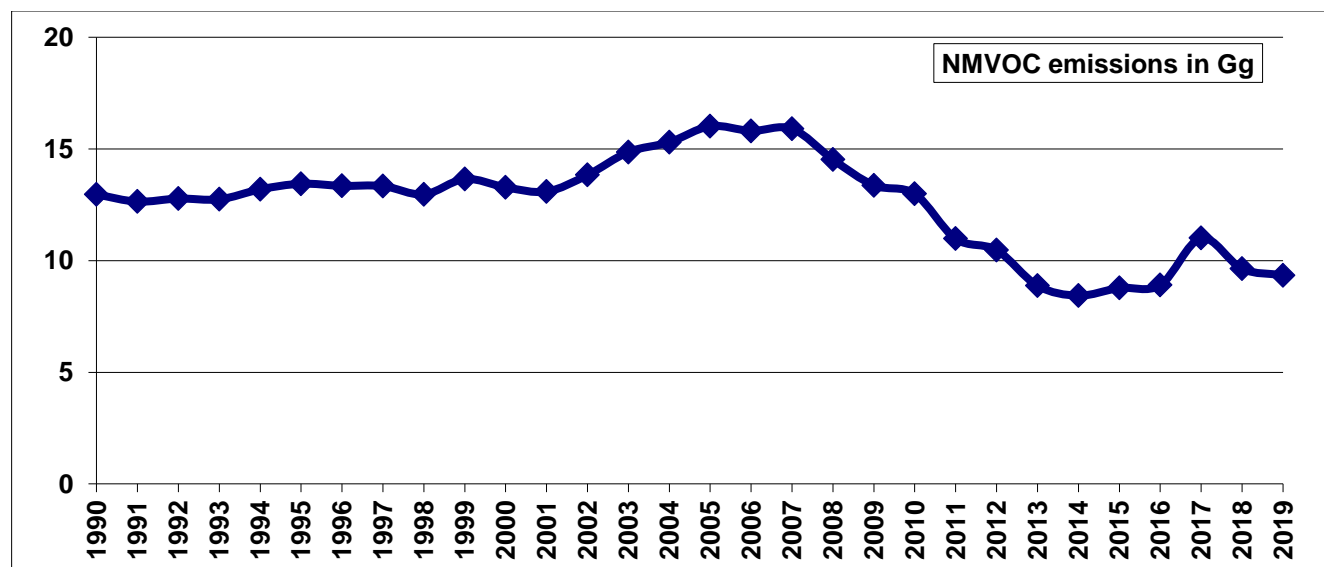


Figure 15: National total NMVOC emissions for the period 1990 – 2019.

6.3 Trends for Sulphur Dioxide (SO₂)

The Cyprus SO_x emissions (reported as SO₂) decreased by 16.14 Gg in the 1990 – 2019 period, corresponding to 51% of the national total in 1990 and decreased by 22.06 Gg in the 2005 – 2019 period, corresponding to 58% of the national total in 2005 (**Figure 16-17**). The main contributors to this decrease are the A_Public Power, B_Industry, C_Other Stationary Combustion and F_Road Transport sectors. The Sulphur content in fuels consumed by those sectors was reduced. This is mainly due to the transposition and enforcement of the relevant EU Directives. Currently, the energy sector is responsible for almost 90% of the national SO_x emissions.

During the years 2010 to 2014 it was observed an increase in SO_x emissions due to the fact that the Flue - Gas Desulphurization Unit (FGD) installed in the Steam Turbine Unit 3 of the Vassilikos PS was not in operation.

The decrease observed in the SO_x emissions in 2012 was due to the fact that the temporary ICE engines installed were using diesel with low Sulphur content. These temporary ICE engines were installed in order to anticipate the reduction in generating capacity of Electricity Authority of Cyprus (EAC) due to the extensive damage of Vassilikos PS caused by an explosion on July 11th, 2011.

In 2013 the SO_x emissions were decreased even more due to the fact that the Vassilikos PS were completely restored. A small increase was observed in 2014 due to the increased energy demand as a consequence of the relevant Cyprus economy recovery.

The decrease observed in the SO_x emissions in 2015 was due to the fact that the Flue-Gas Desulphurization Unit (FGD) installed in the Steam Turbine Unit 3 of the Vassilikos PS was again in full operation.

A small increase observed between the years 2016 to 2018 for SO_x emissions compared to those of 2015 in the A_PublicPower Sector was due to the fact that the average Sulphur (**S**) content fuel used by the Power Plants was increased but still remaining in the limits (<1%). The SO_x emissions of 2019 have a small decrease compared to the ones of 2018.

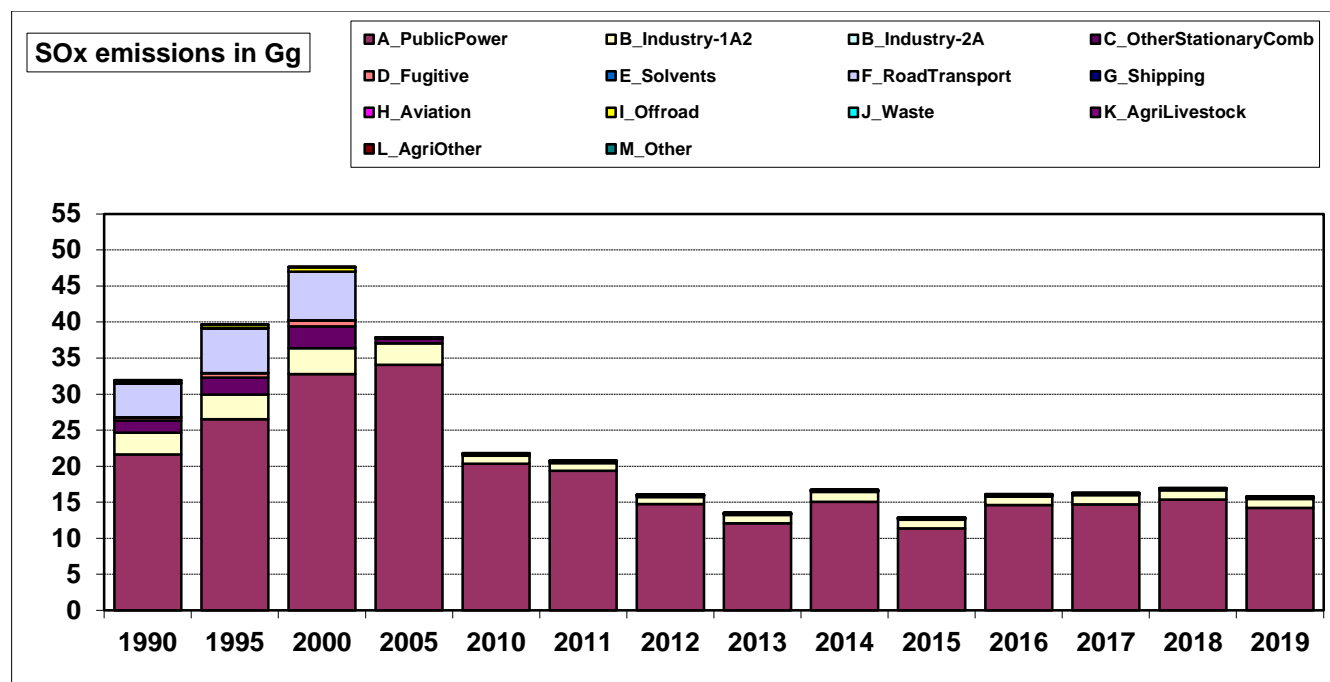


Figure 16: SO_x emissions trend 1990 – 2019.

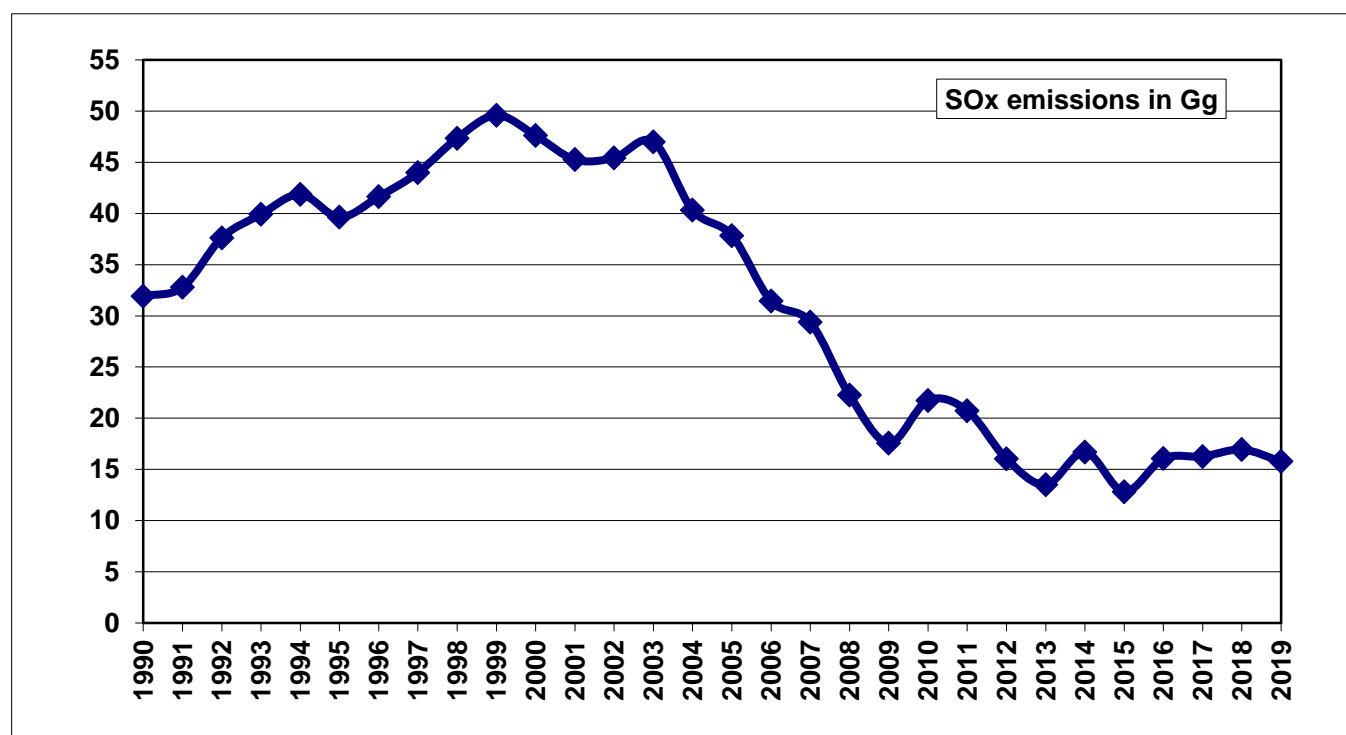


Figure 17: National total SO_x emissions for the period 1990 – 2019.

6.4 Trends for Ammonia (NH₃)

The Cyprus NH₃ emissions increased by 1.14 Gg in the 1990 – 2019 period, corresponding to 14% of the national total in 1990 and decreased by 3.00 Gg in the 2005 – 2019 period, corresponding to 31% of the national total in 2005 (**Figure 18-19**). This decrease occurred in the agricultural sources, mainly due to measures taken to reduce NH₃ emissions during the application of manure to the soil and the reduction of Nitrogen contained in the modern fertilizers. Approximately 96% of ammonia emissions (2019) come from agricultural sources (K_AgriLivestockc sector and L_AgriOther sector).

A small increase observed between the years of 2016 to 2018 was due to the increased numbers of animals (cattle and fattening pigs). In 2019 the K_AgriLivestockc sector has a significant decrease.

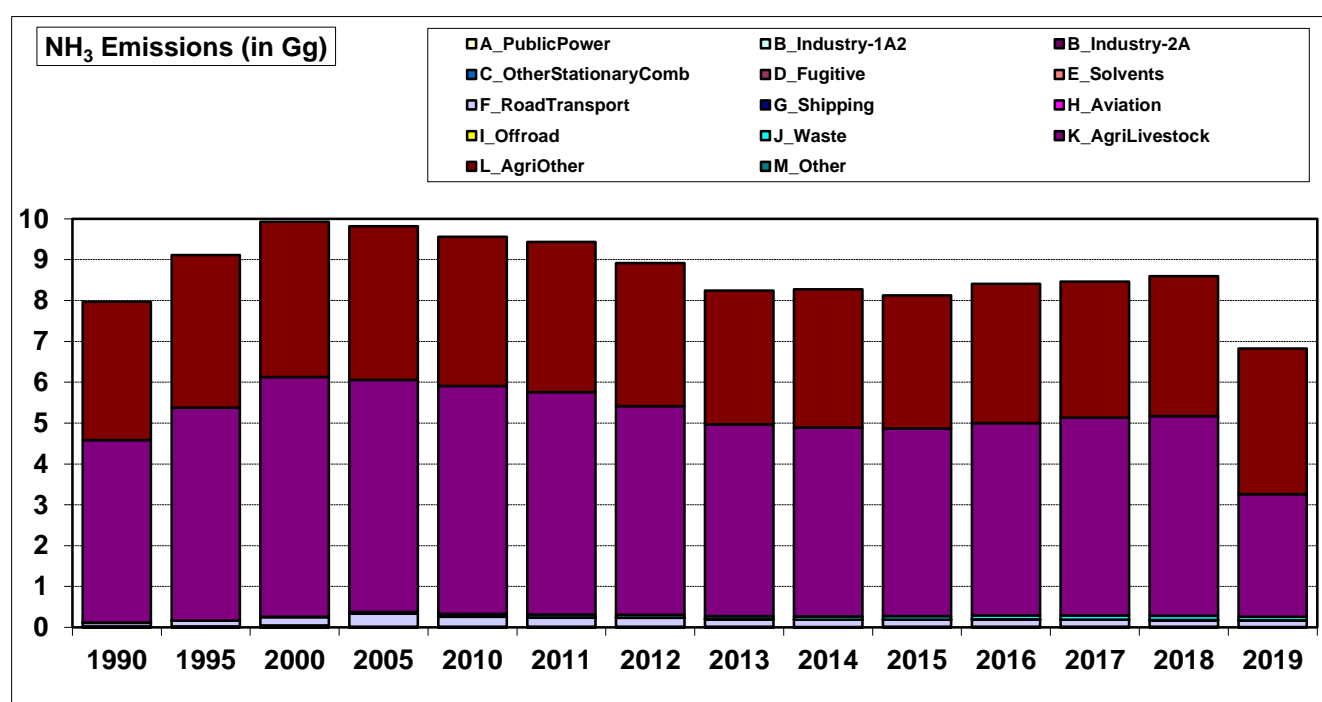


Figure 18: NH₃ emissions trend 1990 – 2019.

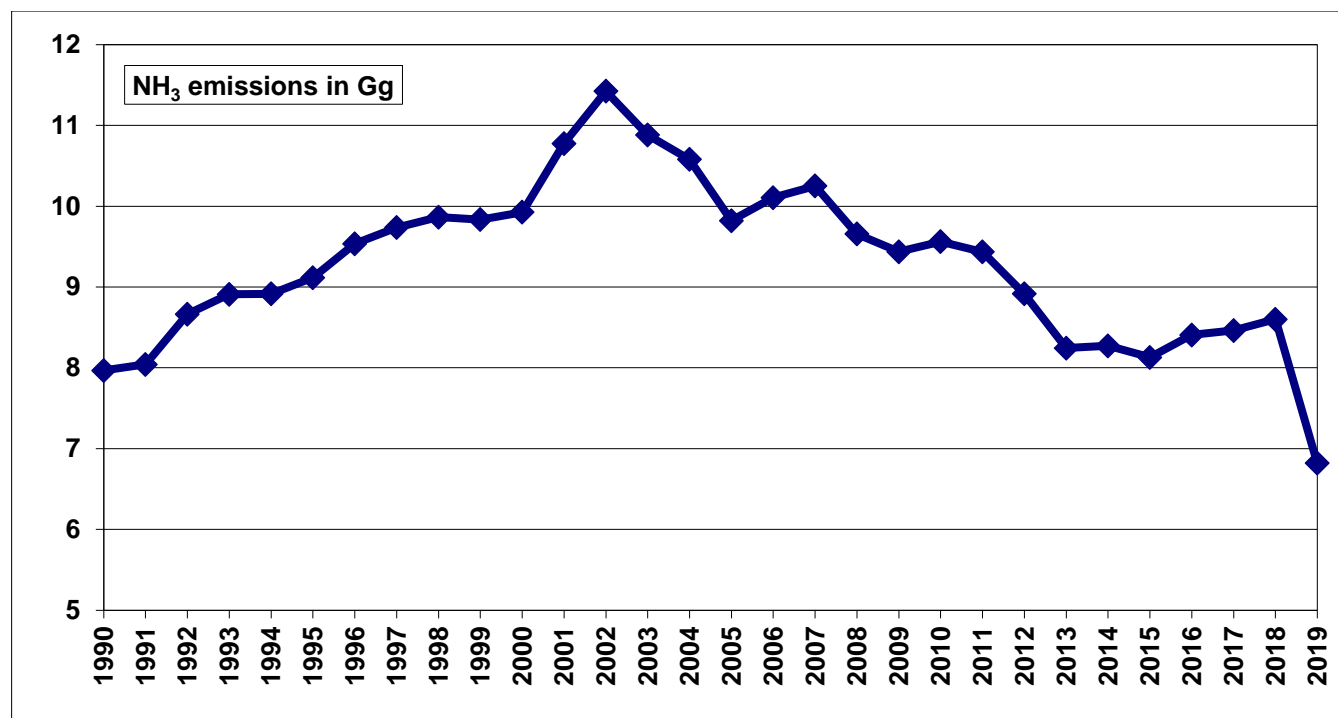


Figure 19: National total NH₃ emissions for the period 1990 – 2019.

6.5 Trends for Particulate Matter (TSP, PM₁₀, PM_{2.5})

The Cyprus particulate matter emissions are presented in **Figure 20-23**. The PM₁₀ emissions decreased by 2.65 Gg in the 2000 – 2019 period, corresponding to 56% of the national total in 2000. The main contributors to this decrease are the A_Public Power, the F_Road Transport and the B_Industry. The PM_{2.5} emissions decreased by 1.47 Gg in the 2000 – 2019 period, corresponding to 58% of the national total in 2000 and decreased by 1.12 Gg in the 2005 – 2019 period, corresponding to 51% of the national total in 2005. The main contributors to this decrease are the A_Public Power, the F_Road Transport and the B_Industry.

The TSP emissions decreased by 5.98 Gg in the 2000 – 2019 period, corresponding to 63% of the national total in 2000. The main contributors to this decrease are the A_Public Power, the F_Road Transport and the B_Industry.

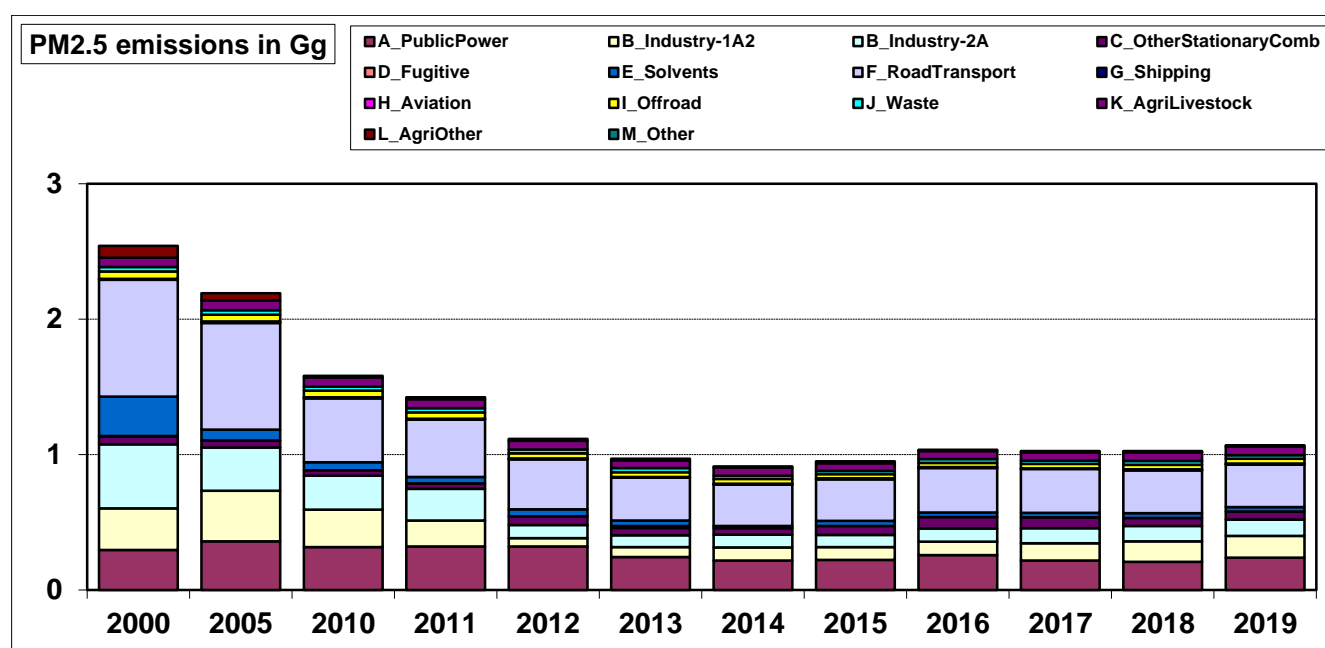


Figure 20: PM_{2.5} emissions trend 2000 – 2019.

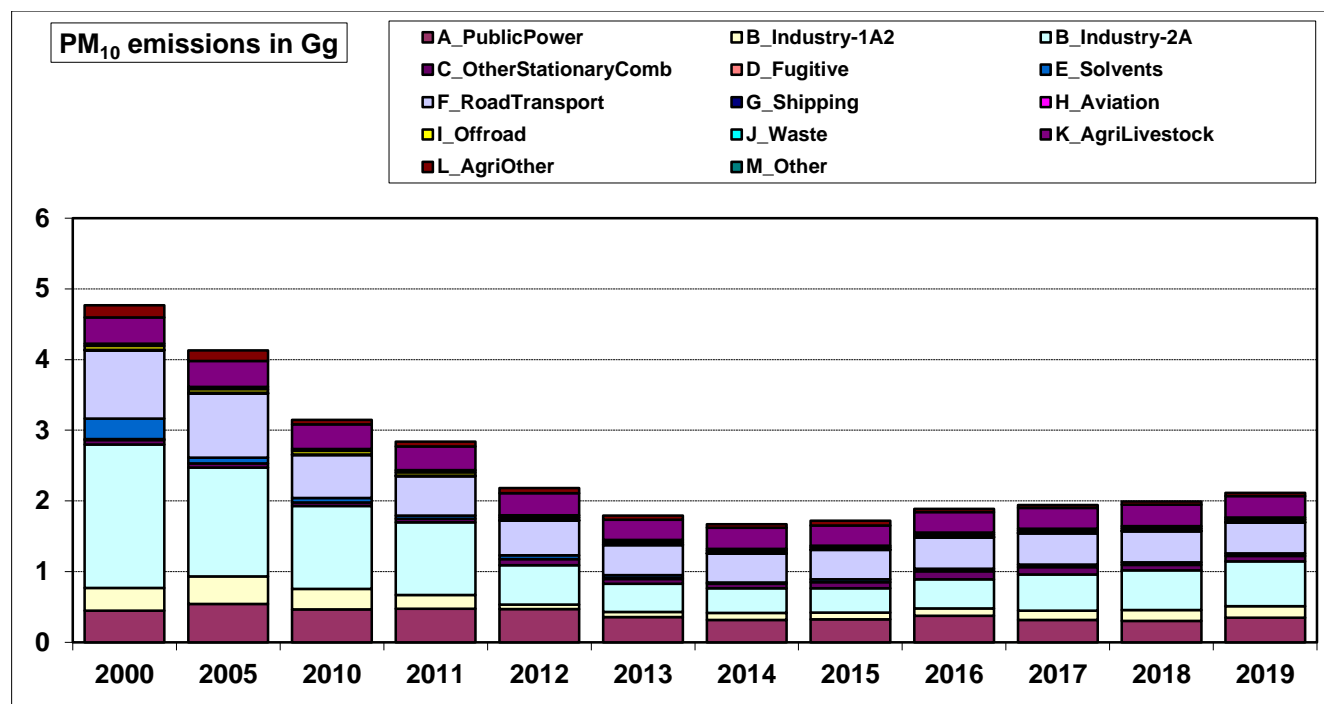


Figure 21: PM₁₀ emissions trend 2000 – 2019.

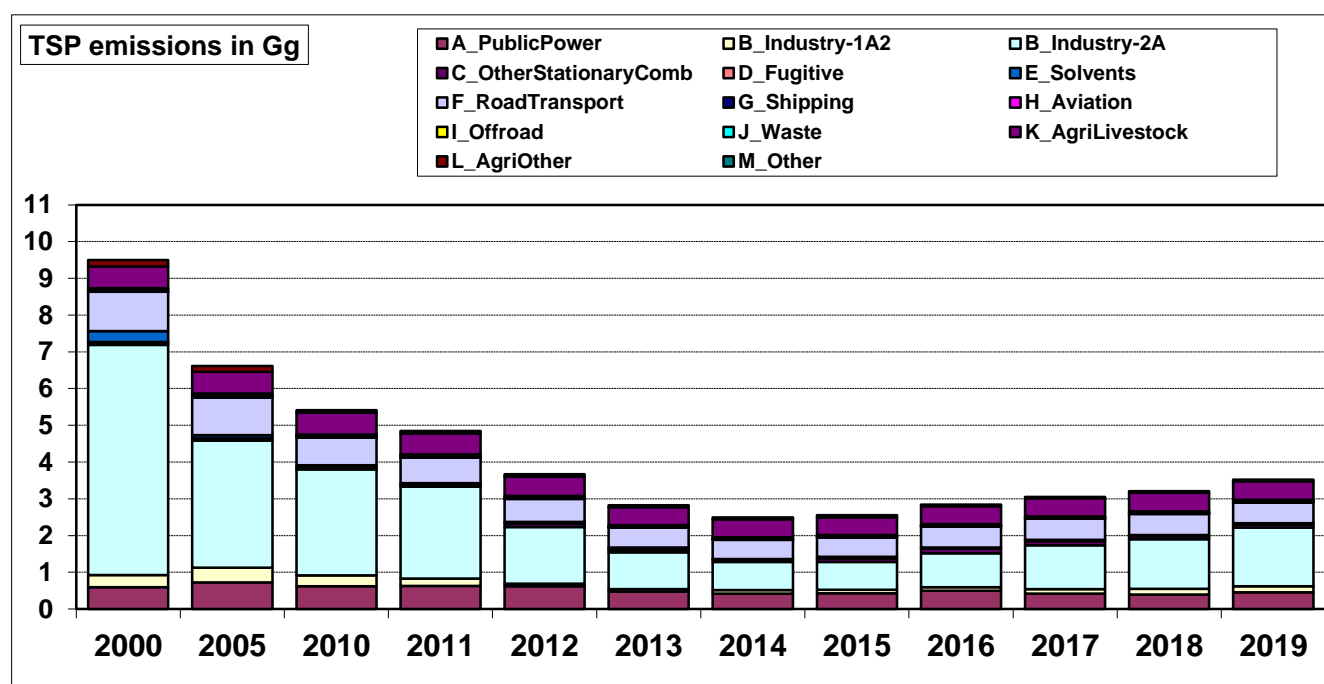


Figure 22: TSP emissions trend 2000 – 2019.

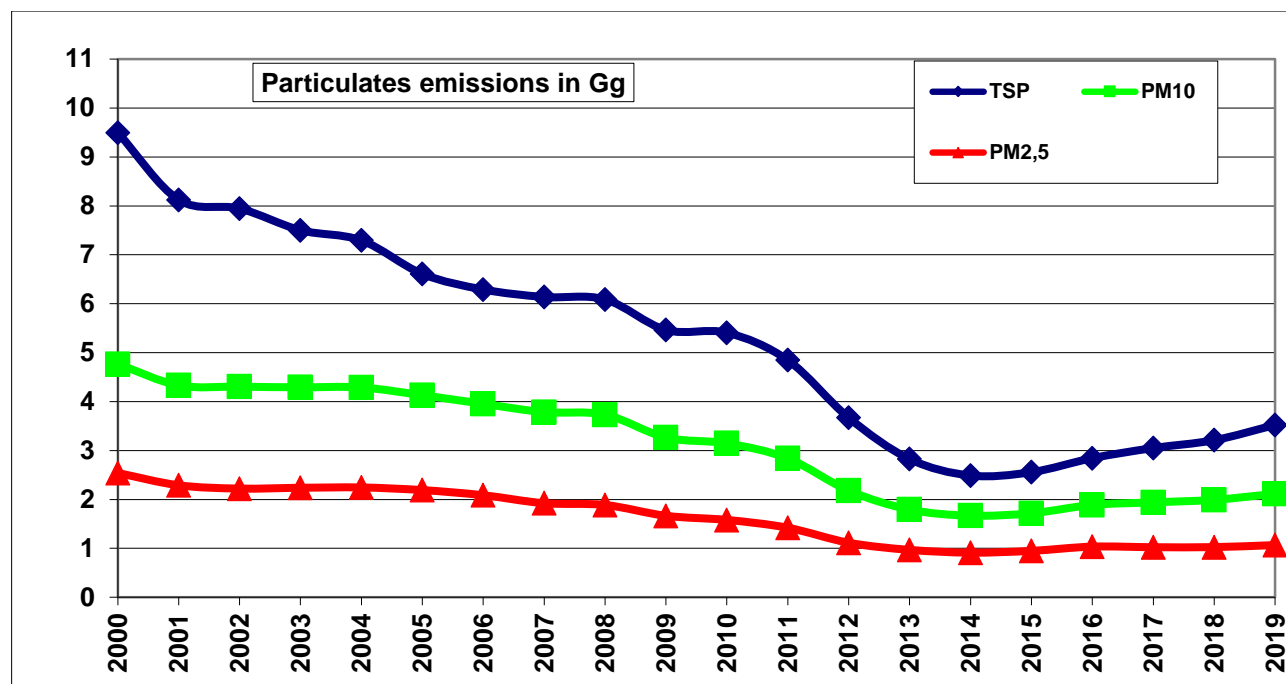


Figure 23: National total TSP, PM₁₀ and PM_{2.5} emissions for the period 2000 – 2019.

6.6 Trends for Carbon Monoxide (CO)

The Cyprus CO emissions decreased by 32.75 Gg in the 1990 – 2019 period, corresponding to 75% of the national total in 1990 and decreased by 15.56 Gg in the 2005 – 2019 period, corresponding to 59% of the national total in 2005 (**Figure 24-25**). The main contributor to this decrease is the F_Road Transport sector. Currently, the Road Transport sector is responsible for about 63% of the national CO emissions in 2019.

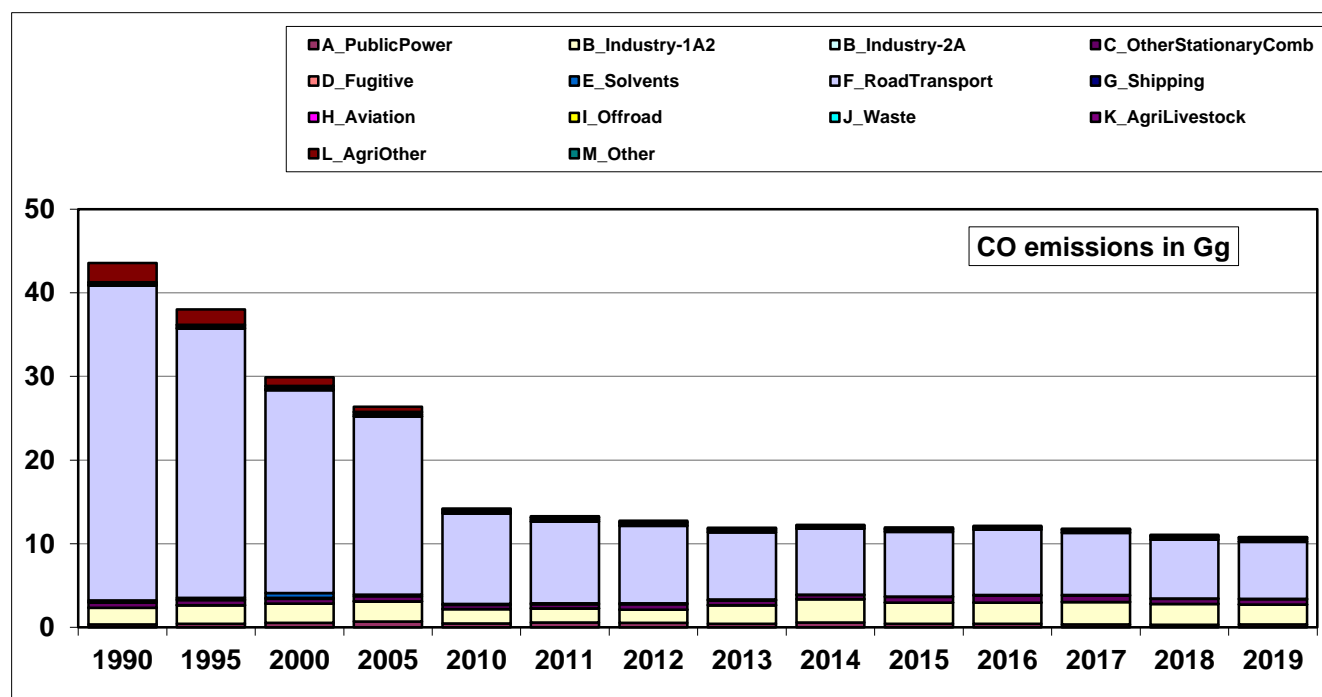


Figure 24: CO emissions trend 1990 – 2019.

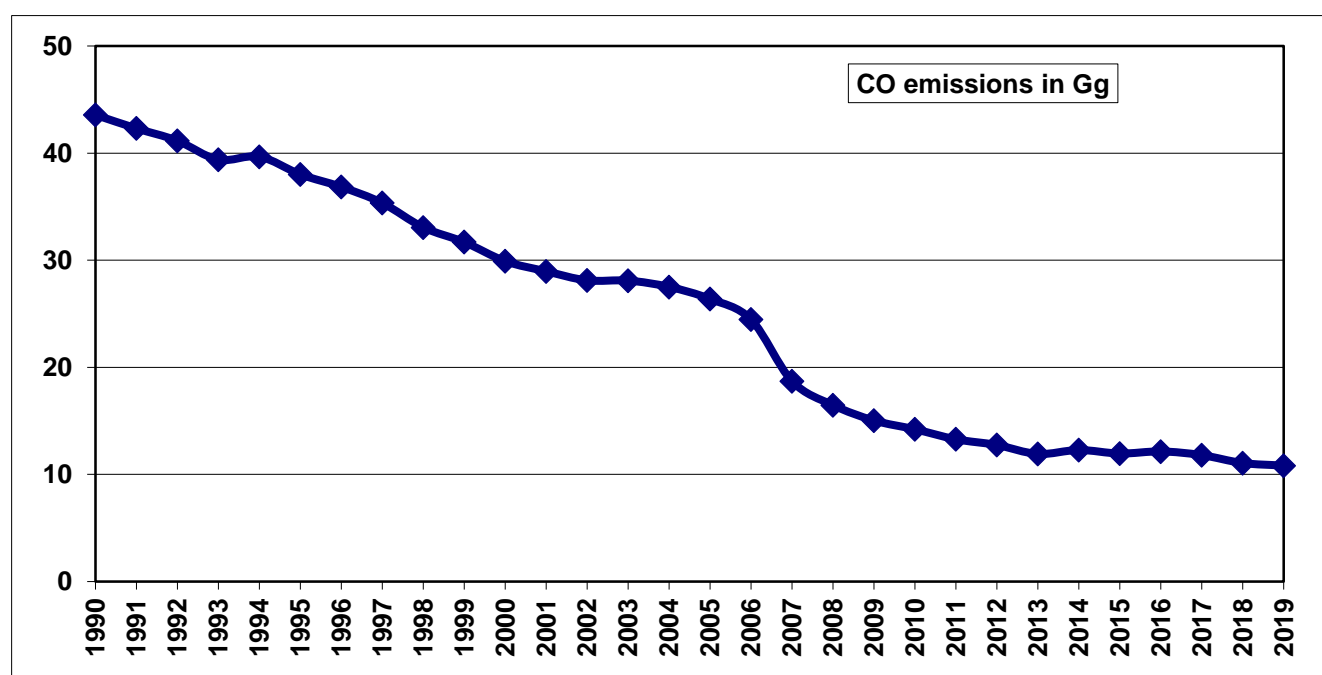


Figure 25: National total CO emissions for the period 1990 – 2019.

6.7 Trends for Heavy Metals (Pb, Cd, Hg)

The Cyprus Lead (Pb) emissions decreased by 24.50 Mg in the 1990 – 2019 period, corresponding to 98% of the national total in 1990 and decreased by 0.22 Mg in the 2005 – 2019 period, corresponding to 36% of the national total in 2005 (**Figure 26-27**). This decrease is solely attributed to the F_Road Transport sector, where, due to the big reduction of Pb content of the petrol, the Pb emissions were dramatically reduced. The remaining emission source, apart from the F_Road Transport sector, is the A_Public Power sector. Currently, the Road Transport sector (1A3b) is responsible for about 64% of the national Pb emissions in 2019.

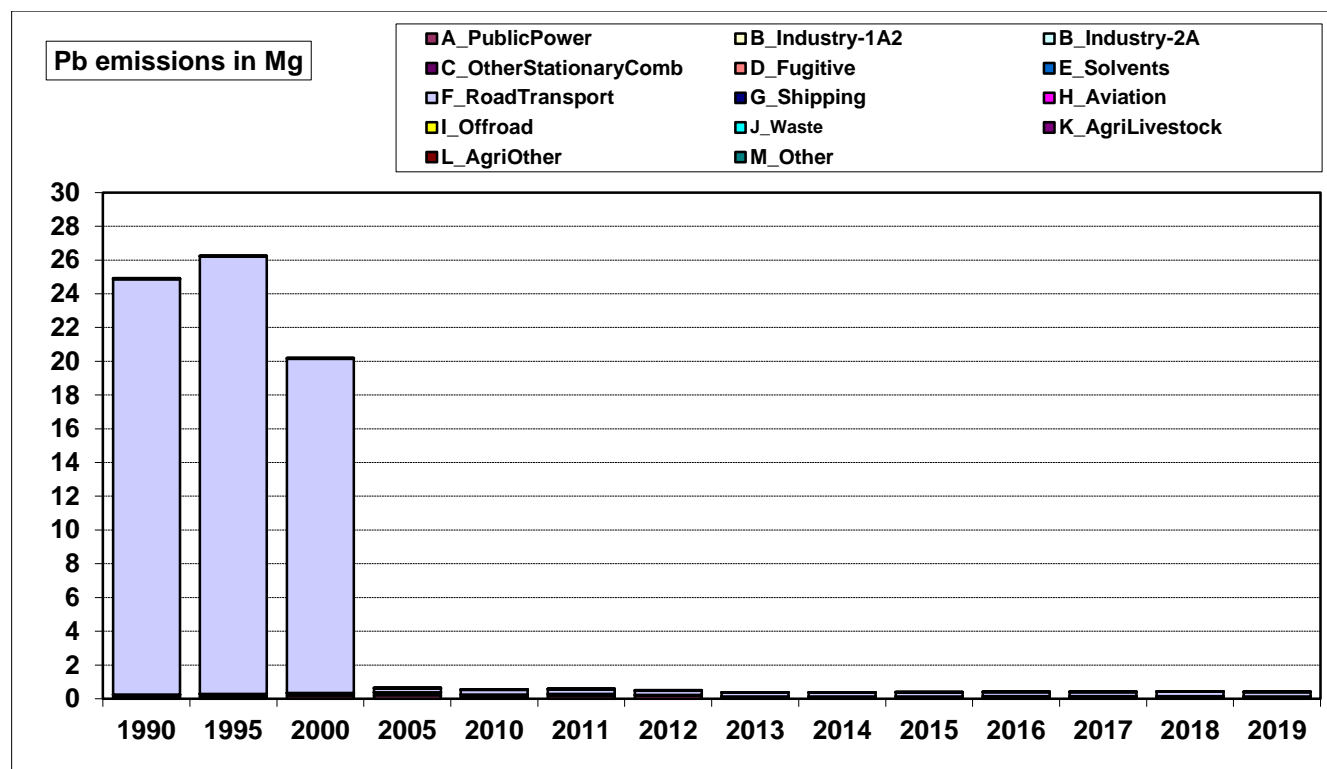


Figure 26: Pb emissions trend 1990 – 2019.

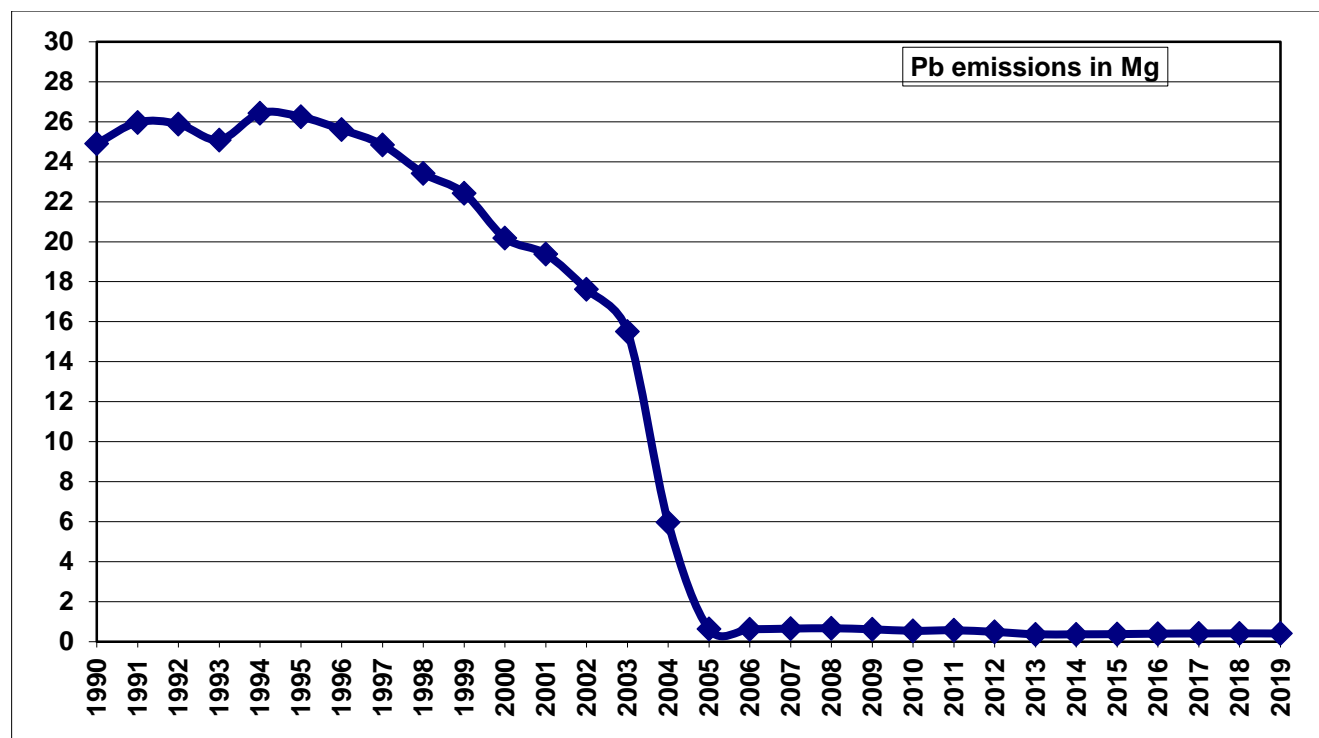


Figure 27: National total Pb emissions for the period 1990 – 2019.

The Cyprus Cd national emissions decreased by 0.05 Mg in the 1990 – 2019 period, corresponding to 61% of the national total in 1990 and decreased by 0.05 Mg in the 2005 – 2019 period, corresponding to 61% of the national total in 2005 (**Figure 28-29**). The big decrease occurred between 2012 and 2013 (26% of the national total in 2012) was due to the A_Public Power sector. The Moni Power Stations was almost shut down and the ICE units of Dhekelia PS worked fewer hours. In Cyprus, there are not any metal industries. Currently, A_Public Power (NFR 1A1a) is responsible for about 73% of the national Cd emissions in 2019.

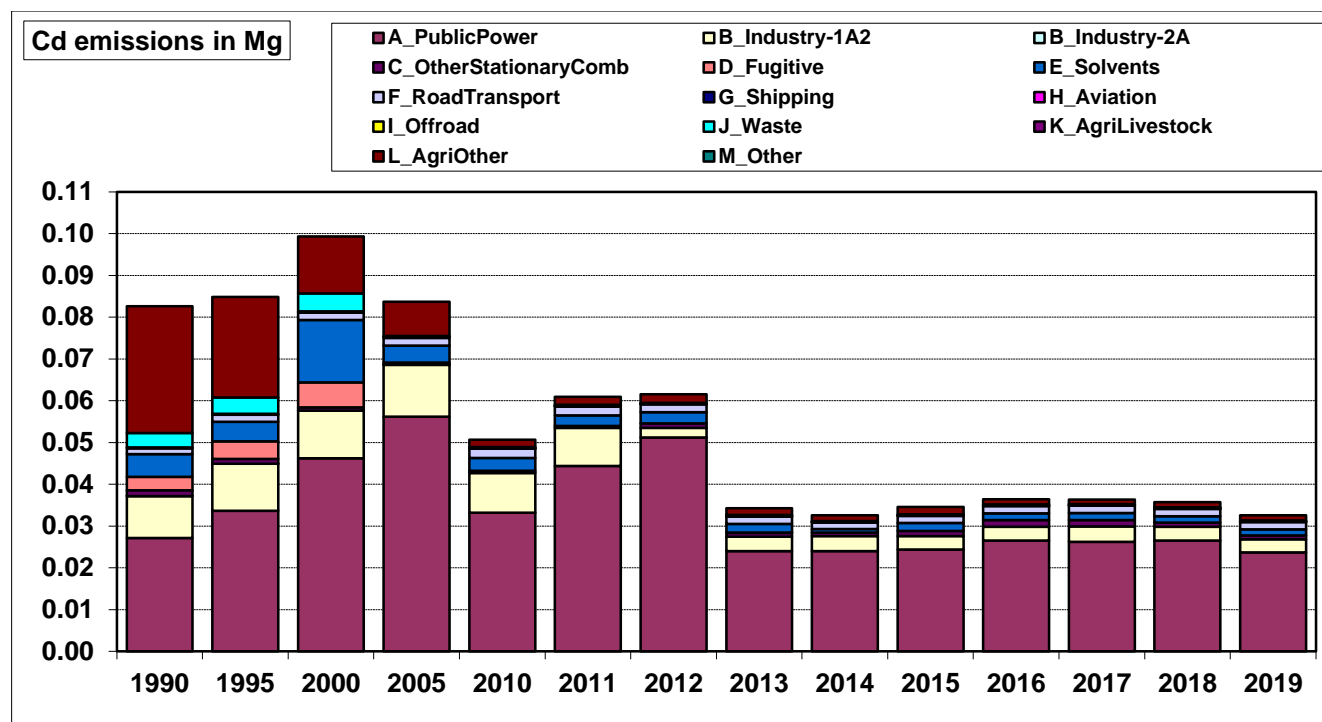


Figure 28: Cd emissions trend 1990 – 2019.

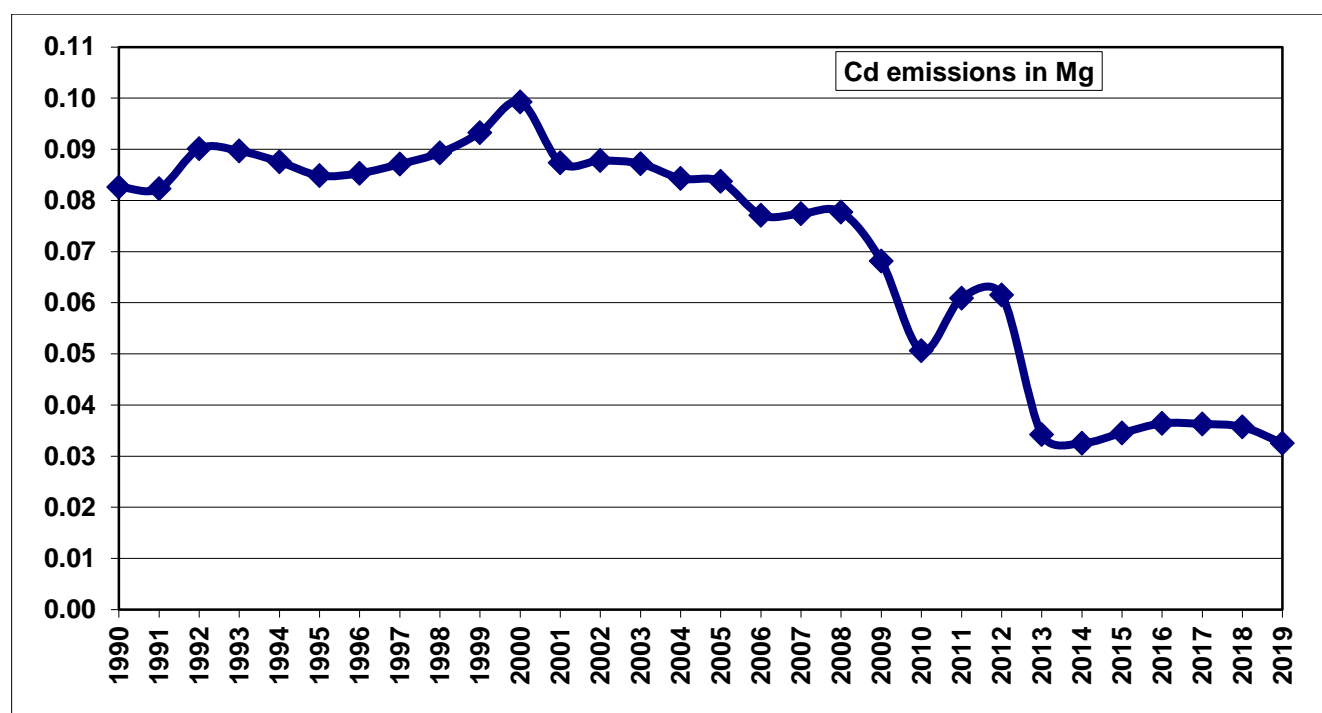


Figure 29: National total Cd emissions for the period 1990 – 2019.

The Cyprus Hg emissions decreased by 0.07 Mg in the 1990 – 2019 period, corresponding to 71% of the national total in 1990 and decreased by 0.07 Mg in the 2005 – 2019 period, corresponding to 70% of the national total in 2005 (**Figure 30-31**). The main contributors of Hg emissions in Cyprus are the B_Industry [Non-metallic minerals sector (NFR 1A2f)] and the A_Public Power (NFR 1A1a) with 53% and 27% of the national Hg emissions in 2019, respectively.

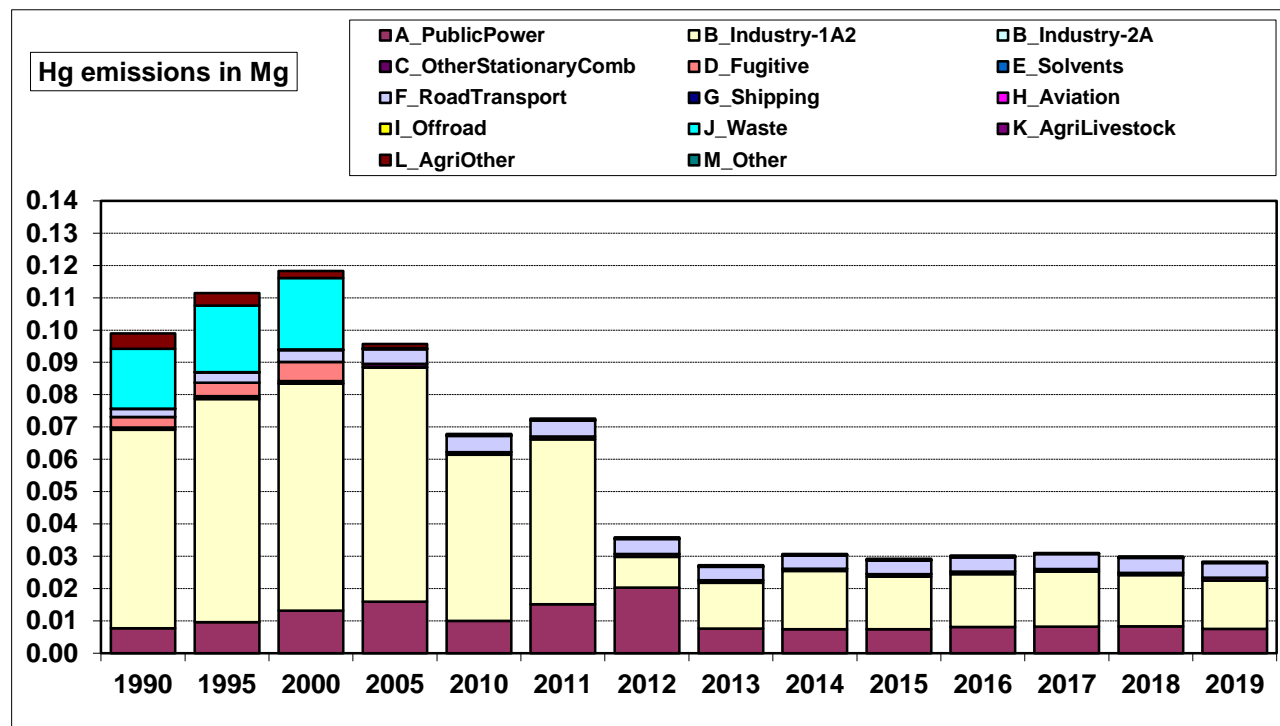


Figure 30: Hg emissions trend 1990 – 2019.

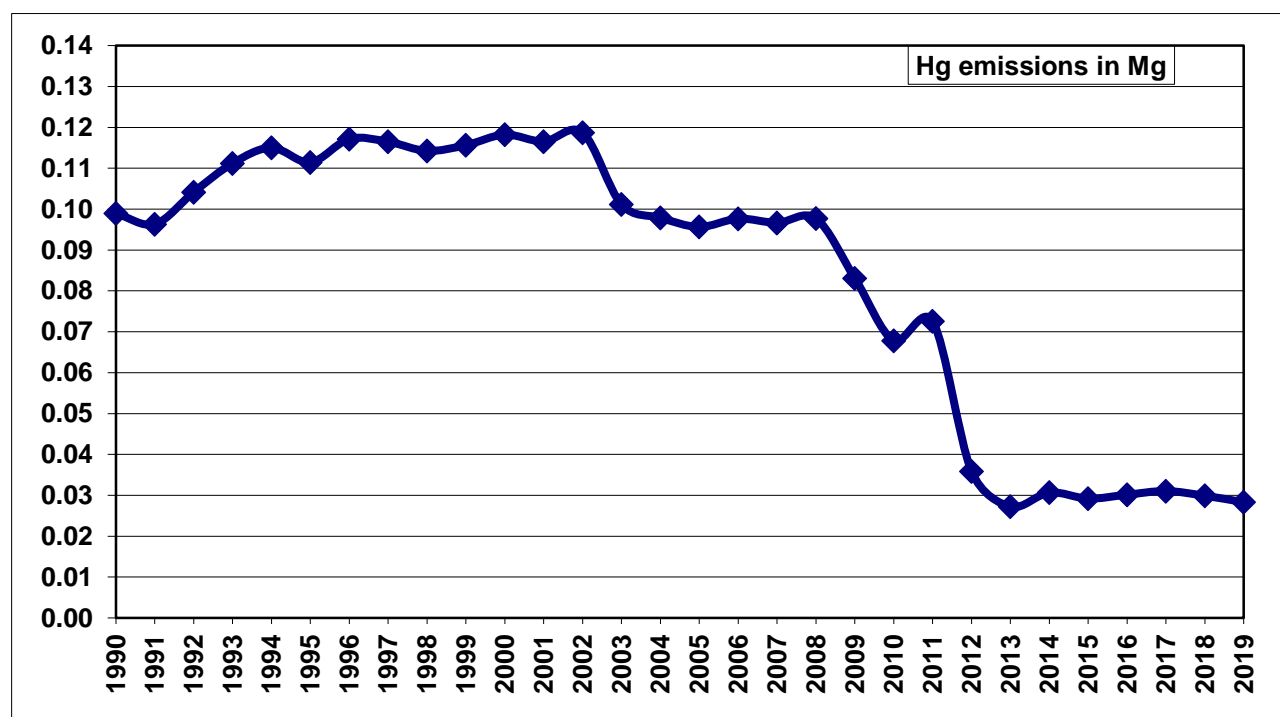


Figure 31: National total Hg emissions for the period 1990 – 2019.

6.8 Trends for Dioxins (PCDD/PCDF)

The Cyprus PCDD / PCDF emissions decreased by 16.92 g I-Teq in the 1990 – 2019 period, corresponding to 97% of the national total in 1990 and decreased by 0.14 g I-Teq in the 2005 – 2019 period, corresponding to 19% of the national total in 2005 (**Figure 32-33**). This decrease is mainly due to the J_Waste sector, as clinical waste incineration plant was terminated its operation in 2003 and all clinical wastes are subjected to sterilization.

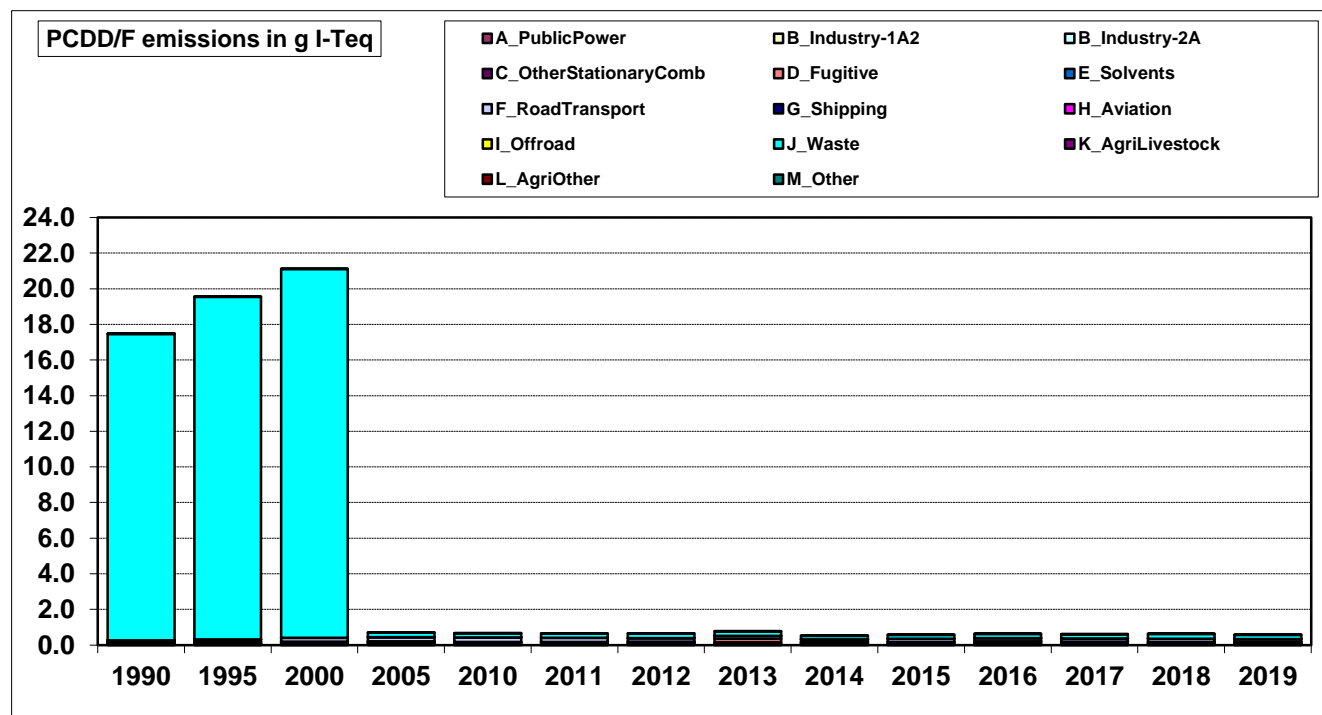


Figure 32: PCDD/F emissions trend 1990 – 2019.

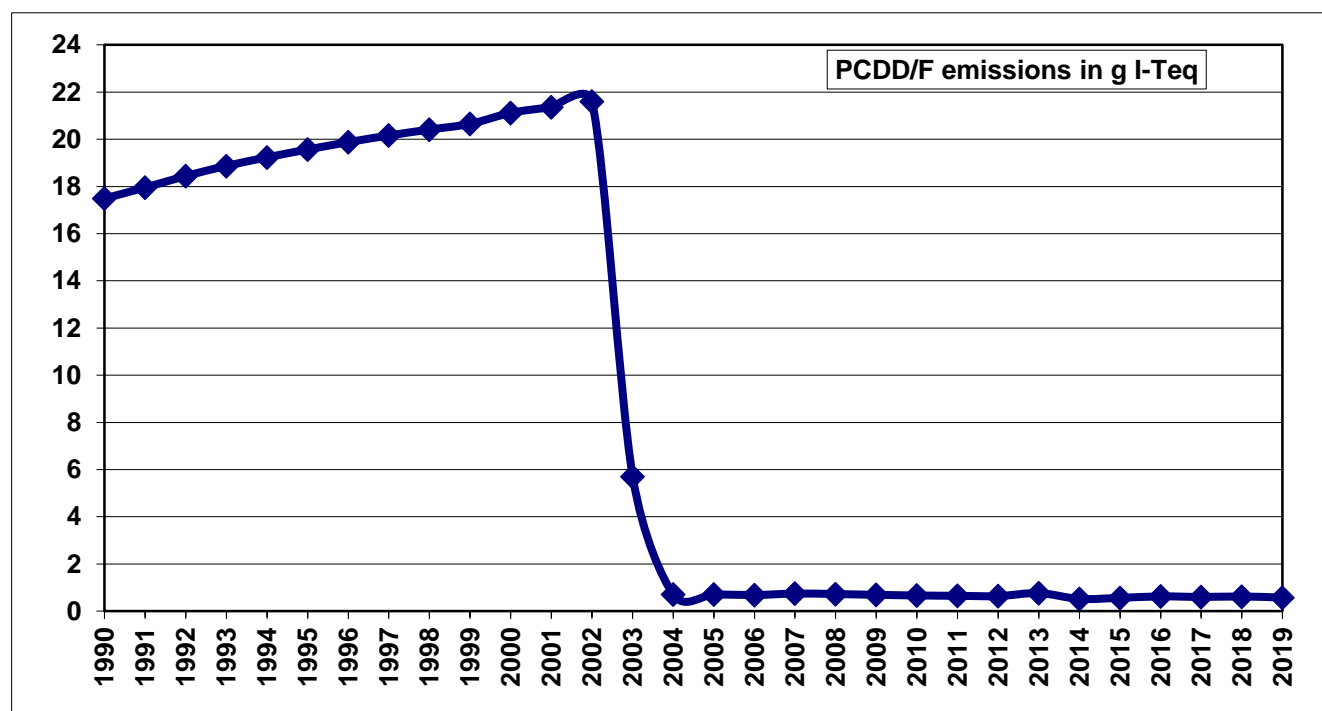


Figure 33: National total PCDD/F emissions for the period 1990 – 2019.

6.9 Trends for Polycyclic Aromatic Hydrocarbons (PAHs)

The Cyprus PAHs emissions decreased by 13.10 Mg in the 1990 – 2019 period, corresponding to 95% of the national total in 1990 and decreased by 3.15 Mg in the 2005 – 2019 period, corresponding to 83% of the national total in 2005 (**Figure 34-35**). This decrease is mainly due to the agricultural sector (L_AgriOther sector – 3F Field Burning), where the amount of the crop residue burned has been reduced significantly over the years due to the intensive campaign of the responsible authorities (MARDE) and the enforcement of a new legislation against the uncontrolled burnings.

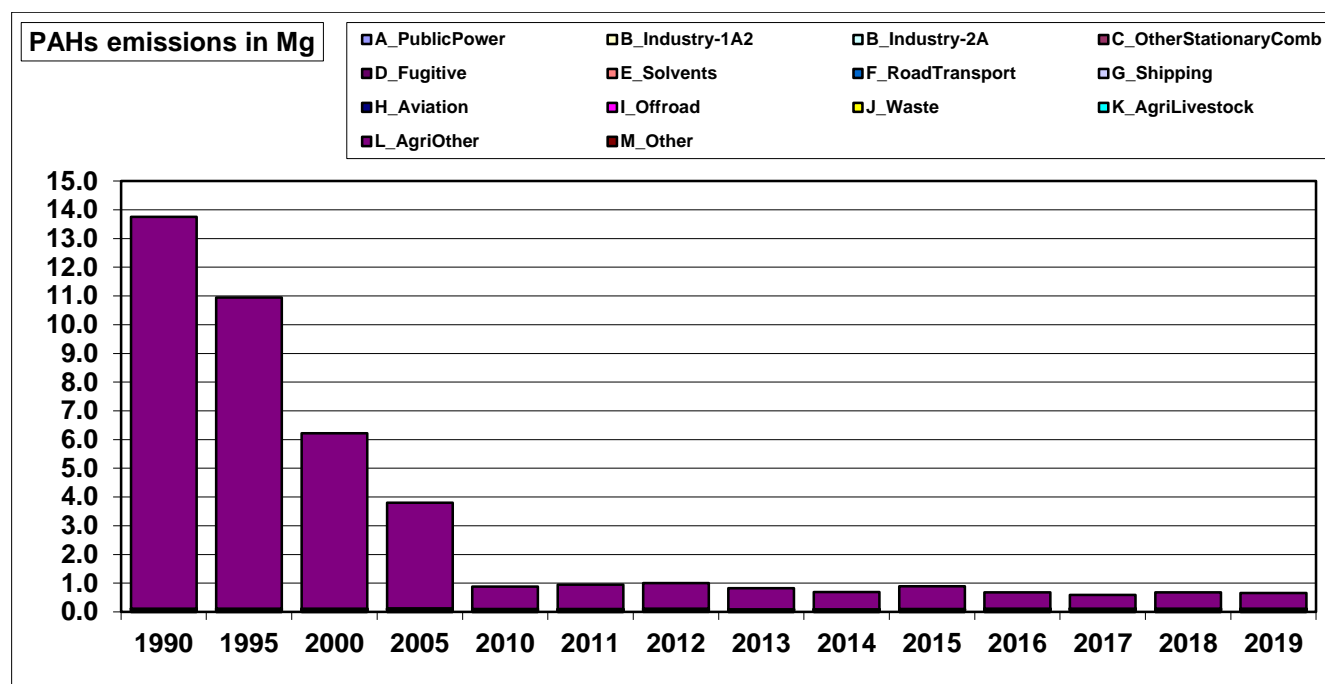


Figure 34: PAHs emissions trend 1990 – 2019.

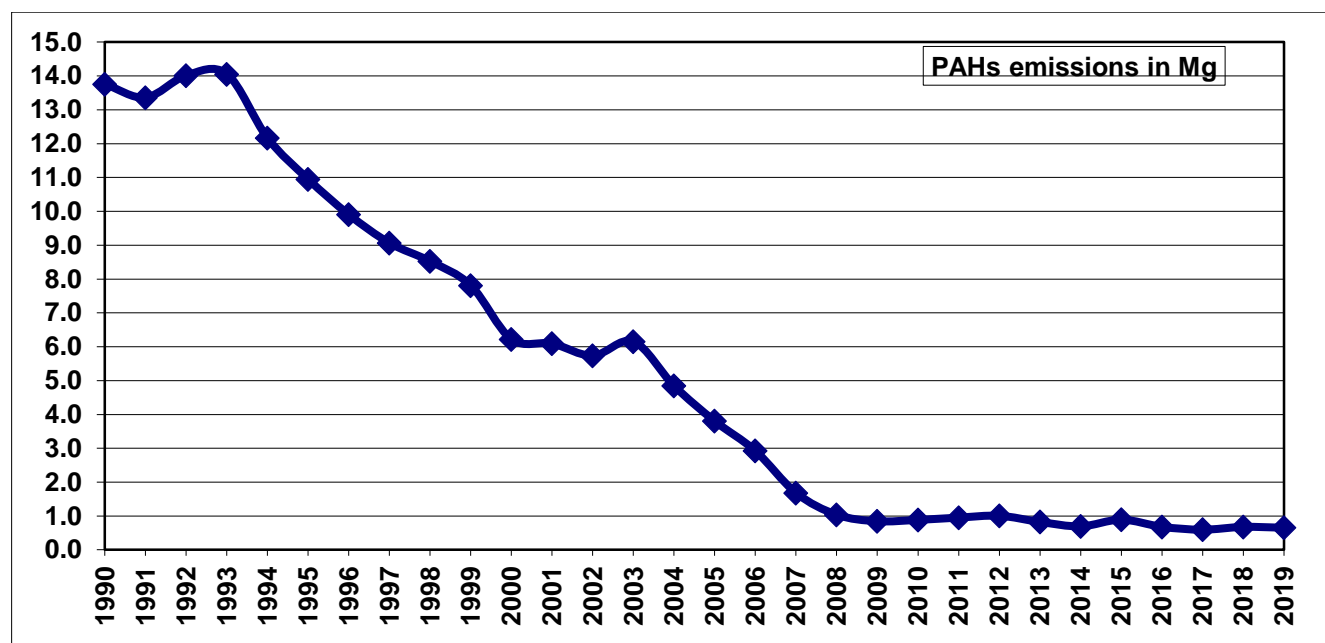


Figure 35: National total PAHs emissions for the period 1990 – 2019.

6.10 Trends for Hexachlorobenzene (HCB)

The Cyprus HCB emissions decreased by 0.03 kg in the 1990 – 2019 period, corresponding to 53% of the national total in 1990 and increased by 0.02 Kg in the 2000 – 2019 period, corresponding to 206% of the national total in 2005 (**Figure 36-37**). The decrease for the period 1990 – 2019 is mainly due to the J_ Waste sector, where clinical waste incineration plant was terminated its operation since 2003 and all clinical wastes are subjected to sterilization. The increase for the period 2005 – 2019 is due to L_AgriOther and the B_Industry (1A2) sectors. The latter is due to the increased production of the cement factory. Since we do not have any data regarding the use of pesticides before 2007 (3Df category) the recent years show an increase in this category (included in L_AgriOther sector).

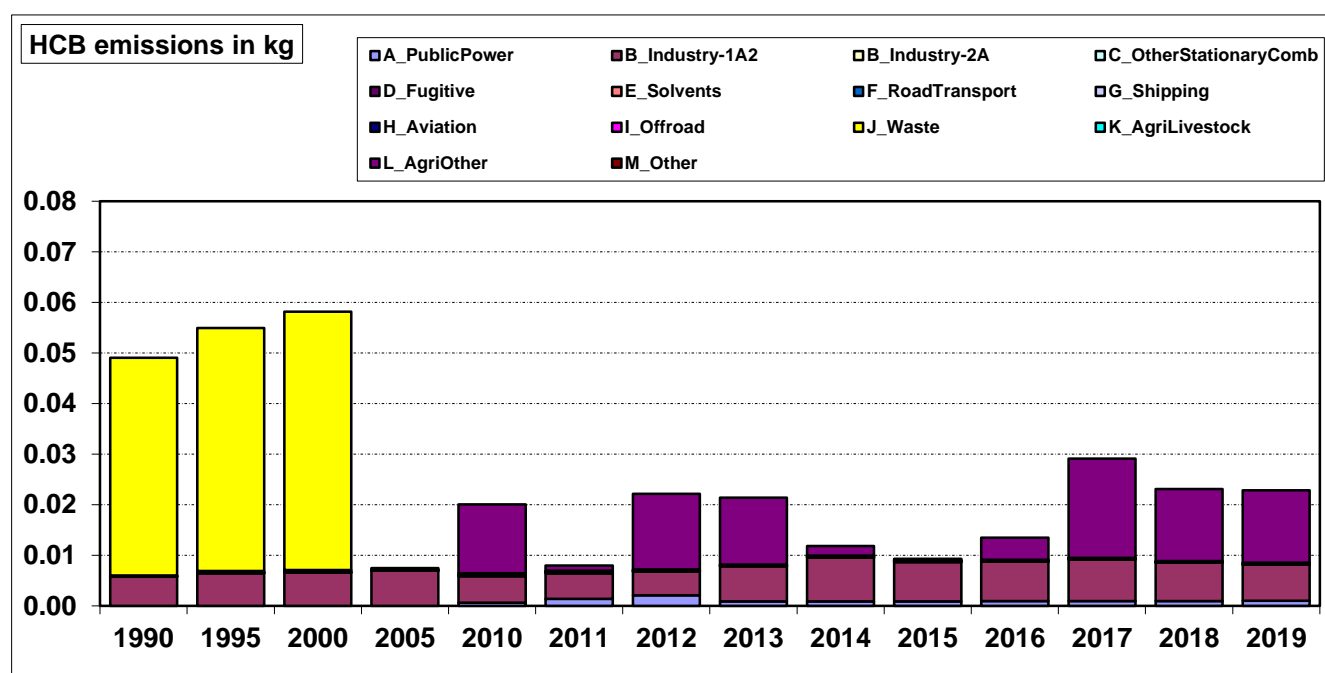


Figure 36: HCB emissions trend 1990 – 2019.

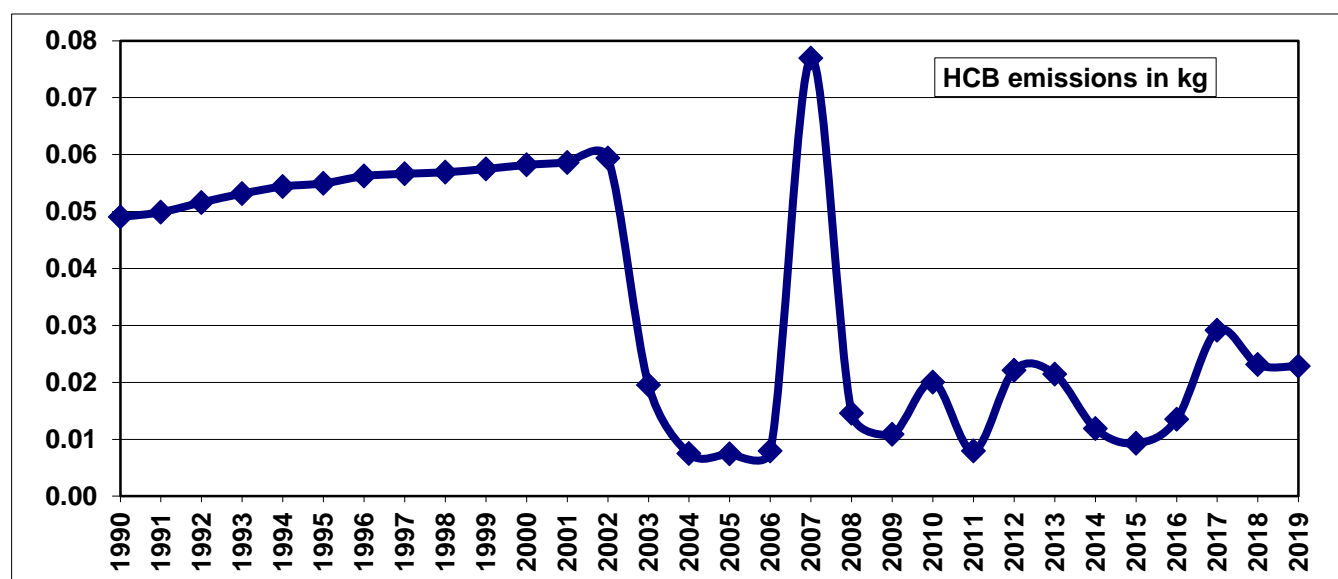


Figure 37: National total HCB emissions for the period 1990 – 2019.

7 Energy

The A_Public Power sector is the major contributing sector to Cyprus' national emission inventory. The A_Public Power sector contributes by about 90% SO₂, 26% NO_x, 16% PM₁₀, 22% PM_{2.5}, 73% Cd, 27% Hg and 15% PCDD/F to the national total of these pollutants.

The emission data from this sector are based on direct emission measurements – Tier 3 method (NO_x, CO and Particulates) or calculations based on fuel consumed and emission factors.

Emission estimations from direct emission measurements are calculated according to the following formula:

$$Emission (mg / year) = Flow rate (Nm^3 / h) * Operation hours (h / year) * Concentration (mg / Nm^3)$$

Concentration value is the yearly average.

Emission estimations based on fuel consumption and use of emission factors are calculated according to the following formula:

$$Emission (g / year) = Fuel Consumption (tn / year) * Emission Factor (g / tn)$$

The fuel consumption is derived from the Cyprus energy balance provided by the Energy Service. The emission factors used are derived from the EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019 [10].

7.1 Energy industries

7.1.1 Public electricity and heat production (1A1a)

On July 11th 2011, a severe explosion that occurred within the military naval base “Evangellos Florakis” at the Southern coast of Cyprus, adjacent to the Vassilikos Power Station (PS), caused extensive damage to Vassilikos PS and as a result this power station was not in operation until late 2012. Vassilikos PS is the newest and largest power station of the island contributing approximately 50% to the generation system capacity. The Cyprus Energy Regulatory Authority (CERA) informed the Energy Commissioner and the Director General of the European Commission DG Energy about the sudden crisis in the energy market that Cyprus was facing.

The result of the severe reduction in generating capacity was that the Electricity Authority of Cyprus (EAC) was unable to meet the peak summer demand. The expected maximum demand for the summer 2011 was 1155 MW and the available generation capacity of the existing generating plants right after the incident was 689MW. Because of the damage of the plants at Vassilikos PS, temporary generating plants were immediately required and the old generating units of Moni PS and Dhekelia PS were returned to full use, until Vassilikos PS is fully restored. Details concerning the situation of Public Electricity in Cyprus during 2011 – 2014 are shown in the Cyprus Informative Inventory Report 2013, March 2015 [6].

As far as the Renewable Energy Sources (RES) is concerned, the year 2010 can be regarded as a landmark year in the promotion of large scale Energy Projects from RES. Following the start of operation in the previous years, of small but important electricity generation units from Biogas, in 2010 important strides were made in the penetration of Wind and Solar Energy in the electricity system of Cyprus.

The first Wind Park was placed in operation in November 2010 at Orites locality, having 82MW installed capacity and consisting of 41 wind generators of 2,0 MW installed capacity each. Furthermore, additional Wind Farms was placed in operation in 2012. In the period under review three Wind Farms with total capacity of 146,7 MW were licensed.

Having in mind the already licensed electricity generation installations from RES and the prospective investments as well as the submitted timetables of the investors, it is believed that more projects will materialise and operate in the following years, if subject to the limitation of long procedures for obtaining the necessary approvals.

As mentioned above, in November 2010 the first Wind Park (82 MW) was placed in operation thus improving the generation mix to include renewable generation sources (wind, solar, animal waste etc.) and eventually natural gas.

Details on electricity generation installations from RES in 2019 in comparison with 2017 and 2018 are given below in **Table 25**, with reference to Cyprus Energy Regulatory Authority, Annual Report 2021 [18].

Table 25: Electricity Generation Installation from RES

Technology	Installed Capacity in MW			Annual Energy Production in GWh		
	2017	2018	2019	2017	2018	2019
Wind Parks	157.5	157.5	157.5	211.1	220.6	238.1
Photovoltaic Systems	73.8	78.1	87.0	111.4	128.5	132.0
Biomass	9.7	9.7	9.7	36.1	36.1	37.8
Total Energy Production from RES (GWh)				358.6	385.2	407.9

Details for the above table could be found in the following link.

<https://www.cera.org.cy/en-gb/ilektrismos/details/statistika-ape>¹

Currently Cyprus is mainly dependent on Heavy Fuel Oil and Diesel, which are 100% imported. In Cyprus, two power stations are in operation (Moni PS is a kind of standby unit). All the units of these stations burn liquid fuel (heavy fuel oil or diesel). Details of the units of these power stations are given in **Table 28**. It should be noted that Cyprus does not have waste incineration unit with energy recovery within this sector.

Based on **Table 26**, a small amount of electricity is produced by small power plants that are using biomass.

The activity data as well as the EF used for the estimation of the emissions of these small power plants are shown below in **Table 26** and **Table 27** respectively.

Table 26: Biomass consumption in NFR 1A

Year	Biomass Consumption (toe)
2006	13
2007	120
2008	992
2009	2281
2010	3021
2011	4438
2012	4301
2013	4202
2014	4347
2015	4406
2016	4474
2017	4434
2018	4480
2019	4889

Table 27: EF used in 1A for Biomass

Pollutants	Emission factors
NO _x	81g/GJ
NM ₅₀ OC	7.31 g/GJ
SO _x	10.8 g/GJ
PM _{2.5}	133 g/GJ
PM ₁₀	155 g/GJ
TSP	172 g/GJ
BC	3.3% * PM _{2.5}
CO	90 g/GJ
Pb	20.6 mg/GJ
Cd	1.76 mg/GJ
Hg	1.51 mg/GJ
As	9.46 mg/GJ
Cr	9.03 mg/GJ
Cu	21.1 mg/GJ
Ni	14.2 mg/GJ
Se	1.2 mg/GJ
Zn	181 mg/GJ
PCDD/F	50 mg/GJ
Benzo(a)pyrene	1.12 mg/GJ
Benzo(b)fluoranthene	0.043 mg/GJ
Benzo(k)fluoranthene	0.0155 mg/GJ

Pollutants	Emission factors
Indeno (1.2.3-cd) pyrene	0.0374 mg/GJ
HCB	5 µg/GJ
PCBs	3.5 µg/GJ

Table 28: Power Stations Operating in Cyprus.

Power Station	Units	Abatement Technology	Capacity (in MWe)	Fuel	Year of Operation
Moni (south coast)	Gas Turbine 1	None	37.5	Diesel	1992
	Gas Turbine 2		37.5	Diesel	1992
	Gas Turbine 3		37.5	Diesel	1995
	Gas Turbine 4		37.5	Diesel	1995
Dhekelia (south-east coast)	Steam Turbine 1	Low NOx tips	60	HFO	1982
	Steam Turbine 2	Low NOx tips	60	HFO	1983
	Steam Turbine 3	Low NOx tips	60	HFO	1989
	Steam Turbine 4	Low NOx tips	60	HFO	1989
	Steam Turbine 5	Low NOx tips	60	HFO	1993
	Steam Turbine 6	Low NOx tips	60	HFO	1993
	ICE 1	DeNOx ¹	50	HFO	2009
	ICE 2	DeNOx ²	50	HFO	2010
Vassilikos (south coast)	Steam Turbine 1	EP. Low NOx burners ³	130	HFO	2000
	Steam Turbine 2	EP. Low NOx burners ⁴	130	HFO	2000
	Steam Turbine 3 ⁷	EP. Low NOx burners. FGD ⁵	130	HFO	2006
	CCGT 4	Water Injection for NOx reduction	220	Diesel	2009
	CCGT 5	Water Injection for NOx reduction	220	Diesel	2011
	Temporary ICE ⁶	None	38	Diesel	2012

Notes:

EP = Electrostatic Precipitators and FGD = Flue Gas Desulphurization

- 1: The DeNOx system for ICE1 plant was installed in September 2016.
- 2: The DeNOx system for ICE2 plant was installed at the start of the operation (April 2010).
- 3: 1.1.2010 electrostatic precipitator (EP) and low NOx burners were installed,
- 4: 1.6.2009 electrostatic precipitator (EP) and low NOx burners were installed,
- 5: FGD was not in operation for the period 20.1.2010 - 31.12.2014.
- 6: Temporary Internal Combustion (ICE) – **Stopped its operations since 2013.**
- 7: The Steam Turbine 3 was out of operation the time period 6.9.2019 to 25.10.2020.

It is noted that the Moni Power Station has almost stopped its operation. Last year the average operating hours for each turbine was approximately 480 hours per year.

In 2004, Cyprus was granted a derogation from Article 4(3) and part A of Annex III of Directive 2001/80/EC [14]. The derogation states that: "Emission limit values of 1700 mg/Nm³ shall apply to the boilers in operation at the combustion plants at Dhekelia and Vassilikos Power Stations until one of the following conditions materializes:

- there is an upgrade or a significant change to these boilers;
- natural gas becomes available on the island;
- Cyprus becomes an exporter of electricity;
- the currently operating boilers are closed.

As far as Moni Power Station is concerned, it falls under Article 4(4) of Directive 2001/80/EC [14] which means that the plant will not operate for more than 20000 operational hours for the period from 1 January 2008 to 31 December 2015.

Emission data are based on environmental annual reports submitted by the operator of the three power plants operating in Cyprus. Emission estimations until 2008, for all pollutants was carried out using activity data and emissions factors. From 2008 until today the emissions estimations for NO_x, CO and particulates (PM_{2.5}, PM₁₀ and TSP) result from continuous emission monitoring systems (**Tier 3 methodology**).

“Cyprus indicated that to the inventory team knowledge the values reported by operators for the estimation of emissions are not validated average values with the confidence limits subtracted. In the opinion of the TERT, bottom-up data based on the "validated average values" defined in the IED cannot be used by the inventory team without adjustment in the framework of a national inventory. The TERT notes that this issue relates to an underestimate, which could correspond to 20% of SO₂, 20% of NO_x, 30% of dust of the sector (depending on the fraction of the operators subtracting confidence interval). The TERT recommends that Cyprus organise a survey among operators to identify whether any are reporting emissions on the basis of the validated average values and try to derive a methodology to adjust the national emissions over the time series in order to compensate for any under reporting”.

Cyprus inventory team, based on TERT recommendation, organized in November 2017, a survey among the Power Station's operators to find out the methodology used to attain the values that they are reporting. The findings of this survey are that the operators are reporting invalided average values without any subtraction of the confidence limits.

SO_x emissions are estimated based on the Sulphur content of fuels used in each unit. The trend of the average Sulphur content of fuels used in energy production in Cyprus during the 1990 – 2014 period are presented in **Table 29**.

Table 29: Sulphur Content (%) of Fuels used per year in NFR 1A1a.

Year	Fuel	Units	Sulphur Content (%)
1990 - 1999	Heavy Fuel Oil	Steam Turbines	2
	Diesel	Gas Turbines	0.3
2000 - 2003	Heavy Fuel Oil	Steam Turbines – Dhekelia. Moni	2
	Heavy Fuel Oil	Steam Turbines – Vassilikos	1
	Diesel	Gas Turbines	0.3
2004	Heavy Fuel Oil	Steam Turbines – Moni	1.98
	Heavy Fuel Oil	Steam Turbines – Dhekelia	1.91
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.7
	Diesel	Gas Turbines	0.2
2005	Heavy Fuel Oil	Steam Turbines – Moni	2.08
	Heavy Fuel Oil	Steam Turbines – Dhekelia	2
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.7
	Diesel	Gas Turbines	0.2
2006	Heavy Fuel Oil	Steam Turbines – Moni	1.68
	Heavy Fuel Oil	Steam Turbines – Dhekelia	1.65
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.61
	Diesel	Gas Turbines	0.2
2007	Heavy Fuel Oil	Steam Turbines – Moni	1.65
	Heavy Fuel Oil	Steam Turbines – Dhekelia	1.54
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.65
	Diesel	Gas Turbines	0.2
2008	Heavy Fuel Oil	Steam Turbines – Moni	1.01
	Heavy Fuel Oil	Steam Turbines – Dhekelia	0.98
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.87
	Diesel	Gas Turbines	0.1
2009	Heavy Fuel Oil	Steam Turbines – Moni	0.84
	Heavy Fuel Oil	Steam Turbines – Dhekelia	0.82
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.8
	Diesel	Gas Turbines	0.1
2010	Heavy Fuel Oil	Steam Turbines – Moni	0.9
	Heavy Fuel Oil	Steam Turbines. ICE – Dhekelia	0.94
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.97
	Diesel	Gas Turbines	0.1
2011	Heavy Fuel Oil	Steam Turbines – Moni	0.91
	Heavy Fuel Oil	Steam Turbines. ICE – Dhekelia	0.93
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.86
	Diesel	Gas Turbines. Temporary ICE	0.065
2012	Heavy Fuel Oil	Steam Turbines – Moni	0.71
	Heavy Fuel Oil	Steam Turbines. ICE – Dhekelia	0.82
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0
	Diesel	Gas Turbines. Temporary ICE	0.073
2013	Diesel	Gas Turbines – Moni	0.087
	Heavy Fuel Oil	Steam Turbines. ICE – Dhekelia	0.89
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.92
	Diesel	Gas Turbines. Temporary ICE	0.087
2014	Diesel	Gas Turbines – Moni	0.086
	Heavy Fuel Oil	Steam Turbines. ICE – Dhekelia	0.95

Year	Fuel	Units	Sulphur Content (%)
2015	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.92
	Diesel	Gas Turbines. Temporary ICE	0.086
	Diesel	Gas Turbines – Moni	0.092
	Heavy Fuel Oil	Steam Turbines. ICE – Dhekelia	0.78
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.82
	Diesel	Gas Turbines. Temporary ICE	0.092
2016	Diesel	Gas Turbines – Moni	0.08
	Heavy Fuel Oil	Steam Turbines. ICE – Dhekelia	0.94
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.93
	Diesel	Gas Turbines. Temporary ICE	0.08
2017	Diesel	Gas Turbines – Moni	0.08
	Heavy Fuel Oil	Steam Turbines. ICE – Dhekelia	0.92
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.92
	Diesel	Gas Turbines. Temporary ICE	0.08
2018	Diesel	Gas Turbines – Moni	0.073
	Heavy Fuel Oil	Steam Turbines. ICE – Dhekelia	0.92
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.92
	Diesel	Gas Turbines. Temporary ICE	0.073
2019	Diesel	Gas Turbines – Moni	0.058
	Heavy Fuel Oil	Steam Turbines. ICE – Dhekelia	0.93
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.93
	Diesel	Gas Turbines. Temporary ICE	0.058

The values of Sulphur contents are given by the Electricity Authority. They analyse every purchased batch of heavy fuel oil and submit to us the results. The values which are given in the **Table 29** are the yearly averages.

For the emission estimations of the other air pollutants, emission factors were used. In **Table 30** the corresponding emission factors used are given. Emissions were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2016 [11].

Table 30: EFs used in NFR 1A1a.

Pollutants	Units	Emission factors
NMVOC	Steam Turbines	2.3 g/GJ
	Gas Turbines. CCGT	0.19 g/GJ
	ICE	37.1 g/GJ
BC	Steam Turbines	5.6% of PM _{2.5}
	Gas Turbines. CCGT	33.5% of PM _{2.5}
	ICE	78% of PM _{2.5}
Pb	Steam Turbines	4.56 mg/GJ
	Gas Turbines. CCGT	0.0069 mg/GJ
	ICE	4.07 mg/GJ
Cd	Steam Turbines	1.2 mg/GJ
	Gas Turbines. CCGT	0.0012 mg/GJ

Pollutants	Units	Emission factors
	ICE	1.36 mg/GJ
Hg	Steam Turbines	0.341 mg/GJ
	Gas Turbines. CCGT	0.53 mg/GJ
	ICE	1.36 mg/GJ
As	Steam Turbines	3.98 mg/GJ
	Gas Turbines. CCGT	0.0023 mg/GJ
	ICE	1.81 mg/GJ
Cr	Steam Turbines	2.55 mg/GJ
	Gas Turbines. CCGT	0.28 mg/GJ
	ICE	1.36 mg/GJ
Cu	Steam Turbines	5.31 mg/GJ
	Gas Turbines. CCGT	0.17 mg/GJ
	ICE	2.72 mg/GJ
Ni	Steam Turbines	255 mg/GJ
	Gas Turbines. CCGT	0.0023 mg/GJ
	ICE	1.36 mg/GJ
Se	Steam Turbines	2.06 mg/GJ
	Gas Turbines. CCGT	0.0023 mg/GJ
	ICE	6.79 mg/GJ
Zn	Steam Turbines	87.8 mg/GJ
	Gas Turbines. CCGT	0.44 mg/GJ
	ICE	1.81 mg/GJ
PCDD/F	Steam Turbines	2.5 ng I-TEQ/TJ
	ICE	0.99 ng I-TEQ/TJ
Benzo(a)pyrene	ICE	0.116 mg/GJ
Benzo(b)fluoranthene	ICE	0.502 mg/GJ
Benzo(k)fluoranthene	ICE	0.0987 mg/GJ
Indeno(1.2.3-cd)pyrene	Steam Turbines	6.92 µg/GJ
	ICE	0.187 mg/GJ

7.1.2 Answers to TERT comments (1A1a)

For NFR 1A1a - PM_{2.5}, the TERT noted with reference to the NFR tables (recalculation of implied emission factors for liquid fuels) that there was a time series inconsistency in the period between 2000-2007 (IEF around 17 g/GJ) and the period 2008-2015 (IEF around 7 g/GJ). On page 55 of the IIR [8], Cyprus explained that two different methods were used for these two periods: the default GB EF was used up to 2007 and plant specific measurements from 2008 onwards. In response to a question raised during the review, Cyprus provided a revised estimate in which the TERT disagreed. Cyprus used time series splicing (Overlap technique) with the measurement data from 2008 to 2015, regardless of abatement techniques and equipment in place for each year and especially in 2005. Given the information available for HFO plants in Table 26, page 54 of the IIR [8], the TERT notes that:

- All steam turbines from Dhekelia have no PM abatement and have been in operation since the 1990.

- At Vassilikos, steam turbine 1 had no electrostatic precipitator in 2008 (installed on 1.1.2010); steam turbine 2 had no electrostatic precipitator in 2008 (installed on 1.6.2009); steam turbine 3 was not in operation in 2005, so its abatement technology is not relevant in the case of year 2005.

Thus, the TERT considers using the overlap technique with measurements from 2008 to 2015 will not lead to a representative PM_{2.5} emissions in 2005. The TERT decided to calculate a technical correction for the year 2005 based on the implied EF for 2008. The estimates demonstrate that the issue is above the threshold of significance. The TERT recommends that Cyprus includes a revised estimate in its next submission.

Based on the above, the PM_{2.5} emissions calculations for the years 1990 up to 2008 was based on the EF used for 2008 (EF PM_{2.5} = 8 g/GJ) and afterwards based on actual measurements.

Please note that based on TERT recommendations the same methodology used for the estimations of PM₁₀ and TSP. The respective EF are: 12.13 and 16.14 g/GJ.

Category 1A1a is a key source for the following components (% of national total in 2019):

NO _x	27.8%
SO _x	89.9%
PM _{2.5}	22.3%
PM ₁₀	16.4%
TSP	13.0%
Pb	23.1%
Cd	72.8%
Hg	26.6%
PCDD/F	15.4%
BC	5.5%

As regards TERT observation (CY-1A1a-2018-0001) we would like to inform you the following:

1) ICE units are mostly working with Heavy fuel oil (HFO). Based on GB2016 table 3-5, there are no EF for HCBs and PCBs.

2) The amount of Diesel used for ICE units are as follow: Please see Table 31.

3) Please note that the increased amount of diesel used for the years 2011 and 2012 was due to the explosion that occurred near Vassilikos station, and as a consequence, the Electricity Authority of Cyprus was forced to install and operate, until the full restoration of Vassilikos Station, ICE units as a temporary solution. We would also like to confirm that HCBs and PCBs emissions are calculated based on EFs of Table 3-19 of GB2016.

Table 31: Diesel quantities consumed in ICE units of E.A.C.

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Year	ICE Dhekelia 1	ICE Dhekelia 2	ICE Moni 1	ICE Moni 2	ICE Vassilikos
	Diesel (tn)	Diesel (tn)	Diesel (tn)	Diesel (tn)	Diesel (tn)
2009	118				
2010	129				
2011	25	9135	7917		32868
2012	49	16599	24262	32294	52852
2013	25				
2014	34				
2015	35				
2016	35				
2017	25				
2018	28				
2019	64				

8 I_Offroad

8.1.1 Mobile Combustion in Manufacturing Industries: Other (1A2gvii)

No key sources are found in this category.

8.1.2 Agriculture/forestry/fishing: Off road vehicles and other machinery (1A4cii)

Emissions from NFR category 1A4cii were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2016 [11]. Off road vehicles and other machinery emissions from agriculture are estimated based on fuel combustion obtained from the Energy Service and emission factors (**Table 32**). The major fuel used in this category is diesel. Diesel consumption under this category is given in **Table 33**. No key sources are found in this category.

The estimation of emissions in this sector shows several jumps and dips in the Cyprus Emission Inventory reporting round 2012 and the ERT experts recommended for improvement in the Stage 3 review report [15]. These inconsistencies were due to the activity data used for the estimation of the emissions, the activity data have been corrected and recalculations were made.

Table 32: EFs used in NFR 1A4cii.

Pollutant	Emission Factor
NO _x	34457 g/tn fuel
NM _{VOC}	3542 g/tn fuel
NH ₃	8 g/tn fuel
TSP	1913 g/tn fuel
PM ₁₀	1913 g/tn fuel
PM _{2,5}	1913 g/tn fuel
CO	11469 g/tn fuel
Cd	0,01 mg/kg fuel
Cr	0,05 mg/kg fuel
Cu	1,7 mg/kg fuel
Ni	0,07 mg/kg fuel
Se	0,01 mg/kg fuel
Zn	1 mg/kg fuel
Benzo(a)pyrene	30 µg/kg fuel
Benzo(b)fluoranthene	50 µg/kg fuel
Benzo(k)fluoranthene	40 µg/kg fuel
Indeno(123cd)pyrene	15 µg/kg fuel

Table 33: Diesel consumption from NFR 1A4cii.

Year	Diesel consumption in tonnes	Year	Diesel consumption in tonnes
1990	6155	2005	8916
1991	6619	2006	8850
1992	7984	2007	9175
1993	8114	2008	8909
1994	9224	2009	7980
1995	8769	2010	7870
1996	9204	2011	8136
1997	9659	2012	7806
1998	10194	2013	7687
1999	10563	2014	7072
2000	10815	2015	7799
2001	10920	2016	7602
2002	11342	2017	7989
2003	10862	2018	7427
2004	8972	2019	7924

8.1.3 Agriculture/forestry/fishing: National fishing (1A4cii)

Emissions from NFR category (1A4cii) were calculated based on TREMOVE methodology. Number of fishing boats was used as activity data. Emission factors consists of a weighted average of the emission of the main engine (ME) plus the emission of the auxiliary engine (AE) taking into account engine types and fuel types used by the main engine and the auxiliary engines. Average engine using time and engine load have been taken into account.

No key sources are found in this category.

The total number of fishing boats for the years 2000-2018 is shown in **Table 34**.

8.1.4 Other Mobile (including military land-based and recreational boat) (1A5b)

Emissions from NFR category (1A5b) were calculated based on TREMOVE methodology. Number of military boats was used as activity data, Emission factors consists of a weighted average of the emission of the main engine (ME) plus the emission of the auxiliary engine (AE) taking into account engine types and fuel types used by the main engine and the auxiliary engines. Average engine using time and engine load have been taken into account.

No key sources are found in this category.

The total number of military boats for the years 2000-2018 is shown in **Table 34**.

Table 34: Number of Fishing and Military Boats.

Year	Fishing Boats	Military Boats
2000	34	35
2001	46	27
2002	45	26
2003	60	23
2004	65	18
2005	50	23
2006	66	428
2007	65	722
2008	57	435
2009	40	321
2010	38	218
2011	60	250
2012	64	246
2013	36	302
2014	29	371
2015	22	206
2016	21	239
2017	9	225
2018	36	259
2019	17	271

9 H_Aviation, F_Road Transport and G_Shipping

9.1 H_Aviation

9.1.1 Civil Aviation (1A3a)

In Cyprus there are two international airports. These airports are not interconnected with internal flights, so there is no domestic aviation activity in Cyprus. However, smaller aircrafts activity is included in the NFR category 1A3ai(i): Civil Aviation (Domestic, LTO).

Emissions from international airport traffic (1A3ai(i): International aviation (LTO)) and NFR sector 1A3ai(i): Civil Aviation (Domestic, LTO) for the years 2005 up to 2019 were taken from the EUROCONTROL Database. For the rest, 1990 – 2004, the results of the overlap method were used. In **previous submissions** the emissions for both International and Domestic Aviation were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2016 [11]. Emission factors used are given in **Table 36**. The emission factors derived using the emission factors of the aircraft type BAe146 which are divided by a factor of 2 based on the engine power of these aircrafts. Number of LTOs per aircraft type was used for the calculations.

With reference to TERT observation (CY-1A3ai(i)-2019-0001) we would like to inform you that as it is stated above, “Emissions from international airport traffic (1A3ai(i): International aviation (LTO)) and NFR sector 1A3ai(i): Civil Aviation (Domestic, LTO) for the years 2005 up to 2019 were taken from the EUROCONTROL Database. For the rest, 1990 – 2004, the results of the overlap method were used. In previous submissions the emissions for both International and Domestic Aviation were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2016”. Based on this, we would like to inform you that for the years 2005 to 2019 we are using the EUROCONTROL emissions. EUROCONTROL does not estimate Heavy metal emissions and they do not give any information on the fuels used. Regarding the previous years from 1990 – 2004, we are using Tier 2 method. We could not find EF factors for Heavy Metals in the GB16.

Table 35: EFs used in NFR 1A3ai.

Aircraft Type	EFs (kg/LTO)				
	CO	NMVOC	NOx	PM _{2.5} . PM ₁₀	SO ₂
A306	14.8	1.08	25.9	0.1	1.7231
A310	28.7	5.85	19.5	0.1	1.5066
A319	9.5	1.8	7.5	0.1	0.6888
A320	5.5	0.09	10.8	0.1	0.8733
A332	16.2	1.17	35.6	0.1	2.2315
A333	13	0.9	27.6	0.1	1.884
A343	25.2	3.51	34.8	0.3	2.0199
A345	26.2	3.78	28.3	0.2	1.8626
A346	15	0.18	64.7	0.2	3.373
A388	29.6	0.36	67.3	0.2	4.1424

Aircraft Type	EFs (kg/LTO)				
	CO	NMVOC	NO _x	PM _{2.5} . PM ₁₀	SO ₂
B737	8	0.81	9.1	0.1	0.7792
B738	7.1	0.63	12.3	0.1	0.8811
B742	27.5	2.88	47.5	0.2	3.0746
B743	18.3	2.25	57	0.2	3.4305
B744	25.3	1.89	44.5	0.2	3.3197
B752	12.3	0.18	15	0.1	1.3626
B753	11.6	0.09	17.9	0.1	1.4636
B762	14.8	2.97	23.8	0.1	1.4627
B763	14.5	1.08	28.2	0.1	1.7748
B772	12.6	0.45	55.8	0.1	2.3321
B773	17.7	1.8	63.3	0.1	2.4089
B77L	47.5	4.59	69.8	0.2	3.0908
B77W	48.1	4.77	61.2	0.2	2.9518
DC10	20.6	2.16	35.7	0.2	2.3059
DC85	28.7	5.85	19.5	0.1	1.5066
DC87	26.3	1.35	15.6	0.1	1.6952
F2TH	5.2	1.44	1.3	0	0.1699
MD11	18.3	1.26	38.2	0.2	2.6279
T154	82.9	11.88	12	0.2	1.8857
A306	14.8	1.08	25.9	0.1	1.7231

Table 36: EFs used in NFR 1A3aii(i).

Aircraft Type	EFs (kg/LTO)				
	NO _x	NMVOC	SO ₂	PM _{2.5} . PM ₁₀	CO
Smaller Aircraft	2.1	0.45	0.3	0.04	4.85

Category 1A3ai(i) is a key source for the following components (% of national total in 2019):

NO _x	3.4%
-----------------	------

9.2 F_RoadTransport

9.2.1 Road Transportation (1A3b)

Road transport emissions are estimated by the use of COPERT 5 (Tier 3 methodology). COPERT 5 is a MS Windows software program. In principle, COPERT 5 has been developed for use by the National Experts in order to estimate emissions from road transport which will be included in official annual national inventories. The use of a software tool to calculate road transport emissions allows for a transparent and standardized, hence consistent and comparable data collecting and emissions reporting procedure, in accordance with the requirements of international conventions and protocols and EU legislation.

The COPERT 5 methodology is part of the EMEP/CORINAIR Emission Inventory Guidebook 2016 [11]. The Guidebook, developed by the UNECE Task Force on Emissions Inventories and Projections, is intended to support reporting under the UNECE Convention on Long-Range Transboundary Air Pollution and the EU directive on national emission ceilings.

COPERT 5 estimates emissions of all major air pollutants (CO, NO_x, VOC, particulates, NH₃, SO₂, heavy metals) produced by different vehicle categories (passenger cars, light duty vehicles, heavy duty vehicles, mopeds and motorcycles). Emissions estimated are distinguished in three sources:

- Emissions produced during thermally stabilized engine operation (hot emissions),
- emissions occurring during engine start from ambient temperature (cold-start and warming-up effects) and
- NMVOC emissions due to fuel evaporation.

Non-exhaust particulate emissions from tyre and brake wear are also included. The total emissions are calculated as a product of activity data provided by the user and speed-dependent emission factors calculated by the software.

In addition, the fuel consumed in this sector is taken into consideration. The COPERT 5 run estimates the fuel consumption (diesel and gasoline). These values are then compared to statistical fuel sold and the annual mileage values are corrected on the basis of the differences between calculated and statistical fuel consumption. A new COPERT run is performed with the adjusted data and all emissions are calculated.

The COPERT 5, had been used for the calculations of the whole time series (1990 – 2018). The total number of road vehicles by type is shown in **Table 37** and the corresponding trend is shown in **Figure 38**. The decrease of the vehicles numbers shown in the years 2014 and 2015 is due to the financial crisis occurred in Cyprus and the increased usage of the public transportation.

The emissions of the category 1A3bvii Automobile road abrasion were also estimated by COPERT 5.

Table 37: Number of vehicles by type.

	1990	1995	2000	2005	2010	2015	2018	2019
Buses	2708	3078	3270	3683	5276	5763	6143	6358
Heavy Duty Trucks	10439	11806	12667	16364	19041	17353	18372	18829
Mopeds & Motorcycles	64457	66395	59403	59924	54812	53661	56850	57973
Light Commercial Vehicles	69708	104591	116672	125586	121573	119537	123895	126997
Passenger Cars	195330	257314	302088	416758	515151	587505	668490	692447
Total	342642	443184	494102	622315	715853	783819	873750	902604

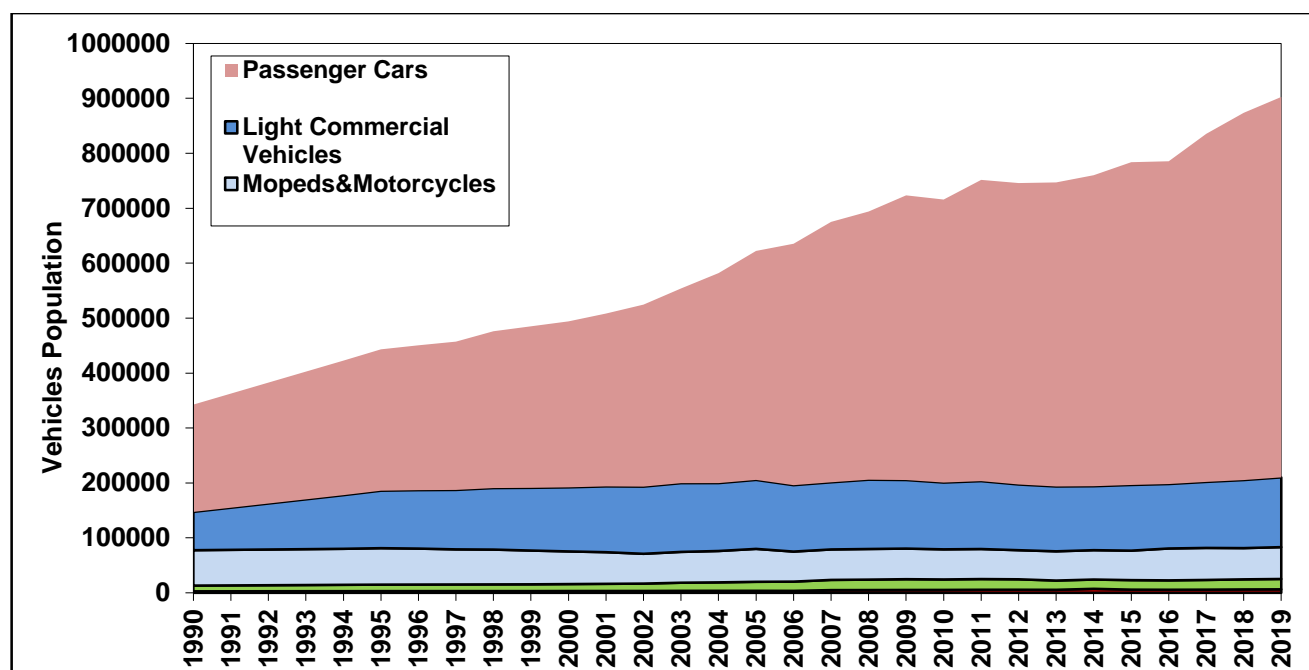


Figure 38: Trend of vehicles population in the F_Road transport sector.

TERT observation CY-1A3bi-2019-0004: For 1A3bi Road Transport: Passenger Cars, NOX, all years the TERT noted that there is a lack of transparency regarding the NOX IEF trend and Cyprus has the lowest NOX IEF across the time series for 1A3bi when compared to other countries. Cyprus did not provide a response to this question during the review. The TERT is unable to determine whether there is an under-estimate that may be above the threshold of significance.

The TERT recommends that Cyprus provides further clarification of the low NOX IEF trend by providing information on the fleet composition/Euro standard mix by vehicle type in the 2020 IIR.

The requested fleet composition data is shown in Table 38 below.

Table 38: Fleet composition per technology

Category	Fuel	Segment	Euro Standard	Stock [n]
Passenger Cars	Petrol	Small	PRE ECE	0.0
Passenger Cars	Petrol	Small	ECE 15/00-01	0.0
Passenger Cars	Petrol	Small	ECE 15/02	62.8
Passenger Cars	Petrol	Small	ECE 15/03	393.5
Passenger Cars	Petrol	Small	ECE 15/04	1,668.5
Passenger Cars	Petrol	Small	Improved Conventional	0.0
Passenger Cars	Petrol	Small	Open Loop	0.0
Passenger Cars	Petrol	Small	Euro 1	20,672.2
Passenger Cars	Petrol	Small	Euro 2	28,183.0
Passenger Cars	Petrol	Small	Euro 3	49,458.0

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Category	Fuel	Segment	Euro Standard	Stock [n]
Passenger Cars	Petrol	Small	Euro 4	61,794.0
Passenger Cars	Petrol	Small	Euro 5	58,910.0
Passenger Cars	Petrol	Small	Euro 6 up to 2016	11,773.0
Passenger Cars	Petrol	Small	Euro 6 2017-2019	3,890.0
Passenger Cars	Petrol	Small	Euro 6 2020+	0.0
Passenger Cars	Petrol	Medium	PRE ECE	0.0
Passenger Cars	Petrol	Medium	ECE 15/00-01	0.0
Passenger Cars	Petrol	Medium	ECE 15/02	80.6
Passenger Cars	Petrol	Medium	ECE 15/03	369.9
Passenger Cars	Petrol	Medium	ECE 15/04	2,443.0
Passenger Cars	Petrol	Medium	Improved Conventional	0.0
Passenger Cars	Petrol	Medium	Open Loop	0.0
Passenger Cars	Petrol	Medium	Euro 1	31,095.6
Passenger Cars	Petrol	Medium	Euro 2	49,056.0
Passenger Cars	Petrol	Medium	Euro 3	71,978.0
Passenger Cars	Petrol	Medium	Euro 4	81,972.0
Passenger Cars	Petrol	Medium	Euro 5	31,759.0
Passenger Cars	Petrol	Medium	Euro 6 up to 2016	6,717.0
Passenger Cars	Petrol	Medium	Euro 6 2017-2019	2,877.0
Passenger Cars	Petrol	Medium	Euro 6 2020+	0.0
Passenger Cars	Petrol	Large-SUV-Executive	PRE ECE	0.0
Passenger Cars	Petrol	Large-SUV-Executive	ECE 15/00-01	0.0
Passenger Cars	Petrol	Large-SUV-Executive	ECE 15/02	138.0
Passenger Cars	Petrol	Large-SUV-Executive	ECE 15/03	193.3
Passenger Cars	Petrol	Large-SUV-Executive	ECE 15/04	233.2
Passenger Cars	Petrol	Large-SUV-Executive	Euro 1	4,199.6
Passenger Cars	Petrol	Large-SUV-Executive	Euro 2	3,055.0
Passenger Cars	Petrol	Large-SUV-Executive	Euro 3	4,954.0
Passenger Cars	Petrol	Large-SUV-Executive	Euro 4	4,943.0
Passenger Cars	Petrol	Large-SUV-Executive	Euro 5	704.0
Passenger Cars	Petrol	Large-SUV-Executive	Euro 6 up to 2016	257.0
Passenger Cars	Petrol	Large-SUV-Executive	Euro 6 2017-2019	98.0
Passenger Cars	Petrol	Large-SUV-Executive	Euro 6 2020+	0.0
Passenger Cars	Diesel	Mini	Euro 4	0.0
Passenger Cars	Diesel	Mini	Euro 5	0.0
Passenger Cars	Diesel	Mini	Euro 6 up to 2016	0.0
Passenger Cars	Diesel	Mini	Euro 6 2017-2019	0.0
Passenger Cars	Diesel	Mini	Euro 6 2020+	0.0
Passenger Cars	Diesel	Small	Conventional	185.8
Passenger Cars	Diesel	Small	Euro 1	2,022.2
Passenger Cars	Diesel	Small	Euro 2	3,150.0
Passenger Cars	Diesel	Small	Euro 3	7,163.0
Passenger Cars	Diesel	Small	Euro 4	26,010.0

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Category	Fuel	Segment	Euro Standard	Stock [n]
Passenger Cars	Diesel	Small	Euro 5	11,562.0
Passenger Cars	Diesel	Small	Euro 6 up to 2016	12,498.0
Passenger Cars	Diesel	Small	Euro 6 2017-2019	4,695.0
Passenger Cars	Diesel	Small	Euro 6 2020+	0.0
Passenger Cars	Diesel	Medium	Conventional	799.4
Passenger Cars	Diesel	Medium	Euro 1	7,154.6
Passenger Cars	Diesel	Medium	Euro 2	8,688.0
Passenger Cars	Diesel	Medium	Euro 3	6,027.0
Passenger Cars	Diesel	Medium	Euro 4	23,483.0
Passenger Cars	Diesel	Medium	Euro 5	6,918.0
Passenger Cars	Diesel	Medium	Euro 6 up to 2016	1,978.0
Passenger Cars	Diesel	Medium	Euro 6 2017-2019	586.0
Passenger Cars	Diesel	Medium	Euro 6 2020+	0.0
Passenger Cars	Petrol Hybrid	Mini	Euro 4	0.0
Passenger Cars	Petrol Hybrid	Small	Euro 4	6,994.0
Passenger Cars	Petrol Hybrid	Medium	Euro 4	0.0
Passenger Cars	LPG Bifuel	Small	Conventional	0.0
Passenger Cars	LPG Bifuel	Small	Euro 1	0.0
Passenger Cars	LPG Bifuel	Small	Euro 2	0.0
Passenger Cars	LPG Bifuel	Small	Euro 3	0.0
Passenger Cars	LPG Bifuel	Small	Euro 4	0.0
Passenger Cars	LPG Bifuel	Small	Euro 5	0.0
Passenger Cars	LPG Bifuel	Small	Euro 6	0.0
Light Commercial Vehicles	Petrol	N1-II	Conventional	392.4
Light Commercial Vehicles	Petrol	N1-II	Euro 1	1,837.6
Light Commercial Vehicles	Petrol	N1-II	Euro 2	326.0
Light Commercial Vehicles	Petrol	N1-II	Euro 3	968.0
Light Commercial Vehicles	Petrol	N1-II	Euro 4	2,179.0
Light Commercial Vehicles	Petrol	N1-II	Euro 5	373.0
Light Commercial Vehicles	Petrol	N1-II	Euro 6 up to 2017	250.0
Light Commercial Vehicles	Petrol	N1-II	Euro 6 2018-2020	0.0
Light Commercial Vehicles	Petrol	N1-II	Euro 6 2021+	0.0
Light Commercial Vehicles	Diesel	N1-II	Conventional	5,381.2
Light Commercial Vehicles	Diesel	N1-II	Euro 1	38,749.8
Light Commercial Vehicles	Diesel	N1-II	Euro 2	14,400.0
Light Commercial Vehicles	Diesel	N1-II	Euro 3	18,252.0
Light Commercial Vehicles	Diesel	N1-II	Euro 4	28,341.0
Light Commercial Vehicles	Diesel	N1-II	Euro 5	6,080.0
Light Commercial Vehicles	Diesel	N1-II	Euro 6 up to 2017	6,371.0
Light Commercial Vehicles	Diesel	N1-II	Euro 6 2018-2020	0.0
Light Commercial Vehicles	Diesel	N1-II	Euro 6 2021+	0.0
Heavy Duty Trucks	Petrol	>3,5 t	Conventional	9.0
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Conventional	269.8

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Category	Fuel	Segment	Euro Standard	Stock [n]
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro I	1,676.2
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro II	1,168.0
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro III	2,379.0
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro IV	1,131.0
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro V	332.0
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro VI	145.0
Heavy Duty Trucks	Diesel	Rigid 7,5 - 12 t	Conventional	16.9
Heavy Duty Trucks	Diesel	Rigid 7,5 - 12 t	Euro I	96.7
Heavy Duty Trucks	Diesel	Rigid 7,5 - 12 t	Euro II	135.8
Heavy Duty Trucks	Diesel	Rigid 7,5 - 12 t	Euro III	195.3
Heavy Duty Trucks	Diesel	Rigid 7,5 - 12 t	Euro IV	110.8
Heavy Duty Trucks	Diesel	Rigid 7,5 - 12 t	Euro V	43.8
Heavy Duty Trucks	Diesel	Rigid 7,5 - 12 t	Euro VI	20.0
Heavy Duty Trucks	Diesel	Rigid 12 - 14 t	Conventional	16.9
Heavy Duty Trucks	Diesel	Rigid 12 - 14 t	Euro I	96.7
Heavy Duty Trucks	Diesel	Rigid 12 - 14 t	Euro II	135.8
Heavy Duty Trucks	Diesel	Rigid 12 - 14 t	Euro III	195.3
Heavy Duty Trucks	Diesel	Rigid 12 - 14 t	Euro IV	110.8
Heavy Duty Trucks	Diesel	Rigid 12 - 14 t	Euro V	43.8
Heavy Duty Trucks	Diesel	Rigid 12 - 14 t	Euro VI	20.0
Heavy Duty Trucks	Diesel	Rigid 14 - 20 t	Conventional	49.5
Heavy Duty Trucks	Diesel	Rigid 14 - 20 t	Euro I	288.3
Heavy Duty Trucks	Diesel	Rigid 14 - 20 t	Euro II	371.0
Heavy Duty Trucks	Diesel	Rigid 14 - 20 t	Euro III	646.4
Heavy Duty Trucks	Diesel	Rigid 14 - 20 t	Euro IV	411.1
Heavy Duty Trucks	Diesel	Rigid 14 - 20 t	Euro V	82.9
Heavy Duty Trucks	Diesel	Rigid 14 - 20 t	Euro VI	45.7
Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	Conventional	32.6
Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	Euro I	191.6
Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	Euro II	235.3
Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	Euro III	451.1
Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	Euro IV	300.4
Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	Euro V	39.2
Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	Euro VI	25.7
Heavy Duty Trucks	Diesel	Rigid 26 - 28 t	Conventional	26.7
Heavy Duty Trucks	Diesel	Rigid 26 - 28 t	Euro I	156.8
Heavy Duty Trucks	Diesel	Rigid 26 - 28 t	Euro II	192.5
Heavy Duty Trucks	Diesel	Rigid 26 - 28 t	Euro III	369.1
Heavy Duty Trucks	Diesel	Rigid 26 - 28 t	Euro IV	245.8
Heavy Duty Trucks	Diesel	Rigid 26 - 28 t	Euro V	32.0
Heavy Duty Trucks	Diesel	Rigid 26 - 28 t	Euro VI	21.0
Heavy Duty Trucks	Diesel	Rigid 28 - 32 t	Conventional	32.6
Heavy Duty Trucks	Diesel	Rigid 28 - 32 t	Euro I	191.6

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Category	Fuel	Segment	Euro Standard	Stock [n]
Heavy Duty Trucks	Diesel	Rigid 28 - 32 t	Euro II	235.3
Heavy Duty Trucks	Diesel	Rigid 28 - 32 t	Euro III	451.1
Heavy Duty Trucks	Diesel	Rigid 28 - 32 t	Euro IV	300.4
Heavy Duty Trucks	Diesel	Rigid 28 - 32 t	Euro V	39.2
Heavy Duty Trucks	Diesel	Rigid 28 - 32 t	Euro VI	25.7
Heavy Duty Trucks	Diesel	Rigid >32 t	Conventional	0.6
Heavy Duty Trucks	Diesel	Rigid >32 t	Euro I	7.7
Heavy Duty Trucks	Diesel	Rigid >32 t	Euro II	17.7
Heavy Duty Trucks	Diesel	Rigid >32 t	Euro III	2.0
Heavy Duty Trucks	Diesel	Rigid >32 t	Euro IV	0.7
Heavy Duty Trucks	Diesel	Rigid >32 t	Euro V	0.0
Heavy Duty Trucks	Diesel	Rigid >32 t	Euro VI	0.0
Heavy Duty Trucks	Diesel	Articulated 14 - 20 t	Conventional	49.5
Heavy Duty Trucks	Diesel	Articulated 14 - 20 t	Euro I	288.3
Heavy Duty Trucks	Diesel	Articulated 14 - 20 t	Euro II	371.0
Heavy Duty Trucks	Diesel	Articulated 14 - 20 t	Euro III	646.4
Heavy Duty Trucks	Diesel	Articulated 14 - 20 t	Euro IV	411.1
Heavy Duty Trucks	Diesel	Articulated 14 - 20 t	Euro V	82.9
Heavy Duty Trucks	Diesel	Articulated 14 - 20 t	Euro VI	45.7
Heavy Duty Trucks	Diesel	Articulated 20 - 28 t	Conventional	32.6
Heavy Duty Trucks	Diesel	Articulated 20 - 28 t	Euro I	191.6
Heavy Duty Trucks	Diesel	Articulated 20 - 28 t	Euro II	235.3
Heavy Duty Trucks	Diesel	Articulated 20 - 28 t	Euro III	451.1
Heavy Duty Trucks	Diesel	Articulated 20 - 28 t	Euro IV	300.4
Heavy Duty Trucks	Diesel	Articulated 20 - 28 t	Euro V	39.2
Heavy Duty Trucks	Diesel	Articulated 20 - 28 t	Euro VI	25.7
Heavy Duty Trucks	Diesel	Articulated 28 - 34 t	Conventional	33.2
Heavy Duty Trucks	Diesel	Articulated 28 - 34 t	Euro I	199.3
Heavy Duty Trucks	Diesel	Articulated 28 - 34 t	Euro II	252.9
Heavy Duty Trucks	Diesel	Articulated 28 - 34 t	Euro III	453.1
Heavy Duty Trucks	Diesel	Articulated 28 - 34 t	Euro IV	301.0
Heavy Duty Trucks	Diesel	Articulated 28 - 34 t	Euro V	39.2
Heavy Duty Trucks	Diesel	Articulated 28 - 34 t	Euro VI	25.7
Heavy Duty Trucks	Diesel	Articulated 34 - 40 t	Conventional	0.6
Heavy Duty Trucks	Diesel	Articulated 34 - 40 t	Euro I	7.7
Heavy Duty Trucks	Diesel	Articulated 34 - 40 t	Euro II	17.7
Heavy Duty Trucks	Diesel	Articulated 34 - 40 t	Euro III	2.0
Heavy Duty Trucks	Diesel	Articulated 34 - 40 t	Euro IV	0.7
Heavy Duty Trucks	Diesel	Articulated 34 - 40 t	Euro V	0.0
Heavy Duty Trucks	Diesel	Articulated 34 - 40 t	Euro VI	0.0
Heavy Duty Trucks	Diesel	Articulated 40 - 50 t	Conventional	0.0
Heavy Duty Trucks	Diesel	Articulated 40 - 50 t	Euro I	0.0
Heavy Duty Trucks	Diesel	Articulated 40 - 50 t	Euro II	0.0

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Category	Fuel	Segment	Euro Standard	Stock [n]
Heavy Duty Trucks	Diesel	Articulated 40 - 50 t	Euro III	0.0
Heavy Duty Trucks	Diesel	Articulated 40 - 50 t	Euro IV	0.0
Heavy Duty Trucks	Diesel	Articulated 40 - 50 t	Euro V	0.0
Heavy Duty Trucks	Diesel	Articulated 40 - 50 t	Euro VI	0.0
Heavy Duty Trucks	Diesel	Articulated 50 - 60 t	Conventional	0.0
Heavy Duty Trucks	Diesel	Articulated 50 - 60 t	Euro I	0.0
Heavy Duty Trucks	Diesel	Articulated 50 - 60 t	Euro II	0.0
Heavy Duty Trucks	Diesel	Articulated 50 - 60 t	Euro III	0.0
Heavy Duty Trucks	Diesel	Articulated 50 - 60 t	Euro IV	0.0
Heavy Duty Trucks	Diesel	Articulated 50 - 60 t	Euro V	0.0
Heavy Duty Trucks	Diesel	Articulated 50 - 60 t	Euro VI	0.0
Buses	Diesel	Urban Buses Midi <=15 t	Conventional	106.8
Buses	Diesel	Urban Buses Midi <=15 t	Euro I	553.2
Buses	Diesel	Urban Buses Midi <=15 t	Euro II	406.2
Buses	Diesel	Urban Buses Midi <=15 t	Euro III	503.4
Buses	Diesel	Urban Buses Midi <=15 t	Euro IV	490.8
Buses	Diesel	Urban Buses Midi <=15 t	Euro V	232.2
Buses	Diesel	Urban Buses Midi <=15 t	Euro VI	128.4
Buses	Diesel	Urban Buses Standard 15 - 18 t	Conventional	71.2
Buses	Diesel	Urban Buses Standard 15 - 18 t	Euro I	368.8
Buses	Diesel	Urban Buses Standard 15 - 18 t	Euro II	270.8
Buses	Diesel	Urban Buses Standard 15 - 18 t	Euro III	335.6
Buses	Diesel	Urban Buses Standard 15 - 18 t	Euro IV	327.2
Buses	Diesel	Urban Buses Standard 15 - 18 t	Euro V	154.8
Buses	Diesel	Urban Buses Standard 15 - 18 t	Euro VI	85.6
Buses	Diesel	Urban Buses Articulated >18 t	Conventional	0.0
Buses	Diesel	Urban Buses Articulated >18 t	Euro I	0.0
Buses	Diesel	Urban Buses Articulated >18 t	Euro II	0.0
Buses	Diesel	Urban Buses Articulated >18 t	Euro III	0.0
Buses	Diesel	Urban Buses Articulated >18 t	Euro IV	0.0
Buses	Diesel	Urban Buses Articulated >18 t	Euro V	0.0
Buses	Diesel	Urban Buses Articulated >18 t	Euro VI	0.0
Buses	Diesel	Coaches Standard <=18 t	Conventional	46.0
Buses	Diesel	Coaches Standard <=18 t	Euro I	286.0
Buses	Diesel	Coaches Standard <=18 t	Euro II	358.0
Buses	Diesel	Coaches Standard <=18 t	Euro III	541.0
Buses	Diesel	Coaches Standard <=18 t	Euro IV	629.0
Buses	Diesel	Coaches Standard <=18 t	Euro V	86.0
Buses	Diesel	Coaches Standard <=18 t	Euro VI	150.0
Buses	Diesel	Coaches Articulated >18 t	Conventional	0.0
Buses	Diesel	Coaches Articulated >18 t	Euro I	0.0
Buses	Diesel	Coaches Articulated >18 t	Euro II	0.0
Buses	Diesel	Coaches Articulated >18 t	Euro III	0.0

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Category	Fuel	Segment	Euro Standard	Stock [n]
Buses	Diesel	Coaches Articulated >18 t	Euro IV	0.0
Buses	Diesel	Coaches Articulated >18 t	Euro V	0.0
Buses	Diesel	Coaches Articulated >18 t	Euro VI	0.0
L-Category	Petrol	Mopeds 2-stroke <50 cm ³	Conventional	780.2
L-Category	Petrol	Mopeds 2-stroke <50 cm ³	Euro 1	9,622.8
L-Category	Petrol	Mopeds 2-stroke <50 cm ³	Euro 2	3,038.0
L-Category	Petrol	Mopeds 2-stroke <50 cm ³	Euro 3	3,935.0
L-Category	Petrol	Mopeds 4-stroke <50 cm ³	Conventional	0.0
L-Category	Petrol	Mopeds 4-stroke <50 cm ³	Euro 1	0.0
L-Category	Petrol	Mopeds 4-stroke <50 cm ³	Euro 2	0.0
L-Category	Petrol	Mopeds 4-stroke <50 cm ³	Euro 3	0.0
L-Category	Petrol	Motorcycles 2-stroke >50 cm ³	Conventional	23.8
L-Category	Petrol	Motorcycles 2-stroke >50 cm ³	Euro 1	146.2
L-Category	Petrol	Motorcycles 2-stroke >50 cm ³	Euro 2	16.0
L-Category	Petrol	Motorcycles 2-stroke >50 cm ³	Euro 3	667.0
L-Category	Petrol	Motorcycles 4-stroke <250 cm ³	Conventional	675.6
L-Category	Petrol	Motorcycles 4-stroke <250 cm ³	Euro 1	4,850.4
L-Category	Petrol	Motorcycles 4-stroke <250 cm ³	Euro 2	2,992.0
L-Category	Petrol	Motorcycles 4-stroke <250 cm ³	Euro 3	12,007.0
L-Category	Petrol	Motorcycles 4-stroke 250 - 750 cm ³	Conventional	274.4
L-Category	Petrol	Motorcycles 4-stroke 250 - 750 cm ³	Euro 1	2,421.6
L-Category	Petrol	Motorcycles 4-stroke 250 - 750 cm ³	Euro 2	1,301.0
L-Category	Petrol	Motorcycles 4-stroke 250 - 750 cm ³	Euro 3	5,424.0
L-Category	Petrol	Motorcycles 4-stroke >750 cm ³	Conventional	218.2
L-Category	Petrol	Motorcycles 4-stroke >750 cm ³	Euro 1	1,534.8
L-Category	Petrol	Motorcycles 4-stroke >750 cm ³	Euro 2	1,309.0
L-Category	Petrol	Motorcycles 4-stroke >750 cm ³	Euro 3	3,356.0

Regarding the TERT observation CY-1A3b-2018-0003, we would like to inform you that for the estimations of the emissions of Heavy Metals from transportation we used the default values of COPERT 5. As per TERT's recommendation, the calculations were updated for the whole time series 1990 – 2019.

9.2.2 1A3bi Road Transport - Passenger cars

Category 1A3bi is a key source for the following components (% of national total in 2019):

NO _x	8.8%
NM VOC	4.2%
PM _{2.5}	2.8%
BC	8.5%
CO	39.8%
Hg	11.4%
PCDD/PCDF	13.6%

9.2.3 1A3bii Road Transport - Light duty vehicles

Category 1A3bii is a key source for the following components (% of national total in 2019):

NO _x	12.8%
PM _{2.5}	7.8%
PM ₁₀	4.0%
BC	27.3%
CO	7.7%
PCDD/PCDF	10.4%

9.2.4 1A3biii Road Transport - Heavy duty vehicles

Category 1A3biii is a key source for the following components (% of national total in 2019):

NO _x	18.6%
PM _{2.5}	5.0%
PM ₁₀	2.5%
BC	14.9%
CO	5.8%

9.2.5 1A3biv Road Transport - Mopeds and motorcycles

Category 1A3biv is a key source for the following components (% of national total in 2019):

NMVOC	4.5%
CO	9.6%

9.2.6 1A3bv Road Transport - Gasoline evaporation

Category 1A3bv is a key source for the following components (% of national total in 2019):

NMVOC	12.6%
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9.2.7 1A3bvi Road Transport - Automobile tyre and brake wear

Category 1A3bvi is a key source for the following components (% of national total in 2019):

PM _{2.5}	9.2%
PM ₁₀	8.8%
TSP	6.9%
Pb	64.8%
BC	4.2%

9.2.8 1A3bvii Road Transport - Automobile Road Abrasion

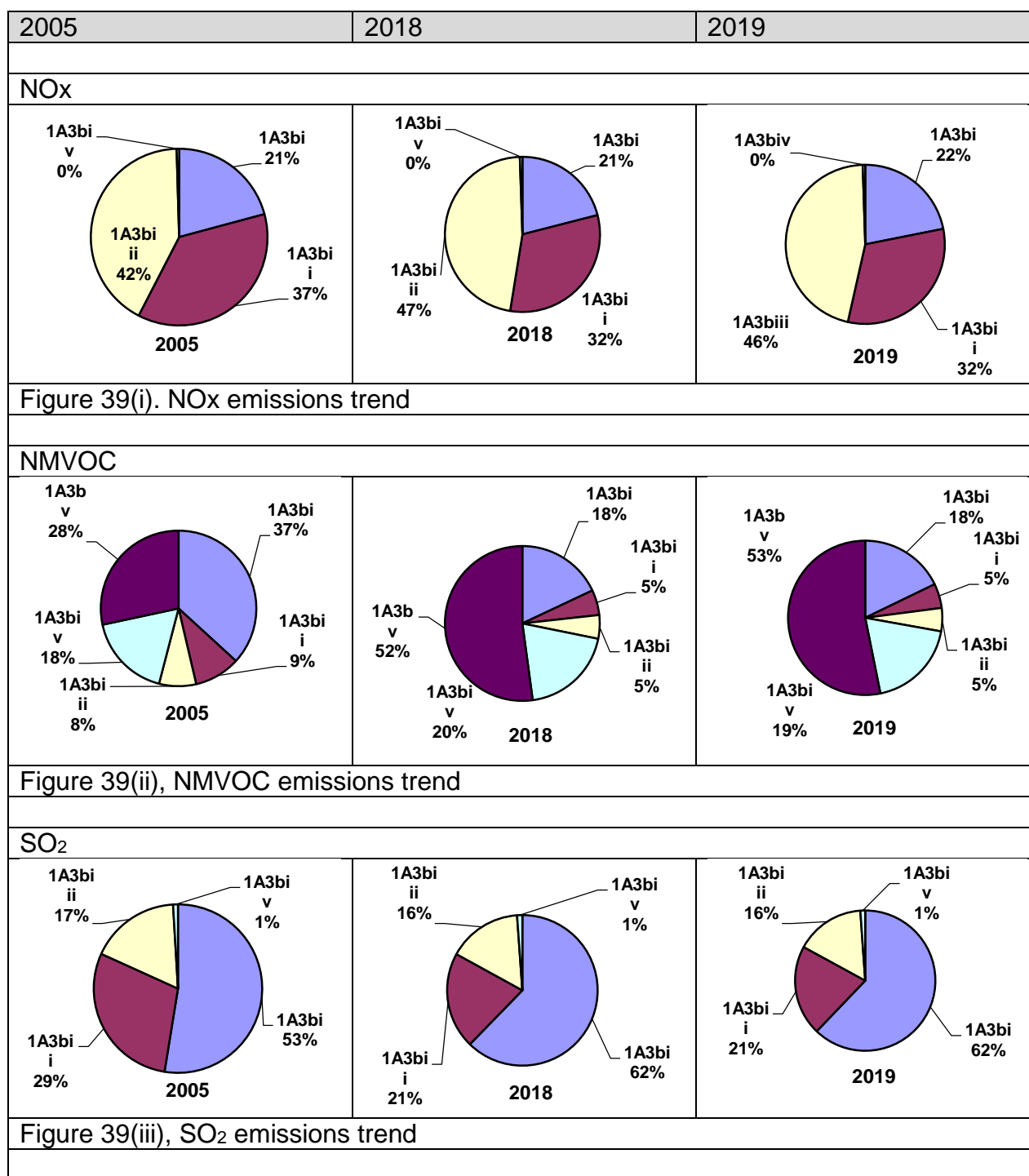
COPERT 5 was used for the estimation of the emissions of this category.

Category 1A3bvii is a key source for the following components (% of national total in 2019):

PM _{2.5}	3.9%
PM ₁₀	3.7%
TSP	4.4%

As shown above, the road transport sector (NFR 1A3b) is a key source sector in the Cyprus national emission inventory for many of the pollutants covered under the LRTAP convention.

In **Figure 39** below the trend of NO_x, NMVOC, SO₂, TSP, CO and PCDD/PCDF are shown for the years 2005, 2018 and 2019.



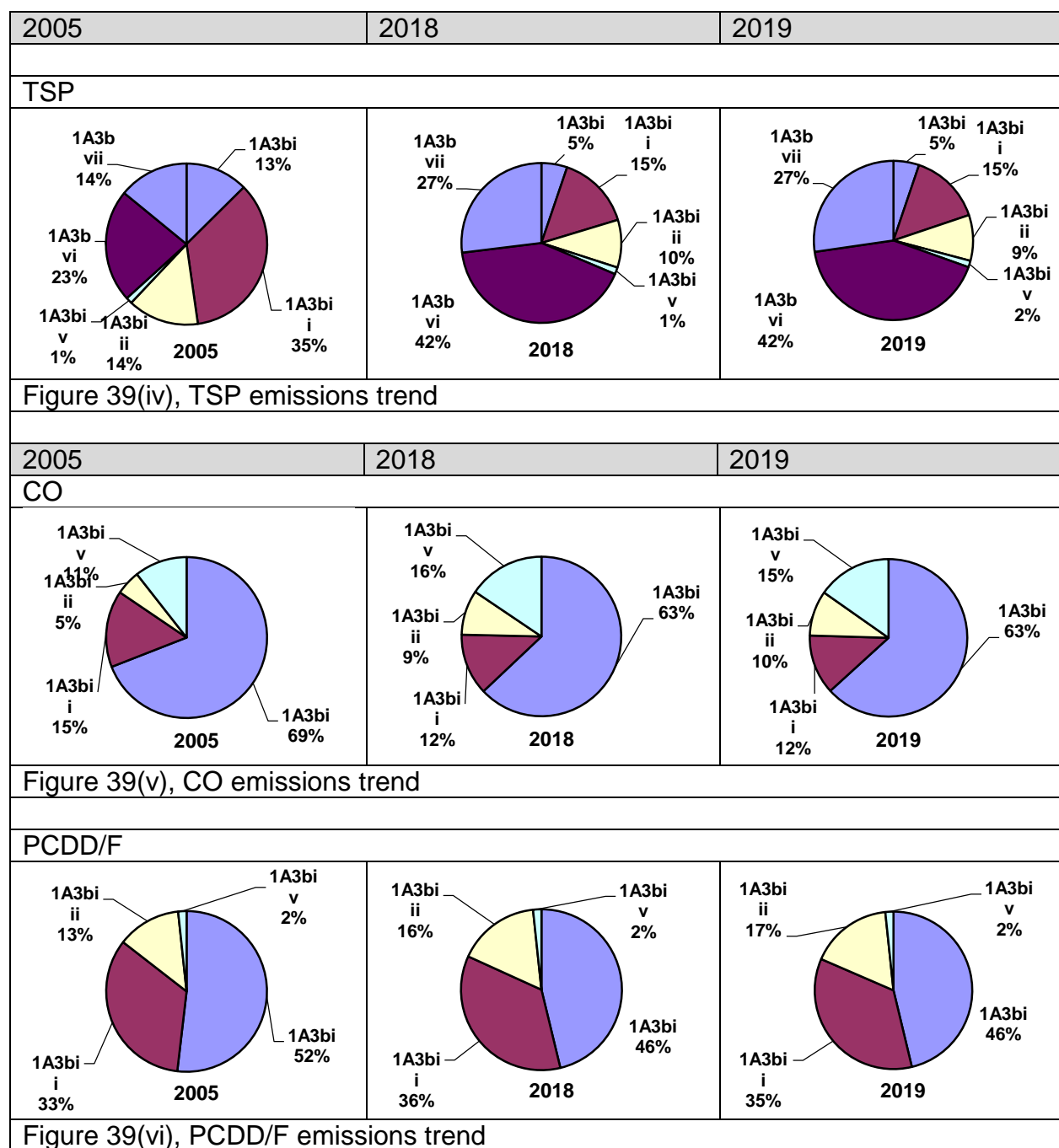


Figure 39: Emissions trend in the road transport sector.

9.2.9 Railways (1A3c)

No such activity takes place in Cyprus.

9.3 G_Shipping

9.3.1 Navigation (1A3d)

For the estimation of emissions from the International navigation (1A3di) sector, only in-port emissions were taken into account. Port callings for various passenger ferries and cargo vessels were used as activity data for the calculations based on the TREMOVE methodology. The emission factor consists of a weighted average of the emission of the main engine (ME) plus the emission of the auxiliary engine (AE) taking into account engine types and fuel types used by the main and the auxiliary engines. Average engine using time and engine load have been taken into account. No key sources are found in this category. This category is not included in the national total (memo items).

In Cyprus there are no inland waterways. Thus, the NFR category 1A3dii: National Navigation (shipping) includes emissions from yachts and small boats. The emissions calculation is based on the same methodology (TREMOVE methodology) as described above.

No key sources are found in this category.

Following the TERT recommendation (CY-1A3dii-2019-0002) regarding the estimation of NH₃ of category 1A3dii, Cyprus is using the 2016 EMEP/EEA Guidebook (1A3d chapter, Table 3-5) for the 2020 submission.

The total number of ships entered into Cyprus ports in 2000, 2005, 2010, , 2013, 2014, 2015, 2016, 2017, 2018 and 2019 by category are shown in **Table 39 for International Navigation and Table 40 for Domestic Navigation**.

Table 39: Number of Ships by Category (International Navigation)

Ship Category	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019
Passenger Carriers	1212	482	382	249	207	162	72	48	38	43
Cargo ships: Conventional & Reefer	1382	1240	755	491	392	359	416	295	283	314
Cargo ships: Container & Cont/Multipurpose	879	978	961	854	767	742	843	660	764	762
Cargo ships: Ro-Ro & Vehicle Carriers	593	649	461	232	231	264	262	232	247	277
Cargo ships: Bulk Carriers	116	291	248	426	522	549	483	224	285	407
Cargo ships: Tankers	859	995	792	775	655	805	788	577	582	770
Other cargo ships	4	16	9	14	112	14	23	172	194	238
Total	5045	4651	3608	3041	2886	2895	2887	2208	2393	2811

Table 40: Number of Ships by Category (Domestic Navigation)

Ship Category	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019
Yacht	58	54	112	94	52	47	46	77	81	84
Other (small boats)	118	206	457	1061	853	792	197	77	117	94
Total	276	260	569	1155	905	839	243	154	198	178

The TERT recommended that for completeness, Cyprus would try to find data on vessel destination from vessels leaving ports in Cyprus in order to make a more accurate and complete estimate of emissions for international navigation. For the time being we did not manage to collect such data.

9.3.2 Pipeline transport (1A3ei)

No such activity takes place in Cyprus.

10 C_Other Stationary Combustion

10.1 Commercial/Institutional (1A4ai and 1A4aii)

Emissions from categories Commercial/Institutional: Stationary (1A4ai) and Commercial/Institutional: Mobile (1A4aii) are reported as Included Elsewhere (IE). This is due to the fact that the amount of fuel consumed under each of these categories cannot be identified. Thus, emissions from category Commercial / Institutional: Stationary (1A4ai) are included in category Residential stationary plants (1A4bi) and emissions from category Commercial / Institutional: Mobile (1A4aii) are included in category F_Road transport (1A3bi-iv).

10.2 Residential: Stationary plants (1A4bi)

Emissions from Residential: Stationary plants (1A4bi) were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10]. Combustion emissions from central heating are based on fuel consumption data (Cyprus energy balance - Annex 6) and emission factors (**Table 41**). The major fuels used in this category is diesel and LPG. Wood is also used as a fuel in fireplaces for heating. Activity data on wood were derived from the annual Statistical Service reports. The activity data used under this category are given in **Table 42**.

The estimation of emissions in this sector shows several jumps and dips in the Cyprus Emission Inventory reporting round 2011 and recommendations for improvement were written in the Stage 3 review report [15]. These inconsistencies were due to the activity data used for the estimation of the emissions. The activity data have been corrected and recalculations were made.

Table 41: EFs used in NFR 1A4bi.

Pollutants	Emission Factors		
	Other Liquid fuels	Biomass	Gaseous fuels
NO _x	51 g/GJ	50 g/GJ	51 g/GJ
NM VOC	0.69 g/GJ	600 g/GJ	1.9 g/GJ
SO _x	sulphur content 1% (for diesel) 70 g/GJ (for the others)	11 g/GJ	0.3 g/GJ
NH ₃	NE	70 g/GJ	NE
TSP	1.9 g/GJ	800 g/GJ	1.2 g/GJ
PM ₁₀	1.9 g/GJ	760 g/GJ	1.2 g/GJ
PM _{2.5}	1.9 g/GJ	740 g/GJ	1.2 g/GJ
BC	8.5% of PM _{2.5}	10% of PM _{2.5}	5.4% of PM _{2.5}
CO	57 g/GJ	4000 g/GJ	26 g/GJ
Pb	0.012 mg/GJ	27 mg/GJ	0.0015 mg/GJ
Cd	0.001 mg/GJ	13 mg/GJ	0.00025 mg/GJ
Hg	0.12 mg/GJ	0.56 mg/GJ	0.1 mg/GJ
As	0.002 mg/GJ	0.19 mg/GJ	0.12 mg/GJ
Cr	0.2 mg/GJ	23 mg/GJ	0.00076 mg/GJ

Pollutants	Emission Factors		
	Other Liquid fuels	Biomass	Gaseous fuels
Cu	0.13 mg/GJ	6 mg/GJ	0.000076 mg/GJ
Ni	0.005 mg/GJ	2 mg/GJ	0.00051 mg/GJ
Se	0.002 mg/GJ	0.5 mg/GJ	0.11 mg/GJ
Zn	0.42 mg/GJ	512 mg/GJ	0.0015 mg/GJ
PCDD/F	5.9 ng I-TEQ/GJ	800 ng I-TEQ/GJ	1.5 ng I-TEQ/GJ
Benzo(a)pyrene	80 µg/GJ	121 mg/GJ	0.56 µg/GJ
Benzo(b)fluoranthene	40 µg/GJ	111 mg/GJ	0.84 µg/GJ
Benzo(k)fluorathene	70 µg/GJ	42 mg/GJ	0.84 µg/GJ
Indeno(1.2.3-cd)pyrene	160 µg/GJ	71 mg/GJ	0.84 µg/GJ
HCB	NA	5 µg/GJ	NA
PCBs	NA	0.06 mg/GJ	NA

Table 42: Fuels consumption from NFR 1A4bi.

Year	Other Liquid fuels ¹ in tonnes	Biomass in tonnes	Gaseous fuels In tonnes
1990	70788	6169	0
1991	76117	5037	0
1992	91819	4731	0
1993	93314	5961	0
1994	106074	4516	0
1995	100846	4725	0
1996	105849	4261	0
1997	111075	4111	0
1998	117236	3563	0
1999	121475	3455	0
2000	124375	2898	0
2001	125582	3450	0
2002	130431	2799	0
2003	124917	2341	0
2004	141908	1866	0
2005	143584	2131	53787
2006	143394	1759	53224
2007	124464	4008	53597
2008	123786	3611	51031
2009	118168	2283	50191
2010	98724	1981	45617
2011	108503	1824	50757
2012	105490	4727	49558
2013	87696	3941	45966
2014	72566	3344	43588
2015	87058	5368	48239
2016	93987	7570	45841
2017	92682	6791	47367

Year	Other Liquid fuels ¹ in tonnes	Biomass in tonnes	Gaseous fuels In tonnes
2018	89329	4408	44956
2019	97616	3676	52621

Note ¹: Other Liquids includes Diesel and Kerosene.

Category 1A4bi is a key source for the following components (% of national total in 2019):

PM _{2.5}	3.9%
PM ₁₀	2.6%
PCDD/PCDF	11.0%

10.3 Residential: Household and gardening (mobile) (1A4bii)

Combustion emissions from household and gardening activities (mobile) are reported as Included Elsewhere (IE). This is due to fact that the fuel consumed under this category cannot be identified from the fuel used in agriculture (off-road vehicles and other machinery). Thus, emissions from this category are included in category Agriculture/forestry/fishing: Off-road vehicles and other machinery (1A4cii).

10.4 Agriculture/forestry/fishing: Stationary (1A4ci)

Emissions from NFR category 1A4ci were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2016 [11]. Stationary combustion emissions from agriculture are estimated based on fuel combustion obtained from the Energy Service and emission factors (**Table 43**). The major fuel used in this category is diesel. Diesel consumption under this category is given in **Table 44**.

The estimation of emissions in this sector shows several jumps and dips in the Cyprus During the Stage 3 review of the Emission Inventory reporting round 2012, the ERT experts suggested to investigate the reasons for these jumps and dips. The national experts after investigation concluded that these inconsistencies were due to the fact that the activity data were used for the estimation of the emissions were wrong. The activity data were corrected and recalculations were made.

Table 43: EFs used in NFR 1A4ci.

Pollutant	Emission Factor
NO _x	306 g/GJ
NM VOC	20 g/GJ
SO _x	Sulphur content 1%
NH ₃	NE
TSP	21 g/GJ
PM ₁₀	21 g/GJ
PM _{2.5}	18 g/GJ

Pollutant	Emission Factor
BC	56% of PM _{2.5}
CO	93 g/GJ
Pb	8 mg/GJ
Cd	0.15 mg/GJ
Hg	0.1 mg/GJ
As	0.5 mg/GJ
Cr	10 mg/GJ
Cu	3 mg/GJ
Ni	125 mg/GJ
Se	0.1 mg/GJ
Zn	18 mg/GJ
PCDD/F	6 ng I-TEQ/GJ
Benzo(a)pyrene	1.9 µg/GJ
Benzo(b)fluoranthene	15 µg/GJ
Benzo(k)fluorathene	1.7 µg/GJ
Indeno(1.2.3-cd)pyrene	1.5 µg/GJ
HCB	0.22 µg/GJ
PCBs	0.13 ng/GJ

Table 44: Diesel consumption from NFR 1A4ci.

Year	Diesel consumption in tonnes	Year	Diesel consumption in tonnes
1990	12311	2005	19682
1991	13238	2006	20075
1992	15969	2007	18397
1993	16229	2008	17783
1994	18448	2009	15959
1995	17538	2010	15739
1996	18408	2011	16271
1997	19317	2012	15611
1998	20389	2013	15375
1999	21126	2014	14145
2000	21630	2015	15598
2001	21840	2016	15204
2002	22684	2017	15979
2003	21725	2018	14854
2004	18944	2019	23772

Category 1A4ci is a key source for the following components (% of national total in 2019):

BC	4.3%
PM ₁₀	2.6%
PCDD/PCDF	11.0%

10.5 Other Stationary (including military) (1A5a)

Emissions from category Other Stationary (including military) (1A5a) are reported as Included Elsewhere (IE). This is due to the fact that the amount of fuel consumed under this category cannot be identified. Thus, emissions from this category are included in categories Residential: stationary plants (1A4bi) and Agricultural/forestry/fishing: stationary (1A4ci).

11 D_Fugitive

11.1 Solid Fuels (1B1a-c)

In Cyprus there is no mining and handling of solid fuels. These categories are reported as NO (Not Occurring).

11.2 Exploration, Production, Transport (1B2ai)

In Cyprus there are no first treatment oil facilities. This category is reported as NO (Not Occurring).

11.3 Refining/Storage (1B2aiv)

A petroleum refinery was in operation in Cyprus until its termination in March 2004. Since then, all fuels consumed in Cyprus are imported. As a consequence, from 2005 and on this category is reported as NO (Not Occurring).

Emissions from this NFR category until 2004 were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10]. NMVOC emissions from refining and storage were estimated based on crude oil treated in the refinery. Crude oil consumption was obtained from the national energy balance. NMVOC emission factor used is 0.2 kg/Mg crude oil.

11.4 Distribution of Oil Products (1B2av)

Emissions from NFR category 1B2av were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2019 [10]. NMVOC emissions are estimated based on fuel stored and distributed in Cyprus. The quantity of fuel was obtained from the national energy balance (Annex 5). The emission factors used are shown in **Table 45**.

In Cyprus, only storage and distribution of petroleum oil products takes place. All fuels used are imported, stored and distributed all over the island. The oil companies are operating Vapour Recovery Units (VRUs) for the control of NMVOC emissions from petrol. Two VRUs have been installed since 2006. In addition, all road tankers have been modified as required to maintain petrol vapours and all petrol stations have installed the necessary equipment for vapour collection (Stage I vapour recovery). Until the end of 2019, approximately 95% of the existing petrol stations installed the necessary equipment and **were upgraded to Stage II**.

Table 45: EFs used in NFR 1B2av.

Activity	Technologies/Practices	NMVOC EFs (g/m ³ throughput/kPa TVP)
	Road Tanker, Bottom Loading	9
	Road Tanker, Top Loading	9

Activity	Technologies/Practices	NMVOC EFs (g/m ³ throughput/kPa TVP)
Transport and Depots and Border Terminals	Road Tanker, Bottom or Top Loading	23
	Vertical Fixed Roof Tanks	0.06 kg/Mg gasoline handled
Service Stations (including re-fuelling of cars)	Storage Tank-Filling with Stage 1b in operation	1.2
	Storage Tank-Breathing	3
	Automobile Re-fuelling with no emission controls in operation	37
	Automobile Re-fuelling with Stage II controls in operation	5.55

Category 1B2av is one of the key sources for the following component (% of national total in 2019):

NMVOC	4.6%
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11.5 Natural Gas (1B2b)

In Cyprus for the time being there are no first treatment natural gas facilities. This category is reported as NO.

11.6 Venting and Flaring (1B2c)

A petroleum refinery was in operation in Cyprus until its termination in March 2004. Since then, all fuels consumed in Cyprus are imported.

Emissions from this NFR category until 2004 were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10]. Emissions were estimated based on the annual total throughput of the refinery. The quantity of crude oil was obtained from the national energy balance. The emission factors used are shown in **Table 46**.

No key sources are found in this category.

Table 46: EFs used in NFR 1B2c.

Pollutant	Emission Factor (g/m ³ refinery feed)
NO _x	54
NMVOC	2
SO _x	77
CO	12

Drilling has been conducted in the Cypriot EEZ in the last few years as the exploitation of hydrocarbons is to be expected in the area. Please note that there were no drillings in 2019. Emissions from this NFR category were calculated based on the Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10].

The emission factors used are shown in **Table 47**. No key sources are found in this category.

Table 47: EFs used in NFR 1B2c.

Pollutant	Emission Factor (Kg/Mg gas burned)
NO _x	1.4
NMVOC	1.8
SO _x	0.013
CO	6.3
PM _{2.5}	2.6
PM ₁₀	2.6
TSP	2.6
BC	24% of PM _{2.5}

11.7 Energy production (1B2d)

This category is reported as NO.

12 B_Industry

12.1 Industry Emissions due to combustion process

Industrial process emissions are based either on environmental reports of large industries or on the use of emission factors and activity (production and/or fuel) data.

In Cyprus there is no large industrial activity. There is one cement production plant, one small size lime production industry and few brick and tiles factories. In addition, there are some small-scale food and drinks industries and quarrying activities. Sector Categories included in NFR 2B are reported as NO due to the fact that there is no chemical industry in Cyprus.

12.1.1 Petroleum refining (1A1b)

A petroleum refinery was in operation in Cyprus until its termination in March 2004. Since then, all fuels consumed in Cyprus are imported.

For the calculation of the emissions resulting from the plant, the petroleum refinery operators were using a spreadsheet provided by Shell International Company. Those emissions were included in their annual environmental report submitted to Cyprus national authority. Those emissions are included in the emission inventory.

With reference to the TERT recommendation (CY-1A1b-2018-0001) we would like to inform you that concerning the reporting of pollutants Pb, Cd, Hg, for the years 1990-2004 for NFR 1A1b and that the emissions of Pb, Cd, Hg, for the years 1990-2004 have been included in category 1B2aiv in the 2021 submission and that category 1A1b, 'IE' is reported for the years 1990-2004.

12.1.2 Stationary Combustion (1A2b)

With reference to the TERT observation (CY-1A2b-2019-0001) we would like to inform you that for the calculations of the emissions of this category we are using Tier1 method and the EFs from Table 3-4 of the GB2019. For HCBs there is no EF in the mentioned Table. HCBs are included in the NE row of the corresponding Table.

12.1.3 Manufacture of Solid fuels and other energy industries (1A1c)

No such activity takes place in Cyprus.

12.1.4 Manufacturing Industries and Construction (1A2a – 1A2f)

Emission data from this sector are based mainly on emission factor and fuel used in each industrial sector.

The fuel consumption per sector is derived through questionnaires distributed to operators of industrial installations and collected by the Statistical Service. These data are presented in accordance with the NACE code. Emission inventory compilers, in order to estimate the pollutants emissions from this sector, make all the necessary transformations from the NACE code to the NFR code. Thus, the pollutants emissions from categories 1A2a – 1A2f are calculated based **on fuel consumption** and **emission factors**.

Emissions for the Heavy Metals, PCBs and HCBs for NFR sector 1A2a to 1A2f were calculated based on the following equations:

- Fuel consumption x calorific value (14200 KJ/kg) x EF for Biomass
- Fuel consumption x calorific value (41870 KJ/kg) x EF for Liquid fuels

The EF was taken from CORINAIR EMEP/EEA Guidebook 2019 [10], Chapter 1A2 and Table 3.4 for Liquid fuels and Table 3.5 for Biomass.

The main contributors to **1A2f sector** are cement production industries, ceramics (bricks and tiles) and lime production industry.

In response to a question raised during the 2017 review, Cyprus explained that for the entire time series (1990 – 2015), emissions of 1A2f are calculated based on the production of cement, lime, and brick & tiles (Tier 2 approach: EF for NO_x and SO_x tables 3.24, 3.23 and 3.28 of the 2016 EMEP/EEA Guidebook respectively; EF for PM_{2.5} from table 3.4 for all products) and that is the reason why solid fuels emissions are not calculated separately. Cyprus also explained that from 2008 onwards, emissions from liquid fuels are added and that before 2008 liquid fuels are 'IE' because the detailed activity for 1A2f is not known. The TERT agreed with the explanation provided by Cyprus. The TERT noted that the issue does not relate to an over- or under-estimate and recommends that Cyprus includes this information in its IIR for the next submission.

In Cyprus, one cement production industry, seven bricks and tiles industries and one lime production industry are operated. Compared to last year one plant for brick and tiles was closed.

Emission data from cement, ceramics and lime industries are based on their environmental annual reports. Activity data were provided from the annual environmental reports and emissions were calculated by the use of EFs, Tier 2 methodology, from the EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019 [10].

In the case that no EFs were provided in Tier 2 methodology of the Guidebook, EFs from the Tier 1 methodology were used, such as PM_{2.5}, PM₁₀, TSP and BC. The emission factors used are given in **Table 48**. Emissions from the other industrial activities included in this NFR sector are based on fuel consumption.

The reason for small differences that may appear between Energy Balance 2019 and NFR submitted is: Energy Balance includes the import and use balance of each fuel. Due to the fact that a quantity of fuel consumed by an industry is different than the quantity imported within a certain year, information about fuel used is derived by the industry annual reports.

Table 48: EFs used in NFR 1A2f (Cement, Lime, Brick & Tiles).

Pollutant	Cement Production	Bricks & Tiles	Lime Production
NO _x	1241 g/tonne clinker	184 g/tonne	1369 g/tonne
NM VOC	18 g/tonne clinker	25 g/GJ	25 g/GJ
SO _x	374 g/tonne clinker	39.6 g/tonne	316 g/tonne
PM _{2.5}	20 g/GJ	20 g/GJ	20 g/GJ
PM ₁₀	20 g/GJ	20 g/GJ	20 g/GJ
TSP	20 g/GJ	20 g/GJ	20 g/GJ
BC	56% of PM _{2.5}	56% of PM _{2.5}	56% of PM _{2.5}
CO	1455 g/tn clinker	189 g/tonne	1940 g/tonne
Pb	0.098 g/tonne clinker	0.08 mg/GJ	0.08 mg/GJ
Cd	0.008 g/tonne clinker	0.006 mg/GJ	0.006 mg/GJ
Hg	0.049 g/tonne clinker	0.12 mg/GJ	0.12 mg/GJ
As	0.0265 g/tonne clinker	0.03 mg/GJ	0.03 mg/GJ
Cr	0.041 g/tonne clinker	0.2 mg/GJ	0.2 mg/GJ
Cu	0.0647 g/tonne clinker	0.22 mg/GJ	0.22 mg/GJ
Ni	0.049 g/tonne clinker	0.008 mg/GJ	0.008 mg/GJ
Se	0.0253 g/tonne clinker	0.11 mg/GJ	0.11 mg/GJ
Zn	0.424 g/tonne clinker	29 mg/GJ	29 mg/GJ
PCDD/F	4.1 ng/tonne clinker	1.4 ng/GJ	1.4 ng/GJ
Benzo(a)pyrene	0.000065 g/tonne clinker	1.9 mg/GJ	1.9 mg/GJ
Benzo(b)fluoranthene	0.00028 g/tonne clinker	15 mg/GJ	15 mg/GJ
Benzo(k)fluorathene	0.000077 g/tonne clinker	1.7 mg/GJ	1.7 mg/GJ
Indeno (1.2.3-cd) pyrene	0.000043 g/tonne clinker	1.5 mg/GJ	1.5 mg/GJ
HCB	4.6 µg/tonne clinker	NE	NE
PCBs	103 µg/tonne clinker	NE	NE

Please note that since 2012, the cement factory installed abatement measures. They installed a DeNO_x system for the reduction of NO_x emissions and a bag filter for the reduction of particulates.

The activity data and the total annual emissions of the Cement Industries, Brick&Tiles and Lime Industries which are important industries and contribute essentially in the total emissions are shown in **Table 49**.

Table 49: Activity data / Total Emissions (2019) for Cement, Lime, Brick & Tiles Industries

	Cement Industries		Bricks and Tiles Industries		Lime Industries	
Pollutant	Activity data (tonnes)	Total Emissions	Activity data (tonnes)	Total Emissions	Activity data (tonnes)	Total Emissions
NO _x	1498857 (Clinker production)	0.84 (Gg)	224795 (bricks & tiles production)	0.041 (Gg)	6052 (lime production)	0.008 (Gg)
NM VOC	1498857 (Clinker production)	0.03 (Gg)	Based on fuel consumption (LFO)	0.01 (Gg)	Based on fuel consumption (LFO)	0.0006 (Gg)
SO _x	1498857 (Clinker production)	0.56 (Gg)	Based on fuel consumption (LFO)	0.01 (Gg)	Based on fuel consumption (LFO)	0.002 (Gg)
PM _{2.5}	Based on fuel consumption* ¹	0.118 (Gg)	Based on fuel consumption (LFO)	0.006 (Gg)	Based on fuel consumption (LFO)	0.00046 (Gg)
PM ₁₀	Based on fuel consumption* ¹	0.120 (Gg)	Based on fuel consumption (LFO)	0.006 (Gg)	Based on fuel consumption (LFO)	0.00046 (Gg)
TSP	Based on fuel consumption* ¹	0.120 (Gg)	Based on fuel consumption (LFO)	0.006 (Gg)	Based on fuel consumption (LFO)	0.00046 (Gg)
CO	1498857 (Clinker production)	2.18 (Gg)	224795 (bricks & tiles production)	0.042 (Gg)	6052 (lime production)	0.012 (Gg)
Pb	1498857 (Clinker production)	0.03 (Mg)	Based on fuel consumption (LFO)	0.00003 (Mg)	Based on fuel consumption (LFO)	0.000002 (Mg)
Cd	1498857 (Clinker production)	0.002 (Mg)	Based on fuel consumption (LFO)	0.000002 (Mg)	Based on fuel consumption (LFO)	0.0000001 (Mg)
Hg	1498857 (Clinker production)	0.015 (Mg)	Based on fuel consumption (LFO)	0.00004 (Mg)	Based on fuel consumption (LFO)	0.000003 (Mg)
As	1498857 (Clinker production)	0.008 (Mg)	Based on fuel consumption (LFO)	0.000009 (Mg)	Based on fuel consumption (LFO)	0.0000007 (Mg)
Cr	1498857 (Clinker production)	0.012 (Mg)	Based on fuel consumption (LFO)	0.00006 (Mg)	Based on fuel consumption (LFO)	0.000005 (Mg)
Cu	1498857 (Clinker production)	0.019 (Mg)	Based on fuel consumption (LFO)	0.00007 (Mg)	Based on fuel consumption (LFO)	0.000005 (Mg)
Ni	1498857 (Clinker production)	0.015 (Mg)	Based on fuel consumption (LFO)	0.000003 (Mg)	Based on fuel consumption (LFO)	0.0000002 (Mg)
Se	1498857 (Clinker production)	0.008 (Mg)	Based on fuel consumption (LFO)	0.00003 (Mg)	Based on fuel consumption (LFO)	0.000003 (Mg)
Zn	1498857 (Clinker production)	0.127 (Mg)	Based on fuel consumption (LFO)	0.009 (Mg)	Based on fuel consumption (LFO)	0.0007 (Mg)

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	Cement Industries		Bricks and Tiles Industries		Lime Industries	
Pollutant	Activity data (tonnes)	Total Emissions	Activity data (tonnes)	Total Emissions	Activity data (tonnes)	Total Emissions
PCDD/F	1498857 (Clinker production)	0.006 (g)	Based on fuel consumption (LFO)	0.0004 (g)	Based on fuel consumption (LFO)	0.00003 (g)
Benzo(a) pyrene	1498857 (Clinker production)	0.0001 (Mg)	Based on fuel consumption (LFO)	0.0006 (Mg)	Based on fuel consumption (LFO)	0.00004 (Mg)
Benzo(b) fluoranthene	1498857 (Clinker production)	0.0004 (Mg)	Based on fuel consumption (LFO)	0.005 (Mg)	Based on fuel consumption (LFO)	0.0003 (Mg)
Benzo(k) fluoranthene	1498857 (Clinker production)	0.0001 (Mg)	Based on fuel consumption (LFO)	0.0005 (Mg)	Based on fuel consumption (LFO)	0.00004 (Mg)
Indeno (1.2.3-cd) pyrene	1498857 (Clinker production)	0.00006 (Mg)	Based on fuel consumption (LFO)	0.0005 (Mg)	Based on fuel consumption (LFO)	0.00003 (Mg)
HCB	1498857 (Clinker production)	0.007 (Kg)	-	-	-	-
PCBs	1498857 (Clinker production)	0.154 (kg)	-	-	-	-

Category 1A2f is a key source for the following components (% of national total in 2019):

NO _x	6.8%
PM _{2.5}	12.0%
PM ₁₀	6.2%
TSP	3.7%
BC	14.2%
CO	20.7%
Cd	7.4%
Hg	52.1%
HCB	30.2%
PCBs	88.3%

12.1.5 Stationary Combustion in Manufacturing Industries: Other (1A2gviii)

This sector includes all combustion emissions from industrial sectors not belonging to the NFR categories 1A2a to 1A2f. This sector also includes some other activities such as leather, wood and plastics production.

No key sources are found in this category.

12.2 Industrial Emissions due to Production

In the Cyprus emission inventory, this category comprises emissions related to the production and use of non-metallic minerals in:

- 2A1 Cement clinker production
- 2A2 Lime production
- 2A5a Quarrying and mining of mineral other than coal
- 2A5b Construction and demolition
- 2A5c Storage, handling and transport of mineral products

The other categories are reported as Not Occurring (NO) due to the fact that these processes do not take place in Cyprus.

12.2.1 Cement production (2A1)

Two cement plants, initially belonging to two different companies, were in operation in Cyprus until 2011. The two companies merged and the new company built a new installation. The new installation, that uses dry process, is in operation since September 2011. Moni cement plant shut down in April 2011 and old Vassilikos cement plant shut down in September 2011.

The new cement plant has a maximum production capacity about 2,000,000 tonnes clinker per year. One stack is installed and all the gaseous wastes emitted from this stack. In addition, a fabric filter was installed in 2012 resulting to about 99.78% reduction of TSP, 99.5% PM₁₀ and 99% PM_{2.5}, (Values of abatements measures were taken from Table 1.28, Chapter 1, Production of Cement, Lime and Magnesium Oxide (data used for RAINS Model) [24].

Based on the observation (CY – 2A1- 2018 – 001) of the reviewing Team, the above reductions were not accepted, even though, they were mentioned in the relative BREF [24]. As a consequence, the following reductions were adopted: 98.3% reduction of TSP, 80% PM₁₀ and 73.3% PM_{2.5}.

Please also note that since 2012 (the installation of the new cement factory), the cement factory installed a DeNOx system for the reduction of NOx emissions.

Activity data are based on annual environmental reports and emissions are estimated based on Tier 2 methodology of the EMEP/EEA Guidebook [11]. In **Table 50** the emission factors used are given. Activity data (cement production) for the time series 1990-2019 are given in **Table 51**.

Table 50: EFs used in NFR 2A1.

Pollutant	Emission Factor (g/Mg clinker)
	Dry process
PM _{2.5}	130
PM ₁₀	234
TSP	260
BC	3% of PM _{2.5}

Table 51: Activity data from cement industries.

Year	Clinker Production in tonnes	
	Moni Cement Plant	Vassilikos Cement Plant
1990	353282	895388
1991	390135	786116
1992	380170	901870
1993	382265	1014553
1994	382615	1083208
1995	369406	1035155
1996	358770	1157700
1997	374065	1084820
1998	336515	1045404
1999	334315	1047201
2000	362350	1065365
2001	360795	1033139
2002	373195	1058514
2003	362648	1042611
2004	367009	1142049
2005	329570	1142984
2006	365477	1176556
2007	349661	1165590
2008	368390	1157843
2009	231083	1032694
2010	259592	783370
2011	76148	961140
2012	closed	953246
2013	closed	1418452
2014	closed	1822972
2015	closed	1640717
2016	closed	1648256
2017	closed	1716889
2018	closed	1593425
2019	closed	1498857

Table 52: Emission Factor and abatement measures from cement industry.

	PM_{2.5}	PM₁₀	TSP
Emission Factors	130 g/Mg clinker	234 g/Mg clinker	260 g/Mg clinker
Abatement efficiency	73.3%	80%	98.3%

Table 53: Activity data and Particulate Emissions.

Year	Clinker production (tn)	PM_{2.5} Emissions Total (ktn)	PM₁₀ Emissions Total (ktn)	TSP Emissions Total (ktn)
2000	1427715	0.186	0.334	0.371
2001	1393934	0.181	0.326	0.362
2002	1431709	0.186	0.335	0.372
2003	1405259	0.183	0.329	0.365
2004	1509058	0.196	0.353	0.392
2005	1472554	0.191	0.345	0.383
2006	1542033	0.200	0.361	0.401
2007	1515251	0.197	0.355	0.394
2008	1526233	0.198	0.357	0.397
2009	1263777	0.164	0.296	0.329
2010	1042962	0.136	0.244	0.271
2011	1037288	0.135	0.243	0.270
Installation of a Fabric filter as an abatement measure				
2012	953246	0.033	0,053	0,053
2013	1418452	0.049	0,079	0,079
2014	1822972	0.063	0,101	0,102
2015	1640717	0.057	0,091	0,092
2016	1648256	0.057	0,091	0,092
2017	1716889	0,060	0,095	0,096
2018	1593425	0,055	0,088	0,089
2019	1498857	0,052	0,083	0,084

Category 2A1 is a key source for the following components (% of national total in 2019):

PM _{2.5}	4.9%
PM ₁₀	3.9%

12.2.2 Lime production (2A2)

In Cyprus, one small-scale lime production plant is in operation. Emission data are based on the annual environmental report. Activity data were provided by the annual environmental report and emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook [11]. In **Table 54** the emission factors used are given. No key sources are found in this category.

Table 54: EFs used in NFR 2A2.

Pollutant	Emission Factor (g/Mg lime produced)
PM _{2.5}	700
PM ₁₀	3500
TSP	9000
BC	0.46 % of PM _{2.5}

Table 55: Activity data from Lime Industries

Year	Lime Production In tonnes	Year	Lime Production In tonnes
1990	4637	2005	14822
1991	4353	2006	12778
1992	4133	2007	12083
1993	5537	2008	12779
1994	7166	2009	10457
1995	4342	2010	11545
1996	4591	2011	8777
1997	5915	2012	4238
1998	4345	2013	2816
1999	5980	2014	3597
2000	6065	2015	3328
2001	7579	2016	3282
2002	11864	2017	4009
2003	12511	2018	5933
2004	11940	2019	6052

12.2.3 Quarrying and Mining of Minerals other than Coal (2A5a)

Activity data concerning the quantities of quarrying and mining of minerals other than coal were provided by the Statistical Service of Cyprus and emissions were calculated based on Tier 1

methodology of the EMEP/EEA Guidebook 2019 [10]. In **Table 56** the emission factors used are given.

Table 56: EFs used in NFR 2A5a.

Pollutant	Emission Factor
	(g/Mg mineral)
PM _{2.5}	3.68
PM ₁₀	27.0
TSP	51.0

Category 2A5a is a key source for the following components (% of national total in 2019):

PM _{2.5}	2.9%
PM ₁₀	10.6%
TSP	12.3%

12.2.4 Construction and Demolition (2A5b)

Activity data concerning the area in square meters refers to the floor area of the building or utility that is constructed or demolished were provided by the Statistical Service of Cyprus and emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook [10]. In **Table 57** the emission factors used are given.

Table 57: EFs used in NFR 2A5b.

Pollutant	Emission Factor (kg/m ² /year)
PM _{2.5}	0.0086
PM ₁₀	0.086
TSP	0.29

Category 2A5b is a key source for the following components (% of national total in 2019):

PM ₁₀	10.5%
TSP	21.3%

12.2.5 Storage, Handling and Transport of Mineral Products (2A5c)

Activity data concerning the quantities of mineral products were provided by the Statistical Service of Cyprus and emissions were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2019 [10]. In **Table 58** the emission factors used are given.

Table 58: EFs used in NFR 2A5c.

Pollutant	Emission Factor (g/Mg product)
PM _{2.5}	0.6
PM ₁₀	6.0
TSP	12.0

Category 2A5c is a key source for the following component (% of national total in 2019):

TSP	2.6%
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In **Table 59**, the activity data used in the NFR categories 2A5a, 2A5b and 2A5c are given.

Table 59: Activity data from NFR sectors 2A5a, 2A5b and 2A5c.

Year	NFR 2A5a	NFR 2A5b	NFR 2A5c
	Gravel and Sand Mineral (Gg)	Constructed and Demolished Area (*1000 m ²)	Gravel and Sand production (Gg)
2000	10714	1753	9740
2001	10714	2163	9740
2002	11770	2396	10700
2003	12419	2752	11290
2004	13596	3016	12360
2005	14080	3417	12800
2006	14278	3507	12980
2007	15460	3613	14055
2008	16666	3689	15151
2009	13860	3136	12600
2010	14754	2918	13413
2011	13777	2253	12525
2012	8311	1500	7556
2013	5280	1045	4800
2014	4598	785	4180
2015	4518	881	4107
2016	6232	1047	5665
2017	7660	1543	6964
2018	8439	1726	7671
2019	8439 ¹	2586	7671 ¹

Note ¹: Provisional values

12.3 Metal production (2C)

Two metal production industries, foundries, were in operation in Cyprus until their termination in 2005. In the 2019 national emission inventory, this category is reported as Not Occurring (NO).

12.4 Food and Drink (2H2)

Emissions from NFR category 2H2 were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2019 [10]. Activity data concerning the different food and drink products produced in the food and drink industry were provided by the Statistical Service of Cyprus. The emission factors used are given in **Table 60**.

Table 60: VOCs EFs used in NFR 2H2.

Type of Food Products	Emission Factor (kg/Mg product)
Cakes, Biscuits, Breakfast cereals	1
Meat, Fish & Poultry	0.3
Sugar	10
Margarine & solid cooking fats	10
Coffee Roasting	0.55
Type of Drink Products	Emission Factor (kg/hl product)
Wine	0.08
Beer	0.035
Whisky	15
Brandy	3.5
Other spirits	0.4

No key sources are found in this category.

12.5 Others (2D3b and 2D3c)

12.5.1 Road Paving with Asphalt (2D3b)

Activity data concerning the annual weight of asphalt used in road paving were provided by the Statistical Service of Cyprus and emissions were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2019 [10]. The emission factors used are given in **Table 61** and the activity data in **Table 62**.

The Mixing plants operating in Cyprus are equipped with fabric filters with abatement efficiency of 99,9%. The abatement measure implementation was applied gradually, at 50% in 2000 and completed to 100% in 2005. No key sources are found in this category.

Table 61: EFs used in NFR 2D3b

Pollutant	Emission Factor
	(g/Mg asphalt)
NMVOC	15
PM _{2.5}	700
PM ₁₀	3000
TSP	13000
BC	5.7 % of PM _{2.5}

Table 62: Activity data from NFR sector 2D3b

Year	NFR 2D3b Bituminous mixtures (Gg)
2000	563
2001	458
2002	499
2003	473
2004	566
2005	451
2006	408
2007	378
2008	358
2009	609
2010	814
2011	794
2012	620
2013	327
2014	151
2015	132
2016	136
2017	171
2018	223
2019	223 ¹

Note ¹: Provisional values

12.5.2 Asphalt Roofing (2D3c)

Activity data concerning shingle were provided by the Statistical Service of Cyprus and emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10]. The emission factors used are given in **Table 63**.

Table 63: EFs used in NFR 2D3c

Pollutant	Emission Factor (g/Mg shingle)
NM VOC	130
TSP	1600
PM _{2.5}	80
PM ₁₀	400
TSP	1600
BC	0.013% of PM _{2.5}
CO	9.5

Category 2D3c is a key source for the following component (% national total 2019).

TSP	5.1%
-----	------

The activity data used in the NFR category 2D3c, are given in **Table 64**.

Table 64: Activity data from NFR Sector 2D3c

Year	NFR 2D3c Shingle (Gg)
2000	282
2001	229
2002	250
2003	237
2004	283
2005	225
2006	204
2007	189
2008	179
2009	305
2010	407
2011	397
2012	310
2013	164

Year	NFR 2D3c Shingle (Gg)
2014	75
2015	66
2016	68
2017	85
2018	112
2019	112 ¹

Note ¹: Provisional values

12.5.3 Chemical Products (2D3g)

This activity Asphalt Blowing which belongs to this category is not occurring in Cyprus.

In this category we include the production of enamel, varnishes and emulsions. So for this category we only estimate NMVOC emissions. For the others is very difficult of what notation key we should use.

13 E_Solvents

13.1 Domestic Solvent Use (2D3a)

Activity data concerning the Cyprus population were provided by the Statistical Service of Cyprus and emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10]. The population of Cyprus was 888000 in 2019, based on data published by the Statistical Service of Cyprus. The NMVOC emission factor used is 1.2 kg/person/year. Despite the TERT questions / observations since 2017, we are still using Tier 1 in this category. This year we contacted the Custom Authorities of Cyprus and they gave us the correct codes of the products that belongs in this category. Then we contacted Statistical Service to find data. Unfortunately, until now, we have not managed to find a complete time series of data. The effort will be continued in the next years.

Category 2D3a is a key source for the following components (% of national total in 2019):

NMVOC	11.4%
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13.2 Coating Application (2D3d)

Activity data concerning the quantities of paints consumed in industrial and domestic sectors in Cyprus (both produced and imported) were provided by the Statistical Service and emissions were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2019 [10].

In 2011, the provisions of the Paints Directive 2004/42/EC (Directive on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products - Deco paint) have been fully implemented.

For the abatement efficiencies used in the inventory and the EF please see Table 64 and 65 respectively.

Table 65: Time series Abatement Efficiencies used in NFR 2D3.

Paint	1990 - 2007	2008 - 2010	2011 - 2019
Decorative – water based	0%	26%	65%
Car repairing – Solvent based	0%	8%	8%
Wood Coating – Solvent based	0%	31%	50%

Table 66: EFs used in NFR 2D3.

Paint	NMVOCs EF g/kg
Water based	230
Car repairing – Solvent based	720

Wood Coating – Solvent based	800
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Category 2D3d “Coating application” is a key source for the following components (% of national total in 2019):

NMVOC	24.6%
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Table 67: Activity data for NFR sector 2D3d

Year	Decorative coating application (ton) ¹	Industrial coating application (ton)
1990	4293	958
1991	4226	577
1992	4325	666
1993	4569	599
1994	4902	741
1995	5097	303
1996	5562	166
1997	5335	425
1998	5625	196
1999	5833	148
2000	5846	328
2001	5740	202
2002	8535	376
2003	8330	1174
2004	9452	1758
2005	8993	2228
2006	10277	2122
2007	10403	2459
2008	10279	2789
2009	9106	2773
2010	10375	3020
2011	8533	1972
2012	8371	2116
2013	7079	1895
2014	6366	1632
2015	7710	2269
2016	8011	2421
2017	8307	2994
2018	9414	3190
2019	10842	3148

¹: Please note that the Decorative coating application activity data is significantly different from the values submitted last years because the quantities of glue, at previous years, were added in this category (2D3d). The emissions due to glues were added in the recent submission in category 2D3i.

Category 2D3d is a key source for the following components (% of national total in 2019):

NM VOC	13.74%
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13.3 Dry Cleaning (2D3f)

Activity data are provided by the annual environmental reports submitted by the owners of the Dry Cleaning shops and NMVOC emissions were calculated based on solvent consumption data.

No key sources are found in this category.

13.4 Chemical products (2D3g)

Activity data concerning the quantities of paints produced in the industrial sector were provided by the Statistical Service and emissions were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2019 [10]. The NMVOC emission factor used is 11g/kg product.

Due to the full implementation of the provisions of Deco paint EU Directive (2004/42/EC) the abatement efficiency 70%, corresponding to the improved production mix were applied for this category as described in the Guidebook. No key sources are found in this category.

13.5 Printing (2D3h)

Activity data concerning the consumption of ink in printing industries were provided by the Statistical Service of Cyprus (Table 67) and emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10]. The NMVOC emission factor used is 730g/kg ink.

Due to the full implementation of the provisions of Deco paint EU Directive (2004/42/EC) the abatement efficiency 30%, corresponding to the improved production mix were applied for this category as described in the Guidebook. No key sources are found in this category.

Table 68: Activity data for NFR sector 2D3h

Year	Ink Consumption (ton)
2000	459605
2001	520726
2002	421281
2003	395077
2004	465634
2005	472006
2006	497028
2007	437737
2008	612135
2009	446561

Year	Ink Consumption (ton)
2010	482148
2011	655067
2012	520175
2013	405445
2014	512335
2015	494393
2016	518734
2017	519488
2018	444824
2019	481056

13.6 Other Solvents used (2D3i)

Activity data concerning the consumption Other Solvents were provided by the Statistical Service of Cyprus (Table 68) and emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10]. For this category only glues are included. The NMVOC emission factor adhesive used is 522g/kg glue.

Table 69: Activity data for NFR sector 2D3i

Year	Glue Consumption (ton)
2000	1937
2001	1768
2002	2192
2003	2752
2004	3478
2005	5172
2006	6263
2007	6203
2008	5725
2009	4597
2010	3580
2011	3405
2012	3147
2013	1767

Year	Glue Consumption (ton)
2014	1243
2015	1292
2016	1477
2017	5000
2018	2472
2019	1558

The quantities used in the 2021 submission only include imports since the locally produced adhesives are water-based and in the solid form, used for masonry activities (adhere floor ceramics, etc.), which do not contain any NMVOCs. This information was retrieved after contacting the relevant people in the industry.

Category 2D3i is a key source for the following components (% of national total in 2019):

NMVOC	8.7%
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13.7 Other Product Use (2G)

Activity data concerning the annual weight of tobacco and fireworks used were provided by the Statistical Service of Cyprus and emissions were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2019 [10]. In **Table 70** the emission factors used are given. Activity data for the Category 2G are given in **Table 71**.

Table 70: EFs used in NFR 2G

Pollutants	Emission Factors	
	Tobacco combustion	Use of fireworks
NO _x	1.8 Kg/Mg tobacco	260 g/t product
NMVOC	4.84 Kg/Mg tobacco	NE
SO _x	NE	3020 g/t product
NH ₃	4.15 Kg/Mg tobacco	NE
TSP	27 Kg/Mg tobacco	109.83 g/t product
PM ₁₀	27 Kg/Mg tobacco	99.92 g/t product
PM _{2.5}	27 Kg/Mg tobacco	51.94 g/t product
BC	0.45% of PM _{2.5}	NE
CO	55.1 Kg/Mg tobacco	7150 g/t product
Pb	NE	784 g/t product
Cd	5.4 g/Mg tobacco	1.48 g/t product

Pollutants	Emission Factors	
	Tobacco combustion	Use of fireworks
Hg	NE	0.057 g/t product
As	NE	1.33 g/t product
Cr	NE	15.6 g/t product
Cu	5.4 g/Mg tobacco	444 g/t product
Ni	2.7 g/Mg tobacco	30 g/t product
Zn	2.7 g/Mg tobacco	260 g/t product
PCDD/F	0.1 µg/Mg tobacco	NE
Benzo(a)pyrene	0.111 g/Mg tobacco	NE
Benzo(b)fluoranthene	0.045 g/Mg tobacco	NE
Benzo(k)fluorathene	0.045 g/Mg tobacco	NE
Indeno (1.2.3-cd) pyrene	0.045 g/Mg tobacco	NE

Based on TERT observation (CY-2G-2018-0001), we would like to inform you that the activity data for fireworks are provided by the Statistical Service of Cyprus, based on the imports of fireworks in Cyprus and thus that the activity data pertains to yearly imports and not the yearly consumption of fireworks. For this reason, we have these big fluctuations.

Table 71: Activity data from NFR sector 2G

Year	NFR 2G	NFR 2G
	Tobacco (Kg)	Fireworks (Kg)
2000	10694524	43650
2001	3291543	43650
2002	3081252	43650
2003	2219167	43650
2004	3301626	43650
2005	2877075	43650
2006	1796955	43650
2007	1871656	43650
2008	1820672	43650
2009	2024716	43650
2010	2162450	43650
2011	1766789	7006
2012	1919818	33077
2013	1507409	1579
2014	597867	28039
2015	1376328	19873
2016	1129274	24027
2017	1210971	10738
2018	1099991	97583
2019	1060274	85123

Category 2G is a key source for the following components (% of national total in 2019):

PM2.5	3.1%
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14 K_AgriLivestock & L_AgriOther

The Agriculture sector is a major source category for ammonia, NMVOC and particulates emissions. For ammonia emissions from agriculture two different sources are distinguished: animal manure and synthetic fertilizer.

14.1 Agriculture Livestock (3B)

Activity data concerning the number of animals at any time were provided by the Agriculture Department of Cyprus and are given in **Table 72** below. Emissions from NFR 3B for the whole time series 1990 – 2019 were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2019 [10] (Excel file provided). Emission factors used are presented in **Table 73**.

Table 72: Number of animals – Population size (1000 head).

NFR	Longname	1990	1995	2000	2005	2010	2015	2018	2019
3B1a	Cattle dairy	22.4	29.5	23.5	24.6	23.4	26.2	31.9	35
3B1b	Cattle non dairy	32.3	38.6	30.7	33.0	31.3	32.7	38.9	38.8
3B2	Sheep	290.0	250.0	246.0	268.9	328.9	296.9	311.0	324.0
3B3	Swine: Fattening pigs	244.2	325.7	356.3	379.1	417.4	326.2	328.2	312.9
3B4	Swine: Sows	33.8	48.4	52.1	50.6	46.3	31.8	33.8	32.7
3B4d	Goats	205.0	220.0	378.6	329.3	307.4	233.9	250.4	251
3B4e	Horses	0.5	0.4	0.9	1.0	0.8	0.8	0.8	0.8
3B4f	Mules and asses	5.0	2.5	1.8	1.2	0.5	0.5	0.5	0.5
3B4gi	Laying hens	640.9	764.4	550.0	648.4	555.2	554.6	561.5	617.7
3B4gii	Broilers	2992.9	3623.6	4200.0	3727.0	3223.7	2604.9	2903.4	2986.4
3B4giii	Turkeys	53.7	58.7	65.0	32.9	14.1	9.8	10.1	11.9
3B4giv	Other poultry	6.7	13.3	15.0	10.3	0	0	0	0

Please note that based on June 2018 Review (Observation CY-3B-2018-0001), it was made clear that in Cyprus there are not Buffalos and there is no Dairy cattle – tied housing.

During the June 2019 Review (Observation CY-3B-2017-0003), we were asked to provide further clarification of the distribution of MMS (solid/slurry) for all livestock categories to the TERT outlining the manure management system(s) used for each livestock species. Please find the required data in the following Table.

Table 73: EFs NH₃ used in NFR 3B.

NFR Code	Longname	EF NH ₃							
		house, slurry	house, solid	yard	storage, slurry	storage, solid	appl., slurry	appl., solid	grazing
3B1a	Dairy cows	0.2	0.19	0.3	0.2	0.27	0.55	0.79	0.1
3B1a	Dairy cattle, tied housing	0.066	0.066	0.3	0.2	0.27	0.55	0.79	0.1
3B1b	Other cattle	0.2	0.19	0.53	0.2	0.27	0.55	0.79	0.06
3B3	Fattening pigs	0.28	0.27	0.53	0.14	0.45	0.4	0.81	0
3B3	Sows	0.22	0.25	0	0.14	0.45	0.29	0.81	
3B2	Sheep	0	0.22	0.75	0	0.28	0	0.9	0.09
3B4d	Goats	0	0.22	0.75	0	0.28	0	0.9	0.09
3B4e	Horses	0	0.22	0	0	0.35	0	0.9	0.35
3B4f	Mules and Asses	0	0.22	0	0	0.35	0	0.9	0.35
3B4gi	Layers	0.41	0.41	0	0.14	0.14	0.69	0.69	0
3B4gii	Broilers	0	0.28	0	0	0.17	0	0.66	0
3B4giii	Turkeys	0	0.35	0	0	0.24	0	0.54	0
3B4giv	Other Poultry	0	0.24	0	0	0.24	0	0.54	0
3B4a	Buffalos	0	0.2	0	0	0.17	0	0.55	0.13

Regarding Observation CY-3B1a-2020-0001, it was clarified that the NMVOC emissions for category 3B for the whole time series were calculated with Tier 2 methodology. EFs were taken from Tables 3-11 and 3-12 of the 3B Chapter of the GB2019.

14.1.1 Dairy Cattle (3B1a)

Category 3B1a is a key source for the following components (% of national total in 2019):

NH ₃	10.3%
NMVOC	7.0%

14.1.2 Non – dairy cattle (3B1b)

Category 3B1b is a key source for the following components (% of national total in 2019):

NH ₃	6.1%
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14.1.3 Sheep (3B2)

No key source is found in this Category

14.1.4 Swine (3B3)

Category 3B3 is a key source for the following components (% of national total in 2019):

NH ₃	19.7%
PM _{2.5}	2.3%
PM ₁₀	6.1%
TSP	8.3%

14.1.5 Goats (3B4d)

No key sources are found in this category.

14.1.6 Horses (3B4e)

No key sources are found in this category.

14.1.7 Mules and asses (3B4f)

No key sources are found in this category.

14.1.8 Laying hens (3B4gi)

No key sources are found in this category.

14.1.9 Broilers (3B4gii)

Category 3B4gii is a key source for the following components (% of national total in 2019):

PM ₁₀	4.9%
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14.1.10 Turkeys (3B4giii) and Other poultries (3B4giv)

No key sources are found in these categories.

14.2 Agriculture Other (3D)

14.2.1 Synthetic N-Fertilizers (3Da1)

For this category we previously used activity data concerning the amount of applied nitrogen fertilizers provided by the Statistical Service. Emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10]. Based on a TERT observation we were asked to use data from FAO.

Even though we do not agree with the quantities of fertilisers used in the TERT Technical correction estimates, since we do not have data for all categories of fertilisers, we decided to accept the TERT estimates.

In the following Table 73 activity data are shown.

Table 74: Activity data from NFR 3Da1.

	Crop Area	Ammonium nitrate (AN)	Ammonium phosphates (AP)	Ammonium sulphate (AS)	Calcium ammonium nitrate (CAN)	NK Mixtures	NPK Mixtures	N solutions	Other straight N compounds	NP Mixtures	Urea
year	ha	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
1990	156600	2.4	0	1	0.7	0.1	2	0	0	5.1	1.3
1991	155200	2.3	0	1.1	0.7	0.1	2	0	0	5.1	1
1992	155600	2.9	0	1.4	1.1	0.1	2.5	0	0	6.8	1.2
1993	154700	2.6	0	1.1	1.2	0.1	2.2	0	0	6.3	1
1994	141400	2.6	0	1	0.9	0.1	2.3	0	0	6.4	1.1
1995	141100	2.6	0	0.9	0.5	0.1	2.5	0	0	5.4	0.9
1996	142000	2.7	0	1.1	0.6	0.1	2.4	0	0	5.9	0.9
1997	141100	2	0	0.7	0.4	0.1	1.9	0	0	5	0.6
1998	143100	2	0	0.9	0.4	0.1	2.1	0	0	4.6	0.7
1999	143100	2	0	1	0.4	0.1	2.1	0	0	4.6	0.7
2000	140400	1.7	0	0.7	0.4	0.1	1.6	0	0	2.7	0.6
2001	139000	1.6	0	0.7	0.4	0.1	1.6	0	0	2.9	0.5
2002	139000	1.4	0	0.7	0.3	0.1	1.9	0	0	3.2	0.5
2003	153000	3.1	0	0	0.3	0.1	2	0	0	3.2	0.4
2004	155000	2.9	0	0.3	0.2	0.1	2	0	0	3.3	0.5
2005	166000	1	0	0.5	0.2	0.5	2.5	0	0	3.7	0
2006	156000	1.6	0	0.5	0.2	0	3	0	0	4	0.6
2007	145300	0.8	0.1	0.3	0.3	0	3	0	0	4	0
2008	114200	1.3	0	0.2	0	0	3	0	0	3	0.2
2009	123300	0.6	0	0.2	0	0	2.5	0	0	2.2	0.6
2010	112500	0.9	0	0.3	0.5	0	1	0	0	1	0.5
2011	113900	0.5	0	0.5	0.1	0	1	0	0	1	0.9
2012	114300	0.5	0	0.6	0.1	0	1	0	0	1	0.9

	Crop Area	Ammonium nitrate (AN)	Ammonium phosphates (AP)	Ammonium sulphate (AS)	Calcium ammonium nitrate (CAN)	NK Mixtures	NPK Mixtures	N solutions	Other straight N compounds	NP Mixtures	Urea
year	ha	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
2013	107030	0.5	0	0.2	0.1	0	2.6	0	0	0.9	1
2014	107180	0.5	0	0.1	0.1	0	2.1	0	0	1	2.1
2015	125610	0.7	0	0	0.1	0	2.5	0	0	1.5	0.8
2016	110930	0.6	0	0.1	0	0.2	3	0	0	1.8	0.9
2017	122559	0.6	0	0	0	0.2	3.2	0	0	1.5	1.1
2018	129355	1.2	0	0	0	0	1.2	0	0	0	1.3
2019 ¹	129355	1.2	0	0	0	0	1.2	0	0	0	1.3

Note ¹: Preliminary data.

EF were taken from Table 3.2 of the Chapter 3D of the GB2019.

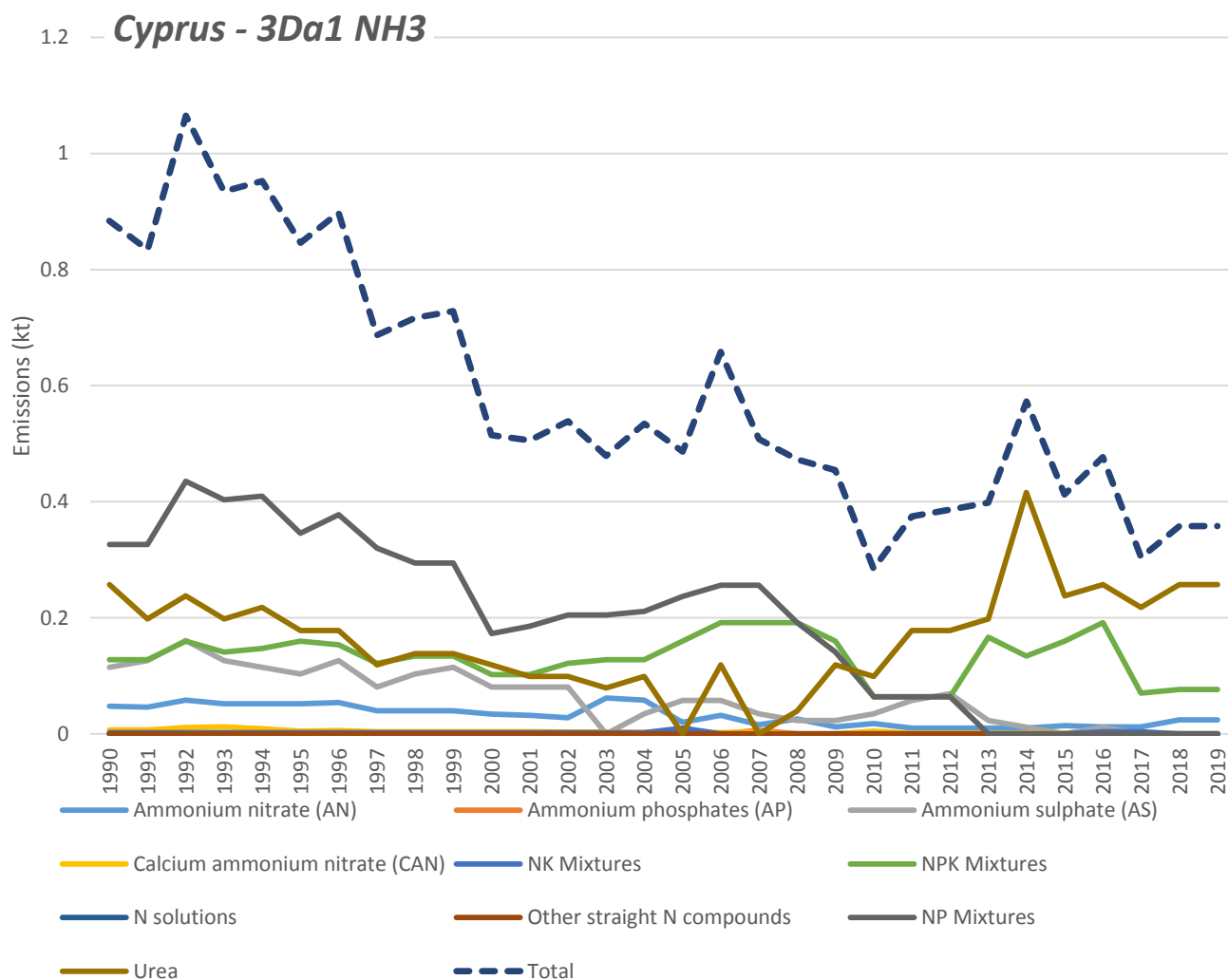


Figure 40: NH₃ emissions due to Inorganic Fertilizers (3Da1)

14.2.2 Animal Manure applied to soils (3Da2a)

Activity data and emissions for NH₃ concerning the amount of applied animal manure to soils had been calculated using the excel file provided with the CORINAIR EMEP/EEA Guidebook 2019 [10].

Category 3Da2a is a key source for the following components (% of national total in 2019):

NO _x	4.9%
NH ₃	44.6%

For the calculations of NO_x emissions of this category the relevant excel file provided by the new Corinair GB2019 were used.

14.2.3 Sewage Sludge applied to soils (3Da2b)

Emissions from this category were estimated by multiplying the EF with the per capita number. The EF factor used for NH₃ is 0.0068 kg/capita and for NO_x 0.002 kg/capita and the number of capita used is 888000 for the year 2019. Based on new data found, the total number of the population of Cyprus connected to drainage systems is 600000. Furthermore, a portion of the produced sludge is applied to soil, and a large quantity is used as a fuel in the cement factory.

Please note that for the calculation of the 3Da2b emissions, by mistake, the total Population was used and not the one that is connected to the drainage systems.

14.2.4 Sewage Sludge applied to soils (3Da2c)

Based on a recommendation of the TERT (CY-3Da2c-2019-0001) Cyprus in this year submission made reviews for the NO_x and NH₃ estimates and includes corrected values in its 2020 NFR and IIR 2020 submission.

Please find below Table 75 with the activity data and Table 76 with EF and calculations.

Table 75: Activity data for Animal Manure Applied to Soils

	Dairy Cattle	Other Cattle	Total Cattles	Market Swine	Breeding Swine	Total Pigs	Poultry
	anaerobic digester	anaerobic digester	solid storage	anaerobic digester	anaerobic digester	anaerobic digester	anaerobic digester
Year	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)
1990	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0
2001	0	0	0	51257	110454	161711	0
2002	0	0	0	103623	242965	346588	0
2003	0	0	0	153290	362335	515625	0
2004	0	0	0	190255	467745	658000	0
2005	0	0	0	232732	529291	762023	0
2006	0	0	0	292430	669597	962027	68622
2007	0	0	0	347878	774539	1122417	144609
2008	22776	12970	35746	355573	930623	1286196	212244
2009	22351	12581	34932	389398	1045974	1435372	275814

	Dairy Cattle	Other Cattle	Total Cattles	Market Swine	Breeding Swine	Total Pigs	Poultry
	anaerobic digester	anaerobic digester	solid storage	anaerobic digester	anaerobic digester	anaerobic digester	anaerobic digester
Year	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)
2010	22568	12703	35271	425923	1165549	1591472	344718
2011	23194	13134	36328	372611	1113354	1485965	334299
2012	69671	37954	107625	445723	1334182	1779905	317021
2013	71403	37269	108672	430086	1201881	1631967	280944
2014	122016	65741	187757	520975	1433732	1954707	334190
2015	126179	62962	189141	491372	1518281	2009653	430018
2016	137323	69379	206702	499881	1487204	1987085	592808
2017	145200	70095	215295	559126	1622793	2181919	610727
2018	153598	75650	229247	621914	1833084	2454998	631660
2019	168712	74645	243357	602156	1747658	2349814	655129

Table 76: NH₃ calculations for Animal Manure Applied to Soils category

	Total Cattles NH ₃ emissions	Total Pigs NH ₃ emissions	Total Poultry NH ₃ emissions	TOTAL
	EF = 0.012 kg NH ₃ -N per Kg N in feedstock	EF = 0.012 kg NH ₃ -N per Kg N in feedstock	EF = 0.012 kg NH ₃ -N per Kg N in feedstock	
Year	(kg)	(kg)	(kg)	(kg)
1990	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00
2001	0.00	11.87	0.00	11.87
2002	0.00	25.44	0.00	25.44
2003	0.00	37.85	0.00	37.85
2004	0.00	48.30	0.00	48.30
2005	0.00	55.94	0.00	55.94
2006	0.00	70.62	14.69	85.31
2007	0.00	82.39	30.96	113.35
2008	2.27	94.41	45.44	142.13
2009	2.22	105.36	59.05	166.63
2010	2.24	116.82	73.80	192.87
2011	2.31	109.08	71.57	182.96
2012	6.85	130.65	67.87	205.37

	Total Cattles NH ₃ emissions	Total Pigs NH ₃ emissions	Total Poultry NH ₃ emissions	TOTAL
	EF = 0.012 kg NH ₃ -N per Kg N in feedstock	EF = 0.012 kg NH ₃ -N per Kg N in feedstock	EF = 0.012 kg NH ₃ -N per Kg N in feedstock	
Year	(kg)	(kg)	(kg)	(kg)
2013	6.91	119.79	60.15	186.85
2014	11.94	143.48	71.55	226.97
2015	12.03	147.52	92.06	251.61
2016	13.15	145.86	126.92	285.93
2017	13.70	160.16	130.75	304.61
2018	14.58	180.21	135.23	330.02
2019	15.48	172.48	140.26	328.23

Table 77: NO_x calculations for Animal Manure Applied to Soils category

	Total Cattles NO _x emissions	Total Pigs NO _x emissions	Total Poultry NO _x emissions	TOTAL
	EF = 0.04 kg NO per Kg N waste applied	EF = 0.04 kg NO per Kg N waste applied	EF = 0.04 kg NO per Kg N waste applied	
Year	(kg)	(kg)	(kg)	(kg)
1990	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00
2001	0.00	38.81	0.00	38.81
2002	0.00	83.18	0.00	83.18
2003	0.00	123.75	0.00	123.75
2004	0.00	157.92	0.00	157.92
2005	0.00	182.89	0.00	182.89
2006	0.00	230.89	48.04	278.92
2007	0.00	269.38	101.23	370.61
2008	7.44	308.69	148.57	464.69
2009	7.27	344.49	193.07	544.82
2010	7.34	381.95	241.30	630.59
2011	7.56	356.63	234.01	598.20
2012	22.39	427.18	221.91	671.48
2013	22.60	391.67	196.66	610.94

	Total Cattles NOx emissions	Total Pigs NOx emissions	Total Poultry NOx emissions	TOTAL
	EF = 0.04 kg NO per Kg N waste applied	EF = 0.04 kg NO per Kg N waste applied	EF = 0.04 kg NO per Kg N waste applied	
Year	(kg)	(kg)	(kg)	(kg)
2014	39.05	469.13	233.93	742.12
2015	39.34	482.32	301.01	822.67
2016	42.99	476.90	414.97	934.86
2017	44.78	523.66	427.51	995.95
2018	47.68	589.20	442.16	1079.04
2019	50.62	563.96	458.59	1073.16

14.2.5 Urine and dung deposited by grazing animals (3Da3)

Activity data and emissions for NH₃ concerning the amount of applied animal manure to soils had been calculated using the excel file provided with the CORINAIR EMEP/EEA Guidebook 2013 [12].

For category 3Da3 Urine and Dung Deposited by Grazing Animals and pollutant NH₃ for all years 1990-2017 the TERT noted (Observation CY-3Da3-2019-0001) that no explanation was provided in the IIR with respect to recalculations for the category. In response to a question raised during the review, Cyprus explained that an explanation was mistakenly omitted from the IIR and provided the TERT with the relevant explanation and emission calculations. The TERT agreed with the explanation provided by Cyprus.

The reason for the large change is the same as the answer to question CY-3B1a-2019-0001, quoted here: “The recalculations were done for the whole series (1990 – 2016). After a review question about whether there are tied cows or not, we came to the conclusion that in Cyprus there are no tied cows, and for this reason we changed the following factors: Straw from 1500 to 3000 kg/y, Housing from 180 to 365 days and % excreta on yards from 25% to 50%”. An excel file with the relevant calculations was submitted. From the next year Cyprus will use the new excel provide with the Corinair GB2019.

Category 3Da3 is a key source for the following components (% of national total in 2019):

NH ₃	6.67%
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14.2.6 Farm – level agricultural operations (3Dc)

Activity data concerning the concerning the agricultural operations were based on the crop area provided by the Statistical Service and is given in **Table 74**. Emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10]. The emission factors used are presented in **Table 78**.

Table 78: EFs used in NFR 3Dc

Pollutant	Emission Factor
PM _{2.5}	0.06 kg/ha ⁻¹
PM ₁₀	1.56 kg/ha ⁻¹
TSP	1.56 kg/ha ⁻¹

14.2.7 Use of Pesticides

Based on a TERT's suggestion (CY-3Df-2018-0001), Cyprus found activity data for the use of pesticides in agriculture from FAO portal.

The activity data are presented in Table 76.

Table 79 : Activity data for pesticides

	Pentachlorophenol	Salts of Pentachlorophenol	Chlorothalonil	Total
	kg	kg	kg	kg
2007	0	1378	0	1378
2008	0	131	0	131
2009	0	75	0	75
2010	235	37	0	272
2011	0	20	0	20
2012	237	61	0	298
2013	235	30	0	265
2014	0	39	0	39
2015	0	5	0	5
2016	0	87	0.75	87.75
2017	235	157	0	392
2018	0	285	0	285
2019	0	285	0	285

Table 80: EF used for pesticides

	EF for HCB	
PCP	50	mg/kg
Chlorothalonil	5	mg/kg

Category 3Df is a key source for the following components (% of national total in 2019):

HCB	62.4%
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14.3 Cultivated Crops 3De

Activity data concerning the concerning the agricultural operations were based on the crop area provided by the Statistical Service and is given in **Table 74**. Emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10]. The emission factors used are presented in **Table 81**.

Table 81: EFs used in NFR 3De

Pollutant	Emission Factor
NMVOC	0.86 kg/ha ⁻¹

14.4 Field Burning of Agricultural Residues (3F)

Activity data concerning the amount of crop residue burned were provided by the Statistical Service and emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10]. The emission factors used are presented in **Table 82**.

Table 82: EFs used in NFR 3F.

Pollutant	Emission Factor
NO _x	0.0023 kg/kg dry matter
NMVOC	0.0005 kg/kg dry matter
SO _x	0.0005 kg/kg dry matter
NH ₃	0.0024 kg/kg dry matter
PM _{2.5}	0.0054 kg/kg dry matter
PM ₁₀	0.0057 kg/kg dry matter
TSP	0.0058 kg/kg dry matter
BC	500 mg/kg dry matter
CO	0.0667 kg/kg dry matter
Pb	0.11 mg/kg dry matter
Cd	0.88 mg/kg dry matter
Hg	0.14 mg/kg dry matter
As	0.0064 mg/kg dry matter
Cr	0.08 mg/kg dry matter
Cu	0.073 mg/kg dry matter
Ni	0.052 mg/kg dry matter
Se	0.02 mg/kg dry matter
Zn	0.56 mg/kg dry matter
PCDD/F	0.5 µg I-TEQ/t
Benzo(a)pyrene	67.7 mg/kg dry matter

Pollutant	Emission Factor
Benzo(b)fluoranthene	189.1 mg/kg dry matter
Benzo(k)fluorathene	80.7 mg/kg dry matter
Indeno (1.2.3-cd) pyrene	57.9 mg/kg dry matter

Category 3F is a key source for the following component (% of national total in 2018):

PAHs	83.7%
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Table 83: Activity data for field burning (3F)

Year	Activity data (t)	Activity data (t), dry matter (20% Hummidity)	% of waste burned
1990	43125	34500	100
1991	44093	35274	95
1992	48833	39066	90
1993	51825	41460	85
1994	47625	38100	80
1995	45653	36522	75
1996	44205	35364	70
1997	43515	34812	65
1998	44318	35454	60
1999	44205	35364	55
2000	38610	30888	50
2001	41978	33582	45
2002	44400	35520	40
2003	54525	43620	35
2004	49800	39840	30
2005	46575	37260	25
2006	44400	35520	20
2007	32700	26160	15
2008	29025	23220	10
2009	23400	18720	10
2010	24675	19740	10
2011	26925	21540	10
2012	28350	22680	10
2013	23100	18480	10
2014	18977	15182	10
2015	25039	20031	10
2016	17846	14277	10
2017	15161	12129	10
2018	18008	14407	10
2019	17305	13844	10

15 J_Waste

15.1 Solid Waste Disposal on Land (5A)

Activity data concerning the amount of solid waste disposal on land were provided by the Statistical Service. Cyprus used to calculate emissions based on Tier 1 methodology of the EMEP/EEA Guidebook 2016 [11]. After the TERTs' observation / advise (CY-5A-2019-001), Cyprus changed the methodology and calculated the NMVOC emissions based on UNFCCC methodology [CH₄ (methane) production]. To do this, as per TERT suggestion, we used CH₄ emission ratio per ton of disposed waste (based on UNFCCC 2019 reporting), converted it into a volume of CH₄ per ton of disposed waste (using the molecular volume of CH₄) and then into a volume of biogas per ton of disposed waste (applying the fraction of CH₄ in biogas F = 50%) and then we applied the fraction of NMVOC in biogas (5.65 g/m³ of landfill gas) presented in the note at the bottom of table 3-1, chapter 5A of the 2019 EMEP/EEA GB.

The emission factors for the particles used for this category are shown in Table 80.

Category 5A is a key source for the following component (% of national total in 2019):

NMVOC	3.4%
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Activity data are presented in **Table 84**.

Table 84: Activity data from NFR 5A.

Year	Solid Waste Disposal (in Gg)
1990	305.97
1991	320.29
1992	334.97
1993	348.66
1994	361.94
1995	387.00
1996	389.00
1997	398.00
1998	406.00
1999	413.00
2000	423.00
2001	442.00
2002	450.00
2003	466.63
2004	481.59
2005	489.3
2006	499.49
2007	512.19

Year	Solid Waste Disposal (in Gg)
2008	530.59
2009	539.67
2010	497.86
2011	475.91
2012	467.48
2013	434.49
2014	398.67
2015	409.99
2016	424.44
2017	423.16
2018	392.86
2019	379.39

Note ¹: Preliminary data.

Table 85: EFs used in NFR 5A.

Pollutant	Emission Factor
PM _{2.5}	0.033 kg/Mg waste
PM ₁₀	0.219 kg/Mg waste
TSP	0.436 kg/Mg waste

15.2 Biological treatment of waste – Anaerobic digestion at biogas facilities (5B2)

For the calculations of NH₃ due to anaerobic digestion, Cyprus used the population of livestock, the percentage of the manure that goes to anaerobic digestion and the EF from Table 3-2 (Tier 2 method) from the Corinair GB 2019.

Year	3B2.1a Dairy cattle	3B2.1b Other cattle	3B2.3a Breeding Swine	3B2.3b Market Swine	3B2.4 Poultry	TOTAL NH ₃ emissions (kt)
1990	0	0	0	0	0	0
1991	0	0	0	0	0	0
1992	0	0	0	0	0	0
1993	0	0	0	0	0	0
1994	0	0	0	0	0	0
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0

Year	3B2.1a Dairy cattle	3B2.1b Other cattle	3B2.3a Breeding Swine	3B2.3b Market Swine	3B2.4 Poultry	TOTAL NH ₃ emissions (kt)
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	4.61E-05	9.94E-05	0	0.000146
2002	0	0	9.33E-05	0.000219	0	0.000312
2003	0	0	0.000138	0.000326	0	0.000464
2004	0	0	0.000171	0.000421	0	0.000592
2005	0	0	0.000209	0.000476	0	0.000686
2006	0	0	0.000263	0.000603	6.18E-05	0.000928
2007	0	0	0.000313	0.000697	0.00013	0.00114
2008	2.05E-05	1.17E-05	0.00032	0.000838	0.000191	0.001381
2009	2.01E-05	1.13E-05	0.00035	0.000941	0.000248	0.001572
2010	2.03E-05	1.14E-05	0.000383	0.001049	0.00031	0.001774
2011	2.09E-05	1.18E-05	0.000335	0.001002	0.000301	0.001671
2012	6.27E-05	3.42E-05	0.000401	0.001201	0.000285	0.001984
2013	6.43E-05	3.35E-05	0.000387	0.001082	0.000253	0.001819
2014	0.00011	5.92E-05	0.000469	0.00129	0.000301	0.002229
2015	0.000114	5.67E-05	0.000439	0.001366	0.000389	0.002364
2016	0.000124	5.98E-05	0.00045	0.00134	0.000534	0.002507
2017	0.000131	6.31E-05	0.000503	0.001459	0.00055	0.002706
2018	0.000138	6.81E-05	0.00056	0.00165	0.000568	0.002984
2019	0.000151	6.81E-05	0.00054	0.00157	0.000592	0.002926

15.3 Clinical Waste Incineration (5C1biii)

As far as clinical waste incineration is concerned, three incinerators were in operation in Cyprus until 2003 when their operations were terminated. Since then, all clinical wastes are subjected to sterilization. In addition, no municipal (NFR 5C1a), industrial (NFR 5C1bi), hazardous (NFR 5C1bii) or sewage sludge (NFR 5C1biv) waste incineration takes place in the island.

Based on TERT recommendation (CY-5C1biii-2019-0001) we made new calculations for category 5C1biii for the year's 1990 up to 2003 when the clinical incinerator was stopped working.

15.4 Cremation (5C1bv)

In Cyprus there is one plant in operation for the incineration of animal carcasses. Activity data concerning the amount (number) of animal bodies incinerated were provided by the annual environmental report of the operator of the incinerator. Emissions were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2019 [10]. The operator of the incinerator does not keep records of the total number of animals per category incinerated. However, the

operator of the incinerator reports that the number of cows burned is bigger than the number of sheep burned. Therefore, the emission factors used for the estimation of the emissions of these pollutants are those that correspond to cows and are presented in **Table 86**.

Furthermore, it should be mentioned that in Cyprus there is no cremation of human bodies. Even though, in 2008, a relevant legislation on cremation of human bodies was enacted in Cyprus, until now, there is no application submitted yet to build crematoria.

Table 86: EFs used in NFR 5C1bv

Pollutant	Emission Factor
PM _{2.5}	0.538 kg/Mg waste
PM ₁₀	0.628 kg/Mg waste
TSP	0.897 kg/Mg waste

No key sources are found in this category.

15.5 Open Burning waste (5C2)

Activity data concerning the amount of material burned are based on assumptions made by the inventory team. The assumptions concern the number of bonfires and the amount of wood burned per bonfire (2 tons). Emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10]. The emission factors used are presented in **Table 87**.

Table 87: EFs used in NFR 5C2.

Pollutant	Emission Factor
NM VOC	1.23 kg/Mg waste
NO _x	3.18 kg/Mg waste
PM _{2.5}	4.19 kg/Mg waste
PM ₁₀	4.51 kg/Mg waste
TSP	4.64 kg/Mg waste
PCDD/F	10 µg I-TEQ/Mg waste
Total 3 PAHs	12.64 g/Mg waste

No key sources are found in this category.

With reference to TERT observation (CY-5C2-2019-0001), we would like to inform you that domestic green waste burning in backyard, agricultural waste and forest residue are forbidden by law (Fire Prevention of Outdoors Law of 1988 (220/1988) as amended by 109(I)/2002), and we do not have any methods to find data for any illegal burning. The only known open burning wastes are the Easter controlled bonfires that are allowed.

15.6 Domestic Wastewater Handling (5D1)

Activity data concerning the total amount of waste water handled by all the wastewater treatment plants in Cyprus were provided by the Water Development Department of MARDE and are shown in table 76. Emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2019 [10]. The NMVOC emission factor used is 15 mg/m³ wastewater.

Year	Waste water (in thousands of m ³)
1990	18575
1991	18575
1992	18575
1993	18575
1994	18575
1995	18575
1996	18575
1997	18575
1998	18575
1999	18575
2000	18575
2001	18575
2002	18575
2003	18575
2004	18575
2005	18991
2006	20238
2007	19299
2008	20998
2009	21406
2010	23754
2011	25015
2012	28702
2013	28439
2014	28772
2015	32106
2016	32555
2017	33761
2018	36090
2019	41462

No key sources are found in this category.

15.7 Other Disposal (5E)

Activity data concerning the other waste (Accidental fires of cars and buildings) are taken from the Police Statistical Service. Emissions were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2019 [10]. The emission factors used are presented in **Table 88**.

Table 88: EFs used in NFR 5E.

Pollutant	Car Fire	Detached house fire	Undetached house fire	Apartment building fire	Industrial building fire
PM _{2.5}	2.3 kg/fire	143.8 kg/fire	61.6 kg/fire	43.5 kg/fire	27.2 kg/fire
PM ₁₀	2.3 kg/fire	143.8 kg/fire	61.6 kg/fire	43.5 kg/fire	27.2 kg/fire
TSP	2.3 kg/fire	143.8 kg/fire	61.6 kg/fire	43.5 kg/fire	27.2 kg/fire
PCDD/F	0.048 mg/fire	1.44 mg/fire	0.6 mg/fire	0.4 mg/fire	0.3 mg/fire

Category 5E is a key source for the following component (% of national total in 2019):

PCDD	39.1%
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16 Recalculations and Improvements

16.1 Recalculations

In the preparation of the 2019 submission, some methodological improvements were included in the national emission inventory. The changes were done based on TERT previous recommendations or Technical corrections. This led to recalculations of the time series 1990-2018, aiming at the improvement of the accuracy of the emission data. The main reason of the recalculations was the full implementation of the provisions of the new EMEP/EEA Emission Inventory Guidebook 2019 and the implementation of the TERT 2017, 2018, 2019 and 2020 suggestions.

The following major changes can be distinguished:

16.1.1 NFR Category K_Agrilivestock

3B Manure emissions recalculations for the years 1990 to 2019 were done based on the methodology proposed in the new EMEP/EEA Emission Inventory Guidebook 2019. Actually, we used the new **excel tool** provided by EEA.

Furthermore, methods to reduce ammonia emissions from manure are applied, as abatement measures. Either aerobic or anaerobic treatment.

16.1.2 NFR Category F_RoadTransport

The emissions from the road transport sector were recalculated the whole time series 1990 – 2018 because the previous version of COPERT when exporting to NFR, it omitted the Hg values.

16.1.3 NFR Category 1A1a - Public Electricity and heat production

Emissions due to Biomass were calculated in the submission of February 2020.

16.1.4 NFR Category 1A4bi - Residential: Stationary

Recalculations were made in this category due to TERT technical correction.

16.1.5 NFR Category 2D3d – Coating Applications

Re calculations were made due to new data from Statistical service. We used for the activity data for glues only the import quantities since the ones produced in Cyprus are in solid form and are water based.

16.1.6 NFR Category 3Da1 – Inorganic Fertilisers

Emissions were recalculated due to TERT technical correction. Activity data were taken from FAO and a Tier 2 methodology was used.

16.1.7 NFR Category 3Df – Use of pesticides

Recalculations were done for the whole time series 1990 – 2018 after the TERT observation. New source for the activity data was suggested.

16.1.8 NFR Category 5B2 – Biological treatment of waste - Anaerobic digestion at biogas facilities

Based on TERT observation we estimated the NH₃ emissions due to anaerobic digesters.

16.1.9 NFR Category 5C1biii – Clinical waste incineration

Based on TERT observation recalculations were made for the time series 1990 to 2003 for PAHs, PCBs, HCB and the metals Pb, Cd and Hg.

16.2 Resubmission of NFR Emissions in March 2021

On the 15th of March we made a resubmission of the emissions calculations due to:

- a) The fuels quantities used in the COPERT software for the calculation of the emissions submitted in February 2021 were wrong. New, more accurate activity data were used.
- b) The NO_x emissions of category 1A2f (from cement factory) were recalculated. We forgot to reduce the NO_x emissions due to the fact that the company installed a DeNO_x system since 2012.
- c) The NFR template of 2009 had a mistake. Instead of “ANNEX 1”, “ANNEW 1” was written.
- d) There was a mistake (missing values) for Dioxins in 1A4bi category.

16.3 Improvements

16.3.1 NFR Categories manure – Anaerobic Treatment

Data were collected from the relevant Authorities regarding the quantities of manure that is going to anaerobic digesters.

16.3.2 Commercial/Institutional (1A4ai and 1A4aii)

Emissions from categories Commercial/Institutional: Stationary (1A4ai) and Commercial/Institutional: Mobile (1A4aii) are reported as Included Elsewhere (IE). This is due to the fact that the amount of fuel consumed under each of these categories cannot be identified. Thus,

emissions from category Commercial / Institutional: Stationary (1A4ai) are included in category Residential stationary plants (1A4bi) and emissions from category Commercial / Institutional: Mobile (1A4aii) are included in category F_Road transport (1A3bi-iv).

During next submission, we will try to find separate for each of the above categories.

17 Projections

17.1 Introduction

According to the provisions of the new National Emissions Ceilings Directive (EU) 2016/2284 (NECD) Table C, Annex 1 **[21]**, as regards the obligation to submit a Projections Report, Cyprus was obliged to submit a report every 2 years from 2017 and on. Consequently, the next submission will be this year (2021).

In the following paragraphs, we explain briefly the main assumptions which were taken into consideration in order to make the calculations for the Projections.

17.1.1 For EU countries, the baseline projection assumes:

- the implementation of all emission control legislation as laid down in national laws,
- compliance with the new National Emission Ceilings Directive **[21]**,
- compliance with the amended Protocol of Gothenburg in 2012,
- the implementation of emission control measures for heavy duty vehicles,
- the implementation of the Directive on Industrial Emissions (IED) **[17]** for stationary sources,
- the implementation of EURO-VI standard from 2014 onwards and
- the implementation of the RES Target Directive.

Additionally, the projections for the years 2020 up to 2030 for Cyprus have been also based on Cyprus experts' projections of the activity data and special provisions on the IED Directive for Cyprus.

17.1.2 Special provisions for Cyprus on Articles 33 and 34 of the IED

According to Directive 2003/54/EC, Cyprus is considered a «small isolated system» (any system with consumption of less than 3000 GWh in the year 1996, where less than 5% of annual consumption is obtained through interconnection with other systems). Therefore, one of its power generation plants falls into the provisions of the Article 33(3) of the IED, which states that: “In case of a combustion plant being, on 6 January 2011, part of a small isolated system and accounting at that date for at least 35% of the electricity supply within that system, which is unable, due to its technical characteristics, to comply with the emission limit values referred to in Article 30(2), the number of operating hours referred to in paragraph 1(a) of this Article shall be 18000, starting from 1.1.2020 and ending no later than 31.12.2023”.

Based on the above, the Dhekelia Power Station will continue to work until 31.12.2023 with limited lifetime derogation using the emission limit values set out in the permit pursuant in particular to the requirements of Directives 2001/80/EC (LCP) and 2008/1/EC (IPPC).

Therefore, Dhekelia Power Station will continue to operate until 31.12.2023 using liquid fuels with less than 1% sulphur content.

17.1.3 Emission Obligations for the years 2020 and 2030

Based on the revised Gothenburg Protocol in 2012 and the new NECD (mentioned above), the Cyprus emission reduction obligations of the annual emissions for the pollutants SO₂, NO_x, VOC, NH₃ and PM_{2.5} are the following:

Year	SO ₂	NO _x	VOC	NH ₃	PM _{2.5}
2020	-83%	-44%	-45%	-10%	-46%
2030	-93%	-55%	-50%	-20%	-70%

The figures in the above table show the percentage of reduction compared to the total emissions of the reference year 2005.

17.1.4 Policies and Measures in order to achieve the above mentioned targets

The national policies are prepared, updated, and monitored by the Ministry of Agriculture, Rural Development and Environment (MARDE), in collaboration with the responsible Ministry for each measure or policy. Currently, the main focus of the policy related to reduction of gas emissions is Energy and in Agriculture and Waste Sectors. The sectors of energy for which most measures are implemented are A_Public Power and F_Road Transport.

The policies and measures currently in implementation are presented in **Table 89**.

Table 89: List of Policies and Measures.

Various Policies / Measures planned by Cyprus Government
Agriculture
– Promotion of anaerobic digestion for the treatment of animal waste
Cross-cutting
– Energy efficiency obligation in public purchases and national green public procurement action plan
– Reduction of emissions from the businesses
Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)
– Additional floor space “allowance” for new buildings: incentive for new buildings with higher energy efficiency than EPBD requirements
– Advanced Metering Infrastructure Plan
– Energy efficiency in water sector
– Energy efficiency Obligation scheme
– Energy efficient street lighting
– Financing tool providing soft loans for energy efficiency investments

Various Policies / Measures planned by Cyprus Government

- Fiscally neutral green tax reform by increasing environmental taxes while reducing labor taxation
- Implementation of measures aimed at attaining energy savings in existing public buildings (annual obligation)
- Implementation of soft measures (information campaigns, trainings, workshops, etc).
- Individual energy efficiency interventions and energy efficiency retrofits in selected governmental and municipal buildings through project funding and Interreg projects CYPRUS-GREECE
- Minimum energy performance requirements for new and existing buildings, requirements for technical building systems installed in existing buildings, inspections for heating systems and a/c systems)
- Minimum energy performance requirements for new buildings (revised)
- Removing barriers that impede the uptake of energy performance contracting and the implementation of energy efficiency investments in general
- RES and Energy Conservation fee (tax) applied on electricity.
- Supporting scheme for energy efficiency investment using European Structural and Investment Funds 2021-2027
- Supporting Schemes through national Fund of Renewable Energy (RE) & Energy Conservation (EC) for promoting energy efficiency investments in Residential and Public sector and energy audits in SMEs.
- Technical guidance promotion of NZEB and electronic tool kit for consumers
- Uptake of energy efficiency services in public sector by removing procurement hurdles

Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture); Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)

- Pilot projects for installing high efficiency cogeneration in public buildings
- Support scheme for the installation or replacement of solar water heaters in households
- Support scheme for the production of electricity from renewable energy sources for own use Category A:Net-billing
- Support scheme for the promotion of renewable energy sources and energy saving

Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)

- Certification of small-scale RES system installers
- Create localised tools for selecting the appropriate PV size and scheme
- Development of natural gas network pipeline infrastructure in Cyprus
- Electricity Interconnectivity of Cyprus
- Energy efficiency in electricity infrastructure
- Energy Storage: further analysis for both behind the meter and central storage for further penetration of RES
- Framework for Repowering of existing RES systems
- Improve forecasting modelling tool for Weather to Energy production
- Incentives for encouraging the use of RES in different types of developments.
- Installation of net-metering PV systems in houses of vulnerable consumers
- Measures promoting the installation of small-scale renewable energy technologies on or in buildings
- Project "LNG Import Terminal"
- Renewable Energy Communities
- Research and innovation programs in the sector of renewable energy sources
- Rural development programme 2014-2020 of the Ministry of Agriculture, Rural Development and Environment.
- Statistical Transfer Renewable Energy Sources
- Support Scheme for Renewable Energy Sources in order to promote innovation and reduce CO2
- Support scheme for storage units
- Support scheme for the installation of renewable energy systems that will operate in the competitive electricity market

Various Policies / Measures planned by Cyprus Government

- Support scheme for the production of electricity from RES-Feed-in Tariffs for RES installations
- Virtual netmetering

Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production); Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)

- Efficient district heating and cooling
- Net billing Scheme for high efficiency cogeneration (HECHP)
- Self-consumption of electricity from renewable energy sources
- Standalone renewable energy systems
- Support scheme for the installation of net-metering photovoltaic systems with capacity up to 20KW, in public schools buildings.
- Support scheme for the production of electricity from renewable energy sources for own use Category A:Net-metering

Industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon)

- Preparation of the proper recovery system for F-gases in equipment

Transport

- Excise tax on road transport fuels exceeding the minimum levels as required in Directive 2003/96/EC
- Installation of charging points and infrastructures for electric vehicles
- Installation of telematic system in public bus fleet
- Integrated Fleet Management System (Central Government vehicles)
- New Bus Contracts 2020-2030
- Old vehicle scraping scheme and financial incentives for the purchase of electric vehicles
- Replacement of the conventional transport fuels with biofuels
- Shift of modal share from car trips to sustainable modes of transport – Implementation of Sustainable Urban Mobility Plans
- Use of buses that have low or no GHG emissions
- Use of vehicles with low or no GHG emissions
- Vehicle excise duty based on CO2 emissions

Waste management / waste

- Biogas recovery from old solid waste disposal sites (deep unmanaged)
- Promotion of anaerobic digestion for the treatment of the organic fraction of the municipal solid waste
- Reduction of organics to landfills
- Reduction of waste to solid waste disposal sites from sorting at production level

More details regarding each policy and measure, as well as, the projections of the energy sector (A_Public Power and F_RoadTransport) could be found in the following report submitted to UNFCCC by the Department of Environment of the MARDE.

http://cdr.eionet.europa.eu/cy/eu/mmr/art04-13-14_lcds_pams_projections/pams/pams/envxtkusg/

In the following paragraphs, we are giving more details on projected activity data for the main sectors.

17.1.5 Reduction Targets Exceedances for the year 2020

Based on the projections data submitted to CDR this year it is noted that for the pollutants NO_x and SO_x the target values were not achieved. The main reason for not achieving these targets is that natural gas has not yet been available for use by Power Plants.

We have not prepared any additional measures for 2020 since this year is past.

17.2 Energy Sector

17.2.1 Public electricity and heat production (1A1a)

The main factors that affect the emissions from the Energy Sector are a) the energy demand, b) the type of fuel used for the electricity production and c) the penetration of the RES in the electricity market.

As regards the total electricity supply and the fuel used, please find data in the following Table 90 and in Figure 41. The estimations were made by the Cyprus Institute (Cyl) within the framework of the project "**Supporting the Economic Recovery of Cyprus with a View to Energy and Climate Policy**".

Table 90: Contribution of Various Fuels On Total Electricity Supply (GWh)

	2019	2020	2025	2030
Gas	-	-	4,305	4,400
HFO	2,495	1,462	21	46
Diesel	1,946	2,329	-	-
Solar PV	-	265	272	580
Solar Thermal	-	-	172	172
Wind	191	197	270	270
Biomass	53	74	180	211
Dist. PV	279	311	473	635
Total Electricity Supply (GWh)	4963	4639	5694	6315
RES share (%)	11.0%	19.1%	25.2%	31.1%

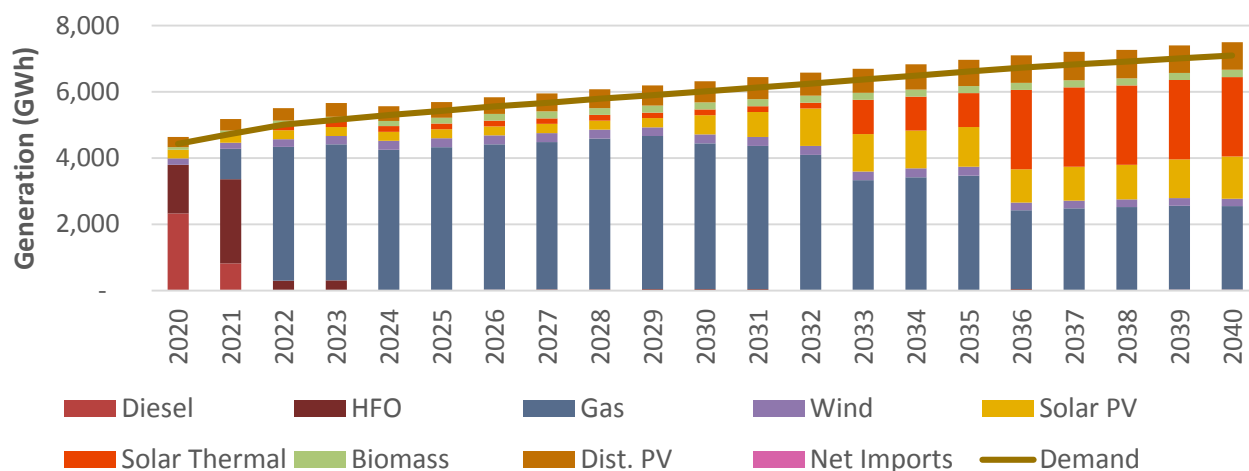


Figure 41: Projections of Various Fuels On Total Electricity Supply (GWh)

It is noted that the use of Natural Gas in electricity production is estimated to be completed in 2023. In order to achieve the emissions reductions targets, especially for the SO_x emissions, the following measures will be taken by EAC:

- 1) Desulfurization units will be installed in Steam Turbine 1, 2 and 3 of the Vassilikos Power Plant.
- 2) The use of HFO in Dhekelia Power Plant will cease completely in 2023. Before 2023, based on the derogations of the IED Directive, they could operate these units for a certain amount of hours per year.
- 3) After 2023, only Natural Gas and a very small amount of HFO will be used in the Power Plants.

It seems that for 2020, the reduction target for SO_x will be not achieved since the Power Plants, being the main contributor, still use HFO and Diesel.

17.2.2 Commercial / Institutional and Residential Stationary Plants (1A4ai & 1A4bi)

The Cyprus government announced recently a plan which gives incentives to citizens to restore their buildings (built before 2007) upgrading their energy efficiency. This will lead to a lower demand of energy needed for cooling and heating. Since it is a new plan, we were not able to materialize it and find the relevant emissions reductions.

17.2.3 F- Road Transport

Activity data (composition of the vehicles fleet) and the fuels needed were estimated based on the trend of the historical data, taking into consideration new technologies and legislations (Euro VI, etc).

Please find in Table 91 the vehicle projections and in Table 4 the fuels projections.

Table 91: Vehicle Projections per Category

Row Labels	2005	2019	2020	2025	2030
Buses	3683	6358	5619	5505	5572
Heavy Duty Trucks	16364	18829	17144	17007	17088
L-Category	59924	57973	40504	40374	40430
Light Commercial Vehicles	125586	126997	106717	112011	109262
Passenger Cars	416758	692447	577005	579495	578466
Grand Total	622315	902604	746989	754391	750819

Table 92: Total fuels sales projections

Row Labels	2005	2019	2020	2025	2030
Biodiesel	0	450	1424	1197	1146
Bioethanol	0	0	0	0	0
CNG	0	0	0	0	0
Diesel Grade 1	14847	13551	13912	10906	10444
Diesel Grade 2	0	0	0	0	0
LPG Grade 1	0	23	23	23	38
LPG Grade 2	0	0	0	0	0
Petrol Grade 1	13423	14915	12528	17689	16372
Petrol Grade 2	0	0	0	0	0
Grand Total	28269	28938	27887	29815	28000

The projections of the vehicle fleet show a big decrease of the total vehicle numbers. This was based on the following:

- Economic crisis in Cyprus. This leads many young people to unemployment and to migration.
- The Cyprus government put in a lot of effort promoting public transportation and especially buses. The government promotes measures to increase the use of buses such as giving incentives to companies to use new buses, to increase the frequency of itineraries and the usage of smart applications to informing people on estimated wait and bus arrival times.
- Increase in people using bicycles for their movements.
- The Cyprus government provides incentives for buying hybrid, electric cars ... The number of electric cars are not shown in Table 91.

17.3 Industrial Processes and Product Use

In Cyprus there are seven brick & tiles factories and one cement factory that are covered by IED. The pollutant emissions for these plants (except PM) are estimated based on their production (get from the plants). The fuel consumed for these plants is approximately 94% of

the total fuel consumed for 1A2f category. IED is not affecting these plants and there are no additional Cypriot Regulations. For the time being Natural Gas is not planned to be used for these plants.

Based on the above, the only factor that was taken into account for the projections is the statement of the owners of the cement factory that it will work at full capacity, which is 2,000,000 tons per year. It is expected that the new BREFs coming in 2021 will be stricter regarding particulate matter emissions.

Please find the projections of the activity data for the lime and the bricks factories:

	2005	2019	2020	2025	2030
Bricks and Tiles Industries (tn/year)	503957	224795	193989	161469	128949
Lime (tn/year)	14822	6052	7518	7605	7692

17.4 Agriculture

In this sector, we assume that there is a certain increase in the livestock, which is presented in the following Table 93. In addition, a percentage of the manure quantities is treated in anaerobic digesters, lowering the quantities disposed on soil, and consequently, the relevant emissions. These amounts are shown in Table 94.

Table 93: Livestock Population Projections

	3B1a Dairy cattle	3B1b Non- dairy cattle	3B3 Fattening pigs	3B4 Sows	3B2 Sheeps	3B4d Goats	3B4e Horses	3B4f Mules & Asses	3B4gi Laying hens	3B4gii Broilers	3B4giii Turkeys	3B4giv Other poultry
1990	22411	32271	244181	33756	290000	205000	460	5026	640900	2992900	53700	6700
1991	23120	31911	258662	37566	295000	205000	433	4438	621500	2734200	40500	7250
1992	23897	31916	299533	42413	285000	200000	405	3850	596000	3183500	48700	9740
1993	25646	35458	325788	43621	275000	198000	378	3262	774102	3729000	37400	10250
1994	27574	36790	308158	48048	255000	210000	350	2674	755400	3502900	44300	10000
1995	29481	38648	325673	48401	250000	220000	440	2534	764400	3623600	58700	13300
1996	27319	42769	350666	48864	252000	240000	530	2395	797300	3885400	56300	10400
1997	25491	36935	361469	53319	245000	302000	621	2255	741700	4012500	49900	12300
1998	23822	32019	381501	49798	240000	322000	711	2115	841600	3985000	54300	13300
1999	24052	30200	374327	44173	233000	346000	801	1976	722000	4035000	51300	14200

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	3B1a Dairy cattle	3B1b Non- dairy cattle	3B3 Fattening pigs	3B4 Sows	3B2 Sheeps	3B4d Goats	3B4e Horses	3B4f Mules & Asses	3B4gi Laying hens	3B4gii Broilers	3B4giii Turkeys	3B4gi v Other poultry
2000	23511	30672	356300	52100	246000	378600	891	1836	550000	4200000	65000	15000
2001	24365	29069	395574	55726	296600	427100	982	1696	600000	4200000	58000	14500
2002	26232	31924	435071	56329	294000	459500	1072	1557	600000	4360000	61000	16000
2003	26612	31901	432548	55552	264600	407900	1162	1417	600000	4340000	60000	15000
2004	26078	34233	418789	51711	278980	378000	1103	1289	810000	3682000	44000	11000
2005	24585	32994	379114	50605	268874	329300	1045	1161	648400	3727000	32900	10250
2006	23931	32178	399656	52988	272192	344930	986	1033	638840	3098044	32080	6250
2007	23701	31189	413030	54030	292190	368120	928	904	580025	3370680	21860	5250
2008	23636	32048	416610	48322	267308	318400	869	776	607920	3261980	19780	2500
2009	23195	30902	416221	47039	300200	280840	811	648	604985	3173695	14770	0
2010	23421	31294	417423	46306	328864	307430	752	520	555165	3223650	14090	0
2011	24070	32844	398730	40510	355944	290230	752	520	593800	3073735	10725	0
2012	24101	32823	358362	36344	346836	271180	752	520	649550	2830000	8600	0
2013	24700	32536	322826	35069	313458	243130	752	520	640920	2441000	9280	0
2014	25325	34219	308081	33984	292982	232013	752	520	593800	3073735	9530	0
2015	26189	32670	326249	31809	296857	233889	752	520	554570	2604900	9770	0
2016	28460	34379	320001	32602	304187	246624	752	520	575850	2675790	9670	0
2017	30262	36600	317006	33023	321488	257637	752	520	570330	2777700	11860	0
2020	29785	35749	329158	33586	319396	258955	401	349	604643	2809580	10154	4
2025	34202	37994	338745	34564	334606	271286	401	349	621918	2889853	10444	9
2030	34202	37994	338745	34564	334606	271286	401	349	621918	2889853	10444	14

17.5 Solvent Sector

Since for category 2D we are using a Tier 1 method and the population is increasing, the NMVOCs emissions should be increased for 2025 and 2030. Instead the emissions were decreased since we used a lower emission factor (1 instead 1,2 kg/person).

We expect that more stringent rules as regards the VOCs content of the products in this category will be taken in the next few years.

Table 94: Livestock Solid Waste for Digestion

	Dairy cattle		Other cattle		Market Swine		Breeding swine		Sheep	Goats	Horses	Mules	Poultry	
	Solid storage	Digester	Solid storage	Digester	Liquid system	Digester	Liquid system	Digester	Solid storage	Solid storage	Solid storage	Solid storage	Solid storage	Digester
1990	100	0	100	0	100	0	100	0	100	100	100	100	100	0
1991	100	0	100	0	100	0	100	0	100	100	100	100	100	0
1992	100	0	100	0	100	0	100	0	100	100	100	100	100	0
1993	100	0	100	0	100	0	100	0	100	100	100	100	100	0
1994	100	0	100	0	100	0	100	0	100	100	100	100	100	0
1995	100	0	100	0	100	0	100	0	100	100	100	100	100	0
1996	100	0	100	0	100	0	100	0	100	100	100	100	100	0
1997	100	0	100	0	100	0	100	0	100	100	100	100	100	0
1998	100	0	100	0	100	0	100	0	100	100	100	100	100	0
1999	100	0	100	0	100	0	100	0	100	100	100	100	100	0
2000	100	0	100	0	100	0	100	0	100	100	100	100	100	0
2001	100	0	100	0	97	3	97	3	100	100	100	100	100	0
2002	100	0	100	0	94	6	94	6	100	100	100	100	100	0
2003	100	0	100	0	91	9	91	9	100	100	100	100	100	0
2004	100	0	100	0	88	12	88	12	100	100	100	100	100	0
2005	100	0	100	0	85	15	85	15	100	100	100	100	100	0
2006	100	0	100	0	82	18	82	18	100	100	100	100	98	2
2007	100	0	100	0	79	21	79	21	100	100	100	100	96	4
2008	99	1	99	1	76	24	76	24	100	100	100	100	94	6
2009	99	1	99	1	73	27	73	27	100	100	100	100	92	8
2010	99	1	99	1	70	30	70	30	100	100	100	100	90	10
2011	99	1	99	1	70	30	70	30	100	100	100	100	90	10
2012	97	3	97	3	60	40	60	40	100	100	100	100	90	10
2013	97	3	97	3	60	40	60	40	100	100	100	100	90	10
2014	95	5	95	5	50	50	50	50	100	100	100	100	90	10
2015	95	5	95	5	50	50	50	50	100	100	100	100	85	15
2016	95	5	95	5	50	50	50	50	100	100	100	100	80	20
2017	95	5	95	5	45	55	45	55	100	100	100	100	80	20

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	Dairy cattle		Other cattle		Market Swine		Breeding swine		Sheep	Goats	Horses	Mules	Poultry	
	Solid storage	Digester	Solid storage	Digester	Liquid system	Digester	Liquid system	Digester	Solid storage	Solid storage	Solid storage	Solid storage	Solid storage	Digester
2018	95	5	95	5	40	60	40	60	100	100	100	100	80	20
2019	95	5	95	5	40	60	40	60	100	100	100	100	80	20
2020	95	5	95	5	40	60	40	60	100	100	100	100	80	20
2025	94	6	94	6	33	67	33	67	100	100	100	100	78	22
2030	92	8	92	8	22	78	22	78	100	100	100	100	76	24

17.6 Waste

In this sector we assumed that the waste production will be based on the population growth (the data were taken from Eurostat Database), and on the assumption that the production per capita will be reduced every year based on the Government campaign of reusing some products instead of sending them for recycling.

Please find the data in Table 95.

Table 95: Waste per Capita

	Population	kg/capita	Total (tn)
2017	859983	493	423971
2018	865255	498	430897
2019	875899	502	439701
2020	887331	500	443666
2025	928295	485	450223
2030	962854	475	457356

Furthermore, we take into consideration that after 2021, 10% of the total quantities will go for composting.

In addition, we estimate that some quantities will be sorted from the original volume and will be treated in certain plants.

The percentage of this sorting is 40% in 2020, 55% in 2025 and 60% in 2030, and these quantities either will be recycled or recovered.

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[Annex 1: Level Assessment 2019](#)

Annex 1

Key Category Analysis

Level Assessment 2019

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Table 96: NOx Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	3905.57	27.81%	27.81%
1A3biii	Road transport: Heavy duty vehicles and buses	2609.11	18.58%	46.39%
1A3bii	Road transport: Light duty vehicles	1797.02	12.80%	59.19%
1A3bi	Road transport: Passenger cars	1241.44	8.84%	68.03%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	954.69	6.80%	74.83%
3Da2a	Animal manure applied to soils	691.91	4.93%	79.76%
1A3ai(i)	International aviation LTO (civil)	473.79	3.37%	83.13%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	396.88	2.83%	85.96%
1A4bi	Residential: Stationary	334.84	2.38%	88.34%
1A4ci	Agriculture/Forestry/Fishing: Stationary	304.57	2.17%	90.51%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	273.04	1.94%	92.46%
3Da1	Inorganic N-fertilizers (includes also urea application)	225.65	1.61%	94.07%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	207.07	1.47%	95.54%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	143.35	1.02%	96.56%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	122.00	0.87%	97.43%
3Da3	Urine and dung deposited by grazing animals	112.39	0.80%	98.23%
1A5b	Other, Mobile (including military, land based and recreational boats)	62.87	0.45%	98.68%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	40.83	0.29%	98.97%
1A3dii	National navigation (shipping)	29.27	0.21%	99.18%
1A3biv	Road transport: Mopeds & motorcycles	29.01	0.21%	99.38%

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Table 96: NOx Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	28.25	0.20%	99.58%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	18.05	0.13%	99.71%
3B3	Manure management - Swine	13.43	0.10%	99.81%
3B1a	Manure management - Dairy cattle	8.27	0.06%	99.87%
3B4gii	Manure management - Broilers	3.69	0.03%	99.89%
3F	Field burning of agricultural residues	3.18	0.02%	99.92%
5C2	Open burning of waste	2.28	0.02%	99.93%
2G	Other product use (please specify in the IIR)	1.91	0.01%	99.95%
3Da2b	Sewage sludge applied to soils	1.78	0.01%	99.96%
3B1b	Manure management - Non-dairy cattle	1.48	0.01%	99.97%
3B4gi	Manure management - Laying hens	1.33	0.01%	99.98%
3Da2c	Other organic fertilisers applied to soils (including compost)	1.07	0.01%	99.99%
3B2	Manure management - Sheep	0.79	0.01%	99.99%
3B4d	Manure management - Goats	0.61	0.00%	100.00%
1A3a(i)	Domestic aviation LTO (civil)	0.21	0.00%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.11	0.00%	100.00%
3B4giii	Manure management - Turkeys	0.06	0.00%	100.00%
3B4e	Manure management - Horses	0.04	0.00%	100.00%
3B4f	Manure management - Mules and asses	0.03	0.00%	100.00%
TOTAL		14041.89	100%	

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Table 97: NMVOC Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
2D3d	Coating applications	2297.19	24.58%	24.58%
1A3bv	Road transport: Gasoline evaporation	1173.46	12.56%	37.14%
2D3a	Domestic solvent use including fungicides	1065.60	11.40%	48.54%
2D3i	Other solvent use (please specify in the IIR)	813.22	8.70%	57.24%
3B1a	Manure management - Dairy cattle	655.52	7.01%	64.26%
1B2av	Distribution of oil products	429.26	4.59%	68.85%
1A3biv	Road transport: Mopeds & motorcycles	419.81	4.49%	73.34%
1A3bi	Road transport: Passenger cars	393.64	4.21%	77.56%
5A	Biological treatment of waste - Solid waste disposal on land	315.77	3.38%	80.94%
3B3	Manure management - Swine	248.02	2.65%	83.59%
3B4gii	Manure management - Broilers	247.74	2.65%	86.24%
2D3h	Printing	245.82	2.63%	88.87%
2H2	Food and beverages industry	165.46	1.77%	90.64%
3B1b	Manure management - Non-dairy cattle	152.55	1.63%	92.27%
1A3bii	Road transport: Light duty vehicles	112.95	1.21%	93.48%
1A3biii	Road transport: Heavy duty vehicles and buses	107.49	1.15%	94.63%
1A1a	Public electricity and heat production	75.61	0.81%	95.44%
3B4gi	Manure management - Laying hens	51.01	0.55%	95.99%
1A4bi	Residential: Stationary	42.70	0.46%	96.44%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	38.97	0.42%	96.86%
3B2	Manure management - Sheep	29.24	0.31%	97.17%
1A3ai(i)	International aviation LTO (civil)	28.82	0.31%	97.48%

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Table 97: NMVOC Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	28.62	0.31%	97.79%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	28.07	0.30%	98.09%
2D3f	Dry cleaning	26.68	0.29%	98.37%
1A4ci	Agriculture/Forestry/Fishing: Stationary	19.91	0.21%	98.59%
3De	Cultivated crops	19.84	0.21%	98.80%
3B4d	Manure management - Goats	16.97	0.18%	98.98%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	14.84	0.16%	99.14%
2D3c	Asphalt roofing	14.51	0.16%	99.30%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	12.42	0.13%	99.43%
2D3g	Chemical products	11.85	0.13%	99.56%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	6.32	0.07%	99.62%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	6.07	0.06%	99.69%
1A3dii	National navigation (shipping)	5.53	0.06%	99.75%
2G	Other product use (please specify in the IIR)	5.13	0.05%	99.80%
1A5b	Other, Mobile (including military, land based and recreational boats)	4.09	0.04%	99.85%
3B4giii	Manure management - Turkeys	3.36	0.04%	99.88%
2D3b	Road paving with asphalt	3.35	0.04%	99.92%
3B4e	Manure management - Horses	2.44	0.03%	99.94%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	1.38	0.01%	99.96%
5C2	Open burning of waste	0.88	0.01%	99.97%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.88	0.01%	99.98%

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Table 97: NMVOC Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3B4f	Manure management - Mules and asses	0.75	0.01%	99.99%
3F	Field burning of agricultural residues	0.69	0.01%	99.99%
5D1	Domestic wastewater handling	0.62	0.01%	100.00%
1A3aii(i)	Domestic aviation LTO (civil)	0.03	0.00%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.01	0.00%	100.00%
TOTAL		9345.09	100%	

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Table 98: SOx Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	14194.49	89.90%	89.90%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	634.65	4.02%	93.92%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	367.23	2.33%	96.25%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	192.23	1.22%	97.46%
1A4bi	Residential: Stationary	131.94	0.84%	98.30%
1A5b	Other, Mobile (including military, land based and recreational boats)	77.71	0.49%	98.79%
1A4ci	Agriculture/Forestry/Fishing: Stationary	47.54	0.30%	99.09%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	36.94	0.23%	99.33%
1A3ai(i)	International aviation LTO (civil)	27.53	0.17%	99.50%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	26.31	0.17%	99.67%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	16.81	0.11%	99.77%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	15.85	0.10%	99.88%
1A3bi	Road transport: Passenger cars	8.03	0.05%	99.93%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	3.82	0.02%	99.95%
1A3bii	Road transport: Light duty vehicles	2.69	0.02%	99.97%
1A3biii	Road transport: Heavy duty vehicles and buses	2.06	0.01%	99.98%
1A3dii	National navigation (shipping)	1.75	0.01%	99.99%
3F	Field burning of agricultural residues	0.69	0.00%	100.00%
2G	Other product use (please specify in the IIR)	0.26	0.00%	100.00%
1A3biv	Road transport: Mopeds & motorcycles	0.14	0.00%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.11	0.00%	100.00%

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Table 98: SO_x Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	0.09	0.00%	100.00%
5C2	Open burning of waste	0.08	0.00%	100.00%
1A3aii(i)	Domestic aviation LTO (civil)	0.01	0.00%	100.00%
	TOTAL	15788.96	100%	

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Table 99: NH₃ Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3Da2a	Animal manure applied to soils	3040.57	44.57%	44.57%
3B3	Manure management - Swine	1340.93	19.66%	64.23%
3B1a	Manure management - Dairy cattle	703.20	10.31%	74.54%
3B1b	Manure management - Non-dairy cattle	418.24	6.13%	80.67%
3Da1	Inorganic N-fertilizers (includes also urea application)	358.20	5.25%	85.92%
3B2	Manure management - Sheep	167.34	2.45%	88.37%
3B4gi	Manure mangement - Laying hens	164.85	2.42%	90.79%
3Da3	Urine and dung deposited by grazing animals	153.54	2.25%	93.04%
3B4d	Manure management - Goats	144.22	2.11%	95.15%
1A3bi	Road transport: Passenger cars	117.17	1.72%	96.87%
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities	78.33	1.15%	98.02%
3B4gii	Manure mangement - Broilers	57.30	0.84%	98.86%
1A3biii	Road transport: Heavy duty vehicles and buses	34.84	0.51%	99.37%
5B1	Biological treatment of waste - Composting	7.28	0.11%	99.47%
1A3dii	National navigation (shipping)	6.14	0.09%	99.56%
3Da2b	Sewage sludge applied to soils	6.04	0.09%	99.65%
1A3bii	Road transport: Light duty vehicles	5.34	0.08%	99.73%
2G	Other product use (please specify in the IIR)	4.40	0.06%	99.80%
1A4bi	Residential: Stationary	4.12	0.06%	99.86%
3F	Field burning of agricultural residues	3.32	0.05%	99.90%
3B4giii	Manure mangement - Turkeys	1.48	0.02%	99.93%
3B4e	Manure management - Horses	1.44	0.02%	99.95%

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Table 99: NH₃ Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	1.16	0.02%	99.96%
3B4f	Manure management - Mules and asses	0.67	0.01%	99.97%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.54	0.01%	99.98%
1A3biv	Road transport: Mopeds & motorcycles	0.47	0.01%	99.99%
3Da2c	Other organic fertilisers applied to soils (including compost)	0.33	0.00%	99.99%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	0.29	0.00%	100.00%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	0.06	0.00%	100.00%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	0.04	0.00%	100.00%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.03	0.00%	100.00%
3B4giv	Manure management - Other poultry	0.00	0.00%	100.00%
	TOTAL	6821.88	100%	

Table 100: PM_{2.5} Level Assessment for 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	237.93	22.28%	22.28%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	127.72	11.96%	34.24%
1A3bvi	Road transport: Automobile tyre and brake wear	98.35	9.21%	43.45%
1A3bii	Road transport: Light duty vehicles	83.70	7.84%	51.29%
1A3biii	Road transport: Heavy duty vehicles and buses	53.15	4.98%	56.27%
2A1	Cement production	52.03	4.87%	61.14%
1A3bvii	Road transport: Automobile road abrasion	42.17	3.95%	65.09%
1A4bi	Residential: Stationary	41.72	3.91%	69.00%
2G	Other product use (please specify in the IIR)	33.05	3.10%	72.09%
2A5a	Quarrying and mining of minerals other than coal	31.02	2.90%	75.00%
1A3bi	Road transport: Passenger cars	29.79	2.79%	77.79%
3B3	Manure management - Swine	24.43	2.29%	80.08%
2A5b	Construction and demolition	22.24	2.08%	82.16%
5E	Other waste (please specify in IIR)	21.94	2.05%	84.21%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	19.76	1.85%	86.06%
1A4ci	Agriculture/Forestry/Fishing: Stationary	17.92	1.68%	87.74%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	15.16	1.42%	89.16%
3B1a	Manure management - Dairy cattle	14.36	1.34%	90.51%
3B4gii	Manure management - Broilers	13.59	1.27%	91.78%
1A5b	Other, Mobile (including military, land based and recreational boats)	9.34	0.87%	92.65%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	9.24	0.87%	93.52%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	9.15	0.86%	94.38%

Table 100: PM_{2.5} Level Assessment for 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3B4gi	Manure management - Laying hens	8.00	0.75%	95.13%
1A3biv	Road transport: Mopeds & motorcycles	7.60	0.71%	95.84%
3F	Field burning of agricultural residues	7.48	0.70%	96.54%
2A5c	Storage, handling and transport of mineral products	4.60	0.43%	96.97%
2D3c	Asphalt roofing	4.47	0.42%	97.39%
2A2	Lime production	4.24	0.40%	97.78%
1A3ai(i)	International aviation LTO (civil)	3.72	0.35%	98.13%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	3.59	0.34%	98.47%
3B1b	Manure management - Non-dairy cattle	3.54	0.33%	98.80%
1A3dii	National navigation (shipping)	3.33	0.31%	99.11%
5C2	Open burning of waste	3.00	0.28%	99.39%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	2.48	0.23%	99.63%
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	1.38	0.13%	99.75%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	1.10	0.10%	99.86%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.70	0.07%	99.92%
3B2	Manure management - Sheep	0.23	0.02%	99.95%
3B4giii	Manure management - Turkeys	0.19	0.02%	99.96%
3B4d	Manure management - Goats	0.18	0.02%	99.98%
2D3b	Road paving with asphalt	0.16	0.01%	99.99%
3B4e	Manure management - Horses	0.03	0.00%	100.00%
3B4f	Manure management - Mules and asses	0.01	0.00%	100.00%
5A	Biological treatment of waste - Solid waste disposal on land	0.01	0.00%	100.00%

Table 100: PM_{2,5} Level Assessment for 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3a(i)	Domestic aviation LTO (civil)	0.01	0.00%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.00	0.00%	100.00%
5C1bv	Cremation	0.00	0.00%	100.00%
	TOTAL	1067.80	100%	

Table 101: PM₁₀ Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	347.78	16.44%	16.44%
2A5a	Quarrying and mining of minerals other than coal	224.23	10.60%	27.05%
2A5b	Construction and demolition	222.38	10.51%	37.56%
1A3bvi	Road transport: Automobile tyre and brake wear	185.35	8.76%	46.32%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	130.43	6.17%	52.49%
3B3	Manure management - Swine	129.48	6.12%	58.61%
3B4gii	Manure management - Broilers	103.03	4.87%	63.49%
1A3bii	Road transport: Light duty vehicles	83.70	3.96%	67.44%
2A1	Cement production	83.20	3.93%	71.38%
1A3bvii	Road transport: Automobile road abrasion	78.10	3.69%	75.07%
1A4bi	Residential: Stationary	55.37	2.62%	77.69%
1A3biii	Road transport: Heavy duty vehicles and buses	53.15	2.51%	80.20%
2A5c	Storage, handling and transport of mineral products	46.03	2.18%	82.38%
3B4gi	Manure management - Laying hens	44.47	2.10%	84.48%
2G	Other product use (please specify in the IIR)	37.13	1.76%	86.23%
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	35.9939	1.70%	87.94%
2D3c	Asphalt roofing	33.49	1.58%	89.52%
1A3bi	Road transport: Passenger cars	29.79	1.41%	90.93%
3B1a	Manure management - Dairy cattle	22.06	1.04%	91.97%
5E	Other waste (please specify in IIR)	21.91	1.04%	93.01%
2A2	Lime production	21.18	1.00%	94.01%
1A4ci	Agriculture/Forestry/Fishing: Stationary	20.90	0.99%	95.00%

Table 101: PM₁₀ Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	19.85	0.94%	95.94%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	15.16	0.72%	96.65%
1A5b	Other, Mobile (including military, land based and recreational boats)	9.34	0.44%	97.09%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	9.24	0.44%	97.53%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	9.17	0.43%	97.97%
3F	Field burning of agricultural residues	7.89	0.37%	98.34%
1A3biv	Road transport: Mopeds & motorcycles	7.60	0.36%	98.70%
3B1b	Manure management - Non-dairy cattle	5.37	0.25%	98.95%
1A3ai(i)	International aviation LTO (civil)	3.72	0.18%	99.13%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	3.64	0.17%	99.30%
1A3dii	National navigation (shipping)	3.33	0.16%	99.46%
5C2	Open burning of waste	3.23	0.15%	99.61%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	2.87	0.14%	99.75%
3B4giii	Manure management - Turkeys	1.44	0.07%	99.81%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	1.10	0.05%	99.87%
3B2	Manure management - Sheep	0.75	0.04%	99.90%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.70	0.03%	99.93%
2D3b	Road paving with asphalt	0.67	0.03%	99.97%
3B4d	Manure management - Goats	0.58	0.03%	99.99%
5A	Biological treatment of waste - Solid waste disposal on land	0.08	0.00%	100.00%
3B4e	Manure management - Horses	0.04	0.00%	100.00%

Table 101: PM₁₀ Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3B4f	Manure management - Mules and asses	0.02	0.00%	100.00%
1A3a(ii)	Domestic aviation LTO (civil)	0.01	0.00%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.00	0.00%	100.00%
5C1bv	Cremation	0.00	0.00%	100.00%
TOTAL		2114.97	100%	

Table 102: TSP Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
2A5b	Construction and demolition	749.88	21.29%	21.29%
1A1a	Public electricity and heat production	456.61	12.97%	34.26%
2A5a	Quarrying and mining of minerals other than coal	432.02	12.27%	46.53%
3B3	Manure management - Swine	290.63	8.25%	54.78%
1A3bvi	Road transport: Automobile tyre and brake wear	241.74	6.86%	61.65%
2D3c	Asphalt roofing	178.60	5.07%	66.72%
1A3bvii	Road transport: Automobile road abrasion	156.20	4.44%	71.15%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	130.12	3.70%	74.85%
3B4gii	Manure management - Broilers	103.03	2.93%	77.77%
2A5c	Storage, handling and transport of mineral products	92.06	2.61%	80.39%
2A1	Cement production	83.86	2.38%	82.77%
1A3bii	Road transport: Light duty vehicles	83.70	2.38%	85.15%
1A4bi	Residential: Stationary	57.72	1.64%	86.79%
2A2	Lime production	54.47	1.55%	88.33%
1A3biii	Road transport: Heavy duty vehicles and buses	53.15	1.51%	89.84%
3B1a	Manure management - Dairy cattle	48.15	1.37%	91.21%
3B4gi	Manure management - Laying hens	46.02	1.31%	92.52%
2G	Other product use (please specify in the IIR)	37.98	1.08%	93.59%
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	35.99	1.02%	94.62%
1A3bi	Road transport: Passenger cars	29.79	0.85%	95.46%
5E	Other waste (please specify in IIR)	21.91	0.62%	96.08%
1A4ci	Agriculture/Forestry/Fishing: Stationary	20.90	0.59%	96.68%

Table 102: TSP Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	20.07	0.57%	97.25%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	15.17	0.43%	97.68%
3B1b	Manure management - Non-dairy cattle	11.59	0.33%	98.01%
1A5b	Other, Mobile (including military, land based and recreational boats)	9.34	0.27%	98.27%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	9.24	0.26%	98.54%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	9.23	0.26%	98.80%
3F	Field burning of agricultural residues	8.03	0.23%	99.03%
1A3biv	Road transport: Mopeds & motorcycles	7.60	0.22%	99.24%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	3.74	0.11%	99.35%
1A3ai(i)	International aviation LTO (civil)	3.72	0.11%	99.45%
1A3dii	National navigation (shipping)	3.33	0.09%	99.55%
5C2	Open burning of waste	3.32	0.09%	99.64%
2D3b	Road paving with asphalt	2.90	0.08%	99.72%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	2.87	0.08%	99.81%
3B2	Manure management - Sheep	1.85	0.05%	99.86%
3B4giii	Manure management - Turkeys	1.44	0.04%	99.90%
3B4d	Manure management - Goats	1.43	0.04%	99.94%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	1.10	0.03%	99.97%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.70	0.02%	99.99%
5A	Biological treatment of waste - Solid waste disposal on land	0.18	0.00%	100.00%
3B4e	Manure management - Horses	0.09	0.00%	100.00%

Table 102: TSP Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3B4f	Manure management - Mules and asses	0.04	0.00%	100.00%
1A3aii(i)	Domestic aviation LTO (civil)	0.01	0.00%	100.00%
5C1bv	Cremation	0.00	0.00%	100.00%
	TOTAL	3521.54	100%	

Table 103: BC Level Assessment for 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3bii	Road transport: Light duty vehicles	63.03	27.28%	27.28%
1A3biii	Road transport: Heavy duty vehicles and buses	34.51	14.94%	42.21%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	32.75	14.17%	56.39%
1A3bi	Road transport: Passenger cars	19.62	8.49%	64.88%
1A1a	Public electricity and heat production	12.70	5.50%	70.37%
1A4ci	Agriculture/Forestry/Fishing: Stationary	10.03	4.34%	74.72%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	9.83	4.26%	78.97%
1A3bvi	Road transport: Automobile tyre and brake wear	9.80	4.24%	83.21%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	8.8194	3.82%	87.03%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	5.64	2.44%	89.47%
1A4bi	Residential: Stationary	5.29	2.29%	91.76%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	5.12	2.22%	93.97%
1A3dii	National navigation (shipping)	3.7294	1.61%	95.59%
1A3bvii	Road transport: Automobile road abrasion	1.6557	0.72%	96.30%
2A1	Cement production	1.56	0.68%	96.98%
1A3biv	Road transport: Mopeds & motorcycles	1.53	0.66%	97.64%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	1.44	0.62%	98.26%
5C2	Open burning of waste	1.26	0.55%	98.81%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.8886	0.38%	99.19%
3F	Field burning of agricultural residues	0.69	0.30%	99.49%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.62	0.27%	99.76%

Table 103: BC Level Assessment for 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.39	0.17%	99.93%
2G	Other product use (please specify in the IIR)	0.13	0.06%	99.99%
2A2	Lime production	0.02	0.01%	100.00%
2D3b	Road paving with asphalt	0.01	0.00%	100.00%
2D3c	Asphalt roofing	0.00	0.00%	100.00%
	TOTAL	231.06	100%	

Table 104: CO Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3bi	Road transport: Passenger cars	4305.55	39.80%	39.80%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	2244.26	20.74%	60.54%
1A3biv	Road transport: Mopeds & motorcycles	1038.38	9.60%	70.14%
1A3bii	Road transport: Light duty vehicles	832.58	7.70%	77.83%
1A3biii	Road transport: Heavy duty vehicles and buses	631.58	5.84%	83.67%
1A4bi	Residential: Stationary	531.14	4.91%	88.58%
1A1a	Public electricity and heat production	377.90	3.49%	92.07%
1A3ai(i)	International aviation LTO (civil)	284.49	2.63%	94.70%
1A4ci	Agriculture/Forestry/Fishing: Stationary	92.57	0.86%	95.56%
3F	Field burning of agricultural residues	92.34	0.85%	96.41%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	90.88	0.84%	97.25%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	68.59	0.63%	97.89%
2G	Other product use (please specify in the IIR)	59.03	0.55%	98.43%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	47.33	0.44%	98.87%
5C2	Open burning of waste	39.98	0.37%	99.24%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	31.04	0.29%	99.53%
1A3dii	National navigation (shipping)	16.42	0.15%	99.68%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	14.14	0.13%	99.81%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	13.43	0.12%	99.93%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	3.63	0.03%	99.97%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	2.32	0.02%	99.99%

Table 104: CO Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
2D3c	Asphalt roofing	1.06	0.01%	100.00%
1A3aii(i)	Domestic aviation LTO (civil)	0.30	0.00%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.01	0.00%	100.00%
	TOTAL	10818.98	1.00	

Table 105: Pb Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3bvi	Road transport: Automobile tyre and brake wear	0.2612	64.81%	64.81%
1A1a	Public electricity and heat production	0.0929	23.05%	87.87%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.0294	7.30%	95.17%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.0080	1.98%	97.15%
2G	Other product use (please specify in the IIR)	0.0067	1.66%	98.80%
1A4bi	Residential: Stationary	0.0016	0.41%	99.21%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.0009	0.23%	99.43%
1A3bi	Road transport: Passenger cars	0.0006	0.14%	99.57%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.0004	0.10%	99.67%
5C2	Open burning of waste	0.0004	0.09%	99.76%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.0002	0.06%	99.82%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	0.0002	0.06%	99.88%
3F	Field burning of agricultural residues	0.0002	0.04%	99.92%
1A3dii	National navigation (shipping)	0.0001	0.03%	99.95%
1A3bii	Road transport: Light duty vehicles	0.0001	0.02%	99.97%
5E	Other waste (please specify in IIR)	0.0001	0.02%	99.98%
1A3biii	Road transport: Heavy duty vehicles and buses	0.0001	0.01%	99.99%
1A3biv	Road transport: Mopeds & motorcycles	0.0000	0.00%	100.00%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.0000	0.00%	100.00%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.0000	0.00%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.0000	0.00%	100.00%

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TOTAL	0.40	100%
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Table 106: Cd Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	0.024	72.83%	72.83%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.002	7.41%	80.24%
2G	Other product use (please specify in the IIR)	0.001	4.60%	84.84%
3F	Field burning of agricultural residues	0.001	3.74%	88.59%
1A3bvi	Road transport: Automobile tyre and brake wear	0.001	3.67%	92.26%
1A4bi	Residential: Stationary	0.001	2.36%	94.63%
1A3biv	Road transport: Mopeds & motorcycles	0.000	1.39%	96.01%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.000	1.27%	97.28%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.000	0.59%	97.87%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.000	0.46%	98.33%
5E	Other waste (please specify in IIR)	0.0001	0.39%	98.72%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	0.000	0.32%	99.04%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	0.000	0.24%	99.28%
5C2	Open burning of waste	0.000	0.22%	99.50%
1A3bi	Road transport: Passenger cars	0.000	0.21%	99.72%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	0.000	0.14%	99.85%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.0000	0.06%	99.91%
1A3dii	National navigation (shipping)	0.0000	0.05%	99.96%
1A3bii	Road transport: Light duty vehicles	0.000	0.02%	99.98%
1A3biii	Road transport: Heavy duty vehicles and buses	0.000	0.02%	100.00%

Table 106: Cd Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.000	0.00%	100.00%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.000	0.00%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.000	0.00%	100.00%
	TOTAL	0.033	100%	

Table 107: Hg Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.01475	52.09%	52.09%
1A1a	Public electricity and heat production	0.00752	26.58%	78.67%
1A3bi	Road transport: Passenger cars	0.0032	11.42%	90.09%
1A4bi	Residential: Stationary	0.00077	2.70%	92.79%
1A3bii	Road transport: Light duty vehicles	0.0007	2.60%	95.39%
1A3biii	Road transport: Heavy duty vehicles and buses	0.0005	1.93%	97.32%
3F	Field burning of agricultural residues	0.00019	0.68%	98.01%
5E	Other waste (please specify in IIR)	0.00013	0.45%	98.46%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.00011	0.39%	98.84%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.00010	0.35%	99.20%
1A3biv	Road transport: Mopeds & motorcycles	0.0001	0.22%	99.42%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.0001	0.20%	99.62%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	0.00005	0.19%	99.81%
1A3dii	National navigation (shipping)	0.0000	0.09%	99.90%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.00002	0.06%	99.96%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.00001	0.02%	99.98%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.000004	0.01%	100.00%
2G	Other product use (please specify in the IIR)	0.000000	0.00%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.0000	0.00%	100.00%
TOTAL		0.0283	100%	

Table 108: PCDD/F Level Assessment for the year 2019

NFR Code	Longname	Emissions (g I-TEQ)	Level Assessment	Cumulative Total
5E	Other waste (please specify in IIR)	0.2242	39.12%	39.12%
1A1a	Public electricity and heat production	0.0884	15.42%	54.54%
1A3bi	Road transport: Passenger cars	0.0781	13.62%	68.16%
1A4bi	Residential: Stationary	0.0631	11.02%	79.18%
1A3bii	Road transport: Light duty vehicles	0.0595	10.38%	89.56%
1A3biii	Road transport: Heavy duty vehicles and buses	0.0284	4.96%	94.52%
5C2	Open burning of waste	0.0072	1.25%	95.77%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.0069	1.20%	96.97%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.0060	1.04%	98.01%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.0042	0.74%	98.75%
1A3biv	Road transport: Mopeds & motorcycles	0.0028	0.49%	99.23%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.0016	0.27%	99.51%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	0.0014	0.24%	99.75%
3F	Field burning of agricultural residues	0.0009	0.15%	99.90%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.0002	0.04%	99.94%
1A3dii	National navigation (shipping)	0.0001	0.02%	99.96%
2G	Other product use (please specify in the IIR)	0.0001	0.02%	99.98%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.0001	0.01%	99.99%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.0000	0.01%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.0000	0.00%	100.00%
TOTAL		0.5732	100%	

Table 109: PAHs Level Assessment for the year 2019

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3F	Field burning of agricultural residues	0.00055	83.69%	83.69%
1A4bi	Residential: Stationary	0.00002	3.32%	87.01%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.00002	2.53%	89.54%
1A3bi	Road transport: Passenger cars	0.00002	2.42%	91.96%
1A3bii	Road transport: Light duty vehicles	0.00001	1.66%	93.62%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.00001	1.55%	95.18%
5C2	Open burning of waste	0.00001	1.38%	96.56%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	0.000008	1.28%	97.84%
1A3biii	Road transport: Heavy duty vehicles and buses	0.00001	1.11%	98.95%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.000002	0.32%	99.26%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.000001	0.17%	99.43%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	0.000001	0.16%	99.60%
1A1a	Public electricity and heat production	0.000001	0.12%	99.71%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.000001	0.11%	99.82%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	0.0000006	0.09%	99.91%
1A3biv	Road transport: Mopeds & motorcycles	0.0000003	0.05%	99.96%
2G	Other product use (please specify in the IIR)	0.0000003	0.04%	100.00%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.00000002	0.00%	100.00%
	TOTAL	0.000654	100%	

Table 110: HCB Level Assessment for the year 2019

NFR Code	Longname	Emissions (Kg)	Level Assessment	Cumulative Total
3Df	Use of pesticides	0.0143	62.43%	62.43%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.00690	30.22%	92.66%
1A1a	Public electricity and heat production	0.00102	4.49%	97.14%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.00016	0.69%	97.83%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.0002	0.67%	98.50%
1A3bi	Road transport: Passenger cars	0.00008	0.34%	98.84%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.00007	0.32%	99.16%
1A3dii	National navigation (shipping)	0.0001	0.28%	99.44%
1A3bii	Road transport: Light duty vehicles	0.00006	0.26%	99.70%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	0.00004	0.17%	99.87%
1A3biii	Road transport: Heavy duty vehicles and buses	0.00003	0.11%	99.99%
1A3biv	Road transport: Mopeds & motorcycles	0.000003	0.01%	100.00%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.0000002	0.00%	100.00%
1A4bi	Residential: Stationary	0.0000000	0.00%	100.00%
TOTAL		0.022825	100%	

Table 111: PCBs Level Assessment for the year 2019

NFR Code	Longname	Emissions (Kg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.03088	88.30%	88.30%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.00188	5.39%	93.68%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.00088	2.51%	96.20%
1A1a	Public electricity and heat production	0.00072	2.05%	98.25%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	0.00047	1.35%	99.60%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.00007	0.21%	99.81%
1A3dii	National navigation (shipping)	0.00003	0.10%	99.90%
1A3bi	Road transport: Passenger cars	0.00002	0.04%	99.95%
1A3bii	Road transport: Light duty vehicles	0.00001	0.03%	99.98%
1A3biii	Road transport: Heavy duty vehicles and buses	0.00001	0.02%	100.00%
1A3biv	Road transport: Mopeds & motorcycles	0.000001	0.00%	100.00%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.0000001	0.00%	100.00%
1A4bi	Residential: Stationary	0.0000000	0.00%	100.00%
	TOTAL	0.034969	100%	

[Annex 2: Level Assessment 1990-2018](#)

Annex 2

Key Category Analysis

Level Assessment 1990-2018

Table 112: Key Category Analysis - Level Assessment for the year 1990

Comp.	Key categories (Sorted from high to low from left to right)										Total (%)
SO _x	1A1a 67.6%	1A3bii 6.1%	1A3biii 5.2%	1A4bi 4.4%							83.3
NO _x	1A1a 18.6%	1A3biii 18.4%	1A3bi 16.9%	1A3bii 13.5%	1A2f 9.4%	3Da1 5.0%					81.8
NH ₃	3B3 33.4%	3B1a 17.5%	3Da1 14.1%	3Da2a 11.0%	3Da3 7.0%						83.0
NM VOC	1A3bi 22.6%	2D3d 13.4%	1A3bv 11.9%	1A3biv 11.0%	1B2av 5.5%	2D3a 5.4%	1A3bii 4.2%	1A3biii 3.6%	1A1b 3.2%		80.8
CO	1A3bi 62.2%	1A3bii 13.5%	1A3biv 8.7%								84.4
Pb	1A3bi 85.1%										85.1
Hg	1A2f 59.8%	5C1biii 18.1%	1A1a 7.5%								85.4
Cd	3F 36.7%	1A1a 32.8%	1A2f 12.1%								81.6
DIOX	5C1biii 97.8%										97.8
PAH	3F 99.2%										99.2
HCB	5C1biii 88.0%										88.0

Color Codes

A_PublicPower	
B_Industry	

G_Shipping	
I_Offroad	

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C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 113: Key Category Analysis - Level Assessment for the year 1991

Comp.	Key categories (Sorted from high to low from left to right)										Total (%)
SOx	1A1a 68.4%	1A3bii 6.1%	1A4bi 4.6%	1A3biii 4.5%							83.6
NOx	1A1a 18.9%	1A3biii 16.1%	1A3bii 16.0%	1A3bi 15.8%	1A2f 8.7%	3Da1 5.0%					80.5
NH3	3Da2a 29.0%	3B3 17.7%	3B4d 10.7%	3B2 10.6%	3Da1 10.4%	3B1a 5.8%					84.2
NMVOC	1A3bi 22.4%	1A3bv 12.0%	1A3biv 11.5%	2D3d 11.3%	2D3a 5.7%	1B2av 5.6%	1A3bii 4.5%	1A1b 3.9%	3B1a 3.1%	1A3biii 3.0%	83.0
CO	1A3bi 60.9%	1A3bii 14.5%	1A3biv 9.0%								84.4
Pb	1A3bi 85.2%										85.2
Hg	1A2f 59.9%	5C1biii 19.7%	1A1a 8.3%								87.9
Cd	3F 35.8%	1A1a 34.2%	1A2f 11.4%								81.4
DIOX	5C1biii 98.4%										98.4
PAH	3F 99.2%										99.2
HCb	5C1biii 88.5%										88.5

Color Codes

A_PublicPower	
B_Industry	

G_Shipping	
I_Offroad	

Cyprus Informative Inventory Report 2019

C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 114: Key Category Analysis - Level Assessment for the year 1992

Comp.	Key categories (Sorted from high to low from left to right)										Total (%)
SOx	1A1a 68.7%	1A3bii 6.8%	1A4bi 4.9%								80.4
NOx	1A1a 19.5%	1A3bii 17.5%	1A3biii 16.9%	1A3bi 13.6%	1A2f 8.4%	3Da1 5.6%					81.5
NH3	3Da2a 28.4%	3B3 18.9%	3Da1 12.3%	3B4d 9.7%	3B2 9.5%	3B4gii 5.6%					84.4
NMVOC	1A3bi 21.0%	2D3d 11.9%	1A3bv 11.4%	1A3biv 11.2%	1B2av 5.9%	2D3a 5.8%	1A3bii 4.6%	1A1b 3.6%	1A3biii 3.5%	3B1a 3.2%	82.1
CO	1A3bi 58.4%	1A3bii 15.2%	1A3biv 9.0%								82.6
Pb	1A3bi 85.8%										85.8
Hg	1A2f 60.4%	5C1biii 18.7%	1A1a 9.0%								88.1
Cd	1A1a 36.5%	3F 34.3%	1A2f 11.4%								82.2
DIOX	5C1biii 98.3%										98.3
PAH	3F 99.2%										99.2
HCb	5C1biii 87.9%										87.9

Color Codes

A_PublicPower	
B_Industry	

G_Shipping	
I_Offroad	

Cyprus Informative Inventory Report 2019

C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

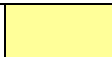
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 115: Key Category Analysis - Level Assessment for the year 1993

Comp.	Key categories (Sorted from high to low from left to right)										Total (%)
SOx	1A1a 69.7%	1A3bii 6.8%	1A4bi 4.7%								81.2
NOx	1A1a 20.6%	1A3bii 18.0%	1A3biii 16.6%	1A3bi 12.7%	1A2f 9.0%	3Da1 4.6%					81.5
NH3	3Da2a 29.2%	3B3 19.6%	3Da1 10.5%	3B4d 9.3%	3B2 8.9%	3B4gii 6.4%					83.9
NMVOC	1A3bi 19.8%	2D3d 11.9%	1A3bv 11.2%	1A3biv 10.8%	1B2av 6.0%	2D3a 6.0%	1A3bii 4.5%	1A1b 3.9%	1A3biii 3.5%	3B1a 3.4%	81.0
CO	1A3bi 57.2%	1A3bii 15.3%	1A3biv 8.9%								81.4
Pb	1A3bi 86.3%										86.3
Hg	1A2f 61.6%	5C1biii 17.9%	1A1a 9.0%								88.5
Cd	1A1a 39.1%	3F 34.6%	1A2f 12.5%								86.2
DIOX	5C1biii 98.2%										98.2
PAH	3F 99.2%										99.2
HCB	5C1biii 87.2%										87.2

Color Codes

A_PublicPower



G_Shipping



Cyprus Informative Inventory Report 2019

B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 116: Key Category Analysis - Level Assessment for the year 1994

Comp.	Key categories (Sorted from high to low from left to right)										Total (%)
SOx	1A1a 69.4%	1A3bii 6.8%	1A4bi 5.1%								81.3
NOx	1A1a 20.9%	1A3bii 18.4%	1A3biii 15.7%	1A3bi 12.7%	1A2f 9.1%	3Da1 4.4%					81.2
NH3	3Da2a 29.1%	3B3 19.5%	3Da1 10.7%	3B4d 9.9%	3B2 8.2%	3B1a 6.2%					83.6
NMVOC	1A3bi 19.5%	2D3d 12.9%	1A3biv 11.0%	1A3bv 11.0%	1B2av 5.9%	2D3a 5.9%	1A3bii 4.4%	1A1b 4.3%	3B1a 3.6%	1A3biii 3.2%	81.7
CO	1A3bi 57.6%	1A3bii 15.4%	1A3biv 9.2%								82.2
Pb	1A3bi 87.0%										87.0
Hg	1A2f 62.5%	5C1biii 17.7%									80.2
Cd	1A1a 41.8%	3F 30.6%	1A2f 13.4%								85.8
DIOX	5C1biii 98.3%										98.3
PAH	3F 99.1%										99.1
HCB	5C1biii 86.9%										86.9

Color Codes

A_PublicPower	
B_Industry	

G_Shipping	
I_Offroad	

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C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 117: Key Category Analysis - Level Assessment for the year 1995

Comp.	Key categories (Sorted from high to low from left to right)											Total (%)
SO _x	1A1a 66.9%	1A3bii 8.1%	1A4bi 5.1%									80.1
NO _x	1A3bii 19.5%	1A1a 19.2%	1A3biii 16.7%	1A3bi 12.5%	1A2f 8.8%	3Da1 4.2%						80.9
NH ₃	3Da2a 29.6%	3B3 19.8%	3B4d 10.1%	3Da1 9.3%	3B2 7.9%	3B1a 6.5%						83.2
NMVOC	1A3bi 18.3%	1A3biv 10.7%	2D3d 10.5%	1A3bv 10.5%	1B2av 6.0%	2D3a 5.9%	2D3i 4.5%	1A3bii 4.3%	1A1b 3.9%	3B1a 3.7%	1A3biii 3.2%	81.5
CO	1A3bi 56.8%	1A3bii 15.6%	1A3biv 9.5%									81.9
Pb	1A3bi 87.3%											87.3
Hg	1A2f 61.8%	5C1biii 18.5%										80.3
Cd	1A1a 39.6%	3F 28.4%	1A2f 13.2%									81.2
DIOX	5C1biii 98.2%											98.2
PAH	3F 99.0%											99.0
HCB	5C1biii 87.4%											87.4

Color Codes

A_PublicPower	
B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	

G_Shipping	
I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	

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F_RoadTransport	
H_Aviation	

M_Other	
---------	--

Table 118: Key Category Analysis - Level Assessment for the year 1996

Comp.	Key categories (Sorted from high to low from left to right)											Total (%)
SOx	1A1a 67.6%	1A3bii 8.0%	1A4bi 5.1%									80.7
NOx	1A1a 19.9%	1A3bii 19.0%	1A3biii 16.8%	1A3bi 11.9%	1A2f 9.3%	3Da1 4.3%						81.2
NH3	3Da2a 29.7%	3B3 20.0%	3B4d 10.5%	3Da1 9.4%	3B2 7.6%	3B4gii 6.2%						83.4
NMVOC	1A3bi 17.8%	1A3biv 10.8%	2D3d 10.6%	1A3bv 10.2%	1B2av 6.1%	2D3a 6.0%	2D3i 4.9%	1A3bii 4.3%	1A1b 3.7%	3B1a 3.5%	1A3biii 3.2%	81.1
CO	1A3bi 56.0%	1A3bii 15.5%	1A3biv 9.8%									81.3
Pb	1A3bi 87.6%											87.6
Hg	1A2f 63.5%	5C1biii 17.9%										81.4
Cd	1A1a 41.7%	3F 25.5%	1A2f 14.2%									81.4
DIOX	5C1biii 98.2%											98.2
PAH	3F 98.9%											98.9
HCB	5C1biii 86.8%											86.8

Color Codes

A_PublicPower	
B_Industry	

G_Shipping	
I_Offroad	

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C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 119: Key Category Analysis - Level Assessment for the year 1997

Comp.	Key categories (Sorted from high to low from left to right)											Total (%)
SO _x	1A1a 67.6%	1A3bii 7.9%	1A4bi 5.1%									80.6
NO _x	1A1a 20.7%	1A3bii 19.0%	1A3biii 17.0%	1A3bi 11.6%	1A2f 8.8%	3Da1 3.4%						80.5
NH ₃	3Da2a 30.5%	3B3 20.6%	3B4d 13.0%	3B2 7.2%	3Da1 7.1%	3B4gii 6.3%						84.7
NM VOC	1A3bi 16.9%	2D3d 11.7%	1A3biv 10.4%	1A3bv 9.9%	1B2av 6.3%	2D3a 6.1%	1A1b 5.0%	1A3bii 4.3%	2D3i 3.5%	3B1a 3.3%	1A3biii 3.2%	80.6
CO	1A3bi 55.4%	1A3bii 15.5%	1A3biv 9.9%									80.8
Pb	1A3bi 88.1%											88.1
Hg	1A2f 61.4%	5C1biii 18.2%	1A1a 9.2%									88.8
Cd	1A1a 43.2%	3F 22.9%	1A2f 13.4%	2G 6.4%								85.9
DIOX	5C1biii 98.1%											98.1
PAH	3F 98.7%											98.7
HCB	5C1biii 87.3%											87.3

Color Codes

A_PublicPower	
B_Industry	

G_Shipping	
I_Offroad	

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C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 120: Key Category Analysis - Level Assessment for the year 1998

Comp.	Key categories (Sorted from high to low from left to right)											Total (%)
SO _x	1A1a 68.7%	1A3bii 8.0%	1A4bi 5.0%									81.7
NO _x	1A1a 22.2%	1A3bii 19.2%	1A3biii 17.1%	1A3bi 10.9%	1A2f 8.1%	3Da2a 2.8%						80.3
NH ₃	3Da2a 30.6%	3B3 20.6%	3B4d 13.7%	3Da1 7.3%	3B2 7.0%	3B4gii 6.2%						85.4
NM VOC	1A3bi 16.1%	2D3d 11.2%	1A3biv 9.9%	1A3bv 9.9%	1B2av 6.6%	2D3a 6.3%	1A1b 5.3%	1A3bii 4.4%	2D3i 4.0%	1A3biii 3.3%	3B1a 3.1%	80.1
CO	1A3bi 54.3%	1A3bii 15.7%	1A3biv 9.9%	1A2f 6.3%								86.2
Pb	1A3bi 88.7%											88.7
Hg	1A2f 59.3%	5C1biii 18.8%	1A1a 10.3%									88.4
Cd	1A1a 46.3%	3F 21.0%	1A2f 12.4%	2G 6.4%								86.1
DIOX	5C1biii 98.0%											98.0
PAH	3F 98.7%											98.7
HCB	5C1biii 87.9%											87.9

Color Codes

A_PublicPower	
B_Industry	

G_Shipping	
I_Offroad	

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C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 121: Key Category Analysis - Level Assessment for the year 1999

Comp.	Key categories (Sorted from high to low from left to right)											Total (%)
SO _x	1A1a 69.2%	1A3bii 7.8%	1A4bi 4.9%									81.9
NO _x	1A1a 23.1%	1A3bii 18.8%	1A3biii 16.7%	1A3bi 10.5%	1A2f 8.1%	3Da1 3.0%						80.2
NH ₃	3Da2a 30.5%	3B3 19.7%	3B4d 14.7%	3Da1 7.4%	3B2 6.8%	3B4gii 6.3%						85.4
NM VOC	1A3bi 14.6%	2D3d 10.7%	1A3bv 9.1%	2D3i 8.9%	1A3biv 8.7%	1B2av 6.5%	2D3a 6.1%	1A1b 5.5%	1A3bii 4.1%	3B1a 3.0%	1A3biii 3.0%	80.2
CO	1A3bi 53.8%	1A3bii 15.5%	1A3biv 9.7%	1A2f 6.6%								85.6
Pb	1A3bi 89.2%											89.2
Hg	1A2f 58.6%	5C1biii 18.8%	1A1a 10.8%									88.2
Cd	1A1a 47.3%	3F 18.4%	1A2f 11.9%	2G 8.5%								86.1
DIOX	5C1biii 97.9%											97.9
PAH	3F 98.5%											98.5
HCB	5C1biii 88.0%											88.0

Color Codes

A_PublicPower	
B_Industry	

G_Shipping	
I_Offroad	

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C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 122: Key Category Analysis - Level Assessment for the year 2000

Comp.	Key categories (Sorted from high to low from left to right)												Total (%)
SOx	1A1a 68.9%	1A3bii 7.5%	1A4bi 5.2%										81.6
NOx	1A1a 23.9%	1A3bii 18.4%	1A3biii 16.9%	1A3bi 9.8%	1A2f 8.2%	3Da1 2.9%							80.1
NH3	3Da2a 30.9%	3B3 19.8%	3B4d 16.0%	3B2 7.1%	3B4gii 6.5%								80.3
NMVOC	1A3bi 14.0%	2D3d 12.1%	1A3bv 9.0%	1A3biv 8.2%	2D3i 7.6%	1B2av 6.8%	2D3a 6.3%	1A1b 5.2%	1A3bii 4.1%	3B1a 3.0%	1A3biii 3.0%	3B4gii 2.6%	81.9
CO	1A3bi 52.6%	1A3bii 15.4%	1A3biv 9.5%	1A2f 7.2%									84.7
TSP	2D3b 38.6%	2A5a 11.5%	1A1a 6.3%	2A5b 5.4%	2D3c 4.7%	1A3bii 4.7%	2A1 3.9%	3B3 3.7%	2G 3.1%				81.9
PM10	2D3b 17.7%	2A5a 11.2%	1A3bii 9.4%	1A1a 9.4%	2A1 7.0%	2G 6.1%	1A2f 5.8%	1A3biii 3.5%	3B3 3.3%	1A3bvi 3.3%	2A5b 3.2%	3B4gii 3.0%	82.9
PM2.5	1A3bii 17.6%	1A1a 11.6%	2G 11.5%	1A2f 10.4%	2D3b 7.8%	2A1 7.3%	1A3biii 6.6%	1A3bi 4.4%	3F 3.3%				80.5
Pb	1A3bi 89.5%												89.5
Hg	1A2f 59.2%	5C1biii 18.6%	1A1a 11.1%										88.9
Cd	1A1a 46.5%	2G 15.1%	3F 13.7%	1A2f 11.5%									86.8
DIOX	5C1biii 96.7%												96.7
PAH	3F 98.1%												98.1
HCB	5C1biii 87.8%												87.8

Color Codes

A_PublicPower

G_Shipping

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B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

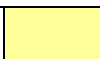
I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 123: Key Category Analysis - Level Assessment for the year 2001

Comp.	Key categories (Sorted from high to low from left to right)												Total (%)
SO _x	1A1a 65.9%	1A3bii 8.2%	1A4bi 5.6%	1A3biii 4.1%									83.8
NO _x	1A1a 23.6%	1A3bii 18.4%	1A3biii 16.8%	1A3bi 9.9%	1A2f 8.0%	3Da1 3.2%	3Da2a 3.1%						83.0
NH ₃	3Da2a 31.3%	3B3 19.9%	3B4d 16.6%	3B2 7.9%	3B4gii 5.9%								81.6
NM VOC	1A3bi 14.0%	2D3d 11.3%	1A3bv 9.2%	1A3biv 7.8%	1B2av 7.4%	2D3i 7.0%	2D3a 6.5%	1A1b 5.6%	1A3bii 4.1%	3B1a 3.2%	2D3h 2.9%	1A3biii 2.9%	81.9
CO	1A3bi 53.9%	1A3bii 15.1%	1A3biv 9.3%	1A2f 7.2%									85.5
TSP	2D3b 29.4%	2A5a 13.5%	2A5b 7.7%	1A1a 7.1%	1A3bii 5.5%	3B3 4.8%	2D3c 4.5%	2A1 4.5%	1A2f 3.7%				80.7
PM ₁₀	2D3b 12.7%	2A5a 12.4%	1A3bii 10.3%	1A1a 10.0%	2A1 7.5%	1A2f 6.7%	2A5b 4.3%	3B3 4.0%	1A3bvi 3.7%	1A3biii 3.7%	3B4gii 3.3%	1A3bi 2.9%	81.5
PM _{2.5}	1A3bii 19.6%	1A1a 12.5%	1A2f 12.1%	2A1 7.9%	1A3biii 6.9%	2D3b 5.6%	1A3bi 5.4%	2G 4.0%	1A3bvi 3.7%	3F 3.6%			81.3
Pb	1A3bi 90.1%												90.1
Hg	1A2f 58.7%	5C1biii 19.1%	1A1a 11.0%										88.8
Cd	1A1a 51.6%	3F 15.2%	1A2f 12.8%	1B2aiv 6.7%									86.3
DIOX	5C1biii 96.7%												96.7
PAH	3F 98.1%												98.1
HCB	5C1biii 88.1%												88.1

Color Codes

A_PublicPower



G_Shipping



Cyprus Informative Inventory Report 2019

B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 124: Key Category Analysis - Level Assessment for the year 2002

Comp.	Key categories (Sorted from high to low from left to right)												Total (%)
SO _x	1A1a 66.8%	1A3bii 7.6%	1A4bi 5.7%										80.1
NO _x	1A1a 25.0%	1A3bii 17.3%	1A3biii 16.2%	1A3bi 9.8%	1A2f 8.4%	3Da2a 3.3%							80.0
NH ₃	3Da2a 31.6%	3B3 20.0%	3B4d 16.9%	3B2 7.4%	3B4gii 5.8%								81.7
NM VOC	2D3d 16.3%	1A3bi 13.1%	1A3bv 8.7%	2D3i 8.3%	1B2av 7.3%	2D3a 6.2%	1A3biv 6.0%	1A1b 4.9%	1A3bii 3.5%	3B1a 3.2%	3B3 2.7%		80.2
CO	1A3bi 55.5%	1A3bii 13.9%	1A3biv 8.6%	1A2f 7.7%									85.7
TSP	2D3b 24.6%	2A5a 15.1%	2A5b 8.7%	1A1a 7.6%	3B3 5.3%	1A3bii 5.1%	2D3c 5.0%	2A1 4.7%	1A2f 3.8%	1A3bvi 2.6%			82.5
PM ₁₀	2A5a 13.7%	1A1a 10.5%	2D3b 10.5%	1A3bii 9.4%	2A1 7.8%	1A2f 6.7%	2A5b 4.8%	3B3 4.4%	1A3bvi 3.7%	3B4gii 3.5%	1A3biii 3.4%	1A3bi 2.8%	81.2
PM _{2.5}	1A3bii 18.3%	1A1a 13.4%	1A2f 12.5%	2A1 8.4%	1A3biii 6.5%	1A3bi 5.5%	2D3b 4.7%	2G 3.8%	1A3bvi 3.8%	3F 3.5%			80.4
Pb	1A3bi 90.6%												90.6
Hg	1A2f 59.2%	5C1biii 18.9%	1A1a 11.2%										89.3
Cd	1A1a 53.4%	3F 14.2%	1A2f 13.0%										80.6
DIOX	5C1biii 96.8%												96.8
PAH	3F 98.0%												98.0
HCB	5C1biii 88.0%												88.0

Color Codes

A_PublicPower	
B_Industry	

G_Shipping	
I_Offroad	

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C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 125: Key Category Analysis - Level Assessment for the year 2003

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Color Codes

A_PublicPower	
B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

G_Shipping	
I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 126: Key Category Analysis - Level Assessment for the year 2004

Comp.	Key categories (Sorted from high to low from left to right)												Total (%)
SO _x	1A1a 77.9%	1A4bi 6.0%											83.9
NO _x	1A1a 27.5%	1A3biii 17.7%	1A3bii 16.4%	1A3bi 9.4%	1A2f 8.8%	3Da2a 3.0%							82.8
NH ₃	3Da2a 31.8%	3B3 20.1%	3B4d 15.0%	3B2 7.6%	3B4gii 5.3%	3Da1 5.1%							84.9
NMVOC	2D3d 23.2%	2D3i 11.9%	1A3bi 11.4%	1B2av 8.1%	1A3bv 8.1%	2D3a 5.7%	1A3biv 5.1%	1A3bii 2.9%	3B1a 2.9%	3B3 2.3%			81.6
CO	1A3bi 56.3%	1A3bii 12.8%	1A2f 8.4%	1A3biv 8.4%									85.9
TSP	2A5a 19.0%	2A5b 12.0%	2D3b 10.2%	1A1a 9.3%	2D3c 6.2%	3B3 5.5%	2A1 5.4%	1A3bii 5.3%	1A2f 4.8%	1A3bvi 3.2%			80.9
PM ₁₀	2A5a 15.9%	1A1a 11.9%	1A3bii 9.0%	2A1 8.2%	1A2f 7.8%	2A5b 6.0%	3B3 4.2%	1A3bvi 4.1%	2D3b 4.0%	1A3biii 3.5%	1A3bi 3.0%	3B4gii 3.0%	80.6
PM _{2.5}	1A3bii 17.2%	1A1a 15.0%	1A2f 14.3%	2A1 8.7%	1A3biii 6.7%	1A3bi 5.8%	1A3bvi 4.2%	2G 4.1%	2A5a 3.0%	3F 2.9%			81.9
Pb	1A3bi 85.3%												85.3
Hg	1A2f 75.7%	1A1a 15.3%											91.0
Cd	1A1a 62.6%	1A2f 14.3%	3F 12.5%										89.4
DIOX	5E 36.6%	1A3bi 18.6%	1A1a 15.5%	1A3bii 11.6%									82.3
PAH	3F 97.6%												97.6
HCB	1A2f 92.8%												92.8

Color Codes

A_PublicPower	
B_Industry	
C_OtherStationaryComb	

G_Shipping	
I_Offroad	
J_Waste	

Cyprus Informative Inventory Report 2019

D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

K_AgriLivestock	
L_AgriOther	
M_Other	

Table 127: Key Category Analysis - Level Assessment for the year 2005

Comp.	Key categories (Sorted from high to low from left to right)											Total (%)
SO _x	1A1a 90.0%											90.0
NO _x	1A1a 29.2%	1A3biii 17.8%	1A3bii 15.6%	1A3bi 8.8%	1A2f 8.6%	3Da2a 2.8%						82.8
NH ₃	3Da2a 31.4%	3B3 20.0%	3B4d 14.0%	3B2 7.9%	3B4gii 5.8%	3B1a 5.0%						84.1
NM VOC	2D3d 23.8%	2D3i 16.9%	1A3bi 10.1%	1B2av 8.3%	1A3bv 7.8%	2D3a 5.6%	1A3biv 4.8%	3B1a 2.6%	1A3bii 2.6%			82.5
CO	1A3bi 55.9%	1A3bii 12.5%	1A2f 8.6%	1A3biv 8.6%								85.6
TSP	2A5a 21.7%	2A5b 15.0%	1A1a 10.9%	2A1 5.8%	3B3 5.6%	1A3bii 5.5%	2D3c 5.5%	1A2f 5.4%	1A3bvi 3.5%	2A5c 2.3%		81.2
PM ₁₀	2A5a 17.0%	1A1a 13.1%	1A3bii 8.8%	2A1 8.3%	1A2f 8.3%	2A5b 7.1%	1A3bvi 4.3%	3B3 4.0%	1A3biii 3.6%	1A3bi 3.1%	3B4gii 3.1%	80.7
PM _{2.5}	1A3bii 16.6%	1A1a 16.3%	1A2f 15.0%	2A1 8.7%	1A3biii 6.7%	1A3bi 5.9%	1A3bvi 4.3%	2G 3.6%	2A5a 3.2%			80.3
Pb	1A3bvi 40.4%	1A1a 34.1%	1A2f 23.0%									97.5
Hg	1A2f 75.5%	1A1a 16.7%										92.2
Cd	1A1a 67.1%	1A2f 14.1%										81.2
DIOX	5E 36.6%	1A3bi 17.3%	1A1a 16.3%	1A3bii 11.3%								81.5
PAH	3F 96.9%											96.9
HCB	1A2f 90.8%											90.8

Color Codes

A_PublicPower

G_Shipping

Cyprus Informative Inventory Report 2019

B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 128: Key Category Analysis - Level Assessment for the year 2006

Comp.	Key categories (Sorted from high to low from left to right)											Total (%)
SO _x	1A1a 87.5%											87.5
NO _x	1A1a 30.6%	1A3biii 17.0%	1A3bii 14.2%	1A2f 9.1%	1A3bi 8.5%	3Da2a 2.9%						82.3
NH ₃	3Da2a 31.3%	3B3 20.3%	3B4d 14.3%	3B2 7.8%	3Da1 6.5%							80.2
NMVOG	2D3d 25.5%	2D3i 20.7%	1A3bi 9.5%	1A3bv 7.8%	2D3a 5.8%	1B2av 5.5%	1A3biv 3.5%	3B1a 2.6%				80.9
CO	1A3bi 57.2%	1A3bii 11.4%	1A2f 9.7%	1A3biv 7.0%								85.3
TSP	2A5a 19.7%	2A5b 16.2%	1A1a 11.7%	2A1 6.4%	3B3 6.2%	1A2f 5.2%	2D3c 5.2%	1A3bii 5.2%	1A3bvi 3.7%	2A5c 2.5%		82.0
PM ₁₀	2A5a 16.2%	1A1a 14.0%	2A1 9.1%	1A3bii 8.2%	1A2f 8.0%	2A5b 7.6%	1A3bvi 4.5%	3B3 4.4%	1A3biii 3.5%	1A3bi 3.1%	3B4gii 2.7%	81.3
PM _{2.5}	1A1a 17.5%	1A3bii 15.6%	1A2f 14.5%	2A1 9.6%	1A3biii 6.6%	1A3bi 5.8%	1A3bvi 4.5%	2A5a 3.3%	2G 2.4%	1A3bvii 1.9%		81.7
Pb	1A3bvi 40.6%	1A1a 32.3%	1A2f 24.6%									97.5
Hg	1A2f 77.5%	1A1a 15.2%										92.7
Cd	1A1a 67.8%	1A2f 16.0%										83.8
DIOX	5E 35.4%	1A3bi 17.6%	1A1a 17.5%	1A3bii 10.8%								81.3
PAH	3F 96.0%											96.0
HCB	1A2f 89.5%											89.5

Color Codes

Cyprus Informative Inventory Report 2019

A_PublicPower	
B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

G_Shipping	
I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 129: Key Category Analysis - Level Assessment for the year 2007

Comp.	Key categories (Sorted from high to low from left to right)											Total (%)
SO _x	1A1a 86.8%											86.8
NO _x	1A1a 32.9%	1A3biii 18.6%	1A3bii 12.3%	1A2f 9.3%	1A3bi 5.7%	3Da2a 3.1%						81.9
NH ₃	3Da2a 32.1%	3B3 20.4%	3B4d 15.0%	3B2 8.2%	3Da1 5.0%							80.7
NMVOc	2D3d 27.2%	2D3i 20.4%	1A3bv 8.2%	1A3biv 6.5%	1B2av 6.0%	2D3a 5.9%	1A3bi 5.1%	3B1a 2.5%				81.8
CO	1A3bi 44.6%	1A3biv 13.3%	1A2f 12.4%	1A3bii 10.9%								81.2
TSP	2A5a 19.7%	2A5b 17.1%	1A1a 12.5%	3B3 6.5%	2A1 6.4%	1A2f 5.3%	2D3c 4.9%	1A3bvi 4.1%	1A3bii 3.4%			79.9
PM ₁₀	2A5a 16.5%	1A1a 15.3%	2A1 9.4%	1A2f 8.4%	2A5b 8.2%	1A3bii 5.6%	1A3bvi 5.2%	3B3 4.7%	3B4gii 3.1%	1A3biii 2.9%	2A5c 2.2%	81.5
PM _{2.5}	1A1a 19.8%	1A2f 15.8%	1A3bii 11.0%	2A1 10.2%	1A3biii 5.8%	1A3bvi 5.4%	2A5a 3.6%	1A4bi 2.9%	2G 2.7%	1A3bvii 2.3%	1A3bi 2.2%	81.7
Pb	1A3bvi 42.8%	1A1a 31.7%	1A2f 22.9%									97.4
Hg	1A2f 76.9%	1A1a 15.9%										92.8
Cd	1A1a 69.8%	1A2f 15.7%										85.5
DIOX	5E 32.4%	1A1a 16.6%	1A3bii 15.4%	1A3bi 13.8%	1A4bi 11.0%							89.2
PAH	3F 92.2%											92.2
HCb	3Df 89.6%											89.6

Color Codes

Cyprus Informative Inventory Report 2019

A_PublicPower	
B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

G_Shipping	
I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 130: Key Category Analysis - Level Assessment for the year 2008

Comp.	Key categories (Sorted from high to low from left to right)											Total (%)
SO _x	1A1a 92.2%											92.2
NO _x	1A1a 31.8%	1A3biii 19.5%	1A3bii 12.9%	1A2f 10.7%	1A3bi 5.8%							80.7
NH ₃	3Da2a 32.5%	3B3 20.9%	3B4d 13.8%	3B2 8.0%	3B4gii 5.0%							80.2
NMVOG	2D3d 23.1%	2D3i 20.6%	1A3bv 8.6%	1B2av 7.5%	2D3a 6.6%	1A3biv 6.6%	1A3bi 4.6%	2D3h 3.1%				80.7
CO	1A3bi 44.2%	1A2f 14.4%	1A3biv 13.7%	1A3bii 11.3%								83.6
TSP	2A5a 19.2%	2A5b 17.6%	1A1a 13.1%	2A1 6.5%	3B3 6.5%	1A2f 5.7%	2D3c 4.7%	1A3bvi 4.3%	1A3bii 3.2%			80.8
PM ₁₀	2A5a 16.3%	1A1a 16.1%	2A1 9.6%	1A2f 9.0%	2A5b 8.5%	1A3bvi 5.4%	1A3bii 5.3%	3B3 4.7%	3B4gii 3.0%	1A3biii 2.8%		80.7
PM _{2.5}	1A1a 21.2%	1A2f 17.2%	2A1 10.5%	1A3bii 10.4%	1A3bvi 5.7%	1A3biii 5.5%	2A5a 3.8%	2G 2.7%	1A4bi 2.7%	1A3bvii 2.4%		82.1
Pb	1A3bvi 43.0%	1A1a 32.3%	1A2f 22.6%									97.9
Hg	1A2f 76.7%	1A1a 16.5%										93.2
Cd	1A1a 72.7%	1A2f 16.0%										88.7
DIOX	5E 31.5%	1A1a 17.6%	1A3bii 16.2%	1A3bi 13.8%	1A4bi 10.6%							89.7
PAH	3F 88.5%											88.5
HCB	1A2f 48.9%	3Df 45.0%										93.9

Color Codes

Cyprus Informative Inventory Report 2019

A_PublicPower	
B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

G_Shipping	
I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 131: Key Category Analysis - Level Assessment for the year 2009

Comp.	Key categories (Sorted from high to low from left to right)											Total (%)
SO _x	1A1a 91.5%											91.5
NO _x	1A1a 37.1%	1A3biii 18.4%	1A3bii 11.8%	1A2f 9.0%	1A3bi 5.6%							81.9
NH ₃	3Da2a 32.6%	3B3 21.1%	3B4d 12.5%	3B2 9.2%	3B4gii 5.0%							80.4
NMVOG	2D3d 23.5%	2D3i 17.9%	1A3bv 9.4%	1B2av 8.4%	2D3a 7.3%	1A3biv 6.3%	1A3bi 4.7%	3B1a 3.0%				80.5
CO	1A3bi 44.7%	1A3biv 13.1%	1A2f 13.0%	1A3bii 10.9%								81.7
TSP	2A5b 16.6%	2A5a 16.0%	1A1a 12.6%	2D3c 8.9%	3B3 7.2%	2A1 6.0%	1A2f 5.1%	1A3bvi 4.8%	1A3bii 3.2%			80.4
PM ₁₀	1A1a 15.9%	2A5a 13.9%	2A1 9.1%	1A2f 8.3%	2A5b 8.3%	1A3bvi 6.2%	3B3 5.4%	1A3bii 5.3%	3B4gii 3.4%	1A3biii 2.9%	2D3c 2.8%	81.5
PM _{2.5}	1A1a 20.9%	1A2f 15.9%	1A3bii 10.5%	2A1 9.9%	1A3bvi 6.4%	1A3biii 5.6%	2G 3.4%	2A5a 3.4%	1A3bvii 2.7%	1A3bi 2.4%		81.1
Pb	1A3bvi 46.5%	1A1a 31.1%	1A2f 20.3%									97.9
Hg	1A2f 74.7%	1A1a 17.4%										92.1
Cd	1A1a 72.7%	1A2f 15.2%										87.9
DIOX	5E 33.0%	1A1a 17.2%	1A3bii 16.4%	1A3bi 14.5%								81.1
PAH	3F 87.6%											87.6
HCB	1A2f 54.2%	3Df 34.4%										88.6

Color Codes

Cyprus Informative Inventory Report 2019

A_PublicPower	
B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

G_Shipping	
I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 132: Key Category Analysis - Level Assessment for the year 2010

Comp.	Key categories (Sorted from high to low from left to right)												Total (%)
SO _x	1A1a 93.6%												93.6
NO _x	1A1a 33.6%	1A3biii 20.2%	1A3bii 12.7%	1A2f 8.4%	1A3bi 5.9%								80.8
NH ₃	3Da2a 33.3%	3B3 20.6%	3B4d 13.5%	3B2 9.9%	3B4gii 4.9%								82.2
NMVOC	2D3d 26.9%	2D3i 14.4%	1A3bv 9.3%	1B2av 8.5%	2D3a 7.8%	1A3biv 5.8%	1A3bi 4.7%	3B1a 3.1%					80.5
CO	1A3bi 46.1%	1A3biv 12.3%	1A2f 11.5%	1A3bii 11.0%									80.9
TSP	2A5b 15.6%	2A5a 15.5%	2D3c 12.0%	1A1a 11.4%	3B3 7.2%	2A1 5.0%	1A3bvi 4.9%	1A2f 4.9%	1A3bvii 3.2%	1A3bii 3.2%			82.9
PM ₁₀	1A1a 14.9%	2A5a 13.8%	1A2f 8.1%	2A5b 8.0%	2A1 7.8%	1A3bvi 6.5%	3B3 5.5%	1A3bii 5.4%	2D3c 3.9%	3B4gii 3.5%	1A3biii 3.0%		80.4
PM _{2.5}	1A1a 19.9%	1A2f 15.7%	1A3bii 10.8%	2A1 8.6%	1A3bvi 6.9%	1A3biii 6.0%	2G 3.8%	2A5a 3.6%	1A3bvii 3.0%	1A3bi 2.4%			80.7
Pb	1A3bvi 54.3%	1A1a 24.0%	1A2f 19.2%										97.5
Hg	1A2f 75.5%	1A1a 14.7%											90.2
Cd	1A1a 65.5%	1A2f 17.2%											82.7
DIOX	5E 34.4%	1A3bii 16.7%	1A1a 16.2%	1A3bi 14.6%									81.9
PAH	3F 88.2%												88.2
HCB	3Df 67.8%	1A2f 24.6%											92.4

Color Codes

A_PublicPower	
B_Industry	
C_OtherStationaryComb	

G_Shipping	
I_Offroad	
J_Waste	

Cyprus Informative Inventory Report 2019

D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

K_AgriLivestock	
L_AgriOther	
M_Other	

Table 133: Key Category Analysis - Level Assessment for the year 2011

Comp.	Key categories (Sorted from high to low from left to right)												Total (%)
SO _x	1A1a 93.4%												93.4
NO _x	1A1a 45.1%	1A3biii 16.5%	1A3bii 10.4%	1A2f 6.8%	1A3bi 4.9%								83.7
NH ₃	3Da2a 33.1%	3B3 19.3%	3B4d 12.9%	3B2 10.9%	3B1a 5.1%								81.3
NMVOC	2D3i 16.2%	2D3d 14.4%	1A3bv 11.4%	1B2av 9.9%	2D3a 9.4%	1A3biv 6.5%	1A3bi 5.0%	3B1a 3.7%	2D3h 3.0%	3B3 2.8%			82.3
CO	1A3bi 44.3%	1A3biv 12.5%	1A2f 11.9%	1A3bii 10.2%	1A3biii 6.7%								85.6
TSP	2A5a 14.6%	2A5b 13.5%	2D3c 13.1%	1A1a 12.9%	3B3 7.6%	2A1 5.6%	1A3bvi 5.3%	1A3bvii 3.5%	1A2f 3.4%	2A5c 3.1%			82.6
PM ₁₀	1A1a 16.7%	2A5a 12.9%	2A1 8.5%	1A3bvi 7.0%	2A5b 6.8%	3B3 5.8%	1A2f 5.7%	1A3bii 5.0%	2D3c 4.2%	3B4gii 3.7%	1A3biii 3.0%	1A3bvii 3.0%	82.3
PM _{2.5}	1A1a 22.6%	1A2f 11.0%	1A3bii 10.0%	2A1 9.5%	1A3bvi 7.4%	1A3biii 5.9%	2A5a 3.6%	2G 3.4%	1A3bvii 3.2%	1A3bi 2.4%	3B3 2.2%		81.2
Pb	1A3bvi 50.0%	1A1a 30.1%											80.1
Hg	1A2f 70.1%	1A1a 20.8%											90.9
Cd	1A1a 72.8%	1A2f 13.6%											86.4
DIOX	5E 36.1%	1A1a 17.0%	1A3bii 14.8%	1A3bi 14.2%									82.1
PAH	3F 89.4%												89.4
HCB	1A2f 59.9%	1A1a 17.6%	3Df 12.6%										90.1

Color Codes

A_PublicPower	
B_Industry	
C_OtherStationaryComb	

G_Shipping	
I_Offroad	
J_Waste	

Cyprus Informative Inventory Report 2019

D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

K_AgriLivestock	
L_AgriOther	
M_Other	

Table 134: Key Category Analysis - Level Assessment for the year 2012

Comp.	Key categories (Sorted from high to low from left to right)													Total (%)
SO _x	1A1a 92.0%													92.0
NO _x	1A1a 52.3%	1A3biii 14.8%	1A3bii 9.2%	1A3bi 4.9%										81.2
NH ₃	3Da2a 32.9%	3B3 18.2%	3B4d 12.7%	3B2 11.2%	3B1a 5.4%									80.4
NMVO C	2D3i 15.7%	2D3d 15.6%	1A3bv 11.1%	2D3a 9.9%	1B2av 9.4%	1A3bi 5.5%	1A3biv 5.1%	3B1a 3.9%	5A 2.7%	1A1a 2.7%				81.6
CO	1A3bi 48.0%	1A2f 11.3%	1A3biv 10.0%	1A3bii 8.5%	1A3bii i 6.1%									83.9
TSP	1A1a 17.0%	2D3c 13.5%	2A5b 11.9%	2A5a 11.6%	3B3 9.0%	1A3bvi 6.5%	1A3bvi i 4.2%	1A3bii 3.2%	3B4gii 2.7%	2A5c 2.5%				82.1
PM ₁₀	1A1a 21.6%	2A5a 10.1%	1A3bvi 8.4%	3B3 6.8%	2A5b 5.9%	1A3bii 5.4%	3B4gii 4.5%	2D3c 4.3%	1A3bvi i 3.6%	1A3biii 3.4%	1A4bi 3.1%	3Dc 2.7%	2G 2.5%	82.3
PM _{2.5}	1A1a 28.7%	1A3bii 10.5%	1A3bvi 8.7%	1A3biii 6.6%	2G 4.8%	1A4bi 4.6%	1A3bvi i 3.8%	2A1 3.0%	1A2f 2.9%	2A5a 2.7%	1A3bi 2.7%	3B3 2.5%		81.5
Pb	1A3bvi 53.6%	1A1a 39.8%												93.4
Hg	1A1a 56.4%	1A2f 26.2%												82.6
Cd	1A1a 83.2%													83.2
DIOX	5E 37.1%	1A1a 15.2%	1A3bi 13.8%	1A3bii 12.6%	1A4bi ####									90.5
PAH	3F 89.1%													89.1
HCB	3Df 67.3%	1A2f 19.8%												87.1

Color Codes

A_PublicPower

G_Shipping

Cyprus Informative Inventory Report 2019

B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 135: Key Category Analysis - Level Assessment for the year 2013

Comp.	Key categories (Sorted from high to low from left to right)														Total (%)
SO _x	1A1a 89.6%														89.6
NO _x	1A1a 41.2%	1A3biii 16.6%	1A3bii 10.8%	1A2f 6.0%	1A3bi 5.7%										80.3
NH ₃	3Da2a 33.0%	3B3 17.9%	3B4d 12.4%	3B2 10.9%	3B1a 5.9%										80.1
NM VOC	2D3d 16.1%	1A3bv 13.2%	2D3a 11.6%	2D3i 10.4%	1B2av 9.7%	1A3biv 6.5%	1A3bi 5.2%	3B1a 4.8%	5A 3.3%						80.8
CO	1A3bi 42.0%	1A2f 17.6%	1A3biv 11.7%	1A3bii 8.4%	1A3biii 5.4%										85.1
TSP	1A1a 16.5%	2A5b 10.7%	3B3 10.7%	2A5a 9.6%	2D3c 9.3%	1A3bvi 7.5%	1A3bvii 4.8%	1A3bii 3.4%	3B4gii 3.0%	2A1 2.8%	1A3biii 2.1%				80.4
PM ₁₀	1A1a 19.8%	1A3bvi 9.1%	2A5a 7.8%	3B3 7.5%	1A3bii 5.4%	2A5b 5.0%	3B4gii 4.7%	2A1 4.4%	1A3bvii 3.8%	1A3biii 3.4%	1A4bi 3.2%	2D3c 2.7%	3Dc 2.7%	3B4gi 2.6%	82.1
PM _{2.5}	1A1a 25.0%	1A3bii 10.0%	1A3bvi 8.9%	1A3biii 6.2%	2A1 5.1%	1A4bi 4.4%	2G 4.2%	1A2f 4.1%	1A3bvii 3.8%	1A3bi 2.7%	5E 2.6%	3B3 2.6%	2A5a 2.0%		81.6
Pb	1A3bvi 63.2%	1A1a 26.1%													89.3
Hg	1A2f 51.2%	1A1a 28.0%	1A3bi 11.3%												90.5
Cd	1A1a 70.1%	1A2f 6.6%	2G 6.2%												82.9
DIOX	5E 31.3%	1B2c 25.5%	1A3bi 9.9%	1A3bii 8.9%	1A1a 8.7%										84.3
PAH	3F 88.6%														88.6
HCB	3Df 61.8%	1A2f 30.4%													92.2

Color Codes

A_PublicPower	
B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	

G_Shipping	
I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	

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F_RoadTransport	
H_Aviation	

M_Other	
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Table 136: Key Category Analysis - Level Assessment for the year 2014

Comp.	Key categories (Sorted from high to low from left to right)													Total (%)
SO _x	1A1a 90.1%													90.1
NO _x	1A1a 43.2%	1A3biii 16.2%	1A3bii 9.3%	1A2f 6.9%	1A3bi 5.4%									81.0
NH ₃	3Da2a 32.2%	3B3 17.0%	3B4d 11.8%	3B2 10.2%	3Da1 6.9%	3B1a 6.0%								84.1
NMVO C	2D3d 14.8%	1A3bv 14.2%	2D3a 12.1%	1B2av 9.5%	2D3i 7.7%	1A3biv 6.3%	1A3bi 5.5%	3B1a 5.1%	5A 3.5%	2D3h 3.1%				81.8
CO	1A3bi 40.6%	1A2f 21.9%	1A3biv 10.6%	1A3bii 7.4%										80.5
TSP	1A1a 16.7%	3B3 11.6%	2A5a 9.5%	2A5b 9.1%	1A3bvi 8.2%	1A3bvi 5.3%	2D3c 4.8%	3B4gii 4.3%	2A1 4.1%	1A3bii 3.4%	1A3biii 2.7%	1A2f 2.3%		82.0
PM ₁₀	1A1a 19.0%	1A3bvi 9.4%	3B3 7.7%	2A5a 7.3%	3B4gii 6.4%	2A1 6.1%	1A3bii 5.1%	1A3biii 4.1%	2A5b 4.0%	1A3bvi 3.9%	1A2f 3.6%	1A4bi 2.9%	3B4gi 2.6%	82.1
PM _{2.5}	1A1a 23.8%	1A3bii 9.4%	1A3bvi 9.1%	1A3biii 7.5%	2A1 6.9%	1A2f 6.5%	1A4bi 4.0%	1A3bvi 3.9%	3B3 2.7%	1A3bi 2.6%	1A2e 2.3%	5E 2.3%		81.0
Pb	1A3bvi 60.8%	1A1a 26.1%												86.9
Hg	1A2f 58.4%	1A1a 24.0%												82.4
Cd	1A1a 73.6%	1A2f 9.0%												82.6
DIOX	5E 38.2%	1A1a 15.6%	1A3bi 13.7%	1A3bii 11.5%	1A4bi 10.3%									89.3
PAH	3F 86.5%													86.5
HCB	1A2f 70.7%	3Df 16.4%												87.1

Color Codes

A_PublicPower	
B_Industry	

G_Shipping	
I_Offroad	

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C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 137: Key Category Analysis - Level Assessment for the year 2015

Comp.	Key categories (Sorted from high to low from left to right)													Total (%)
SO _x	1A1a 88.6%													88.6
NO _x	1A1a 35.1%	1A3biii 17.9%	1A3bii 11.8%	1A2f 7.6%	1A3bi 6.6%	3Da2a 3.9%								82.9
NH ₃	3Da2a 33.2%	3B3 17.6%	3B4d 12.1%	3B2 10.5%	3B1a 6.3%	3Da1 5.1%								84.8
NMVO C	2D3d 18.8%	1A3bv 13.4%	2D3a 11.6%	1B2av 8.9%	2D3i 7.7%	1A3biv 6.0%	1A3bi 5.1%	3B1a 5.1%	5A 3.4%	2D3h 2.9%				82.9
CO	1A3bi 40.9%	1A2f 20.3%	1A3biv 10.6%	1A3bii 7.9%	1A3biii 5.2%									84.9
TSP	1A1a 16.6%	3B3 11.7%	2A5b 10.0%	2A5a 9.0%	1A3bvi 8.4%	1A3bvi i 5.4%	2D3c 4.1%	2A1 3.6%	1A3bii 3.5%	3B4gii 3.5%	1A4bi 3.1%	1A2f 2.7%		81.6
PM ₁₀	1A1a 18.8%	1A3bvi 9.5%	3B3 7.8%	2A5a 7.0%	2A1 5.3%	1A3bii 5.3%	3B4gii 5.2%	2A5b 4.4%	1A4bi 4.4%	1A2f 4.1%	1A3bvi i 4.0%	1A3bii i 3.3%	3Dc 3.0%	82.1
PM _{2.5}	1A1a 23.3%	1A3bii 9.5%	1A3bvi 9.2%	1A2f 7.3%	1A3biii 6.0%	2A1 6.0%	1A4bi 5.8%	2G 4.0%	1A3bvi i 3.9%	1A3bi 2.9%	3B3 2.7%			80.6
Pb	1A3bvi 62.1%	1A1a 26.0%												88.1
Hg	1A2f 55.2%	1A1a 25.4%												80.6
Cd	1A1a 70.6%	1A2f 7.6%	2G 5.6%											83.8
DIOX	5E 36.1%	1A1a 15.6%	1A3bi 13.6%	1A4bi 13.6%	1A3bii 11.5%									90.4
PAH	3F 88.8%													88.8
HCB	1A2f 81.1%													81.1

Color Codes

A_PublicPower	
B_Industry	

G_Shipping	
I_Offroad	

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C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 138: Key Category Analysis - Level Assessment for the year 2016

Comp.	Key categories (Sorted from high to low from left to right)												Total (%)
SO _x	1A1a 90.9%												90.9
NO _x	1A1a 29.7%	1A3biii 19.9%	1A3bii 13.3%	1A2f 7.4%	1A3bi 7.4%	3Da2a 4.1%							81.8
NH ₃	3Da2a 33.0%	3B3 16.7%	3B4d 12.3%	3B2 10.4%	3B1a 6.6%	3Da1 5.7%							84.7
NMVOG	2D3d 19.5%	1A3bv 13.0%	2D3a 11.5%	2D3i 8.7%	1B2av 7.4%	1A3biv 5.7%	3B1a 5.5%	1A3bi 5.1%	5A 3.4%	2D3h 3.0%			82.8
CO	1A3bi 40.2%	1A2f 20.0%	1A3biv 10.4%	1A3bii 8.1%	1A4bi 6.3%								85.0
TSP	1A1a 17.5%	2A5a 11.2%	2A5b 10.7%	3B3 10.4%	1A3bvi 8.1%	1A3bvii 5.2%	2D3c 3.8%	1A4bi 3.8%	1A3bii 3.4%	3B4gii 3.2%	2A1 3.2%		80.5
PM ₁₀	1A1a 20.0%	1A3bvi 9.3%	2A5a 8.8%	3B3 7.0%	1A4bi 5.4%	1A3bii 5.1%	3B4gii 4.9%	2A1 4.8%	2A5b 4.8%	1A3bvii 3.9%	1A2f 3.8%	1A3biii 3.3%	81.1
PM _{2.5}	1A1a 24.8%	1A3bii 9.4%	1A3bvi 9.0%	1A4bi 7.1%	1A2f 6.9%	1A3biii 6.1%	2A1 5.5%	1A3bvii 3.9%	2G 3.1%	1A3bi 2.7%	5E 2.4%		80.9
Pb	1A3bvi 62.5%	1A1a 26.0%											88.5
Hg	1A2f 53.7%	1A1a 26.7%											80.4
Cd	1A1a 72.7%	1A2f 7.2%	2G 4.4%										84.3
DIOX	5E 36.3%	1A1a 15.9%	1A4bi 15.8%	1A3bi 12.4%									80.4
PAH	3F 83.1%												83.1
HCB	1A2f 56.1%	3Df 32.4%											88.5

Color Codes

Cyprus Informative Inventory Report 2019

A_PublicPower	
B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

G_Shipping	
I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 139: Key Category Analysis - Level Assessment for the year 2017

Comp.	Key categories (Sorted from high to low from left to right)												Total (%)
SO _x	1A1a 90.5%												90.5
NO _x	1A1a 27.1%	1A3biii 19.7%	1A3bii 13.5%	1A3bi 8.3%	1A2f 7.9%	3Da2a 4.3%							80.8
NH ₃	3Da2a 33.8%	3B3 16.4%	3B4d 12.8%	3B2 10.9%	3B1a 7.0%								80.9
NM VOC	2D3i 23.7%	2D3d 18.4%	1A3bv 10.7%	2D3a 9.4%	1B2av 5.4%	3B1a 4.7%	1A3biv 4.4%	1A3bi 3.9%					80.6
CO	1A3bi 39.5%	1A2f 21.6%	1A3biv 10.0%	1A3bii 7.9%	1A4bi 6.0%								85.0
TSP	2A5b 14.7%	1A1a 13.6%	2A5a 12.9%	3B3 9.6%	1A3bvi 7.7%	1A3bvii 5.0%	2D3c 4.5%	1A4bi 3.2%	1A2f 3.2%	2A1 3.1%	3B4gii 3.1%		80.6
PM ₁₀	1A1a 16.3%	2A5a 10.5%	1A3bvi 9.3%	2A5b 6.8%	3B3 6.7%	1A2f 5.0%	3B4gii 4.9%	2A1 4.9%	1A4bi 4.8%	1A3bii 4.7%	1A3bvii 3.9%	1A3biii 3.0%	80.8
PM _{2.5}	1A1a 21.1%	1A3bvi 9.4%	1A2f 9.4%	1A3bii 8.9%	1A4bi 6.6%	2A1 5.8%	1A3biii 5.6%	1A3bvii 4.0%	2G 3.2%	1A3bi 2.9%	2A5a 2.7%	3B3 2.4%	82.0
Pb	1A3bvi 63.2%	1A1a 25.3%											88.5
Hg	1A2f 54.4%	1A1a 26.5%											80.9
Cd	1A1a 72.3%	1A2f 7.6%	2G 4.7%										84.6
DIOX	5E	1A4bi	1A1a	1A3bi	1A3bii								90.0

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[illegible]

Color Codes

A_PublicPower	
B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

G_Shipping	
I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

Table 140: Key Category Analysis - Level Assessment for the year 2018

[illegible]

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	62.8%	25.3%												
Hg	1A2f 52.4%	1A1a 27.7%												80.1
Cd	1A1a 74.3%	1A2f 7.2%												81.5
DIOX	5E 42.4%	1A1a 14.7%	1A3bi 12.8%	1A4bi 10.9%										80.8
PAH	3F 84.2%													84.2
HCB	3Df 61.6%	1A2f 31.7%												93.3

Color Codes

A_PublicPower	
B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	
F_RoadTransport	
H_Aviation	

G_Shipping	
I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	
M_Other	

[Annex 3: Trend Assessment 2019](#)

Annex 3

Key Category Analysis

Trend Assessment 2019

Table 141: NO_x Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3bi	Road transport: Passenger cars	2912.25	1241.44	0.059181	29.43%	29.43%
3Da1	Inorganic N-fertilizers (includes also urea application)	870.32	225.65	0.025846	12.85%	42.29%
1A3bii	Road transport: Light duty vehicles	2795.55	1797.02	0.022828	11.35%	53.64%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	1621.35	954.69	0.018153	9.03%	62.67%
1A2gviii	Stationary combustion in manufacturing industries and construction	494.02	207.07	0.010237	5.09%	67.76%
1A3biii	Road transport: Heavy duty vehicles and buses	3081.38	2609.11	0.010112	5.03%	72.79%
1A2gvii	Mobile Combustion in manufacturing industries and construction	403.95	143.35	0.009828	4.89%	77.68%
1A4bi	Residential: Stationary	156.09	334.84	0.008179	4.07%	81.74%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	231.98	396.88	0.006500	3.23%	84.98%
1A4ci	Agriculture/Forestry/Fishing: Stationary	157.73	304.57	0.006369	3.17%	88.14%
1A3ai(i)	International aviation LTO (civil)	310.01	473.79	0.005509	2.74%	90.88%
3Da2a	Animal manure applied to soils	490.4582	691.9131	0.005480	2.73%	93.61%
3F	Field burning of agricultural residues	79.35	3.18	0.003333	1.66%	95.27%
1A5b	Other, Mobile (including military, land based and recreational boats)	8.12	62.87	0.002977	1.48%	96.75%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	81.62	28.25	0.002026	1.01%	97.76%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	133.09	122.00	0.000960	0.48%	98.23%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	212.10	273.04	0.000900	0.45%	98.68%

Table 141: NO_x Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A1a	Public electricity and heat production	3212.86	3905.57	0.000700	0.35%	99.03%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	27.92	40.83	0.000393	0.20%	99.22%
1A3biv	Road transport: Mopeds & motorcycles	29.41	29.01	0.000327	0.16%	99.39%
1A3aii(i)	Domestic aviation LTO (civil)	6.86	0.21	0.000292	0.15%	99.53%
3Da3	Urine and dung deposited by grazing animals	95.7543	112.3933	0.000204	0.10%	99.63%
2G	Other product use	6.90	1.91	0.000198	0.10%	99.73%
1A3dii	National navigation (shipping)	26.49	29.27	0.000159	0.08%	99.81%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	2.36	0.11	0.000098	0.05%	99.86%
3B1a	Manure management - Dairy cattle	5.59	8.27	0.000084	0.04%	99.90%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	13.96	18.05	0.000064	0.03%	99.93%
3B4gii	Manure management - Broilers	3.70	3.69	0.000044	0.02%	99.95%
5C2	Open burning of waste	1.55	2.28	0.000022	0.01%	99.97%
3Da2b	Sewage sludge applied to soils	1.1742	1.7760	0.000020	0.01%	99.98%
3B4gi	Manure management - Laying hens	1.38	1.33	0.000014	0.01%	99.98%
3B3	Manure management - Swine	11.27	13.43	0.000012	0.01%	99.99%
3B4f	Manure management - Mules and asses	0.26	0.03	0.000010	0.01%	99.99%
3B4giii	Manure management - Turkeys	0.27	0.06	0.000009	0.00%	100.00%
3B2	Manure management - Sheep	0.71	0.79	0.000004	0.00%	100.00%
3B4e	Manure management - Horses	0.02	0.04	0.000001	0.00%	100.00%
3B1b	Manure management - Non-dairy cattle	1.23	1.48	0.000001	0.00%	100.00%

Table 141: NOx Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
3B4d	Manure management - Goats	0.50	0.61	0.000000	0.00%	100.00%

Table 142: NMVOC Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3bi	Road transport: Passenger cars	2935.16	393.64	0.132824	44.16%	44.16%
1A3biv	Road transport: Mopeds & motorcycles	1434.25	419.81	0.047359	15.75%	59.91%
1A3bii	Road transport: Light duty vehicles	550.81	112.95	0.021911	7.29%	67.19%
1A3biii	Road transport: Heavy duty vehicles and buses	412.77	107.49	0.014658	4.87%	72.07%
3B1a	Manure management - Dairy cattle	382.81	655.52	0.012791	4.25%	76.32%
2D3a	Domestic solvent use including fungicides	704.52	1065.60	0.012679	4.22%	80.54%
2D3f	Dry cleaning	200.15	26.68	0.009070	3.02%	83.55%
5A	Biological treatment of waste - Solid waste disposal on land	166.92	315.77	0.007887	2.62%	86.17%
1B2av	Distribution of oil products	715.88	429.26	0.006691	2.22%	88.40%
2D3d	Coating applications	1738.74	2297.19	0.005631	1.87%	90.27%
3B4gii	Manure management - Broilers	248.27	247.74	0.005305	1.76%	92.04%
1A3bv	Road transport: Gasoline evaporation	1552.24	1173.46	0.004212	1.40%	93.44%
3B3	Manure management - Swine	220.54	248.02	0.002630	0.87%	94.31%
2H2	Food and beverages industry	259.91	165.46	0.001688	0.56%	94.87%
2D3g	Chemical products	38.81	11.85	0.001244	0.41%	95.29%
3De	Cultivated crops	49.45	19.84	0.001219	0.41%	95.69%
1A2gvii	Mobile Combustion in manufacturing industries and construction	41.81	14.84	0.001180	0.39%	96.08%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	11.30	28.62	0.001092	0.36%	96.45%
3B4gi	Manure management - Laying hens	52.92	51.01	0.000992	0.33%	96.78%

Table 142: NMVOC Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3ai(i)	International aviation LTO (civil)	12.64	28.82	0.000976	0.32%	97.10%
3F	Field burning of agricultural residues	17.25	0.69	0.000906	0.30%	97.40%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	39.78	38.97	0.000794	0.26%	97.67%
2D3h	Printing	200.00	245.82	0.000773	0.26%	97.92%
3B1b	Manure management - Non-dairy cattle	126.70	152.55	0.000735	0.24%	98.17%
1A1a	Public electricity and heat production	52.04	75.61	0.000697	0.23%	98.40%
2D3c	Asphalt roofing	32.50	14.51	0.000688	0.23%	98.63%
2G	Other product use	18.55	5.13	0.000635	0.21%	98.84%
3B4giii	Manure management - Turkeys	15.10	3.36	0.000580	0.19%	99.03%
1A4ci	Agriculture/Forestry/Fishing: Stationary	10.31	19.91	0.000518	0.17%	99.20%
1A2gviii	Stationary combustion in manufacturing industries and construction	24.08	12.42	0.000380	0.13%	99.33%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	1.36	6.32	0.000353	0.12%	99.45%
3B4f	Manure management - Mules and asses	7.21	0.75	0.000343	0.11%	99.56%
3B2	Manure management - Sheep	26.14	29.24	0.000324	0.11%	99.67%
1A5b	Other, Mobile (including military, land based and recreational boats)	0.53	4.09	0.000263	0.09%	99.76%
2D3b	Road paving with asphalt	7.50	3.35	0.000159	0.05%	99.81%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	3.98	1.38	0.000115	0.04%	99.85%
1A4bi	Residential: Stationary	61.27	42.70	0.000112	0.04%	99.89%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	6.57	6.07	0.000103	0.03%	99.92%

Table 142: NMVOC Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3dii	National navigation (shipping)	5.14	5.53	0.000080	0.03%	99.95%
3B4d	Manure management - Goats	13.86	16.97	0.000058	0.02%	99.97%
3B4e	Manure management - Horses	1.49	2.44	0.000041	0.01%	99.98%
5D1	Domestic wastewater handling	0.28	0.62	0.000020	0.01%	99.99%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	21.80	28.07	0.000014	0.00%	99.99%
5C2	Open burning of waste	0.58	0.88	0.000010	0.00%	99.99%
1A3aii(i)	Domestic aviation LTO (civil)	0.22	0.03	0.000010	0.00%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.12	0.01	0.000006	0.00%	100.00%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.68	0.88	0.000001	0.00%	100.00%

Table 143: SOx Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A1a	Public electricity and heat production	21615.28	14194.49	0.109785	47.64%	47.64%
1A3bii	Road transport: Light duty vehicles	2004.80	2.69	0.030969	13.44%	61.08%
1A3biii	Road transport: Heavy duty vehicles and buses	1597.46	2.06	0.024679	10.71%	71.79%
1A4bi	Residential: Stationary	1416.84	131.94	0.017813	7.73%	79.52%
1A3bi	Road transport: Passenger cars	1083.53	8.03	0.016531	7.17%	86.69%
1A2gviii	Stationary combustion in manufacturing industries and construction	1150.00	192.23	0.011792	5.12%	91.81%
1A2gvii	Mobile Combustion in manufacturing industries and construction	247.60	0.09	0.003832	1.66%	93.47%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	540.00	367.23	0.003138	1.36%	94.84%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	482.54	634.65	0.002875	1.25%	96.08%
1A4ci	Agriculture/Forestry/Fishing: Stationary	246.22	47.54	0.002325	1.01%	97.09%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	190.00	26.31	0.002119	0.92%	98.01%
1A5b	Other, Mobile (including military, land based and recreational boats)	10.04	77.71	0.001961	0.85%	98.86%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	123.11	15.85	0.001410	0.61%	99.47%
1A3ai(i)	International aviation LTO (civil)	26.31	27.53	0.000378	0.16%	99.64%
1A3biv	Road transport: Mopeds & motorcycles	19.89	0.14	0.000304	0.13%	99.77%
3F	Field burning of agricultural residues	17.25	0.69	0.000246	0.11%	99.88%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	65.00	36.94	0.000150	0.07%	99.94%

Table 143: SO_x Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	5.50	0.11	0.000082	0.04%	99.98%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	32.50	16.81	0.000023	0.01%	99.99%
1A3dii	National navigation (shipping)	2.76	1.75	0.000012	0.01%	99.99%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	8.28	3.82	0.000009	0.00%	100.00%
1A3aii(i)	Domestic aviation LTO (civil)	0.41	0.01	0.000006	0.00%	100.00%
2G	Other product use	0.13	0.26	0.000002	0.00%	100.00%
5C2	Open burning of waste	0.05	0.08	0.000000	0.00%	100.00%

Table 144: NH₃ Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
3B4d	Manure management - Goats	858.83	144.22	0.074218	19.98%	19.98%
3B2	Manure management - Sheep	834.88	167.34	0.068742	18.50%	38.48%
3Da2a	Animal manure applied to soils	2282.21	3040.57	0.054043	14.55%	53.03%
3Da1	Inorganic N-fertilizers (includes also urea application)	883.80	358.20	0.050041	13.47%	66.50%
3B4gii	Manure management - Broilers	456.57	57.30	0.041887	11.27%	77.77%
3B1a	Manure management - Dairy cattle	451.93	703.20	0.023393	6.30%	84.07%
3B3	Manure management - Swine	1325.15	1340.93	0.021914	5.90%	89.97%
3F	Field burning of agricultural residues	82.80	3.32	0.008484	2.28%	92.25%
1A3bi	Road transport: Passenger cars	60.42	117.17	0.006035	1.62%	93.88%
3B1b	Manure management - Non-dairy cattle	331.12	418.24	0.004965	1.34%	95.21%
3B4f	Manure management - Mules and asses	45.45	0.67	0.004802	1.29%	96.51%
3B4gi	Manure management - Laying hens	110.87	164.85	0.004777	1.29%	97.79%
3B4giii	Manure management - Turkeys	42.42	1.48	0.004374	1.18%	98.97%
2G	Other product use	15.90	4.40	0.001157	0.31%	99.28%
3B4e	Manure management - Horses	6.51	1.44	0.000519	0.14%	99.42%
1A3biii	Road transport: Heavy duty vehicles and buses	26.89	34.84	0.000513	0.14%	99.56%
3Da3	Urine and dung deposited by grazing animals	130.81	153.54	0.000495	0.13%	99.69%
1A3bii	Road transport: Light duty vehicles	1.34	5.34	0.000478	0.13%	99.82%
1A4bi	Residential: Stationary	6.91	4.12	0.000226	0.06%	99.88%
3Da2b	Sewage sludge applied to soils	3.99	6.04	0.000185	0.05%	99.93%
3B4giv	Manure management - Other poultry	1.4575	0.0000	0.000157	0.04%	99.97%

Table 144: NH₃ Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3dii	National navigation (shipping)	4.8284	6.1421	0.000078	0.02%	99.99%
1A3biv	Road transport: Mopeds & motorcycles	0.31	0.47	0.000015	0.00%	100.00%
1A2gvii	Mobile Combustion in manufacturing industries and construction	0.10	0.04	0.000006	0.00%	100.00%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	0.05	0.06	0.000001	0.00%	100.00%

Table 145: PM_{2.5} Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A1a	Public electricity and heat production	294.29	237.93	0.044964	17.87%	17.87%
1A3bii	Road transport: Light duty vehicles	446.60	83.70	0.040937	16.27%	34.15%
2G	Other product use	291.02	33.05	0.035136	13.97%	48.12%
2D3b	Road paving with asphalt	197.29	0.16	0.032577	12.95%	61.07%
1A3bvi	Road transport: Automobile tyre and brake wear	82.89	98.35	0.012828	5.10%	66.16%
3F	Field burning of agricultural residues	83.40	7.48	0.010854	4.31%	70.48%
2A1	Cement production	185.60	52.03	0.010227	4.07%	74.55%
1A4bi	Residential: Stationary	40.29	41.72	0.008632	3.43%	77.98%
1A3bi	Road transport: Passenger cars	112.47	29.79	0.006879	2.73%	80.71%
1A3biii	Road transport: Heavy duty vehicles and buses	167.04	53.15	0.006715	2.67%	83.38%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	264.77	127.72	0.006471	2.57%	85.95%
3B3	Manure management - Swine	29.67	24.43	0.004708	1.87%	87.82%
5E	Other waste	28.09	21.94	0.003991	1.59%	89.41%
1A3bvii	Road transport: Automobile road abrasion	32.79	42.17	0.003790	1.51%	90.92%
2A5a	Quarrying and mining of minerals other than coal	53.57	31.02	0.003346	1.33%	92.25%
1A4ci	Agriculture/Forestry/Fishing: Stationary	16.30	17.92	0.003084	1.23%	93.47%
1A5b	Other, Mobile (including military, land based and recreational boats)	1.21	9.34	0.002926	1.16%	94.64%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	20.69	15.16	0.002544	1.01%	95.65%
3B4gii	Manure management - Broilers	19.11	13.59	0.002187	0.87%	96.52%
3B4gi	Manure management - Laying hens	7.12	8.00	0.001280	0.51%	97.03%

Table 145: PM_{2.5} Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
2A2	Lime production	4.25	4.24	0.000965	0.38%	97.41%
1A2gvii	Mobile Combustion in manufacturing industries and construction	27.35	9.24	0.000886	0.35%	97.76%
2A5c	Storage, handling and transport of mineral products	5.84	4.60	0.000845	0.34%	98.10%
2A5b	Construction and demolition	15.08	22.24	0.000622	0.25%	98.35%
1A3biv	Road transport: Mopeds & motorcycles	21.28	7.60	0.000530	0.21%	98.56%
5C1bv	Cremation	2.90	0.00	0.000480	0.19%	98.75%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	13.06	19.76	0.000346	0.14%	98.88%
3B1b	Manure management - Non-dairy cattle	2.80	3.54	0.000345	0.14%	99.02%
3B1a	Manure management - Dairy cattle	9.64	14.36	0.000343	0.14%	99.16%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	1.76	3.59	0.000320	0.13%	99.28%
1A3ai(i)	International aviation LTO (civil)	2.86	3.72	0.000311	0.12%	99.41%
1A2gviii	Stationary combustion in manufacturing industries and construction	19.90	9.15	0.000310	0.12%	99.53%
5C2	Open burning of waste	2.36	3.00	0.000284	0.11%	99.64%
1A3dii	National navigation (shipping)	2.45	3.33	0.000209	0.08%	99.73%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	3.68	1.10	0.000176	0.07%	99.80%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	5.25	2.48	0.000110	0.04%	99.84%
2D3c	Asphalt roofing	11.26	4.47	0.000106	0.04%	99.88%
3B4giii	Manure management - Turkeys	1.04	0.19	0.000097	0.04%	99.92%

Table 145: PM_{2,5} Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	1.13	0.70	0.000090	0.04%	99.96%
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	3.09	1.38	0.000034	0.01%	99.97%
3B4d	Manure management - Goats	0.26	0.18	0.000025	0.01%	99.98%
3B2	Manure management - Sheep	0.17	0.23	0.000018	0.01%	99.99%
1A3a(ii)	Domestic aviation LTO (civil)	0.08	0.01	0.000010	0.00%	99.99%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.07	0.00	0.000009	0.00%	100.00%
3B4e	Manure management - Horses	0.03	0.03	0.000005	0.00%	100.00%
5A	Biological treatment of waste - Solid waste disposal on land	0.01	0.01	0.000003	0.00%	100.00%
3B4f	Manure management - Mules and asses	0.05	0.01	0.000002	0.00%	100.00%

Table 146: PM₁₀ Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
2D3b	Road paving with asphalt	845.55	0.67	0.078572	31.46%	31.46%
1A1a	Public electricity and heat production	446.24	347.78	0.031423	12.58%	44.04%
1A3bii	Road transport: Light duty vehicles	446.60	83.70	0.024015	9.61%	53.65%
2G	Other product use	293.11	37.13	0.019496	7.81%	61.46%
2A1	Cement production	334.09	83.20	0.013645	5.46%	66.92%
3B3	Manure management - Swine	157.87	129.48	0.012468	4.99%	71.91%
1A3bvi	Road transport: Automobile tyre and brake wear	156.52	185.35	0.012219	4.89%	76.81%
3B4gii	Manure management - Broilers	144.90	103.03	0.008127	3.25%	80.06%
3F	Field burning of agricultural residues	88.03	7.89	0.006539	2.62%	82.68%
1A3biii	Road transport: Heavy duty vehicles and buses	167.04	53.15	0.004400	1.76%	84.44%
1A3bi	Road transport: Passenger cars	112.47	29.79	0.004219	1.69%	86.13%
2A5c	Storage, handling and transport of mineral products	58.44	46.03	0.004217	1.69%	87.82%
3B4gi	Manure management - Laying hens	39.60	44.47	0.003599	1.44%	89.26%
1A3bvii	Road transport: Automobile road abrasion	60.73	78.10	0.003442	1.38%	90.64%
1A4bi	Residential: Stationary	45.13	55.37	0.003120	1.25%	91.89%
2A5a	Quarrying and mining of minerals other than coal	535.70	224.23	0.002825	1.13%	93.02%
2A5b	Construction and demolition	150.77	222.38	0.002572	1.03%	94.05%
2A2	Lime production	21.23	21.18	0.002468	0.99%	95.03%
5E	Other waste	28.09	21.91	0.001983	0.79%	95.83%
1A4ci	Agriculture/Forestry/Fishing: Stationary	19.02	20.90	0.001825	0.73%	96.56%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	276.62	130.43	0.001614	0.65%	97.20%

Table 146: PM₁₀ Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A5b	Other, Mobile (including military, land based and recreational boats)	1.21	9.34	0.001565	0.63%	97.83%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	20.69	15.16	0.001254	0.50%	98.33%
2D3c	Asphalt roofing	84.47	33.49	0.000838	0.34%	98.67%
1A2gvii	Mobile Combustion in manufacturing industries and construction	27.35	9.24	0.000607	0.24%	98.91%
3B4giii	Manure magement - Turkeys	7.80	1.44	0.000425	0.17%	99.08%
1A3biv	Road transport: Mopeds & motorcycles	21.28	7.60	0.000387	0.15%	99.24%
5C1bv	Cremation	3.39	0.00	0.000315	0.13%	99.36%
3B1b	Manure management - Non-dairy cattle	4.24	5.37	0.000257	0.10%	99.47%
3B1a	Manure management - Dairy cattle	14.81	22.06	0.000208	0.08%	99.55%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	1.76	3.64	0.000189	0.08%	99.62%
1A3ai(i)	International aviation LTO (civil)	2.86	3.72	0.000152	0.06%	99.69%
5C2	Open burning of waste	2.54	3.23	0.000151	0.06%	99.75%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	3.68	1.10	0.000112	0.04%	99.79%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	13.06	19.85	0.000100	0.04%	99.83%
1A3dii	National navigation (shipping)	2.45	3.33	0.000100	0.04%	99.87%
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	80.31	35.99	0.000075	0.03%	99.90%
1A2gviii	Stationary combustion in manufacturing industries and construction	19.90	9.17	0.000072	0.03%	99.93%

Table 146: PM₁₀ Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	1.13	0.70	0.000042	0.02%	99.95%
3B4d	Manure management - Goats	0.87	0.58	0.000040	0.02%	99.96%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	6.05	2.87	0.000038	0.02%	99.98%
3B2	Manure management - Sheep	0.57	0.75	0.000028	0.01%	99.99%
5A	Biological treatment of waste - Solid waste disposal on land	0.09	0.08	0.000009	0.00%	99.99%
1A3aii(i)	Domestic aviation LTO (civil)	0.08	0.01	0.000006	0.00%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.07	0.00	0.000005	0.00%	100.00%
3B4e	Manure management - Horses	0.05	0.04	0.000004	0.00%	100.00%
3B4f	Manure management - Mules and asses	0.07	0.02	0.000002	0.00%	100.00%

Table 147: TSP Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
2D3b	Road paving with asphalt	3664.03	2.90	0.142762	53.97%	53.97%
1A1a	Public electricity and heat production	593.91	456.61	0.024891	9.41%	63.37%
3B3	Manure management - Swine	354.11	290.63	0.016777	6.34%	69.72%
1A3bvi	Road transport: Automobile tyre and brake wear	203.79	241.74	0.009506	3.59%	73.31%
1A3bii	Road transport: Light duty vehicles	446.60	83.70	0.008625	3.26%	76.57%
2A5b	Construction and demolition	508.41	749.88	0.008256	3.12%	79.69%
2G	Other product use	293.55	37.98	0.007463	2.82%	82.51%
2A1	Cement production	371.21	83.86	0.005664	2.14%	84.65%
3B4gii	Manure management - Broilers	144.90	103.03	0.005191	1.96%	86.61%
2A5c	Storage, handling and transport of mineral products	116.88	92.06	0.005130	1.94%	88.55%
1A3bvii	Road transport: Automobile road abrasion	121.45	156.20	0.004388	1.66%	90.21%
2A2	Lime production	54.59	54.47	0.003604	1.36%	91.57%
2A5a	Quarrying and mining of minerals other than coal	1092.83	432.02	0.002820	1.07%	92.64%
3F	Field burning of agricultural residues	89.58	8.03	0.002652	1.00%	93.64%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	286.03	130.12	0.002534	0.96%	94.60%
3B4gi	Manure management - Laying hens	40.98	46.02	0.002184	0.83%	95.43%
1A4bi	Residential: Stationary	46.99	57.72	0.001983	0.75%	96.18%
1A3bi	Road transport: Passenger cars	112.47	29.79	0.001254	0.47%	96.65%
2D3c	Asphalt roofing	450.51	178.60	0.001216	0.46%	97.11%
5E	Other waste	28.09	21.91	0.001211	0.46%	97.57%
1A4ci	Agriculture/Forestry/Fishing: Stationary	19.02	20.90	0.001062	0.40%	97.97%

Table 147: TSP Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3biii	Road transport: Heavy duty vehicles and buses	167.04	53.15	0.000926	0.35%	98.32%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	20.69	15.17	0.000789	0.30%	98.62%
1A5b	Other, Mobile (including military, land based and recreational boats)	1.21	9.34	0.000776	0.29%	98.91%
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	80.31	35.99	0.000654	0.25%	99.16%
3B1a	Manure management - Dairy cattle	32.33	48.15	0.000476	0.18%	99.34%
3B1b	Manure management - Non-dairy cattle	9.15	11.59	0.000349	0.13%	99.47%
1A2gviii	Stationary combustion in manufacturing industries and construction	19.90	9.23	0.000195	0.07%	99.54%
5C1bv	Cremation	4.84	0.00	0.000189	0.07%	99.61%
3B4giii	Manure management - Turkeys	7.80	1.44	0.000153	0.06%	99.67%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	13.06	20.07	0.000128	0.05%	99.72%
1A3ai(i)	International aviation LTO (civil)	2.86	3.72	0.000098	0.04%	99.76%
5C2	Open burning of waste	2.61	3.32	0.000098	0.04%	99.80%
1A2gvii	Mobile Combustion in manufacturing industries and construction	27.35	9.24	0.000095	0.04%	99.83%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	1.76	3.74	0.000092	0.03%	99.87%
1A3dii	National navigation (shipping)	2.45	3.33	0.000069	0.03%	99.89%
3B4d	Manure management - Goats	2.16	1.43	0.000067	0.03%	99.92%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	6.05	2.87	0.000066	0.02%	99.94%
3B2	Manure management - Sheep	1.41	1.85	0.000046	0.02%	99.96%

Table 147: TSP Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3biv	Road transport: Mopeds & motorcycles	21.28	7.60	0.000031	0.01%	99.97%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	1.13	0.70	0.000030	0.01%	99.98%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	3.68	1.10	0.000028	0.01%	99.99%
5A	Biological treatment of waste - Solid waste disposal on land	0.20	0.18	0.000011	0.00%	100.00%
3B4e	Manure management - Horses	0.11	0.09	0.000005	0.00%	100.00%
1A3aii(i)	Domestic aviation LTO (civil)	0.08	0.01	0.000002	0.00%	100.00%
3B4f	Manure management - Mules and asses	0.15	0.04	0.000001	0.00%	100.00%

Table 148: BC Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3bii	Road transport: Light duty vehicles	272.50	63.03	0.061266	44.20%	44.20%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	70.24	32.75	0.010730	7.74%	51.94%
1A1a	Public electricity and heat production	16.48	12.70	0.010571	7.63%	59.57%
1A3bi	Road transport: Passenger cars	66.77	19.62	0.008305	5.99%	65.56%
1A4ci	Agriculture/Forestry/Fishing: Stationary	9.13	10.03	0.007770	5.61%	71.17%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	12.02	8.82	0.007003	5.05%	76.22%
2D3b	Road paving with asphalt	11.25	0.01	0.006693	4.83%	81.05%
1A3bvi	Road transport: Automobile tyre and brake wear	8.2215	9.7982	0.005772	4.16%	85.21%
3F	Field burning of agricultural residues	7.72	0.69	0.003493	2.52%	87.73%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	7.32	9.83	0.003345	2.41%	90.15%
1A3biii	Road transport: Heavy duty vehicles and buses	87.94	34.51	0.003000	2.16%	92.31%
1A4bi	Residential: Stationary	4.36	5.29	0.002929	2.11%	94.42%
1A2gviii	Stationary combustion in manufacturing industries and construction	11.14	5.12	0.001586	1.14%	95.57%
1A3dii	National navigation (shipping)	1.7451	3.7294	0.001425	1.03%	96.60%
1A2gvii	Mobile Combustion in manufacturing industries and construction	16.68	5.64	0.000892	0.64%	97.24%
2A1	Cement production	5.57	1.56	0.000813	0.59%	97.83%
1A3bvii	Road transport: Automobile road abrasion	1.2874	1.6557	0.000709	0.51%	98.34%
2G	Other product use	1.30	0.13	0.000568	0.41%	98.75%
5C2	Open burning of waste	0.99	1.26	0.000566	0.41%	99.16%

Table 148: BC Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A4ciii	Agriculture/Forestry/Fishing: National fishing	1.8763	0.8886	0.000309	0.22%	99.38%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.98	1.44	0.000269	0.19%	99.57%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.63	0.39	0.000256	0.18%	99.76%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	2.06	0.62	0.000240	0.17%	99.93%
1A3biv	Road transport: Mopeds & motorcycles	3.99	1.53	0.000077	0.06%	99.99%
2A2	Lime production	0.02	0.02	0.000020	0.01%	100.00%
2D3c	Asphalt roofing	0.00	0.00	0.000000	0.00%	100.00%

Table 149: CO Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3bi	Road transport: Passenger cars	26973.91	4305.55	0.054928	40.76%	40.76%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	1892.99	2244.26	0.024598	18.26%	59.02%
1A3bii	Road transport: Light duty vehicles	5898.39	832.58	0.014511	10.77%	69.79%
3F	Field burning of agricultural residues	2301.15	92.34	0.010997	8.16%	77.95%
1A4bi	Residential: Stationary	563.76	531.14	0.008978	6.66%	84.61%
1A3biii	Road transport: Heavy duty vehicles and buses	984.40	631.58	0.008886	6.59%	91.21%
1A1a	Public electricity and heat production	341.65	377.90	0.005063	3.76%	94.97%
1A3biv	Road transport: Mopeds & motorcycles	3787.86	1038.38	0.002243	1.66%	96.63%
1A3ai(i)	International aviation LTO (civil)	122.41	284.49	0.001608	1.19%	97.82%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	70.60	90.88	0.000752	0.56%	98.38%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	29.84	68.59	0.000374	0.28%	98.66%
1A2gviii	Stationary combustion in manufacturing industries and construction	63.56	31.04	0.000350	0.26%	98.92%
1A2gvii	Mobile Combustion in manufacturing industries and construction	133.38	47.33	0.000326	0.24%	99.16%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	15.3214	14.1414	0.000237	0.18%	99.34%
1A4ci	Agriculture/Forestry/Fishing: Stationary	47.94	92.57	0.000197	0.15%	99.48%
1A3dii	National navigation (shipping)	13.6574	16.4248	0.000172	0.13%	99.61%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	3.59	13.43	0.000164	0.12%	99.73%
2G	Other product use	211.44	59.03	0.000150	0.11%	99.85%

Table 149: CO Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
5C2	Open burning of waste	26.43	39.98	0.000145	0.11%	99.95%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	10.50	3.63	0.000024	0.02%	99.97%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	1.80	2.32	0.000019	0.01%	99.98%
2D3c	Asphalt roofing	2.38	1.06	0.000011	0.01%	99.99%
1A3aii(i)	Domestic aviation LTO (civil)	2.68	0.30	0.000008	0.01%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.30	0.01	0.000001	0.00%	100.00%

Table 150: Pb Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3bi	Road transport: Passenger cars	21.1752	0.0006	0.013734	64.31%	64.31%
1A1a	Public electricity and heat production	0.1032	0.0929	0.003663	17.15%	81.46%
1A3bii	Road transport: Light duty vehicles	2.2941	0.0001	0.001487	6.96%	88.43%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.1224	0.0294	0.001102	5.16%	93.59%
1A3biv	Road transport: Mopeds & motorcycles	0.9944	0.0000	0.000645	3.02%	96.61%
1A3bvi	Road transport: Automobile tyre and brake wear	0.1387	0.2612	0.000557	2.61%	99.22%
1A4bi	Residential: Stationary	0.0027	0.0016	0.000064	0.30%	99.52%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.0000	0.0009	0.000034	0.16%	99.68%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.0000	0.0004	0.000016	0.07%	99.75%
1A3biii	Road transport: Heavy duty vehicles and buses	0.0267	0.0001	0.000015	0.07%	99.82%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.0003	0.0002	0.000010	0.05%	99.87%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.0041	0.0080	0.000009	0.04%	99.91%
2G	Other product use	0.0034	0.0067	0.000005	0.02%	99.93%
5C2	Open burning of waste	0.0002	0.0004	0.000004	0.02%	99.95%
1A2gviii	Stationary combustion in manufacturing industries and construction	0.0001	0.0002	0.000004	0.02%	99.97%
3F	Field burning of agricultural residues	0.0038	0.0002	0.000004	0.02%	99.99%
1A3dii	National navigation (shipping)	0.0001	0.0001	0.000003	0.01%	100.00%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.0000	0.0000	0.000000	0.00%	100.00%

Table 150: Pb Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.0000	0.0000	0.000000	0.00%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.0000	0.0000	0.000000	0.00%	100.00%

Table 151: Cd Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A1a	Public electricity and heat production	0.0272	0.0237	0.157380	47.69%	47.69%
3F	Field burning of agricultural residues	0.0304	0.0012	0.129902	39.36%	87.05%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.0100	0.0024	0.018431	5.59%	92.64%
2G	Other product use	0.0054	0.0015	0.007472	2.26%	94.90%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.0000	0.0004	0.004943	1.50%	96.40%
1A4bi	Residential: Stationary	0.0013	0.0008	0.003181	0.96%	97.37%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.0000	0.0002	0.002305	0.70%	98.06%
1A3bvi	Road transport: Automobile tyre and brake wear	0.0006	0.0012	0.002189	0.66%	98.73%
1A3biv	Road transport: Mopeds & motorcycles	0.0007	0.0005	0.001932	0.59%	99.31%
1A2gviii	Stationary combustion in manufacturing industries and construction	0.0000	0.0001	0.001157	0.35%	99.66%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.0001	0.0001	0.000304	0.09%	99.76%
1A3bi	Road transport: Passenger cars	0.0000	0.0001	0.000251	0.08%	99.83%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	0.0001	0.0001	0.000238	0.07%	99.90%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.0000	0.0000	0.000133	0.04%	99.94%
1A2gvii	Mobile Combustion in manufacturing industries and construction	0.0001	0.0000	0.000058	0.02%	99.96%
1A3bii	Road transport: Light duty vehicles	0.0000	0.0000	0.000056	0.02%	99.98%
5C2	Open burning of waste	0.0000	0.0001	0.000054	0.02%	99.99%
1A3biii	Road transport: Heavy duty vehicles and buses	0.0000	0.0000	0.000016	0.00%	100.00%

Table 151: Cd Trend Assessment

1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.0000	0.0000	0.000001	0.00%	100.00%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.0000	0.0000	0.000001	0.00%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.0000	0.0000	0.000000	0.00%	100.00%

Table 152: Hg Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A1a	Public electricity and heat production	0.0077	0.0075	0.053703	48.92%	48.92%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.0613	0.0147	0.027987	25.50%	74.42%
3F	Field burning of agricultural residues	0.0048	0.0002	0.011990	10.92%	85.34%
1A3bi	Road transport: Passenger cars	0.0014	0.0032	0.008356	7.61%	92.96%
1A3bii	Road transport: Light duty vehicles	0.0007	0.0007	0.003850	3.51%	96.47%
1A3biii	Road transport: Heavy duty vehicles and buses	0.0004	0.0005	0.001835	1.67%	98.14%
1A4bi	Residential: Stationary	0.0004	0.0008	0.000617	0.56%	98.70%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.0001	0.0001	0.000400	0.36%	99.06%
1A3biv	Road transport: Mopeds & motorcycles	0.0001	0.0001	0.000365	0.33%	99.40%
1A2gviii	Stationary combustion in manufacturing industries and construction	0.0001	0.0001	0.000198	0.18%	99.58%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.0001	0.0001	0.000169	0.15%	99.73%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.0001	0.0001	0.000113	0.10%	99.83%
1A3dii	National navigation (shipping)	0.0000	0.0000	0.000092	0.08%	99.92%

Table 152: Hg Trend Assessment

1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.00001	0.00002	0.000063	0.06%	99.98%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.000003	0.000004	0.000014	0.01%	99.99%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.00002	0.00001	0.000012	0.01%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.0000	0.0000	0.000001	0.00%	100.00%
2G	Other product use	0.000000	0.000000	0.000001	0.00%	100.00%

Table 153: PCDD/F Trend Assessment

NFR Code	NFR Category	1990 Emissions (in g I-TEQ)	2019 Emissions (in g I-TEQ)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
5E	Other waste	0.0096	0.2242	0.011742	50.01%	50.01%
1A4bi	Residential: Stationary	0.0897	0.0631	0.003442	14.66%	64.67%
1A3bi	Road transport: Passenger cars	0.0637	0.0781	0.002699	11.49%	76.16%
1A3bii	Road transport: Light duty vehicles	0.0066	0.0595	0.002661	11.33%	87.49%
1A1a	Public electricity and heat production	0.0566	0.0884	0.001308	5.57%	93.06%
1A3biii	Road transport: Heavy duty vehicles and buses	0.0190	0.0284	0.000508	2.16%	95.22%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.0061	0.0069	0.000291	1.24%	96.46%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.0013	0.0060	0.000191	0.81%	97.28%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.0006	0.0042	0.000170	0.72%	98.00%
1A3biv	Road transport: Mopeds & motorcycles	0.0034	0.0028	0.000154	0.65%	98.65%
5C2	Open burning of waste	0.0047	0.0072	0.000123	0.52%	99.18%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.0001	0.0016	0.000081	0.35%	99.53%
1A2gviii	Stationary combustion in manufacturing industries and construction	0.0013	0.0014	0.000074	0.32%	99.84%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.0003	0.0002	0.000014	0.06%	99.90%
3F	Field burning of agricultural residues	0.0216	0.0009	0.000009	0.04%	99.94%
2G	Other product use	0.0004	0.0001	0.000005	0.02%	99.96%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.0002	0.0001	0.000004	0.02%	99.98%

Table 153: PCDD/F Trend Assessment

1A3dii	National navigation (shipping)	0.0001	0.0001	0.000004	0.02%	99.99%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.0000	0.0000	0.000001	0.01%	100.00%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	0.0000	0.0000	0.000000	0.00%	100.00%

Table 154: PAHs Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2019 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
3F	Field burning of agricultural residues	13.6413	0.5474	0.007368	67.21%	67.21%
1A4bi	Residential: Stationary	0.0351	0.0217	0.001458	13.30%	80.51%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.0145	0.0102	0.000689	6.28%	86.79%
1A2gviii	Stationary combustion in manufacturing industries and construction	0.0194	0.0084	0.000541	4.93%	91.73%
1A3bii	Road transport: Light duty vehicles	0.0074	0.0109	0.000264	2.41%	94.14%
5C2	Open burning of waste	0.0060	0.0091	0.000191	1.75%	95.88%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.0091	0.0165	0.000088	0.80%	96.69%
1A3bi	Road transport: Passenger cars	0.0075	0.0158	0.000082	0.75%	97.44%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.0032	0.0011	0.000069	0.63%	98.07%
1A3biii	Road transport: Heavy duty vehicles and buses	0.0042	0.0073	0.000063	0.57%	98.64%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	0.0008	0.0011	0.000040	0.37%	99.01%
1A2gvii	Mobile Combustion in manufacturing industries and construction	0.0017	0.0006	0.000037	0.34%	99.35%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.0005	0.0007	0.000026	0.24%	99.59%
1A3biv	Road transport: Mopeds & motorcycles	0.0003	0.0003	0.000020	0.18%	99.77%
2G	Other product use	0.0009	0.0003	0.000016	0.14%	99.91%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.0011	0.0021	0.000005	0.05%	99.96%
1A1a	Public electricity and heat production	0.0004	0.0008	0.000004	0.04%	100.00%

Table 154: PAHs Trend Assessment

1A4ci	Agriculture/Forestry/Fishing: Stationary	0.0000	0.0000	0.000000	0.00%	100.00%
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Table 155: HCB Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Kg)	2019 Emissions (in Kg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.0057439	0.0068987	0.039059	91.99%	91.99%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.0002	0.0002	0.001545	3.64%	95.62%
1A3bii	Road transport: Light duty vehicles	0.0000066	0.0000595	0.001007	2.37%	98.00%
1A3biii	Road transport: Heavy duty vehicles and buses	0.0000033	0.0000258	0.000424	1.00%	99.00%
1A3bi	Road transport: Passenger cars	0.0000637	0.0000781	0.000401	0.94%	99.94%
1A3biv	Road transport: Mopeds & motorcycles	0.0000034	0.0000028	0.000025	0.06%	100.00%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.0000	0.0000	0.000001	0.00%	100.00%
1A4bi	Residential: Stationary	0.0000000	0.0000000	0.000000	0.00%	100.00%

Table 156: PCBs Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Kg)	2019 Emissions (in Kg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.025723	0.030877	0.138462	99.51%	99.51%
1A3dii	National navigation (shipping)	0.0000	0.0000	0.000196	0.14%	99.65%
1A3bii	Road transport: Light duty vehicles	0.000007	0.000012	0.000156	0.11%	99.76%
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.0001	0.0001	0.000142	0.10%	99.87%
1A3biv	Road transport: Mopeds & motorcycles	0.000003	0.000001	0.000070	0.05%	99.92%
1A3biii	Road transport: Heavy duty vehicles and buses	0.000003	0.000005	0.000059	0.04%	99.96%
1A3bi	Road transport: Passenger cars	0.000013	0.000016	0.000057	0.04%	100.00%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.0000	0.0000	0.000002	0.00%	100.00%
1A4bi	Residential: Stationary	0.000000	0.000000	0.000000	0.00%	100.00%

[Annex 4: Uncertainty Analysis per Pollutant](#)

Annex 4

Uncertainty Analysis per Pollutant for 2019

Table 157: NOx emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	NOx	3.213	3.906	0	10	10.00	2.78	0.77
1A2a	NOx	0.002	0.000	2	40	40.05	0.00	0.00
1A2b	NOx	0.082	0.028	2	40	40.05	0.08	0.08
1A2c	NOx	0.028	0.041	2	40	40.05	0.12	0.04
1A2d	NOx	0.014	0.018	2	40	40.05	0.05	0.02
1A2e	NOx	0.232	0.397	2	40	40.05	1.13	0.48
1A2f	NOx	1.621	0.955	2	0	2.00	0.14	0.15
1A2gvii	NOx	0.404	0.143	0	0	0.00	0.00	0.00
1A2gviii	NOx	0.494	0.207	2	40	40.05	0.59	0.41
1A3ai(i)	NOx	0.310	0.474	1	200	200.00	6.75	2.58
1A3aii(i)	NOx	0.007	0.000	1	200	200.00	0.00	0.06
1A3bi	NOx	2.912	1.241	1	30	30.02	2.65	1.78
1A3bii	NOx	2.796	1.797	1	30	30.02	3.84	0.70
1A3biii	NOx	3.081	2.609	1	30	30.02	5.58	0.37
1A3biv	NOx	0.029	0.029	1	30	30.02	0.06	0.01
1A3dii	NOx	0.026	0.029	1	200	200.00	0.42	0.09
1A4bi	NOx	0.156	0.335	1	200	200.00	4.77	2.38
1A4ci	NOx	0.158	0.305	1	100	100.00	2.17	1.01
1A4cii	NOx	0.212	0.273	1	100	100.00	1.94	0.59
1A4ciii	NOx	0.133	0.122	1	100	100.00	0.87	0.10
1A5b	NOx	0.008	0.063	1	100	100.00	0.45	0.32
2G	NOx	0.007	0.002	0	0	0.00	0.00	0.00
3B1a	NOx	0.006	0.008	2	150	150.01	0.09	0.03
3B1b	NOx	0.001	0.001	2	150	150.01	0.02	0.00

Table 157: NO_x emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
3B2	NO _x	0.001	0.001	2	150	150.01	0.01	0.00
3B3	NO _x	0.011	0.013	2	150	150.01	0.14	0.04
3B4d	NO _x	0.001	0.001	2	150	150.01	0.01	0.00
3B4e	NO _x	0.000	0.000	2	150	150.01	0.00	0.00
3B4f	NO _x	0.000	0.000	2	150	150.01	0.00	0.00
3B4gi	NO _x	0.001	0.001	2	150	150.01	0.01	0.00
3B4gii	NO _x	0.004	0.004	2	150	150.01	0.04	0.01
3B4giii	NO _x	0.000	0.000	2	150	150.01	0.00	0.00
3Da1	NO _x	0.870	0.226	10	150	150.33	2.42	3.88
3Da2a	NO _x	0.490	0.692	10	150	150.33	7.41	2.63
3Da2b	NO _x	0.001	0.002	10	150	150.33	0.02	0.01
3Da3	NO _x	0.096	0.112	10	0	10.00	0.08	0.09
3F	NO _x	0.079	0.003	100	200	223.61	0.05	0.67
5C2	NO _x	0.002	0.002	100	50	111.80	0.02	0.02
Total		17.813	14.042				44.701	19.317

Table 158: NMVOC emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	NMVOC	0.052	0.076	0	10	10.00	0.08	0.03
1A2a	NMVOC	0.000	0.000	2	40	40.05	0.00	0.00
1A2b	NMVOC	0.004	0.001	2	40	40.05	0.01	0.00
1A2c	NMVOC	0.001	0.006	2	40	40.05	0.03	0.02
1A2d	NMVOC	0.001	0.001	2	40	40.05	0.00	0.00
1A2e	NMVOC	0.011	0.029	2	40	40.05	0.12	0.06
1A2f	NMVOC	0.040	0.039	2	0	2.00	0.01	0.01
1A2gvii	NMVOC	0.042	0.015	0	0	0.00	0.00	0.00
1A2gviii	NMVOC	0.024	0.012	2	40	40.05	0.05	0.02
1A3ai(i)	NMVOC	0.013	0.029	1	200	200.00	0.62	0.30
1A3aii(i)	NMVOC	0.000	0.000	1	200	200.00	0.00	0.00
1A3bi	NMVOC	2.935	0.394	1	30	30.02	1.26	3.98
1A3bii	NMVOC	0.551	0.113	1	30	30.02	0.36	0.66
1A3biii	NMVOC	0.413	0.107	1	30	30.02	0.35	0.44
1A3biv	NMVOC	1.434	0.420	1	30	30.02	1.35	1.42
1A3bv	NMVOC	1.552	1.173	1	0	1.00	0.13	0.13
1A3dii	NMVOC	0.005	0.006	1	200	200.00	0.12	0.03
1A4bi	NMVOC	0.061	0.043	1	200	200.00	0.91	0.02
1A4ci	NMVOC	0.010	0.020	1	100	100.00	0.21	0.10
1A4cii	NMVOC	0.022	0.028	1	100	100.00	0.30	0.10
1A4ciii	NMVOC	0.007	0.006	1	100	100.00	0.06	0.01
1A5b	NMVOC	0.001	0.004	1	100	100.00	0.04	0.03
1B2av	NMVOC	0.716	0.429	1	0	1.00	0.05	0.05

Table 158: NMVOC emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
2D3a	NMVOC	0.705	1.066	20	20	28.28	3.23	2.48
2D3b	NMVOC	0.008	0.003	50	20	53.85	0.02	0.02
2D3c	NMVOC	0.033	0.015	50	20	53.85	0.08	0.08
2D3d	NMVOC	1.739	2.297	20	20	28.28	6.95	5.26
2D3f	NMVOC	0.200	0.027	100	20	101.98	0.29	0.34
2D3g	NMVOC	0.039	0.012	20	20	28.28	0.04	0.04
2D3h	NMVOC	0.200	0.246	20	20	28.28	0.74	0.56
2D3i	NMVOC	0.000	0.813	20	20	28.28	2.46	2.17
2G	NMVOC	0.019	0.005	0	0	0.00	0.00	0.00
2H2	NMVOC	0.260	0.165	2	200	200.01	3.54	0.34
3B1a	NMVOC	0.383	0.656	2	150	150.01	10.52	4.39
3B1b	NMVOC	0.127	0.153	2	150	150.01	2.45	0.71
3B2	NMVOC	0.026	0.029	2	150	150.01	0.47	0.12
3B3	NMVOC	0.221	0.248	2	150	150.01	3.98	1.03
3B4d	NMVOC	0.014	0.017	2	150	150.01	0.27	0.08
3B4e	NMVOC	0.001	0.002	2	150	150.01	0.04	0.02
3B4f	NMVOC	0.007	0.001	2	150	150.01	0.01	0.05
3B4gi	NMVOC	0.053	0.051	2	150	150.01	0.82	0.15
3B4gii	NMVOC	0.248	0.248	2	150	150.01	3.98	0.80
3B4giii	NMVOC	0.015	0.003	2	150	150.01	0.05	0.09
3De	NMVOC	0.049	0.020	10	0	10.00	0.02	0.02
3F	NMVOC	0.017	0.001	100	200	223.61	0.02	0.18
5A	NMVOC	0.167	0.316	10	50	50.99	1.72	0.83
5C2	NMVOC	0.001	0.001	100	50	111.80	0.01	0.01

Table 158: NMVOC emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
5D1	NMVOC	0.000	0.001	10	50	50.99	0.00	0.00
Total		12.965	9.345				47.791	27.164

Table 159: SOx emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	SOx	21.615	14.194	0	10	10.00	8.99	1.09
1A2a	SOx	0.006	0.000	2	40	40.05	0.00	0.00
1A2b	SOx	0.190	0.026	2	40	40.05	0.07	0.08
1A2c	SOx	0.065	0.037	2	40	40.05	0.09	0.01
1A2d	SOx	0.033	0.017	2	40	40.05	0.04	0.00
1A2e	SOx	0.540	0.367	2	40	40.05	0.93	0.13
1A2f	SOx	0.483	0.635	2	0	2.00	0.08	0.06
1A2gvii	SOx	0.248	0.000	0	0	0.00	0.00	0.00
1A2gviii	SOx	1.150	0.192	2	40	40.05	0.49	0.47
1A3ai(i)	SOx	0.026	0.028	1	200	200.00	0.35	0.09
1A3aii(i)	SOx	0.000	0.000	1	200	200.00	0.00	0.00
1A3bi	SOx	1.084	0.008	1	30	30.02	0.02	0.50
1A3bii	SOx	2.005	0.003	1	30	30.02	0.01	0.93
1A3biii	SOx	1.597	0.002	1	30	30.02	0.00	0.74
1A3biv	SOx	0.020	0.000	1	30	30.02	0.00	0.01
1A3dii	SOx	0.003	0.002	1	200	200.00	0.02	0.00
1A4bi	SOx	1.417	0.132	1	200	200.00	1.67	3.56
1A4ci	SOx	0.246	0.048	1	100	100.00	0.30	0.23
1A4cii	SOx	0.123	0.016	1	100	100.00	0.10	0.14
1A4ciii	SOx	0.008	0.004	1	100	100.00	0.02	0.00
1A5b	SOx	0.010	0.078	1	100	100.00	0.49	0.23
2G	SOx	0.000	0.000	0	0	0.00	0.00	0.00
3F	SOx	0.017	0.001	100	200	223.61	0.01	0.05
5C2	SOx	0.000	0.000	100	50	111.80	0.00	0.00

Table 159: SOx emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
Total		31.927	15.789				13.688	8.326

Table 160: NH₃ emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A2gvii	NH ₃	0.000	0.000	0	0	0.00	0.00	0.00
1A3bi	NH ₃	0.060	0.117	1	30	30.02	0.52	0.25
1A3bii	NH ₃	0.001	0.005	1	30	30.02	0.02	0.02
1A3biii	NH ₃	0.027	0.035	1	30	30.02	0.15	0.04
1A3biv	NH ₃	0.000	0.000	1	30	30.02	0.00	0.00
1A3dii	NH ₃	0.005	0.006	1	200	200.00	0.18	0.05
1A4bi	NH ₃	0.007	0.004	1	200	200.00	0.12	0.05
1A4cii	NH ₃	0.000	0.000	1	100	100.00	0.00	0.00
2G	NH ₃	0.016	0.004	0	0	0.00	0.00	0.00
3B1a	NH ₃	0.452	0.703	2	150	150.01	15.46	5.96
3B1b	NH ₃	0.331	0.418	2	150	150.01	9.20	2.54
3B2	NH ₃	0.835	0.167	2	150	150.01	3.68	10.30
3B3	NH ₃	1.325	1.341	2	150	150.01	29.49	3.90
3B4d	NH ₃	0.859	0.144	2	150	150.01	3.17	11.12
3B4e	NH ₃	0.007	0.001	2	150	150.01	0.03	0.08
3B4f	NH ₃	0.045	0.001	2	150	150.01	0.01	0.72
3B4gi	NH ₃	0.111	0.165	2	150	150.01	3.63	1.32
3B4gii	NH ₃	0.457	0.057	2	150	150.01	1.26	6.28
3B4giii	NH ₃	0.042	0.001	2	150	150.01	0.03	0.66
3B4giv	NH ₃	0.001	0.000	2	150	150.01	0.00	0.02
3Da1	NH ₃	0.884	0.358	10	150	150.33	7.89	7.52
3Da2a	NH ₃	2.282	3.041	10	150	150.33	67.00	21.10
3Da2b	NH ₃	0.004	0.006	10	150	150.33	0.13	0.05
3Da3	NH ₃	0.131	0.154	10	0	10.00	0.23	0.27

Table 160: NH₃ emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
3F	NH ₃	0.083	0.003	100	200	223.61	0.11	1.70
Total		7.966	6.822				142.976	73.942

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Table 161: PM_{2.5} emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	PM _{2.5}	0.294	0.238	0	10	10.00	2.23	0.45
1A2a	PM _{2.5}	0.000	0.000	2	40	40.05	0.00	0.00
1A2b	PM _{2.5}	0.004	0.001	2	40	40.05	0.04	0.01
1A2c	PM _{2.5}	0.002	0.004	2	40	40.05	0.13	0.05
1A2d	PM _{2.5}	0.001	0.001	2	40	40.05	0.03	0.00
1A2e	PM _{2.5}	0.013	0.020	2	40	40.05	0.74	0.23
1A2f	PM _{2.5}	0.265	0.128	2	0	2.00	0.24	0.14
1A2gvii	PM _{2.5}	0.027	0.009	0	0	0.00	0.00	0.00
1A2gviii	PM _{2.5}	0.020	0.009	2	40	40.05	0.34	0.02
1A3ai(i)	PM _{2.5}	0.003	0.004	1	200	200.00	0.70	0.20
1A3aii(i)	PM _{2.5}	0.000	0.000	1	200	200.00	0.00	0.00
1A3bi	PM _{2.5}	0.112	0.030	1	30	30.02	0.84	0.21
1A3bii	PM _{2.5}	0.447	0.084	1	30	30.02	2.35	1.23
1A3biii	PM _{2.5}	0.167	0.053	1	30	30.02	1.49	0.20
1A3biv	PM _{2.5}	0.021	0.008	1	30	30.02	0.21	0.02
1A3bvi	PM _{2.5}	0.083	0.098	1	0	1.00	0.09	0.05
1A3bvii	PM _{2.5}	0.033	0.042	100	0	100.00	3.95	2.35
1A3dii	PM _{2.5}	0.002	0.003	1	200	200.00	0.62	0.18
1A4bi	PM _{2.5}	0.040	0.042	1	200	200.00	7.81	1.95
1A4ci	PM _{2.5}	0.016	0.018	1	100	100.00	1.68	0.44
1A4cii	PM _{2.5}	0.021	0.015	1	100	100.00	1.42	0.25
1A4ciii	PM _{2.5}	0.005	0.002	1	100	100.00	0.23	0.01
1A5b	PM _{2.5}	0.001	0.009	1	100	100.00	0.87	0.35
2A1	PM _{2.5}	0.186	0.052	1	200	200.00	9.74	2.04

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Table 161: PM_{2.5} emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
2A2	PM _{2.5}	0.004	0.004	1	200	200.00	0.79	0.19
2A5a	PM _{2.5}	0.054	0.031	10	200	200.25	5.82	0.69
2A5b	PM _{2.5}	0.015	0.022	100	200	223.61	4.66	1.76
2A5c	PM _{2.5}	0.006	0.005	50	200	206.16	0.89	0.21
2D3b	PM _{2.5}	0.197	0.000	50	20	53.85	0.01	0.65
2D3c	PM _{2.5}	0.011	0.004	50	20	53.85	0.23	0.12
2G	PM _{2.5}	0.291	0.033	0	0	0.00	0.00	0.00
3B1a	PM _{2.5}	0.010	0.014	2	150	150.01	2.02	0.61
3B1b	PM _{2.5}	0.003	0.004	2	150	150.01	0.50	0.14
3B2	PM _{2.5}	0.000	0.000	2	150	150.01	0.03	0.01
3B3	PM _{2.5}	0.030	0.024	2	150	150.01	3.43	0.71
3B4d	PM _{2.5}	0.000	0.000	2	150	150.01	0.02	0.00
3B4e	PM _{2.5}	0.000	0.000	2	150	150.01	0.00	0.00
3B4f	PM _{2.5}	0.000	0.000	2	150	150.01	0.00	0.00
3B4gi	PM _{2.5}	0.007	0.008	2	150	150.01	1.12	0.30
3B4gii	PM _{2.5}	0.019	0.014	2	150	150.01	1.91	0.33
3B4giii	PM _{2.5}	0.001	0.000	2	150	150.01	0.03	0.01
3Dc	PM _{2.5}	0.003	0.001	10	0	10.00	0.01	0.01
3F	PM _{2.5}	0.083	0.007	100	200	223.61	1.57	2.21
5A	PM _{2.5}	0.000	0.000	10	50	50.99	0.00	0.00
5C1bv	PM _{2.5}	0.003	0.000	2	50	50.04	0.00	0.02
5C2	PM _{2.5}	0.002	0.003	100	50	111.80	0.31	0.17
5E	PM _{2.5}	0.028	0.022	100	50	111.80	2.30	1.24
Total		2.541	1.068				61.429	19.762

Table 162: PM₁₀ emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	PM ₁₀	0.446	0.348	0	10	10.00	1.64	0.31
1A2a	PM ₁₀	0.000	0.000	2	40	40.05	0.00	0.00
1A2b	PM ₁₀	0.004	0.001	2	40	40.05	0.02	0.00
1A2c	PM ₁₀	0.002	0.004	2	40	40.05	0.07	0.02
1A2d	PM ₁₀	0.001	0.001	2	40	40.05	0.01	0.00
1A2e	PM ₁₀	0.013	0.020	2	40	40.05	0.38	0.12
1A2f	PM ₁₀	0.277	0.130	2	0	2.00	0.12	0.08
1A2gvii	PM ₁₀	0.027	0.009	0	0	0.00	0.00	0.00
1A2gviii	PM ₁₀	0.020	0.009	2	40	40.05	0.17	0.01
1A3ai(i)	PM ₁₀	0.003	0.004	1	200	200.00	0.35	0.10
1A3a(ii)	PM ₁₀	0.000	0.000	1	200	200.00	0.00	0.00
1A3bi	PM ₁₀	0.112	0.030	1	30	30.02	0.42	0.13
1A3bii	PM ₁₀	0.447	0.084	1	30	30.02	1.19	0.72
1A3biii	PM ₁₀	0.167	0.053	1	30	30.02	0.75	0.13
1A3biv	PM ₁₀	0.021	0.008	1	30	30.02	0.11	0.01
1A3bvi	PM ₁₀	0.157	0.185	1	0	1.00	0.09	0.05
1A3bvii	PM ₁₀	0.061	0.078	100	0	100.00	3.69	2.32
1A3dii	PM ₁₀	0.002	0.003	1	200	200.00	0.32	0.09
1A4bi	PM ₁₀	0.045	0.055	1	200	200.00	5.24	1.48
1A4ci	PM ₁₀	0.019	0.021	1	100	100.00	0.99	0.26
1A4cii	PM ₁₀	0.021	0.015	1	100	100.00	0.72	0.13
1A4ciii	PM ₁₀	0.006	0.003	1	100	100.00	0.14	0.00
1A5b	PM ₁₀	0.001	0.009	1	100	100.00	0.44	0.18
2A1	PM ₁₀	0.334	0.083	1	200	200.00	7.87	2.73

Table 162: PM₁₀ emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
2A2	PM ₁₀	0.021	0.021	1	200	200.00	2.00	0.49
2A5a	PM ₁₀	0.536	0.224	10	200	200.25	21.23	0.87
2A5b	PM ₁₀	0.151	0.222	100	200	223.61	23.51	9.28
2A5c	PM ₁₀	0.058	0.046	50	200	206.16	4.49	1.09
2D3b	PM ₁₀	0.846	0.001	50	20	53.85	0.02	1.57
2D3c	PM ₁₀	0.084	0.033	50	20	53.85	0.85	0.50
2G	PM ₁₀	0.293	0.037	0	0	0.00	0.00	0.00
3B1a	PM ₁₀	0.015	0.022	2	150	150.01	1.56	0.49
3B1b	PM ₁₀	0.004	0.005	2	150	150.01	0.38	0.11
3B2	PM ₁₀	0.001	0.001	2	150	150.01	0.05	0.02
3B3	PM ₁₀	0.158	0.129	2	150	150.01	9.18	1.87
3B4d	PM ₁₀	0.001	0.001	2	150	150.01	0.04	0.01
3B4e	PM ₁₀	0.000	0.000	2	150	150.01	0.00	0.00
3B4f	PM ₁₀	0.000	0.000	2	150	150.01	0.00	0.00
3B4gi	PM ₁₀	0.040	0.044	2	150	150.01	3.15	0.85
3B4gii	PM ₁₀	0.145	0.103	2	150	150.01	7.31	1.22
3B4giii	PM ₁₀	0.008	0.001	2	150	150.01	0.10	0.06
3Dc	PM ₁₀	0.080	0.036	10	0	10.00	0.17	0.11
3F	PM ₁₀	0.088	0.008	100	200	223.61	0.83	1.33
5A	PM ₁₀	0.000	0.000	10	50	50.99	0.00	0.00
5C1bv	PM ₁₀	0.003	0.000	2	50	50.04	0.00	0.02
5C2	PM ₁₀	0.003	0.003	100	50	111.80	0.17	0.10
5E	PM ₁₀	0.028	0.022	100	50	111.80	1.16	0.66
Total		4.766	2.115				100.956	29.518

Table 163: TSP emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A3bvii	TSP	0.121	0.156	100	0	100.00	4.64	2.36
3Dc	TSP	0.080	0.036	10	0	10.00	0.11	0.05
1A1a	TSP	0.594	0.457	0	10	10.00	1.36	0.26
2A5a	TSP	1.093	0.432	10	200	200.25	25.71	1.05
1A3bvi	TSP	0.204	0.242	1	0	1.00	0.07	0.04
5A	TSP	0.000	0.000	10	50	50.99	0.00	0.00
2A5b	TSP	0.508	0.750	100	200	223.61	49.83	16.60
3B3	TSP	0.354	0.291	2	150	150.01	12.96	2.62
2D3c	TSP	0.451	0.179	50	20	53.85	2.86	1.35
1A3bii	TSP	0.447	0.084	1	30	30.02	0.75	0.25
1A2f	TSP	0.286	0.130	2	0	2.00	0.08	0.04
3B4gii	TSP	0.145	0.103	2	150	150.01	4.59	0.82
2A1	TSP	0.371	0.084	1	200	200.00	4.98	1.06
1A3biii	TSP	0.167	0.053	1	30	30.02	0.47	0.02
1A4bi	TSP	0.047	0.058	1	200	200.00	3.43	0.87
1A3bi	TSP	0.112	0.030	1	30	30.02	0.27	0.03
2A5c	TSP	0.117	0.092	50	200	206.16	5.64	1.28
2G	TSP	0.294	0.038	0	0	0.00	0.00	0.00
3B4gi	TSP	0.041	0.046	2	150	150.01	2.05	0.50
2A2	TSP	0.055	0.054	1	200	200.00	3.24	0.74
1A2e	TSP	0.013	0.020	2	40	40.05	0.24	0.07
3B1a	TSP	0.032	0.048	2	150	150.01	2.15	0.59
1A3dii	TSP	0.002	0.003	1	200	200.00	0.20	0.05
1A4cii	TSP	0.021	0.015	1	100	100.00	0.45	0.08

Table 163: TSP emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A4ci	TSP	0.019	0.021	1	100	100.00	0.62	0.15
3F	TSP	0.090	0.008	100	200	223.61	0.53	0.53
3B1b	TSP	0.009	0.012	2	150	150.01	0.52	0.13
1A5b	TSP	0.001	0.009	1	100	100.00	0.28	0.10
1A2c	TSP	0.002	0.004	2	40	40.05	0.04	0.01
1A3biv	TSP	0.021	0.008	1	30	30.02	0.07	0.00
1A3ai(i)	TSP	0.003	0.004	1	200	200.00	0.22	0.06
1A2gvii	TSP	0.027	0.009	0	0	0.00	0.00	0.00
1A2b	TSP	0.004	0.001	2	40	40.05	0.01	0.00
5C2	TSP	0.003	0.003	100	50	111.80	0.11	0.05
1A2gviii	TSP	0.020	0.009	2	40	40.05	0.11	0.01
2D3b	TSP	3.664	0.003	50	20	53.85	0.05	2.80
3B2	TSP	0.001	0.002	2	150	150.01	0.08	0.02
3B4giii	TSP	0.008	0.001	2	150	150.01	0.06	0.02
3B4d	TSP	0.002	0.001	2	150	150.01	0.06	0.01
1A2d	TSP	0.001	0.001	2	40	40.05	0.01	0.00
3B4e	TSP	0.000	0.000	2	150	150.01	0.00	0.00
3B4f	TSP	0.000	0.000	2	150	150.01	0.00	0.00
1A3aii(i)	TSP	0.000	0.000	1	200	200.00	0.00	0.00
5E	TSP	0.028	0.022	100	50	111.80	0.73	0.34
1A4ciii	TSP	0.006	0.003	1	100	100.00	0.09	0.01
5C1bv	TSP	0.005	0.000	2	50	50.04	0.00	0.01
Total		9.349	3.365				125.016	32.642

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Table 164: BC emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	BC	0.016	0.013	0	10	10.00	0.55	0.11
1A2b	BC	0.002	0.001	2	40	40.05	0.11	0.01
1A2c	BC	0.001	0.001	2	40	40.05	0.25	0.07
1A2d	BC	0.001	0.000	2	40	40.05	0.07	0.01
1A2e	BC	0.007	0.010	2	40	40.05	1.70	0.46
1A2f	BC	0.070	0.033	2	0	2.00	0.28	0.15
1A2gvii	BC	0.017	0.006	0	0	0.00	0.00	0.00
1A2gviii	BC	0.011	0.005	2	40	40.05	0.89	0.07
1A3bi	BC	0.067	0.020	1	30	30.02	2.55	0.25
1A3bii	BC	0.272	0.063	1	30	30.02	8.19	1.84
1A3biii	BC	0.088	0.035	1	30	30.02	4.48	0.12
1A3biv	BC	0.004	0.002	1	30	30.02	0.20	0.00
1A3bvi	BC	0.008	0.010	1	0	1.00	0.04	0.02
1A3bvii	BC	0.001	0.002	100	0	100.00	0.72	0.38
1A3dii	BC	0.002	0.004	1	200	200.00	3.23	0.99
1A4bi	BC	0.004	0.005	1	200	200.00	4.58	1.18
1A4ci	BC	0.009	0.010	1	100	100.00	4.34	1.07
1A4cii	BC	0.012	0.009	1	100	100.00	3.82	0.70
1A4ciii	BC	0.002	0.001	1	100	100.00	0.38	0.03
2A1	BC	0.006	0.002	1	200	200.00	1.35	0.16
2A2	BC	0.000	0.000	1	200	200.00	0.02	0.00
2D3b	BC	0.011	0.000	50	20	53.85	0.00	0.13
2D3c	BC	0.000	0.000	50	20	53.85	0.00	0.00
2G	BC	0.001	0.000	0	0	0.00	0.00	0.00

Table 164: BC emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
3F	BC	0.008	0.001	100	200	223.61	0.67	0.72
5C2	BC	0.001	0.001	100	50	111.80	0.61	0.30
Total		0.622	0.231				39.025	8.760

Table 165: CO emission Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	CO	0.342	0.378	0	10	10.00	0.35	0.07
1A2a	CO	0.000	0.000	2	40	40.05	0.00	0.00
1A2b	CO	0.011	0.004	2	40	40.05	0.01	0.00
1A2c	CO	0.004	0.013	2	40	40.05	0.05	0.01
1A2d	CO	0.002	0.002	2	40	40.05	0.01	0.00
1A2e	CO	0.030	0.069	2	40	40.05	0.25	0.06
1A2f	CO	1.893	2.244	2	0	2.00	0.41	0.15
1A2gvii	CO	0.133	0.047	0	0	0.00	0.00	0.00
1A2gviii	CO	0.064	0.031	2	40	40.05	0.11	0.01
1A3ai(i)	CO	0.122	0.284	1	200	200.00	5.26	1.17
1A3aii(i)	CO	0.003	0.000	1	200	200.00	0.01	0.00
1A3bi	CO	26.974	4.306	1	30	30.02	11.95	1.64
1A3bii	CO	5.898	0.833	1	30	30.02	2.31	0.44
1A3biii	CO	0.984	0.632	1	30	30.02	1.75	0.27
1A3biv	CO	3.788	1.038	1	30	30.02	2.88	0.08
1A3dii	CO	0.014	0.016	1	200	200.00	0.30	0.06
1A4bi	CO	0.564	0.531	1	200	200.00	9.82	1.80
1A4ci	CO	0.048	0.093	1	100	100.00	0.86	0.19
1A4cii	CO	0.071	0.091	1	100	100.00	0.84	0.17
1A4ciii	CO	0.015	0.014	1	100	100.00	0.13	0.02
2D3c	CO	0.002	0.001	50	20	53.85	0.01	0.00
2G	CO	0.211	0.059	0	0	0.00	0.00	0.00
3F	CO	2.301	0.092	100	200	223.61	1.91	2.22
5C2	CO	0.026	0.040	100	50	111.80	0.41	0.14

Table 165: CO emission Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
Total		43.566	10.819				39.634	8.476

Table 166: Pb emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	Pb	0.103	0.093	0	10	10.00	2.31	0.04
1A2a	Pb	0.000	0.000	2	40	40.05	0.00	0.00
1A2b	Pb	0.000	0.000	2	40	40.05	0.00	0.00
1A2c	Pb	0.000	0.000	2	40	40.05	0.04	0.00
1A2d	Pb	0.000	0.000	2	40	40.05	0.00	0.00
1A2e	Pb	0.000	0.001	2	40	40.05	0.09	0.00
1A2f	Pb	0.122	0.029	2	0	2.00	0.15	0.00
1A2gviii	Pb	0.000	0.000	2	40	40.05	0.02	0.00
1A3bi	Pb	21.175	0.001	1	30	30.02	0.04	0.41
1A3bii	Pb	2.294	0.000	1	30	30.02	0.01	0.04
1A3biii	Pb	0.027	0.000	1	30	30.02	0.00	0.00
1A3biv	Pb	0.994	0.000	1	30	30.02	0.00	0.02
1A3bvi	Pb	0.139	0.261	1	0	1.00	0.65	0.01
1A3dii	Pb	0.000	0.000	1	200	200.00	0.06	0.00
1A4bi	Pb	0.003	0.002	1	200	200.00	0.81	0.01
1A4ci	Pb	0.004	0.008	1	100	100.00	1.98	0.03
1A4ciii	Pb	0.000	0.000	1	100	100.00	0.06	0.00
2G	Pb	0.003	0.007	0	0	0.00	0.00	0.00
3F	Pb	0.004	0.000	100	200	223.61	0.08	0.00
5C2	Pb	0.000	0.000	100	50	111.80	0.10	0.00
5E	Pb		0.000	100	50	111.80	0.02	
Total		24.908	0.403				6.415	0.580

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Table 167: Cd emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A3dii	Cd	0.000	0.000	1	200	200.00	0.10	0.04
1A4ciii	Cd	0.000	0.000	1	100	100.00	0.06	0.01
1A1a	Cd	0.027	0.024	0	10	10.00	7.29	1.57
1A2f	Cd	0.010	0.002	2	0	2.00	0.15	0.08
1A3bi	Cd	0.000	0.000	1	30	30.02	0.06	0.02
2G	Cd	0.005	0.001	0	0	0.00	0.00	0.00
3F	Cd	0.030	0.001	100	200	223.61	8.38	25.95
1A4bi	Cd	0.001	0.001	1	200	200.00	4.73	0.64
1A3bvi	Cd	0.001	0.001	1	0	1.00	0.04	0.02
1A3biii	Cd	0.000	0.000	1	30	30.02	0.00	0.00
1A3bii	Cd	0.000	0.000	1	30	30.02	0.01	0.00
1A2c	Cd	0.000	0.000	2	40	40.05	0.24	0.09
1A2e	Cd	0.000	0.000	2	40	40.05	0.51	0.20
1A4cii	Cd	0.000	0.000	1	100	100.00	0.24	0.07
5C2	Cd	0.000	0.000	100	50	111.80	0.25	0.13
1A3biv	Cd	0.001	0.000	1	30	30.02	0.42	0.06
1A2gvii	Cd	0.000	0.000	0	0	0.00	0.00	0.00
1A4ci	Cd	0.000	0.000	1	100	100.00	0.46	0.14
1A2b	Cd	0.000	0.000	2	40	40.05	0.00	0.00
1A2gviii	Cd	0.000	0.000	2	40	40.05	0.13	0.05
1A2d	Cd	0.000	0.000	2	40	40.05	0.00	0.00
1A2a	Cd	0.000	0.000	2	40	40.05	0.00	0.00
Total		0.083	0.032				23.345	29.024

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Table 168: Hg emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	Hg	0.008	0.008	0	10	10.00	2.66	0.54
1A2a	Hg	0.000	0.000	2	40	40.05	0.00	0.00
1A2b	Hg	0.000	0.000	2	40	40.05	0.01	0.00
1A2c	Hg	0.000	0.000	2	40	40.05	0.02	0.01
1A2d	Hg	0.000	0.000	2	40	40.05	0.01	0.00
1A2e	Hg	0.000	0.000	2	40	40.05	0.16	0.04
1A2f	Hg	0.061	0.015	2	0	2.00	1.04	0.42
1A2gviii	Hg	0.000	0.000	2	40	40.05	0.07	0.01
1A3bi	Hg	0.001	0.003	1	30	30.02	3.43	0.86
1A3bii	Hg	0.001	0.001	1	30	30.02	0.78	0.17
1A3biii	Hg	0.000	0.001	1	30	30.02	0.58	0.13
1A3biv	Hg	0.000	0.000	1	30	30.02	0.07	0.01
1A3dii	Hg	0.000	0.000	1	200	200.00	0.19	0.04
1A4bi	Hg	0.000	0.001	1	200	200.00	5.41	1.31
1A4ci	Hg	0.000	0.000	1	100	100.00	0.35	0.09
1A4ciii	Hg	0.000	0.000	1	100	100.00	0.20	0.04
2G	Hg	0.000	0.000	0	0	0.00	0.00	0.00
3F	Hg	0.005	0.000	100	200	223.61	1.53	2.41
Total		0.099	0.028				17.004	6.070

Table 169: PCCD/PCCF emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	PCDD-PCDF	0.057	0.088	0	10	10.00	1.54	0.05
1A2a	PCDD-PCDF	0.000	0.000	2	40	40.05	0.00	0.00
1A2b	PCDD-PCDF	0.000	0.000	2	40	40.05	0.01	0.00
1A2c	PCDD-PCDF	0.000	0.002	2	40	40.05	0.11	0.00
1A2d	PCDD-PCDF	0.000	0.000	2	40	40.05	0.00	0.00
1A2e	PCDD-PCDF	0.001	0.004	2	40	40.05	0.29	0.01
1A2f	PCDD-PCDF	0.006	0.007	2	0	2.00	0.02	0.00
1A2gviii	PCDD-PCDF	0.001	0.001	2	40	40.05	0.09	0.00
1A3bi	PCDD-PCDF	0.064	0.078	1	30	30.02	4.09	0.13
1A3bii	PCDD-PCDF	0.007	0.060	1	30	30.02	3.12	0.10
1A3biii	PCDD-PCDF	0.019	0.028	1	30	30.02	1.49	0.05
1A3biv	PCDD-PCDF	0.003	0.003	1	30	30.02	0.15	0.00
1A3dii	PCDD-PCDF	0.000	0.000	1	200	200.00	0.04	0.00
1A4bi	PCDD-PCDF	0.090	0.063	1	200	200.00	22.03	0.69
1A4ci	PCDD-PCDF	0.001	0.006	1	100	100.00	1.04	0.03
1A4ciii	PCDD-PCDF	0.000	0.000	1	100	100.00	0.04	0.00
2G	PCDD-PCDF	0.000	0.000	0	0	0.00	0.00	0.00
3F	PCDD-PCDF	0.022	0.001	100	200	223.61	0.34	0.01
5C2	PCDD-PCDF	0.005	0.007	100	50	111.80	1.40	0.06
5E	PCDD-PCDF	0.010	0.224	100	50	111.80	43.74	1.92
Total		17.489	0.573				79.542	3.068

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Table 170: PAHs emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Mg	Mg	%	%	%	%	%
1A1a	PAHs	0.000	0.001	0	10	10.00	0.01	0.00
1A2b	PAHs	0.003	0.001	2	40	40.05	0.07	0.00
1A2c	PAHs	0.001	0.002	2	40	40.05	0.13	0.01
1A2d	PAHs	0.001	0.001	2	40	40.05	0.04	0.00
1A2e	PAHs	0.009	0.017	2	40	40.05	1.01	0.05
1A2f	PAHs	0.014	0.010	2	0	2.00	0.03	0.00
1A2gvii	PAHs	0.002	0.001	0	0	0.00	0.00	0.00
1A2gviii	PAHs	0.019	0.008	2	40	40.05	0.51	0.02
1A3bi	PAHs	0.008	0.016	1	30	30.02	0.73	0.03
1A3bii	PAHs	0.007	0.011	1	30	30.02	0.50	0.02
1A3biii	PAHs	0.004	0.007	1	30	30.02	0.33	0.02
1A3biv	PAHs	0.000	0.000	1	30	30.02	0.01	0.00
1A4bi	PAHs	0.035	0.022	1	200	200.00	6.64	0.29
1A4ci	PAHs	0.000	0.000	1	100	100.00	0.00	0.00
1A4cii	PAHs	0.001	0.001	1	100	100.00	0.16	0.01
2G	PAHs	0.001	0.000	0	0	0.00	0.00	0.00
3F	PAHs	13.641	0.547	100	200	223.61	187.13	5.81
5C2	PAHs	0.006	0.009	100	50	111.80	1.55	0.10
Total		13.754	0.654				198.861	6.367

Table 171: HCB emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Kg	Kg	%	%	%	%	%
1A2f	HCB	0.006	0.007	2	0	2.00	0.60	0.40
1A3bi	HCB	0.000	0.000	1	30	30.02	0.10	0.03
1A3bii	HCB	0.000	0.000	1	30	30.02	0.08	0.03
1A3biii	HCB	0.000	0.000	1	30	30.02	0.03	0.01
1A3biv	HCB	0.000	0.000	1	30	30.02	0.00	0.00
1A3dii	HCB	0.000	0.000	1	200	200.00	0.55	0.26
1A4bi	HCB	0.000	0.000	1	200	200.00	0.00	0.00
1A4ci	HCB	0.000	0.000	1	100	100.00	0.00	0.00
1A4ciii	HCB	0.000	0.000	1	100	100.00	0.67	0.15
Total		0.049	0.023				9.213	0.891

Table 172: PCBs emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Kg	Kg	%	%	%	%	%
1A2f	PCBs	0.026	0.031	2	0	2.00	1.77	2.53
1A3bi	PCBs	0.000	0.000	1	30	30.02	0.01	0.00
1A3bii	PCBs	0.000	0.000	1	30	30.02	0.01	0.00
1A3biii	PCBs	0.000	0.000	1	30	30.02	0.00	0.00
1A3biv	PCBs	0.000	0.000	1	30	30.02	0.00	0.00
1A3dii	PCBs	0.000	0.000	1	200	200.00	0.19	0.04

Table 172: PCBs emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2019 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2019	Uncertainty introduced into the trend in total national emissions
		Kg	Kg	%	%	%	%	%
1A4bi	PCBs	0.000	0.000	1	200	200.00	0.00	0.00
1A4ci	PCBs	0.000	0.000	1	100	100.00	0.00	0.00
1A4ciii	PCBs	0.000	0.000	1	100	100.00	0.21	0.02
Total		0.034	0.035				6.105	2.606

Annex 5: Cyprus Energy Balance 2019

Annex 5

Cyprus Energy Balance 2019

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Energy balance for the year 2019 in toe

	Crude oil	LPG	Unleaded 95	Unleaded 98	Unleaded 100	ATF	Kerosene	Diesel S 10 ppm	Biofuels	Gas oil S 0.1%	Marine gas oil	LFO S31%	LFO S4%	HFO S51%	HFO S4%	Electricity from Conventional Fuels	Heating from CHP (Conventional Fuels)	Used Oils	Bitumen	Pet-coke	Coal	Tyres and other fuels	Solar Thermal	Geothermal	Biomass	Electricity fom Biomass	Heating from CHP (Biomass)	Electricity fom wind	Electricity from PV Systems	Total	
Production of primary energy									0									0				4545	73029	1551	26233	4889	5448	20517	21354	157566	
Net imports	0	72501	325997	27895	0	301205	21058	370405	11638	366283	129547	22255	0	750394	8410	0			33700	52936	20121	27490			31395					2573230	
Change stocks	0	-6784	-1754	-1957	0	1727	-5741	-10271	-178	-1518	0	-612	0	-2541	293	0		0		-11261	-2956	-1274	0	0	-1314	0					-46141
Bunkers									0	-718	-129547	0	0	0	0																-130265
Primary Consumption	0	65717	324243	25938	0	302932	15317	360134	11460	364047	0	21643	0	747853	8703	0	0	0	33700	41675	17165	30761	73029	1551	56314	4889	5448	20517	21354	2554390	
Energy Conversion-Electricity								0		-267002				-747853	-34	358794															-656095
Non energy use																			-33700				0								-33700
Occupied area by Turkish army																-5															-5
Final consumption	0	65717	324243	25938	0	302932	15317	360134	11460	97045	0	21643	0	0	8669	358789	0	0	0	41675	17165	30761	73029	1551	56314	4889	5448	20517	21354	1864590	
Selective consumers																															
Cement industry												723			0		0	0		41675	17165	30761			25413						115737
Road transport			324243	25938	0			330937	11460																						692578
Air transport						302931																									302931
Households (Heating)		36801					13019			45611													62075	1551	22370					5971	187398
Agriculture		1314						24533																		1641	5448				32936
Industry		6572						4664		12616		18756			8669		0								3206						54483
Commerce, Hotels & Services		21029					2298			38818		2164											10954			5325			37	6	80630
Electricity from RES fed to the Grid																										3248		20480	15378		39106

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[Annex 6: Annex IV – Table 1](#)

Annex 6

NFR Sector Emissions 2019 (Template Annex IV-Table 1)

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TABLE IV 1-12: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants

[illegible]

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TABLE IV 2-12: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants

[illegible]

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TABLE IV 3-12: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants

[illegible]

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TABLE IV 4-12: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants

NFR sectors to be reported		Main Pollutants (from 1990)				Particulate Matter (from 2000)				Other (from 1990)	Priority Heavy Metals (from 1990)			Additional Heavy Metals (from 1990, voluntary reporting)					
		NOx (as NO ₂)	NM VOC	SOx (as SO ₂)	NH ₃	PM _{2.5}	PM ₁₀	TSP	BC		CO	Pb	Cd	Hg	As	Cr	Cu	Ni	Se
NFR Code	Longname	kt	kt	kt	kt	kt	kt	kt	kt	kt	t	t	t	t	t	t	t	t	t
2D3h	Printing	NA	0.2458	NA	NA	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2D3i	Other solvent use (please specify in the IIR)	NE	0.8132	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2G	Other product use (please specify in the IIR)	0.0019	0.0051	0.0003	0.0044	0.0330	0.0371	0.0380	0.0001	0.0590	0.0067	0.0015	0.0000	0.0001	0.0013	0.0435	0.0054	NE	0.0250
2H1	Pulp and paper industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2H2	Food and beverages industry	NA	0.1655	NA	NA	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2H3	Other industrial processes (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2I	Wood processing	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2J	Production of POPs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2L	Other production, consumption, storage, transportation or handling of bulk products	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3B1a	Manure management - Dairy cattle	0.0083	0.6555	NA	0.7032	0.0144	0.0221	0.0481	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B1b	Manure management - Non-dairy cattle	0.0015	0.1525	NA	0.4182	0.0035	0.0054	0.0116	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B2	Manure management - Sheep	0.0008	0.0292	NA	0.1673	0.0002	0.0007	0.0019	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B3	Manure management - Swine	0.0134	0.2480	NA	1.3409	0.0244	0.1295	0.2906	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B4a	Manure management - Buffalo	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3B4d	Manure management - Goats	0.0006	0.0170	NA	0.1442	0.0002	0.0006	0.0014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B4e	Manure management - Horses	0.0000	0.0024	NA	0.0014	0.0000	0.0000	0.0001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B4f	Manure management - Mules and asses	0.0000	0.0007	NA	0.0007	0.0000	0.0000	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B4gi	Manure mangement - Laying hens	0.0013	0.0510	NA	0.1648	0.0080	0.0445	0.0460	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B4gii	Manure mangement - Broilers	0.0037	0.2477	NA	0.0573	0.0136	0.1030	0.1030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B4giii	Manure mangement - Turkeys	0.0001	0.0034	NA	0.0015	0.0002	0.0014	0.0014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B4giv	Manure management - Other poultry	NO	NO	NO	0.0000	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3B4h	Manure management - Other animals (please specify in IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3Da1	Inorganic N-fertilizers (includes also urea application)	0.2257	NA	NA	0.3582	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3Da2a	Animal manure applied to soils	0.6919	NA	NA	3.0406	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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TABLE IV 5-12: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants

<i>NFR sectors to be reported</i>		Main Pollutants (from 1990)				Particulate Matter (from 2000)				Other (from 1990)	Priority Heavy Metals (from 1990)			Additional Heavy Metals (from 1990, voluntary reporting)					
		NO _x (as NO ₂)	NM VOC	SO _x (as SO ₂)	NH ₃	PM _{2.5}	PM ₁₀	TSP	BC	CO	Pb	Cd	Hg	As	Cr	Cu	Ni	Se	Zn
NFR Code	Longname	kt	kt	kt	kt	kt	kt	kt	kt	kt	t	t	t	t	t	t	t	t	t
3Da2b	Sewage sludge applied to soils	0.0018	NA	NA	0.0060	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3Da2c	Other organic fertilisers applied to soils (including compost)	0.0011	NE	NE	0.0003	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
3Da3	Urine and dung deposited by grazing animals	0.1124	NA	NE	0.1535	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3Da4	Crop residues applied to soils	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
3Db	Indirect emissions from managed soils	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	NA	NA	NA	NA	0.0014	0.0360	0.0360	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3Dd	Off-farm storage, handling and transport of bulk agricultural products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3De	Cultivated crops	NA	0.0198	NA	NA	NO	NO	NO	NO	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3Df	Use of pesticides	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3F	Field burning of agricultural residues	0.0032	0.0007	0.0007	0.0033	0.0075	0.0079	0.0080	0.0007	0.0923	0.0002	0.0012	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0008
3I	Agriculture other (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5A	Biological treatment of waste - Solid waste disposal on land	NA	0.3158	NA	NE	0.0000	0.0001	0.0002	NA	NE	NA	NA	NE	NA	NA	NA	NA	NA	NA
5B1	Biological treatment of waste - Composting	NE	NE	NE	0.0073	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities	NA	NA	NA	0.0783	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5C1a	Municipal waste incineration	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5C1bi	Industrial waste incineration	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5C1bii	Hazardous waste incineration	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5C1biii	Clinical waste incineration	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5C1biv	Sewage sludge incineration	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5C1bv	Cremation	NE	NE	NE	NE	0.0000	0.0000	0.0000	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
5C1bvi	Other waste incineration (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5C2	Open burning of waste	0.0023	0.0009	0.0001	NE	0.0030	0.0032	0.0033	0.0013	0.0400	0.0004	0.0001	NE	0.0003	0.0000	0.0001	NE	0.0001	0.0126

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TABLE IV 6-12: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants

[illegible]

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TABLE IV 7-12: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants

[illegible]

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TABLE IV 8-12: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants

NFR sectors to be reported		POPs ⁽¹⁾ (from 1990)								Activity Data (from 1990)						
		PCDD/ PCDF (dioxins/ furans)	PAHs					HCB	PCBs	Liquid Fuels	Solid Fuels	Gaseous Fuels	Biomass	Other Fuels	Other activity (specified)	Other Activity Units
			benzo(a) pyrene	benzo(b) fluoranthene	benzo(k) fluoranthene	Indeno (1,2,3- cd) pyrene	Total 1-4									
NFR Code	Longname	g I-TEQ	t	t	t	t	t	kg	kg	TJ NCV	TJ NCV	TJ NCV	TJ NCV	TJ NCV		
1A4ai	Commercial/institutional: Stationary	IE	IE	IE	IE	IE	IE	IE	IE	IE	NA	NO	NA	NA	NA	TJ NCV
1A4aii	Commercial/institutional: Mobile	IE	IE	IE	IE	IE	IE	IE	IE	IE	NO	NO	NO	NO	NA	TJ NCV
1A4bi	Residential: Stationary	0.0631	0.0074	0.0067	0.0028	0.0048	0.0217	0.0000	0.0000	4176	NO	NO	92	NO	NA	TJ NCV
1A4bii	Residential: Household and gardening (mobile)	IE	IE	IE	IE	IE	IE	IE	IE	IE	NO	NO	IE	NO	NA	TJ NCV
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.0060	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1015	NO	NO	NO	NO	NA	TJ NCV
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	NE	0.0002	0.0004	0.0003	0.0001	0.0011	NA	NA	338	NA	NA	NO	NE	NA	TJ NCV
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.0002	NE	NE	NE	NE	NE	0.0002	0.0001	38	NA	NA	NA	NA	NA	TJ NCV
1A5a	Other stationary (including military)	IE	IE	IE	IE	IE	IE	IE	IE	IE	NA	NA	NA	NA	NA	TJ NCV
1A5b	Other, Mobile (including military, land based and recreational boats)	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	271	Number of Vessels called at ports
1B1a	Fugitive emission from solid fuels: Coal mining and handling	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Coal produced [Mt]
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Coal used for transformation [Mt]
1B1c	Other fugitive emissions from solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
1B2ai	Fugitive emissions oil: Exploration, production, transport	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Crude oil produced [Mt]
1B2aiv	Fugitive emissions oil: Refining / storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Crude oil refined [Mt]
1B2av	Distribution of oil products	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	Oil consumed [Mt]
1B2b	Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Gas throughput [TJ]
1B2c	Venting and flaring (oil, gas, combined oil and gas)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Gas vented flared [TJ]
1B2d	Other fugitive emissions from energy production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
2A1	Cement production	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	1499	Clinker produced [kt]
2A2	Lime production	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6	Lime produced [kt]
2A3	Glass production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Glass produced [kt]
2A5a	Quarrying and mining of minerals other than coal	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8439	Material quarried [kt]
2A5b	Construction and demolition	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8275	Floor space constructed/demolished [m2]
2A5c	Storage, handling and transport of mineral products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7671	Amount [kt]
2A6	Other mineral products (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR

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TABLE IV 9-12: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants																
NFR sectors to be reported		POPs ⁽¹⁾ (from 1990)								Activity Data (from 1990)						
		PCDD/ PCDF (dioxins/ furans)	PAHs					HCB	PCBs	Liquid Fuels	Solid Fuels	Gaseous Fuels	Biomass	Other Fuels	Other activity (specified)	Other Activity Units
			benzo(a) pyrene	benzo(b) fluoranthene	benzo(k) fluoranthene	Indeno (1,2,3- cd) pyrene	Total 1-4									
NFR Code	Longname	g I-TEQ	t	t	t	t	t	kg	kg	TJ NCV	TJ NCV	TJ NCV	TJ NCV	TJ NCV		
2B1	Ammonia production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Ammonia produced [kt]
2B2	Nitric acid production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Nitric acid produced [kt]
2B3	Adipic acid production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Adipic acid produced [kt]
2B5	Carbide production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Carbide produced [kt]
2B6	Titanium dioxide production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Titanium dioxide produced [kt]
2B7	Soda ash production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Soda ash produced [kt]
2B10a	Chemical industry: Other (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
2B10b	Storage, handling and transport of chemical products (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
2C1	Iron and steel production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Steel produced [kt]
2C2	Ferroalloys production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Ferroalloys produced [kt]
2C3	Aluminium production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Aluminium produced [kt]
2C4	Magnesium production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Magnesium produced [kt]
2C5	Lead production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Lead produced [kt]
2C6	Zinc production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Zinc produced [kt]
2C7a	Copper production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Copper produced [kt]
2C7b	Nickel production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Nickel produced [kt]
2C7c	Other metal production (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
2C7d	Storage, handling and transport of metal products (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Amount (kt)
2D3a	Domestic solvent use including fungicides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	888000	Population
2D3b	Road paving with asphalt	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	223	Asphalt Production [kt]
2D3c	Asphalt roofing	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	112	Shingle(kt)
2D3d	Coating applications	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	14	Paint applied [kt]
2D3e	Degreasing	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Solvents used [kt]
2D3f	Dry cleaning	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	Solvents used [kt]
2D3g	Chemical products	NE	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	4	Paint produced [kt]

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TABLE IV 10-12: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants																
NFR sectors to be reported		POPs ⁽¹⁾ (from 1990)								Activity Data (from 1990)						
		PCDD/ PCDF (dioxins/ furans)	PAHs					HCB	PCBs	Liquid Fuels	Solid Fuels	Gaseous Fuels	Biomass	Other Fuels	Other activity (specified)	Other Activity Units
			benzo(a) pyrene	benzo(b) fluoranthene	benzo(k) fluoranthene	Indeno (1,2,3- cd) pyrene	Total 1-4									
NFR Code	Longname	g I-TEQ	t	t	t	t	t	kg	kg	TJ NCV	TJ NCV	TJ NCV	TJ NCV	TJ NCV		
2D3h	Printing	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5	Printing ink used [kt]
2D3i	Other solvent use (please specify in the IIR)	NE	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	1.6	glue used [kt]
2G	Other product use (please specify in the IIR)	0.0001	0.0001	0.0000	0.0000	0.0000	0.0003	NE	NE	NA	NA	NA	NA	NA	1.1	Tobacco combustion kt]
2H1	Pulp and paper industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Pulp production [kt]
2H2	Food and beverages industry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	153	Bread, Wine, Beer, Spirits production [kt]
2H3	Other industrial processes (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
2I	Wood processing	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
2J	Production of POPs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Please specify and/or provide details in the IIR
2L	Other production, consumption, storage, transportation or handling of bulk products (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
3B1a	Manure management - Dairy cattle	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	35	Population size (1000 head)
3B1b	Manure management - Non-dairy cattle	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	39	Population size (1000 head)
3B2	Manure management - Sheep	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	324	Population size (1000 head)
3B3	Manure management - Swine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	313	Population size (1000 head)
3B4a	Manure management - Buffalo	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Population size (1000 head)
3B4d	Manure management - Goats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	251	Population size (1000 head)
3B4e	Manure management - Horses	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.8	Population size (1000 head)
3B4f	Manure management - Mules and asses	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5	Population size (1000 head)
3B4gi	Manure management - Laying hens	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	618	Population size (1000 head)
3B4gii	Manure management - Broilers	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2986	Population size (1000 head)
3B4giii	Manure management - Turkeys	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12	Population size (1000 head)
3B4giv	Manure management - Other poultry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Population size (1000 head)
3B4h	Manure management - Other animals (please specify in IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Population size (1000 head)
3Da1	Inorganic N-fertilizers (includes also urea application)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3679100	Use of inorganic fertilizers (kg N)
3Da2a	Animal manure applied to soils	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.6	solid application (kt)

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TABLE IV 11-12: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants																
NFR sectors to be reported		POPs ⁽¹⁾ (from 1990)								Activity Data (from 1990)						
		PCDD/ PCDF (dioxins/ furans)	PAHs					HCB	PCBs	Liquid Fuels	Solid Fuels	Gaseous Fuels	Biomass	Other Fuels	Other activity (specified)	Other Activity Units
			benzo(a) pyrene	benzo(b) fluoranthene	benzo(k) fluoranthene	Indeno (1,2,3- cd) pyrene	Total 1-4									
NFR Code	Longname	g I-TEQ	t	t	t	t	t	kg	kg	TJ NCV	TJ NCV	TJ NCV	TJ NCV	TJ NCV		
3Da2b	Sewage sludge applied to soils	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	888000	Population
3Da2c	Other organic fertilisers applied to soils (including compost)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	Please specify and/or provide details in the IIR
3Da3	Urine and dung deposited by grazing animals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.4	Urine (kt)
3Da4	Crop residues applied to soils	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	Please specify and/or provide details in the IIR
3Db	Indirect emissions from managed soils	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	Please specify and/or provide details in the IIR
3Dc	On-farm agricultural operations including storage, handling and transport of agricultural products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Please specify and/or provide details in the IIR
3Dd	Off-farm storage, handling and transport of bulk agricultural products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Please specify and/or provide details in the IIR
3De	Cultivated crops	NA	NA	NA	NA	NA	NA	NA	NA	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
3Df	Use of pesticides	NO	NO	NO	NO	NO	NO	0.0143	NO	NE	NE	NE	NE	NE	286	Use of pesticides (Kg)
3F	Field burning of agricultural residues	0.0009	0.0937	0.2618	0.1117	0.0802	0.5474	NE	NE	NA	NA	NA	NA	NA	23073	Area burned [ha]
3I	Agriculture other (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
5A	Biological treatment of waste - Solid waste disposal on land	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	379	Annual deposition of MSW at the SWDS [kt]
5B1	Biological treatment of waste - Composting	NA	NA	NA	NA	NA	NA	NA	NA	NO	NO	NO	NO	NO	NO	Organic domestic waste [kt]
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3	N in feedstock [kt]
5C1a	Municipal waste incineration	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Waste incinerated [kt]
5C1bi	Industrial waste incineration	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Waste incinerated [kt]
5C1bii	Hazardous waste incineration	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Waste incinerated [kt]
5C1biii	Clinical waste incineration	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Waste incinerated [kt]
5C1biv	Sewage sludge incineration	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Sludge incinerated [kt]
5C1bv	Cremation	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	Corpses [Number]
5C1bvi	Other waste incineration (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
5C2	Open burning of waste	0.0072	0.0017	0.0033	0.0041	NE	0.0091	NE	NA	NA	NA	NA	NA	NA	0.6	Amount of waste burned [kt]

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TABLE IV 12-12: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants

NFR sectors to be reported		POPs ⁽¹⁾ (from 1990)								Activity Data (from 1990)						
		PCDD/ PCDF (dioxins/ furans)	PAHs					HCB	PCBs	Liquid Fuels	Solid Fuels	Gaseous Fuels	Biomass	Other Fuels	Other activity (specified)	Other Activity Units
			benzo(a) pyrene	benzo(b) fluoranthene	benzo(k) fluoranthene	Indeno (1,2,3- cd) pyrene	Total 1-4									
NFR Code	Longname	g I-TEQ	t	t	t	t	t	kg	kg	TJ NCV	TJ NCV	TJ NCV	TJ NCV	TJ NCV		
5D1	Domestic wastewater handling	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	41462205	Waste water handled [m3/yr]
5D2	Industrial wastewater handling	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	Total organic product [kt DC]
5D3	Other wastewater handling	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Total organic product [kt DC]
5E	Other waste (please specify in IIR)	0.2242	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	544	Accidental cars, Detached house ,Undetached house , Attached house
6A	Other (included in national total for entire territory) (please specify in IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
NATIONAL TOTAL	National total for the entire territory (based on fuel sold)	0.5732	0.1149	0.3115	0.1317	0.0960	0.6541	0.0228	0.0350							
1A3bi(fu)	Road transport: Passenger cars (fuel used)	0.08	0.00	0.00	0.00	0.00	0.02	0.00	0.00	5564.11	NA	NA	112.78	NA	NA	TJ NCV
1A3bii(fu)	Road transport: Light duty vehicles (fuel used)	0.06	0.00	0.00	0.00	0.00	0.01	0.00	0.00	1573.78	NA	NE	186.45	NA	NA	TJ NCV
1A3biii(fu)	Road transport: Heavy duty vehicles and buses (fuel used)	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.00	1189.86	NA	NA	150.59	NA	NA	TJ NCV
1A3biv(fu)	Road transport: Mopeds & motorcycles (fuel used)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	106.14	NA	NE	NA	NA	NA	TJ NCV
1A3bv(fu)	Road transport: Gasoline evaporation (fuel used)	NA	NA	NA	NA	NA	NA	NA	NA	45.31	NA	NA	NA	NA	NA	TJ NCV
1A3bvi(fu)	Road transport: Automobile tyre and brake wear (fuel used)	NE	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	2611.40	Mileage [10^6 km]
1A3bvii(fu)	Road transport: Automobile road abrasion (fuel used)	NE	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	2611.40	Mileage [10^6 km]
ADJUSTMENTS	Sum of approved adjustments (negative value) from Annex VII (CLRTAP)															
COMPLIANCE TOTAL (CLRTAP)	National total for compliance calculations and checks (CLRTAP)	2.90	0.57	0.11	0.31	0.13	0.10	0.65	0.02	0						
ADJUSTMENTS AND FLEXIBILITIES	Sum of approved adjustments from Annex VII and other flexibilities (negative value) (NECD)															
COMPLIANCE TOTAL (NECD)	National total for compliance calculations and checks (NECD)	2.90	0.57	0.11	0.31	0.13	0.10	0.65	0.02	0						
MEMO ITEMS - NOT TO BE INCLUDED IN NATIONAL TOTALS																
1A3ai(ii)	International aviation cruise (civil)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	TJ NCV
1A3aii(ii)	Domestic aviation cruise (civil)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	TJ NCV
1A3di(i)	International maritime navigation	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	TJ NCV
1A5c	Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	
6B	Other not included in national total of the entire territory (please specify in the IIR)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	Please specify and/or provide details in the IIR
11A	Volcanoes	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify and/or provide details in the IIR
11B	Forest fires	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	Area of forest burned [ha]
11C	Other natural emissions (please specify in the IIR)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	Please specify and/or provide details in the IIR

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Review year of initial recommendation (number of years it has been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2019	RE, TC, or UPTC in 2020	Tier 1 used for Key Category
2017 (4)	CY-2D3a-2017-0001	Yes	2D3a Domestic Solvent use including Fungicides, NMVOC, 1990-2015	UPTC	UPTC	Yes
Assessment of the implementation of the initial recommendation The TERT notes with reference to the information provided in the IIR on sector 2D3a Domestic Solvent use including Fungicides and the information provided during the 2018 and 2019 review that a Tier 1 method is used for a key category. The TERT notes that using a Tier 1 method is not best practice and could result in an over- or under-estimate of emissions. This over- or under-estimate may have an impact on total emissions that is above the threshold of significance. Cyprus has not provided a revised estimate which has been accepted by the TERT. It is currently not possible for the TERT to provide a numerical emission estimate Tier 2 method, and therefore the issue will be flagged as Potential Technical Correction and will be assessed as a high priority item in future reviews. The TERT recommends that Cyprus should calculate NMVOC emissions from category 2D3a using a Tier 2 or Tier 3 method for inclusion in next years' inventory submission.						
Cyprus comments: The recommendation was not adopted this year. –We tried at the beginning to find the correct codes that the Custom Authorities uses and through these codes to find data from Statistical Service. We found some data but the time series is incomplete. The effort will be continued next years.						
Review year of initial recommendation (number of years it has been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2019	RE, TC, or UPTC in 2020	Tier 1 used for Key Category
2017 (4)	CY-3B-2017-0001	Yes	3B Manure Management, NH ₃ , 1990-2018	No	No	No
Assessment of the implementation of the initial recommendation For 3B Manure Management, for all livestock categories, for NH ₃ and NO _x emissions, for all years, the TERT noted that there is a lack of transparency regarding the correct implementation of the N-flow according to the Tier 2 methodology from EMEP. This does not relate to an over- or under-estimate of emissions. This was raised during the 2017, 2018 and 2019 NECD reviews. In response to a question raised during the review, Cyprus explained that they used the excel file provided with 2013 EMEP/EEA Guidebook. Cyprus also indicated that the calculations will be improved with the new excel template included in the 2019 EMEP/EEA Guidebook. The TERT recommends that Cyprus include more information in its IIR regarding the implementation of the N-flow, such as livestock numbers per manure management system (MMS) (%slurry, %solid stored, % solid directly spread, % pasture, % yard then stored as slurry, % yard then stored as solid...), N excretion per livestock category, N from straw, EF used and any other parameters used in the calculation for the N flow.						
Cyprus comments: The recommendation was adopted both in 2021 NFR and IIR 2021 (Please see in paragraph 14.1 of IIR).						
Review year of initial recommendation (number of years it has been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2019	RE, TC, or UPTC in 2020	Tier 1 used for Key Category
2020 (1)	CY-3B1a-2020-0001	Yes	3B1a Manure Management - Dairy Cattle, NMVOC, 1990-2018	N/A	No	No

Recommendation

For 3B1a Manure Management - Dairy cattle and NMVOC emissions for all years, the TERT noted that there is a lack of transparency regarding the calculation done and values of the different parameters used. This does not relate to an over- or under-estimate of emissions. In response to a question raised during the review, Cyprus indicated that a Tier 2 methodology is implemented for the whole period and provided the values of the different parameters used.

The TERT recommends that Cyprus include these explanations in its IIR for the next submission, adding also the references associated to the estimation of the gross feed intake (e.g. IPCC default, national values).

Cyprus comments:

The recommendation was adopted both in 2021 NFR and IIR 2021 (Please see in paragraph 14.1of IIR).

Review year of initial recommendation (number of years it has been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2019	RE, TC, or UPTC in 2020	Tier 1 used for Key Category
2019 (2)	CY-3Da1-2019-0001	Yes	3Da1 Inorganic N-Fertilizers, NH ₃ , 1990-2018	TC	No	No

Assessment of the implementation of the initial recommendation

For 3Da1 Inorganic N-fertilizers for NH₃ emissions for all years, the TERT noted that Cyprus applied the Tier 2 methodology for a warm climate. However, a warm climate corresponds to an average annual temperature > 26°C-28°C. Thus, the TERT suggested to use the values of a temperate climate (15°C-25°C). In response to a question raised during the review Cyprus indicated that they calculated the emissions of this category based on the last year TERT's suggestion, but that if the TERT considers that a temperate climate is more suitable, they will modify the calculation in the next submission. Moreover, Cyprus provided the calculation updated for a temperate climate. The TERT noted that the issue is below the threshold of significance for a technical correction.

The TERT recommends that Cyprus estimate the NH₃ emissions from 3Da1 Inorganic N-fertilizers using values for a temperate climate in the next submission.

Cyprus comments:

The recommendation was adopted both in 2021 NFR and IIR 2021 (Please see in paragraph 14.2.1of IIR).

Review year of initial recommendation (number of years it has been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2019	RE, TC, or UPTC in 2020	Tier 1 used for Key Category
2020 (1)	CY-3Da3-2020-0001	No	3Da3 Urine and Dung Deposited by Grazing Animals, NO _x , 1990-2018	N/A	No	No

Recommendation

For 3Da3 Urine and Dung Deposited by Grazing Animals for NO_x emissions for all years, the TERT noted that Cyprus reported the notation key 'NA'. However, a methodology is included in the EMEP Guidebook. In response to a question raised during the review, Cyprus indicated that NH₃ emissions from 3Da3 are estimated with the excel file provided by the 2013 EMEP/EEA Guidebook, where there are no formulas to calculate the relevant NO_x emissions. Cyprus indicated that for next year submission, they will use the new excel file provided with 2019 EMEP/EEA Guidebook which includes such formulas, so the NO_x emissions will be reported.

The TERT recommends that Cyprus include NO_x emissions from 3Da3 Urine and dung deposited by grazing animals in the next submission.

Cyprus comments:

The recommendation was adopted both in 2021 NFR and IIR 2021 (Please see in paragraph 14.2.5 of IIR). The new EMEP tool was used and the calculations of NO_x for category 3Da3 were calculated.

Review year of initial recommendation (number of years it has been recommended)	Observation	Key Category	NFR, Pollutant(s), Year(s)	RE, TC, or UPTC in 2019	RE, TC, or UPTC in 2020	Tier 1 used for Key Category
2020 (1)	CY-5-2020-0001	No	5A Biological Treatment of Waste - Solid Waste Disposal on Land, PM _{2.5} , PM ₁₀ , 1990-2018	N/A	No	No

Recommendation

For PM_{2.5} emissions from 5A Biological Treatment of Waste – Solid Waste Disposal on Land for all years, the TERT noted that there is a lack of transparency regarding the activity data used to estimate PM_{2.5} emissions. In the 2019 EMEP/EEA Guidebook, chapter 5.A table 3-A, the particulate emission factors reference is US EPA 2006. In the US EPA Guidebook (chapter 13.2.4 Miscellaneous sources/aggregate handling and storage piles/table), the activity data used to estimate the PM emission factor is amount of waste handled (especially mineral waste). The definition of this term is provided and includes handle of construction/demolition waste (sand, clay, misc. fill materials). Consequently, it is important to collect data on total amount of waste handled (including the amount of mineral waste, such as construction and demolition, ash etc.) and not only waste disposed at municipal solid waste disposal sites. In response to a question raised during the review, Cyprus explained that PM_{2.5} emissions are calculated using the same amounts of organic matter going to landfills as those used to NMVOC emission calculation.

The TERT recommends that Cyprus verifies if activity data used is consistent with definition above and correct its PM_{2.5} emissions if needed from 5A using the total amount of waste generated as AD.

Cyprus comments:

The recommendation was adopted both in 2021 NFR and IIR 2021 (Please see in paragraph 15.1 of IIR). The new EMEP tool was used and the calculations of NO_x for category 3Da3 were calculated.

