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

Cyprus Informative Inventory

Report 2017

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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
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
NOx	- 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 micrometers
$PM_{2.5}$	- Particulate matter with aerodynamic diameter less than 2.5

	micrometers
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 2017. It includes descriptions of methods and data sources. Similar reports were submitted annually to the Convention's Secretariat the period 2010 - 2016 **[1-9].** In addition, these reports were uploaded in the CDR (http://cdr.eionet.europa.eu).

For the preparation of the 2017 National Emission Inventory, the relevant emission factors from EMEP/EEA Air Pollutant Emission Inventory Guidebook 2016 (Corinair Guidebook) **[10]** were used. Please also note that National Emission Inventories for the years 1990 to 2016 were re-submitted based on the new emission factors of the new Emission Inventory Guidebook 2016 and the new NFR014 template was used for the whole timeseries.

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 is carried out for the time series 1990-2016 showing the relevant sources of air pollution in Cyprus. In addition, a key category analysis trend assessment is carried out for the year 2017 showing categories whose trend is different from the trend of the overall inventory.

Finally, the 2019 submission for the 2017 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	Not ratified yet[1]

Note [1]: A relevant letter was sent to the Secretary of the Convention.

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 statistics and industrial statistics, environmental reports of operators of industrial installations and emission factors either form the Corinair Guidebook (mainly) or from studies conducted in Cyprus.

Cyprus applies the ”Guidelines for Reporting Emission Data under the Convention on Long-range Transboundary Air Pollution” **[12]** for reporting to the UNECE LRTAP Convention and the “EMEP/EEA Air Pollutant Emission Inventory Guidebook 2016 ” **[10]**.

The main methodology followed for the preparation of the 2017 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 their emissions are included in other NFR Sectors. Additionally, in certain sectors, actual emission pollutants measurements from industrial stacks are used.

In the 2019 (for 2017) emission inventory submissions, there are no differences found in the reported national totals for the entire territory and the corresponding NEC inventory report since it is the same report. Small differences in reported national totals were found in relation to the corresponding UNFCCC inventory report due to the fact that some categories in the UNFCCC report are not included in the LRTAP report and vice versa. The main difference in the LRTAP and UNFCCC national totals is the fact that the UNFCCC national total data exclude the international aviation emissions. 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 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 Civil Aviation Department,
- the Water Development Department,
- 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, 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 NOx emissions.

Figure 3: Geographical Distribution of 2015 NMVOC emissions.

Figure 4: Geographical Distribution of 2015 SO_x emissions.

Figure 5: Geographical Distribution of 2015 NH_3 emissions.

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

Figure 7: Geographical Distribution of 2015 PM_{10} 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 2016 **[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, for the estimation of emissions from the transport sector the COPERT 5 tool was used (Tier 3). Please also note that for the A_PublicPower sector for the pollutants NOx, CO and particulates Tier 3 method was also used since 2008 when actual measurements on the stacks were used.

5.4.1. 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 2017, only 597 cells have values. All others are filled in with notation keys as follows:

Notation key	No of cells
IE	136
NO	1481
NA	637
NE	451
Values	597
Total	3302

Extra effort will be given to find out activity data for the categories / pollutants with notation keys "NE".

5.5. 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 2016 **[10]**, was used. With this approach the influence of various categories of sources on the level of the national inventory was identified.

5.5.1. Level Assessment

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

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

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 2017 are shown in the following **Table 2-17** (Sorted from high to low and highlighted using the following color codes).

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 2: Key Categories for NOx.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	**3655.11**	**25.18%**	**25.18%**
1A3biii	Road transport: Heavy duty vehicles and buses	**3181.60**	**21.91%**	**47.09%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic	**2229.98**	**15.36%**	**62.45%**

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
	minerals			
1A3bi	Road transport: Passenger cars	**1640.50**	**11.30%**	**73.75%**
1A3bii	Road transport: Light duty vehicles	**1377.38**	**9.49%**	**83.23%**

Table 3: Key Categories for NMVOC.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
2D3i	Other solvent use (please specify in the IIR)	**4716.27**	**35.57%**	**35.57%**
2D3d	Coating applications	**2032.17**	**15.33%**	**50.89%**
1A3bv	Road transport: Gasoline evaporation	**1183.66**	**8.93%**	**59.82%**
2D3a	Domestic solvent use including fungicides	**1037.04**	**7.82%**	**67.64%**
5A	Biological treatment of waste - Solid waste disposal on land	**646.35**	**4.87%**	**72.51%**
1A3bi	Road transport: Passenger cars	**616.50**	**4.65%**	**77.16%**
1B2av	Distribution of oil products	**589.19**	**4.44%**	**81.61%**

Table 4: Key Categories for SO_x.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	**14724.25**	**89.40%**	**89.40%**

Table 5: Key Categories for NH_3.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3B3	Manure management - Swine	**2559.94**	**39.49%**	**39.49%**
3B1a	Manure management - Dairy cattle	**1472.25**	**22.71%**	**62.19%**
3Da2a	Animal manure applied to soils	**671.95**	**10.36%**	**72.56%**

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3Da3	Urine and dung deposited by grazing animals	**478.91**	**7.39%**	**79.95%**
3B1b	Manure management - Non-dairy cattle	**341.17**	**5.26%**	**85.21%**

Table 6: Key Categories for $PM_{2.5}$.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**334.79**	**26.01%**	**26.01%**
1A1a	Public electricity and heat production	**216.17**	**16.80%**	**42.81%**
1A3bii	Road transport: Light duty vehicles	**110.51**	**8.59%**	**51.40%**
1A3bvi	Road transport: Automobile tyre and brake wear	**94.42**	**7.34%**	**58.73%**
1A4bi	Residential: Stationary	**90.40**	**7.02%**	**65.76%**
1A3biii	Road transport: Heavy duty vehicles and buses	**77.79**	**6.04%**	**71.80%**
1A3bi	Road transport: Passenger cars	**67.61**	**5.25%**	**77.05%**
1A3bvii	Road transport: Automobile road abrasion	**42.80**	**3.33%**	**80.38%**

Table 7: Key Categories for PM_{10}.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**341.10**	**16.63%**	**16.63%**
1A1a	Public electricity and heat production	**315.99**	**15.40%**	**32.03%**
1A3bvi	Road transport: Automobile tyre and brake wear	**176.70**	**8.61%**	**40.65%**
2A5b	Construction and demolition	**132.67**	**6.47%**	**47.12%**
3B3	Manure management - Swine	**131.06**	**6.39%**	**53.51%**
2A5a	Quarrying and mining of minerals other than coal	**120.04**	**5.85%**	**59.36%**
1A3bii	Road transport: Light duty vehicles	**110.51**	**5.39%**	**64.74%**

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3B4gii	Manure mangement - Broilers	**95.83**	**4.67%**	**69.42%**
1A4bi	Residential: Stationary	**92.57**	**4.51%**	**73.93%**
1A3bvii	Road transport: Automobile road abrasion	**79.26**	**3.86%**	**77.79%**
1A3biii	Road transport: Heavy duty vehicles and buses	**77.79**	**3.79%**	**81.59%**

Table 8: Key Categories for TSP.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
2A5b	Construction and demolition	**447.38**	**14.69%**	**14.69%**
1A1a	Public electricity and heat production	**414.88**	**13.62%**	**28.31%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**354.09**	**11.62%**	**39.93%**
3B3	Manure management - Swine	**294.19**	**9.66%**	**49.59%**
1A3bvi	Road transport: Automobile tyre and brake wear	**231.88**	**7.61%**	**57.20%**
2A5a	Quarrying and mining of minerals other than coal	**231.29**	**7.59%**	**64.80%**
1A3bvii	Road transport: Automobile road abrasion	**158.52**	**5.20%**	**70.00%**
1A3bii	Road transport: Light duty vehicles	**110.51**	**3.63%**	**73.63%**
2D3c	Asphalt roofing	**105.43**	**3.46%**	**77.09%**
1A4bi	Residential: Stationary	**96.92**	**3.18%**	**80.27%**

Table 9: Key Categories for BC.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**109.93**	**33.13%**	**33.13%**
1A3bii	Road transport: Light duty vehicles	**74.18**	**22.36%**	**55.49%**
1A3biii	Road transport: Heavy duty vehicles and buses	**48.02**	**14.47%**	**69.97%**

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3bi	Road transport: Passenger cars	**45.21**	**13.63%**	**83.59%**

Table 10: Key Categories for CO.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3bi	Road transport: Passenger cars	**6230.16**	**45.02%**	**45.02%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**2543.15**	**18.38%**	**63.40%**
1A3biv	Road transport: Mopeds & motorcycles	**1383.42**	**10.00%**	**73.39%**
1A3bii	Road transport: Light duty vehicles	**1113.40**	**8.05%**	**81.44%**

Table 11: Key Categories for Pb.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3bi	Road transport: Passenger cars	**6.74**	**36.67%**	**36.67%**
1A3biii	Road transport: Heavy duty vehicles and buses	**6.01**	**32.69%**	**69.36%**
1A3bii	Road transport: Light duty vehicles	**5.08**	**27.63%**	**96.99%**

Table 12: Key Categories for Cd.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	**0.026**	**49.34%**	**49.34%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.014**	**25.83%**	**75.17%**
1A3bi	Road transport: Passenger cars	**0.005**	**8.49%**	**83.66%**

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	**0.0842**	**84.20%**	**84.20%**

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)	**0.2160**	**32.69%**	**32.69%**
1A3bi	Road transport: Passenger cars	**0.1258**	**19.03%**	**51.72%**
1A4bi	Residential: Stationary	**0.1131**	**17.11%**	**68.84%**
1A1a	Public electricity and heat production	**0.0883**	**13.36%**	**82.20%**

Table 15: Key Categories for PAHs.

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3F	Field burning of agricultural residues	**0.0005**	**80.40%**	**80.40%**

Table 16: Key Categories for HCB.

NFR Code	Longname	Emissions (Kg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.00790**	**85.04%**	**85.04%**

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	**0.0354**	**90.15%**	**90.15%**

5.6. 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 2017 was calculated according to the following equation:

$$T_{x,2017} = \frac{E_{x,2017}}{\sum E_{2017}} \left(\frac{E_{x,2017} - E_{x,1990}}{E_{x,1990}} - \frac{\sum E_{2017} - \sum E_{1990}}{\sum E_{1990}} \right)$$

Whereas: $T_{x,2017}$ = Trend assessment of source category x in 2017 as compared to the base year (1990),

$E_{x,2017}$ and $E_{x,1990}$ = Values of estimates of source category x in year 2017 and 1990, respectively,

$\sum E_{2017}$ and $\sum E_{1990}$ = Total inventory estimates in years 2017 and 1990, respectively,

Please note that for $PM_{2.5}$, PM_{10}, 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 2017are 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 2017, concerning key category analysis (level assessment) per pollutant for the year 2017.

Annex 2: Key Category Analysis – Level Assessment 1990-2016, concerning key source categories (level assessment) for the whole time series 1990 -2016, per pollutant and per year.

Annex 3: Key Category Analysis – Trend Assessment 2017, concerning key source categories (trend assessment) per pollutant for the year 2017.

5.7. Emissions of Large Point Sources (LPS)

Table 18 gives an overview of emission totals of Sulphur dioxide (SO_2), Nitrogen oxides (NO_x), Carbon monoxide (CO) and Particulate Matter (PM_{10}) from four (4) large point sources operating in Cyprus and which have reported their emissions in the E-PRTR. These 4 installations are 3 power stations and 1 cement plant. Please note that the Moni Power Station which used to be a LPS plant has almost stopped its operations. It works a few hours per year (on average 170) and it is considered a standby unit.

It can be seen that these three LPSs in 2017, contributed:

- 93.3% of the national total SO_x emissions,
- 39.7% of the national total NO_x emissions,
- 20.6% of the national total CO emissions and
- 30.4% of the national total $PM_{2.5}$ emissions,

Table 18: Pollutant emissions from Large Point Sources in 2017.

Large Point Source	SO_x		NO_x		CO		PM_{10}	
	Gg	%	Gg	%	Gg	%	Gg	%
Vasilikos Power Station	6.448	39.2	1.403	9.7	0.074	0.5	0.132	6.4
Dhekelia Power Station	8.255	50.1	2.023	13.9	0.273	2.0	0.150	7.3
Moni Power Station	0.020	0.1	0.214	1.5	0.002	0.0	0.006	0.3
Vasilikos Cement Plant	0.642	3.9	2.131	14.7	2.498	18.1	0.336	16.4
Total LPS	**15.364**	**93.3**	**5.771**	**39.7**	**2.847**	**20.6**	**0.623**	**30.4**
National Total	**16.470**		**14.519**		**13.839**		**2.051**	

5.8. 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 in the near future **[14]**.

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

5.9. 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 2016 **[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 2017 data using as a base year the 1990 and the year 2000 for $PM_{2,5}$, PM_{10}, 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 **[10]**. 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 19**.

Table 19: Emissions Uncertainties.

Pollutant	Emissions (2017)	Uncertainty (%)	Trend Uncertainty (1990-2017) (%)
NO_x	14.519 Gg	36.80	19.78
NMVOC	13.260 Gg	38.63	23.66
SOx	16.470 Gg	15.54	9.30
NH_3	6.483 Gg	136.10	40.11
$PM_{2.5}$	1.287 Gg	50.95	28.54
PM_{10}	2.051 Gg	78.58	32.23
TSP	2.887 Gg	100.31	26.87
BC	0.332 Gg	28.65	10.49
CO	13.839 Gg	38.78	10.27
Pb	18.384 Mg	29.30	9.42
Cd	0.053 Mg	24.06	49.89
Hg	0.100 Mg	8.74	16.70
PCDD/PCDF	0.661 g I-Teq	84.23	27.12
PAHs	0.596 Mg	198.08	5.98
HCB	0.0093 kg	4.48	0.57
PCBs	0.039 kg	5.24	2.94

Note: For $PM_{2.5}$, PM_{10} and TSP the Trend Uncertainty was calculated for the years 2000 and 2017.

5.10. 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 20** 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 **[12]**.

Table 20: 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

5.10.1. Sources Not Estimated (NE)

In **Table 21** sources reported as NE (Not Estimated) are presented.

Table 21: Sources reported with the Notation Key NE (Not Estimated)

NFR Code	Substance (s)
1A1a	NH_3
1A2b	NH_3, HCB, PCBs
1A2c	NH_3, HCB, PCBs
1A2d	NH_3, HCB, PCBs
1A2e	NH_3, HCB, PCBs
1A2gvii	Pb, Hg, As, PCDD / PCDF (dioxins/ furans)

NFR Code	Substance (s)
1A3ai(i)	NH_3, 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)	NH_3, 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
1A3bi	Hg, As
1A3bii	Hg, As
1A3biii	Hg, As
1A3biv	Hg, As
1A3bv	Zn, PCDD / PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , PCBs
1A3bvi	CO, PCDD / PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, PCBs
1A3bvii	CO, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, PCDD / PCDF (dioxins/ furans), benzo(a) pyrene , benzo(b) fluoranthene , benzo(k) fluoranthene , Indeno (1,2,3-cd) pyrene, Total 1-4, PCBs
1A3dii	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
1A4ci	NH_3, HCB, PCBs
1A4cii	Pb, Hg, As, PCDD / PCDF (dioxins/ furans)
1A4ciii	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
1A5b	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
1B2av	SO_x , PCDD/ PCDF (dioxins/ furans)
2A1	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
2A2	CO, Pb, Cd, Hg
2A5b	NMVOC
2D3a	$PM_{2.5}$, PM_{10}, TSP
2D3b	NOx, 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
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, SO_x , NH_3, $PM_{2.5}$, PM_{10}, TSP, 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, HCB, PCBs
2D3h	$PM_{2.5}$, PM_{10}, TSP
2G	Se, HCB, PCBs
2H2	$PM_{2.5}$, PM_{10}, TSP

NFR Code	Substance (s)
3Da2a	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
3Da2b	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
3Da2c	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
3Da3	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
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
3De	NH_3
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, 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

5.10.2. Sources Included Elsewhere (IE)

In **Table 22** sources reported as IE (Included Elsewhere) are presented.

Table 22: Sources reported with the Notation Key IE (Included Elsewhere).

NFR Code	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

NFR Code	Substance (s)
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
1A4bi	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	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	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
2A1	NO_x, NMVOC, SO_x
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

5.10.3. 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 23** these sources are presented.

Table 23: Additional NFR Sources Reported as NA.

NFR Code	Substance (s)
1A2f	NH_3
1A2gvii	HCB, PCBs
1A2gviii	NH_3, 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, Indeno (1,2,3-cd) pyrene, Total 1-4, HCB
1A3bvi	NO_x, NMVOC, SO_x , NH_3, BC , HCB
1A3bvii	NO_x, NMVOC, SO_x , NH_3, BC , Zn, HCB
1A3dii	BC
1A4cii	HCB, PCBs
1A4ciii	BC

NFR Code	Substance (s)
1A5b	BC , 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
2A5c	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
2D3a	NO_x, SO_x , NH_3, BC , CO, 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
2D3b	NH_3, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCBs
2D3c	SO_x , NH_3, As, Cr, Cu, Ni, Se, Zn, PCBs
2D3d	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
2D3f	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
2D3g	BC
2D3h	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
2H2	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
2K	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
3B1a	SO_x , 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
3B1b	SO_x , 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

NFR Code	Substance (s)
3B2	SO_x , 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
3B3	SO_x , 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
3B4d	SO_x , 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
3B4e	SO_x , 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
3B4f	SO_x , 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
3B4gi	SO_x , 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
3B4gii	SO_x , 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
3B4giii	SO_x , 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
3Da1	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
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
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
5C2	PCBs
5D1	NO_x, SO_x , BC , 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

5.10.4. Sources Not Occuring

In **Table 24** 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 24: Sources reported with the notation key NO (Not Occuring)

NFR Code	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	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
1A3c	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
1A3di(ii)	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
1A3ei	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
1A3eii	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
1B1a	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
1B1b	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
1B1c	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
1B2ai	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
1B2aiv	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

NFR Code	Substance (s)
1B2b	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
1B2c	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
1B2d	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
2A3	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
2A6	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
2B1	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
2B2	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
2B3	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
2B5	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
2B6	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
2B7	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
2B10a	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
2B10b	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
2C1	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

NFR Code	Substance (s)
2C2	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
2C3	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
2C4	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
2C5	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
2C6	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
2C7a	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
2C7b	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
2C7c	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
2C7d	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
2D3e	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
2D3g	Total 1-4
2D3i	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
2H1	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
2H3	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
2I	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

NFR Code	Substance (s)
2J	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
2L	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
3B4a	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
3B4giv	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
3B4h	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
3Da1	NMVOC
3De	NO_x, 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
3Df	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
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
5B2	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

NFR Code	Substance (s)
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

5.10.5. Sources Not Relevant

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

5.10.6. 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 – 2017 (**Table 25** 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 - 2017. On the contrary, the trend observed for the period of 1990 – 2017 for the other Metals (except Lead Pb) and the POPs is upward. The trend of Lead is downward because after 2004 the gasoil 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 25: Total National Emissions 1990 - 2017.

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	16.50	17.78	31.74	6.07	43.40	-	-	-	-	35.26	0.09	0.10
1991	16.87	17.54	33.07	6.24	42.62	-	-	-	-	37.11	0.09	0.10
1992	18.75	17.68	37.90	6.86	41.47	-	-	-	-	39.27	0.09	0.10
1993	18.98	17.63	40.10	7.18	39.63	-	-	-	-	38.91	0.09	0.11
1994	20.24	18.15	42.64	7.19	40.31	-	-	-	-	41.84	0.09	0.12
1995	19.06	17.66	39.64	7.44	38.13	-	-	-	-	40.97	0.09	0.11
1996	19.66	17.54	41.66	7.67	36.97	-	-	-	-	41.10	0.09	0.12
1997	19.93	17.74	43.98	7.57	35.48	-	-	-	-	41.14	0.09	0.12
1998	20.29	17.33	47.29	7.48	33.19	-	-	-	-	40.72	0.09	0.11
1999	20.76	17.98	49.65	7.32	31.90	-	-	-	-	40.37	0.10	0.12
2000	22.06	18.55	48.37	7.35	30.54	9.63	4.90	2.68	0.69	40.86	0.10	0.12
2001	21.39	18.71	45.51	7.87	29.31	8.17	4.39	2.36	0.65	38.89	0.09	0.12
2002	21.39	18.53	45.95	8.22	28.61	8.03	4.39	2.32	0.63	37.34	0.09	0.12
2003	21.68	20.23	47.40	8.04	28.90	7.57	4.36	2.32	0.63	36.16	0.09	0.10
2004	21.26	22.29	40.34	7.93	27.78	7.30	4.30	2.27	0.60	25.48	0.09	0.10
2005	21.37	22.12	37.88	7.48	26.68	6.61	4.14	2.22	0.59	20.17	0.09	0.10
2006	21.21	20.76	31.49	7.51	24.84	6.31	3.98	2.12	0.55	19.46	0.08	0.10
2007	21.42	21.04	29.44	7.61	23.90	6.31	3.97	2.13	0.54	19.81	0.08	0.10
2008	20.29	21.40	22.44	7.35	22.01	6.28	3.93	2.10	0.52	20.80	0.08	0.10
2009	20.12	19.24	17.77	7.21	19.78	5.62	3.43	1.85	0.47	20.07	0.07	0.08
2010	18.69	20.71	21.93	7.32	18.59	5.55	3.30	1.75	0.45	20.42	0.06	0.07
2011	21.54	14.78	20.94	7.05	17.15	4.99	2.99	1.59	0.39	19.79	0.07	0.07
2012	21.68	15.00	16.24	6.67	15.71	3.77	2.29	1.27	0.32	17.68	0.07	0.07
2013	16.44	13.97	13.76	6.27	14.64	2.92	1.89	1.11	0.29	15.18	0.05	0.08

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
2014	17.44	12.59	16.91	6.16	14.64	2.62	1.80	1.09	0.30	15.18	0.05	0.10
2015	15.12	12.98	13.02	6.21	14.03	2.72	1.88	1.16	0.30	16.02	0.05	0.10
2016	14.61	13.04	16.26	6.40	14.36	2.89	1.99	1.24	0.32	17.08	0.05	0.10
2017	14.52	13.26	16.47	6.48	13.84	3.05	2.05	1.29	0.33	18.38	0.05	0.10
2017-1990	-1.98	-4.73	-15.5	0.3	-29.0	-	-	-	-	-18.2	-0.03	-0.00
2017 -2000	-7.54	-5.50	-32.1	-0.9	-16.2	-6.4	-2.9	-1.4	-0.4	-23.8	-0.05	-0.02
2017-2005	-6.86	-8.86	-21.4	-1.0	-12.8	-3.6	-2.1	-0.9	-0.2	-1.8	-0.04	0.00

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	0.18	1.35	5.86	0.08	3.81	2.11	13.75	0.05	0.03
1991	0.13	0.19	1.42	6.07	0.09	3.92	2.16	13.36	0.05	0.03
1992	0.15	0.21	1.59	7.09	0.10	4.45	2.24	14.01	0.05	0.04
1993	0.16	0.22	1.60	7.55	0.10	4.67	2.31	14.05	0.05	0.04
1994	0.17	0.23	1.75	7.88	0.11	4.94	2.36	12.17	0.05	0.04
1995	0.16	0.22	1.72	7.25	0.10	4.67	2.38	10.95	0.05	0.04
1996	0.17	0.23	1.80	7.67	0.11	4.91	2.42	9.90	0.06	0.04
1997	0.17	0.24	1.88	8.10	0.11	5.10	2.46	9.06	0.06	0.04
1998	0.18	0.25	1.96	8.89	0.12	5.41	2.50	8.52	0.06	0.04
1999	0.19	0.26	2.05	9.48	0.12	5.68	2.54	7.81	0.06	0.04
2000	0.20	0.27	2.26	9.94	0.13	6.01	2.84	6.23	0.06	0.04
2001	0.20	0.26	2.19	9.69	0.12	5.88	2.86	6.09	0.06	0.04
2002	0.20	0.27	2.23	10.06	0.13	6.06	2.89	5.74	0.06	0.04
2003	0.21	0.28	2.30	10.84	0.13	6.41	1.30	6.16	0.02	0.03
2004	0.22	0.28	2.32	11.33	0.13	6.65	0.78	4.85	0.01	0.03
2005	0.23	0.29	2.37	12.05	0.14	6.95	0.79	3.80	0.01	0.03
2006	0.22	0.29	2.36	11.22	0.13	6.72	0.76	2.93	0.01	0.04
2007	0.22	0.29	2.46	11.58	0.14	6.97	0.79	1.68	0.01	0.04
2008	0.23	0.30	2.58	12.11	0.14	7.22	0.77	1.04	0.01	0.03
2009	0.20	0.28	2.52	10.62	0.12	6.59	0.73	0.85	0.01	0.03
2010	0.14	0.24	2.49	7.13	0.09	5.36	0.71	0.89	0.01	0.03
2011	0.17	0.25	2.46	8.90	0.12	5.90	0.70	0.95	0.01	0.03
2012	0.19	0.25	2.33	9.40	0.14	5.91	0.69	1.01	0.01	0.02

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	0.12	0.21	2.03	5.20	0.08	4.44	0.81	0.83	0.01	0.04
2014	0.13	0.23	2.04	5.20	0.09	4.56	0.57	0.70	0.01	0.04
2015	0.13	0.22	2.10	5.29	0.09	4.58	0.61	0.89	0.01	0.04
2016	0.14	0.23	2.19	5.66	0.09	4.82	0.68	0.68	0.01	0.04
2017	0.14	0.24	2.27	5.62	0.09	4.90	0.66	0.60	0.01	0.04
2016-1990	0.006	0.050	0.835	-0.198	0.006	1.004	-1.427	-13.074	-0.040	0.003
2016 - 2000	-0.066	-0.034	-0.073	-4.279	-0.035	-1.193	-2.160	-5.546	-0.049	-0.002
2016-2005	-0.094	-0.057	-0.180	-6.384	-0.048	-2.127	-0.105	-3.123	0.002	0.005

Figure 9: Emission trends 1990-2017 (Main Pollutants and Particulates).

Figure 10: Emission trends 1990-2017 (Heavy Metals).

Figure 11: Emission trends 1990-2017 (Persistent Organic Pollutants).

6.1. Trends for Nitrogen Oxides (NOx)

The Cyprus NOx emissions (NO and NO_2) decreased by 1.89 Gg in the 1990 – 2017 period, corresponding to 12% of the national total in 1990 and decreased by 6.76 Gg in the 2005 – 2017 period, corresponding to 32% of the national total in 2005 (**Figure 12-13**). The main contributors to the National total NOx 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 – 2017) 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 2.98 Gg for the period between 2010 – 2012, corresponding to 16,0% 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 NOx 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 NOx emissions at a national level is observed in 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 in 2013, regarding NOx 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 significally 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 DeNOx system for the ICE1 plant. A DeNOx 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 359 GWh produced in 2017 [18]. This is an increase of 488%.

Figure 12: NO_x emissions trend 1990 – 2017

Figure 13: National total NO_x emissions for the period 1990 – 2017.

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 4.73 Gg in the 1990 – 2017 period, corresponding to 25% of the national total in 1990 and decreased by 9.08 Gg in the 2005 – 2017 period, corresponding to 40% of the national total in 2005 (**Figures 14-15**). The main contributors to this decrease were the F - Road Transport sector, which from 6.92 Gg in 1990 went to 2.43 Gg in 2017 and the E - Solvents sector from 13.79 Gg in 2005 went to 8.12 Gg in 2017. The latter was due to the full implementation of relevant the EU Directive 2004/42/EC.

Figure 14: NMVOC emissions trend 1990 – 2017.

Figure 15: National total NMVOC emissions for the period 1990 – 2017.

6.3. Trends for Sulphur Dioxide (SO_2)

The Cyprus SO_x emissions (reported as SO_2) decreased by 15.48 Gg in the 1990 – 2017 period, corresponding to 48% of the national total in 1990 and decreased by 21.62 Gg in the 2005 – 2017 period, corresponding to 57% of the national total in 2005 (**Figure 16-17**). The main contributions to this decrease came from 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 89% 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 sulpur 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.

An increase obsverved in 2016 and 2017 for SOx 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.

Figure 16: SO_x emissions trend 1990 – 2017.

Figure 17: National total SO_x emissions for the period 1990 – 2017.

6.4. Trends for Ammonia (NH_3)

The Cyprus NH_3 emissions decreased by 0.33 Gg in the 1990 – 2017 period, corresponding to 7% of the national total in 1990 and decreased by 1.08 Gg in the 2005 – 2017 period, corresponding to 13% of the national total in 2005 (**Figure 18-19**). This decrease occurred in the agricultural sources, mainly due to measures taken to reduce NH_3 emissions during the application of manure to the soil and the reduction of Nitrogen contained in the modern fertilizers (1.92 Gg 1990 to 1.35 Gg 2017 in L_AgriOther sector). Approximately 97% of ammonia emissions (2017) come from agricultural sources (K_AgriLivestockc sector and L_AgriOther sector).

A small increase observed between the years of 2013 and 2017 was due to the increased numbers of animals (cows and fattening pigs).

Figure 18: NH_3 emissions trend 1990 – 2017.

Figure 19: National total NH_3 emissions for the period 1990 – 2017.

6.5. Trends for Particulate Matter (TSP, PM_{10}, $PM_{2.5}$)

The Cyprus particulate matter emissions are presented in **Figure 20-23**. The PM_{10} emissions decreased by 2.91 Gg in the 2000 – 2017 period, corresponding to 58% 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 1.43 Gg in the 2000 – 2017 period, corresponding to 52% of the national total in 2000 and decreased by 0.97 Gg in the 2005 – 2017 period, corresponding to 42% 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 6.74 Gg in the 2000 – 2017 period, corresponding to 68% 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 – 2017.

Figure 21: PM_{10} emissions trend 2000 – 2017.

Figure 22: TSP emissions trend 2000 – 2017.

Figure 23: National total TSP, PM_{10} and $PM_{2.5}$ emissions for the period 2000 – 2017.

6.6. Trends for Carbon MonOxide (CO)

The Cyprus CO emissions decreased by 29.04 Gg in the 1990 – 2017 period, corresponding to 68% of the national total in 1990 and decreased by 12.32 Gg in the 2005 – 2017 period, corresponding to 48% 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 69% of the national CO emissions in 2017.

Figure 24: CO emissions trend 1990 – 2017.

Figure 25: National total CO emissions for the period 1990 – 2017.

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

The Cyprus Lead (Pb) emissions decreased by 18.18 Mg in the 1990 – 2017 period, corresponding to 48% of the national total in 1990 and decreased by 3.08 Mg in the 2005 – 2017 period, corresponding to 9% 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 B_Industry sector. Currently, the Road Transport sector (1A3b) is responsible for about 98% of the national Pb emissions in 2017.

Figure 26: Pb emissions trend 1990 – 2017.

Figure 27: National total Pb emissions for the period 1990 – 2017.

The Cyprus Cd national emissions decreased by 0.03 Mg in the 1990 – 2017 period, corresponding to 38% of the national total in 1990 and decreased by 0.04 Mg in the 2005 – 2017 period, corresponding to 41% of the national total in 2005 (**Figure 28-29**). The big decrease occurred between 2012 and 2013 (28% 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) and Stationary Combustion for Non – metallic minerals (NFR 1A2f) are responsible for about 76% of the national Cd emissions in 2017.

Figure 28: Cd emissions trend 1990 – 2017.

Figure 29: National total Cd emissions for the period 1990 – 2017.

The Cyprus Hg emissions decreased by 0.003 Mg in the 1990 – 2017 period, corresponding to 0.1% of the national total in 1990 and decreased by 0.001 Mg in the 2005 – 2017 period, corresponding to 3% of the national total in 2005 (**Figure 30-31**). The main contributors of Hg emissions in Cyprus are the B_Industry [Non-metallic minerals public sector (NFR 1A2f)], the A_Public Power (NFR 1A1a), and the Road Transport sector (1A3b) with 84%, 8% and 5% of the national Hg emissions in 2017, respectively.

Figure 30: Hg emissions trend 1990 – 2017.

Figure 31: National total Hg emissions for the period 1990 – 2017.

Trends for Dioxins (PCDD/PCDF)

The Cyprus PCDD / PCDF emissions decreased by 1.43 g I-Teq in the 1990 – 2017 period, corresponding to 69% of the national total in 1990 and decreased by 0.11 g I-Teq in the 2005 – 2017 period, corresponding to 16% 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 – 2017.

Figure 33: National total PCDD/F emissions for the period 1990 – 2017.

6.8. Trends for Polycyclic Aromatic Hydrocarbons (PAHs)

The Cyprus PAHs emissions decreased by 13.07 Mg in the 1990 – 2017 period, corresponding to 96% of the national total in 1990 and decreased by 3.12 Mg in the 2005 – 2017 period, corresponding to 84% 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 – 2017.

Figure 35: National total PAHs emissions for the period 1990 – 2017.

6.9. Trends for Hexachlorobenzene (HCB)

The Cyprus HCB emissions decreased by 0.04 kg in the 1990 – 2017 period, corresponding to 81% of the national total in 1990 and increased by 0.05 Kg in the 2000 – 2017 period, corresponding to 29% of the national total in 2005 (**Figure 36-37**). The decrease for the period 1990 – 2017 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 – 2017 is due to the B_Industry (1A2). Actually is due to the increased production of the cement factory.

Figure 36: HCB emissions trend 1990 – 2017.

Figure 37: National total HCB emissions for the period 1990 – 2017.

7. A_Public Power

The A_Public Power sector is the major contributing sector to Cyprus' national emission inventory. The A_Public Power sector contributes by about 89% SO_2, 25% NO_x, 15% PM_{10}, 17% $PM_{2,5}$, 50% Cd, 8% Hg and 13% PCDD/F to the national total of these pollutants.

The emission data from this sector are based on direct emission measurements (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:

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

Concetration 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 2016 **[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 licenced.

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 2018 in comparison with 2016 and 2017 are given below in Table 26, with reference to Cyprus Energy Regulatory Authority, Annual Report 2017 **[18]**.

Table 26: Electricity Generation Installation from RES

Technology	Installed Capacity in MW			Annual Energy Production in GWh		
	2016	2017	2018[a]	2016	2017	2018[a]
Wind Parks	157.5	157.5	157.5	226.3	211.1	220.6
Photovoltaic Systems	54.8	73.8	76.9	94.4	111.4	133.2
Biomass	9.7	9.7	9.7	36.6	36.5	36.0
Total Energy Production from RES (GWh)				357.3	359.0	389.8

Note [a]: Provisional data – up to November 2018.
Details for the above table could be found in the following link:
https://www.cera.org.cy/el-gr/ilektrismos/1169/statistika-ape

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 29**. 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 electicity 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 27**and **Table 28** respectively.

Table 27: 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

Table 28: EF used in 1A for Biomass

Pollutants	Emission factors
NOx	81g/GJ
NMVOC	7.31 g/GJ
SOx	10.8 g/GJ
PM2.5	133 g/GJ
PM10	155 g/GJ
TSP	172 g/GJ
BC	3.3% * PM2.5
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)fluoroanthene	0.043 mg/GJ
Benzo(k)fluoroanthene	0.0155 mg/GJ
Indeno (1.2.3-cd) pyrene	0.0374 mg/GJ

Pollutants	Emission factors
HCB	5 µg/GJ
PCBs	3.5 µg/GJ

Table 29: 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	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 Compustion (ICE) – **Stopped its operations since 2013**.

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 **[13]**. The derogation states that: “Emission limit values of 1700 mg/Nm^3 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 **[13]** 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 missions estimations for NOx, CO and particulates ($PM_{2.5}$, PM_{10} 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 SO_2, 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 unvalided 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 30**.

Table 30: 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 (%)
	Heavy Fuel Oil	Steam Turbines – Vassilikos	0.92
	Diesel	Gas Turbines. Temporary ICE	0.086
2015	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

The values of sulphur contents are given by the Electricity Authority. They analyze every purchased batch of heavy fuel oil and submit to us the results. The values which are given in the **Table 30** are the yearly averages.

For the emission estimations of the other air pollutants, emission factors were used. In **Table 31** the corresponding emission factors used are given. Emissions were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2016 **[10]**.

Table 31: 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
	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

Pollutants	Units	Emission factors
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)fluoroanthene	ICE	0.502 mg/GJ
Benzo(k)fluoroanthene	ICE	0.0987 mg/GJ
Indeno(1.2.3-cd)pyrene	Steam Turbines	6.92 µg/GJ
	ICE	0.187 mg/GJ

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 timeseries 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 $PM_{2.5}$ emission 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 PM_{10} 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 2017):

NOx	25.18%
SO_x	89.40%
$PM_{2.5}$	16.80%
PM_{10}	15.40%
TSP	13.62.%
Cd	49.34%
PCDD/F	13.36%

8. I_Offroad

Mobile Combustion in Manufacturing Industries: Other (1A2gvii)
No key sources are found in this category.

8.1.1. 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 **[10]**. 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 **[14]**. 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
NOx	34457 g/tn fuel
NMVOC	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

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Table 33: Diesel consumption from NFR 1A4cii.

Year	Diesel consumption in tonnes
1990	6155
1991	6619
1992	7984
1993	8114
1994	9224
1995	8769
1996	9204
1997	9659
1998	10194
1999	10563
2000	10815
2001	10920
2002	11342
2003	10862

Year	Diesel consumption in tonnes
2004	8972
2005	8916
2006	8850
2007	9175
2008	8909
2009	7980
2010	7870
2011	8136
2012	7806
2013	7687
2014	7072
2015	7799
2016	7602
2017	7989

8.1.2. Agriculture/forestry/fishing: National fishing (1A4ciii)

Emissions from NFR category (1A4ciii) 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 2000-2017 is shown in **Table 34**.

8.1.3. 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 2000-2017 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

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 1A3aii(i): Civil Aviation (Domestic, LTO).

Emissions from international airport traffic (1A3ai(i): International aviation (LTO)) and NFR sector 1A3aii(i): Civil Aviation (Domestic, LTO) for the years 2005 up to 2017 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 **[10].** 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.

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
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

Aircraft Type	EFs (kg/LTO)				
	CO	NMVOC	NOx	$PM_{2.5}$. PM_{10}	SO_2
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)				
	NOx	NMVOC	SO_2	$PM_{2.5}$. PM_{10}	CO
Smaller Aircraft	2.1	0.45	0.3	0.04	4.85

No key sources are found in these categories.

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 **[10]**. 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, NOx, VOC, particulates, NH_3, SO_2, 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 timeseries (1990 – 2017).
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 vechicles numbers shown in the years 2014 and 2015 is due to the financial crisis occurred in Cyprus and the icreased 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**	**2016**	**2017**
Buses	2743	3113	3313	3727	5505	5512	5601	5770
Heavy Duty Trucks	10439	11806	12667	16364	19595	17028	17096	17649
Mopeds & Motorcycles	64457	66395	59403	59924	55001	52168	54267	58303
Light Commercial Vehicles	69708	104591	116672	125586	125507	115597	117341	120153
Passenger Cars	195330	257314	302088	416758	536137	576755	588831	629750

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

9.2.2. 1A3bi Road Transport; Passenger cars

Category 1A3bi is a key source for the following components (% of national total in 2017):

NO_X	11.30%
NMVOC	4.65%
PM2.5	5.25%
BC	13.63%
CO	45.02%
Pb	36.67%
Cd	8.49%
PCDD/PCDF	19.03%

9.2.3. 1A3bii Road Transport; Light duty vehicles

Category 1A3bii is a key source for the following components (% of national total in 2017):

NOx	9.49%
$PM_{2.5}$	8.59%
PM_{10}	5.39%
TSP	3.63%
BC	22.36%

CO	8.05%
Pb	27.63%

9.2.4. 1A3biii Road Transport; Heavy duty vehicles

Category 1A3biii is a key source for the following components (% of national total in 2017):

NOx	21.91%
$PM_{2.5}$	6.04%
PM_{10}	3.79%
BC	14.47%
Pb	32.69%

9.2.5. 1A3biv Road Transport; Mopeds and motorcycles

Category 1A3biv is a key source for the following components (% of national total in 2017):

CO	10.00%

9.2.6. 1A3bv Road Transport; Gasoline evaporation

Category 1A3bv is a key source for the following components (% of national total in 2017):

NMVOC	8.93%

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 2017):

$PM_{2.5}$	7.34%
PM_{10}	8.61%
TSP	7.61%

9.2.8. 1A3bvii Road Transport: Automobile Road Abrasion

The estimation of the emissions of this category was done based on the average vehicle km per year multiply by the respective emission factor as shown in Table 38.

Table 38: Number of vehicles by type.

Category	Total vkm (*10^6)	EF $PM_{2,5}$ (g/vkm)	EF PM_{10} (g/vkm)	EF TSP (g/vkm)	Emissions $PM_{2,5}$ (kt)	Emissions PM_{10} (kt)	Emissions TSP (kt)
Passenger Cars	6270.89	0.004	0.008	0.015	0.026	0.047	0.094
Light Commercial Vehicles	1219.96	0.004	0.008	0.015	0.005	0.009	0.018
Heavy Duty Trucks	332.93	0.021	0.038	0.076	0.007	0.013	0.025
Buses	153.82	0.021	0.038	0.076	0.003	0.006	0.012
L-Category	236.45	0.002	0.003	0.006	0.000	0.001	0.001

Category 1A3bvii is a key source for the following components (% of national total in 2017):

$PM_{2.5}$	3.33%
PM_{10}	3.86%
TSP	5.20%

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 NOx, NMVOC, SO_2, TSP, CO and PCDD/PCDF are shown for the years 2005, 2016 and 2017.

2005	2016	2017
NOx		
Figure 39(i). NOx emissions trend		
NMVOC		
Figure 39(ii), NMVOC emissions trend		
SO_2		
Figure 39(iii), SO_2 emissions trend		

2005	2016	2017
TSP		
Figure 39(iv), TSP emissions trend		
2005	2016	2017
CO		
Figure 39(v), CO emissions trend		
PCDD/F		
Figure 39(vi), PCDD/F emissions trend		

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.

The total number of ships entered into Cyprus ports in 2000, 2005, 2010, , 2013, 2014, 2015, 2016 and 2017 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
Passenger Carriers	1212	482	382	249	207	162	72	48
Cargo ships: Conventional & Reefer	1382	1240	755	491	392	359	416	295
Cargo ships: Container & Cont/Multipurpose	879	978	961	854	767	742	843	660
Cargo ships: Ro-Ro & Vehicle Carriers	593	649	461	232	231	264	262	232
Cargo ships: Bulk Carriers	116	291	248	426	522	549	483	224
Cargo ships: Tankers	859	995	792	775	655	805	788	577
Other cargo ships	4	16	9	14	112	14	23	172
Total	5045	4651	3608	3041	2886	2895	2887	2208

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

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

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 2016 **[10]**. Combustion emissions from central heating are based on fuel consumption data (Cyprus energy balance - Annex 6) and emission factors (**Table 41**). The major fuel used in this category is diesel. 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 **[14]**. 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
NOx	51 g/GJ	80 g/GJ	51 g/GJ
NMVOC	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	0.68 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
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

Year	Other Liquid fuels[1] in tonnes	Biomass in tonnes	Gaseous fuels In tonnes
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

Note [1]: Other Liquids includes Diesel and Kerosene.

Category 1A4bi is a key source for the following components (% of national total in 2017):

$PM_{2.5}$	7.02%
PM_{10}	4.51%
TSP	3.18%
PCDD/PCDF	17.11%

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 **[10]**. 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**.

No key sources are found in this category.

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 invistegation 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
NOx	303.3 g/GJ
NMVOC	12.9 g/GJ
SO_x	sulphur content 1%
NH_3	NE
TSP	11.6 g/GJ
PM_{10}	11.6 g/GJ
$PM_{2.5}$	10.7 g/GJ
BC	56% of $PM_{2.5}$
CO	40.3 g/GJ
Pb	2 mg/GJ
Cd	0.6 mg/GJ
Hg	0.4 mg/GJ
As	4.2 mg/GJ
Cr	0.6 mg/GJ
Cu	2 mg/GJ
Ni	0.4 mg/GJ
Se	2.1 mg/GJ
Zn	36 mg/GJ
PCDD/F	2.6 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

Table 44: Diesel consumption from NFR 1A4ci.

Year	Diesel consumption in tonnes
1990	12311
1991	13238
1992	15969
1993	16229
1994	18448

Year	Diesel consumption in tonnes
2004	18944
2005	19682
2006	20075
2007	18397
2008	17783

Year	Diesel consumption in tonnes
1995	17538
1996	18408
1997	19317
1998	20389
1999	21126
2000	21630
2001	21840
2002	22684
2003	21725

Year	Diesel consumption in tonnes
2009	15959
2010	15739
2011	16271
2012	15611
2013	15375
2014	14145
2015	15598
2016	15204
2017	15979

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. Since 2005 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 2016 **[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 **[10]**. NMVOC emissions are estimated based on fuel stored and distributed in Cyprus. The quantity of fuel was obtained from the national energy balance. 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 2017, approximately 74% 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)
Transport and Depots and Border Terminals	Road Tanker, Bottom Loading	9
	Road Tanker, Top Loading	9
	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 2017):

NMVOC	4.44%

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 2016 **[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)
NOx	54
NMVOC	2
SO_x	77
CO	12

The last few years drillings were conducted in the EEZ of Cyprus since it is expected to exploit hydrocarbons. Please note that there were no drillings in 2017. Emissions from this NFR category were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2016 **[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)
NOx	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.

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

No such activity takes place in Cyprus.

12.1.3. 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 2016 [**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 NOx and SOx 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 2016 **[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 $PM_{2.5}$, PM_{10}, 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 2017 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 importetd 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
NOx	1241 g/tonne clinker	184 g/tonne	1369 g/tonne
NMVOC	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

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 and Total Emissions (2017) for Cement, Lime, Brick and 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	1716889 (Clinker production)	2.13 (Gg)	152570 (bricks & tiles production)	0.028 (Gg)	4009 (lime production)	0.005 (Gg)
$PM_{2.5}$	Based on fuel consumption*[1]	0.327 (Gg)	Based on fuel consumption (LFO)	0.005 (Gg)	Based on fuel consumption (LFO)	0.00034 (Gg)
PM_{10}	Based on fuel consumption*[1]	0.33 (Gg)	Based on fuel consumption (LFO)	0.005 (Gg)	Based on fuel consumption (LFO)	0.00034 (Gg)
TSP	Based on fuel consumption*[1]	0.35 (Gg)	Based on fuel consumption (LFO)	0.005 (Gg)	Based on fuel consumption (LFO)	0.00034 (Gg)
CO	1716889 (Clinker production)	2.5 (Gg)	152570 (bricks & tiles production)	0.029 (Gg)	4009 (lime production)	0.008 (Gg)
Pb	1716889 (Clinker production)	0.17 (Mg)	Based on fuel consumption (LFO)	0.00002 (Mg)	Based on fuel consumption (LFO)	0.000001 (Mg)
Cd	1716889 (Clinker production)	0.014 (Mg)	Based on fuel consumption (LFO)	0.000002 (Mg)	Based on fuel consumption (LFO)	0.0000001 (Mg)
Hg	1716889 (Clinker production)	0.084 (Mg)	Based on fuel consumption (LFO)	0.00003 (Mg)	Based on fuel consumption (LFO)	0.000002 (Mg)
As	1716889 (Clinker production)	0.045 (Mg)	Based on fuel consumption (LFO)	0.000008 (Mg)	Based on fuel consumption (LFO)	0.0000005 (Mg)
Cr	1716889 (Clinker production)	0.07 (Mg)	Based on fuel consumption (LFO)	0.00005 (Mg)	Based on fuel consumption (LFO)	0.000003 (Mg)
Cu	1716889 (Clinker production)	0.11 (Mg)	Based on fuel consumption (LFO)	0.00006 (Mg)	Based on fuel consumption (LFO)	0.000004 (Mg)
Ni	1716889 (Clinker production)	0.084 (Mg)	Based on fuel consumption (LFO)	0.000002 (Mg)	Based on fuel consumption (LFO)	0.0000001 (Mg)
Se	1716889 (Clinker production)	0.043 (Mg)	Based on fuel consumption (LFO)	$2.8 * 10^{-5}$ (Mg)	Based on fuel consumption (LFO)	$1.8 * 10^{-6}$ (Mg)
Zn	1716889 (Clinker production)	0.74 (Mg)	Based on fuel consumption (LFO)	0.0073 (Mg)	Based on fuel consumption (LFO)	0.0005 (Mg)

	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	1716889 (Clinker production)	0.007 (g)	Based on fuel consumption (LFO)	0.0004 (g)	Based on fuel consumption (LFO)	0.00002 (g)
Benzo(a) pyrene	1716889 (Clinker production)	0.00011 (Mg)	Based on fuel consumption (LFO)	0.0005 (Mg)	Based on fuel consumption (LFO)	0.00003 (Mg)
Benzo(b) fluoranthene	1716889 (Clinker production)	0.0005 (Mg)	Based on fuel consumption (LFO)	0.004 (Mg)	Based on fuel consumption (LFO)	0.0002 (Mg)
Benzo(k) fluorathene	1716889 (Clinker production)	0.0001 (Mg)	Based on fuel consumption (LFO)	0.0004 (Mg)	Based on fuel consumption (LFO)	0.00003 (Mg)
Indeno (1.2.3-cd) pyrene	1716889 (Clinker production)	0.00007 (Mg)	Based on fuel consumption (LFO)	0.0004 (Mg)	Based on fuel consumption (LFO)	0.00002 (Mg)
HCB	1716889 (Clinker production)	0.0079 (Kg)	-	-	-	-
PCBs	1716889 (Clinker production)	0.177 (kg)	-	-	-	-

Category 1A2f is a key source for the following components (% of national total in 2017):

NOx	15.36%
$PM_{2.5}$	26.01%
PM_{10}	16.63%
TSP	11.62%
BC	33.13%
CO	18.38%
Cd	25.83%
Hg	84.20%
HCB	85.04%
PCBs	90.15%

12.1.4. 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 those 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% PM_{10} 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% reduction of TSP, 80% PM_{10} and 73% $PM_{2.5.}$

Activity data are based on annual environmental reports and emissions are estimated based on Tier 2 methodology of the EMEP/EEA Guidebook **[10]**. In **Table 50** the emission factors used are given. Activity data (cement production) for the time series 1990-2017 are given in **Table 51**.

Table 50: EFs used in NFR 2A1.

Pollutant	Emission Factor (g/Mg clinker)
	Dry process
$PM_{2.5}$	0.13
PM_{10}	0.234
TSP	0.26
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

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

	$PM_{2.5}$	PM_{10}	TSP
Emission Factors	**130 g/Mg clinker**	**234 g/Mg clinker**	**260 g/Mg clinker**
Abatement efficiency	**73%**	**80%**	**98%**

Table 53: Activity data and Particulate Emissions.

Year	Clinker production (tn)	$PM_{2.5}$ Emissions Total (ktn)	PM_{10} 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	0.0533	0.0538
2013	1418452	0.050	0.0793	0.0800
2014	1822972	0.064	0.1019	0.1029
2015	1640717	0.058	0.0917	0.0926
2016	1648256	0.058	0.0921	0.0930

No key sources are found in this category.

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 **[10].** 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 (kg/Mg lime produced)
$PM_{2.5}$	0.7
PM_{10}	3.5
TSP	9
BC	0.46 % of $PM_{2.5}$

Table 55: Activity data from Lime Industries

Year	Lime Production In tonnes
1990	4637
1991	4353
1992	4133
1993	5537
1994	7166
1995	4342
1996	4591
1997	5915
1998	4345
1999	5980
2000	6065
2001	7579
2002	11864
2003	12511

Year	Lime Production In tonnes
2004	11940
2005	14822
2006	12778
2007	12083
2008	12779
2009	10457
2010	11545
2011	8777
2012	4238
2013	2816
2014	3597
2015	3328
2016	3282
2017	4009

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 2016 **[10]**. In **Table 56** the emission factors used are given.

Table 56: EFs used in NFR 2A5a.

Pollutant	Emission Factor (g/Mg mineral)
$PM_{2.5}$	3.8
PM_{10}	25.0
TSP	51.0

Category 2A5a is a key source for the following components (% of national total in 2017):

PM_{10}	5.85%
TSP	7.59%

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 2017):

PM_{10}	6.47%
TSP	14.69%

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 **[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

No key sources are found in this category.

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	4518[1]	1047	4107[1]
2017	4518[1]	1543	4107[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 2017 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 **[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 **[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	132[1]
2017	132[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 **[**10**]**. The emission factors used are given in **Table 63**.

Table 63: EFs used in NFR 2D3c

Pollutant	Emission Factor (g/Mg shingle)
NMVOC	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 2017).

TSP	3.46%

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
2014	75
2015	66
2016	66[1]
2017	66[1]

Note [1]: Provisional values

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 2016 **[10]**. Based on the data which were published by the Statistical Service of Cyprus, the population of Cyprus for 2017 was 864200. The NMVOC emission factor used is 1.2 kg/person/year. This was change after the TERT question / observation of 2017. Category 2D3a is a key source for the following components (% of national total in 2017):

NMVOC	7.82%

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 **[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 - Decopaint) have been fully implemented.

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

Table 65: Timeseries Abatement Efficiencies used in NFR 2D3.

Paint	1990 - 2007	2008 - 2010	2011 - 2017
Decorative – water based	0%	26%	65%
Car repairing – Solvent based	0%	8%	8%
Wood Coating – Solvent based	0%	31%	50%

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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

Category 2D3d “Coating application” is a key source for the following components (% of national total in 2017):

NMVOC	15.33%

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	8031	2421
2017	8418	2994

[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 emmisions 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 2017):

NMVOC	15.33%

13.3. Dry Cleaning (2D3f)

Activity data are provided by the annual environmental reports submiited 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 **[10].** The NMVOC emission factor used is 11g/kg product.

Due to the full implementation of the provisions of Decopaint 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 **[10]**. The NMVOC emission factor used is 730g/kg ink.

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
2010	482148
2011	655067
2012	520175
2013	405445
2014	512335

Year	Ink Consumption (ton)
2015	494393
2016	518734
2017	519488

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 **[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	11311
2001	11911
2002	10545
2003	12282
2004	16269
2005	16235
2006	15060
2007	14726
2008	17350
2009	14550
2010	17280
2011	9885
2012	10950
2013	10955
2014	8680
2015	9035
2016	9035[1]
2017	9035[1]

Note [1]: Provisional data

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 **[10]**. In **Table 70** the emission factors used are given. Activity data for the Gategory 2G are given in **Table 71**.
Category 2G is not a key source.

Table 70: EFs used in NFR 2G

Pollutants	Emission Factors	
	Tobacco combustion	Use of fireworks
NOx	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
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

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

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 – 2017 were calculated based on Tier 2 methodology of the EMEP/EEA Guidebook 2013 **[11] (**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	2016	2017
3B1a	Cattle dairy	22.4	29.5	23.5	24.6	23.4	26.2	28.5	30.3
3B1b	Cattle non dairy	32.3	38.6	30.7	33.0	31.3	32.7	34.4	36.6
3B2	Sheep	290.0	250.0	246.0	268.9	328.9	296.9	304.2	321.5
3B3	Swine: Fattening pigs	244.2	325.7	356.3	379.1	417.4	326.2	320.0	317.0
3B4	Swine: Sows	33.8	48.4	52.1	50.6	46.3	31.8	32.6	33.0
3B4d	Goats	205.0	220.0	378.6	329.3	307.4	233.9	246.6	257.6
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	575.9	570.3
3B4gii	Broilers	2992.9	3623.6	4200.0	3727.0	3223.7	2604.9	2675.8	2777.7
3B4giii	Turkeys	53.7	58.7	65.0	32.9	14.1	9.8	9.7	11.8
3B4giv	Other poultry	6.7	13.3	15.0	10.3	0	0	0	0

During Reviewing June 2018 (Observation CY-3B-2018-0001), we were are asked to complete the excel file used for the calculations with the categories: a) Diary cattle – tied housing and b) for buffalo. At that time we informed the Review Team that 50% of the Diary cattles are assumed to be Diary cattle – tied housing and as a consequence we submitted an excel with new calculations. In the meantime, we made our search and found out that this practice is not applicable in Cyprus. We do not have Diary cattle – tied housing. For this reason we made new calculations for the whole timeseries 1990 -2017.

Table 73: EFs NH_3 used in NFR 3B.

		EF NH_3							
NFR Code	Longname	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

14.1.1. Dairy Cattle (3B1a)

Category 3B1a is a key source for the following components (% of national total in 2017):

NH_3	22.71%

14.1.2. Non – dairy cattle (3B1b)

Category 3B1b is a key source for the following components (% of national total in 2017):

NH_3	5.26%

14.1.3. Sheep (3B2)

No key source are found in this Category

14.1.4. Swine (3B3)

Category 3B3 is a key source for the following components (% of national total in 2017):

NH_3	39.49%
PM_{10}	6.39%
TSP	9.66%

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 2017):

PM_{10}	4.67%

14.1.10. Turkeys (3B4giii) and Other poultries (3B4giv)

No key sources are found in theses categories.

14.2. Agriculture Other (3D)

14.2.1. Synthetic N-Fertilizers (3Da1)

Activity data concerning the amount of applied nitrogen fertilizers were provided by the Statistical Service are given in **Table 74**. Emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook **[10]**. The emission factors used are presented in **Table 75**.

Table 74: Activity data from NFR 3Da1.

Year	N-Fertilizers applied (in Mg)	Area covered by crop (in hectares)
1990	14190	57500
1991	14330	58790
1992	17935	65110
1993	15144	69100
1994	14773	63500
1995	13973	60870
1996	14742	58940
1997	11790	58020
1998	9954	59090
1999	10621	58940
2000	10707	51480
2001	11673	55970
2002	9346	59200
2003	7459	72700
2004	8442	66400
2005	8964	62100
2006	8126	59200
2007	7655	43600
2008	5981	38700
2009	4920	31200
2010	6137	32900
2011	4504	35900
2012	4864	37800
2013	4709	30800
2014	3847	25303
2015	4156	33385
2016	4873	23795
2017	3839	20215

Table 75: EFs used in NFR 3Da1.

Pollutant	Emission Factor
NOx	0.04 kg/kg fertilizer-N applied
NH_3	0.05 kg/kg fertilizer-N applied

The applied kg of fertilizer per hectare of area was decreased during the last years due to the following reasons: a) Cost- The farmers tried to minimize their cost by reducing the amounts of fertilizers applied per hectare and b) Training of Farmers. At the beginning the farmers were overdosing their fields but now, after been trained by the people of the MARDE, the applied amount of fertilizer is decreased.

14.2.2. Animal Manure applied to soils (3Da2a)

Activity data and emissions for NH_3 concerning the amount of applied animal manure to soils had been calculated using the excel file provided with the CORINAIR EMEP/EEA Guidebook 2013 **[11]**.

Category 3Da2a is a key source for the following components (% of national total in 2017):

NH_3	10.36%

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 NH_3 is 0.0066 kg/capita and for NOx 0.002 kg/capita and the number of capita used is 864200 for the year 2017. 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.

14.2.4. Urine and dung deposited by grazing animals (3Da3)

Activity data and emissions for NH_3 concerning the amount of applied animal manure to soils had been calculated using the excel file provided with the CORINAIR EMEP/EEA Guidebook 2013 **[11]**.

Category 3Da3 is a key source for the following components (% of national total in 2017):

NH_3	7.39%

14.2.5. 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 **[10]**. The emission factors used are presented in **Table 75**.

Table 76: 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}

14.2.6. 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 **[10]**. The emission factors used are presented in **Table** 77.

Table 77: EFs used in NFR 3De

Pollutant	Emission Factor
NMVOC	0.86 kg/ha^{-1}

14.3. 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 2016 **[10]**. The emission factors used are presented in **Table 78**.

Table 78: EFs used in NFR 3F.

Pollutant	Emission Factor
NOx	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
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 2017):

PAHs	80.40%

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. Emissions were calculated based on Tier 1 methodology of the EMEP/EEA Guidebook 2016 **[10]**. The emission factors used for this category are shown in **Table 80**: EFs used in NFR 5A.

Category 5A is a key source for the following component (% of national total in 2017):

NMVOC	4.87%

Activity data are presented in **Table 79**.

Table 79: Activity data from NFR 5A.

Year	Solid Waste Disposal (in Gg)
1990	338
1991	348
1992	358
1993	369
1994	381
1995	387
1996	389
1997	398
1998	406
1999	413
2000	423
2001	442
2002	450
2003	467
2004	482
2005	489
2006	500
2007	512
2008	531
2009	540
2010	490
2011	461
2012	451
2013	423
2014	398
2015	403
2016	410

Year	Solid Waste Disposal (in Gg)
2017	414

Table 80: EFs used in NFR 5A.

Pollutant	Emission Factor
NMVOC	1.56 kg/Mg waste
$PM_{2.5}$	0.033 kg/Mg waste
PM_{10}	0.219 kg/Mg waste
TSP	0.436 kg/Mg waste

15.2. 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.

15.3. 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 2016 **[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 81**. Furthermore, it should be mentioned that in Cyprus there is no cremation of human bodies. In 2008, a relevant legislation on cremation of human bodies was enacted in Cyprus. However, there is no application submitted yet to build crematoria.

Table 81: 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.

15.4. 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 2016 **[10]**. The emission factors used are presented in **Table 82**.

Table 82: EFs used in NFR 5C2.

Pollutant	Emission Factor
NMVOC	1.23 kg/Mg waste
NOx	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.

15.5. 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 2016 **[10]**. The NMVOC emission factor used is 15 mg/m^3 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

Year	Waste water (in thousands of m^3)
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

No key sources are found in this category.

15.6. 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 **[10].** The emission factors used are presented in **Table 83**.

Table 83: EFs used in NFR 5E.

Pollutant	Car Fire	Detached house fire	Undetached house fire	Appartment 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

No key sources are found in this category.

16. Recalculations and Improvements

16.1. Recalculations

In the preparation of the 2017 submission, some methodological improvements were included in the national emission inventory. This led to recalculations of the time series 1990-2016, 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 2016 and the implementation of the TERT 2017 and 2018 suggestions.

The following major changes can be distinguished:

16.1.1. NFR Category K_Agrilivestock

3B Manure emissions recalculations for the years 1990 to 2016 were done based on the methodology proposed in the new EMEP/EEA Emission Inventory Guidebook 2016.

Furthermore, methods to reduce ammonia emisions from manure are applied, as abatement measures. Either aerobic or anaerobic treatment. More details are available in **Table 84** on page 123.

16.1.2. NFR Category F_RoadTransport

The emissions from the road transport sector were recalculated the whole time series 1990 – 2017 because we –used new data for the fuel consumption. These data are taken from the Cyprus Statistical Service.

16.1.3. NFR Category 1A1a - Public Electricity and heat production

Emissions due to Biomass were calculated in the submission of February 2019.

16.1.4. NFR Category 1A4bi – Residential - Stationary

Emissions due to LPG and kerosene were calculated in the submission of February 2019.

16.1.5. NFR Category 1A3a(i) and 1A3aii(i) - Aviation

Emissions were recalcualated because for the years 2005 up to 2107 EUROCONTROL Data were used, and for the rest of the years 1990 - 2004 the overlap method was used to fill the gap.

16.1.6. NFR Categories 2D3d and 2D3i

Recalculations were done for the whole timeseries 1990 – 2016 for the above mentioned categories since the quanities of glues were removed for category 2D3d and added to category 2D3i, after the TERT observation.

16.2. Improvements

16.2.1. NFR Categories manure – Anaerobic Treatment

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

16.2.2. NFR Categories manure – Sewage Connection

The entire population is not connected to Sewage. Houses in villages have their own septic tanks for their wastes. We have collected these data from the relevant Authorities, but we will use them in next submission.

Table 84: Livestock Sludge Treatment 1990-2017

	Dairy Cattle		Other Cattle		Sheep	Market Swine		Breeding Swine		Horses	Mules & Asses	Goats	Poultry		TOTAL
	solid storage	anaerobic digester	solid storage	anaerobic digester	solid storage	anaerobic digester	aerobic treatment	anaerobic digester	aerobic treatment	solid storage	solid storage	solid storage	solid storage	anaerobic digester	
1990	2159524	0	1360465	0	3598900	0	1034959	0	2272715	19654	128793	3831040	3357474	0	17763522
1991	2227843	0	1345288	0	3660950	0	1151774	0	2407497	18477	113723	3831040	3093226	0	17849817
1992	2302715	0	1345499	0	3536850	0	1300383	0	2787903	17300	98654	3737600	3488112	0	18615016
1993	2471249	0	1494821	0	3412750	0	1337420	0	3032272	16124	83585	3700224	4135951	0	19684394
1994	2657031	0	1550974	0	3164550	0	1473152	0	2868181	14947	68516	3924480	3919507	0	19641336
1995	2840789	0	1629303	0	3102500	0	1483975	0	3031201	18800	64937	4111360	4053471	0	20336336
1996	2632459	0	1803034	0	3127320	0	1498170	0	3263824	22653	61359	4485120	4316492	0	21210430
1997	2456313	0	1557087	0	3040450	0	1634761	0	3364373	26506	57780	5643776	4377385	0	22158430
1998	2295488	0	1349841	0	2978400	0	1526807	0	3550821	30359	54201	6017536	4448094	0	22251546
1999	2317651	0	1273157	0	2891530	0	1354344	0	3484049	34211	50623	6466048	4382929	0	22254541
2000	2265520	0	1293055	0	3052860	0	1597386	0	3316262	38064	47044	7075277	4389746	0	23075214
2001	2347811	0	1225476	0	3680806	51257	1657302	110454	3571351	41917	43465	7981645	4428372	0	25139857
2002	2527716	0	1345836	0	3648540	103623	1623424	242965	3806458	45770	39886	8587136	4577877	0	26549232
2003	2564332	0	1344866	0	3283686	153290	1549934	362335	3663606	49623	36308	7622835	4557883	0	25188699
2004	2512876	0	1443178	0	3462142	190255	1395204	467745	3430133	47122	33024	7064064	4132541	0	24178285
2005	2369011	0	1390945	0	3336726	232732	1318817	529291	2999313	44621	29741	6153902	4015799	0	22420897
2006	2305991	0	1356544	0	3377903	292430	1332182	669597	3050387	42119	26458	6446052	3362481	68622	22330766
2007	2283828	0	1314850	0	3626078	347878	1308682	774539	2913744	39618	23174	6879427	3470628	144609	23127055
2008	2254789	22776	1337553	13511	3317292	355573	1125980	930623	2946974	37117	19891	5950278	3325163	212244	21849764
2009	2212719	22351	1289724	13028	3725482	389398	1052817	1045974	2828003	34615	16607	5248338	3171863	275814	21326734
2010	2234279	22568	1306084	13193	4081202	425923	993819	1165549	2719615	32114	16400	5745214	3102464	344718	22203144
2011	2296191	23194	1370775	13846	4417265	372611	869426	1113354	2597826	29613	14825	5423893	3008688	334299	21885804
2012	2252701	69671	1342224	41512	4304235	445723	668584	1334182	2001273	27112	13400	5067718	2853185	317021	20738540
2013	2308689	71403	1330487	41149	3890014	430086	645129	1201881	1802822	24610	12113	4543520	2528493	280944	19111341
2014	2318301	122016	1370458	72129	3635907	520975	520975	1433732	1433732	22109	10949	4335859	3007710	334190	19139042
2015	2397393	126179	1308421	68864	3683995	491372	491372	1518281	1518281	19608	9898	4370918	2436768	430018	18871369
2016	2609130	137323	1383314	72806	3774961	499881	499881	1487204	1487204	17106	8947	4608909	2519435	444606	19550706
2017	2717122	158139	1428264	83126	3888209	515398	494361	1533369	1470782	17125	8947	4747177	2557228	466096	20085342

17. Projections

17.1. Introduction

According to the provisions of the new National Emissions Ceilings Directive (EU) 2016/2284 Table C, Annex 1 **[21],** as regards the obligation to submit a Projections Report, Cyprus is obliged to submit a report in 2019 (2017 + 2 years).

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

Under the negotiations on the revision of the National Emissions Ceilings Directive [21], projections were made for all the member states to set national emission ceilings for the year 2030 by the IIASA Institute. The IIASA has presented a report [**20**] to European Comission which describes the methodology for the estimation of 2030 and proposes emission ceilings for all the member states. Since there were a lot of discussions for the correctiveness of these calculations with various Member States, the European Commission gave the opportunity to each member to have negotiations with representatives of IIASA, regardings the emissions reductions limits. Cyprus experts provided them with its own projections / calculations. Both IIASA and Cyprus projections / calculations are mentioned in TSAP16a of IIASA report [**18**].

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 **[17]** for stationary sources and
- the implementation of EURO-VI standard from 2014 onwards.

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 [**17**] 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 life time 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 using liquid fuels with less than 1% sulphur content.

17.1.3. 2020 – 2030 Emission Obligations

Based on the above, the Cyprus emission obligations for the SO_2, NOx, VOC, NH_3 and $PM_{2.5}$ annual emissions are the following (revised Gothenburg Protocol in 2012 and the new NECD):

Year	SO_2	NOx	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 compare to the total emissions of the reference year 2005.

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. 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 85**.

Table 85: List of Policies and Measures.

A. Energy
A1. Natural Gas
A2. Renewable Energy Sources
A2.1. Renewable Energy Sources in Electricity Production
A2.2. Renewable Energy Sources for Heating and Cooling
A2.3. Renewable Energy Sources in Transport
A3. Energy efficiency and savings
A3.1. Savings from Energy Efficiency in Residential Buildings
A3.2. Savings from Energy Efficiency in Tertiary Buildings
A3.3. Savings from Efficient Bulbs
A3.4. Savings from Insulation in Residential Sector
A3.5. Savings in Existing Companies
A4. Energy savings from promotion of biomass and alternative fuels in industry
B. Transport
B1. Reduction in fuel consumption for transport from the promotion of public transport
C. Agriculture
C1. Reduction of emissions from manure management from the promotion of Anaerobic Digestion for animal waste
D. Waste

D1. Reduction of emissions from controlled waste management sites from biogas recovery
D2. Reduction of emissions from wastewater treatment from the promotion of Anaerobic Digestion
D3. Reduction of organics to landfill
D4. Separate organics collection

Reduction of emissions from uncontrolled waste management sites from management of uncontrolled disposal sites was a measure which has been fully implemented by 2013.
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 UNFCC by the Department of Environment of the MARDE.
http://cdr.eionet.europa.eu/cy/eu/mmr/art04-13-14_lcds_pams_projections/pams/

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

17.2. Energy Sector

17.2.1. Public electricity and heat production (1A1a)

The main factors that affects the emissions from 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 demand and the fuel used, please find data in the following Table 86. The estimations were made by the CUT in October 2018.

Table 86: Contribution of Various Fuels On Total Electricity Demand

	2017	2020	2025	2030
Oil (fossil)	4200	4735	1037	1180
Natural Gas	0	0	4211	4343
Coal	0	0	0	0
Renewable sources	359	526	926	1381
Total Electricity Demand (GWh)	4559	5261	6174	6904

It is noted that the use of Natural Gas in the electricity production is estimated to be done 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) Desulfarization units will be installed in Steam Turbine 1 , 2 and 3 of the Vasilikos Power Plant.
2) The use of HFO in Dekelia Power Plant will completely stop 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 Diesel fuels will be used in the Power Plants. The Diesel will be used for the ICE units. The use of the ICE units is needed in order to increase the stability of the electricity supply.

17.2.2. F- Road Transport

Emissions and vehicles data were taken from IIASA study, made for Cyprus for the new NECD.

Please find in Table 87 the vehicle projections made by IIASA.

Table 87: Vehicle Projections per Category

Sector Activity Unit: [thousands of vehicles]	2000	2005	2010	2015	2020	2025	2030
2-wheelers	59.403	59.924	74.546	59.859	62.066	67.596	73.644
Cars and light trucks - gasoline	278.849	384.835	537.909	529.708	514.180	485.869	498.632
Cars and light trucks - diesel	139.912	157.509	190.797	166.205	202.076	275.447	331.103
Heavy trucks - diesel	12.604	16.317	12.716	14.330	14.276	14.586	14.901
Other vehicles	3.372	3.795	3.814	4.358	4.817	5.092	5.277
Non-exhaust	n.a	n.a	n.a	n.a	n.a	n.a	n.a
electric vehicles	4.225	5.320	n.a	0.058	1.889	5.013	8.556
Sum	498.365	627.700	819.782	774.518	799.303	853.603	932.114

17.3. Industrial Processes and Product Use

In Cyprus there are 7 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). Regarding fuel consumed for these plants is aprox. 94% of the total fuel consumed for 1A2f category. IED is not affecting these plants and there is not an additional Cypriot Requlation. 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 2000000 tonnes 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:

Bricks and Tiles Industries (tn/year)	87440	111561	152570	209100	209100	209100
Lime (tn/year)	3328	3282	4009	4330	4651	5820

17.4. Agriculture

In this sector, we assume that there is a certain increase in the livestock, which is presented in the following Table 88. In addition a percentage of the manure quantities is treated in anerobic digester, so the quantities disposed on soil are less. These amounts are shown in Table 89.

Table 88: 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
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

	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
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

Table 89: Livestock Solid Waste for Digestion

	dairy cattle		other cattle		market swine		breeding swine		horses	mules & asses	sheep	goats	poultry		TOTAL
	solid storage	anaerobic digester	solid storage	anaerobic digester	anaerobic digester	aerobic treatment	anaerobic digester	aerobic treatment	solid storage	solid storage	solid storage	solid storage	solid storage	anaerobic digester	
1990	2159524	0	1360465	0	0	1034959	0	2272715	19654	128793	3598900	3831040	3357474	0	17763522
1991	2227843	0	1345288	0	0	1151774	0	2407497	18477	113723	3660950	3831040	3093226	0	17849817
1992	2302715	0	1345499	0	0	1300383	0	2787903	17300	98654	3536850	3737600	3488112	0	18615016
1993	2471249	0	1494821	0	0	1337420	0	3032272	16124	83585	3412750	3700224	4135951	0	19684394
1994	2657031	0	1550974	0	0	1473152	0	2868181	14947	68516	3164550	3924480	3919507	0	19641336
1995	2840789	0	1629303	0	0	1483975	0	3031201	18800	64937	3102500	4111360	4053471	0	20336336
1996	2632459	0	1803034	0	0	1498170	0	3263824	22653	61359	3127320	4485120	4316492	0	21210430
1997	2456313	0	1557087	0	0	1634761	0	3364373	26506	57780	3040450	5643776	4377385	0	22158430
1998	2295488	0	1349841	0	0	1526807	0	3550821	30359	54201	2978400	6017536	4448094	0	22251546
1999	2317651	0	1273157	0	0	1354344	0	3484049	34211	50623	2891530	6466048	4382929	0	22254541
2000	2265520	0	1293055	0	0	1597386	0	3316262	38064	47044	3052860	7075277	4389746	0	23075214
2001	2347811	0	1225476	0	51257	1657302	110454	3571351	41917	43465	3680806	7981645	4428372	0	25139857
2002	2527716	0	1345836	0	103623	1623424	242965	3806458	45770	39886	3648540	8587136	4577877	0	26549232
2003	2564332	0	1344866	0	153290	1549934	362335	3663606	49623	36308	3283686	7622835	4557883	0	25188699
2004	2512876	0	1443178	0	190255	1395204	467745	3430133	47122	33024	3462142	7064064	4132541	0	24178285
2005	2369011	0	1390945	0	232732	1318817	529291	2999313	44621	29741	3336726	6153902	4015799	0	22420897
2006	2305991	0	1356544	0	292430	1332182	669597	3050387	42119	26458	3377903	6446052	3362481	68622	22330766
2007	2283828	0	1314850	0	347878	1308682	774539	2913744	39618	23174	3626078	6879427	3470628	144609	23127055
2008	2254789	22776	1337553	13511	355573	1125980	930623	2946974	37117	19891	3317292	5950278	3325163	212244	21849764
2009	2212719	22351	1289724	13028	389398	1052817	1045974	2828003	34615	16607	3725482	5248338	3171863	275814	21326734
2010	2234279	22568	1306084	13193	425923	993819	1165549	2719615	32114	16400	4081202	5745214	3102464	344718	22203144
2011	2296191	23194	1370775	13846	372611	869426	1113354	2597826	29613	14825	4417265	5423893	3008688	334299	21885804
2012	2252701	69671	1342224	41512	445723	668584	1334182	2001273	27112	13400	4304235	5067718	2853185	317021	20738540
2013	2308689	71403	1330487	41149	430086	645129	1201881	1802822	24610	12113	3890014	4543520	2528493	280944	19111341

	dairy cattle		other cattle		market swine		breeding swine		horses	mules & asses	sheep	goats	poultry		TOTAL
	solid storage	anaerobic digester	solid storage	anaerobic digester	anaerobic digester	aerobic treatment	anaerobic digester	aerobic treatment	solid storage	solid storage	solid storage	solid storage	solid storage	anaerobic digester	
2014	2318301	122016	1370458	72129	520975	520975	1433732	1433732	22109	10949	3635907	4335859	3007710	334190	19139042
2015	2397393	126179	1308421	68864	491372	491372	1518281	1518281	19608	9898	3683995	4370918	2436768	430018	18871369
2016	2609130	137323	1383314	72806	499881	499881	1487204	1487204	17106	8947	3774961	4608909	2519435	444606	19550706
2017	2717122	158139	1428264	83126	515398	494361	1533369	1470782	17125	8947	3888209	4747177	2557228	466096	20085342

17.5. Waste

In this sector we made the assumption that the waste production will be based on the population qrowth and the increase of production per capita of 1% each year.

Please find the data in Table 90.

Table 90: Waste per Capita

	Population	kg/capita	Total (tn)
2017	859982.6	**493**	423775.4
2018	865255.4	**498**	430750.8
2019	870654.4	**502**	437034.6
2020	876257.8	**506**	443115.5
2021	881841.1	**510**	449767.6
2022	887353.3	**514**	456404.7
2023	892781.4	**519**	463252.3
2024	898068.2	**524**	470175.1
2025	903198.7	**528**	477233.1
2026	908137.8	**534**	484584.3
2027	912879.6	**539**	492161
2028	917398	**545**	500196.1
2029	921705	**552**	508629.7
2030	925816.6	**559**	517544.3

Further more 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.

18. IIR References

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19. Annex 1: Level Assessment 2017

Annex 1

Key Category Analysis

Level Assessment 2017

Table 91: NOx Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	3655.11	25.18%	25.18%
1A3biii	Road transport: Heavy duty vehicles and buses	3181.60	21.91%	47.09%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	2229.98	15.36%	62.45%
1A3bi	Road transport: Passenger cars	1640.50	11.30%	73.75%
1A3bii	Road transport: Light duty vehicles	1377.38	9.49%	83.23%
1A3ai(i)	International aviation LTO (civil)	470.63	3.24%	86.48%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	425.89	2.93%	89.41%
1A4bi	Residential: Stationary	317.73	2.19%	91.60%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	275.29	1.90%	93.49%
3Da1	Inorganic N-fertilizers (includes also urea application)	235.46	1.62%	95.12%
1A4ci	Agriculture/Forestry/Fishing: Stationary	202.92	1.40%	96.51%
1A3dii	National navigation (shipping)	139.63	0.96%	97.47%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	79.61	0.55%	98.02%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	70.06	0.48%	98.51%
1A5b	Other, Mobile (including military, land based and recreational boats)	52.20	0.36%	98.86%
1A3biv	Road transport: Mopeds & motorcycles	43.01	0.30%	99.16%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	42.90	0.30%	99.46%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	24.70	0.17%	99.63%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	18.84	0.13%	99.76%
3B3	Manure management - Swine	13.59	0.09%	99.85%
3B1a	Manure management - Dairy cattle	3.73	0.03%	99.88%

Table 91: NOx Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3B4gii	Manure mangement - Broilers	**3.43**	**0.02%**	**99.90%**
3F	Field burning of agricultural residues	**2.79**	**0.02%**	**99.92%**
5C2	Open burning of waste	**2.22**	**0.02%**	**99.93%**
2G	Other product use (please specify in the IIR)	**2.18**	**0.02%**	**99.95%**
3Da2b	Sewage sludge applied to soils	**1.73**	**0.01%**	**99.96%**
3B1b	Manure management - Non-dairy cattle	**1.39**	**0.01%**	**99.97%**
3B4gi	Manure mangement - Laying hens	**1.22**	**0.01%**	**99.98%**
1A3aii(i)	Domestic aviation LTO (civil)	**1.01**	**0.01%**	**99.99%**
3B2	Manure management - Sheep	**0.79**	**0.01%**	**99.99%**
3B4d	Manure management - Goats	**0.63**	**0.00%**	**100.00%**
1A4ciii	Agriculture/Forestry/Fishing: National fishing	**0.51**	**0.00%**	**100.00%**
3B4giii	Manure mangement - 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	**14518.79**	**100%**	

Table 92: NMVOC Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
2D3i	Other solvent use (please specify in the IIR)	4716.27	35.57%	35.57%
2D3d	Coating applications	2032.17	15.33%	50.89%
1A3bv	Road transport: Gasoline evaporation	1183.66	8.93%	59.82%
2D3a	Domestic solvent use including fungicides	1037.04	7.82%	67.64%
5A	Biological treatment of waste - Solid waste disposal on land	646.35	4.87%	72.51%
1A3bi	Road transport: Passenger cars	616.50	4.65%	77.16%
1B2av	Distribution of oil products	589.19	4.44%	81.61%
1A3biv	Road transport: Mopeds & motorcycles	373.98	2.82%	84.43%
2D3h	Printing	265.46	2.00%	86.43%
3B3	Manure management - Swine	250.79	1.89%	88.32%
3B1a	Manure management - Dairy cattle	239.96	1.81%	90.13%
3B4gii	Manure mangement - Broilers	230.42	1.74%	91.87%
1A3biii	Road transport: Heavy duty vehicles and buses	156.94	1.18%	93.05%
2H2	Food and beverages industry	153.50	1.16%	94.21%
3B1b	Manure management - Non-dairy cattle	143.70	1.08%	95.29%
1A3bii	Road transport: Light duty vehicles	101.98	0.77%	96.06%
1A1a	Public electricity and heat production	76.17	0.57%	96.64%
1A4bi	Residential: Stationary	72.01	0.54%	97.18%
2D3f	Dry cleaning	52.61	0.40%	97.58%
3B4gi	Manure mangement - Laying hens	47.09	0.36%	97.93%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	40.82	0.31%	98.24%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	31.05	0.23%	98.47%

Table 92: NMVOC Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3ai(i)	International aviation LTO (civil)	**30.93**	**0.23%**	**98.71%**
3B2	Manure management - Sheep	**28.98**	**0.22%**	**98.93%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**28.30**	**0.21%**	**99.14%**
3B4d	Manure management - Goats	**17.42**	**0.13%**	**99.27%**
3De	Cultivated crops	**17.38**	**0.13%**	**99.40%**
2D3g	Chemical products	**11.11**	**0.08%**	**99.49%**
1A3dii	National navigation (shipping)	**10.09**	**0.08%**	**99.56%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**8.63**	**0.07%**	**99.63%**
2D3c	Asphalt roofing	**8.57**	**0.06%**	**99.69%**
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	**8.24**	**0.06%**	**99.75%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**7.34**	**0.06%**	**99.81%**
2G	Other product use (please specify in the IIR)	**5.86**	**0.04%**	**99.85%**
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	**3.41**	**0.03%**	**99.88%**
1A5b	Other, Mobile (including military, land based and recreational boats)	**3.40**	**0.03%**	**99.90%**
3B4giii	Manure mangement - Turkeys	**3.33**	**0.03%**	**99.93%**
3B4e	Manure management - Horses	**2.44**	**0.02%**	**99.95%**
2D3b	Road paving with asphalt	**1.98**	**0.01%**	**99.96%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**1.20**	**0.01%**	**99.97%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.92**	**0.01%**	**99.98%**
5C2	Open burning of waste	**0.86**	**0.01%**	**99.98%**
3B4f	Manure management - Mules and asses	**0.75**	**0.01%**	**99.99%**
3F	Field burning of agricultural residues	**0.61**	**0.00%**	**100.00%**
5D1	Domestic wastewater handling	**0.51**	**0.00%**	**100.00%**

Table 92: NMVOC Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3aii(i)	Domestic aviation LTO (civil)	**0.11**	**0.00%**	**100.00%**
1A4ciii	Agriculture/Forestry/Fishing: National fishing	**0.04**	**0.00%**	**100.00%**
	TOTAL	**13260.08**	**100.00%**	

Table 93: SOx Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	**14724.25**	**89.40%**	**89.40%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**710.66**	**4.31%**	**93.72%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**393.99**	**2.39%**	**96.11%**
1A4bi	Residential: Stationary	**204.73**	**1.24%**	**97.35%**
1A3dii	National navigation (shipping)	**138.21**	**0.84%**	**98.19%**
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	**65.24**	**0.40%**	**98.59%**
1A5b	Other, Mobile (including military, land based and recreational boats)	**64.52**	**0.39%**	**98.98%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**38.64**	**0.23%**	**99.21%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**31.96**	**0.19%**	**99.41%**
1A3ai(i)	International aviation LTO (civil)	**26.62**	**0.16%**	**99.57%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**23.00**	**0.14%**	**99.71%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**17.54**	**0.11%**	**99.82%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**15.98**	**0.10%**	**99.91%**
1A3bi	Road transport: Passenger cars	**8.68**	**0.05%**	**99.97%**
1A3biii	Road transport: Heavy duty vehicles and buses	**2.24**	**0.01%**	**99.98%**
1A3bii	Road transport: Light duty vehicles	**2.02**	**0.01%**	**99.99%**
3F	Field burning of agricultural residues	**0.61**	**0.00%**	**99.99%**
1A4ciii	Agriculture/Forestry/Fishing: National fishing	**0.51**	**0.00%**	**100.00%**
1A3biv	Road transport: Mopeds & motorcycles	**0.13**	**0.00%**	**100.00%**
5C2	Open burning of waste	**0.08**	**0.00%**	**100.00%**

Table 93: SOx Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3aii(i)	Domestic aviation LTO (civil)	**0.07**	**0.00%**	**100.00%**
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	**0.05**	**0.00%**	**100.00%**
2G	Other product use (please specify in the IIR)	**0.03**	**0.00%**	**100.00%**
	T0TAL	**16469.74**	**100.00%**	

Table 94: NH_3 Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3B3	Manure management - Swine	2559.94	39.49%	39.49%
3B1a	Manure management - Dairy cattle	1472.25	22.71%	62.19%
3Da2a	Animal manure applied to soils	671.95	10.36%	72.56%
3Da3	Urine and dung deposited by grazing animals	478.91	7.39%	79.95%
3B1b	Manure management - Non-dairy cattle	341.17	5.26%	85.21%
3B4gi	Manure mangement - Laying hens	247.38	3.82%	89.02%
3Da1	Inorganic N-fertilizers (includes also urea application)	191.95	2.96%	91.99%
1A3bi	Road transport: Passenger cars	187.15	2.89%	94.87%
3B4gii	Manure mangement - Broilers	145.01	2.24%	97.11%
3B2	Manure management - Sheep	81.83	1.26%	98.37%
3B4d	Manure management - Goats	65.58	1.01%	99.38%
1A4bi	Residential: Stationary	7.61	0.12%	99.50%
3Da2b	Sewage sludge applied to soils	5.7037	0.09%	99.59%
2G	Other product use (please specify in the IIR)	5.03	0.08%	99.67%
5B1	Biological treatment of waste - Composting	3.96	0.06%	99.73%
1A3bii	Road transport: Light duty vehicles	3.56	0.05%	99.78%
3B4giii	Manure mangement - Turkeys	3.54	0.05%	99.84%
3F	Field burning of agricultural residues	2.91	0.04%	99.88%
3B4e	Manure management - Horses	2.02	0.03%	99.91%
1A3biii	Road transport: Heavy duty vehicles and buses	1.89	0.03%	99.94%
3B4f	Manure management - Mules and asses	1.40	0.02%	99.96%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	1.29	0.02%	99.98%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.66	0.01%	99.99%

Table 94: NH_3 Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3biv	Road transport: Mopeds & motorcycles	**0.41**	**0.01%**	**100.00%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**0.06**	**0.00%**	**100.00%**
	T0TAL	**6483.17**	**100.00%**	

Table 95: $PM_{2,5}$ Level Assessment for 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	334.79	26.01%	26.01%
1A1a	Public electricity and heat production	216.17	16.80%	42.81%
1A3bii	Road transport: Light duty vehicles	110.51	8.59%	51.40%
1A3bvi	Road transport: Automobile tyre and brake wear	94.42	7.34%	58.73%
1A4bi	Residential: Stationary	90.40	7.02%	65.76%
1A3biii	Road transport: Heavy duty vehicles and buses	77.79	6.04%	71.80%
1A3bi	Road transport: Passenger cars	67.61	5.25%	77.05%
1A3bvii	Road transport: Automobile road abrasion	42.80	3.33%	80.38%
2G	Other product use (please specify in the IIR)	33.25	2.58%	82.96%
3B3	Manure management - Swine	24.73	1.92%	84.89%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	21.36	1.66%	86.54%
5E	Other waste (please specify in IIR)	20.88	1.62%	88.17%
1A3dii	National navigation (shipping)	17.85	1.39%	89.55%
2A5a	Quarrying and mining of minerals other than coal	16.60	1.29%	90.84%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	15.28	1.19%	92.03%
2A5b	Construction and demolition	13.27	1.03%	93.06%
3B4gii	Manure mangement - Broilers	12.64	0.98%	94.04%
1A5b	Other, Mobile (including military, land based and recreational boats)	7.75	0.60%	94.65%
3B4gi	Manure mangement - Laying hens	7.39	0.57%	95.22%
1A4ci	Agriculture/Forestry/Fishing: Stationary	7.16	0.56%	95.78%
3F	Field burning of agricultural residues	6.55	0.51%	96.29%
3B1a	Manure management - Dairy cattle	6.12	0.48%	96.76%

Table 95: $PM_{2,5}$ Level Assessment for 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3biv	Road transport: Mopeds & motorcycles	**6.00**	**0.47%**	**97.23%**
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	**5.13**	**0.40%**	**97.63%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**4.10**	**0.32%**	**97.94%**
1A3ai(i)	International aviation LTO (civil)	**3.56**	**0.28%**	**98.22%**
3B1b	Manure management - Non-dairy cattle	**3.34**	**0.26%**	**98.48%**
5C2	Open burning of waste	**2.92**	**0.23%**	**98.71%**
2A2	Lime production	**2.81**	**0.22%**	**98.93%**
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	**2.73**	**0.21%**	**99.14%**
2D3c	Asphalt roofing	**2.64**	**0.20%**	**99.34%**
2A5c	Storage, handling and transport of mineral products	**2.46**	**0.19%**	**99.53%**
2A1	Cement production	**2.23**	**0.17%**	**99.71%**
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	**1.21**	**0.09%**	**99.80%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**0.96**	**0.07%**	**99.88%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.73**	**0.06%**	**99.93%**
3B2	Manure management - Sheep	**0.22**	**0.02%**	**99.95%**
3B4giii	Manure mangement - Turkeys	**0.19**	**0.01%**	**99.97%**
3B4d	Manure management - Goats	**0.18**	**0.01%**	**99.98%**
2D3b	Road paving with asphalt	**0.09**	**0.01%**	**99.99%**
1A4ciii	Agriculture/Forestry/Fishing: National fishing	**0.07**	**0.01%**	**99.99%**
5C1bv	Cremation	**0.04**	**0.00%**	**99.99%**

Table 95: $PM_{2,5}$ Level Assessment for 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3B4e	Manure management - Horses	**0.03**	**0.00%**	**100.00%**
5A	Biological treatment of waste - Solid waste disposal on land	**0.01**	**0.00%**	**100.00%**
3B4f	Manure management - Mules and asses	**0.01**	**0.00%**	**100.00%**
1A3aii(i)	Domestic aviation LTO (civil)	**0.01**	**0.00%**	**100.00%**
	T0TAL	**1286.99**	**100.00%**	

Table 96: PM_{10} Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	341.10	16.63%	16.63%
1A1a	Public electricity and heat production	315.99	15.40%	32.03%
1A3bvi	Road transport: Automobile tyre and brake wear	176.70	8.61%	40.65%
2A5b	Construction and demolition	132.67	6.47%	47.12%
3B3	Manure management - Swine	131.06	6.39%	53.51%
2A5a	Quarrying and mining of minerals other than coal	120.04	5.85%	59.36%
1A3bii	Road transport: Light duty vehicles	110.51	5.39%	64.74%
3B4gii	Manure mangement - Broilers	95.83	4.67%	69.42%
1A4bi	Residential: Stationary	92.57	4.51%	73.93%
1A3bvii	Road transport: Automobile road abrasion	79.26	3.86%	77.79%
1A3biii	Road transport: Heavy duty vehicles and buses	77.79	3.79%	81.59%
1A3bi	Road transport: Passenger cars	67.61	3.30%	84.88%
3B4gi	Manure mangement - Laying hens	41.06	2.00%	86.88%
2G	Other product use (please specify in the IIR)	33.77	1.65%	88.53%
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	31.54	1.54%	90.07%
2A5c	Storage, handling and transport of mineral products	24.64	1.20%	91.27%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	21.46	1.05%	92.31%
5E	Other waste (please specify in IIR)	20.88	1.02%	93.33%
2D3c	Asphalt roofing	19.77	0.96%	94.30%
1A3dii	National navigation (shipping)	17.85	0.87%	95.17%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	15.28	0.75%	95.91%

Table 96: PM_{10} Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
2A2	Lime production	**14.03**	**0.68%**	**96.60%**
3B1a	Manure management - Dairy cattle	**9.40**	**0.46%**	**97.05%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**7.76**	**0.38%**	**97.43%**
1A5b	Other, Mobile (including military, land based and recreational boats)	**7.75**	**0.38%**	**97.81%**
3F	Field burning of agricultural residues	**6.91**	**0.34%**	**98.15%**
1A3biv	Road transport: Mopeds & motorcycles	**6.00**	**0.29%**	**98.44%**
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	**5.13**	**0.25%**	**98.69%**
3B1b	Manure management - Non-dairy cattle	**5.05**	**0.25%**	**98.94%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**4.15**	**0.20%**	**99.14%**
1A3ai(i)	International aviation LTO (civil)	**3.56**	**0.17%**	**99.31%**
5C2	Open burning of waste	**3.14**	**0.15%**	**99.47%**
2A1	Cement production	**3.11**	**0.15%**	**99.62%**
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	**2.73**	**0.13%**	**99.75%**
3B4giii	Manure mangement - Turkeys	**1.42**	**0.07%**	**99.82%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**0.96**	**0.05%**	**99.87%**
3B2	Manure management - Sheep	**0.74**	**0.04%**	**99.90%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.73**	**0.04%**	**99.94%**
3B4d	Manure management - Goats	**0.59**	**0.03%**	**99.97%**
2D3b	Road paving with asphalt	**0.40**	**0.02%**	**99.99%**
5A	Biological treatment of waste - Solid waste disposal on land	**0.09**	**0.00%**	**99.99%**
1A4ciii	Agriculture/Forestry/Fishing: National fishing	**0.07**	**0.00%**	**99.99%**

Table 96: PM_{10} Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
5C1bv	Cremation	**0.05**	**0.00%**	**100.00%**
3B4e	Manure management - Horses	**0.04**	**0.00%**	**100.00%**
3B4f	Manure management - Mules and asses	**0.02**	**0.00%**	**100.00%**
1A3aii(i)	Domestic aviation LTO (civil)	**0.01**	**0.00%**	**100.00%**
	T0TAL	**2051.22**	**100.00%**	

Table 97: TSP Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
2A5b	Construction and demolition	447.38	14.69%	14.69%
1A1a	Public electricity and heat production	414.88	13.62%	28.31%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	354.09	11.62%	39.93%
3B3	Manure management - Swine	294.19	9.66%	49.59%
1A3bvi	Road transport: Automobile tyre and brake wear	231.88	7.61%	57.20%
2A5a	Quarrying and mining of minerals other than coal	231.29	7.59%	64.80%
1A3bvii	Road transport: Automobile road abrasion	158.52	5.20%	70.00%
1A3bii	Road transport: Light duty vehicles	110.51	3.63%	73.63%
2D3c	Asphalt roofing	105.43	3.46%	77.09%
1A4bi	Residential: Stationary	96.92	3.18%	80.27%
3B4gii	Manure mangement - Broilers	95.83	3.15%	83.42%
1A3biii	Road transport: Heavy duty vehicles and buses	77.79	2.55%	85.97%
1A3bi	Road transport: Passenger cars	67.61	2.22%	88.19%
2A5c	Storage, handling and transport of mineral products	49.28	1.62%	89.81%
3B4gi	Manure mangement - Laying hens	42.49	1.39%	91.20%
2A2	Lime production	36.08	1.18%	92.39%
2G	Other product use (please specify in the IIR)	33.88	1.11%	93.50%
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	31.54	1.04%	94.54%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	21.70	0.71%	95.25%
5E	Other waste (please specify in IIR)	20.88	0.69%	95.93%
3B1a	Manure management - Dairy cattle	20.52	0.67%	96.61%

Table 97: TSP Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3dii	National navigation (shipping)	**17.85**	**0.59%**	**97.19%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**15.28**	**0.50%**	**97.69%**
3B1b	Manure management - Non-dairy cattle	**10.92**	**0.36%**	**98.05%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**7.76**	**0.25%**	**98.31%**
1A5b	Other, Mobile (including military, land based and recreational boats)	**7.75**	**0.25%**	**98.56%**
3F	Field burning of agricultural residues	**7.03**	**0.23%**	**98.79%**
1A3biv	Road transport: Mopeds & motorcycles	**6.00**	**0.20%**	**98.99%**
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	**5.13**	**0.17%**	**99.16%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**4.27**	**0.14%**	**99.30%**
1A3ai(i)	International aviation LTO (civil)	**3.56**	**0.12%**	**99.42%**
5C2	Open burning of waste	**3.23**	**0.11%**	**99.52%**
2A1	Cement production	**3.20**	**0.11%**	**99.63%**
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	**2.73**	**0.09%**	**99.72%**
3B2	Manure management - Sheep	**1.84**	**0.06%**	**99.78%**
2D3b	Road paving with asphalt	**1.71**	**0.06%**	**99.83%**
3B4d	Manure management - Goats	**1.47**	**0.05%**	**99.88%**
3B4giii	Manure mangement - Turkeys	**1.42**	**0.05%**	**99.93%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**0.96**	**0.03%**	**99.96%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.73**	**0.02%**	**99.98%**
5A	Biological treatment of waste - Solid waste disposal on land	**0.19**	**0.01%**	**99.99%**
3B4e	Manure management - Horses	**0.09**	**0.00%**	**99.99%**

Table 97: TSP Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
5C1bv	Cremation	**0.07**	**0.00%**	**100.00%**
1A4ciii	Agriculture/Forestry/Fishing: National fishing	**0.07**	**0.00%**	**100.00%**
3B4f	Manure management - Mules and asses	**0.04**	**0.00%**	**100.00%**
1A3aii(i)	Domestic aviation LTO (civil)	**0.01**	**0.00%**	**100.00%**
	T0TAL	**3046.00**	**100.00%**	

Table 98: BC Level Assessment for 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	109.93	33.13%	33.13%
1A3bii	Road transport: Light duty vehicles	74.18	22.36%	55.49%
1A3biii	Road transport: Heavy duty vehicles and buses	48.02	14.47%	69.97%
1A3bi	Road transport: Passenger cars	45.21	13.63%	83.59%
1A1a	Public electricity and heat production	11.54	3.48%	87.07%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	10.59	3.19%	90.26%
1A4bi	Residential: Stationary	9.03	2.72%	92.99%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	8.88	2.68%	95.66%
1A4ci	Agriculture/Forestry/Fishing: Stationary	4.01	1.21%	96.87%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	3.13	0.94%	97.82%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	1.60	0.48%	98.30%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	1.53	0.46%	98.76%
5C2	Open burning of waste	1.23	0.37%	99.13%
1A3biv	Road transport: Mopeds & motorcycles	1.10	0.33%	99.46%
3F	Field burning of agricultural residues	0.61	0.18%	99.64%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.54	0.16%	99.81%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.41	0.12%	99.93%
2G	Other product use (please specify in the IIR)	0.15	0.04%	99.97%

Table 98: BC Level Assessment for 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
2A1	Cement production	**0.07**	**0.02%**	**99.99%**
2A2	Lime production	**0.01**	**0.00%**	**100.00%**
2D3b	Road paving with asphalt	**0.01**	**0.00%**	**100.00%**
2D3c	Asphalt roofing	**0.00**	**0.00%**	**100.00%**
	T0TAL	**331.78**	**100.00%**	

Table 99: CO Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3bi	Road transport: Passenger cars	6230.16	45.02%	45.02%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	2543.15	18.38%	63.40%
1A3biv	Road transport: Mopeds & motorcycles	1383.42	10.00%	73.39%
1A3bii	Road transport: Light duty vehicles	1113.40	8.05%	81.44%
1A3biii	Road transport: Heavy duty vehicles and buses	786.81	5.69%	87.12%
1A4bi	Residential: Stationary	712.48	5.15%	92.27%
1A1a	Public electricity and heat production	365.63	2.64%	94.91%
1A3ai(i)	International aviation LTO (civil)	266.25	1.92%	96.84%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	91.63	0.66%	97.50%
3F	Field burning of agricultural residues	80.90	0.58%	98.08%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	74.24	0.54%	98.62%
2G	Other product use (please specify in the IIR)	66.80	0.48%	99.10%
5C2	Open burning of waste	38.91	0.28%	99.39%
1A4ci	Agriculture/Forestry/Fishing: Stationary	26.96	0.19%	99.58%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	26.29	0.19%	99.77%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	15.43	0.11%	99.88%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	9.01	0.07%	99.95%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	3.18	0.02%	99.97%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	2.42	0.02%	99.99%

Table 99: CO Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3aii(i)	Domestic aviation LTO (civil)	**1.17**	**0.01%**	**100.00%**
2D3c	Asphalt roofing	**0.63**	**0.00%**	**100.00%**
	T0TAL	**13838.87**	**100.00%**	

Table 100: Pb Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A3bi	Road transport: Passenger cars	6.74	36.67%	36.67%
1A3biii	Road transport: Heavy duty vehicles and buses	6.01	32.69%	69.36%
1A3bii	Road transport: Light duty vehicles	5.08	27.63%	96.99%
1A3bvi	Road transport: Automobile tyre and brake wear	0.24	1.33%	98.31%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.17	0.92%	99.23%
1A1a	Public electricity and heat production	0.10	0.56%	99.79%
1A3biv	Road transport: Mopeds & motorcycles	0.03	0.18%	99.96%
1A4bi	Residential: Stationary	0.00	0.02%	99.98%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.00	0.01%	99.98%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.00	0.01%	99.99%
2G	Other product use (please specify in the IIR)	0.00	0.00%	99.99%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.00	0.00%	100.00%
5C2	Open burning of waste	0.00	0.00%	100.00%
3F	Field burning of agricultural residues	0.00	0.00%	100.00%
5E	Other waste (please specify in IIR)	0.0001	0.00%	100.00%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	0.00	0.00%	100.00%
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.00	0.00%	100.00%
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.00	0.00%	100.00%
	T0TAL	**18.37**	**100.00%**	

Table 101: Cd Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A1a	Public electricity and heat production	0.026	49.34%	49.34%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	0.014	25.83%	75.17%
1A3bi	Road transport: Passenger cars	0.005	8.49%	83.66%
2G	Other product use (please specify in the IIR)	0.002	3.19%	86.86%
1A4bi	Residential: Stationary	0.001	2.66%	89.52%
1A3bvi	Road transport: Automobile tyre and brake wear	0.001	2.12%	91.64%
3F	Field burning of agricultural residues	0.001	2.01%	93.64%
1A3biii	Road transport: Heavy duty vehicles and buses	0.001	1.89%	95.53%
1A3bii	Road transport: Light duty vehicles	0.001	1.73%	97.26%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.000	0.86%	98.13%
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.000	0.75%	98.88%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.000	0.43%	99.31%
5E	Other waste (please specify in IIR)	0.0001	0.22%	99.54%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	0.000	0.15%	99.69%
5C2	Open burning of waste	0.000	0.13%	99.82%
1A3biv	Road transport: Mopeds & motorcycles	0.000	0.13%	99.95%
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	0.000	0.05%	100.00%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	0.000	0.00%	100.00%
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%
	TOTAL	0.053	100.00%	

Table 102: Hg Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.08418**	**84.20%**	**84.20%**
1A1a	Public electricity and heat production	**0.00822**	**8.22%**	**92.43%**
2D3a	Domestic solvent use including fungicides	**0.00484**	**4.84%**	**97.27%**
1A4bi	Residential: Stationary	**0.00201**	**2.01%**	**99.28%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**0.00027**	**0.27%**	**99.55%**
3F	Field burning of agricultural residues	**0.00017**	**0.17%**	**99.72%**
5E	Other waste (please specify in IIR)	**0.00012**	**0.12%**	**99.83%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**0.00012**	**0.12%**	**99.95%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**0.00002**	**0.02%**	**99.97%**
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	**0.00002**	**0.02%**	**99.99%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**0.00001**	**0.01%**	**99.99%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.000004**	**0.00%**	**100.00%**
1A3bvi	Road transport: Automobile tyre and brake wear	**0.000001**	**0.00%**	**100.00%**
2G	Other product use (please specify in the IIR)	**0.000000**	**0.00%**	**100.00%**
	T0TAL	**0.09996**	**100.00%**	

Table 103: PCDD/F Level Assessment for the year 2017

NFR Code	Longname	Emissions (g I-TEQ)	Level Assessment	Cumulative Total
5E	Other waste (please specify in IIR)	**0.2160**	**32.69%**	**32.69%**
1A3bi	Road transport: Passenger cars	**0.1258**	**19.03%**	**51.72%**
1A4bi	Residential: Stationary	**0.1131**	**17.11%**	**68.84%**
1A1a	Public electricity and heat production	**0.0883**	**13.36%**	**82.20%**
1A3bii	Road transport: Light duty vehicles	**0.0612**	**9.26%**	**91.46%**
1A3biii	Road transport: Heavy duty vehicles and buses	**0.0291**	**4.41%**	**95.87%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.0076**	**1.15%**	**97.02%**
5C2	Open burning of waste	**0.0070**	**1.05%**	**98.07%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**0.0046**	**0.70%**	**98.78%**
1A3biv	Road transport: Mopeds & motorcycles	**0.0033**	**0.50%**	**99.27%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**0.0019**	**0.29%**	**99.56%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**0.0017**	**0.26%**	**99.82%**
3F	Field burning of agricultural residues	**0.0008**	**0.11%**	**99.93%**
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	**0.0002**	**0.03%**	**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	**0.0001**	**0.01%**	**100.00%**
	T0TAL	**0.6608**	**100.00%**	

Table 104: PAHs Level Assessment for the year 2017

NFR Code	Longname	Emissions (Mg)	Level Assessment	Cumulative Total
3F	Field burning of agricultural residues	**0.00048**	**80.40%**	**80.40%**
1A4bi	Residential: Stationary	**0.00004**	**6.51%**	**86.91%**
1A3bi	Road transport: Passenger cars	**0.00002**	**3.05%**	**89.96%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**0.00002**	**2.98%**	**92.94%**
5C2	Open burning of waste	**0.00001**	**1.48%**	**94.41%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.00001**	**1.47%**	**95.88%**
1A3bii	Road transport: Light duty vehicles	**0.00001**	**1.37%**	**97.25%**
1A3biii	Road transport: Heavy duty vehicles and buses	**0.00001**	**1.17%**	**98.42%**
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	**0.000003**	**0.46%**	**98.88%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**0.000002**	**0.38%**	**99.25%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**0.000001**	**0.18%**	**99.44%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**0.000001**	**0.16%**	**99.60%**
1A1a	Public electricity and heat production	**0.000001**	**0.12%**	**99.72%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.000001**	**0.12%**	**99.85%**
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	**0.0000003**	**0.06%**	**99.90%**
2G	Other product use (please specify in the IIR)	**0.0000003**	**0.05%**	**99.95%**
1A3biv	Road transport: Mopeds & motorcycles	**0.0000003**	**0.05%**	**100.00%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**0.00000001**	**0.00%**	**100.00%**
	TOTAL	**0.00060**	**100.00%**	

Table 105: HCB Level Assessment for the year 2017

NFR Code	Longname	Emissions (Kg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.00790**	**85.04%**	**85.04%**
1A1a	Public electricity and heat production	**0.00093**	**10.00%**	**95.03%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**0.00017**	**1.88%**	**96.91%**
1A3bi	Road transport: Passenger cars	**0.00012**	**1.30%**	**98.20%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**0.00009**	**0.96%**	**99.16%**
1A3bii	Road transport: Light duty vehicles	**0.00005**	**0.54%**	**99.70%**
1A3biii	Road transport: Heavy duty vehicles and buses	**0.00002**	**0.27%**	**99.96%**
1A3biv	Road transport: Mopeds & motorcycles	**0.000003**	**0.04%**	**100.00%**
1A4bi	Residential: Stationary	**0.000000**	**0.00%**	**100.00%**
	T0TAL	**0.00929**	**100.00%**	

Table 106: PCBs Level Assessment for the year 2017

NFR Code	Longname	Emissions (Kg)	Level Assessment	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.03537**	**90.15%**	**90.15%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**0.00209**	**5.33%**	**95.48%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**0.00107**	**2.72%**	**98.19%**
1A1a	Public electricity and heat production	**0.00065**	**1.66%**	**99.85%**
1A3bi	Road transport: Passenger cars	**0.00004**	**0.11%**	**99.96%**
1A3bii	Road transport: Light duty vehicles	**0.00001**	**0.03%**	**99.98%**
1A3biii	Road transport: Heavy duty vehicles and buses	**0.00001**	**0.01%**	**100.00%**
1A3biv	Road transport: Mopeds & motorcycles	**0.000001**	**0.00%**	**100.00%**
1A4bi	Residential: Stationary	**0.000000**	**0.00%**	**100.00%**
	T0TAL	**0.03923**	**100.00%**	

20. Annex 2: Level Assessment 1990-2016

Annex 2

Key Category Analysis

Level Assessment 1990-2016

Table 107: 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 **68.1%**	1A3bii **5.8%**	1A3biii **4.9%**	1A4bi **4.5%**						83.3
NO_x	1A1a **19.5%**	1A3biii **18.4%**	1A3bi **17.7%**	1A3bii **13.6%**	1A2f **9.8%**	3Da1 **5.3%**				88.6
NH_3	3B3 **34.3%**	3B1a **18.0%**	3Da1 **11.7%**	3Da2a **11.3%**	3Da3 **7.2%**					82.5
NMVOC	2D3i **26.1%**	1A3bi **16.6%**	2D3d **9.8%**	1A3bv **8.7%**	1A3biv **8.1%**	1B2av **4.0%**	2D3a **4.0%**	1A3bii **3.0%**		80.3
CO	1A3bi **62.4%**	1A3bii **13.4%**	1A3biv **8.8%**							84.6
Pb	1A3bi **64.8%**	1A3bii **19.7%**								84.5
Hg	1A2f **61.4%**	5C1biii **18.5%**	1A1a **7.7%**							87.6
Cd	3F **35.5%**	1A1a **31.8%**	1A2f **11.7%**	2G **6.3%**						85.3
DIOX	5C1biii **81.5%**									81.5
PAH	3F **99.2%**									99.2
HCB	5C1biii **88,0%**									88.0

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 108: Key Category Analysis - Level Assessment for the year 1991

Comp.	Key categories (Sorted from high to low from left to right)										Total (%)
SOx	1A1a 67.8%	1A3bii 6.2%	1A3biii 4.9%	1A4bi 4.6%							83.5
NOx	1A1a 19.8%	1A3biii 18.5%	1A3bi 16.7%	1A3bii 14.7%	1A2f 9.1%	3Da1 5.2%					84.0
NH3	3B3 35.8%	3B1a 18.0%	3Da1 11.5%	3Da2a 11.0%	3Da3 7.0%						83.3
NMVOC	2D3i 26.5%	1A3bi 16.2%	1A3bv 8.7%	1A3biv 8.3%	2D3d 8.1%	2D3a 4.1%	1B2av 4.0%	1A3bii 3.3%	5A 3.1%		82.3
CO	1A3bi 60.8%	1A3bii 14.5%	1A3biv 9.0%								84.3
Pb	1A3bi 64.3%	1A3bii 20.5%									84.8
Hg	1A2f 59.4%	5C1biii 19.5%	1A1a 8.2%								87.1
Cd	3F 34.5%	1A1a 33.0%	1A2f 11.0%	2G 6.3%							84.8
DIOX	5C1biii 81.9%										81.9
PAH	3F 99.2%										99.2
HCB	5C1biii 88.8%										88.8

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 109: Key Category Analysis - Level Assessment for the year 1992

Comp.	Key categories (Sorted from high to low from left to right)										Total (%)
SOx	1A1a **68.2%**	1A3bii **6.8%**	1A3biii **5.0%**								80.0
NOx	1A1a **20.4%**	1A3biii **19.3%**	1A3bii **15.9%**	1A3bi **14.4%**	1A2f **8.8%**	3Da1 **5.9%**					84.7
NH3	3B3 **37.5%**	3B1a **17.0%**	3Da1 **13.1%**	3Da2a **10.7%**	3Da3 **6.1%**						84.4
NMVOC	2D3i **26.2%**	1A3bi **15.3%**	2D3d **8.6%**	1A3bv **8.3%**	1A3biv **8.1%**	1B2av **4.3%**	2D3a **4.2%**	1A3bii **3.3%**	5A **3.2%**		81.5
CO	1A3bi **58.3%**	1A3bii **15.3%**	1A3biv **8.9%**								82.5
Pb	1A3bi **61.5%**	1A3bii **22.5%**									84.0
Hg	1A2f **60.0%**	5C1biii **18.6%**	1A1a **8.9%**								87.5
Cd	1A1a **35.1%**	3F **33.0%**	1A2f **11.0%**	2G **6.2%**							85.3
DIOX	5C1biii **80.9%**										80.9
PAH	3F **99.2%**										99.2
HCB	5C1biii **88.2%**										88.2

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 110: Key Category Analysis - Level Assessment for the year 1993

Comp.	Key categories (Sorted from high to low from left to right)										Total (%)
SOx	1A1a **69.4%**	1A3bii **6.8%**	1A4bi **4.7%**								80.9
NOx	1A1a **21.8%**	1A3biii **18.8%**	1A3bii **16.2%**	1A3bi **13.6%**	1A2f **9.5%**	3Da1 **4.9%**					84.8
NH3	3B3 **38.5%**	3B1a **17.4%**	3Da2a **11.2%**	3Da1 **10.5%**	3Da3 **5.7%**						83.3
NMVOC	2D3i **26.3%**	1A3bi **14.4%**	2D3d **8.6%**	1A3bv **8.1%**	1A3biv **7.9%**	1B2av **4.3%**	2D3a **4.3%**	5A **3.3%**	1A3bii **3.2%**		80.4
CO	1A3bi **57.2%**	1A3bii **15.3%**	1A3biv **8.9%**								81.4
Pb	1A3bi **61.1%**	1A3bii **23.0%**									84.1
Hg	1A2f **61.2%**	5C1biii **17.8%**	1A1a **8.9%**								87.9
Cd	1A1a **37.6%**	3F **33.2%**	1A2f **12.0%**								82.8
DIOX	5C1biii **80.3%**										80.3
PAH	3F **99.2%**										99.2
HCB	5C1biii **87.6%**										87.6

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 111: Key Category Analysis - Level Assessment for the year 1994

Comp.	Key categories (Sorted from high to low from left to right)										Total (%)
SOx	1A1a **68.2%**	1A3bii **7.4%**	1A4bi **5.0%**								80.6
NOx	1A1a **21.3%**	1A3biii **19.1%**	1A3bii **17.5%**	1A3bi **13.3%**	1A2f **9.3%**						80.5
NH3	3B3 **37.6%**	3B1a **18.7%**	3Da2a **11.3%**	3Da1 **10.3%**	3Da3 **5.6%**						83.5
NMVOC	2D3i **25.6%**	1A3bi **14.3%**	2D3d **9.4%**	1A3biv **8.0%**	1A3bv **8.0%**	1B2av **4.3%**	2D3a **4.3%**	1A3bii **3.3%**	5A **3.3%**		80.5
CO	1A3bi **57.1%**	1A3bii **15.8%**	1A3biv **9.1%**								82.0
Pb	1A3bi **60.0%**	1A3bii **24.1%**									84.1
Hg	1A2f **62.1%**	5C1biii **17.5%**	1A1a **9.0%**								88.6
Cd	1A1a **39.9%**	3F **29.3%**	1A2f **12.8%**								82.0
DIOX	5C1biii **80.1%**										80.1
PAH	3F **99.1%**										99.1
HCB	5C1biii **87.3%**										87.3

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	

Table 112: Key Category Analysis - Level Assessment for the year 1995

Comp.	Key categories (Sorted from high to low from left to right)											Total (%)
SOx	1A1a **66.9%**	1A3bii **7.8%**	1A4bi **5.1%**	1A3biii **4.7%**								84.5
NOx	1A1a **20.6%**	1A3biii **18.6%**	1A3bii **17.5%**	1A3bi **13.5%**	1A2f **9.5%**	3Da1 **4.5%**						84.2
NH3	3B3 **38.0%**	3B1a **19.3%**	3Da2a **11.3%**	3Da1 **9.4%**	3Da3 **5.5%**							83.5
NMVOC	2D3i **26.3%**	1A3bi **14.0%**	1A3biv **8.2%**	2D3d **8.0%**	1A3bv **8.0%**	1B2av **4.6%**	2D3a **4.5%**	5A **3.4%**	1A3bii **3.2%**			80.2
CO	1A3bi **56.9%**	1A3bii **15.5%**	1A3biv **9.6%**									82.0
Pb	1A3bi **60.9%**	1A3bii **23.9%**										84.8
Hg	1A2f **61.5%**	5C1biii **18.4%**	1A1a **8.5%**									88.4
Cd	1A1a **37.9%**	3F **27.2%**	1A2f **12.7%**	2G **5.3%**								83.1
DIOX	5C1biii **80.7%**											80.7
PAH	3F **98.9%**											98.9
HCB	5C1biii **87.9%**											87.9

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 113: Key Category Analysis - Level Assessment for the year 1996

Comp.	Key categories (Sorted from high to low from left to right)											Total (%)
SOx	1A1a **67.5%**	1A3bii **7.8%**	1A4bi **5.1%**									80.4
NOx	1A1a **21.2%**	1A3biii **18.7%**	1A3bii **17.2%**	1A3bi **12.9%**	1A2f **9.9%**	3Da1 **4.6%**						84.5
NH3	3B3 **39.1%**	3B1a **17.3%**	3Da2a **11.4%**	3Da1 **9.6%**	3Da3 **5.6%**							83.0
NMVOC	2D3i **26.4%**	1A3bi **13.6%**	1A3biv **8.3%**	2D3d **8.0%**	1A3bv **7.8%**	1B2av **4.7%**	2D3a **4.6%**	5A **3.5%**	1A3bii **3.2%**			80.1
CO	1A3bi **56.1%**	1A3bii **15.4%**	1A3biv **9.8%**									81.3
Pb	1A3bi **60.0%**	1A3bii **24.5%**										84.5
Hg	1A2f **63.1%**	5C1biii **17.8%**										80.9
Cd	1A1a **39.8%**	3F **24.4%**	1A2f **13.6%**	2G **5.6%**								83.4
DIOX	5C1biii **80.7%**											80.7
PAH	3F **98.8%**											98.8
HCB	5C1biii **87.2%**											87.2

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 114: 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 **7.7%**	1A4bi **5.1%**									80.4
NOx	1A1a **22.2%**	1A3biii **18.9%**	1A3bii **17.3%**	1A3bi **12.6%**	1A2f **9.4%**							80.4
NH3	3B3 **41.4%**	3B1a **16.4%**	3Da2a **11.7%**	3Da1 **7.8%**	3Da3 **6.1%**							83.4
NMVOC	2D3i **26.1%**	1A3bi **12.8%**	2D3d **8.8%**	1A3biv **7.9%**	1A3bv **7.5%**	1B2av **4.7%**	2D3a **4.6%**	1A1b **3.8%**	5A **3.5%**	1A3bii **3.1%**		82.8
CO	1A3bi **55.6%**	1A3bii **15.4%**	1A3biv **9.9%**									80.9
Pb	1A3bi **59.2%**	1A3bii **25.0%**										84.2
Hg	1A2f **61.1%**	5C1biii **18.2%**	1A1a **9.1%**									88.4
Cd	1A1a **41.2%**	3F **21.8%**	1A2f **12.8%**	2G **6.1%**								81.9
DIOX	5C1biii **80.3%**											80.3
PAH	3F **98.7%**											98.7
HCB	5C1biii **87.7%**											87.7

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 115: 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 **7.7%**	1A4bi **5.0%**									81.4
NO_x	1A1a **23.8%**	1A3biii **18.9%**	1A3bii **17.6%**	1A3bi **11.8%**	1A2f **8.7%**							80.8
NH_3	3B3 **43.0%**	3B1a **15.5%**	3Da2a **11.6%**	3Da1 **6.7%**	3Da3 **6.3%**							83.1
NMVOC	2D3i **26.8%**	1A3bi **12.1%**	2D3d **8.4%**	1A3biv **7.5%**	1A3bv **7.4%**	1B2av **5.0%**	2D3a **4.7%**	1A1b **4.0%**	5A **3.7%**	1A3bii **3.2%**		82.8
CO	1A3bi **54.6%**	1A3bii **15.6%**	1A3biv **9.9%**									80.1
Pb	1A3bi **57.7%**	1A3bii **26.2%**										83.9
Hg	1A2f **59.1%**	5C1biii **18.7%**	1A1a **10.2%**									88.0
Cd	1A1a **44.1%**	3F **20.0%**	1A2f **11.8%**	2G **6.1%**								82.0
DIOX	5C1biii **79.9%**	1A3bi **5.3%**										85.2
PAH	3F **98.7%**											98.7
HCB	5C1biii **88.3%**											88.3

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	

Table 116: 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 **69.1%**	1A3bii **7.6%**	1A4bi **4.9%**									81.6
NO_x	1A1a **24.5%**	1A3biii **18.6%**	1A3bii **17.5%**	1A3bi **11.3%**	1A2f **8.6%**							80.5
NH_3	3B3 **42.2%**	3B1a **16.0%**	3Da2a **11.3%**	3Da1 **7.3%**	3Da3 **6.6%**							83.4
NMVOC	2D3i **29.3%**	1A3bi **11.2%**	2D3d **8.1%**	1A3bv **7.0%**	1A3biv **6.7%**	1B2av **5.0%**	2D3a **4.6%**	1A1b **4.2%**	5A **3.6%**	1A3bii **3.0%**		82.7
CO	1A3bi **53.9%**	1A3bii **15.5%**	1A3biv **9.7%**	1A2f **6.5%**								85.6
Pb	1A3bi **56.6%**	1A3bii **27.1%**										83.7
Hg	1A2f **58.4%**	5C1biii **18.7%**	1A1a **10.8%**									87.9
Cd	1A1a **45.0%**	3F **17.5%**	1A2f **11.3%**	2G **8.1%**								81.9
DIOX	5C1biii **79.5%**	1A3bi **5.5%**										85.0
PAH	3F **98.5%**											98.5
HCB	5C1biii **88.4%**											88.4

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 117: Key Category Analysis - Level Assessment for the year 2000

Comp.	Key categories (Sorted from high to low from left to right)												Total (%)
SOx	1A1a **67.8%**	1A3bii **8.0%**	1A4bi **5.1%**										80.9
NOx	1A1a **24.3%**	1A3biii **20.0%**	1A3bii **18.3%**	1A3bi **10.5%**	1A2f **8.3%**								81.4
NH3	3B3 **41.9%**	3B1a **15.6%**	3Da2a **11.8%**	3Da1 **7.3%**	3Da3 **7.0%**								83.6
NMVOC	2D3i **31.8%**	1A3bi **10.2%**	2D3d **8.6%**	1A3bv **6.5%**	1A3biv **6.0%**	1B2av **4.9%**	2D3a **4.5%**	1A1b **3.7%**	5A **3.6%**	1A3bii **3.1%**			82.9
CO	1A3bi **52.3%**	1A3bii **15.9%**	1A3biv **9.4%**	1A2f **7.0%**									84.6
TSP	2D3b **38.1%**	2A5a **11.4%**	1A1a **6.2%**	1A3bii **5.6%**	2A5b **5.3%**	2D3c **4.7%**	2A1 **3.9%**	3B3 **3.7%**	2G **3.0%**				81.9
PM10	2D3b **17.3%**	1A3bii **11.0%**	2A5a **10.9%**	1A1a **9.1%**	2A1 **6.8%**	2G **6.0%**	1A2f **5.7%**	1A3biii **4.1%**	1A3bvi **3.2%**	3B3 **3.2%**	2A5b **3.1%**		80.4
PM2.5	1A3bii **20.0%**	1A1a **11.0%**	2G **10.9%**	1A2f **9.9%**	1A3biii **7.5%**	2D3b **7.4%**	2A1 **6.9%**	1A3bi **4.8%**	1A3bvi **3.2%**				81.6
Pb	1A3bi **52.5%**	1A3bii **29.8%**											82.3
Hg	1A2f **59.0%**	5C1biii **18.5%**	1A1a **11.1%**										88.6
Cd	1A1a **44.2%**	2G **14.3%**	3F **13.0%**	1A2f **10.9%**									82.4
DIOX	5C1biii **71.9%**	5E **9.1%**											81.0
PAH	3F **98.1%**												98.1
HCB	5C1biii **88.2%**												88.2

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 118: 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 **65.5%**	1A3bii **8.2%**	1A4bi **5.5%**	1A3biii **4.4%**									83.6
NO_x	1A1a **24.8%**	1A3biii **19.0%**	1A3bii **17.6%**	1A3bi **10.7%**	1A2f **8.4%**								80.5
NH_3	3B3 **43.1%**	3B1a **15.1%**	3Da2a **11.5%**	3Da3 **7.5%**	3Da1 **7.4%**								84.6
NMVOC	2D3i **33.2%**	1A3bi **9.9%**	2D3d **7.9%**	1A3bv **6.4%**	1A3biv **5.5%**	1B2av **5.1%**	2D3a **4.5%**	1A1b **3.9%**	5A **3.7%**				80.1
CO	1A3bi **53.9%**	1A3bii **15.3%**	1A3biv **9.3%**	1A2f **7.1%**									85.6
TSP	2D3b **29.2%**	2A5a **13.4%**	2A5b **7.7%**	1A1a **7.1%**	1A3bii **6.1%**	3B3 **4.8%**	2D3c **4.5%**	2A1 **4.4%**	1A2f **3.7%**				80.9
PM_{10}	2D3b **12.6%**	2A5a **12.2%**	1A3bii **11.4%**	1A1a **9.9%**	2A1 **7.4%**	1A2f **6.6%**	2A5b **4.2%**	1A3biii **4.0%**	3B3 **4.0%**	1A3bvi **3.6%**	3B4gii **3.3%**	1A3bi **3.0%**	82.2
$PM_{2.5}$	1A3bii **21.1%**	1A1a **12.2%**	1A2f **11.8%**	2A1 **7.7%**	1A3biii **7.5%**	1A3bi **5.6%**	2D3b **5.5%**	2G **3.9%**	1A3bvi **3.5%**	3F **3.5%**			82.3
Pb	1A3bi **53.6%**	1A3bii **29.1%**											82.7
Hg	1A2f **58.5%**	5C1biii **19.0%**	1A1a **11.0%**										88.5
Cd	1A1a **48.7%**	3F **14.4%**	1A2f **12.1%**	1B2aiv **6.4%**									81.6
DIOX	5C1biii **72.2%**	5E **9.1%**											81.3
PAH	3F **98.1%**												98.1
HCB	5C1biii **88.6%**												88.6

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 119: 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 **66.0%**	1A3bii **7.9%**	1A4bi **5.7%**	1A3biii **4.2%**									83.8
NO_x	1A1a **25.9%**	1A3biii **19.0%**	1A3bii **17.2%**	1A3bi **10.6%**	1A2f **8.7%**								81.4
NH_3	3B3 **44.6%**	3B1a **15.5%**	3Da2a **11.4%**	3Da3 **7.5%**	3Da1 **5.7%**								84.7
NMVOC	2D3i **29.7%**	2D3d **12.2%**	1A3bi **10.0%**	1A3bv **6.5%**	1B2av **5.4%**	2D3a **4.6%**	1A3biv **4.5%**	5A **3.8%**	1A1b **3.7%**				80.4
CO	1A3bi **55.3%**	1A3bii **14.2%**	1A3biv **8.6%**	1A2f **7.6%**									85.7
TSP	2D3b **24.3%**	2A5a **15.0%**	2A5b **8.7%**	1A1a **7.5%**	1A3bii **5.9%**	3B3 **5.2%**	2D3c **5.0%**	2A1 **4.6%**	1A2f **3.7%**	1A3bvi **2.6%**			82.5
PM_{10}	2A5a **13.4%**	1A3bii **10.8%**	1A1a **10.3%**	2D3b **10.3%**	2A1 **7.6%**	1A2f **6.6%**	2A5b **4.7%**	3B3 **4.3%**	1A3biii **3.8%**	1A3bvi **3.6%**	3B4gii **3.4%**	1A3bi **3.1%**	81.9
$PM_{2.5}$	1A3bii **20.4%**	1A1a **12.9%**	1A2f **12.0%**	2A1 **8.0%**	1A3biii **7.2%**	1A3bi **5.9%**	2D3b **4.5%**	2G **3.7%**	1A3bvi **3.7%**	3F **3.3%**			81.6
Pb	1A3bi **52.2%**	1A3bii **29.9%**											82.1
Hg	1A2f **59.0%**	5C1biii **18.9%**	1A1a **11.2%**										89.1
Cd	1A1a **50.3%**	3F **13.4%**	1A2f **12.3%**	1B2aiv **5.9%**									81.9
DIOX	5C1biii **72.4%**	5E **9.0%**											81.4
PAH	3F **97.9%**												97.9
HCB	5C1biii **88.4%**												88.4

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 120: Key Category Analysis - Level Assessment for the year 2003

Comp.	Key categories (Sorted from high to low from left to right)												Total (%)
SO_x	1A1a **69.4%**	1A3bii **7.1%**	1A4bi **5.3%**										81.8
NO_x	1A1a **27.4%**	1A3biii **19.8%**	1A3bii **16.5%**	1A3bi **10.5%**	1A2f **8.4%**								82.6
NH_3	3B3 **45.2%**	3B1a **16.1%**	3Da2a **11.4%**	3Da3 **6.9%**	3Da1 **4.6%**								84.2
NMVOC	2D3i **31.7%**	2D3d **14.0%**	1A3bi **9.3%**	1A3bv **6.2%**	1B2av **5.6%**	2D3a **4.3%**	1A3biv **4.2%**	1A1b **3.6%**	5A **3.6%**				82.5
CO	1A3bi **55.9%**	1A3bii **13.8%**	1A3biv **8.6%**	1A2f **7.4%**									85.7
TSP	2A5a **16.7%**	2D3b **16.3%**	2A5b **10.5%**	1A1a **8.6%**	1A3bii **6.0%**	3B3 **5.5%**	2D3c **5.0%**	2A1 **4.8%**	1A2f **4.3%**	1A3bvi **2.9%**			80.6
PM_{10}	2A5a **14.2%**	1A1a **11.2%**	1A3bii **10.4%**	2A1 **7.5%**	1A2f **7.2%**	2D3b **6.5%**	2A5b **5.4%**	3B3 **4.3%**	1A3biii **3.9%**	1A3bvi **3.8%**	3B4gii **3.4%**	1A3bi **3.3%**	81.1
$PM_{2.5}$	1A3bii **19.7%**	1A1a **13.9%**	1A2f **13.1%**	2A1 **7.9%**	1A3biii **7.3%**	1A3bi **6.1%**	1A3bvi **3.9%**	3F **3.6%**	2D3b **2.9%**	2G **2.7%**			81.1
Pb	1A3bi **50.6%**	1A3bii **29.9%**											80.5
Hg	1A2f **68.1%**	1A1a **14.2%**											82.3
Cd	1A1a **54.4%**	3F **14.5%**	1A2f **12.1%**										81.0
DIOX	5C1biii **38.3%**	5E **19.9%**	1A3bi **12.5%**	1A3bii **11.2%**									81.9
PAH	3F **98.1%**												98.1
HCB	5C1biii **65.0%**	1A2f **33.6%**											98.6

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 121: 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 **77.8%**	1A4bi **6.0%**											83.8
NO_x	1A1a **29.1%**	1A3biii **19.5%**	1A3bii **15.4%**	1A3bi **10.2%**	1A2f **9.3%**								83.5
NH_3	3B3 **44.0%**	3B1a **16.0%**	3Da2a **11.0%**	3Da3 **6.8%**	3Da1 **5.3%**								83.1
NMVOC	2D3i **38.1%**	2D3d **15.9%**	1A3bi **8.0%**	1A3bv **5.6%**	1B2av **5.6%**	2D3a **3.9%**	1A3biv **3.5%**						80.6
CO	1A3bi **56.6%**	1A3bii **12.7%**	1A3biv **8.4%**	1A2f **8.3%**									86.0
TSP	2A5a **19.0%**	2A5b **12.0%**	2D3b **10.2%**	1A1a **9.3%**	2D3c **6.2%**	1A3bii **5.7%**	3B3 **5.5%**	2A1 **5.4%**	1A2f **4.8%**	1A3bvi **3.0%**			81.1
PM_{10}	2A5a **15.8%**	1A1a **11.8%**	1A3bii **9.6%**	2A1 **8.2%**	1A2f **7.8%**	2A5b **6.0%**	3B3 **4.2%**	2D3b **4.0%**	1A3bvi **3.9%**	1A3biii **3.7%**	1A3bi **3.1%**	3B4gii **3.0%**	81.1
$PM_{2.5}$	1A3bii **18.2%**	1A1a **14.8%**	1A2f **14.2%**	2A1 **8.6%**	1A3biii **7.0%**	1A3bi **6.0%**	2G **4.0%**	1A3bvi **4.0%**	2A5a **3.0%**	3F **2.8%**			82.6
Pb	1A3bii **38.3%**	1A3bi **35.4%**	1A3biii **23.5%**										97.2
Hg	1A2f **75.8%**	1A1a **15.3%**											91.1
Cd	1A1a **58.6%**	1A2f **13.4%**	3F **11.7%**										83.7
DIOX	5E **32.9%**	1A3bi **20.1%**	1A3bii **17.4%**	1A1a **13.9%**									84.3
PAH	3F **97.5%**												97.5
HCB	1A2f **96.5%**												96.5

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 122: 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 **89.9%**												89.9
NO_x	1A1a **30.7%**	1A3biii **19.4%**	1A3bii **14.6%**	1A3bi **9.5%**	1A2f **9.1%**								83.3
NH_3	3B3 **42.9%**	3B1a **16.0%**	3Da2a **11.1%**	3Da3 **6.6%**	3Da1 **6.0%**								82.6
NMVOC	2D3i **38.3%**	2D3d **17.2%**	1A3bi **7.4%**	1B2av **6.0%**	1A3bv **5.7%**	2D3a **4.0%**	1A3biv **3.5%**						82.1
CO	1A3bi **56.2%**	1A3bii **12.4%**	1A3biv **8.6%**	1A2f **8.5%**									85.7
TSP	2A5a **21.7%**	2A5b **15.0%**	1A1a **10.9%**	1A3bii **5.9%**	2A1 **5.8%**	3B3 **5.6%**	2D3c **5.5%**	1A2f **5.4%**	1A3bvi **3.4%**	1A3biii **2.3%**			81.5
PM_{10}	2A5a **17.0%**	1A1a **13.1%**	1A3bii **9.4%**	2A1 **8.3%**	1A2f **8.3%**	2A5b **7.1%**	1A3bvi **4.2%**	3B3 **4.0%**	1A3biii **3.7%**	1A3bi **3.3%**	3B4gii **3.1%**		81.5
$PM_{2.5}$	1A3bii **17.6%**	1A1a **16.2%**	1A2f **14.8%**	2A1 **8.6%**	1A3biii **7.0%**	1A3bi **6.1%**	1A3bvi **4.2%**	2G **3.6%**	2A5a **3.2%**				81.3
Pb	1A3bii **45.8%**	1A3biii **30.0%**	1A3bi **21.0%**										96.8
Hg	1A2f **74.6%**	1A1a **16.5%**											91.1
Cd	1A1a **62.7%**	1A2f **13.2%**	3F **9.1%**										85.0
DIOX	5E **32.9%**	1A3bi **19.1%**	1A3bii **16.6%**	1A1a **14.7%**									83.3
PAH	3F **96.8%**												96.8
HCB	1A2f **93.8%**												93.8

Color Codes

A_PublicPower	
B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	

G_Shipping	
I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	

F_RoadTransport	
H_Aviation	
M_Other	

Table 123: 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 **87.4%**												87.4
NO_x	1A1a **31.9%**	1A3biii **18.9%**	1A3bii **13.5%**	1A2f **9.5%**	1A3bi **9.1%**								82.9
NH_3	3B3 **45.0%**	3B1a **15.5%**	3Da2a **10.7%**	3Da3 **6.8%**	3Da1 **5.4%**								83.4
NMVOC	2D3i **37.9%**	2D3d **19.4%**	1A3bi **7.4%**	1A3bv **6.0%**	2D3a **4.4%**	1B2av **4.2%**	5A **3.8%**						83.1
CO	1A3bi **57.5%**	1A3bii **11.5%**	1A2f **9.5%**	1A3biv **7.1%**									85.6
TSP	2A5a **19.6%**	2A5b **16.1%**	1A1a **11.7%**	2A1 **6.4%**	3B3 **6.2%**	1A3bii **5.6%**	1A2f **5.2%**	2D3c **5.2%**	1A3bvi **3.6%**	2A5c **2.5%**			82.1
PM_{10}	2A5a **16.1%**	1A1a **13.9%**	2A1 **9.1%**	1A3bii **8.9%**	1A2f **7.9%**	2A5b **7.6%**	3B3 **4.4%**	1A3bvi **4.3%**	1A3biii **3.7%**	1A3bi **3.2%**	3B4gii **2.7%**		81.8
$PM_{2.5}$	1A1a **17.2%**	1A3bii **16.8%**	1A2f **14.3%**	2A1 **9.4%**	1A3biii **6.9%**	1A3bi **6.1%**	1A3bvi **4.4%**	2A5a **3.2%**	2G **2.4%**				80.7
Pb	1A3bii **44.3%**	1A3biii **30.5%**	1A3bi **22.0%**										96.8
Hg	1A2f **76.5%**	1A1a **15.0%**											91.5
Cd	1A1a **62.8%**	1A2f **14.8%**	3F **7.5%**										85.1
DIOX	5E **31.9%**	1A3bi **19.4%**	1A3bii **16.1%**	1A1a **15.8%**									83.2
PAH	3F **96.0%**												96.0
HCB	1A2f **92.1%**												92.1

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 124: 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 **86.7%**												86.7
NO_x	1A1a **33.0%**	1A3biii **19.4%**	1A3bii **12.4%**	1A2f **9.3%**	1A3bi **9.1%**								83.2
NH_3	3B3 **45.8%**	3B1a **15.1%**	3Da2a **10.8%**	3Da3 **7.1%**	3Da1 **5.0%**								83.8
NMVOC	2D3i **36.5%**	2D3d **20.5%**	1A3bi **7.1%**	1A3bv **6.2%**	1B2av **4.5%**	2D3a **4.4%**	5A **3.8%**						83.0
CO	1A3bi **56.0%**	1A3bii **11.6%**	1A2f **9.7%**	1A3biv **8.1%**									85.4
TSP	2A5a **19.1%**	2A5b **16.6%**	1A1a **12.2%**	3B3 **6.3%**	2A1 **6.2%**	1A2f **5.2%**	1A3bii **5.1%**	2D3c **4.8%**	1A3bvi **3.8%**	2A5c **2.7%**			82.0
PM_{10}	2A5a **15.8%**	1A1a **14.5%**	2A1 **8.9%**	1A3bii **8.1%**	1A2f **8.0%**	2A5b **7.8%**	1A3bvi **4.6%**	3B3 **4.5%**	1A3biii **3.5%**	1A3bi **3.3%**	3B4gii **2.9%**		81.9
$PM_{2.5}$	1A1a **17.9%**	1A3bii **15.0%**	1A2f **14.3%**	2A1 **9.3%**	1A3biii **6.5%**	1A3bi **6.1%**	1A3bvi **4.5%**	2A5a **3.3%**	1A4bi **2.8%**	2G **2.5%**			82.2
Pb	1A3bii **41.5%**	1A3biii **32.3%**	1A3bi **23.0%**										96.8
Hg	1A2f **76.1%**	1A1a **15.7%**											91.8
Cd	1A1a **64.9%**	1A2f **14.6%**	1A3bi **5.0%**										84.5
DIOX	5E **30.6%**	1A3bi **19.2%**	1A1a **15.6%**	1A3bii **14.8%**									80.2
PAH	3F **92.2%**												92.2
HCB	1A2f **89.9%**												89.9

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 125: 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 **91.5%**												91.5
NO_x	1A1a **31.2%**	1A3biii **22.0%**	1A3bii **12.5%**	1A2f **10.5%**	1A3bi **9.3%**								85.5
NH_3	3B3 **46.7%**	3B1a **15.6%**	3Da2a **10.5%**	3Da3 **6.6%**	3Da1 **4.1%**								83.5
NMVOC	2D3i **42.3%**	2D3d **15.7%**	1A3bi **6.5%**	1A3bv **6.0%**	1B2av **5.1%**	2D3a **4.5%**							80.1
CO	1A3bi **56.6%**	1A3bii **11.4%**	1A2f **10.8%**	1A3biv **8.5%**									87.3
TSP	2A5a **18.6%**	2A5b **17.0%**	1A1a **12.7%**	2A1 **6.3%**	3B3 **6.3%**	1A2f **5.5%**	1A3bii **4.7%**	2D3c **4.6%**	1A3bvi **4.0%**	2A5c **2.9%**			82.6
PM_{10}	2A5a **15.5%**	1A1a **15.2%**	2A1 **9.1%**	1A2f **8.5%**	2A5b **8.1%**	1A3bii **7.5%**	1A3bvi **4.8%**	3B3 **4.5%**	1A3biii **3.6%**	1A3bi **3.3%**			80.1
$PM_{2.5}$	1A1a **19.1%**	1A2f **15.4%**	1A3bii **14.1%**	2A1 **9.4%**	1A3biii **6.7%**	1A3bi **6.3%**	1A3bvi **4.8%**	2A5a **3.4%**	1A4bi **2.6%**				81.8
Pb	1A3bii **39.0%**	1A3biii **34.3%**	1A3bi **23.5%**										96.8
Hg	1A2f **75.9%**	1A1a **16.3%**											92.2
Cd	1A1a **67.2%**	1A2f **14.8%**											82.0
DIOX	5E **29.6%**	1A3bi **19.9%**	1A1a **16.5%**	1A3bii **14.9%**									80.9
PAH	3F **88.4%**												88.4
HCB	1A2f **91.8%**												91.8

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 126: 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 **90.5%**												90.5
NO_x	1A1a **36.9%**	1A3biii **20.6%**	1A3bii **11.4%**	1A2f **9.0%**	1A3bi **8.8%**								86.7
NH_3	3B3 **47.3%**	3B1a **15.6%**	3Da2a **10.5%**	3Da3 **6.6%**									80.0
NMVOC	2D3i **39.5%**	2D3d **16.3%**	1A3bv **6.4%**	1A3bi **6.3%**	1B2av **5.8%**	2D3a **5.1%**	5A **4.4%**						83.8
CO	1A3bi **55.9%**	1A3bii **11.3%**	1A2f **9.9%**	1A3biv **9.0%**									86.1
TSP	2A5b **16.2%**	2A5a **15.6%**	1A1a **12.3%**	2D3c **8.7%**	3B3 **7.0%**	2A1 **5.8%**	1A2f **5.0%**	1A3bii **4.6%**	1A3bvi **4.4%**	1A3bvii **3.0%**			82.6
PM_{10}	1A1a **15.1%**	2A5a **13.3%**	2A1 **8.6%**	1A2f **7.9%**	2A5b **7.9%**	1A3bii **7.5%**	1A3bvi **5.5%**	3B3 **5.1%**	1A3biii **3.7%**	1A3bi **3.5%**	3B4gii **3.2%**		81.3
$PM_{2.5}$	1A1a **18.9%**	1A2f **14.4%**	1A3bii **14.0%**	2A1 **8.9%**	1A3biii **6.8%**	1A3bi **6.6%**	1A3bvi **5.5%**	2G **3.1%**	2A5a **3.1%**				81.3
Pb	1A3bii **37.8%**	1A3biii **34.0%**	1A3bi **25.2%**										97.0
Hg	1A2f **73.8%**	1A1a **17.2%**											91.0
Cd	1A1a **66.5%**	1A2f **13.9%**											80.4
DIOX	5E **31.1%**	1A3bi **20.8%**	1A1a **16.2%**	1A3bii **14.7%**									82.8
PAH	3F **87.5%**												87.5
HCB	1A2f **86.7%**												86.7

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 127: 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 **92.8%**												92.8
NO_x	1A1a **33.8%**	1A3biii **21.9%**	1A3bii **12.2%**	1A3bi **9.3%**	1A2f **8.5%**								85.7
NH_3	3B3 **46.6%**	3B1a **15.6%**	3Da2a **10.3%**	3Da3 **7.1%**	3Da1 **4.2%**								83.8
NMVOC	2D3i **43.6%**	2D3d **16.9%**	1A3bv **5.9%**	1A3bi **5.4%**	1B2av **5.3%**	2D3a **4.9%**							82.0
CO	1A3bi **55.3%**	1A3bii **12.1%**	1A3biv **9.1%**	1A2f **8.8%**									85.3
TSP	2A5b **15.2%**	2A5a **15.1%**	2D3c **11.7%**	1A1a **11.1%**	3B3 **7.1%**	2A1 **4.9%**	1A2f **4.8%**	1A3bvi **4.6%**	1A3bii **4.5%**	1A3bvii **3.1%**			82.1
PM_{10}	1A1a **14.2%**	2A5a **13.2%**	1A2f **7.8%**	2A5b **7.6%**	1A3bii **7.5%**	2A1 **7.4%**	1A3bvi **5.9%**	3B3 **5.3%**	2D3c **3.7%**	1A3bi **3.6%**	3B4gii **3.4%**		83.1
$PM_{2.5}$	1A1a **18.0%**	1A3bii **14.2%**	1A2f **14.2%**	2A1 **7.7%**	1A3bi **6.7%**	1A3biii **6.7%**	1A3bvi **5.9%**	2G **3.5%**	2A5a **3.3%**				80.2
Pb	1A3bii **37.8%**	1A3biii **33.5%**	1A3bi **26.0%**										97.3
Hg	1A2f **74.6%**	1A1a **14.5%**											89.1
Cd	1A1a **58.0%**	1A2f **15.2%**	1A3bi **8.2%**										81.4
DIOX	5E **31.9%**	1A3bi **21.0%**	1A3bii **15.4%**	1A1a **15.0%**									83.3
PAH	3F **88.1%**												88.1
HCB	1A2f **80.6%**												80.6

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 128: 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 **92.5%**													92.5
NO_x	1A1a **45.1%**	1A3biii **18.7%**	1A3bii **9.6%**	1A3bi **7.5%**										80.9
NH_3	3B3 **45.5%**	3B1a **16.6%**	3Da2a **10.3%**	3Da3 **7.5%**	3B1b **4.3%**									84.2
NMVOC	2D3i **34.9%**	2D3d **10.7%**	1A3bv **8.2%**	1B2av **7.3%**	2D3a **7.0%**	1A3bi **6.6%**	5A **4.9%**	1A3biv **3.1%**						82.7
CO	1A3bi **53.3%**	1A3bii **11.3%**	1A3biv **9.5%**	1A2f **9.2%**										83.3
TSP	2A5a **14.1%**	2A5b **13.1%**	2D3c **12.7%**	1A1a **12.6%**	3B3 **7.4%**	2A1 **5.4%**	1A3bvi **5.0%**	1A3bii **4.3%**	1A3bvii **3.4%**	1A2f **3.3%**				81.3
PM_{10}	1A1a **15.9%**	2A5a **12.2%**	2A1 **8.1%**	1A3bii **7.2%**	2A5b **6.5%**	1A3bvi **6.3%**	3B3 **5.5%**	1A2f **5.4%**	2D3c **4.0%**	1A3biii **3.7%**	1A3bi **3.6%**	3B4gii **3.5%**		81.9
$PM_{2.5}$	1A1a **20.3%**	1A3bii **13.5%**	1A2f **9.9%**	2A1 **8.5%**	1A3biii **6.9%**	1A3bi **6.9%**	1A3bvi **6.4%**	2A5a **3.2%**	2G **3.0%**	1A3bvii **2.9%**				81.5
Pb	1A3bii **35.6%**	1A3biii **34.6%**	1A3bi **26.9%**											97.1
Hg	1A2f **68.9%**	1A1a **20.4%**												89.3
Cd	1A1a **65.9%**	1A2f **12.3%**	1A3bi **6.9%**											85.1
DIOX	5E **33.4%**	1A3bi **20.4%**	1A1a **15.7%**	1A3bii **13.9%**										83.4
PAH	3F **89.3%**													89.3
HCB	1A2f **71.1%**	1A1a **20.8%**												91.9

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 129: 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 **90.8%**													90.8
NO_x	1A1a **50.5%**	1A3biii **17.5%**	1A3bii **7.5%**	1A3bi **6.9%**										82.4
NH_3	3B3 **43.2%**	3B1a **17.6%**	3Da2a **10.3%**	3Da3 **7.6%**	3B1b **4.6%**									83.3
NMVOC	2D3i **38.1%**	2D3d **10.9%**	1A3bv **7.7%**	2D3a **6.9%**	1B2av **6.6%**	1A3bi **5.8%**	5A **4.7%**							80.7
CO	1A3bi **52.9%**	1A3biv **9.8%**	1A3bii **9.5%**	1A2f **9.2%**										81.4
TSP	1A1a **16.5%**	2D3c **13.2%**	2A5b **11.5%**	2A5a **11.3%**	3B3 **8.8%**	1A3bvi **6.1%**	1A3bii **4.2%**	1A3bvii **4.2%**	1A3biii **2.7%**	3B4gii **2.6%**				81.1
PM_{10}	1A1a **20.6%**	2A5a **9.6%**	1A3bvi **7.7%**	1A3bii **7.0%**	3B3 **6.4%**	2A5b **5.6%**	1A3biii **4.5%**	3B4gii **4.3%**	1A2f **4.1%**	2D3c **4.1%**	1A3bvii **3.5%**	1A3bi **3.0%**		80.4
$PM_{2.5}$	1A1a **25.2%**	1A3bii **12.6%**	1A3biii **8.1%**	1A3bvi **7.4%**	1A2f **7.3%**	1A3bi **5.5%**	1A4bi **5.3%**	2G **4.2%**	1A3bvii **3.4%**	2A5a **2.4%**				81.4
Pb	1A3biii **36.7%**	1A3bii **32.5%**	1A3bi **27.6%**											96.8
Hg	1A2f **62.5%**	1A1a **27.0%**												89.5
Cd	1A1a **69.4%**	1A2f **10.3%**	1A3bi **6.0%**											85.7
DIOX	5E **34.3%**	1A3bi **18.6%**	1A1a **14.0%**	1A4bi **13.1%**										80.0
PAH	3F **89.1%**													89.1
HCB	1A2f **62.7%**	1A1a **29.8%**												92.5

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 130: 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 **87.9%**													87.9
NO_x	1A1a **38.5%**	1A3biii **19.0%**	1A2f **11.5%**	1A3bii **8.3%**	1A3bi **8.1%**									85.4
NH_3	3B3 **41.9%**	3B1a **19.2%**	3Da2a **10.3%**	3Da3 **7.3%**	3B1b **4.8%**									83.5
NMVOC	2D3i **40.9%**	2D3d **10.2%**	1A3bv **8.2%**	2D3a **7.4%**	1B2av **6.1%**	1A3bi **5.4%**	5A **4.7%**							82.9
CO	1A3bi **50.3%**	1A2f **14.3%**	1A3biv **9.8%**	1A3bii **8.7%**										83.1
TSP	1A1a **16.0%**	2A5b **10.4%**	3B3 **10.3%**	2A5a **9.3%**	2D3c **9.0%**	1A3bvi **7.1%**	1A3bvii **4.8%**	1A2f **4.5%**	1A3bii **4.4%**	3B4gii **2.9%**	1A3biii **2.9%**			81.6
PM_{10}	1A1a **18.8%**	1A3bvi **8.4%**	2A5a **7.4%**	3B3 **7.1%**	1A2f **6.8%**	1A3bii **6.7%**	2A5b **4.8%**	3B4gii **4.5%**	1A3biii **4.4%**	1A3bvii **3.7%**	1A3bi **3.1%**	1A4bi **3.0%**	2D3c **2.6%**	81.3
$PM_{2.5}$	1A1a **21.7%**	1A2f **11.5%**	1A3bii **11.4%**	1A3bvi **7.6%**	1A3biii **7.5%**	1A3bi **5.3%**	1A4bi **5.0%**	2G **3.7%**	1A3bvii **3.4%**	5E **2.3%**	3B3 **2.3%**			81.7
Pb	1A3biii **35.4%**	1A3bii **31.9%**	1A3bi **29.5%**											96.8
Hg	1A2f **82.1%**													82.1
Cd	1A1a **49.2%**	1A2f **23.2%**	1A3bi **8.4%**											80.8
DIOX	5E **29.5%**	1B2c **24.0%**	1A3bi **14.1%**	1A4bi **9.3%**	1A1a **8.1%**									85.0
PAH	3F **88.6%**													88.6
HCB	1A2f **81.4%**													81.4

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 131: 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 **89.0%**													89.0
NO_x	1A1a **39.9%**	1A3biii **17.5%**	1A2f **13.5%**	1A3bi **7.6%**	1A3bii **7.6%**									86.1
NH_3	3B3 **40.8%**	3B1a **20.0%**	3Da2a **11.0%**	3Da3 **7.1%**	3B1b **5.2%**									84.1
NMVOC	2D3i **36.8%**	2D3d **9.9%**	1A3bv **9.2%**	2D3a **8.1%**	1B2av **6.3%**	1A3bi **5.6%**	5A **4.9%**							80.8
CO	1A3bi **47.2%**	1A2f **18.3%**	1A3biv **9.6%**	1A3bii **8.2%**										83.3
TSP	1A1a **15.9%**	3B3 **11.0%**	2A5a **9.0%**	2A5b **8.7%**	1A2f **8.1%**	1A3bvi **7.8%**	1A3bvii **5.3%**	2D3c **4.6%**	1A3bii **4.5%**	3B4gii **4.0%**	1A3biii **3.1%**			82.0
PM_{10}	1A1a **17.6%**	1A2f **11.6%**	1A3bvi **8.7%**	3B3 **7.2%**	2A5a **6.8%**	1A3bii **6.6%**	3B4gii **5.9%**	1A3biii **4.5%**	1A3bvii **3.9%**	2A5b **3.8%**	1A3bi **3.2%**	1A4bi **2.7%**		82.5
$PM_{2.5}$	1A1a **19.8%**	1A2f **18.8%**	1A3bii **10.9%**	1A3bvi **7.6%**	1A3biii **7.4%**	1A3bi **5.3%**	1A4bi **4.4%**	1A3bvii **3.5%**	3B3 **2.2%**					79.9
Pb	1A3biii **34.9%**	1A3bii **31.0%**	1A3bi **30.5%**											96.4
Hg	1A2f **85.9%**													85.9
Cd	1A1a **48.2%**	1A2f **29.3%**	1A3bi **8.2%**											85.7
DIOX	5E **34.6%**	1A3bi **19.5%**	1A1a **14.2%**	1A4bi **11.2%**	1A3bii **10.9%**									90.4
PAH	3F **86.3%**													86.3
HCB	1A2f **85.9%**													85.9

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 132: 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 **87.2%**													87.2
NO_x	1A1a **32.1%**	1A3biii **20.7%**	1A2f **14.4%**	1A3bi **9.2%**	1A3bii **8.7%**									85.1
NH_3	3B3 **42.0%**	3B1a **20.5%**	3Da2a **10.1%**	3Da3 **7.1%**	3B1b **4.9%**									84.6
NMVOC	2D3i **36.3%**	2D3d **12.7%**	1A3bv **8.9%**	2D3a **7.8%**	1B2av **6.0%**	1A3bi **5.1%**	5A **4.8%**							81.6
CO	1A3bi **46.5%**	1A2f **17.3%**	1A3biv **10.0%**	1A3bii **8.3%**										82.1
TSP	1A1a **15.6%**	3B3 **11.0%**	2A5b **9.4%**	1A2f **9.2%**	2A5a **8.5%**	1A3bvi **7.8%**	1A3bvii **5.3%**	1A3bii **4.2%**	2D3c **3.9%**	3B4gii **3.3%**	1A3biii **3.0%**			81.2
PM_{10}	1A1a **17.2%**	1A2f **12.9%**	1A3bvi **8.6%**	3B3 **7.1%**	2A5a **6.4%**	1A3bii **6.1%**	3B4gii **4.8%**	1A3biii **4.3%**	2A5b **4.0%**	1A4bi **4.0%**	1A3bvii **3.9%**	1A3bi **3.3%**		82.6
$PM_{2.5}$	1A2f **20.4%**	1A1a **19.0%**	1A3bii **9.9%**	1A3bvi **7.5%**	1A3biii **6.9%**	1A4bi **6.3%**	1A3bi **5.3%**	1A3bvii **3.4%**	2G **3.3%**					82.0
Pb	1A3biii **34.6%**	1A3bi **32.6%**	1A3bii **29.5%**											96.7
Hg	1A2f **84.3%**													84.3
Cd	1A1a **48.1%**	1A2f **25.9%**	1A3bi **8.3%**											82.3
DIOX	5E **33.0%**	1A3bi **18.7%**	1A4bi **15.2%**	1A1a **14.3%**										81.2
PAH	3F **88.6%**													88.6
HCB	1A2f **85.0%**													85.0

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 133: 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 **89.8%**												89.8
NO_x	1A1a **27.8%**	1A3biii **22.1%**	1A2f **14.6%**	1A3bi **10.0%**	1A3bii **9.4%**								83.9
NH_3	3B3 **40.2%**	3B1a **21.6%**	3Da2a **10.2%**	3Da3 **7.1%**	3B1b **5.0%**								84.1
NMVOC	2D3i **36.2%**	2D3d **13.4%**	1A3bv **8.9%**	2D3a **7.9%**	1A3bi **5.1%**	1B2av **5.1%**	5A **4.9%**						81.5
CO	1A3bi **45.9%**	1A2f **16.9%**	1A3biv **10.2%**	1A3bii **8.3%**									81.3
TSP	1A1a **17.2%**	2A5b **10.5%**	3B3 **10.3%**	1A2f **9.1%**	2A5a **8.0%**	1A3bvi **7.7%**	1A3bvii **5.3%**	1A3bii **4.0%**	1A4bi **3.7%**	2D3c **3.7%**	3B4gii **3.2%**		82.7
PM_{10}	1A1a **19.0%**	1A2f **12.8%**	1A3bvi **8.5%**	3B3 **6.6%**	2A5a **6.0%**	1A3bii **5.8%**	1A4bi **5.1%**	3B4gii **4.7%**	2A5b **4.5%**	1A3biii **4.2%**	1A3bvii **3.8%**		81.0
$PM_{2.5}$	1A1a **20.7%**	1A2f **20.0%**	1A3bii **9.3%**	1A4bi **8.0%**	1A3bvi **7.3%**	1A3biii **6.7%**	1A3bi **5.1%**	1A3bvii **3.3%**					80.4
Pb	1A3biii **34.3%**	1A3bi **33.3%**	1A3bii **29.2%**										96.8
Hg	1A2f **83.8%**												83.8
Cd	1A1a **50.1%**	1A2f **25.0%**	1A3bi **8.3%**										83.4
DIOX	5E **33.2%**	1A4bi **18.1%**	1A3bi **17.0%**	1A1a **14.5%**									82.8
PAH	3F **83.0%**												83.0
HCB	1A2f **84.6%**												84.6

Color Codes

A_PublicPower		G_Shipping		F_RoadTransport	
B_Industry		I_Offroad		H_Aviation	
C_OtherStationaryComb		J_Waste		M_Other	
D_Fugitive		K_AgriLivestock			
E_Solvents		L_AgriOther			

Table 134: 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 **89.4%**												89.4
NO_x	1A1a **25.2%**	1A3biii **21.9%**	1A2f **15.4%**	1A3bi **11.3%**	1A3bii **9.5%**								83.3
NH_3	3B3 **39.5%**	3B1a **22.7%**	3Da2a **10.4%**	3Da3 **7.4%**	3B1b **5.3%**								85.3
NMVOC	2D3i **35.6%**	2D3d **15.3%**	1A3bv **8.9%**	2D3a **7.8%**	5A **4.9%**	1A3bi **4.6%**	1B2av **4.4%**						81.5
CO	1A3bi **45.0%**	1A2f **18.4%**	1A3biv **10.0%**	1A3bii **8.0%**									81.4
TSP	2A5b **14.7%**	1A1a **13.6%**	1A2f **11.6%**	3B3 **9.7%**	1A3bvi **7.6%**	2A5a **7.6%**	1A3bvii **5.2%**	1A3bii **3.6%**	2D3c **3.5%**	1A4bi **3.2%**			80.3
PM_{10}	1A2f **16.6%**	1A1a **15.4%**	1A3bvi **8.6%**	2A5b **6.5%**	3B3 **6.4%**	2A5a **5.9%**	1A3bii **5.4%**	3B4gii **4.7%**	1A4bi **4.5%**	1A3bvii **3.9%**	1A3biii **3.8%**		81.7
$PM_{2.5}$	1A2f **26.0%**	1A1a **16.8%**	1A3bii **8.6%**	1A3bvi **7.3%**	1A4bi **7.0%**	1A3biii **6.0%**	1A3bi **5.3%**	1A3bvii **3.3%**					80.3
Pb	1A3bi **36.7%**	1A3biii **32.7%**	1A3bii **27.6%**										97.0
Hg	1A2f **84.2%**												84.2
Cd	1A1a **49.3%**	1A2f **25.8%**	1A3bi **8.5%**										83.6
DIOX	5E **32.7%**	1A3bi **19.0%**	1A4bi **17.1%**	1A1a **13.4%**									82.2
PAH	3F **80.4%**												80.4
HCB	1A2f **85.0%**												85.0

Color Codes

A_PublicPower	
B_Industry	
C_OtherStationaryComb	
D_Fugitive	
E_Solvents	

G_Shipping	
I_Offroad	
J_Waste	
K_AgriLivestock	
L_AgriOther	

F_RoadTransport	
H_Aviation	
M_Other	

21. Annex 3: Trend Assessment 2017

Annex 3

Key Category Analysis

Trend Assessment 2017

Table 135: NOx Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3bi	Road transport: Passenger cars	**2915.14**	**1640.50**	**0.056030**	**22.23%**	**22.23%**
1A3bii	Road transport: Light duty vehicles	**2238.34**	**1377.38**	**0.035885**	**14.24%**	**36.47%**
3Da1	Inorganic N-fertilizers (includes also urea application)	**870.32**	**235.46**	**0.032140**	**12.75%**	**49.23%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**1621.35**	**2229.98**	**0.025085**	**9.95%**	**59.18%**
1A2gviii	Stationary combustion in manufacturing industries and construction	**494.02**	**70.06**	**0.022098**	**8.77%**	**67.95%**
1A2gvii	Mobile Combustion in manufacturing industries and construction	**403.95**	**79.61**	**0.016716**	**6.63%**	**74.59%**
1A3biii	Road transport: Heavy duty vehicles and buses	**3030.44**	**3181.60**	**0.012897**	**5.12%**	**79.70%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**231.98**	**425.89**	**0.010063**	**3.99%**	**83.70%**
1A4bi	Residential: Stationary	**159.05**	**317.73**	**0.008458**	**3.36%**	**87.05%**
1A3ai(i)	International aviation LTO (civil)	**310.01**	**470.63**	**0.007478**	**2.97%**	**90.02%**
1A3dii	National navigation (shipping)	**37.38**	**139.63**	**0.005925**	**2.35%**	**92.37%**
3F	Field burning of agricultural residues	**79.35**	**2.79**	**0.004062**	**1.61%**	**93.98%**
1A1a	Public electricity and heat production	**3212.86**	**3655.11**	**0.003416**	**1.36%**	**95.34%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**81.62**	**24.70**	**0.002855**	**1.13%**	**96.47%**

Table 135: NOx Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A5b	Other, Mobile (including military, land based and recreational boats)	**8.12**	**52.20**	**0.002612**	**1.04%**	**97.51%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**212.10**	**275.29**	**0.002286**	**0.91%**	**98.42%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**156.34**	**202.92**	**0.001685**	**0.67%**	**99.08%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**27.92**	**42.90**	**0.000705**	**0.28%**	**99.36%**
1A3biv	Road transport: Mopeds & motorcycles	**29.53**	**43.01**	**0.000602**	**0.24%**	**99.60%**
1A3aii(i)	Domestic aviation LTO (civil)	**6.86**	**1.01**	**0.000305**	**0.12%**	**99.72%**
2G	Other product use	**6.90**	**2.18**	**0.000236**	**0.09%**	**99.82%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**13.96**	**18.84**	**0.000194**	**0.08%**	**99.89%**
1A4ciii	Agriculture/Forestry/Fishing: National fishing	**1.92**	**0.51**	**0.000072**	**0.03%**	**99.92%**
3B3	Manure management - Swine	**11.27**	**13.59**	**0.000059**	**0.02%**	**99.95%**
3B1a	Manure management - Dairy cattle	**2.76**	**3.73**	**0.000039**	**0.02%**	**99.96%**
5C2	Open burning of waste	**1.55**	**2.22**	**0.000029**	**0.01%**	**99.97%**
3Da2b	Sewage sludge applied to soils	**1.1742**	**1.7284**	**0.000025**	**0.01%**	**99.98%**
3B4f	Manure management - Mules and asses	**0.26**	**0.03**	**0.000012**	**0.00%**	**99.99%**

Table 135: NOx Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
3B4giii	Manure mangement - Turkeys	**0.27**	**0.06**	**0.000011**	**0.00%**	**99.99%**
3B4gii	Manure mangement - Broilers	**3.70**	**3.43**	**0.000011**	**0.00%**	**100.00%**
3B4d	Manure management - Goats	**0.50**	**0.63**	**0.000004**	**0.00%**	**100.00%**
3B1b	Manure management - Non-dairy cattle	**1.23**	**1.39**	**0.000001**	**0.00%**	**100.00%**
3B4gi	Manure mangement - Laying hens	**1.38**	**1.22**	**0.000001**	**0.00%**	**100.00%**
3B4e	Manure management - Horses	**0.02**	**0.04**	**0.000001**	**0.00%**	**100.00%**
3B2	Manure management - Sheep	**0.71**	**0.79**	**0.000000**	**0.00%**	**100.00%**

Table 136: NMVOC Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3bi	Road transport: Passenger cars	2943.89	616.50	0.088830	33.48%	33.48%
2D3i	Other solvent use	4639.01	4716.27	0.061969	23.36%	56.84%
1A3biv	Road transport: Mopeds & motorcycles	1440.04	373.98	0.039379	14.84%	71.68%
1A3bii	Road transport: Light duty vehicles	534.90	101.98	0.016705	6.30%	77.97%
1A3biii	Road transport: Heavy duty vehicles and buses	443.26	156.94	0.009769	3.68%	81.66%
2D3a	Domestic solvent use including fungicides	704.52	1037.04	0.008633	3.25%	84.91%
2D3d	Coating applications	1738.74	2032.17	0.008350	3.15%	88.06%
2D3f	Dry cleaning	200.15	52.61	0.005438	2.05%	90.11%
1B2av	Distribution of oil products	715.88	589.19	0.003108	1.17%	91.28%
3B4gii	Manure mangement - Broilers	248.27	230.42	0.002545	0.96%	92.24%
2H2	Food and beverages industry	259.91	153.50	0.002270	0.86%	93.09%
3B3	Manure management - Swine	220.54	250.79	0.001451	0.55%	93.64%
1A3bv	Road transport: Gasoline evaporation	1554.72	1183.66	0.001353	0.51%	94.15%

Table 136: NMVOC Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2gvii	Mobile Combustion in manufacturing industries and construction	**41.81**	**8.24**	**0.001290**	**0.49%**	**94.63%**
3De	Cultivated crops	**49.45**	**17.38**	**0.001097**	**0.41%**	**95.05%**
2D3g	Chemical products	**38.81**	**11.11**	**0.001003**	**0.38%**	**95.43%**
3B1a	Manure management - Dairy cattle	**177.71**	**239.96**	**0.000961**	**0.36%**	**95.79%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**11.30**	**31.05**	**0.000949**	**0.36%**	**96.15%**
2D3c	Asphalt roofing	**32.50**	**8.57**	**0.000882**	**0.33%**	**96.48%**
3B1b	Manure management - Non-dairy cattle	**126.70**	**143.70**	**0.000855**	**0.32%**	**96.80%**
1A3ai(i)	International aviation LTO (civil)	**12.64**	**30.93**	**0.000848**	**0.32%**	**97.12%**
5A	Biological treatment of waste - Solid waste disposal on land	**527.28**	**646.35**	**0.000840**	**0.32%**	**97.44%**
2D3h	Printing	**200.00**	**265.46**	**0.000823**	**0.31%**	**97.75%**
1A2gviii	Stationary combustion in manufacturing industries and construction	**24.08**	**3.41**	**0.000818**	**0.31%**	**98.06%**
3F	Field burning of agricultural residues	**17.25**	**0.61**	**0.000690**	**0.26%**	**98.32%**
1A1a	Public electricity and heat production	**52.04**	**76.17**	**0.000613**	**0.23%**	**98.55%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**39.78**	**40.82**	**0.000510**	**0.19%**	**98.74%**

Table 136: NMVOC Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
2G	Other product use	**18.55**	**5.86**	**0.000448**	**0.17%**	**98.91%**
3B4giii	Manure mangement - Turkeys	**15.10**	**3.33**	**0.000446**	**0.17%**	**99.08%**
3B4gi	Manure mangement - Laying hens	**52.92**	**47.09**	**0.000429**	**0.16%**	**99.24%**
1A3dii	National navigation (shipping)	**2.74**	**10.09**	**0.000374**	**0.14%**	**99.38%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**1.36**	**7.34**	**0.000317**	**0.12%**	**99.50%**
1A4bi	Residential: Stationary	**61.27**	**72.01**	**0.000271**	**0.10%**	**99.60%**
3B4f	Manure management - Mules and asses	**7.21**	**0.75**	**0.000260**	**0.10%**	**99.70%**
3B2	Manure management - Sheep	**26.14**	**28.98**	**0.000214**	**0.08%**	**99.78%**
2D3b	Road paving with asphalt	**7.50**	**1.98**	**0.000203**	**0.08%**	**99.86%**
1A5b	Other, Mobile (including military, land based and recreational boats)	**0.53**	**3.40**	**0.000154**	**0.06%**	**99.91%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**3.98**	**1.20**	**0.000099**	**0.04%**	**99.95%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**21.80**	**28.30**	**0.000054**	**0.02%**	**99.97%**
3B4e	Manure management - Horses	**1.49**	**2.44**	**0.000032**	**0.01%**	**99.98%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**6.65**	**8.63**	**0.000016**	**0.01%**	**99.99%**

Table 136: NMVOC Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
5D1	Domestic wastewater handling	**0.28**	**0.51**	**0.000009**	**0.00%**	**99.99%**
5C2	Open burning of waste	**0.58**	**0.86**	**0.000007**	**0.00%**	**100.00%**
1A4ciii	Agriculture/Forestry/Fishing: National fishing	**0.14**	**0.04**	**0.000004**	**0.00%**	**100.00%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.68**	**0.92**	**0.000004**	**0.00%**	**100.00%**
1A3aii(i)	Domestic aviation LTO (civil)	**0.22**	**0.11**	**0.000003**	**0.00%**	**100.00%**

Table 137: SOx Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A1a	Public electricity and heat production	**21615.28**	**14724.25**	**0.110540**	**46.71%**	**46.71%**
1A3bii	Road transport: Light duty vehicles	**1837.28**	**2.02**	**0.029970**	**12.66%**	**59.37%**
1A3biii	Road transport: Heavy duty vehicles and buses	**1569.22**	**2.24**	**0.025581**	**10.81%**	**70.18%**
1A3bi	Road transport: Passenger cars	**1064.50**	**8.68**	**0.017128**	**7.24%**	**77.42%**
1A2gviii	Stationary combustion in manufacturing industries and construction	**1150.00**	**65.24**	**0.016744**	**7.08%**	**84.49%**
1A4bi	Residential: Stationary	**1416.84**	**204.73**	**0.016711**	**7.06%**	**91.56%**
1A2gvii	Mobile Combustion in manufacturing industries and construction	**247.60**	**0.05**	**0.004046**	**1.71%**	**93.27%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**540.00**	**393.99**	**0.003585**	**1.51%**	**94.78%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**246.22**	**31.96**	**0.003018**	**1.28%**	**96.06%**
1A3dii	National navigation (shipping)	**37.99**	**138.21**	**0.002581**	**1.09%**	**97.15%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**190.00**	**23.00**	**0.002381**	**1.01%**	**98.15%**
1A5b	Other, Mobile (including military, land based and recreational boats)	**10.04**	**64.52**	**0.001564**	**0.66%**	**98.81%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**123.11**	**15.98**	**0.001509**	**0.64%**	**99.45%**

Table 137: SOx Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3ai(i)	International aviation LTO (civil)	**26.31**	**26.62**	**0.000389**	**0.16%**	**99.62%**
1A3biv	Road transport: Mopeds & motorcycles	**19.97**	**0.13**	**0.000322**	**0.14%**	**99.75%**
3F	Field burning of agricultural residues	**17.25**	**0.61**	**0.000263**	**0.11%**	**99.86%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**65.00**	**38.64**	**0.000155**	**0.07%**	**99.93%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**482.54**	**710.66**	**0.000128**	**0.05%**	**99.98%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**32.50**	**17.54**	**0.000021**	**0.01%**	**99.99%**
1A4ciii	Agriculture/Forestry/Fishing: National fishing	**1.92**	**0.51**	**0.000015**	**0.01%**	**100.00%**
1A3aii(i)	Domestic aviation LTO (civil)	**0.41**	**0.07**	**0.000005**	**0.00%**	**100.00%**
2G	Other product use	**0.13**	**0.03**	**0.000001**	**0.00%**	**100.00%**
5C2	Open burning of waste	**0.05**	**0.08**	**0.000000**	**0.00%**	**100.00%**

Table 138: NH_3 Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
3Da1	Inorganic N-fertilizers (includes also urea application)	**709.50**	**191.95**	**0.077326**	**32.64%**	**32.64%**
3B3	Manure management - Swine	**2084.29**	**2559.94**	**0.055113**	**23.26%**	**55.90%**
3B1a	Manure management - Dairy cattle	**1090.30**	**1472.25**	**0.050754**	**21.42%**	**77.33%**
1A3bi	Road transport: Passenger cars	**60.15**	**187.15**	**0.020244**	**8.55%**	**85.87%**
3F	Field burning of agricultural residues	**82.80**	**2.91**	**0.012234**	**5.16%**	**91.04%**
3Da2a	Animal manure applied to soils	**686.21**	**671.95**	**0.005296**	**2.24%**	**93.27%**
3B1b	Manure management - Non-dairy cattle	**300.82**	**341.17**	**0.003294**	**1.39%**	**94.66%**
3Da3	Urine and dung deposited by grazing animals	**437.16**	**478.91**	**0.002007**	**0.85%**	**95.51%**
3B4gi	Manure mangement - Laying hens	**277.99**	**247.38**	**0.001944**	**0.82%**	**96.33%**
3B4giii	Manure mangement - Turkeys	**16.02**	**3.54**	**0.001877**	**0.79%**	**97.12%**
3B4f	Manure management - Mules and asses	**13.50**	**1.40**	**0.001843**	**0.78%**	**97.90%**
3B4d	Manure management - Goats	**52.18**	**65.58**	**0.001625**	**0.69%**	**98.59%**
2G	Other product use	**15.90**	**5.03**	**0.001614**	**0.68%**	**99.27%**
1A3bii	Road transport: Light duty vehicles	**0.32**	**3.56**	**0.000530**	**0.22%**	**99.49%**

Table 138: NH_3 Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
3B2	Manure management - Sheep	**73.82**	**81.83**	**0.000498**	**0.21%**	**99.70%**
3Da2b	Sewage sludge applied to soils	**3.87**	**5.70**	**0.000258**	**0.11%**	**99.81%**
1A3biii	Road transport: Heavy duty vehicles and buses	**0.85**	**1.89**	**0.000160**	**0.07%**	**99.88%**
3B4e	Manure management - Horses	**1.24**	**2.02**	**0.000115**	**0.05%**	**99.93%**
3B4gii	Manure mangement - Broilers	**156.24**	**145.01**	**0.000110**	**0.05%**	**99.97%**
1A4bi	Residential: Stationary	**6.91**	**7.61**	**0.000038**	**0.02%**	**99.99%**
1A3biv	Road transport: Mopeds & motorcycles	**0.31**	**0.41**	**0.000012**	**0.01%**	**99.99%**
1A2gvii	Mobile Combustion in manufacturing industries and construction	**0.10**	**0.02**	**0.000012**	**0.01%**	**100.00%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**0.05**	**0.06**	**0.000002**	**0.00%**	**100.00%**

Table 139: $PM_{2,5}$ Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3bii	Road transport: Light duty vehicles	**536.52**	**110.51**	**0.055122**	**18.40%**	**18.40%**
2G	Other product use	**291.02**	**33.25**	**0.039872**	**13.31%**	**31.70%**
2D3b	Road paving with asphalt	**197.29**	**0.09**	**0.035421**	**11.82%**	**43.52%**
2A1	Cement production	**185.60**	**2.23**	**0.032520**	**10.85%**	**54.38%**
1A1a	Public electricity and heat production	**294.29**	**216.17**	**0.027889**	**9.31%**	**63.69%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**264.77**	**334.79**	**0.025194**	**8.41%**	**72.09%**
1A3bvi	Road transport: Automobile tyre and brake wear	**84.71**	**94.42**	**0.012800**	**4.27%**	**76.37%**
3F	Field burning of agricultural residues	**83.40**	**6.55**	**0.012540**	**4.19%**	**80.55%**
1A4bi	Residential: Stationary	**44.20**	**90.40**	**0.008686**	**2.90%**	**83.45%**
1A3biii	Road transport: Heavy duty vehicles and buses	**199.95**	**77.79**	**0.006864**	**2.29%**	**85.74%**
1A3bvii	Road transport: Automobile road abrasion	**36.34**	**42.80**	**0.004637**	**1.55%**	**87.29%**
1A3dii	National navigation (shipping)	**4.86**	**17.85**	**0.003912**	**1.31%**	**88.59%**
3B3	Manure management - Swine	**29.67**	**24.73**	**0.003910**	**1.30%**	**89.90%**

Table 139: $PM_{2,5}$ Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
2A5a	Quarrying and mining of minerals other than coal	53.57	16.60	0.003422	1.14%	91.04%
1A2gvii	Mobile Combustion in manufacturing industries and construction	27.35	5.13	0.002997	1.00%	92.04%
5E	Other waste	28.09	20.88	0.002754	0.92%	92.96%
1A2gviii	Stationary combustion in manufacturing industries and construction	19.90	2.73	0.002555	0.85%	93.81%
2A5b	Construction and demolition	15.08	13.27	0.002248	0.75%	94.56%
1A5b	Other, Mobile (including military, land based and recreational boats)	1.21	7.75	0.002213	0.74%	95.30%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	20.69	15.28	0.001993	0.67%	95.97%
1A3bi	Road transport: Passenger cars	129.76	67.61	0.001946	0.65%	96.62%
1A3biv	Road transport: Mopeds & motorcycles	21.49	6.00	0.001621	0.54%	97.16%
3B4gii	Manure mangement - Broilers	19.11	12.64	0.001288	0.43%	97.59%
3B4gi	Manure mangement - Laying hens	7.12	7.39	0.001283	0.43%	98.02%
2D3c	Asphalt roofing	11.26	2.64	0.001039	0.35%	98.36%
1A4ci	Agriculture/Forestry/Fishing: Stationary	9.69	7.16	0.000934	0.31%	98.67%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	13.06	21.36	0.000565	0.19%	98.86%

Table 139: $PM_{2,5}$ Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**1.76**	**4.10**	**0.000532**	**0.18%**	**99.04%**
5C1bv	Cremation	**2.90**	**0.04**	**0.000505**	**0.17%**	**99.21%**
3B1a	Manure management - Dairy cattle	**4.75**	**6.12**	**0.000412**	**0.14%**	**99.35%**
3B1b	Manure management - Non-dairy cattle	**2.80**	**3.34**	**0.000341**	**0.11%**	**99.46%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**3.68**	**0.96**	**0.000302**	**0.10%**	**99.56%**
1A3ai(i)	International aviation LTO (civil)	**2.86**	**3.56**	**0.000293**	**0.10%**	**99.66%**
2A2	Lime production	**4.25**	**2.81**	**0.000286**	**0.10%**	**99.75%**
5C2	Open burning of waste	**2.36**	**2.92**	**0.000247**	**0.08%**	**99.84%**
2A5c	Storage, handling and transport of mineral products	**5.84**	**2.46**	**0.000129**	**0.04%**	**99.88%**
3B4giii	Manure mangement - Turkeys	**1.04**	**0.19**	**0.000116**	**0.04%**	**99.92%**
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	**3.09**	**1.21**	**0.000102**	**0.03%**	**99.95%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**1.13**	**0.73**	**0.000071**	**0.02%**	**99.98%**
1A4ciii	Agriculture/Forestry/Fishing: National fishing	**0.25**	**0.07**	**0.000020**	**0.01%**	**99.98%**

Table 139: $PM_{2,5}$ Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
3B4d	Manure management - Goats	**0.26**	**0.18**	**0.000020**	**0.01%**	**99.99%**
3B2	Manure management - Sheep	**0.17**	**0.22**	**0.000014**	**0.00%**	**99.99%**
1A3aii(i)	Domestic aviation LTO (civil)	**0.08**	**0.01**	**0.000009**	**0.00%**	**100.00%**
3B4e	Manure management - Horses	**0.03**	**0.03**	**0.000004**	**0.00%**	**100.00%**
3B4f	Manure management - Mules and asses	**0.05**	**0.01**	**0.000003**	**0.00%**	**100.00%**
5A	Biological treatment of waste - Solid waste disposal on land	**0.01**	**0.01**	**0.000003**	**0.00%**	**100.00%**

Table 140: PM_{10} Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
2D3b	Road paving with asphalt	845.55	0.40	0.072282	24.05%	24.05%
2A1	Cement production	334.09	3.11	0.027957	9.30%	33.35%
1A1a	Public electricity and heat production	446.24	315.99	0.026354	8.77%	42.12%
1A3bii	Road transport: Light duty vehicles	536.52	110.51	0.023344	7.77%	49.89%
2A5a	Quarrying and mining of minerals other than coal	535.70	120.04	0.021326	7.10%	56.98%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	276.62	341.10	0.019659	6.54%	63.52%
2G	Other product use	293.11	33.77	0.018187	6.05%	69.58%
1A3bvi	Road transport: Automobile tyre and brake wear	158.31	176.70	0.015030	5.00%	74.58%
2A5b	Construction and demolition	150.77	132.67	0.014196	4.72%	79.30%
3B3	Manure management - Swine	157.87	131.06	0.013260	4.41%	83.71%
3B4gii	Manure mangement - Broilers	144.90	95.83	0.007174	2.39%	86.10%
3F	Field burning of agricultural residues	88.03	6.91	0.006122	2.04%	88.14%
1A3bvii	Road transport: Automobile road abrasion	67.30	79.26	0.005545	1.84%	89.98%
3B4gi	Manure mangement - Laying hens	39.60	41.06	0.004401	1.46%	91.44%

Table 140: PM_{10} Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A4bi	Residential: Stationary	**45.13**	**92.57**	**0.004333**	**1.44%**	**92.89%**
2D3c	Asphalt roofing	**84.47**	**19.77**	**0.003191**	**1.06%**	**93.95%**
1A3bi	Road transport: Passenger cars	**129.76**	**67.61**	**0.002705**	**0.90%**	**94.85%**
1A3dii	National navigation (shipping)	**4.86**	**17.85**	**0.002077**	**0.69%**	**95.54%**
5E	Other waste	**28.09**	**20.88**	**0.001861**	**0.62%**	**96.16%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**20.69**	**15.28**	**0.001351**	**0.45%**	**96.61%**
1A2gvii	Mobile Combustion in manufacturing industries and construction	**27.35**	**5.13**	**0.001292**	**0.43%**	**97.04%**
1A3biii	Road transport: Heavy duty vehicles and buses	**199.95**	**77.79**	**0.001222**	**0.41%**	**97.45%**
1A5b	Other, Mobile (including military, land based and recreational boats)	**1.21**	**7.75**	**0.001194**	**0.40%**	**97.84%**
1A2gviii	Stationary combustion in manufacturing industries and construction	**19.90**	**2.73**	**0.001145**	**0.38%**	**98.22%**
2A2	Lime production	**21.23**	**14.03**	**0.001049**	**0.35%**	**98.57%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**10.51**	**7.76**	**0.000686**	**0.23%**	**98.80%**
1A3biv	Road transport: Mopeds & motorcycles	**21.49**	**6.00**	**0.000614**	**0.20%**	**99.01%**
3B1a	Manure management - Dairy cattle	**7.30**	**9.40**	**0.000438**	**0.15%**	**99.15%**

Table 140: PM_{10} Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	**80.31**	**31.54**	**0.000432**	**0.14%**	**99.29%**
3B4giii	Manure mangement - Turkeys	**7.80**	**1.42**	**0.000377**	**0.13%**	**99.42%**
3B1b	Manure management - Non-dairy cattle	**4.24**	**5.05**	**0.000335**	**0.11%**	**99.53%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**1.76**	**4.15**	**0.000280**	**0.09%**	**99.62%**
5C1bv	Cremation	**3.39**	**0.05**	**0.000279**	**0.09%**	**99.72%**
1A3ai(i)	International aviation LTO (civil)	**2.86**	**3.56**	**0.000196**	**0.07%**	**99.78%**
5C2	Open burning of waste	**2.54**	**3.14**	**0.000177**	**0.06%**	**99.84%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**13.06**	**21.46**	**0.000165**	**0.05%**	**99.90%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**3.68**	**0.96**	**0.000119**	**0.04%**	**99.94%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**1.13**	**0.73**	**0.000053**	**0.02%**	**99.95%**
3B4d	Manure management - Goats	**0.87**	**0.59**	**0.000047**	**0.02%**	**99.97%**
2A5c	Storage, handling and transport of mineral products	**58.44**	**24.64**	**0.000032**	**0.01%**	**99.98%**
3B2	Manure management - Sheep	**0.57**	**0.74**	**0.000032**	**0.01%**	**99.99%**

Table 140: PM_{10} Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
5A	Biological treatment of waste - Solid waste disposal on land	**0.09**	**0.09**	**0.000011**	**0.00%**	**99.99%**
1A4ciii	Agriculture/Forestry/Fishing: National fishing	**0.25**	**0.07**	**0.000008**	**0.00%**	**100.00%**
3B4e	Manure management - Horses	**0.05**	**0.04**	**0.000004**	**0.00%**	**100.00%**
1A3aii(i)	Domestic aviation LTO (civil)	**0.08**	**0.01**	**0.000004**	**0.00%**	**100.00%**
3B4f	Manure management - Mules and asses	**0.07**	**0.02**	**0.000002**	**0.00%**	**100.00%**

Table 141: TSP Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
2D3b	Road paving with asphalt	3664.03	1.71	0.120267	41.15%	41.15%
2A5b	Construction and demolition	508.41	447.38	0.029763	10.18%	51.34%
1A1a	Public electricity and heat production	593.91	414.88	0.023577	8.07%	59.41%
3B3	Manure management - Swine	354.11	294.19	0.018921	6.47%	65.88%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	286.03	354.09	0.013241	4.53%	70.41%
1A3bvi	Road transport: Automobile tyre and brake wear	207.98	231.88	0.012287	4.20%	74.62%
2A5a	Quarrying and mining of minerals other than coal	1092.83	231.29	0.011897	4.07%	78.69%
2A1	Cement production	371.21	3.20	0.011870	4.06%	82.75%
1A3bvii	Road transport: Automobile road abrasion	134.61	158.52	0.007074	2.42%	85.17%
1A3bii	Road transport: Light duty vehicles	536.52	110.51	0.006156	2.11%	87.28%
2G	Other product use	293.55	33.88	0.006130	2.10%	89.37%
3B4gii	Manure mangement - Broilers	144.90	95.83	0.005192	1.78%	91.15%
2D3c	Asphalt roofing	450.51	105.43	0.003857	1.32%	92.47%
1A3bi	Road transport: Passenger cars	129.76	67.61	0.002758	0.94%	93.41%

Table 141: TSP Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
3B4gi	Manure mangement - Laying hens	40.98	42.49	0.002752	0.94%	94.36%
3F	Field burning of agricultural residues	89.58	7.03	0.002214	0.76%	95.11%
2A2	Lime production	54.59	36.08	0.001954	0.67%	95.78%
1A4bi	Residential: Stationary	46.99	96.92	0.001850	0.63%	96.42%
1A3biii	Road transport: Heavy duty vehicles and buses	199.95	77.79	0.001508	0.52%	96.93%
2A5c	Storage, handling and transport of mineral products	116.88	49.28	0.001278	0.44%	97.37%
5E	Other waste	28.09	20.88	0.001246	0.43%	97.80%
1A3dii	National navigation (shipping)	4.86	17.85	0.001005	0.34%	98.14%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	20.69	15.28	0.000908	0.31%	98.45%
3B1a	Manure management - Dairy cattle	15.94	20.52	0.000657	0.22%	98.67%
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	80.31	31.54	0.000636	0.22%	98.89%
1A5b	Other, Mobile (including military, land based and recreational boats)	1.21	7.75	0.000595	0.20%	99.10%
3B1b	Manure management - Non-dairy cattle	9.15	10.92	0.000466	0.16%	99.26%
1A4ci	Agriculture/Forestry/Fishing: Stationary	10.51	7.76	0.000461	0.16%	99.41%

Table 141: TSP Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2gviii	Stationary combustion in manufacturing industries and construction	**19.90**	**2.73**	**0.000370**	**0.13%**	**99.54%**
1A2gvii	Mobile Combustion in manufacturing industries and construction	**27.35**	**5.13**	**0.000366**	**0.13%**	**99.66%**
5C1bv	Cremation	**4.84**	**0.07**	**0.000151**	**0.05%**	**99.72%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**1.76**	**4.27**	**0.000136**	**0.05%**	**99.76%**
1A3ai(i)	International aviation LTO (civil)	**2.86**	**3.56**	**0.000130**	**0.04%**	**99.81%**
5C2	Open burning of waste	**2.61**	**3.23**	**0.000121**	**0.04%**	**99.85%**
3B4giii	Manure mangement - Turkeys	**7.80**	**1.42**	**0.000109**	**0.04%**	**99.89%**
1A3biv	Road transport: Mopeds & motorcycles	**21.49**	**6.00**	**0.000083**	**0.03%**	**99.91%**
3B4d	Manure management - Goats	**2.16**	**1.47**	**0.000082**	**0.03%**	**99.94%**
3B2	Manure management - Sheep	**1.41**	**1.84**	**0.000055**	**0.02%**	**99.96%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**1.13**	**0.73**	**0.000039**	**0.01%**	**99.97%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**13.06**	**21.70**	**0.000030**	**0.01%**	**99.99%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**3.68**	**0.96**	**0.000021**	**0.01%**	**99.99%**

Table 141: TSP Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
5A	Biological treatment of waste - Solid waste disposal on land	**0.20**	**0.19**	**0.000013**	**0.00%**	**100.00%**
3B4e	Manure management - Horses	**0.11**	**0.09**	**0.000006**	**0.00%**	**100.00%**
1A4ciii	Agriculture/Forestry/Fishing: National fishing	**0.25**	**0.07**	**0.000001**	**0.00%**	**100.00%**
1A3aii(i)	Domestic aviation LTO (civil)	**0.08**	**0.01**	**0.000001**	**0.00%**	**100.00%**
3B4f	Manure management - Mules and asses	**0.15**	**0.04**	**0.000001**	**0.00%**	**100.00%**

Table 142: BC Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3bii	Road transport: Light duty vehicles	**326.59**	**74.18**	**0.121333**	**63.92%**	**63.92%**
1A3bi	Road transport: Passenger cars	**77.41**	**45.21**	**0.011432**	**6.02%**	**69.95%**
2D3b	Road paving with asphalt	**11.25**	**0.01**	**0.007886**	**4.15%**	**74.10%**
1A2gvii	Mobile Combustion in manufacturing industries and construction	**16.68**	**3.13**	**0.007156**	**3.77%**	**77.87%**
1A2gviii	Stationary combustion in manufacturing industries and construction	**11.14**	**1.53**	**0.005596**	**2.95%**	**80.82%**
1A1a	Public electricity and heat production	**16.48**	**11.54**	**0.005214**	**2.75%**	**83.57%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**70.24**	**109.93**	**0.004875**	**2.57%**	**86.14%**
3F	Field burning of agricultural residues	**7.72**	**0.61**	**0.004538**	**2.39%**	**88.53%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**12.02**	**8.88**	**0.004488**	**2.36%**	**90.89%**
1A3biii	Road transport: Heavy duty vehicles and buses	**105.10**	**48.02**	**0.003928**	**2.07%**	**92.96%**
2A1	Cement production	**5.57**	**0.07**	**0.003811**	**2.01%**	**94.97%**
1A4bi	Residential: Stationary	**4.36**	**9.03**	**0.003495**	**1.84%**	**96.81%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**5.43**	**4.01**	**0.002022**	**1.07%**	**97.87%**
1A3biv	Road transport: Mopeds & motorcycles	**4.03**	**1.10**	**0.001225**	**0.65%**	**98.52%**

Table 142: BC Trend Assessment

NFR Code	NFR Category	2000 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**7.32**	**10.59**	**0.000737**	**0.39%**	**98.91%**
2G	Other product use	**1.30**	**0.15**	**0.000698**	**0.37%**	**99.28%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**2.06**	**0.54**	**0.000664**	**0.35%**	**99.63%**
5C2	Open burning of waste	**0.99**	**1.23**	**0.000401**	**0.21%**	**99.84%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.63**	**0.41**	**0.000154**	**0.08%**	**99.92%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**0.98**	**1.60**	**0.000150**	**0.08%**	**100.00%**
2A2	Lime production	**0.02**	**0.01**	**0.000005**	**0.00%**	**100.00%**
2D3c	Asphalt roofing	**0.00**	**0.00**	**0.000001**	**0.00%**	**100.00%**

Table 143: CO Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3bi	Road transport: Passenger cars	**27070.17**	**6230.16**	**0.055317**	**43.77%**	**43.77%**
1A3bii	Road transport: Light duty vehicles	**5816.24**	**1113.40**	**0.017074**	**13.51%**	**57.28%**
3F	Field burning of agricultural residues	**2301.15**	**80.90**	**0.015040**	**11.90%**	**69.18%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**1892.99**	**2543.15**	**0.014728**	**11.65%**	**80.83%**
1A3biii	Road transport: Heavy duty vehicles and buses	**1015.35**	**786.81**	**0.010669**	**8.44%**	**89.27%**
1A1a	Public electricity and heat production	**341.65**	**365.63**	**0.004809**	**3.81%**	**93.08%**
1A3biv	Road transport: Mopeds & motorcycles	**3803.14**	**1383.42**	**0.003936**	**3.11%**	**96.19%**
1A3ai(i)	International aviation LTO (civil)	**122.41**	**266.25**	**0.001393**	**1.10%**	**97.29%**
1A4bi	Residential: Stationary	**396.87**	**712.48**	**0.001043**	**0.83%**	**98.12%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**70.60**	**91.63**	**0.000623**	**0.49%**	**98.61%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**29.84**	**74.24**	**0.000554**	**0.44%**	**99.05%**
1A2gvii	Mobile Combustion in manufacturing industries and construction	**133.38**	**26.29**	**0.000374**	**0.30%**	**99.34%**
1A2gviii	Stationary combustion in manufacturing industries and construction	**63.56**	**9.01**	**0.000259**	**0.21%**	**99.55%**

Table 143: CO Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**3.59**	**15.43**	**0.000216**	**0.17%**	**99.72%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**20.77**	**26.96**	**0.000183**	**0.15%**	**99.87%**
5C2	Open burning of waste	**26.43**	**38.91**	**0.000127**	**0.10%**	**99.97%**
2G	Other product use	**211.44**	**66.80**	**0.000014**	**0.01%**	**99.98%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**1.80**	**2.42**	**0.000014**	**0.01%**	**99.99%**
1A3aii(i)	Domestic aviation LTO (civil)	**2.68**	**1.17**	**0.000007**	**0.01%**	**99.99%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**10.50**	**3.18**	**0.000004**	**0.00%**	**100.00%**
2D3c	Asphalt roofing	**2.38**	**0.63**	**0.000003**	**0.00%**	**100.00%**

Table 144: Pb Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3bi	Road transport: Passenger cars	**22.8333**	**6.7412**	**0.146448**	**70.96%**	**70.96%**
1A3bii	Road transport: Light duty vehicles	**6.9379**	**5.0794**	**0.041466**	**20.09%**	**91.05%**
1A3biv	Road transport: Mopeds & motorcycles	**0.9984**	**0.0323**	**0.013849**	**6.71%**	**97.76%**
1A3bvi	Road transport: Automobile tyre and brake wear	**0.1252**	**0.2440**	**0.001668**	**0.81%**	**98.57%**
1A1a	Public electricity and heat production	**0.1032**	**0.1023**	**0.001377**	**0.67%**	**99.23%**
1A3biii	Road transport: Heavy duty vehicles and buses	**4.0896**	**6.0094**	**0.001067**	**0.52%**	**99.75%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.1224**	**0.1683**	**0.000361**	**0.17%**	**99.93%**
3F	Field burning of agricultural residues	**0.0038**	**0.0001**	**0.000052**	**0.03%**	**99.95%**
1A4bi	Residential: Stationary	**0.0027**	**0.0030**	**0.000029**	**0.01%**	**99.96%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**0.0000**	**0.0010**	**0.000027**	**0.01%**	**99.98%**
2G	Other product use	**0.0034**	**0.0008**	**0.000027**	**0.01%**	**99.99%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**0.0000**	**0.0005**	**0.000014**	**0.01%**	**100.00%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**0.0010**	**0.0013**	**0.000005**	**0.00%**	**100.00%**

Table 144: Pb Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2gviii	Stationary combustion in manufacturing industries and construction	**0.0001**	**0.0000**	**0.000001**	**0.00%**	**100.00%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**0.0000**	**0.0000**	**0.000000**	**0.00%**	**100.00%**
5C2	Open burning of waste	**0.0002**	**0.0003**	**0.000000**	**0.00%**	**100.00%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.0000**	**0.0000**	**0.000000**	**0.00%**	**100.00%**

Table 145: Cd Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2016 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
3F	Field burning of agricultural residues	**0.0304**	**0.0011**	**0.208341**	**54.38%**	**54.38%**
1A1a	Public electricity and heat production	**0.0272**	**0.0262**	**0.109425**	**28.56%**	**82.94%**
1A3bi	Road transport: Passenger cars	**0.0018**	**0.0045**	**0.023747**	**6.20%**	**89.13%**
2G	Other product use	**0.0054**	**0.0017**	**0.019220**	**5.02%**	**94.15%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**0.0000**	**0.0002**	**0.002700**	**0.70%**	**94.85%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.0100**	**0.0137**	**0.000397**	**0.10%**	**94.96%**
1A3bii	Road transport: Light duty vehicles	**0.0009**	**0.0009**	**0.003902**	**1.02%**	**95.98%**
1A3bvi	Road transport: Automobile tyre and brake wear	**0.0006**	**0.0011**	**0.003894**	**1.02%**	**96.99%**
1A4bi	Residential: Stationary	**0.0013**	**0.0014**	**0.004156**	**1.08%**	**98.08%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**0.0000**	**0.0005**	**0.005309**	**1.39%**	**99.46%**
1A2gvii	Mobile Combustion in manufacturing industries and construction	**0.0001**	**0.0000**	**0.000615**	**0.16%**	**99.62%**
1A3biii	Road transport: Heavy duty vehicles and buses	**0.0007**	**0.0010**	**0.000715**	**0.19%**	**99.81%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**0.0003**	**0.0004**	**0.000290**	**0.08%**	**99.89%**

Table 145: Cd Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2016 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A3biv	Road transport: Mopeds & motorcycles	**0.0001**	**0.0001**	**0.000292**	**0.08%**	**99.96%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**0.0001**	**0.0001**	**0.000058**	**0.02%**	**99.98%**
5C2	Open burning of waste	**0.0000**	**0.0001**	**0.000052**	**0.01%**	**99.99%**
1A2gviii	Stationary combustion in manufacturing industries and construction	**0.0000**	**0.0000**	**0.000032**	**0.01%**	**100.00%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**0.0000**	**0.0000**	**0.000004**	**0.00%**	**100.00%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.0000**	**0.0000**	**0.000000**	**0.00%**	**100.00%**

Table 146: Hg Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.0613**	**0.0842**	**0.228642**	**72.76%**	**72.76%**
3F	Field burning of agricultural residues	**0.0048**	**0.0002**	**0.046616**	**14.84%**	**87.60%**
1A4bi	Residential: Stationary	**0.0004**	**0.0020**	**0.015994**	**5.09%**	**92.69%**
2D3a	Domestic solvent use including fungicides	**0.0033**	**0.0048**	**0.015500**	**4.93%**	**97.62%**
1A1a	Public electricity and heat production	**0.0077**	**0.0082**	**0.004947**	**1.57%**	**99.20%**
1A2gviii	Stationary combustion in manufacturing industries and construction	**0.0001**	**0.0000**	**0.000992**	**0.32%**	**99.51%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**0.0001**	**0.0001**	**0.000642**	**0.20%**	**99.72%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**0.0002**	**0.0003**	**0.000613**	**0.19%**	**99.91%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**0.00002**	**0.00001**	**0.000133**	**0.04%**	**99.95%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**0.00001**	**0.00002**	**0.000131**	**0.04%**	**99.99%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.000003**	**0.000004**	**0.000011**	**0.00%**	**100.00%**
1A3bvi	Road transport: Automobile tyre and brake wear	**0.000000**	**0.000001**	**0.000004**	**0.00%**	**100.00%**

Table 147: PCDD/F Trend Assessment

NFR Code	NFR Category	1990 Emissions (in g I-TEQ)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
5E	Other waste	**0.0096**	**0.2160**	**0.094760**	**57.38%**	**57.38%**
1A4bi	Residential: Stationary	**0.0965**	**0.1131**	**0.023516**	**14.24%**	**71.62%**
1A3bii	Road transport: Light duty vehicles	**0.0658**	**0.0612**	**0.019238**	**11.65%**	**83.27%**
1A3bi	Road transport: Passenger cars	**0.0930**	**0.1258**	**0.014703**	**8.90%**	**92.18%**
1A1a	Public electricity and heat production	**0.0566**	**0.0883**	**0.003366**	**2.04%**	**94.21%**
3F	Field burning of agricultural residues	**0.0216**	**0.0008**	**0.002845**	**1.72%**	**95.94%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**0.0006**	**0.0046**	**0.001693**	**1.02%**	**96.96%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.0061**	**0.0076**	**0.001268**	**0.77%**	**97.73%**
1A3biv	Road transport: Mopeds & motorcycles	**0.0034**	**0.0033**	**0.001043**	**0.63%**	**98.36%**
1A3biii	Road transport: Heavy duty vehicles and buses	**0.0186**	**0.0291**	**0.001025**	**0.62%**	**98.98%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**0.0001**	**0.0019**	**0.000835**	**0.51%**	**99.49%**
5C2	Open burning of waste	**0.0047**	**0.0070**	**0.000482**	**0.29%**	**99.78%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**0.0013**	**0.0017**	**0.000247**	**0.15%**	**99.93%**

Table 147: PCDD/F Trend Assessment

NFR Code	NFR Category	1990 Emissions (in g I-TEQ)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2gviii	Stationary combustion in manufacturing industries and construction	**0.0013**	**0.0002**	**0.000110**	**0.07%**	**100.00%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.0000**	**0.0001**	**0.000006**	**0.00%**	**100.00%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**0.0002**	**0.0001**	**0.000001**	**0.00%**	**100.00%**
2G	Other product use	**0.0004**	**0.0001**	**0.000000**	**0.00%**	**100.00%**

Table 148: PAHs Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
3F	Field burning of agricultural residues	**13.6413**	**0.4796**	**0.008147**	**66.68%**	**66.68%**
1A4bi	Residential: Stationary	**0.0351**	**0.0389**	**0.002167**	**17.74%**	**84.41%**
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.0145**	**0.0088**	**0.000592**	**4.84%**	**89.25%**
1A3bii	Road transport: Light duty vehicles	**0.0072**	**0.0082**	**0.000437**	**3.58%**	**92.83%**
1A3bi	Road transport: Passenger cars	**0.0075**	**0.0182**	**0.000260**	**2.13%**	**94.96%**
5C2	Open burning of waste	**0.0060**	**0.0088**	**0.000211**	**1.73%**	**96.69%**
1A2gviii	Stationary combustion in manufacturing industries and construction	**0.0194**	**0.0027**	**0.000139**	**1.13%**	**97.82%**
1A3biii	Road transport: Heavy duty vehicles and buses	**0.0041**	**0.0070**	**0.000074**	**0.61%**	**98.43%**
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**0.0032**	**0.0010**	**0.000060**	**0.49%**	**98.93%**
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	**0.0008**	**0.0011**	**0.000040**	**0.33%**	**99.25%**
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.0005**	**0.0007**	**0.000024**	**0.20%**	**99.45%**
1A3biv	Road transport: Mopeds & motorcycles	**0.0003**	**0.0003**	**0.000020**	**0.16%**	**99.61%**

Table 148: PAHs Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Mg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
2G	Other product use	**0.0009**	**0.0003**	**0.000019**	**0.15%**	**99.76%**
1A2gvii	Mobile Combustion in manufacturing industries and construction	**0.0017**	**0.0003**	**0.000019**	**0.15%**	**99.92%**
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**0.0011**	**0.0022**	**0.000007**	**0.06%**	**99.97%**
1A1a	Public electricity and heat production	**0.0004**	**0.0007**	**0.000003**	**0.02%**	**99.99%**
1A4ci	Agriculture/Forestry/Fishing: Stationary	**0.0000**	**0.0000**	**0.000000**	**0.00%**	**100.00%**
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**0.0091**	**0.0178**	**0.000000**	**0.00%**	**100.00%**

Table 149: HCB Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Kg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.0057439**	**0.0078977**	**0.051129**	**97.49%**	**97.49%**
1A3bii	Road transport: Light duty vehicles	**0.0000066**	**0.0000500**	**0.000779**	**1.49%**	**98.97%**
1A3biii	Road transport: Heavy duty vehicles and buses	**0.0000032**	**0.0000248**	**0.000389**	**0.74%**	**99.71%**
1A3bi	Road transport: Passenger cars	**0.0000639**	**0.0001204**	**0.000097**	**0.18%**	**99.90%**
1A3biv	Road transport: Mopeds & motorcycles	**0.0000034**	**0.0000033**	**0.000054**	**0.10%**	**100.00%**
1A4bi	Residential: Stationary	**0.0000000**	**0.0000000**	**0.000000**	**0.00%**	**100.00%**

Table 150: PCBs Trend Assessment

NFR Code	NFR Category	1990 Emissions (in Kg)	2017 Emissions (in Mg)	Trend Assessment	Contribution to Trend (%)	Cumulative Total
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.025723**	**0.035368**	**0.174418**	**99.48%**	**99.48%**
1A3bi	Road transport: Passenger cars	**0.000016**	**0.000043**	**0.000717**	**0.41%**	**99.89%**
1A3bii	Road transport: Light duty vehicles	**0.000007**	**0.000011**	**0.000088**	**0.05%**	**99.94%**
1A3biii	Road transport: Heavy duty vehicles and buses	**0.000003**	**0.000006**	**0.000053**	**0.03%**	**99.97%**
1A3biv	Road transport: Mopeds & motorcycles	**0.000003**	**0.000001**	**0.000045**	**0.03%**	**100.00%**
1A4bi	Residential: Stationary	**0.000000**	**0.000000**	**0.000000**	**0.00%**	**100.00%**

22. Annex 4: Uncertainty Analysis per Pollutant

Annex 4

Uncertainty Analysis per Pollutant for 2017

Table 151: NOx emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	NOx	3.213	3.655	0	10	10.00	2.52	0.50
1A2b	NOx	0.082	0.025	2	40	40.05	0.07	0.11
1A2c	NOx	0.028	0.043	2	40	40.05	0.12	0.05
1A2d	NOx	0.014	0.019	2	40	40.05	0.05	0.02
1A2e	NOx	0.232	0.426	2	40	40.05	1.17	0.54
1A2f	NOx	1.621	2.230	2	0	2.00	0.31	0.38
1A2gvii	NOx	0.404	0.080	2	40	40.05	0.22	0.67
1A2gviii	NOx	0.494	0.070	2	40	40.05	0.19	0.88
1A3ai(i)	NOx	0.310	0.471	1	200	200.00	6.48	2.40
1A3aii(i)	NOx	0.007	0.001	1	200	200.00	0.01	0.06
1A3bi	NOx	2.915	1.640	1	30	30.02	3.39	1.68
1A3bii	NOx	2.238	1.377	1	30	30.02	2.85	1.08
1A3biii	NOx	3.030	3.182	1	30	30.02	6.58	0.97
1A3biv	NOx	0.030	0.043	1	30	30.02	0.09	0.03
1A3dii	NOx	0.037	0.140	1	200	200.00	1.92	1.29
1A4bi	NOx	0.159	0.318	1	200	200.00	4.38	2.15
1A4ci	NOx	0.156	0.203	1	100	100.00	1.40	0.40
1A4cii	NOx	0.212	0.275	1	100	100.00	1.90	0.54
1A4ciii	NOx	0.002	0.001	1	100	100.00	0.00	0.01
1A5b	NOx	0.008	0.052	1	100	100.00	0.36	0.27
2G	NOx	0.007	0.002	100	20	101.98	0.02	0.02
3B1a	NOx	0.003	0.004	2	150	150.01	0.04	0.01
3B1b	NOx	0.001	0.001	2	150	150.01	0.01	0.00
3B2	NOx	0.001	0.001	2	150	150.01	0.01	0.00
3B3	NOx	0.011	0.014	2	150	150.01	0.14	0.03
3B4d	NOx	0.001	0.001	2	150	150.01	0.01	0.00
3B4e	NOx	0.000	0.000	2	150	150.01	0.00	0.00
3B4f	NOx	0.000	0.000	2	150	150.01	0.00	0.00
3B4gi	NOx	0.001	0.001	2	150	150.01	0.01	0.00
3B4gii	NOx	0.004	0.003	2	150	150.01	0.04	0.00
3B4giii	NOx	0.000	0.000	2	150	150.01	0.00	0.00
3Da1	NOx	0.870	0.235	10	150	150.33	2.44	4.82
3Da2b	NOx	0.001	0.002	10	150	150.33	0.02	0.01
3F	NOx	0.079	0.003	100	200	223.61	0.04	0.81

Table 151: NOx emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
5C2	NOx	0.002	0.002	100	50	111.80	0.02	0.02
Total		**16.501**	**14.519**				**36.800**	**19.783**

Table 152: NMVOC emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	NMVOC	0.052	0.076	0	10	10.00	0.06	0.02
1A2b	NMVOC	0.004	0.001	2	40	40.05	0.00	0.00
1A2c	NMVOC	0.001	0.007	2	40	40.05	0.02	0.01
1A2d	NMVOC	0.001	0.001	2	40	40.05	0.00	0.00
1A2e	NMVOC	0.011	0.031	2	40	40.05	0.09	0.05
1A2f	NMVOC	0.040	0.041	2	0	2.00	0.01	0.01
1A2gvii	NMVOC	0.042	0.008	2	40	40.05	0.02	0.05
1A2gviii	NMVOC	0.024	0.003	2	40	40.05	0.01	0.03
1A3ai(i)	NMVOC	0.013	0.031	1	200	200.00	0.47	0.24
1A3aii(i)	NMVOC	0.000	0.000	1	200	200.00	0.00	0.00
1A3bi	NMVOC	2.944	0.616	1	30	30.02	1.40	2.66
1A3bii	NMVOC	0.535	0.102	1	30	30.02	0.23	0.50
1A3biii	NMVOC	0.443	0.157	1	30	30.02	0.36	0.29
1A3biv	NMVOC	1.440	0.374	1	30	30.02	0.85	1.18
1A3bv	NMVOC	1.555	1.184	1	0	1.00	0.09	0.09
1A3dii	NMVOC	0.003	0.010	1	200	200.00	0.15	0.09
1A4bi	NMVOC	0.061	0.072	1	200	200.00	1.09	0.30
1A4ci	NMVOC	0.007	0.009	1	100	100.00	0.07	0.02
1A4cii	NMVOC	0.022	0.028	1	100	100.00	0.21	0.07
1A4ciii	NMVOC	0.000	0.000	1	100	100.00	0.00	0.00
1A5b	NMVOC	0.001	0.003	1	100	100.00	0.03	0.02
1B2av	NMVOC	0.716	0.589	1	0	1.00	0.04	0.05
2D3a	NMVOC	0.705	1.037	20	20	28.28	2.21	1.75
2D3b	NMVOC	0.008	0.002	50	20	53.85	0.01	0.01
2D3c	NMVOC	0.033	0.009	50	20	53.85	0.03	0.04
2D3d	NMVOC	1.739	2.032	20	20	28.28	4.33	3.34
2D3f	NMVOC	0.200	0.053	100	20	101.98	0.40	0.43
2D3g	NMVOC	0.039	0.011	20	20	28.28	0.02	0.03
2D3h	NMVOC	0.200	0.265	20	20	28.28	0.57	0.44
2G	NMVOC	0.019	0.006	100	20	101.98	0.05	0.05
2H2	NMVOC	0.260	0.153	2	200	200.01	2.32	0.45
3B1a	NMVOC	0.178	0.240	2	150	150.01	2.71	0.91
3B1b	NMVOC	0.127	0.144	2	150	150.01	1.63	0.42
3B2	NMVOC	0.026	0.029	2	150	150.01	0.33	0.08
3B3	NMVOC	0.221	0.251	2	150	150.01	2.84	0.73

Table 152: NMVOC emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
3B4d	NMVOC	0.014	0.017	2	150	150.01	0.20	0.06
3B4e	NMVOC	0.001	0.002	2	150	150.01	0.03	0.01
3B4f	NMVOC	0.007	0.001	2	150	150.01	0.01	0.04
3B4gi	NMVOC	0.053	0.047	2	150	150.01	0.53	0.06
3B4gii	NMVOC	0.248	0.230	2	150	150.01	2.61	0.38
3B4giii	NMVOC	0.015	0.003	2	150	150.01	0.04	0.07
3De	NMVOC	0.049	0.017	10	0	10.00	0.01	0.01
3F	NMVOC	0.017	0.001	100	200	223.61	0.01	0.14
5A	NMVOC	0.527	0.646	10	50	50.99	2.49	0.88
5C2	NMVOC	0.001	0.001	100	50	111.80	0.01	0.01
5D1	NMVOC	0.000	0.001	10	50	50.99	0.00	0.00
Total		**17.778**	**13.260**				**38.633**	**23.658**

Table 153: SOx emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	SO_x	21.615	14.724	0	10	10.00	8.94	1.10
1A2b	SO_x	0.190	0.023	2	40	40.05	0.06	0.10
1A2c	SO_x	0.065	0.039	2	40	40.05	0.09	0.01
1A2d	SO_x	0.033	0.018	2	40	40.05	0.04	0.00
1A2e	SO_x	0.540	0.394	2	40	40.05	0.96	0.15
1A2f	SO_x	0.483	0.711	2	0	2.00	0.09	0.06
1A2gvii	SO_x	0.248	0.000	2	40	40.05	0.00	0.16
1A2gviii	SO_x	1.150	0.065	2	40	40.05	0.16	0.67
1A3ai(i)	SO_x	0.026	0.027	1	200	200.00	0.32	0.08
1A3aii(i)	SO_x	0.000	0.000	1	200	200.00	0.00	0.00
1A3bi	SO_x	1.065	0.009	1	30	30.02	0.02	0.51
1A3bii	SO_x	1.837	0.002	1	30	30.02	0.00	0.90
1A3biii	SO_x	1.569	0.002	1	30	30.02	0.00	0.77
1A3biv	SO_x	0.020	0.000	1	30	30.02	0.00	0.01
1A3dii	SO_x	0.038	0.138	1	200	200.00	1.68	0.75
1A4bi	SO_x	1.417	0.205	1	200	200.00	2.49	3.34
1A4ci	SO_x	0.246	0.032	1	100	100.00	0.19	0.30
1A4cii	SO_x	0.123	0.016	1	100	100.00	0.10	0.15
1A4ciii	SO_x	0.002	0.001	1	100	100.00	0.00	0.00
1A5b	SO_x	0.010	0.065	1	100	100.00	0.39	0.19
2G	SO_x	0.000	0.000	100	20	101.98	0.00	0.00
3F	SO_x	0.017	0.001	100	200	223.61	0.01	0.05
5C2	SO_x	0.000	0.000	100	50	111.80	0.00	0.00
Total		**31.741**	**16.470**				**15.54**	**9.30**

Table 154: NH_3 emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A2gvii	NH_3	0.000	0.000	2	40	40.05	0.00	0.00
1A3bi	NH_3	0.060	0.187	1	30	30.02	0.87	0.61
1A3bii	NH_3	0.000	0.004	1	30	30.02	0.02	0.02
1A3biii	NH_3	0.001	0.002	1	30	30.02	0.01	0.00
1A3biv	NH_3	0.000	0.000	1	30	30.02	0.00	0.00
1A4bi	NH_3	0.007	0.008	1	200	200.00	0.23	0.01
1A4cii	NH_3	0.000	0.000	1	100	100.00	0.00	0.00
2G	NH_3	0.016	0.005	100	20	101.98	0.08	0.12
3B1a	NH_3	1.090	1.472	2	150	150.01	34.07	7.63
3B1b	NH_3	0.301	0.341	2	150	150.01	7.89	0.52
3B2	NH_3	0.074	0.082	2	150	150.01	1.89	0.08
3B3	NH_3	2.084	2.560	2	150	150.01	59.23	8.32
3B4d	NH_3	0.052	0.066	2	150	150.01	1.52	0.25
3B4e	NH_3	0.001	0.002	2	150	150.01	0.05	0.02
3B4f	NH_3	0.014	0.001	2	150	150.01	0.03	0.32
3B4gi	NH_3	0.278	0.247	2	150	150.01	5.72	1.23
3B4gii	NH_3	0.156	0.145	2	150	150.01	3.36	0.54
3B4giii	NH_3	0.016	0.004	2	150	150.01	0.08	0.34
3Da1	NH_3	0.710	0.192	10	150	150.33	4.45	13.96
3Da2a	NH_3	0.686	0.672	10	150	150.33	15.58	2.17
3Da2b	NH_3	0.004	0.006	10	150	150.33	0.13	0.04
3Da3	NH_3	0.437	0.479	10	0	10.00	0.74	1.12
3F	NH_3	0.083	0.003	100	200	223.61	0.10	2.82
Total		**6.072**	**6.483**				**136.10**	**40.11**

Table 155: $PM_{2.5}$ emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	$PM_{2.5}$	0.294	0.216	0	10	10.00	1.68	0.28
1A2b	$PM_{2.5}$	0.004	0.001	2	40	40.05	0.03	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	0.02	0.00
1A2e	$PM_{2.5}$	0.013	0.021	2	40	40.05	0.66	0.23
1A2f	$PM_{2.5}$	0.265	0.335	2	0	2.00	0.52	0.35
1A2gvii	$PM_{2.5}$	0.027	0.005	2	40	40.05	0.16	0.12
1A2gviii	$PM_{2.5}$	0.020	0.003	2	40	40.05	0.08	0.10
1A3ai(i)	$PM_{2.5}$	0.003	0.004	1	200	200.00	0.55	0.16
1A3aii(i)	$PM_{2.5}$	0.000	0.000	1	200	200.00	0.00	0.00
1A3bi	$PM_{2.5}$	0.130	0.068	1	30	30.02	1.58	0.07
1A3bii	$PM_{2.5}$	0.537	0.111	1	30	30.02	2.58	1.65
1A3biii	$PM_{2.5}$	0.200	0.078	1	30	30.02	1.81	0.21
1A3biv	$PM_{2.5}$	0.021	0.006	1	30	30.02	0.14	0.05
1A3bvi	$PM_{2.5}$	0.085	0.094	1	0	1.00	0.07	0.05
1A3bvii	$PM_{2.5}$	0.036	0.043	100	0	100.00	3.33	2.26
1A3dii	$PM_{2.5}$	0.005	0.018	1	200	200.00	2.77	1.16
1A4bi	$PM_{2.5}$	0.044	0.090	1	200	200.00	14.05	5.17
1A4ci	$PM_{2.5}$	0.010	0.007	1	100	100.00	0.56	0.09
1A4cii	$PM_{2.5}$	0.021	0.015	1	100	100.00	1.19	0.20
1A4ciii	$PM_{2.5}$	0.000	0.000	1	100	100.00	0.01	0.00
1A5b	$PM_{2.5}$	0.001	0.008	1	100	100.00	0.60	0.27
2A1	$PM_{2.5}$	0.186	0.002	1	200	200.00	0.35	6.50
2A2	$PM_{2.5}$	0.004	0.003	1	200	200.00	0.44	0.06
2A5a	$PM_{2.5}$	0.054	0.017	10	200	200.25	2.58	0.69
2A5b	$PM_{2.5}$	0.015	0.013	100	200	223.61	2.31	0.83
2A5c	$PM_{2.5}$	0.006	0.002	50	200	206.16	0.39	0.07
2D3b	$PM_{2.5}$	0.197	0.000	50	20	53.85	0.00	0.71
2D3c	$PM_{2.5}$	0.011	0.003	50	20	53.85	0.11	0.07
2G	$PM_{2.5}$	0.291	0.033	100	20	101.98	2.64	1.93
3B1a	$PM_{2.5}$	0.005	0.006	2	150	150.01	0.71	0.21
3B1b	$PM_{2.5}$	0.003	0.003	2	150	150.01	0.39	0.11

Table 155: $PM_{2.5}$ emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
3B2	$PM_{2.5}$	0.000	0.000	2	150	150.01	0.03	0.01
3B3	$PM_{2.5}$	0.030	0.025	2	150	150.01	2.88	0.59
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	0.007	2	150	150.01	0.86	0.22
3B4gii	$PM_{2.5}$	0.019	0.013	2	150	150.01	1.47	0.19
3B4giii	$PM_{2.5}$	0.001	0.000	2	150	150.01	0.02	0.02
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	1.14	2.53
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	0.03
5C2	$PM_{2.5}$	0.002	0.003	100	50	111.80	0.25	0.16
5E	$PM_{2.5}$	0.028	0.021	100	50	111.80	1.81	1.11
Total		**2.676**	**1.287**				**50.95**	**28.54**

Table 156: PM_{10} emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	PM_{10}	0.446	0.316	0	10	10.00	1.54	0.26
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	0.08	0.03
1A2d	PM_{10}	0.001	0.001	2	40	40.05	0.01	0.00
1A2e	PM_{10}	0.013	0.021	2	40	40.05	0.42	0.13
1A2f	PM_{10}	0.277	0.341	2	0	2.00	0.33	0.20
1A2gvii	PM_{10}	0.027	0.005	2	40	40.05	0.10	0.05
1A2gviii	PM_{10}	0.020	0.003	2	40	40.05	0.05	0.05
1A3ai(i)	PM_{10}	0.003	0.004	1	200	200.00	0.35	0.10
1A3aii(i)	PM_{10}	0.000	0.000	1	200	200.00	0.00	0.00
1A3bi	PM_{10}	0.130	0.068	1	30	30.02	0.99	0.08
1A3bii	PM_{10}	0.537	0.111	1	30	30.02	1.62	0.70
1A3biii	PM_{10}	0.200	0.078	1	30	30.02	1.14	0.04
1A3biv	PM_{10}	0.021	0.006	1	30	30.02	0.09	0.02
1A3bvi	PM_{10}	0.158	0.177	1	0	1.00	0.09	0.05
1A3bvii	PM_{10}	0.067	0.079	100	0	100.00	3.86	2.29
1A3dii	PM_{10}	0.005	0.018	1	200	200.00	1.74	0.65
1A4bi	PM_{10}	0.045	0.093	1	200	200.00	9.03	3.01
1A4ci	PM_{10}	0.011	0.008	1	100	100.00	0.38	0.07
1A4cii	PM_{10}	0.021	0.015	1	100	100.00	0.75	0.14
1A4ciii	PM_{10}	0.000	0.000	1	100	100.00	0.00	0.00
1A5b	PM_{10}	0.001	0.008	1	100	100.00	0.38	0.15
2A1	PM_{10}	0.334	0.003	1	200	200.00	0.30	5.59
2A2	PM_{10}	0.021	0.014	1	200	200.00	1.37	0.21
2A5a	PM_{10}	0.536	0.120	10	200	200.25	11.72	4.27
2A5b	PM_{10}	0.151	0.133	100	200	223.61	14.46	4.77
2A5c	PM_{10}	0.058	0.025	50	200	206.16	2.48	0.36
2D3b	PM_{10}	0.846	0.000	50	20	53.85	0.01	1.44
2D3c	PM_{10}	0.084	0.020	50	20	53.85	0.52	0.29
2G	PM_{10}	0.293	0.034	100	20	101.98	1.68	1.04
3B1a	PM_{10}	0.007	0.009	2	150	150.01	0.69	0.19

Table 156: PM_{10} emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
3B1b	PM_{10}	0.004	0.005	2	150	150.01	0.37	0.10
3B2	PM_{10}	0.001	0.001	2	150	150.01	0.05	0.02
3B3	PM_{10}	0.158	0.131	2	150	150.01	9.59	1.99
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	0.041	2	150	150.01	3.00	0.75
3B4gii	PM_{10}	0.145	0.096	2	150	150.01	7.01	1.08
3B4giii	PM_{10}	0.008	0.001	2	150	150.01	0.10	0.06
3Dc	PM_{10}	0.080	0.032	10	0	10.00	0.15	0.09
3F	PM_{10}	0.088	0.007	100	200	223.61	0.75	1.24
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	0.01
5C2	PM_{10}	0.003	0.003	100	50	111.80	0.17	0.09
5E	PM_{10}	0.028	0.021	100	50	111.80	1.14	0.61
Total		**4.896**	**2.051**				**78.58**	**32.23**

Table 157: TSP emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A3bvii	TSP	0.135	0.159	100	0	100.00	5.49	2.37
3Dc	TSP	0.080	0.032	10	0	10.00	0.11	0.05
1A1a	TSP	0.594	0.415	0	10	10.00	1.44	0.25
2A5a	TSP	1.093	0.231	10	200	200.25	16.04	2.18
1A3bvi	TSP	0.208	0.232	1	0	1.00	0.08	0.03
5A	TSP	0.000	0.000	10	50	50.99	0.00	0.00
2A5b	TSP	0.508	0.447	100	200	223.61	34.65	9.10
3B3	TSP	0.354	0.294	2	150	150.01	15.28	2.95
2D3c	TSP	0.451	0.105	50	20	53.85	1.97	0.79
1A3bii	TSP	0.537	0.111	1	30	30.02	1.15	0.17
1A2f	TSP	0.286	0.354	2	0	2.00	0.25	0.11
3B4gii	TSP	0.145	0.096	2	150	150.01	4.98	0.82
2A1	TSP	0.371	0.003	1	200	200.00	0.22	2.32
1A3biii	TSP	0.200	0.078	1	30	30.02	0.81	0.05
1A4bi	TSP	0.047	0.097	1	200	200.00	6.71	1.74
1A3bi	TSP	0.130	0.068	1	30	30.02	0.70	0.09
2A5c	TSP	0.117	0.049	50	200	206.16	3.52	0.47
2G	TSP	0.294	0.034	100	20	101.98	1.20	0.52
3B4gi	TSP	0.041	0.042	2	150	150.01	2.21	0.48
2A2	TSP	0.055	0.036	1	200	200.00	2.50	0.41
1A2e	TSP	0.013	0.022	2	40	40.05	0.30	0.08
3B1a	TSP	0.016	0.021	2	150	150.01	1.07	0.25
1A3dii	TSP	0.005	0.018	1	200	200.00	1.24	0.35
1A4cii	TSP	0.021	0.015	1	100	100.00	0.53	0.09
1A4ci	TSP	0.011	0.008	1	100	100.00	0.27	0.05
3F	TSP	0.090	0.007	100	200	223.61	0.54	0.44
3B1b	TSP	0.009	0.011	2	150	150.01	0.57	0.13
1A5b	TSP	0.001	0.008	1	100	100.00	0.27	0.08
1A2c	TSP	0.002	0.004	2	40	40.05	0.06	0.02
1A3biv	TSP	0.021	0.006	1	30	30.02	0.06	0.00
1A3ai(i)	TSP	0.003	0.004	1	200	200.00	0.25	0.06
1A2gvii	TSP	0.027	0.005	2	40	40.05	0.07	0.01
1A2b	TSP	0.004	0.001	2	40	40.05	0.01	0.00
5C2	TSP	0.003	0.003	100	50	111.80	0.13	0.05

Table 157: TSP emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (2000) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A2gviii	TSP	0.020	0.003	2	40	40.05	0.04	0.01
2D3b	TSP	3.664	0.002	50	20	53.85	0.03	2.35
3B2	TSP	0.001	0.002	2	150	150.01	0.10	0.02
3B4giii	TSP	0.008	0.001	2	150	150.01	0.07	0.02
3B4d	TSP	0.002	0.001	2	150	150.01	0.08	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	0.021	100	50	111.80	0.81	0.32
1A4ciii	TSP	0.000	0.000	1	100	100.00	0.00	0.00
5C1bv	TSP	0.005	0.000	2	50	50.04	0.00	0.01
Total		**9.466**	**2.888**				**100.31**	**26.87**

Table 158: BC emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	BC	0.016	0.012	0	10	10.00	0.35	0.05
1A2b	BC	0.002	0.001	2	40	40.05	0.07	0.03
1A2c	BC	0.001	0.002	2	40	40.05	0.19	0.07
1A2d	BC	0.001	0.000	2	40	40.05	0.05	0.01
1A2e	BC	0.007	0.011	2	40	40.05	1.28	0.41
1A2f	BC	0.070	0.110	2	0	2.00	0.66	0.45
1A2gvii	BC	0.017	0.003	2	40	40.05	0.38	0.29
1A2gviii	BC	0.011	0.002	2	40	40.05	0.18	0.22
1A3bi	BC	0.077	0.045	1	30	30.02	4.09	0.35
1A3bii	BC	0.327	0.074	1	30	30.02	6.71	3.63
1A3biii	BC	0.105	0.048	1	30	30.02	4.34	0.15
1A3biv	BC	0.004	0.001	1	30	30.02	0.10	0.04
1A4bi	BC	0.004	0.009	1	200	200.00	5.44	2.01
1A4ci	BC	0.005	0.004	1	100	100.00	1.21	0.20
1A4cii	BC	0.012	0.009	1	100	100.00	2.68	0.45
2A1	BC	0.006	0.000	1	200	200.00	0.04	0.76
2A2	BC	0.000	0.000	1	200	200.00	0.01	0.00
2D3b	BC	0.011	0.000	50	20	53.85	0.00	0.16
2D3c	BC	0.000	0.000	50	20	53.85	0.00	0.00
2G	BC	0.001	0.000	100	20	101.98	0.05	0.03
3F	BC	0.008	0.001	100	200	223.61	0.41	0.92
5C2	BC	0.001	0.001	100	50	111.80	0.41	0.26
Total		**0.688**	**0.332**				**28.65**	**10.49**

Table 159: CO emission Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Gg	Gg	%	%	%	%	%
1A1a	CO	0.342	0.366	0	10	10.00	0.26	0.06
1A2b	CO	0.011	0.003	2	40	40.05	0.01	0.00
1A2c	CO	0.004	0.015	2	40	40.05	0.04	0.01
1A2d	CO	0.002	0.002	2	40	40.05	0.01	0.00
1A2e	CO	0.030	0.074	2	40	40.05	0.21	0.06
1A2f	CO	1.893	2.543	2	0	2.00	0.37	0.17
1A2gvii	CO	0.133	0.026	2	40	40.05	0.08	0.02
1A2gviii	CO	0.064	0.009	2	40	40.05	0.03	0.01
1A3ai(i)	CO	0.122	0.266	1	200	200.00	3.85	1.05
1A3aii(i)	CO	0.003	0.001	1	200	200.00	0.02	0.00
1A3bi	CO	27.070	6.230	1	30	30.02	13.51	1.66
1A3bii	CO	5.816	1.113	1	30	30.02	2.41	0.51
1A3biii	CO	1.015	0.787	1	30	30.02	1.71	0.32
1A3biv	CO	3.803	1.383	1	30	30.02	3.00	0.13
1A4bi	CO	0.397	0.712	1	200	200.00	10.30	2.70
1A4ci	CO	0.021	0.027	1	100	100.00	0.19	0.05
1A4cii	CO	0.071	0.092	1	100	100.00	0.66	0.16
2D3c	CO	0.002	0.001	50	20	53.85	0.00	0.00
2G	CO	0.211	0.067	100	20	101.98	0.49	0.22
3F	CO	2.301	0.081	100	200	223.61	1.31	3.02
5C2	CO	0.026	0.039	100	50	111.80	0.31	0.13
Total		**43.403**	**13.839**				**38.78**	**10.27**

Table 160: Pb emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Mg	Mg	%	%	%	%	%
1A1a	Pb	0.103	0.102	0	10	10.00	0.06	0.01
1A2b	Pb	0.000	0.000	2	40	40.05	0.00	0.00
1A2c	Pb	0.000	0.000	2	40	40.05	0.00	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	0.00	0.00
1A2f	Pb	0.122	0.168	2	0	2.00	0.02	0.01
1A2gviii	Pb	0.000	0.000	2	40	40.05	0.00	0.00
1A3bi	Pb	22.833	6.741	1	30	30.02	11.01	4.37
1A3bii	Pb	6.938	5.079	1	30	30.02	8.29	1.26
1A3biii	Pb	4.090	6.009	1	30	30.02	9.81	3.30
1A3biv	Pb	0.998	0.032	1	30	30.02	0.05	0.42
1A3bvi	Pb	0.125	0.244	1	0	1.00	0.01	0.01
1A4bi	Pb	0.003	0.003	1	200	200.00	0.03	0.01
1A4ci	Pb	0.001	0.001	1	100	100.00	0.01	0.00
2G	Pb	0.003	0.001	100	20	101.98	0.00	0.00
3F	Pb	0.004	0.000	100	200	223.61	0.00	0.01
5C2	Pb	0.000	0.000	100	50	111.80	0.00	0.00
5E	Pb	0.000	0.000	100	50	111.80	0.00	0.00
Total		**35.260**	**18.384**				**29.30**	**9.42**

Table 161: Cd emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Mg	Mg	%	%	%	%	%
5E	Cd	0.000	0.000	100	50	111.80	0.25	0.21
1A1a	Cd	0.027	0.026	0	10	10.00	4.93	1.09
1A2f	Cd	0.010	0.014	2	0	2.00	0.52	0.45
1A3bi	Cd	0.002	0.005	1	30	30.02	2.55	1.19
2G	Cd	0.005	0.002	100	20	101.98	3.25	2.83
3F	Cd	0.030	0.001	100	200	223.61	4.49	41.56
1A4bi	Cd	0.001	0.001	1	200	200.00	5.33	1.44
1A3bvi	Cd	0.001	0.001	1	0	1.00	0.02	0.02
1A3biii	Cd	0.001	0.001	1	30	30.02	0.57	0.20
1A3bii	Cd	0.001	0.001	1	30	30.02	0.52	0.12
1A2c	Cd	0.000	0.000	2	40	40.05	0.17	0.11
1A2e	Cd	0.000	0.000	2	40	40.05	0.34	0.21
1A4cii	Cd	0.000	0.000	1	100	100.00	0.15	0.05
5C2	Cd	0.000	0.000	100	50	111.80	0.15	0.12
1A3biv	Cd	0.000	0.000	1	30	30.02	0.04	0.01
1A2gvii	Cd	0.000	0.000	2	40	40.05	0.02	0.02
1A4ci	Cd	0.000	0.000	1	100	100.00	0.75	0.24
1A2b	Cd	0.000	0.000	2	40	40.05	0.00	0.00
1A2gviii	Cd	0.000	0.000	2	40	40.05	0.00	0.00
1A2d	Cd	0.000	0.000	2	40	40.05	0.00	0.00
Total		**0.086**	**0.053**				**24.06**	**49.89**

Table 162: Hg emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Mg	Mg	%	%	%	%	%
1A1a	Hg	0.008	0.008	0	10	10.00	0.82	0.05
1A2b	Hg	0.000	0.000	2	40	40.05	0.00	0.01
1A2c	Hg	0.000	0.000	2	40	40.05	0.01	0.01
1A2d	Hg	0.000	0.000	2	40	40.05	0.00	0.00
1A2e	Hg	0.000	0.000	2	40	40.05	0.05	0.03
1A2f	Hg	0.061	0.084	2	0	2.00	1.68	2.38
1A2gviii	Hg	0.000	0.000	2	40	40.05	0.01	0.04
1A3bvi	Hg	0.000	0.000	1	0	1.00	0.00	0.00
1A4bi	Hg	0.000	0.002	1	200	200.00	4.02	3.20
1A4ci	Hg	0.000	0.000	1	100	100.00	0.27	0.06
2G	Hg	0.000	0.000	100	20	101.98	0.00	0.00
3F	Hg	0.005	0.000	100	200	223.61	0.38	9.35
5E	Hg	0.000	0.000	100	50	111.80	0.13	0.18
Total		**0.100**	**0.100**				**8.74**	**16.70**

Table 163: PCCD/PCCF emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		g I-TEQ	g I-TEQ	%	%	%	%	%
1A1a	PCDD-PCDF	0.057	0.088	0	10	10.00	1.34	0.33
1A2b	PCDD-PCDF	0.000	0.000	2	40	40.05	0.00	0.00
1A2c	PCDD-PCDF	0.000	0.002	2	40	40.05	0.11	0.04
1A2d	PCDD-PCDF	0.000	0.000	2	40	40.05	0.00	0.00
1A2e	PCDD-PCDF	0.001	0.005	2	40	40.05	0.28	0.08
1A2f	PCDD-PCDF	0.006	0.008	2	0	2.00	0.02	0.01
1A2gviii	PCDD-PCDF	0.001	0.000	2	40	40.05	0.01	0.00
1A3bi	PCDD-PCDF	0.093	0.126	1	30	30.02	5.71	1.38
1A3bii	PCDD-PCDF	0.066	0.061	1	30	30.02	2.78	0.58
1A3biii	PCDD-PCDF	0.019	0.029	1	30	30.02	1.32	0.33
1A3biv	PCDD-PCDF	0.003	0.003	1	30	30.02	0.15	0.03
1A4bi	PCDD-PCDF	0.096	0.113	1	200	200.00	34.23	7.86
1A4ci	PCDD-PCDF	0.001	0.002	1	100	100.00	0.26	0.06
2G	PCDD-PCDF	0.000	0.000	100	20	101.98	0.02	0.01
3F	PCDD-PCDF	0.022	0.001	100	200	223.61	0.26	0.57
5C2	PCDD-PCDF	0.005	0.007	100	50	111.80	1.18	0.49
5E	PCDD-PCDF	0.010	0.216	100	50	111.80	36.55	15.34
Total		**2.109**	**0.661**				**84.23**	**27.12**

Table 164: PAHs emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	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	0.06	0.00
1A2c	PAHs	0.001	0.002	2	40	40.05	0.15	0.01
1A2d	PAHs	0.001	0.001	2	40	40.05	0.05	0.00
1A2e	PAHs	0.009	0.018	2	40	40.05	1.19	0.05
1A2f	PAHs	0.014	0.009	2	0	2.00	0.03	0.00
1A2gvii	PAHs	0.002	0.000	2	40	40.05	0.02	0.00
1A2gviii	PAHs	0.019	0.003	2	40	40.05	0.18	0.01
1A3bi	PAHs	0.007	0.018	1	30	30.02	0.91	0.04
1A3bii	PAHs	0.007	0.008	1	30	30.02	0.41	0.02
1A3biii	PAHs	0.004	0.007	1	30	30.02	0.35	0.01
1A3biv	PAHs	0.000	0.000	1	30	30.02	0.01	0.00
1A4bi	PAHs	0.035	0.039	1	200	200.00	13.03	0.54
1A4ci	PAHs	0.000	0.000	1	100	100.00	0.00	0.00
1A4cii	PAHs	0.001	0.001	1	100	100.00	0.18	0.01
2G	PAHs	0.001	0.000	100	20	101.98	0.05	0.00
3F	PAHs	13.641	0.480	100	200	223.61	179.77	5.19
5C2	PAHs	0.006	0.009	100	50	111.80	1.65	0.10
Total		**13.754**	**0.597**				**198.08**	**5.98**

Table 165: HCB emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Kg	Kg	%	%	%	%	%
1A2f	HCB	0.006	0.008	2	0	2.00	1.70	0.46
1A3bi	HCB	0.000	0.000	1	30	30.02	0.39	0.07
1A3bii	HCB	0.000	0.000	1	30	30.02	0.16	0.03
1A3biii	HCB	0.000	0.000	1	30	30.02	0.08	0.01
1A3biv	HCB	0.000	0.000	1	30	30.02	0.01	0.00
1A4bi	HCB	0.000	0.000	1	200	200.00	0.00	0.00
Total		**0.049**	**0.009**				**4.48**	**0.57**

Table 166: PCBs emissions Uncertainty Calculation

NFR Sector	Pollutant	Base Year (1990) emissions	Year 2017 Emissions	Activity Data Uncertainty	Emission Factor Uncertainty	Combined Uncertainty	Combined Uncertainty as % of Emissions in 2017	Uncertainty introduced into the trend in total national emissions
		Kg	Kg	%	%	%	%	%
1A2f	PCBs	0.026	0.035	2	0	2.00	1.80	2.91
1A3bi	PCBs	0.000	0.000	1	30	30.02	0.03	0.02
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
1A4bi	PCBs	0.000	0.000	1	200	200.00	0.00	0.00
Total		**0.034**	**0.039**				**5.24**	**2.94**

23. Annex 5: Cyprus Energy Balance 2017

Annex 5

Cyprus Energy Balance 2017

Energy balance for the year 2017 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 S≤1%	LFO S>1%	HFO S≤1%	HFO S>1%	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								237	0				2954	70233	1551	7559	4434	4441	18184	14941	124534
Net imports	0	68460	343482.565	17145	0	260855	14828	366883	8779	402792	105826	19816	0	773389	2666	0			36664	95241	9719	17583			28053					2572180
Change stocks	0	-7217	2950	4894	0	49722	-10	-24486	-122	-44533	0	1292	0	-15917	2775	0		0		-11543	-6741	1000	0	0	1092	0				-46845
Bunkers									0	0	-105826	0	0	0	0															-105826
Primary Consumption	0	61243	346433	22039	0	310576	14818	342397	8657	358259	0	21108	0	757471	5442	0	237	0	0	83697	2977	21537	70233	1551	36703	4434	4441	18184	14941	2507379
Energy Conversion-Electricity								0		-262995				-755358	0	353869														-664484
Non energy use																			-36664				0							-36664
Occupied area by Turkish army																-86														-86
Final consumption	0	61243	346433	22039.1547	0	310576	14818	342397	8657	95264	0	21108	0	2113	5442	353782	237	0	0	83697	2977	21537	70233	1551	36703	4434	4441	18184	14941	1842808
Selactive consumers																														
Cement industry												789			299		0	0		83697	2977	21537			19777					129077
Road transport			346433	22039	0			311093	8657																					688222
Air transport						310576																								310576
Households (Heating)		33684					13313			68447													59698	1551	9453				2287	188432
Agriculture		2450						24735																		1295	4441			32920
Industry		6737						2543		15373		18169		2113	5143		237								1718					52034
Commerce, Hotels & Services		18373					1505	4027		11444		2150											10535		5755			37	6	53830
Electricity from RES fed to the Grid																										3139		18148	12648	33934

24. Annex 6: Annex IV – Table 1

Annex 6

NFR Sector Emissions 2017 (Template Annex IV-Table 1)

TABLE IV 1 - 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)	NMVOC	SOx (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**
1A1a	Public electricity and heat production	4.0555	0.0852	14.5972	NE	0.2571	0.3773	0.4966	0.0138	0.4478	0.1032	0.0265	0.0081	0.0885	0.0590	0.1207	5.5570	0.0451	1.9492
1A1b	Petroleum refining	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1A1c	Manufacture of solid fuels and other energy industries	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	0.0410	0.0020	0.0382	NE	0.0016	0.0016	0.0016	0.0009	0.0053	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0023
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	0.0391	0.0143	0.0333	0.0016	0.0073	0.0074	0.0077	0.0024	0.0285	0.0011	0.0005	0.0000	0.0000	0.0010	0.0003	0.0001	0.0000	0.0235
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	0.0180	0.0009	0.0167	NE	0.0007	0.0007	0.0007	0.0004	0.0023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	0.3859	0.0202	0.3590	0.0002	0.0157	0.0157	0.0157	0.0086	0.0522	0.0002	0.0001	0.0001	0.0000	0.0003	0.0002	0.0000	0.0001	0.0242
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	2.1900	0.0407	0.7331	NA	0.2582	0.2620	0.2705	0.0944	2.4410	0.1616	0.0132	0.0808	0.0437	0.0677	0.1067	0.0808	0.0417	0.7117
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	0.0930	0.0096	0.0001	0.0000	0.0060	0.0060	0.0060	0.0037	0.0307	NE	0.0000	NE	NE	0.0001	0.0048	0.0002	0.0000	0.0028
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	0.0464	0.0023	0.0432	NA	0.0018	0.0018	0.0018	0.0010	0.0060	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0026
1A3ai(i)	International aviation LTO (civil)	0.8108	0.0354	0.0593	NE	0.0720	0.0720	0.0720	NA	0.4495	NE	NE	NE	NE	NE	NE	NE	NE	NE
1A3aii(i)	Domestic aviation LTO (civil)	0.0323	0.0069	0.0046	NE	0.0006	0.0006	0.0006	NA	0.0900	NE	NE	NE	NE	NE	NE	NE	NE	NE
1A3bi	Road transport: Passenger cars	1.4560	0.6595	0.0083	0.1966	0.0627	0.0627	0.0627	0.0403	6.5213	15.1785	0.0043	NE	NE	0.0077	0.0158	0.0051	0.0001	0.8656
1A3bii	Road transport: Light duty vehicles	1.3643	0.1239	0.0020	0.0034	0.1154	0.1154	0.1154	0.0769	1.1766	5.1304	0.0009	NE	NE	0.0029	0.0023	0.0009	0.0000	0.1801
1A3biii	Road transport: Heavy duty vehicles and buses	3.2100	0.1702	0.0022	0.0016	0.0830	0.0830	0.0830	0.0506	0.8041	5.7700	0.0010	NE	NE	0.0033	0.0024	0.0010	0.0000	0.1937
1A3biv	Road transport: Mopeds & motorcycles	0.0432	0.3969	0.0001	0.0004	0.0063	0.0063	0.0063	0.0012	1.4469	0.2095	0.0001	NE	NE	0.0001	0.0003	0.0001	0.0000	0.0137
1A3bv	Road transport: Gasoline evaporation	NA	1.1954	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NE
1A3bvi	Road transport: Automobile tyre and brake wear	NA	NA	NA	NA	0.0899	0.1682	0.2207	NA	NE	0.2322	0.0011	0.0000	0.0000	0.0861	1.8855	0.0136	0.0018	0.7135
1A3bvii	Road transport: Automobile road abrasion	NA	NA	NA	NA	0.0411	0.0754	0.1508	NA	NE	NE	NE	NE	NE	NE	NE	NE	NE	NA
1A3c	Railways	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1A3di(ii)	International inland waterways	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1A3dii	National navigation (shipping)	0.1055	0.0076	0.1041	NE	0.0135	0.0135	0.0135	NA	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
1A3ei	Pipeline transport	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1A3eii	Other (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

TABLE IV 2 - 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)	NMVOC	SOx (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**
1A4ai	Commercial/institutional: Stationary	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
1A4aii	Commercial/institutional: Mobile	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
1A4bi	Residential: Stationary	0.3179	0.0794	0.2069	0.0085	0.0996	0.1021	0.1069	0.0100	0.7636	0.0033	0.0016	0.0020	0.0003	0.0036	0.0012	0.0003	0.0001	0.0637
1A4bii	Residential: Household and gardening (mobile)	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
1A4ci	Agriculture/Forestry/Fishing: Stationary	0.1931	0.0082	0.0304	NE	0.0068	0.0074	0.0074	0.0038	0.0257	0.0013	0.0004	0.0003	0.0027	0.0004	0.0013	0.0003	0.0013	0.0229
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	0.2619	0.0269	0.0152	0.0001	0.0145	0.0145	0.0145	0.0084	0.0872	NE	0.0001	NE	NE	0.0004	0.0129	0.0005	0.0001	0.0076
1A4ciii	Agriculture/Forestry/Fishing: National fishing	0.0012	0.0001	0.0012	NE	0.0002	0.0002	0.0002	NA	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
1A5a	Other stationary (including military)	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
1A5b	Other, Mobile (including military, land based and recreational boats)	0.0554	0.0036	0.0685	NE	0.0082	0.0082	0.0082	NA	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
1B1a	Fugitive emission from solid fuels: Coal mining and handling	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1B1c	Other fugitive emissions from solid fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1B2ai	Fugitive emissions oil: Exploration, production, transport	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1B2aiv	Fugitive emissions oil: Refining / storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1B2av	Distribution of oil products	NA	0.8166	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
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	NO	NO	NO	NO
1B2c	Venting and flaring (oil, gas, combined oil and gas)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1B2d	Other fugitive emissions from energy production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2A1	Cement production	IE	IE	IE	NE	0.00132	0.0018	0.0019	0.0000	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2A2	Lime production	IE	IE	IE	NA	0.0023	0.0115	0.0295	0.0000	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA
2A3	Glass production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2A5a	Quarrying and mining of minerals other than coal	NA	NA	NA	NA	0.0169	0.1222	0.2354	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2A5b	Construction and demolition	NA	NE	NA	NA	0.0090	0.0901	0.3037	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2A5c	Storage, handling and transport of mineral products	NA	NA	NA	NA	0.0025	0.0251	0.0502	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2A6	Other mineral products (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

TABLE IV 3 - 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)	NMVOC	SOx (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
2B1	Ammonia production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2B2	Nitric acid production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2B3	Adipic acid production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2B5	Carbide production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2B6	Titanium dioxide production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2B7	Soda ash production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2B10a	Chemical industry: Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2B10b	Storage, handling and transport of chemical products	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2C1	Iron and steel production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2C2	Ferroalloys production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2C3	Aluminium production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2C4	Magnesium production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2C5	Lead production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2C6	Zinc production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2C7a	Copper production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2C7b	Nickel production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2C7c	Other metal production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2C7d	Storage, handling and transport of metal products	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2D3a	Domestic solvent use including fungicides	NA	1.0258	NA	NA	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2D3b	Road paving with asphalt	NE	0.0023	NE	NA	0.0001	0.0005	0.0020	0.0000	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA
2D3c	Asphalt roofing	NE	0.0098	NA	NA	0.0030	0.0226	0.1207	0.0000	0.0007	NE	NE	NE	NA	NA	NA	NA	NA	NA
2D3d	Coating applications	NA	2.4267	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2D3e	Degreasing	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2D3f	Dry cleaning	NA	0.0261	NA	NA	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2D3g	Chemical products	NE	0.0392	NE	NE	NE	NE	NE	NA	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

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)	NMVOC	SOx (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
2D3h	Printing	NA	0.2651	NA	NA	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2D3i	Other solvent use (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2G	Other product use (please specify in the IIR)	0.0020	0.0055	0.0001	0.0047	0.0317	0.0329	0.0331	0.0001	0.0624	0.0019	0.0016	0.0000	0.0000	0.0004	0.0168	0.0038	NE	0.0093
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	0.1561	NA	NA	NE	NE	NE	NA	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	0.0035	0.2257	NA	0.8296	0.0058	0.0088	0.0193	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B1b	Manure management - Non-dairy cattle	0.0013	0.1356	NA	0.3220	0.0032	0.0048	0.0103	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B2	Manure management - Sheep	0.0008	0.0292	NA	0.0824	0.0002	0.0007	0.0018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B3	Manure management - Swine	0.0137	0.2512	NA	2.1336	0.0249	0.1319	0.2961	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	0.0169	NA	0.0637	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	0.0020	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	0.0014	0.0000	0.0000	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B4gi	Manure mangement - Laying hens	0.0012	0.0476	NA	0.2498	0.0075	0.0415	0.0429	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B4gii	Manure mangement - Broilers	0.0033	0.2220	NA	0.1397	0.0122	0.0923	0.0923	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B4giii	Manure mangement - Turkeys	0.0000	0.0027	NA	0.0029	0.0002	0.0012	0.0012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3B4giv	Manure management - Other poultry	NO	NO	NO	NO	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)	0.1943	NO	NA	0.2437	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3Da2a	Animal manure applied to soils	NE	NE	NE	0.6864	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

TABLE IV 5 - 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)	NMVOC	SOx (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	0.0017	NE	NE	0.0056	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
3Da2c	Other organic fertilisers applied to soils (including compost)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
3Da3	Urine and dung deposited by grazing animals	NE	NE	NE	0.5560	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
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	0.0371	0.0371	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	NO	0.0205	NO	NE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
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	0.0033	0.0007	0.0007	0.0034	0.0077	0.0081	0.0083	0.0007	0.0952	0.0002	0.0013	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	0.6395	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	0.0064	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
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	0.0001	0.0001	0.0001	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	0.0022	0.0008	0.0001	NE	0.0029	0.0031	0.0032	0.0012	0.0385	0.0003	0.0001	NE	0.0003	0.0000	0.0001	NE	0.0000	0.0121

TABLE IV 6 - 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)	NMVOC	SOx (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
5D1	Domestic wastewater handling	NA	0.0005	NA	NE	NE	NE	NE	NA	NA	NE	NE	NE	NE	NE	NE	NE	NE	NE
5D2	Industrial wastewater handling	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
5D3	Other wastewater handling	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5E	Other waste (please specify in IIR)	NE	NE	NE	NE	0.0251	0.0251	0.0251	NE	NE	0.0001	0.0001	0.0001	0.0002	0.0002	0.0005	NE	NE	NE
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	NO	NO	NO	NO
NATIONAL TOTAL	**National total for the entire territory (based on fuel sold)**	**14.9486**	**9.25847**	**16.3246**	**5.5454**	**1.3203**	**2.0640**	**2.9786**	**0.3186**	**14.5756**	**26.7938**	**0.0527**	**0.0916**	**0.1357**	**0.2333**	**2.1720**	**5.6636**	**0.0905**	**4.8004**
ADJUSTMENTS (Net total)	Sum of adjustments (negative value) from Annex VII	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
NATIONAL TOTAL FOR COMPLIANCE	**National total for compliance assessment (please specify all details in the IIR)**	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
1A3ai(ii)	International aviation cruise (civil)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
1A3aii(ii)	Domestic aviation cruise (civil)	0.0043	0.0000	0.0002	NE	0.0001	0.0001	0.0001	NE	0.0059	NE	NE	NE	NE	NE	NE	NE	NE	NE
1A3di(i)	International maritime navigation	0.4656	0.0367	0.4348	NE	0.0587	0.0587	0.0587	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
1A5c	Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
1A3	Transport (fuel used)	7.0221	2.5959	0.1806	0.2019	0.4845	0.5971	0.7250	0.1690	10.4884	26.5206	0.0073	0.0000	0.0000	0.1002	1.9062	0.0207	0.0019	1.9666
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	NE	NE	NE	NE
11A	Volcanoes	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
11B	Forest fires	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
11C	Other natural emissions (please specify in the IIR)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

TABLE IV 7 - 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 benzo(a) pyrene	benzo(b) fluoranthene	benzo(k) fluoranthene	Indeno (1,2,3-cd) pyrene	Total 1-4	HCB	PCBs	Liquid Fuels	Solid Fuels	Gaseous Fuels	Biomass	Other Fuels	*Other activity (specified)*	*Other Activity Units*
NFR Code	**Longname**	**g I-TEQ**	**t**	**t**	**t**	**t**	**t**	**kg**	**kg**	**TJ NCV**	**TJ NCV**	**TJ NCV**	**TJ NCV**	**TJ NCV**		
1A1a	Public electricity and heat production	**0.0991**	**0.0002**	**0.0002**	**0.0002**	**0.0003**	**0.0008**	**0.0009**	**0.0007**	**41697**	**NO**	**NO**	**187**	**NO**	**NO**	*TJ NCV*
1A1b	Petroleum refining	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	*TJ NCV*
1A1c	Manufacture of solid fuels and other energy industries	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	*TJ NCV*
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	*TJ NCV*
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	**0.0001**	**0.0002**	**0.0012**	**0.0001**	**0.0001**	**0.0016**	**NE**	**NE**	**81**	**NO**	**NO**	**NO**	**NO**	**NO**	*TJ NCV*
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	**0.0043**	**0.0006**	**0.0017**	**0.0003**	**0.0003**	**0.0029**	**0.0002**	**0.0025**	**70**	**NO**	**NO**	**74**	**NO**	**NO**	*TJ NCV*
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	**0.0000**	**0.0001**	**0.0005**	**0.0001**	**0.0001**	**0.0007**	**NE**	**NE**	**35**	**NO**	**NO**	**NO**	**NO**	**NO**	*TJ NCV*
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	**0.0015**	**0.0015**	**0.0113**	**0.0013**	**0.0011**	**0.0153**	**0.0000**	**0.0003**	**759**	**NO**	**NO**	**8**	**NO**	**NO**	*TJ NCV*
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	**0.0074**	**0.0009**	**0.0071**	**0.0009**	**0.0007**	**0.0096**	**0.0076**	**0.0340**	**3766**	**24**	**12**	**1817**	**NO**	**NO**	*TJ NCV*
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	**NE**	**0.0001**	**0.0001**	**0.0001**	**0.0000**	**0.0004**	**NA**	**NA**	**120**	**NO**	**NO**	**NO**	**NO**	**NO**	*TJ NCV*
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	**0.0001**	**0.0002**	**0.0014**	**0.0002**	**0.0001**	**0.0018**	**NA**	**NA**	**91**	**NO**	**NO**	**NO**	**NO**	**NO**	*TJ NCV*
1A3ai(i)	International aviation LTO (civil)	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NA**	**NA**	**NE**	**NE**	**NE**	**NE**	**NE**	**63526**	*Number of LTO's*
1A3aii(i)	Domestic aviation LTO (civil)	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NA**	**NA**	**NE**	**NE**	**NE**	**NE**	**NE**	**15382**	*Number of LTO's*
1A3bi	Road transport: Passenger cars	**0.1151**	**0.0039**	**0.0044**	**0.0033**	**0.0041**	**0.0156**	**0.0001**	**0.0000**	**18130**	**NA**	**NA**	**NA**	**NA**	***NA***	*TJ NCV*
1A3bii	Road transport: Light duty vehicles	**0.0616**	**0.0020**	**0.0023**	**0.0018**	**0.0019**	**0.0080**	**0.0000**	**0.0000**	**4355**	**NA**	**NA**	**NA**	**NA**	***NA***	*TJ NCV*
1A3biii	Road transport: Heavy duty vehicles and buses	**0.0286**	**0.0004**	**0.0027**	**0.0030**	**0.0007**	**0.0067**	**0.0000**	**0.0000**	**4757**	**NA**	**NA**	**NA**	**NA**	***NA***	*TJ NCV*
1A3biv	Road transport: Mopeds & motorcycles	**0.0033**	**0.0001**	**0.0001**	**0.0000**	**0.0001**	**0.0003**	**0.0000**	**0.0000**	**280**	**NA**	**NA**	**NA**	**NA**	***NA***	*TJ NCV*
1A3bv	Road transport: Gasoline evaporation	**NE**	**NE**	**NE**	**NE**	**NA**	**NA**	**NA**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	*TJ NCV*
1A3bvi	Road transport: Automobile tyre and brake wear	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NA**	**NE**	**NA**	**NA**	**NA**	**NA**	**NA**	**8214**	*10^6 km*
1A3bvii	Road transport: Automobile road abrasion	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NA**	**NE**	**NA**	**NA**	**NA**	**NA**	**NA**	**8214**	*10^6 km*
1A3c	Railways	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	*TJ NCV*
1A3di(ii)	International inland waterways	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	*TJ NCV*
1A3dii	National navigation (shipping)	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NA**	**NA**	**NA**	**NA**	**NA**	**243**	*Number of Vessels called at ports*
1A3ei	Pipeline transport	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	*TJ NCV*
1A3eii	Other (please specify in the IIR)	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	*TJ NCV*

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 benzo(a) pyrene	benzo(b) fluoranthene	benzo(k) fluoranthene	Indeno (1,2,3-cd) pyrene	Total 1-4	HCB	PCBs	Liquid Fuels	Solid Fuels	Gaseous Fuels	Biomass	Other Fuels	*Other activity (specified)*	*Other Activity Units*
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	IE	IE	IE	IE	IE	*TJ NCV*
1A4aii	Commercial/institutional: Mobile	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	*TJ NCV*
1A4bi	Residential: Stationary	0.1233	0.0150	0.0136	0.0054	0.0092	0.0432	0.0000	0.0000	4021	NO	2109	190	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	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000	NE	NE	649	NO	99	NO	NO	NA	*TJ NCV*
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	NE	0.0002	0.0004	0.0003	0.0001	0.0010	NA	NA	325	NA	NA	NO	NE	NA	*TJ NCV*
1A4ciii	Agriculture/Forestry/Fishing: National fishing	NE	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	21	*Number of Vessels called at ports*
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	NE	NA	NA	NA	NA	NA	NA	239	*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*
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 [Mn3]*
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	
2A1	Cement production	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	1648	*Clinker produced [kt]*
2A2	Lime production	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3	*Lime produced [kt]*
2A3	Glass production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	*Glass produced [t]*
2A5a	Quarrying and mining of minerals other than coal	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5	*Material quarried [Mt]*
2A5b	Construction and demolition	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3351	*floor space constructed/demolished [M3]*
2A5c	Storage, handling and transport of mineral products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4	*Amount [Mt]*
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*

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 benzo(a) pyrene	benzo(b) fluoranthene	benzo(k) fluoranthene	Indeno (1,2,3-cd) pyrene	Total 1-4	HCB	PCBs	Liquid Fuels	Solid Fuels	Gaseous Fuels	Biomass	Other Fuels	*Other activity (specified)*	*Other Activity Units*
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*
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*
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*
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	854800	*Population*
2D3b	Road paving with asphalt	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	151	*Asphalt Production [kt]*
2D3c	Asphalt roofing	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	75	*Shingle(kt)*
2D3d	Coating applications	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	19	*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	NE	NE	NE	NE	NE	0	*Solvents used [kt]*
2D3g	Chemical products	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	12	*Paint produced [kt]*

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 benzo(a) pyrene	PAHs benzo(b) fluoranthene	PAHs benzo(k) fluoranthene	PAHs Indeno (1,2,3-cd) pyrene	PAHs Total 1-4	HCB	PCBs	Liquid Fuels	Solid Fuels	Gaseous Fuels	Biomass	Other Fuels	*Other activity (specified)*	*Other Activity Units*
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	NE	NE	NE	NE	NE	1	*Printing ink used [kt]*
2D3i	Other solvent use (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
2G	Other product use (please specify in the IIR)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003	NE	NE	NA	NA	NA	NA	NA	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	138	*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	
2I	Wood processing	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	*Please specify*
2J	Production of POPs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	*NA*
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*
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	*NA*
3B1a	Manure management - Dairy cattle	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	28	*Population size (1000 head)*
3B1b	Manure management - Non-dairy cattle	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	35	*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	353	*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	250	*Population size (1000 head)*
3B4e	Manure management - Horses	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	*Population size (1000 head)*
3B4f	Manure management - Mules and asses	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	*Population size (1000 head)*
3B4gi	Manure mangement - Laying hens	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	576	*Population size (1000 head)*
3B4gii	Manure mangement - Broilers	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2676	*Population size (1000 head)*
3B4giii	Manure mangement - Turkeys	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10	*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	4873000	*Use of inorganic fertilizers (kg N/yr)*
3Da2a	Animal manure applied to soils	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	

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 benzo(a) pyrene	benzo(b) fluoranthene	benzo(k) fluoranthene	Indeno (1,2,3-cd) pyrene	Total 1-4	HCB	PCBs	Liquid Fuels	Solid Fuels	Gaseous Fuels	Biomass	Other Fuels	*Other activity (specified)*	*Other Activity Units*
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	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	
3Da2c	Other organic fertilisers applied to soils (including compost)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	
3Da3	Urine and dung deposited by grazing animals	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	
3Da4	Crop residues applied to soils	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	
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NE	
3Dd	Off-farm storage, handling and transport of bulk agricultural products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NE	
3De	Cultivated crops	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
3Df	Use of pesticides	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
3F	Field burning of agricultural residues	0.0009	0.0967	0.2700	0.1152	0.0827	0.5645	NE	NE	NA	NA	NA	NA	NA	18	*Area burned [k ha/yr]*
3I	Agriculture other (please specify in the IIR)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	*NA*
5A	Biological treatment of waste - Solid waste disposal on land	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	410	*Annual deposition of MSW at the SWDS [kt]*
5B1	Biological treatment of waste - Composting	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	27	*Annual composting of SWDS [kt]*
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
5C1a	Municipal waste incineration	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	*MSW 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	
5C1bv	Cremation	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	100	*Incineration of 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	
5C2	Open burning of waste	0.0069	0.0016	0.0032	0.0039	NE	0.0087	NE	NA	NO	NO	NO	NO	NO	1	*Amount of waste burned [kt]*

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**	**NO**	**NO**	**NO**	**NO**	**NO**	**32555124**	*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 [Gg DC/yr]*
5D3	Other wastewater handling	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	*Total organic product [Gg DC/yr]*
5E	Other waste (please specify in IIR)	**0.0002**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NO**	**NO**	**NO**	**NO**	**NO**	**585**	*Please specify*
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**	*Accidental car fires(cases)*
NATIONAL TOTAL	**National total for the entire territory (based on fuel sold)**	**0.4543**	**0.1236**	**0.3201**	**0.1361**	**0.1016**	**0.6814**	**0.0089**	**0.0375**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	*NA*
ADJUSTMENTS (Net total)	Sum of adjustments (negative value) from Annex VII	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	NE	NE	NE	NE	NE	NE	*NA*
NATIONAL TOTAL FOR COMPLIANCE	**National total for compliance assessment (please specify all details in the IIR)**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	NE	NE	NE	NE	NE	NE	*NA*
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	
1A3	Transport (fuel used)	**0.2087**	**0.0064**	**0.0094**	**0.0081**	**0.0067**	**0.0306**	**0.0002**	**0.0001**	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	*NA*
11A	Volcanoes	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	NO	NO	NO	NO	NO	NO	*Please specify*
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	

25. Annex 7: Cyprus Review 2018 Report – Comments

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in previous review report	RE or TC in 2017	Assessment of Implementation	RE or TC in 2018	Tier 1 KC[1]	Gb 2016 Issue[2]	IIR references
CY-1A1a-2018-0003	Yes	1A1a Public Electricity and Heat Production, PM2.5, 2005-2015	For NFR 1A1a Public Electricity and Heat Production - PM2.5, the TERT notes with reference to the NFR tables (recalculation of implied emission factors for liquid fuels) that there is a time series inconsistency between period 2000-2007 (IEF around 17 g/GJ) and period 2008-2015 (IEF around 7 g/GJ). In the IIR, page 55, Cyprus explains that two different methods are used for these two periods: use of default 2016 EMEP/EEA Guidebook EF until 2007 and use of plant specific measurements from 2008 onwards. In response to a question raised during the review Cyprus provided a revised estimate that the TERT disagreed with. Cyprus used the time series splicing (Overlap technique) with the measurements data from 2008 to 2015 regardless of abatement techniques and equipment in place for each year and especially in 2005. Given the information available in the IIR page 54, table 26 for HFO plant, the TERT notes that: - all steam turbines from Dhekelia have no PM abatement and have been in operation since the 1990s; - In 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	TC	For 1A1a Public Electricity and Heat Production, PM2.5 years 2000-2007 the TERT noted that the revised estimate which Cyprus included in the submission was mistakenly based on the overlap technique. In response to a question raised during the review, Cyprus explained that this was a mistake. Cyprus provided a revised estimate for 2005 and stated that it will be included in the next submission. The TERT agreed with the revised estimate provided by Cyprus and attached to the annex of the review report. The TERT recommends that Cyprus includes the revised estimate in its next submission.	RE	No	No	Please see details on page 76.

[1] Tier 1 used for a key category
[2] Issue related to use of GB prior to the 2016 version

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in previous review report	RE or TC in 2017	Assessment of Implementation	RE or TC in 2018	Tier 1 KC[1]	Gb 2016 Issue[2]	IIR references
			a representative PM2.5 emission 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.						
CY-1A3ai(i)-2018-0001	No	1A3ai(i) International Aviation LTO (Civil), NMVOC, 2011-2015	For 1A3ai(i) International Aviation LTO (Civil), NMVOCs, years 2000-2015, in response to a question raised during the review Cyprus explained that there was an error in the calculations prior to 2011. The TERT noted that the issue is below the threshold of significance for a technical correction. The TERT recommends that the estimates are correct in the next inventory submission.	No	For 1A3ai(i) international Aviation LTOs (Civil), the TERT noted that the recommendation from the 2017 NECD Review (CY-1A3ai(i)-2017-0001) has been addressed and the error corrected which has removed the substantial drop in NMVOC emissions after 2011. However, the TERT noted a ~20% increase in emissions of all pollutants from 2015 to 2016 with no explanation given in the IIR on the cause of this increase. In response to a question raised during the review, Cyprus explained that this was due to the increase in LTOs between these years and provided the number of LTOs over the 1990-2016 time series to show this. The TERT agrees with the trend in emissions matches the trend in LTOs and does not relate to an over or under-estimate but recommends that Cyprus improve transparency the number of LTOs are shown in a table in the IIR in the next submission.	No	No	No	For the recent submission (15.2.2019) Cyprus used data for Eurocontrol (2005 up to 2017) and for the rest of the timeseries (1990 – 2004) used the overlap method. Please see page 80.
CY-1A3aii(ii)-2018-0001	No	1A3aii(ii) Domestic Aviation Cruise (Civil) - Memo	For 1A3aii(ii) Domestic Aviation Cruise (Civil) - Memo Item and 1A3ai(ii) International Aviation Cruise (Civil) - Memo Item for all pollutants and all years, the TERT noted that in response to a	No	For 1A3ai(ii) Domestic Aviation Cruise (Civil) - Memo Item and 1A3aii(ii) International Aviation Cruise (Civil) - Memo Item the TERT noted that the	No	No	No	For the recent submission (15.2.2019)

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in previous review report	RE or TC in 2017	Assessment of Implementation	RE or TC in 2018	Tier 1 KC[1]	Gb 2016 Issue[2]	IIR references
		Item, NOX, 2000 - 2015	question raised during the review that Cyprus explained that they do not estimate cruise emissions because they do not have the data, but that for the next submission they will use the EUROCONTROL data to generate estimates. The TERT noted that the issue is related to a non-mandatory category. The TERT recommends that emission estimates are provided in the next submission.		recommendation from the 2017 NECD Review (CY-1A3aii(ii)-2017-0001) has been partially addressed by including emissions from domestic cruise (1A3aii(ii)) but not international cruise (1A3ai(ii)). Moreover, emissions from domestic cruise are only estimated from 2005 onwards. Annex 7 of the IIR states that Cyprus will try to include international aviation cruise next year. In response to a question raised during the review, Cyprus explained that it is estimating emissions for Domestic Aviation for the whole time series 1990 – 2016 and provided the time series in number of movements (LTOs) to show this. However, the TERT notes only emissions for LTOs are estimated for the whole time series and not emissions during cruise. Cyprus also stated that it does not have data before 2008 and is assuming that 20% of the airport movements belong to Domestic Aviation, whilst EUROCONTROL only has data after 2005. The TERT notes that this issue does not relate to an over or under-estimate and is related to a non-mandatory category, but recommends that for completeness Cyprus tries to obtain or estimate data for domestic and international movements so that emissions can be estimated for the 1A3aii sources.				Cyprus used data for Eurocontrol (2005 up to 2017) and for the rest of the timeseries (1990 – 2004) used the overlap method. Please see page 80.
CY-1A3dii-2018-0001	No	1A3dii National Navigation	For category 1A3dii National Navigation (Shipping)/NOX, SO2, NMVOC and PM2.5, years	No	The TERT clarified the issue with Cyprus and concluded that small boats and	No	No	No	Please see Table 39 on

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in previous review report	RE or TC in 2017	Assessment of Implementation	RE or TC in 2018	Tier 1 KC[1]	Gb 2016 Issue[2]	IIR references
		(Shipping), NOX, 2000 - 2015	2000-2015, in response to a question raised during the review, Cyprus explained that they had only estimated in-port emissions, because they did not have data available at the time of inventory compilation to estimate emissions from the cruise phase. During the review, Cyprus confirmed that they do have data from Eurostat that they could use in the next inventory submission to generate emission estimates. A revised estimate was not provided during the review week. Based on information provided in the GHG inventory, the TERT noted that the issue is below the threshold of significance for a technical correction. The TERT recommends that the emission estimates for this sector are revised in the next submission to take account of the cruise phase as well as in-port emissions.		yachts are the vessels included in 1A3dii National Navigation (Shipping) and passenger and cargo vessels are the vessels included in 1A3di International Navigation. The emissions for 1A3di are based on the number and types of vessels and time spent in Cyprus ports using main and auxiliary engines. Cyprus explained that there are no movements of these larger vessels between ports within the country and with no destination data available for international movements, the TERT considers 1A3di has the correct allocation of emissions to this non-mandatory source category. However, the TERT does recommend that for completeness, Cyprus tries 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.				page 88.
CY-1A4bi-2018-0002	No	1A4bi Residential: Stationary, SO2, NOX, NMVOC, PM2.5, 2000-2015	For 1A4bi Residential: Stationary, SO2, NOX, NMVOC, PM2.5, Liquid fuels, 2000-2015, the TERT noted that in the IIR pages 69-70, Cyprus presents diesel and wood consumption (table 38) and the related EF (table 37). In the IIR, page 215, Cyprus also presents the energy balance for the year 2015. The TERT notes that the energy balance also considered LPG and kerosene consumptions that are not mentioned in the IIR section on residential. In response to a question raised during the review, Cyprus admitted that the use of LPG and kerosene in the residential sector is not taken into account	No	For category 1A4bi Residential: Stationary and pollutants SO2, NOX, NMVOC, PM2.5 for all years, the TERT noted that there is a lack of transparency regarding the calculation of emission estimates due to LPG and kerosene following the implementation of the recommendation CY-1A4bi-2017-0001 from the 2017 NECD Review. In response to a question raised during the review, Cyprus provided data explaining that kerosene was included with diesel	No	No	No	The table in pages 90 -91 was completed with the consumption of the LPG fuel.

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in previous review report	RE or TC in 2017	Assessment of Implementation	RE or TC in 2018	Tier 1 KC[1]	Gb 2016 Issue[2]	IIR references
			in the inventory. Cyprus provided a revised estimate for years 2005/2010/2015 for NOX/NMVOC/PM2.5. The revised estimate has been checked by the TERT and, unfortunately, cannot be accepted due to lack of transparency regarding the data and method used (fuel consumptions, EF). The TERT made its own calculation and concluded that the potential under-estimate is below the threshold of significance for 1A4bi/LPG and kerosene/all pollutants in years 2005/2010/2015. TERT recommends that Cyprus includes revised estimates with transparent presentation of data sources, methods and assumptions for these fuels in NFR 1A4bi in its next submission.		in 'other liquid fuels' and LPG in 'gaseous fuels' in the table provided in the IIR. The TERT recommends that Cyprus includes this transparency information in the 2019 submission.				
CY-2A1-2018-0001	No	2A1 Cement Production, PM2.5, 2005-2015	For 2A1 Cement Production, PM2.5 for all years the TERT noted there was a lack of transparency regarding the calculation of emissions for this category. In response to a question raised during the review, Cyprus explained that for applying the Tier 2 approach, it considered the upper limit of the Tier 1 EF representative for using in combination with the abatement efficiencies provided in the 2016 EMEP/EEA Guidebook. The TERT partly agreed with the explanation provided by Cyprus. The TERT noted that with the current 2A1 chapter of the 2016 EMEP/EEA Guidebook, there is no uncontrolled emission factor provided which could be used in combination with the abatement efficiency. The TERT recommends that Cyprus finds an alternative methodology. As an option, the TERT suggests that Cyprus use the highest of the dust EFs provided in the European IPPC Bureau BREF document for cement production as the uncontrolled EF. The TERT has	No	For PM2.5 emissions from 2A1 Cement Production for 2005-2015 the TERT noted, with reference to the recommendation (CY-2A1-2017-0003) that Cyprus should justify the high abatement efficiencies assumed in its estimates. The TERT noted that, instead of obtaining plant specific data to justify its assumptions on abatement efficiencies, Cyprus used a Tier 1 methodology with emission factors from 2016 EMEP/EEA Guidebook of 130 g/Mg clinker (table 3.1 on page 10) for the time series until 2011 and from 2012 on Cyprus used the upper limit uncertainty value for Tier 1 emission factor (260 g/Mg Clinker) combined with an abatement efficiency of 99% (for which Cyprus refers to the BREF). The TERT also noted that Cyprus used cement	RE	No	No	Cyprus adopted the TERT recommend-dations. Please see page 104.

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in previous review report	RE or TC in 2017	Assessment of Implementation	RE or TC in 2018	Tier 1 KC[1]	Gb 2016 Issue[2]	IIR references
			found that the reported range of dust emissions up to 0.52 kg/tonne for TSP, which corresponds to the EFs reported in Cyprus' IIR (Table 46). In addition, the BREF also contains typical emission ranges for cement facilities with fabric filters which can be used. The TERT made some preliminary calculations showing that the reported emissions by Cyprus were in the same range, so it is not likely that there is an over- or under-estimate above the threshold of significance. The TERT recommends to further investigate the emissions for this specific facility and if possible collect plant specific information from the cement facility, since this is a key category.		production as AD while the Tier 1 EF is for clinker production. The TERT also believes that the EF is too low for the period 2012-2016 without suitable justification. In response to questions raised during the review, Cyprus provided a revised estimate for the entire time series using AD of clinker production the Tier 1 factor of 130 g/Mg clinker for 1990-2011 and an adjusted Tier 1 factor of 130 g/Mg clinker applying a reduction of 73% (from the 2016 EMEP/EEA Guidebook) to account for abatement for 2012 - 2016. Cyprus noted that the BREF guidelines proposing a 99% reduction was more likely for the levels of abatement in the plant 2012 - 2016 and intends reconsider this revised estimate for its next submission. The TERT agreed with the revised estimate provided by Cyprus and attached to the annex of the review report. The TERT recommends that Cyprus estimate more accurately the emissions using country specific and plant data and justifies any abatement assumptions or include the revised estimate in its next submission.				
CY-2D-2018-0001	No	2D Non-Energy Products from Fuels and Solvent Uses, SO2, NOX, NMVOC, PM2.5, 1990-	For 2D Non-Energy Products from Fuels and Solvent Uses, SO2, NOX, NMVOC, PM2.5, 1990-2015 the TERT notes that Cyprus uses 2013 EMEP/EEA Guidebook emission factors. The TERT recommends that the revised emission factors from the 2016 EMEP/EEA Guidebook are used in the next submission unless Cyprus can provide	No	For 2D Non-Energy Products from Fuels and Solvent Uses for SO2, NOX, NMVOC, PM2.5 the TERT noted that EF from the 2016 EMEP/EEA Guidebook are used following the 2017 recommendation (CY-2D-2017-0001). The TERT also noted that, in response to a question raised	No	No	No	Please see page 113.

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in previous review report	RE or TC in 2017	Assessment of Implementation	RE or TC in 2018	Tier 1 KC[1]	Gb 2016 Issue[2]	IIR references
		2015	sufficient justification for use of the 2013 EMEP/EEA Guidebook emission factors.		during the review Cyprus explained the rationale for choosing the upper limit of the abatement efficiency. This was based on the assumed implementation of the 2004/42/EC ("Paint directive"). For the period between 1990-2007, no abatement efficiencies were used; for the period of 2008-2010, while the Directive was partly implemented, the default value of abatement efficiency was used and for the period of 2011-2016 the full implementation of the Directive, the upper value for abatement was used. The TERT recommends that Cyprus includes this information in its next IIR in order to assure more transparency on its estimates.				
CY-2D3a-2018-0002	Yes	2D3a Domestic Solvent Use Including Fungicides, NMVOC, 1990-2015	For key category 2D3a (Domestic Solvents Use Including Fungicides; NMVOC; whole time series) the TERT noted that Cyprus used a 2013 EMEP/EEA Guidebook Tier 1 EF of 239 g NMVOC/capita. In response to a question raised during the review, Cyprus explained that a 2016 EMEP/EEA Guidebook Tier 1 EF of 1.2 kg NMVOC/capita will be used and that it plans to find further AD for moving to a Tier 2 assessment. Cyprus provided revised estimates for years 1990 to 2015. The TERT agreed with the revised estimate provided by Cyprus. The TERT recommends that Cyprus includes the revised estimate with any additional improvements to Tier 2 in its next submission.	RE	The TERT reiterates recommendation [CY-2D3a-2017-0001] from the 2017 NECD Review. During the 2018 NECD Review, Cyprus explained that it still used the Tier 1 estimate and that since the Statistical Service of Cyprus does not collect data for each item shown in Table 3.2 of the 2016 EMEP/EEA Guidebook it will continue to use the Tier 1 methodology. The TERT reiterates the recommendation to look for improvements by moving to Tier 2.	No	No	No	It might be a future improvement the implementation of this recommendation.
CY-3B-2018-	Yes	3B Manure Management,	For 3B Manure Management and pollutants NH3 for years 2005-2015 the TERT noted a lack of	No	For category 3B1a Manure Management - Dairy Cattle and pollutants NH3 for all	RE	No	No	The IIR was corrected.

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in previous review report	RE or TC in 2017	Assessment of Implementation	RE or TC in 2018	Tier 1 KC[1]	Gb 2016 Issue[2]	IIR references
0001		NH3, 2005-2015	transparency concerning the use of different tiered methods across the time series. In response to a question raised during the review, Cyprus explained that Tier 2 is used to calculate the NH3 emission for the years 2009-2015, while Tier 1 is used for the years before 2009 due a lack of available data. The TERT accepts the explanation provided by Cyprus. The TERT recommend Cyprus includes clear explanation in IIR for next submission. The TERT also recommend that Cyprus continue the work to gather data for N-excretion and allocation of manure type, which makes is possible to use a Tier 2 approach for all of the time series.		years the TERT noted that Cyprus had not implemented in full the Tier 2 emission factors as presented in 2016 EMEP/EEA Inventory Guidebook. Specifically, Cyprus had not utilized the emission factor for tied stall housing of dairy cattle which resulted in an over-estimate of emissions for all years 1990-2016 that was below the threshold of significance. Any revision to emissions in category 3B Manure Management has a knock-on effect on emission values for 3Da2a Animal Manure Applied to Soils and 3Da3 Urine and Dung Deposited by Grazing Animals. In response to a question raised during the review, Cyprus provided revised estimates for all years for 3B1a, 3Da2a and 3Da3 and stated that it will be included in the next submission. The TERT agreed with the revised estimate provided by Cyprus. The TERT recommends that Cyprus includes the revised estimate in its next submission.				Please see page 121.
CY-3B-2018-0005	Yes	3B Manure Management, NH3, 2005-2015	The TERT notes that there is a lack of transparency regarding estimation of NH3 emission from 3B Manure Management. The TERT also noted that the number of animal differ from data in CRF Tables. In response to a question raised during the review, Cyprus inform that NH3 emission from NFR 3B Manure Management is based on Tier 2 approach from 2010 and forwards and Tier 1 is used for the years before 2009 for all livestock categories. Cyprus provided a revised estimate for year 1990 – 2015 for all livestock categories based	RE	For category 3B Manure Management and pollutant NH3 for years 2000-2015 the TERT noted that it was unclear from the IIR as to what methodological approach was adopted. In response to a question raised during the review, Cyprus explained that the Tier 2 approach was used for this key category. The TERT agreed with the explanation provided by Cyprus. The TERT recommends that Cyprus, in its	No	No	No	The IIR was corrected. Please see page 121.

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in previous review report	RE or TC in 2017	Assessment of Implementation	RE or TC in 2018	Tier 1 KC[1]	Gb 2016 Issue[2]	IIR references
			on Tier 2 approach (Excel spreadsheet EMEP/EEA Guidebook 3B Manure Management – Appendix B) and a revised estimate for number of animal matching the CRF Tables. The TERT agreed with the revised estimate provided by Cyprus and recommend to include the revised estimate in its next submission.		next annual submission, provide a clear description of its methodological approach, activity data and emission factors used, including any other ancillary information such as details of the animal waste management systems in use in Cyprus.				
CY-3B-2018-0002	Yes	3B Manure Management, NH3, 2005-2015	For manure Management system (MMS) 2005-2015 the TERT noted that no information on distribution of manure management system (MMS) was provided in IIR. The TERT were concerned that there may be a significant over- or under-estimate. During the review, Cyprus indicated that it uses a Tier 2 method and provided details of its calculations for the estimation of NH3 and NOX emission from 3B Manure Management. The TERT were content with this approach. The TERT recommends that Cyprus provide more transparent information on the Tier 2 method, assumptions and data sources and details of the manure management system assumptions used for the full time series in the IIR of its next submission.	No	For category 3B Manure Management and pollutant NH3 for years 2000-2015 the TERT noted that it was unclear from the IIR as to what methodological approach was adopted. In response to a question raised during the review, Cyprus explained that the Tier 2 approach was used for this key category. The TERT agreed with the explanation provided by Cyprus. The TERT recommends that Cyprus in its next annual submission provide a clear description of its methodological approach, activity data and emission factors used, including any other ancillary information such as details of the animal waste management systems in use in Cyprus.	No	No	No	
CY-3B-2018-0003	Yes	3B Manure Management, NMVOC, 2005-2015	For NMVOC emission from NFR 3B Manure Management for 2005 - 2015, the TERT notes that the NMVOC EF 2005 for all livestock categories 3B is equal to Tier 1 default as given in 2016 EMEP/EEA Guidebook Table 3.4 (with silage feeding), while the EF NMVOC years 2010 and 2015 indicate a discrepancy compared with the 2016 EMEP/EEA Guidebook default Tier 1. During the review process Cyprus confirmed that Tier 1 approach is used for 2005 and Tier 2 used for 2010	No	For category 3B Manure Management and pollutant NH3 for years 2000-2015 the TERT noted that it was unclear from the IIR as to what methodological approach was adopted. In response to a question raised during the review, Cyprus explained that the Tier 2 approach was used for this key category. The TERT agreed with the explanation provided by Cyprus. The	No	No	No	

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in previous review report	RE or TC in 2017	Assessment of Implementation	RE or TC in 2018	Tier 1 KC[1]	Gb 2016 Issue[2]	IIR references
			and 2015. However, the EF for 2010 and 2015 are lower than Tier 1 default. For dairy cattle 2015 the EF is 7.930 kg NMVOC/cow/year (0.2077 kt NH3/26189 number of dairy cattle), which is lower than Tier 1 default for "without silage feeding". No information is given in IIR about the variables used to calculate the Tier 2 estimation. The TERT recommends Cyprus to include a transparent description of the methodology used for Tier 2 calculation in next IIR and include information for variable used; VS excretion, time the cattle spend in the housing and the relation between E-NH3storage/E-NH3building and E-NH3appl/E-NH3building (refer to 2016 EMEP/EEA Guidebook Table 3.11 and 3.12). Furthermore, it is recommended to investigate the assumptions for applying Tier 2 approach for all years.		TERT recommends that Cyprus, in its next annual submission, provide a clear description of its methodological approach, activity data and emission factors used, including any other ancillary information such as details of the animal waste management systems in use in Cyprus.				
CY-3B-2018-0006	Yes	3B Manure Management, NOX, NH3, NMVOC, PM2.5, 2000-2015	The TERT noted that the number of swine in NFR are lower compared to CRF, which indicate a under-estimation of NH3 and NO2 emission from NFR 3B3 Manure management - Swine. In response to a question raised during the review, Cyprus provided a revised NH3 estimate for year 1990 – 2015 for all livestock categories based on Tier 2 approach (Excel spreadsheet EMEP/EEA Guidebook 3B Manure Management – Appendix B) and a revised estimate for number of animal matching the CRF Tables. The TERT agreed with the revised estimate provided by Cyprus. No respond was received regarding the draft technical correction for NO2 emission provided by TERT. A revised NO2 estimate from swine (3B3) is calculated by TERT based on the CY revised number of sows and fattening pigs based on Tier1 approach (used the MMS allocation 50% solid and	TC	For category 3B3 Manure management - Swine and pollutants NOX, NH3, NMVOC, PM2.5 for the years 2015 and 2016 the TERT noted that the activity data for 3B3 swine was not consistent with that reported by Cyprus in its CRF submission to the UNFCCC. This issue was also raised in the 2017 NECD review. In response to a question raised during the review, Cyprus explained that the data reported in the NFR are the latest national statistics in relation to swine and that it will contact the agency responsible for submission of the CRF in Cyprus. The TERT agreed with the explanation provided by Cyprus. The TERT recommends that Cyprus ensure that consistency between the activity	No	No	No	After a meeting it was agreed between the two Depts. to use the same data as regards the number of livestock.

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in previous review report	RE or TC in 2017	Assessment of Implementation	RE or TC in 2018	Tier 1 KC[1]	Gb 2016 Issue[2]	IIR references
			50% slurry). The TERT recommend that Cyprus includes these above revisions in its next submission.		data used in the estimation of air pollutants under the National Emissions Ceilings Directive and that used in the estimation of greenhouse gases and reported to the UNFCCC.				

Table 167: Additional recommendations made during the NECD Review 2018 for NO_X, NMVOC, SO_X, NH_3, $PM_{2.5}$ considering revised estimates (RE), technical corrections (TC)

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation	RE or TC in 2018	Tier 1 used for a key category	Issue related to use of GB prior to the 2016 version	IIR Reference
CY-2D3d-2018-0001	Yes	2D3d Coating Applications, NMVOC, 2005, 2010, 2015	For 2D3d Coating applications the TERT noted that Cyprus made a recalculation for the time series and did not provide an explanation for this recalculation in the IIR. The TERT noted that this recalculation is above the threshold of 2% of the national total. In response to questions raised during the review, Cyprus explained that the recalculation was performed to include the application of glues in the estimate but did not explain the method and EF used to calculate the emissions of application of glues. Cyprus provided a revised estimate for the time series with a separate calculation for coating applications and application of glues. The TERT agreed with the revised estimate provided by Cyprus and attached to the annex of the review report. The TERT recommends that Cyprus includes the revised estimate in its next submission and that Cyprus assigns the emissions to the correct inventory categories, i.e. 2D3d for Coating applications and 2D3i for application of glues. The TERT also recommends Cyprus to include the method, activity data, EF and abatement efficiencies used in its IIR in the respective chapters.	RE	No	No	This was done. Please see pages 113 and 117.
CY-3B-2018-0007	Yes	3B Manure Management, NH_3, 2005, 2010, 2015	For category 3B Manure Management and pollutants NH_3 for year 2005, 2010, and 2015 the TERT noted that the rationale for recalculations is not transparently described in the IIR. In response to a question raised during the review, Cyprus provided a rationale in that the reason for the recalculation was in response to an observation in the 2017 NECD review (CY-3B-2017-0008). The TERT agreed with the explanation provided by Cyprus. The TERT recommends that Cyprus provide the rationale for all recalculations in the IIR of future submissions to enhance transparency.	No	No	No	The recommendation was adopted.
CY-0B-2018-0001	No	0B National Total for Compliance	The TERT notes that Cyprus used the notation key 'NE' for their National Compliance Totals. The TERT recommend that Cyprus	No	No	No	The recommendatio

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation	RE or TC in 2018	Tier 1 used for a key category	Issue related to use of GB prior to the 2016 version	IIR Reference
		Assessment, SO_2, NO_X, NH_3, NMVOC, $PM_{2.5}$, PAHs, PCBs, HCB, Cd, Hg, Pb, PCDD/F, 1990 - 2016	includes in the National Total for Compliance row values that are relevant to the national total for compliance. If this is the same as the National Total then the National Total value should be inserted. Notation keys, blanks or "0"s should not be used.				n was adopted.