



REPUBLIC OF SERBIA
Ministry of Environmental Protection
Environmental Protection Agency

REPUBLIC OF SERBIA
INFORMATIVE INVENTORY REPORT
TO LRTAP CONVENTION FOR 2019

Belgrade, 2019

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EXECUTIVE SUMMARY

Serbian Informative Inventory Report (IIR) and the complete set of NFR tables represent Serbian official submission under the United Nations Economic Commission for Europe (UNECE) Convention on Long range Transboundary Air Pollution (LRTAP). Starting from the first submission, Serbia reports all pollutants in prescribed reporting format from 1990 as a base year to the latest inventory year. Serbia is required to annually report data on emissions of air pollutants covered in the Convention and its Protocols:

Main pollutants: nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOC), Sulphur oxides (SOx), ammonia (NH3) and carbon monoxide (CO);

Particulate matter (PM): primary PM (fine particulate matter (PM_{2.5}) and coarse particulate matter (PM₁₀) as well as total suspended particulates (TSPs);

Priority heavy metals (HMs); Lead (Pb), Cadmium (Cd) and mercury (Hg);

Persistent organic pollutants (POPs): Polychlorinated dibenzodioxins/dibenzofurans (PCDD/Fs),

Polycyclic aromatic hydrocarbons (PAHs), hexachlorobenzene (HCB) and polychlorinated biphenyls (PCBs).

1. INTRODUCTION

The Republic of Serbia became a party to the Convention on Long-range Transboundary Air Pollution (CLRTAP) and to the Protocol on Long-term Financing of the Cooperative Programme for Monitoring and evaluation of the Long-range Transmission of Air Pollutants in Europe on 8 October 1991.

The Republic of Serbia has also ratified following protocols under the LRTAP Convention: Protocol on Long-term Financing of the Cooperative Programme for Monitoring and evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP), Protocol on Heavy Metals, and Protocol on Persistent Organic Pollutants. Table 1.1 shows the status of ratification of international treaties under the CLRTAP and status of ratification in Serbia.

Table 1. Status of ratification of international treaties under the CLRTAP

Treaty	Signed by the Parties	In force since	Ratified by Serbia
Convention on Long-range Transboundary Air Pollution (CLRTAP)	1979	1983	1991
Protocol on Long-term Financing of the Cooperative Programme for Monitoring and evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP)	1984	1988	2001
Protocol on Persistent Organic Pollutants	1998	2003	2012
Protocol on Heavy Metals	1998	2003	2012
Protocol to Abate Acidification, Eutrophication and Ground-level Ozone ("Gothenburg Protocol").	1999	2005	Postponed

In accordance with CLRTAP Executive Body's Decision 2002/10, on emission data reporting under the Convention and the Protocols in force, Serbia is obliged to report on air emissions in line with Emission Reporting Guidelines and methodology described in EMEP/EEA Emission Inventory

Guidebook 2016. Specifically, the application of annual emissions under the CLRTAP consists of the preparation of:

1. NFR formats (emission inventory) and
2. Informative Inventory Report (IIR).

The NFR nomenclature (CLRTAP) is consistent with the CRF nomenclature under the UN Framework Convention on Climate Change (UNFCCC), with the overall aim of harmonization reporting formats. The national inventory is updated annually in order to reflect the availability of new information, sectorial improvements, implementation of higher tier (for example, Tier 2), change in methodology, identification of time series inconsistency, the accuracy of the estimates and the reduction of the uncertainty. Adjustments are applied retrospectively to earlier years, which accounts for any difference in previously published data.

1.1 NATIONAL INVENTORY BACKGROUND

The present Serbian CLRTAP Inventory for the period 1990 to 2017 was compiled according to the recommendations for inventories as set out by the UNECE Executive Body and in the EMEP/EEA Emission Inventory Guidebook 2016.

An important pre-condition for efficient data management system and development of the inventory is a clearly defined organization, competences and responsibilities of institutions involved in the process of developing the inventory, which includes a number of steps to be taken in the collection and processing of data, calculation, control and verification of emission inventories and documentation and communication to competent international bodies.

The total emissions time series by pollutants in 1990, 1995, 2000, 2005, 2010, 2016 and 2017 in Serbia are given in table 2.

Table 2. The total emissions time series by pollutants in 1990, 1995, 2000, 2005, 2010, 2016 and 2017 in Serbia

Pollutant	Unit	1990	1995	2000	2005	2010	2016	2017
NO_x	kt	186,17	153,28	147,76	167,07	149,58	148,92	147,64
NMVOC	kt	188,18	142,28	146,24	146,44	133,61	127,47	125,07
SO_x	kt	592,11	499,46	463,52	446,01	402,69	423,22	420,20
NH₃	kt	93,38	82,86	76,43	81,34	69,00	65,79	64,91
PM_{2,5}	kt	55,02	34,78	40,00	39,70	42,53	40,87	38,51
PM₁₀	kt	72,81	48,93	53,36	53,79	55,93	55,41	52,81
TSP	kt	153,89	95,63	83,03	111,58	100,36	85,49	93,95
BC	kt	4,35	2,67	3,10	3,06	3,73	3,40	3,19
CO	kt	518,07	352,05	400,69	404,16	349,16	277,45	268,37
Pb	t	372,36	285,46	196,73	234,72	105,67	39,88	54,80
Cd	t	4,02	2,42	1,96	1,88	1,84	2,46	2,65
Hg	t	2,79	2,15	2,13	2,19	2,11	1,97	1,88
As	t	7,90	6,09	5,59	5,55	5,07	5,51	5,64
Cr	t	11,71	6,86	7,28	10,06	10,38	10,21	12,35
Cu	t	15,68	10,00	8,82	12,36	13,73	15,35	17,55
Ni	t	21,63	9,95	8,76	22,90	20,83	16,74	23,73
Se	t	17,97	15,95	14,34	13,66	12,61	13,36	13,38
Zn	t	51,55	30,43	36,96	54,75	62,43	54,03	63,21
PCDD	g I-TEQ	69,44	43,47	52,41	59,11	57,73	50,52	51,37

benzo a pyren	t	11,15	6,62	8,82	8,30	7,87	7,23	6,76
benzo b fluoranthen	t	12,84	7,53	10,46	9,76	8,77	8,08	7,60
benzo k fluoranthen	t	5,04	2,96	4,12	3,84	3,41	3,15	2,97
Indeno 1,2,3 pyren	t	5,94	3,56	4,62	4,40	4,26	3,92	3,67
Total 1-4 PAH	t	40,76	20,94	29,53	29,65	27,64	25,75	24,61
HCB	kg	2,90	2,50	2,31	2,23	2,13	2,22	2,24
PCB	kg	844,23	837,03	816,19	774,38	805,49	723,66	717,56

1.2 INSTITUTIONAL ARRANGEMENTS

In terms of organizational arrangements, a centralized model has been applied in Serbia. From institutional point of view, Ministry of Environmental Protection is a National Focal Point for LRTAP Convention, while inventory preparation is under responsibility of Serbian Environment Protection Agency (SEPA).

SEPA undertakes all activities in preparation of NFR tables and IIR from collecting data. All data that are necessary for preparation these tables were collected in SEPA. The main official sources of activity data for the inventory of pollutant emissions are given in table 1.3.

Activity data provided through questionnaires completed directly by individual emission sources or other specialized institutions are used in the development of the inventory to calculate and check data provided by official publications.

The main official sources of activity data for the inventory of pollutant emissions are:

- The Central Bureau of Statistics that, on the basis of the statistic survey programme, collects data on the amounts of raw materials and products relating to activities defined by the National Classification of Business Activities;
- The Ministry of Interior keeps databases of road and off-road vehicles.
- SEPA that collects data from emission point sources

Activity data provided through questionnaires completed directly by individual emission sources or other specialized institutions are used in the development of the inventory to calculate and check data provided by official publications.

1.3 INVENTORY PREPARATION PROCESS

The process of inventory preparation has three main phases: (1) planning, (2) preparation and (3) reporting and archiving. The preparation of the inventory includes the following three stages as illustrated below.

I Planning

In the first stage specific responsibilities are defined and allocated: as mentioned before, the SEPA has the overall responsibility for the national CLRTAP inventory, and also, SEPA is executive institution for this inventory.

Planning phase includes activities related to organizational and technical aspects of inventory preparation such as: preparation of timetable according to EMEP reporting programme, preparation a schedule of data collecting and data analysis activities, data quality control and quality assurance activities, review of existing/updated reporting guidelines and guidebooks, review of emission factors and analysis of recommendations for inventory improvement from previous submissions or gave by expert review teams if such exists.

In accordance with Air Pollution Studies No. 15, Guidelines for Estimating and Reporting Emission Data under the Convention on Long-range Transboundary Air Pollution⁸, TFEIP, 2003 each Party should submit to the LRTAP Convention data on emissions in electronic format as follows:

- Each year until 15 February Parties should submit complete inventory with information on air emissions listed in Part B, and for all sectors listed in Annex III of reporting guidelines in the calendar year which ends 13 months before aforementioned,
- Every fifth year, starting from year 2000, until 15 February information on emissions from Large Point Sources. i.e. sources which emit more than 500 tonnes of SO₂, NO_x, NMVOC-a or total suspended particles (TSP).
- Every fifth year until 15 February information on emission projections and activity data projections for years 2010, 2015, 2020, 2030 and 2050.
- Every fifth year, starting from 1990, until 1 March Parties should submit in electronic format spatial distribution of emissions in EMEP grid 50x50
- Each year until 15 March, starting from 2007, Parties should submit Informative Inventory Report.

Detailed and updated information related to deadlines and scope of reporting are available on official EMEP⁹ /CEIP¹⁰ web page – www.ceip.at/.

Inventory preparation

Inventory preparation phase includes identification and updating of emission sources according to Nomenclature for Reporting, collection and processing of activity data, emission calculation and recalculations if necessary, filling the database and preparation of report and tables. In the second stage, the inventory preparation process, SEPA collect activity data and all other relevant information needed for estimating emissions. SEPA is also responsible for methodological choices due to data availability.

Inventory management

For the inventory management a reliable data management to fulfill the data collecting and reporting requirements is needed. As mentioned above, data collection is performed by the SEPA.

Data management is carried out by using MS Excel spreadsheets, which is a very flexible system that can easily be adjusted to new requirements.

The data is stored on a central network server for National Registers of Polluters in SEPA premises.

1.4 METHODS AND DATA SOURCES

Methodologies

Emission estimates were prepared using the methodology agreed upon by the Executive Body - EMEP/EEA air pollutant emission inventory guidebook — 2016. Further, other internationally applied methodologies and guidelines including National PRTR register and Intergovernmental Panel on Climate Change (IPCC) Guidelines were used.

Emissions from road transport are calculated using application COPERT 4 version 11.3. that contains activity data on vehicle fleet and procedures for emissions calculation from road transport.

In combination with software tools, EMEP/EEA methodology aims to obtain consistency, completeness, comparability and transparency of the emissions estimates utilizing two basic methodological approaches:

- "Bottom-up", where total emissions from defined territory are determined by summing the measured/estimated emissions from all individual sources on defined territory. In case when

one or more sources are missed out inventory is incomplete which leads to lower level of emissions.

- "Top-down" where total emissions from defined territory are determined from aggregate statistical data (for instance total fuel consumption or cement production) and average emission factors that give the best estimation of activities (sectors) under consideration.

Due to evident advantages and shortcomings of both approaches inventory agency in practice utilize both of them with emphasis on achieving a balance between resources available and quality of estimations.

Emissions are calculated on the base of the standard methods and procedures of EMEP/EEA Air Pollutant Emission Inventory Guidebook "Technical Guidance to Prepare National Emission Inventories" (2016).

Emission factors used are default except for coal (lignite), which is the most important fuel in Serbia to obtain, primarily electricity in large thermo-power plants, but also for heat and steam production in communal and industrial thermo plants.

During 2016 a detailed analysis of available data concerning the use of coal (lignite) in electricity and heat production, as well as the technical characteristics for coal has been carried out. It was found that the amount of sulfur in lignite is around 0.5%, but net calorific value is rather low, ranging between 6,000 - 7,000 kJ/kg of fuel.

Based on the data calculated the national emission factor for lignite whose average value is 1350 mg/GJ. Default value for this type of fuel in EMEP/EEA emission inventory guidebook 2016 is 1680 mg/GJ. Based on available data the national emission factor for lignite was calculated. Average value is 1350 mg / GJ. This research is available on request and it is on English also.

The levels of methods used for the different NFR sectors are given in table 3.

Table 3. The levels of methods used for the different NFR sectors:

Public electricity and heat production, Petroleum refining	Tier 1
Iron and steel, Non-ferrous metals, Stationary combustion in manufacturing industries and construction: Other	Tier 2
Civil aviation (domestic, LTO), International aviation (LTO)	Tier 1
Vehicles, Road transport: Gasoline evaporation, Road vehicle tire and brake wear, Road surface wear	COPERT
Railways	Tier 1
National navigation (Shipping)	Tier 1
Commercial / institutional: Stationary, Residential: Stationary plants	Tier 1
Coal mining and handling, Oil – Exploration, production, transport, Refining/storage, Distribution of oil products	Tier 1
Natural gas	Tier 2
Venting and flaring	Tier 1
Cement production	Tier 1
Lime production	Tier 1
Asphalt roofing	Tier 1
Road paving with asphalt	Tier 1
Quarrying and mining of minerals other than coal, Construction and demolition, Storage, handling and transport of mineral products, Other	Tier 1
Ammonia production	Tier 1
Nitric acid production	Tier 1
Other chemical industry	Tier 2
Iron and steel production, Aluminium production, Copper production, Lead production, Other metal production (Magnesium production)	Tier 2
Pulp and paper	Tier 1

Food and drink	Tier 2
Wood processing	Tier 1
Consumption of persistent organic pollutants and heavy metals	Tier 1
Decorative coating application, Industrial coating application	Tier 2
Degreasing, Dry cleaning	
Chemical products	Tier 2
Printing, Domestic solvent use including fungicides	
Other product use	Tier 2
Dairy cattle on slurry, Cattle non-dairy, Sheep Goats, Horses, Swine, poultry	Tier 1
Synthetic N-fertilizers	Tier 1
Solid waste disposal on land	Tier 1
Waste water handling	Tier 1
Cremation	Tier 1
Forest fires	Tier 1

Official data sources

Activity data needed for emissions calculation are extracted from regular publications and databases of Central Bureau of Statistics and other relevant governmental organizations and ministries. For particular sub-sectors and source categories, more detailed data are required than those published in official statistical reports, such as disaggregated energy balance, vehicle fleet etc. Beside official publications inventory agency sent questionnaires directly to some of the Large Point Sources asking for activity data which they use for emissions calculations in order to check consistency of data provided by different sources.

1.5 KEY CATEGORIES

The identification of key categories is described in the “EMEP/EEA air pollutant emission inventory guidebook 2016” (EEA 2016). It stipulates that a key category is one that is prioritised within the national inventory system because it is significantly important for one or a number of air pollutants in a country's national inventory of air pollutants in terms of the absolute level, the trend, or the uncertainty in emissions (EEA 2017).

Furthermore, it is good practice to identify the national key categories in a systematic and objective manner. This can be achieved by a quantitative analysis of the relationship between the magnitude of emission in any year (level) and the change in emission year to year (trend) of each category's emissions compared to the total national emissions;

To focus the available resources for improvement in data and methods on categories identified as key. The identification of key categories in national inventories enables the limited resources available for preparing inventories to be prioritised; more detailed, higher tier methods can be selected for key categories. Inventory compilers should use the category specific methods presented in sectoral decision trees in the sectoral volumes;

The analysis should be performed at the level of NFR categories or subcategories at which the guidebook methods and decision trees are provided in the sectoral volumes. Where possible, some categories should be disaggregated by main fuel types; that each air pollutant emitted from each category should be considered separately;

For each key category, the inventory compiler should determine if certain subcategories are particularly significant usually, for this purpose, the subcategories should be ranked according to their contribution to the aggregate key categories. Those subcategories that contribute together more than 60% to the key category should be treated as particularly significant. It may be appropriate to focus efforts towards methodological improvements of these most significant

subcategories.

All notations, descriptions of identification and results for key categories included in this chapter are based on the latest Inventory Guidebook (EEA 2016).

The identification includes all NFR categories and all reported gases

SO₂, NO_x, NMVOC, NH₃, CO

PM: TSP, PM₁₀, PM_{2.5}

HM: Cd, Hg, Pb

POP: PAH, PCDD/F, HCB, PCB

Used methodology for identification of key categories: Approach 1

The methodology follows the IPCC approach to produce pollutant-specific key categories and covers for both level and trend assessment. In Approach 1, key categories are identified using a predetermined cumulative emissions threshold. Key categories are those which, when summed together in descending order of magnitude, cumulatively add up to 80% of the total level.

The suggested aggregation level of analysis for Approach 1 provided in Table 2-1 of Chapter 2 of the EMEP/EEA emission inventory guidebook 2016 was used. No special considerations like disaggregation to main fuel types have been made. For reasons of transparency, the same level of aggregation for all pollutants was used.

The presented key category analysis was performed by the SEPA with data for air emissions of the submission 2017 to the UNECE/LRTAP. For all gases a level assessment for all years 1990 (base year) and 2017 (last year), as well as a trend assessment for 1990 to 2017 was prepared.

In the following tables are presented important sources for many pollutants, separately key categories by sectors.

1.A Combustion Activities

Table 4. Sources for pollutants, separately key categories by sectors.

1.A Combustion Activities is the most important sector for emissions reported to UNECE.

NFR	Category
1A1a	Public electricity and heat production
1A1c	Manufacture of solid fuels and other energy industries
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)
1A3bi	Road transport: Passenger cars
1A3bii	Road transport: Light duty vehicles
1A3biii	Road transport: Heavy duty vehicles and buses
1A3bv	Road transport: Gasoline evaporation
1A3bvi	Road transport: Automobile tyre and brake wear
1A4ai	Commercial/institutional: Stationary
1A4bi	Residential: Stationary
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery

1.B Fugitive emissions

NFR	Category
1B1a	Fugitive emission from solid fuels: Coal mining and handling
1B1b	Fugitive emission from solid fuels: Solid fuel transformation
1B2av	Distribution of oil products

2. Industrial processes and product use

NFR	Category
2A2	Lime production
2A5a	Quarrying and mining of minerals other than coal
2B10a	Chemical industry: Other (please specify in the IIR)
2C1	Iron and steel production
2C7a	Copper production
2D3a	Domestic solvent use including fungicides
2D3b	Road paving with asphalt
2D3h	Printing
2D3i	Other solvent use (please specify in the IIR)
2H1	Pulp and paper industry
2H2	Food and beverages industry
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)

3. Agriculture

NFR	Category
3B1a	Manure management - Dairy cattle
3B1b	Manure management - Non-dairy cattle
3B3	Manure management - Swine
3B4gi	Manure management - Laying hens
3D1a	Inorganic N-fertilizers (includes also urea application)
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products

1.6.QA/QC AND VERIFICATION METHODS

Quality management system

SEPA is responsible for the preparation of GHG and air pollutant inventory under UNECE/CLRTAP and UNFCCC.

SEPA is also responsible for coordination and implementation of QA/QC activities for the national inventories. A quality manager is in place.

The QA/QC plan is an internal document to organize, plan and implement QA/QC activities. Once developed for the next submission, it is referenced and used in subsequent inventory preparation, or modified as appropriate.

National QA/QC Plan includes following elements:

- Responsible institutions;
- Data collection;
- Preparation of inventory;
- QC Procedures;
- QA Procedures and Verification;

- Uncertainty evaluation;
- Organisation of the activities in quality management system;
- Documentation and archiving.

Institutional arrangements within the SEPA regulate the responsibilities of all engaged institutions for implementation of the requirements of the National QA/QC Plan.

The QC procedures are performed by experts, who are directly involved in the process of preparation of inventory with their specific responsibilities.

The QC experts are responsible for activity data provision, involved in the choice of method and selection of emission factors, and preparing the sector inventories (including preparation of reporting tables and respective chapters from the national reports).

All institutions – data providers, are responsible for quality of information, which are necessary for preparation of national emission inventories.

Quality Assurance (QA) is a planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process. The quality assurance process includes expert review was conducted in two stages: a review of the initial set of emission estimates and, a review of the estimates and text of the Inventory Report.

The QA procedures include the following checks:

- Transparency means that Parties should provide clear documentation and report a level of disaggregation that sufficiently allows individuals or groups other than the designated emission expert or the compiler of the inventory or projection to understand how the inventory was compiled and assure it meets good practice requirements. The transparency of reporting is fundamental to the effective use, review and continuous improvement of the inventory and projection;
- Consistency means that estimates for any different inventory years, gases and source categories are made in such a way that differences in the results between years and source categories reflect real differences in emission estimates. Annual emissions, as far as possible, should be calculated using the same method and data sources for all years, and resultant trends should reflect real fluctuations in emissions and not the changes resulting from methodological differences. Consistency also means that, as far as practicable and appropriate, the same data are reported under different international reporting obligations. For projections, consistency means that a year of the submitted inventory is used as a basis;
- Comparability means that the national inventory and projection is reported in such a way that allows it to be compared with other Parties. This can be achieved by using the reporting templates and through the use of the harmonized Nomenclature for Reporting (NFR);
- Completeness means that estimates are reported for all pollutants, all relevant source categories and all years and for the entire territorial areas of Parties covered by the reporting requirements set forth in the provisions of the Convention and its protocols;
- Accuracy means that emissions are neither systematically overestimated nor underestimated, as far as can be judged. This implies that Parties will endeavour to remove bias from the inventory estimates and minimize uncertainty.

For 2019 submission the QA procedures are implemented by sector experts within the SEPA, who are not directly involved in the preparation of inventory.

Information of the QA/QC activities

The cycle of QA/QC activity for inventory consists of the following steps:

1. The QA/QC Manager prepares a Plan for implementation of QA/QC activities for the current

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- submission. The checklists with all specific QA/QC procedures are part of the plan;
2. The plan for QA/QC is sent to all engaged QC and QA experts for implementation;
 3. In the process of preparation of inventory the QC experts (activity data provider and SEPA's experts) apply each of the specific procedures set in the checklist for each of the sources categories they are responsible for.
 4. The QA/QC Manager coordinates the exchange of the check lists between the QC experts for correction of the findings with input data for calculation of emissions (activity data and EF).
 5. The QA/QC Manager send to the QA experts the prepared by SEPA's expert and/or external consultants CRF/NFR tables and respective chapters from NIR/IIR;
 6. The QA/QC Manager coordinate the exchange of the check lists between the QA experts and SEPA's expert and/or external consultants for correction of the findings with quality of the inventory (CRF/NFR and NIR/IIR);
 7. The QA/QC Manager prepares a summary of the results from implemented QA/QC checks.
 8. The QA/QC Manager prepares an attendant file for implemented procedures;
 9. The QA/QC Manager is responsible for documentation and archiving of all documents, related to perform QA/QC procedures, and archiving of inventory in SEPA.

QA/QC activities of data provider

Based on the National QA/QC Plan each of the institutions has nominated experts, responsible for preparation of the required information as well as for implementation of QA/QC procedures.

The QC experts are all experts from the institutions, who are providing data for preparation of national emission inventories.

All institutions are responsible for quality of information. The institutions are obligated to implement all requirements of the international and national standards for collection, processing and provision of activity data from them competence.

Table 5. QA/QC and verification methods

Activity	QC checks / reviews		QC others (Correction)	
	Expert name	Period / deadline	QA / QC manager / other person	Deadline
DATA COLLECTION ACTIVITIES				
Checks all input data for emission calculations properly referenced	Andjelka Radosavljevic	Until the beginning of December	Nebojsa Redzic	December
Check availability of literature material	Andjelka Radosavljevic		Nebojsa Redzic	
ACTIVITY DATA ENTRY IN DATABASES AND EMISSION CALCULATION				
Check criteria for selection of activity data, emission factors and other necessary parameters for emissions calculation	Andjelka Radosavljevic	December	Nebojsa Redzic	December
Cross-check descriptions of input data and the emission factors with information about categories	Andjelka Radosavljevic	December	Nebojsa Redzic	December
Check the correctness of interpretation and use of activity data and emission factors	Andjelka Radosavljevic	December	Nebojsa Redzic	December
Check that the parameters and units are accurately recorded	Andjelka Radosavljevic	December	Nebojsa Redzic	December

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Check that used appropriate conversion factors	Andjelka Radosavljevic	December	Nebojsa Redzic	December
Check whether the unit is properly marked in the worksheets	Andjelka Radosavljevic	December	Nebojsa Redzic	December
Check the consistency of data between the categories	Andjelka Radosavljevic	December	Nebojsa Redzic	December
Identified e.g. activity data common to several categories	Andjelka Radosavljevic	December	Nebojsa Redzic	December
Check the consistency of the activity data	Andjelka Radosavljevic	December	Nebojsa Redzic	December
Check the consistency of time series of input activity data for each category	Andjelka Radosavljevic	December	Nebojsa Redzic	December
DATABASES ITEMS				
Check whether all the categories covered by the emission sources that exist in the country, if not whether there are marked with the appropriate notation key („NO“)	Andjelka Radosavljevic	December	Nebojsa Redzic	December
Check whether there is double counting, i.e. duplication of entries	Andjelka Radosavljevic	December	Nebojsa Redzic	December
Check out the use of units and all necessary conversions of the same	Andjelka Radosavljevic	December	Nebojsa Redzic	December
Used to check the consistency of data on activities for each pollutant within each category.	Andjelka Radosavljevic	December	Nebojsa Redzic	December
Check the correctness of the emissions calculation	Andjelka Radosavljevic	December	Nebojsa Redzic	December
Check the consistency of trends	Andjelka Radosavljevic	December	Nebojsa Redzic	December
PREPARING IIR (INFORMATIVE INVENTORY REPORT)				
Check the values in the text and excel tables	Andjelka Radosavljevic	10. February to 14th March	Nebojsa Redzic	the 14th March
Check out the Figures	Andjelka Radosavljevic	10. February to 14th March	Nebojsa Redzic	the 14th March
ARCHIVING				
Archiving Excel Table	Andjelka Radosavljevic	from April -...		
Archiving of data sources	Andjelka Radosavljevic	from April - ...		
Archiving IIR	Andjelka Radosavljevic	from April -...		

1.7.GENERAL UNCERTAINTY EVALUATION

The overall uncertainty is closely related to the emission sources data uncertainty (fuels, activities, processes, etc.) and to the emission factor uncertainty.

The same team in SEPA, which is dealing with GHG inventory, is also responsible for preparation of UNECE/CLRTAP inventory. At the moment tier 1 uncertainty analysis is implemented in the GHGs inventory under UNFCCC.

For UNECE/CLRTAP a quantitative estimate of inventory uncertainty for each source category and for the inventory in total will be presented in the next submissions.

1.8 GENERAL ASSESSMENT OF COMPLETENESS

According to reporting guidelines, in cases when methodological and data gaps exist in the inventory, parties to the Convention are required to inform and explain in a transparent manner the reason of their appearance, also the emission of certain emission sources from the inventory. To

accomplish this, Parties have to use designated notation keys, Explanation of the meaning and the purpose of notation keys are presented in the following subchapter.

The emission data presented in this report were compiled according to the Guidelines for Reporting Emission Data approved by the Executive Body for the UNECE/LRTAP Convention.

The inventory is complete with regard to reported gases, reported years and reported emissions from all sources, and also complete in terms of geographic coverage. All relevant pollutants are covered by the Serbian inventory and are reported for the years 1990–2017.

Notification keys are used according to the Guidelines for Estimating and Reporting Emission Data under CLRTAP to indicate where emissions are not occurring in Serbia, where emissions have not been estimated or have been included elsewhere as suggested by EMEP/EEA emission inventory guidebook 2016. The main reasons for different allocations to categories are the allocation in national statistics, insufficient information on the national statistics, national methods, and the impossibility to disaggregate emission declarations.

Table 6. Notification keys used in NFR emission tables for sectors and sub-sectors

Notification key	Meaning	Purpose
NO	Not occurring	For activities or processes which do not exist in Republic of Serbia/ for emissions by sources of compounds that do not occur for a particular compound or source category;
NE	Not estimated	Where emission occur, but have not been estimated or reported
NA	Not applicable	When activity or process exist, but it is assumed that they do not result with emission / Is used for activities which are believed to result in emission which are insignificant to national totals;
IE	Included elsewhere	Where emissions for mentioned activity or process are calculated and included in inventory, but did not separately presented for this source category / For emissions of pollutants which are calculated, but included elsewhere from expected source category in the inventory;
C	Confidential	For emissions by sources of compounds which could lead to the disclosure of confidential information
NR	Not relevant	According to paragraph 9 in the Emission Guidelines, Emission inventory reporting should cover all years from 1980, Onwards, if data are available, Where emissions are not strictly required by the different Protocols, e.g. for some parties emissions of NMVOC prior to 1988

Table 7. Sources reported as "NE"

NFR code	Substance(s)	Reason for not estimation
1 A 1 b	All relevant	No available data from 1990 - 2000
1B1c	All relevant	No available data
2A6	All relevant	No available data
2L	All relevant	No available data
3Da2a	All relevant	No available data
3Da2b	All relevant	No available data
3Da2c	All relevant	No available data
3Da3	All relevant	No available data
3Da4	All relevant	No available data
3Db	All relevant	No available data
3Dd	All relevant	No available data
3Df	All relevant	No available data

5C2	All relevant	No available data
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Table 8.Explanation of the notation key "IE"

NFR code	Substance(s)
1A3di(ii)	All relevant
1A3eii	All relevant
1A4a ii	All relevant
1A4b ii	All relevant
1A4c iii	All relevant
1A5b	All relevant
2B10b	All relevant

Table 9. Sources reported as "NO"

NFR code	Substance(s)
1 A 3	All relevant
1A3ai(ii)	All relevant
1A3di(i)	All relevant
1A3ei	All relevant
1A5c	All relevant
2B3	All relevant
2B5	All relevant
2B6	All relevant
2B7	All relevant
2C2	All relevant
2C7b	All relevant
2C7c	All relevant
2C7d	All relevant
2G	All relevant
2H3	All relevant
2J	All relevant
3B4a	All relevant
3B4f	All relevant
3B4h	All relevant
3F	All relevant
3I	All relevant
5B1	All relevant
5B2	All relevant
5C1a	All relevant
5C1bi	All relevant
5C1bii	All relevant
5C1biii	All relevant
5C1biv	All relevant
5C1bvi	All relevant
5D3	All relevant
5E	All relevant
6A	All relevant

6B	All relevant
11A	All relevant
11C	All relevant

2. EXPLANATION OF KEY TRENDS

This chapter gives an overview of the methodology for the key source analysis by observed pollutants, the results of key sources analysis with an overview of the change in share from 1990 to 2017, then overview of direct emissions of large point sources in Serbia.

2.1. The methodology for key source analysis

The methodology used to identify key source categories of individual pollutant follows the quantitative Approach 1 described in the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories. In Approach 1, key categories are identified using a predetermined cumulative emissions threshold. Key categories are those which, when summed together in descending order of magnitude, cumulatively add up to 90 % of the total.

2.2. Key source analysis

The analysis of key sources in Republic of Serbia includes all pollutants under CLRTAP and associated protocols: pollutants which causes acidification, eutrophication and ground-level ozone (SO_2 , NO_x , CO, NMVOC and NH_3), particles (TSP , PM_{10} and $\text{PM}_{2,5}$), heavy metals (Pb, Cd and Hg), other heavy metals (As, Cr, Cu, Ni, Se and Zn) and persistent organic pollutants (benzo(a) pyrene, benzo(b) fluoranthene, benzo(k) fluoranthene, Indeno (1,2,3-cd) pyrene, total PAHs, PCDD/PCDF and PCB). National emissions have been disaggregated into the categories according to required reporting format (NFR).

SEPA conducted key source analysis. Here are presented the most important sources for each pollutant separately.

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Table 10. Summary of key and main sources and their contributions to overall pollutant emissions and percentage of emission change

NFR Code	NFR Category	% Contributions to pollutant totals for key categories (cumulative 80%)																																											
		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		PAHs					
		LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	benzo(a) pyrene	benzo(b) fluoranthene	benzo(k) fluoranthene	Indeno(1,2,3-cd)	Total 1-4	HCB	PCBs	Sum of KC % Contributions	Rank							
1A4cii	Agriculture/Forestry/Fishing: National fishing																																												
1A5a	Other stationary (including military)																																												
1A5b	Other, Mobile (including military, land based and recreational)																																												
1B1a	Fugitive emission from solid fuels: Coal mining and handling	25																																			32	7							
1B1b	Fugitive emission from solid fuels: Solid fuel transformation																																												
1B1c	Other fugitive emissions from solid fuels																																												
1B2ai	Fugitive emissions oil: Exploration, production, transport																																												
1B2av	Fugitive emissions oil: Refining / storage																																				4	24							
1B2b	Fugitive emissions from natural gas (evaporation, production)																																												
1B2c	Venting and flaring (oil, gas, combined oil and gas)																																												
1B2d	Other fugitive emissions from energy production																																												
2A1	Cement production																																												
2A2	Lime production																																												
2A3	Glass production																																												
2A5a	Quarrying and mining of minerals other than coal																																				2	27							
2A5b	Construction and demolition																																												
2A5c	Storage, handling and transport of mineral products																																												
2A6	Other mineral products (please specify in the IIR)																																												
2B1	Ammonia production																																												
2B2	Nitric acid production																																												
2B3	Adipic acid production																																												
2B5	Carbide production																																												
2B6	Titanium dioxide production																																												
2B7	Soda ash production																																												
2B10a	Chemical industry: Other (please specify in the IIR)																																				28	9							
2B10b	Storage, handling and transport of chemical products (please specify in the IIR)																																												
2C1	Iron and steel production																																					15	321	3					
2C2	Ferroalloys production																																												
2C3	Aluminium production																																												

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NFR Code	NFR Category	% Contributions to pollutant totals for key categories (cumulative 80%)																																																	
		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		PAHs				Total 1-4		HCB		PCBs		Sum of KC % Contributions	Rank
		LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	benzo(a)pyrene	benzo(b)fluoranthene	benzo(k)fluoranthene	Indeno(1,2,3-cd)	LA	TA	LA	TA	LA	TA	LA	TA								
3B1b	Manure management - Non-dairy cattle			3				10																																13	16										
3B2	Manure management - Sheep																																																		
3B3	Manure management - Swine							15																																				15	15						
3B4a	Manure management - Buffalo																																																		
3B4d	Manure management - Goats																																																		
3B4e	Manure management - Horses																																																		
3B4f	Manure management - Mules and asses																																																		
3B4gi	Manure management - Laying hens							8																																				8	18						
3B4gii	Manure management - Broilers																																																		
3B4giii	Manure management - Turkeys																																																		
3B4giv	Manure management - Other poultry																																																		
3B4h	Manure management - Other animals (please specify in IIR)																																																		
3Da1	Inorganic N-fertilizers (includes also urea application)	7						19																																				25	11						
3Da2a	Animal manure applied to soils																																																		
3Da2b	Sewage sludge applied to soils																																																		
3Da2c	Other organic fertilisers applied to soils																																																		
3Da3	Urine and dung deposited by grazing animals																																																		
3Da4	Crop residues applied to soils																																																		
3Db	Indirect emissions from managed soils																																																		
3Dc	Farm-level agricultural operations including storage,																		10	6																							16	14							

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NFR Code	NFR Category	% Contributions to pollutant totals for key categories (cumulative 80%)																																			Sum of KC % Contributions	Rank								
		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		PAHs						
		LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	LA	TA	benzo(a)pyrene	benzo(b)fluoranthene	benzo(k)fluoranthene	Indeno(1,2,3-cd)	Total 1-4										
3Dd	Off-farm storage, handling and transport of bulk agricultural																																													
3De	Cultivated crops																																													
3Df	Use of pesticides																																													
3F	Field burning of agricultural residues																																													
3I	Agriculture other (please specify in the IIR)																																													
5A	Biological treatment of waste - Solid waste disposal on land																																													
5B1	Biological treatment of waste - Composting																																													
5B2	Biological treatment of waste - Anaerobic digestion at biogas																																													
5C1a	Municipal waste incineration																																													
5C1bi	Industrial waste incineration																																													
5C1bii	Hazardous waste incineration																																													
5C1biii	Clinical waste incineration																																													
5C1biv	Sewage sludge incineration																																													
5C1bv	Cremation																																													
5C1bvi	Other waste incineration (please specify in the IIR)																																													
5C2	Open burning of waste																																													
5D1	Domestic wastewater handling																																									7	21			
5D2	Industrial wastewater handling																																													
5D3	Other wastewater handling																																													
5E	Other waste (please specify in IIR)																																													
6A	Other (included in national total for entire territory) (please specify)																																													

2.3. Results of the level and trend assessment (approach 1)

As the analysis was made for all pollutants reported to the UNECE and as these pollutants differ in their way of formation, most of the identified categories are key categories for more than one pollutant - in total 36 key sources were identified.

Table 11. Key Categories for NOx emissions for the year 2017

Level Assessment					
NFR Category Code	NFR Category	Pollutant	Year (2017) Estim. [kt] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t
1A1a	Public electricity and heat production	NOx	72,6489	49,21%	49,21%
1A3biii	Road transport: Heavy duty vehicles and buses	NOx	20,2081	13,69%	62,9%
1A3bi	Road transport: Passenger cars	NOx	11,5523	7,82%	70,7%
3Da1	Inorganic N-fertilizers (includes also urea application)	NOx	9,7610	6,61%	77,3%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	NOx	6,0698	4,11%	81,4%

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
3Da1	Inorganic N-fertilizers (includes also urea application)	NOx	0,87	8,33	0,049	25,61%	25,6%
1A1a	Public electricity and heat production	NOx	97,13	72,25	0,024	12,37%	38,0%
1A3bi	Road transport: Passenger cars	NOx	19,80	12,01	0,022	11,72%	49,7%
1A3bii	Road transport: Light duty vehicles	NOx	1,01	3,13	0,013	6,76%	56,5%
1A3biii	Road transport: Heavy duty vehicles and buses	NOx	28,50	20,02	0,013	6,75%	63,2%
1A3dii	National navigation (shipping)	NOx	3,17	0,71	0,011	5,54%	68,7%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	NOx	NE	1,60	0,010	5,31%	74,1%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	NOx	5,36	2,84	0,006	3,11%	77,2%

1A4ai	Commercial/institutional: Stationary	NOx	0,82	1,81	0,006	3,11%	80,3%
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Table 12. Key Categories for NMVOC emissions for the year 2017

Level Assessment						
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [kt] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t	
1B1a	Fugitive emission from solid fuels: Coal mining and handling	NMVOC	31,8192	25,44%	25,44%	
1A4bi	Residential: Stationary	NMVOC	24,8327	19,86%	45,3%	
2H2	Food and beverages industry	NMVOC	9,0212	7,21%	52,5%	
2D3a	Domestic solvent use including fungicides	NMVOC	8,4250	6,74%	59,2%	
3B1a	Manure management - Dairy cattle	NMVOC	7,6869	6,15%	65,4%	
1A3bi	Road transport: Passenger cars	NMVOC	6,6311	5,30%	70,7%	
1B2av	Distribution of oil products	NMVOC	5,3176	4,25%	74,9%	
2D3h	Printing	NMVOC	4,5636	3,65%	78,6%	
3B1b	Manure management - Non-dairy cattle	NMVOC	4,1848	3,35%	81,9%	

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
1A3bi	Road transport: Passenger cars	NMVOC	30,96	9,18	0,074	33,16%	33,2%
1B1a	Fugitive emission from solid fuels: Coal mining and handling	NMVOC	35,02	30,51	0,045	20,32%	53,5%
3B1a	Manure management - Dairy cattle	NMVOC	16,56	7,70	0,018	7,89%	61,4%
2D3a	Domestic solvent use including fungicides	NMVOC	9,39	8,51	0,012	5,19%	66,6%
1B2av	Distribution of oil products	NMVOC	5,00	4,79	0,011	4,74%	71,3%
1A3bv	Road transport: Gasoline evaporation	NMVOC	2,79	2,67	0,008	3,74%	75,0%
2D3h	Printing	NMVOC	5,09	4,61	0,006	2,81%	77,8%
2D3g	Chemical products	NMVOC	2,43	0,80	0,006	2,63%	80,5%

Table 13. Key Categories for SOx emissions for the year 2017

Level Assessment							
NFR Category Code	NFR Category		Pollutant	Year (2017) Estimate [kt] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t	
1A1a	Public electricity and heat production		SOx	384,1179	91,41%	91,41%	
Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
1A1a	Public electricity and heat production	SOx	518,24	383,30	0,028	45,25%	45,3%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	SOx	28,90	11,94	0,012	20,04%	65,3%
1A4bi	Residential: Stationary	SOx	17,24	6,45	0,005	8,60%	73,9%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	SOx	3,91	3,22	0,004	5,79%	79,7%
1A1c	Manufacture of solid fuels and other energy industries	SOx	3,28	0,99	0,002	3,71%	83,4%

Table 14. Key Categories for NH3 emissions for the year 2017

Level Assessment						
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [kt] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t	
3B1a	Manure management - Dairy cattle	NH3	16,8421	25,95%	25,95%	
3Da1	Inorganic N-fertilizers (includes also urea application)	NH3	12,2013	18,80%	44,7%	
3B3	Manure management - Swine	NH3	9,8128	15,12%	59,9%	
3B1b	Manure management - Non-dairy cattle	NH3	6,2993	9,70%	69,6%	
3B4gi	Manure mangement - Laying hens	NH3	5,2629	8,11%	77,7%	
5D1	Domestic wastewater handling	NH3	4,2462	6,54%	84,2%	

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
3Da1	Inorganic N-fertilizers (includes also urea application)	NH3	1,09	10,42	0,123	40,36%	40,4%
3B1a	Manure management - Dairy cattle	NH3	36,27	16,88	0,090	29,53%	69,9%
2B10a	Chemical industry: Other (please specify in the IIR)	NH3	8,50	3,61	0,020	6,62%	76,5%
3B3	Manure management - Swine	NH3	16,75	11,18	0,020	6,46%	83,0%

Table 15. Key Categories for PM 2.5 emissions for the year 2017

Level Assessment					
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [kt] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t
1A4bi	Residential: Stationary	PM2.5	28,7163	74,56%	74,56%
2D3i	Other solvent use (please specify in the IIR)	PM2.5	1,5761	4,09%	78,7%
1A1a	Public electricity and heat production	PM2.5	1,0147	2,63%	81,3%

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
1A4bi	Residential: Stationary	PM2.5	43,60	28,86	0,033	25,53%	25,5%
2D3i	Other solvent use (please specify in the IIR)	PM2.5	0,62	1,07	0,021	16,17%	41,7%
1A1c	Manufacture of solid fuels and other energy industries	PM2.5	1,98	0,60	0,014	11,21%	52,9%
1A3bi	Road transport: Passenger cars	PM2.5	0,40	0,69	0,008	6,21%	59,1%
1A3bvi	Road transport: Automobile tyre and brake wear	PM2.5	0,16	0,30	0,006	4,71%	63,8%
1A3biii	Road transport: Heavy duty vehicles and buses	PM2.5	1,30	0,64	0,005	4,18%	68,0%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	PM2.5	0,80	0,55	0,005	3,57%	71,6%
1A3bii	Road transport: Light duty vehicles	PM2.5	0,19	0,33	0,004	2,75%	74,3%
1A3bvii	Road transport: Automobile road abrasion	PM2.5	0,09	0,17	0,003	2,59%	76,9%
2A2	Lime production	PM2.5	0,45	0,13	0,003	2,37%	79,3%

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1A2gvi	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	PM2.5	0,01	0,20	0,003	2,03%	81,3%
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Table 16. Key Categories for PM10 emissions for the year 2017

Level Assessment						
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [kt] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t	
1A4bi	Residential: Stationary	PM10	29,4465	55,76%	55,76%	
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	PM10	5,3635	10,16%	65,9%	
1A1a	Public electricity and heat production	PM10	2,3695	4,49%	70,4%	
2D3i	Other solvent use (please specify in the IIR)	PM10	1,7436	3,30%	73,7%	
1B1a	Fugitive emission from solid fuels: Coal mining and handling	PM10	1,6705	3,16%	76,9%	
2D3b	Road paving with asphalt	PM10	1,2557	2,38%	79,3%	
2A5a	Quarrying and mining of minerals other than coal	PM10	1,0874	2,06%	81,3%	

Trend Assessment								
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t	
1A4bi	Residential: Stationary	PM10	44,69	29,61	0,041	24,15%	24,2%	
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	PM10	5,65	5,41	0,017	10,33%	34,5%	
2D3i	Other solvent use (please specify in the IIR)	PM10	0,73	1,15	0,017	9,88%	44,4%	
1A1c	Manufacture of solid fuels and other energy industries	PM10	2,84	0,86	0,017	9,84%	54,2%	
2A2	Lime production	PM10	2,23	0,66	0,012	7,26%	61,5%	
1A3bvi	Road transport: Automobile tyre and brake wear	PM10	0,30	0,55	0,008	4,99%	66,5%	

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1A3bi	Road transport: Passenger cars	PM10	0,47	0,84	0,007	4,35%	70,8%
1B1a	Fugitive emission from solid fuels: Coal mining and handling	PM10	1,84	1,60	0,005	2,75%	73,6%
2D3b	Road paving with asphalt	PM10	1,27	1,37	0,005	2,73%	76,3%
1A3bvii	Road transport: Automobile road abrasion	PM10	0,17	0,31	0,005	2,70%	79,0%
1A3biii	Road transport: Heavy duty vehicles and buses	PM10	1,38	0,74	0,004	2,25%	81,2%

Table 17. Key Categories for TSP emissions for the year 2017

Level Assessment						
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [kt] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t	
1A4bi	Residential: Stationary	TSP	31,1750	33,18%	33,18%	
2B10a	Chemical industry: Other (please specify in the IIR)	TSP	26,4086	28,11%	61,3%	
2D3b	Road paving with asphalt	TSP	5,8601	6,24%	67,5%	
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	TSP	5,3635	5,71%	73,2%	
1B1a	Fugitive emission from solid fuels: Coal mining and handling	TSP	3,5399	3,77%	77,0%	
1A1a	Public electricity and heat production	TSP	3,4825	3,71%	80,7%	

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
2B10a	Chemical industry: Other (please specify in the IIR)	TSP	55,93	23,76	0,050	30,46%	30,5%
2D3b	Road paving with asphalt	TSP	5,92	6,39	0,015	8,84%	39,3%
1A4bi	Residential: Stationary	TSP	47,39	31,29	0,015	8,83%	48,1%
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	TSP	5,65	5,41	0,012	7,55%	55,7%
2A2	Lime production	TSP	5,73	1,70	0,011	6,44%	62,1%
2D3i	Other solvent use (please specify in the IIR)	TSP	0,81	1,20	0,009	5,36%	67,5%
1B1a	Fugitive emission from solid fuels: Coal mining and handling	TSP	3,90	3,39	0,008	4,57%	72,0%
1A1c	Manufacture of solid fuels and other energy industries	TSP	2,95	0,89	0,006	3,61%	75,7%
1A3bvi	Road transport: Automobile tyre and brake wear	TSP	0,39	0,73	0,006	3,36%	79,0%

1A3bvii	Road transport: Automobile road abrasion	TSP	0,35	0,61	0,005	2,77%	81,8%
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Table 18. Key Categories for BC emissions for the year 2017

Level Assessment							
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [kt] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t		
1A4bi	Residential: Stationary	BC	2,7340	85,66%	85,66%		
Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
1A4bi	Residential: Stationary	BC	4,09	2,79	0,062	45,68%	45,7%
1A2gvi i	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)	BC	0,00	0,12	0,021	15,56%	61,2%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	BC	0,03	0,10	0,021	15,54%	76,8%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	BC	NE	0,05	0,013	9,36%	86,1%

Table 19. Key Categories for CO emissions for the year 2017

Level Assessment					
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [kt] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t
1A4bi	Residential: Stationary	CO	178,9044	66,66%	66,66%
1A3bi	Road transport: Passenger cars	CO	34,0193	12,68%	79,3%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	CO	14,0460	5,23%	84,6%

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
1A3bi	Road transport: Passenger cars	CO	192,51	41,53	0,127	49,33%	49,3%
1A4bi	Residential: Stationary	CO	281,12	172,26	0,064	24,99%	74,3%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	CO	0,06	15,99	0,027	10,52%	84,8%

Table 20. Key Categories for Pb emissions for the year 2017

Level Assessment					
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t
2C1	Iron and steel production	Pb	37,2543	67,98%	67,98%
1A3bi	Road transport: Passenger cars	Pb	6,8953	12,58%	80,6%

Trend Assessment

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NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
1A3bi	Road transport: Passenger cars	Pb	345,84	6,60	0,118	49,90%	49,9%
2C1	Iron and steel production	Pb	4,19	19,38	0,098	41,55%	91,4%

Table 21. Key Categories for Cd emissions for the year 2017

Level Assessment						
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t	
2C7a	Copper production	Cd	1,0197	38,42%	38,42%	
1A1a	Public electricity and heat production	Cd	0,5143	19,38%	57,8%	
1A4bi	Residential: Stationary	Cd	0,4517	17,02%	74,8%	
2D3i	Other solvent use (please specify in the IIR)	Cd	0,2482	9,35%	84,2%	

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
2C7a	Copper production	Cd	2,27	0,64	0,118	45,92%	45,9%
2C1	Iron and steel production	Cd	0,07	0,13	0,050	19,20%	65,1%
2D3i	Other solvent use (please specify in the IIR)	Cd	0,08	0,18	0,049	18,93%	84,0%

Table 22. Key Categories for Hg emissions for the year 2017

Level Assessment					
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t
1A1a	Public electricity and heat production	Hg	0,8255	43,81%	43,81%
2C1	Iron and steel production	Hg	0,3265	17,33%	61,1%
1A1c	Manufacture of solid fuels and other energy industries	Hg	0,3243	17,21%	78,3%
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	Hg	0,0935	4,96%	83,3%

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
1A1c	Manufacture of solid fuels and other energy industries	Hg	1,08	0,33	0,145	44,69%	44,7%
2C1	Iron and steel production	Hg	0,00	0,17	0,116	35,95%	80,6%

Table 23. Key Categories for As emissions for the year 2017

Level Assessment					
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t
1A1a	Public electricity and heat production	As	4,0693	72,12%	72,12%
2C1	Iron and steel production	As	0,6305	11,17%	83,3%

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
2C1	Iron and steel production	As	0,42	0,41	0,042	35,72%	35,7%
2C7a	Copper production	As	1,06	0,30	0,040	33,99%	69,7%
1A1c	Manufacture of solid fuels and other energy industries	As	0,40	0,12	0,023	19,40%	89,1%

Table 24 Key Categories for Cr emissions for the year 2017

Level Assessment					
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t
2C1	Iron and steel production	Cr	6,4170	51,97%	51,97%
1A1a	Public electricity and heat production	Cr	2,5883	20,96%	72,9%
2C7a	Copper production	Cr	1,4228	11,52%	84,5%

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
2C1	Iron and steel production	Cr	2,41	3,52	0,331	47,42%	47,4%
2C7a	Copper production	Cr	3,17	0,89	0,164	23,46%	70,9%
1A1a	Public electricity and heat production	Cr	3,48	2,58	0,092	13,22%	84,1%

Table 25. Key Categories for Cu emissions for the year 2017

Level Assessment						
NFR Category Code	NFR Category		Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t
2C1	Iron and steel production		Cu	5,2302	29,81%	29,81%
2C7a	Copper production		Cu	3,9030	22,24%	52,0%
1A3bi	Road transport: Passenger cars		Cu	3,0519	17,39%	69,4%
1A3biii	Road transport: Heavy duty vehicles and buses		Cu	2,4948	14,22%	83,7%

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
2C7a	Copper production	Cu	8,61	2,48	0,365	37,93%	37,9%
2C1	Iron and steel production	Cu	0,06	2,31	0,330	34,22%	72,2%
1A3bi	Road transport: Passenger cars	Cu	1,66	3,39	0,076	7,90%	80,0%

Table 26. Key Categories for Ni emissions for the year 2017

Level Assessment							
NFR Category Code	NFR Category		Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t	
2C1	Iron and steel production		Ni	16,0132	67,49%	67,49%	
1A1a	Public electricity and heat production		Ni	3,5797	15,09%	82,6%	

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
2C1	Iron and steel production	Ni	0,14	7,06	0,733	49,68%	49,7%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	Ni	10,03	1,53	0,423	28,66%	78,3%
1A1a	Public electricity and heat production	Ni	6,05	3,65	0,141	9,56%	87,9%

Table 27. Key Categories for Se emissions for the year 2017

Level Assessment							
NFR Category Code	NFR Category		Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t	
1A1a	Public electricity and heat production		Se	12,7574	95,38%	95,38%	
Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	Se	0,42	0,33	0,003	20,88%	20,9%
1A1c	Manufacture of solid fuels and other energy industries	Se	0,10	0,03	0,003	19,46%	40,3%
2C1	Iron and steel production	Se	0,00	0,03	0,003	19,40%	59,7%
2A3	Glass production	Se	0,11	0,04	0,002	18,63%	78,4%
1A1a	Public electricity and heat production	Se	17,12	12,73	0,001	5,95%	84,3%

Table 28. Key Categories for Zn emissions for the year 2017

Level Assessment						
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t	
2C1	Iron and steel production	Zn	28,9637	45,82%	45,82%	
1A4bi	Residential: Stationary	Zn	19,3303	30,58%	76,4%	
1A3bi	Road transport: Passenger cars	Zn	3,3354	5,28%	81,7%	

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
2C1	Iron and steel production	Zn	4,35	13,91	0,458	46,18%	46,2%
1A4bi	Residential: Stationary	Zn	29,14	19,60	0,318	32,06%	78,2%
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	Zn	3,54	1,12	0,055	5,51%	83,8%

Table 29. Key Categories for PCDD/PCDF emissions for the year 2017

Level Assessment						
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [g I-TEQ] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t	
1A4bi	Residential: Stationary	PCDD/PCDF	34,5920	67,33%	67,33%	
2C1	Iron and steel production	PCDD/PCDF	7,3509	14,31%	81,6%	

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
2C1	Iron and steel production	PCDD/PCDF	0,73	7,80	0,098	40,59%	40,6%
1A4bi	Residential: Stationary	PCDD/PCDF	54,00	33,63	0,077	31,92%	72,5%

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1B1b	Fugitive emission from solid fuels: Solid fuel transformation	PCDD/PC DF	6,32	1,76	0,027	11,13%	83,6%
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Table 30. Key Categories for Benzo a pyren emissions for the year 2017

Level Assessment							
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t		
1A4bi	Residential: Stationary	benzo a pyren	6,2717	92,73%	92,73%		
Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
1A4bi	Residential: Stationary	benzo a pyren	10,19	5,80	0,019	41,21%	41,2%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	benzo a pyren	0,21	0,18	0,007	14,15%	55,4%
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	benzo a pyren	0,34	0,09	0,006	12,84%	68,2%
1A4ai	Commercial/institutional: Stationary	benzo a pyren	0,21	0,12	0,005	10,46%	78,7%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	benzo a pyren	0,11	0,05	0,004	9,04%	87,7%

Table 31. Key Categories for Benzo b flouranthen emissions for the year 2017

Level Assessment							
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NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t		
1A4bi	Residential: Stationary	benzo b fluoranthen	6,8921	90,71%	90,71%		
Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	benzo b fluoranthen	0,15	0,10	0,007	22,86%	22,9%
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	benzo b fluoranthen	0,42	0,12	0,005	15,75%	38,6%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	benzo b fluoranthen	0,29	0,27	0,005	15,20%	53,8%
1A4ai	Commercial/institutional: Stationary	benzo b fluoranthen	0,28	0,16	0,004	14,14%	68,0%
1A4bi	Residential: Stationary	benzo b fluoranthen	11,56	6,09	0,004	13,29%	81,2%

Table 32. Key Categories for Benzo k fluoranthen emissions for the year 2017

Level Assessment							
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t		
1A4bi	Residential: Stationary	benzo k fluoranthen	2,6571	89,39%	89,39%		
Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
1A2e	Stationary combustion in	benzo k	0,12	0,10	0,007	17,74%	17,7%

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	manufacturing industries and construction: Food processing, beverages and tobacco	fluora nten					
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	benzo k fluora nten	0,21	0,06	0,006	16,31%	34,1%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	benzo k fluora nten	0,06	0,03	0,006	15,92%	50,0%
1A4ai	Commercial/institutio nal: Stationary	benzo k fluora nten	0,11	0,06	0,004	11,84%	61,8%
1A4bi	Residential: Stationary	benzo k fluora nten	4,47	2,34	0,004	11,47%	73,3%
1A3bi	Road transport: Passenger cars	benzo k fluora nten	0,00	0,02	0,003	8,52%	81,8%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	benzo k fluora nten	0,12	0,10	0,007	17,74%	17,7%

Table 33. Key Categories for Indeno emissions for the year 2017

Level Assessment						
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t	
1A4bi	Residential: Stationary	Indeno 1,2,3 pyren	3,4415	93,69%	93,69%	
Trend Assessment						
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend
1A4bi	Residential: Stationary	Indeno 1,2,3 pyren	5,52	3,24	0,005	18,98% 19,0%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	Indeno 1,2,3 pyren	0,09	0,08	0,005	17,83% 36,8%
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	Indeno 1,2,3 pyren	0,15	0,04	0,004	15,92% 52,7%
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	Indeno 1,2,3 pyren	0,05	0,03	0,004	14,30% 67,0%
1A4ai	Commercial/institutional: Stationary	Indeno 1,2,3 pyren	0,09	0,05	0,003	12,32% 79,4%
1A3bi	Road transport: Passenger cars	Indeno 1,2,3 pyren	0,01	0,02	0,002	8,52% 87,9%

Table 34. Key Categories for Total emissions for the year 2017

Level Assessment					
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [t] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t
1A4bi	Residential: Stationary	Total 1-4 PAH	19,2623	78,28%	78,28%
2C1	Iron and steel production	Total 1-4 PAH	3,6013	14,64%	92,9%
Trend Assessment					

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NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	Total 1-4 PAH	0,37	0,21	0,005	16,76%	16,8%
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	Total 1-4 PAH	0,70	0,62	0,005	16,75%	33,5%
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	Total 1-4 PAH	1,12	0,31	0,004	15,67%	49,2%
1A4ai	Commercial/institutional: Stationary	Total 1-4 PAH	0,69	0,40	0,004	12,96%	62,1%
1A4bi	Residential: Stationary	Total 1-4 PAH	31,73	17,47	0,003	9,45%	71,6%
2C1	Iron and steel production	Total 1-4 PAH	5,79	2,70	0,003	9,15%	80,7%

Table 35. Key Categories for HCB emissions for the year 2017

Level Assessment						
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [kg] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t	
1A1a	Public electricity and heat production	HCB	1,8992	84,71%	84,71%	

Trend Assessment							
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t	% Contribution to the trend	Cumulative Total of Lx,t
1A1a	Public electricity and heat production	HCB	2,56	1,89	0,028	36,83%	36,8%
2C1	Iron and steel production	HCB	0,00	0,05	0,023	29,53%	66,4%
1A2gviii	Stationary combustion in manufacturing industries and	HCB	0,05	0,07	0,011	14,46%	80,8%

construction: Other
(please specify in
the IIR)

Table 36. Key Categories for PCB emissions for the year 2017

Level Assessment					
NFR Category Code	NFR Category	Pollutant	Year (2017) Estimate [kg] Ex,t	Level Assessment Lx,t	Cumulative Total of Lx,t
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)	PCB	702,0858	97,84%	97,84%
Trend Assessment					
NFR Category Code	NFR Category	Pollutant	Base Year (1990) Estimate [kt] Ex,0	Latest Year (2017) Estimate [kt] Ex,t	Trend Assessment Lx,t
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)	PCB	782,70	709,54	0,044
					82,68%
					82,7%

2.4. Trend in total emissions

This chapter describes the trends and the drivers of air pollutant emissions which Serbia is obliged to report based on the following listed protocols.

From submissions 2017 onwards Serbia reports all mandatory pollutants in the NFR reporting format from 1990 to the latest inventory year. Emissions of the years before 1990 were last updated and published in submissions 2016.

2.4.1. Nitrogen oxides emission (NOx)

The amount of NOx emissions in 2017 was 147,6409kt which is around 0,86 % less than in 2016 and compared to the base year of 1990 saw an decrease of 20.69%.

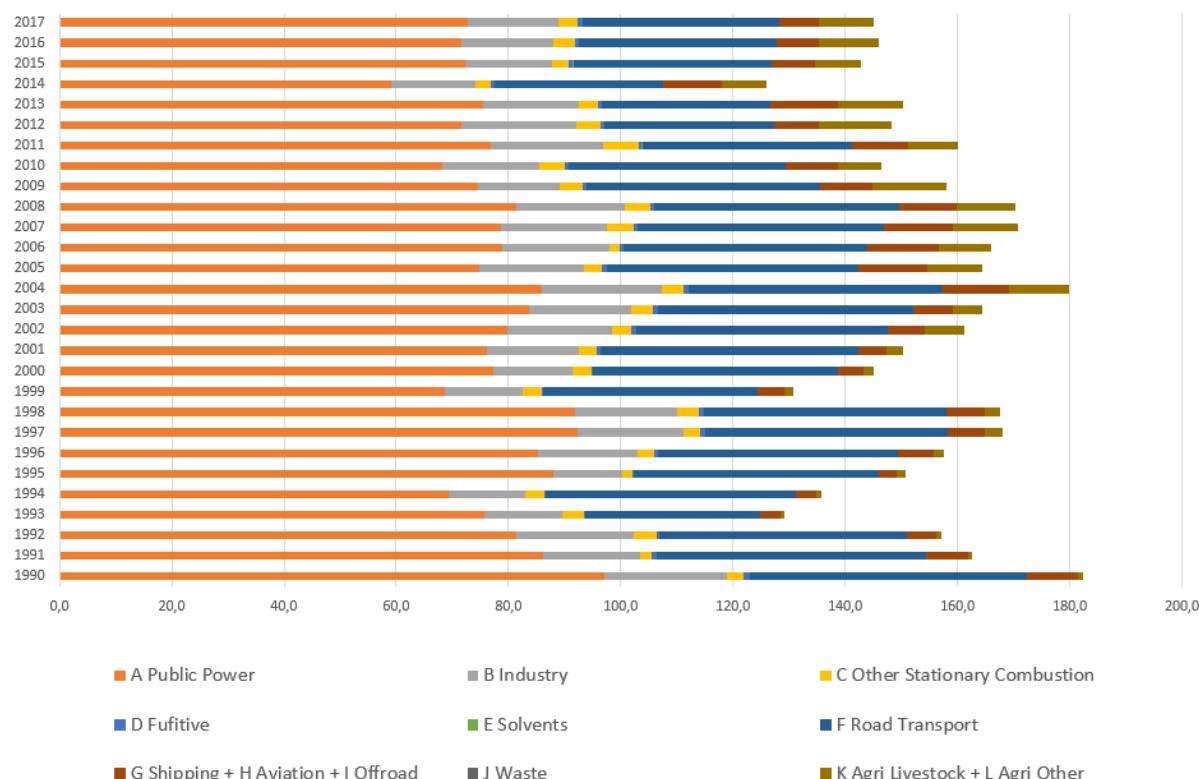


Figure 1. Distribution of NOx between sectors for period 1990 - 2017

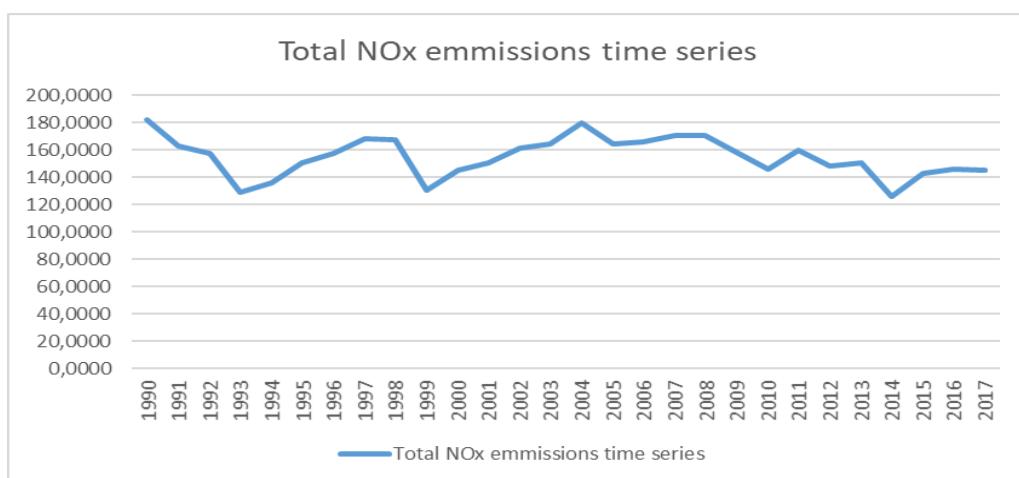


Figure 2. Total NOx emissions time series from 1990 to 2017.

Table 37. Total NOx emissions between sectors for years 1990 and 2017. Trends of dominant sources of NOx emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017.

NFR Category	NOx Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	97,1311	72,6489	-25,21%	1,37%	52,17%	49,21%
B Industry	21,7962	16,3214	-25,12%	-0,56%	11,71%	11,05%
C Other Stationary Combustion	6,8737	6,1025	-11,22%	-7,57%	3,69%	4,13%
D Fugitive	1,1361	0,8011	-29,48%	7,41%	0,61%	0,54%
E Solvents	0,0263	0,0827	214,78%	10,56%	0,01%	0,06%
F Road Transport	49,3183	35,0437	-28,94%	-0,25%	26,49%	23,74%
G Shipping + H Aviation + I Offroad	8,9636	6,8445	-23,64%	-10,14%	4,81%	4,64%
J Waste	0,0006	0,0028	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	0,9207	9,7933	963,71%	-8,18%	0,49%	6,63%
Total	186,1665	147,6409	-20,69%	-0,86%	100,00%	100,00%

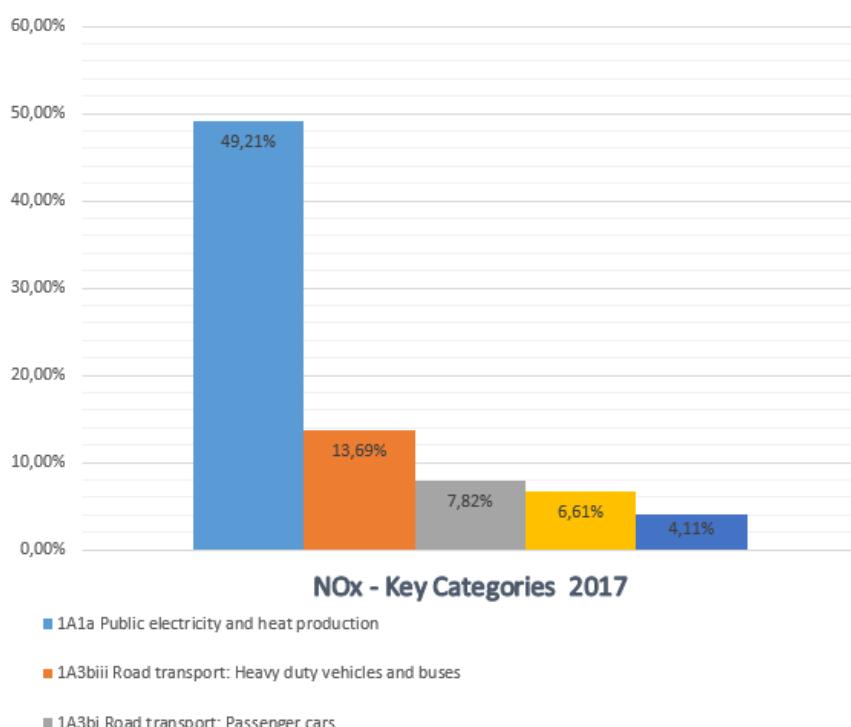


Figure 3. Key Categories assessments of NOx emissions for 2017

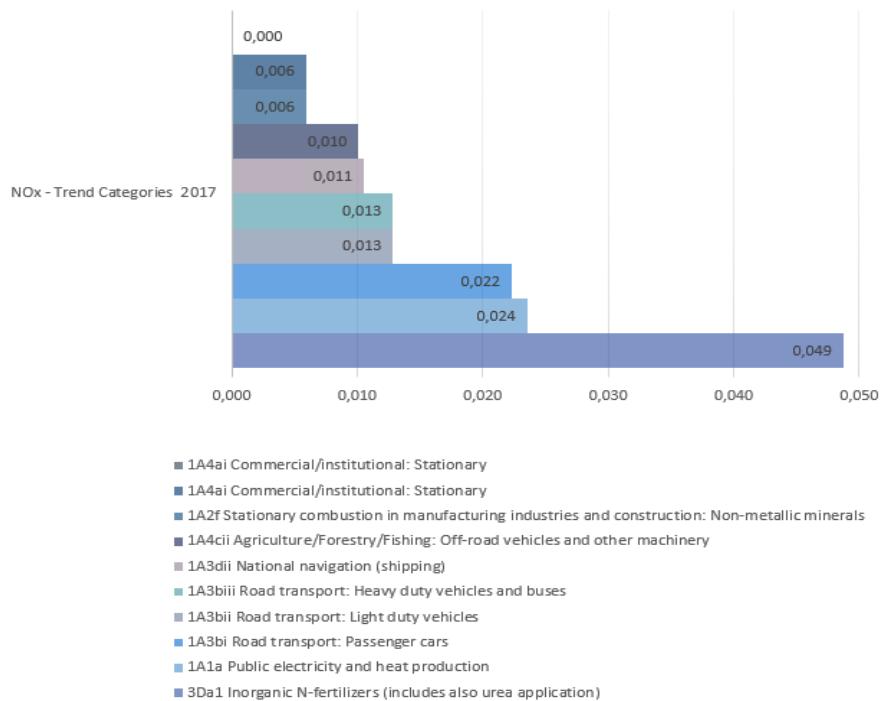


Figure 4. Trends assessments of NOx emissions for base year and 2017

2.4.2. Non-Methane Volatile Organic Compounds (NMVOC)

Anthropogenic NMVOC emissions in Serbia were 125,0663kt in 2017, which is 1.92 %% less than in 2016, compared to the base year of 1990 saw decrease of 32.25 %.

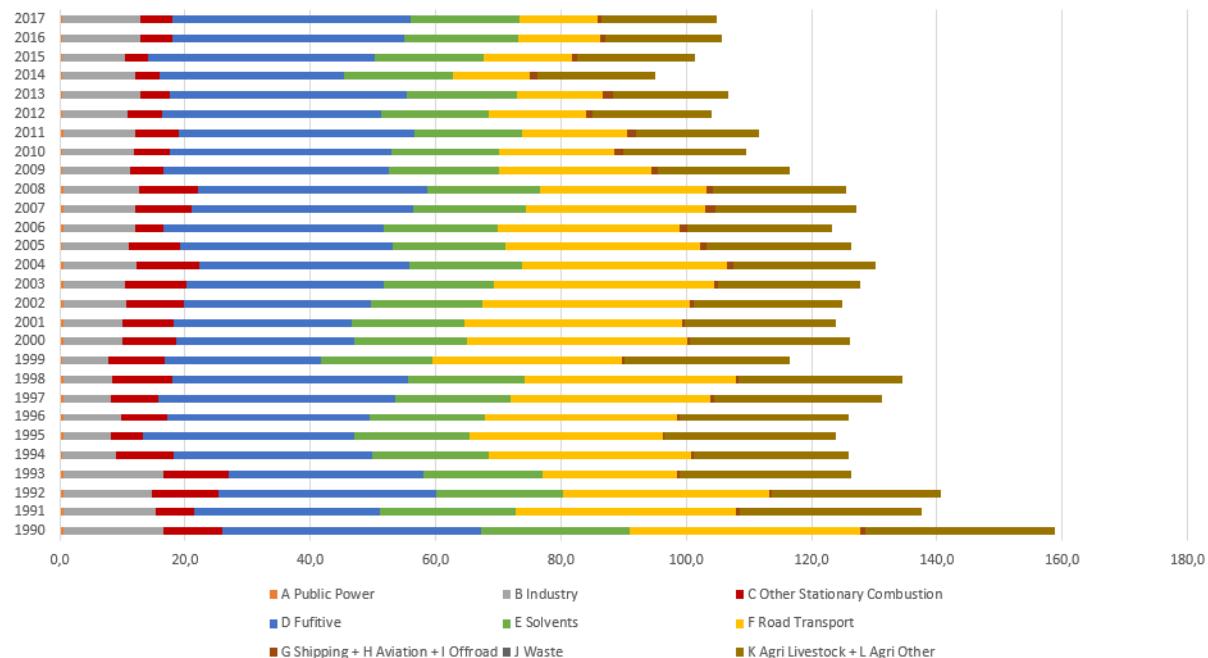


Figure 5. Distribution of NMVOC between sectors for period 1990 – 2017

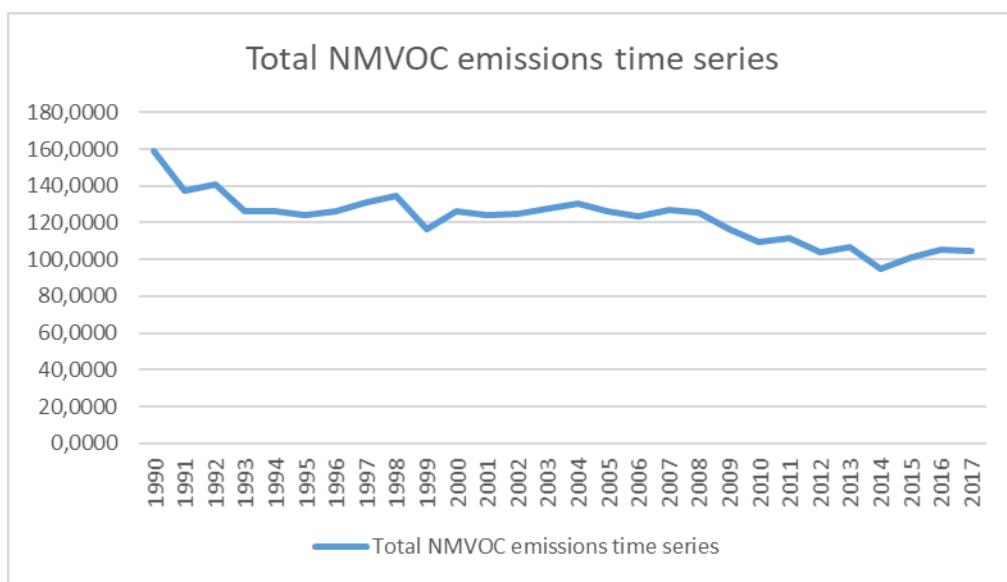


Figure 6.Total NMVOC emissions time series from 1990 to 2017.

Table 38. Total NMVOC emissions between sectors for years 1990 and 2017. Trends of dominant sources of NMVOC emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	NMVOC Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	0,6008	0,4694	-21,88%	1,96%	0,32%	0,38%
B Industry	15,9042	12,3987	-22,04%	0,41%	8,45%	9,91%
C Other Stationary Combustion	38,8170	25,2545	-34,94%	-6,96%	20,63%	20,19%
D Fugitive	41,2610	38,0440	-7,80%	3,05%	21,93%	30,42%
E Solvents	23,6752	17,3903	-26,55%	-4,38%	12,58%	13,90%
F Road Transport	36,8884	12,3623	-66,49%	-6,30%	19,60%	9,88%
G Shipping + H Aviation + I Offroad	0,6932	0,6713	-3,16%	-9,21%	0,37%	0,54%
J Waste	0,0001	0,0024	1627,34%	-11,60%	0,00%	0,00%
K Agri Livestock + L Agri Other	30,3395	18,4734	-39,11%	-0,05%	16,12%	14,77%
Total	188,1793	125,0663	-33,54%	-1,89%	100,00%	100,00%

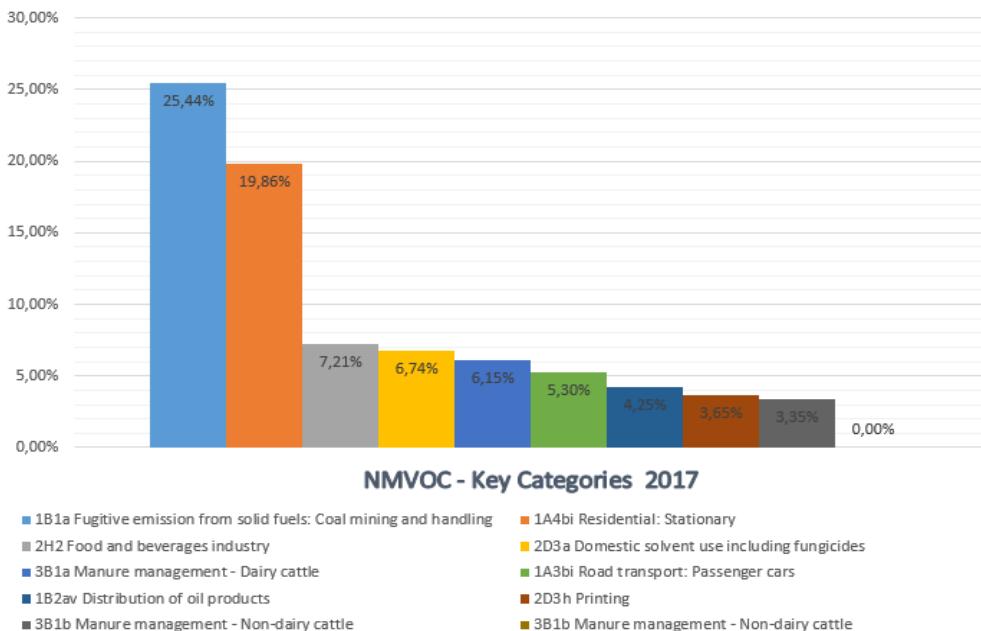


Figure 7. Key Categories assessments of NMVOC emissions for 2017

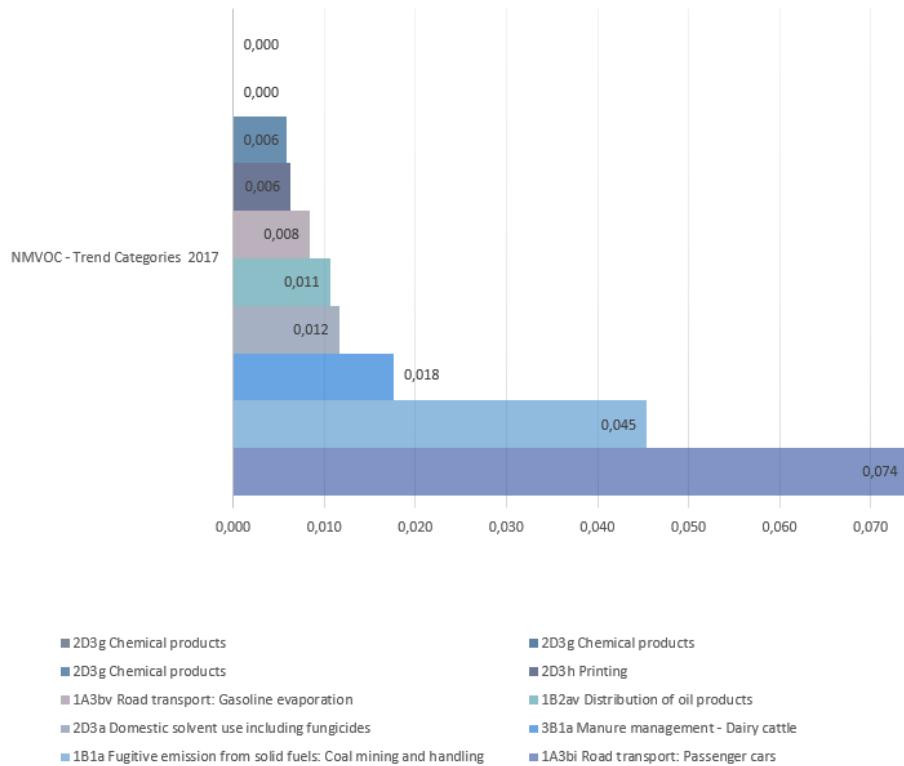


Figure 8. Trends assessments of NMVOC emissions for base year and 2017

2.4.3. Sulphur dioxide emission (SOx)

Total SOx emission in 2017 was 420,1977 kt which is 0.72 % less than in 2016. Compared to the base year of 1990, saw a decrease of 29.03 %

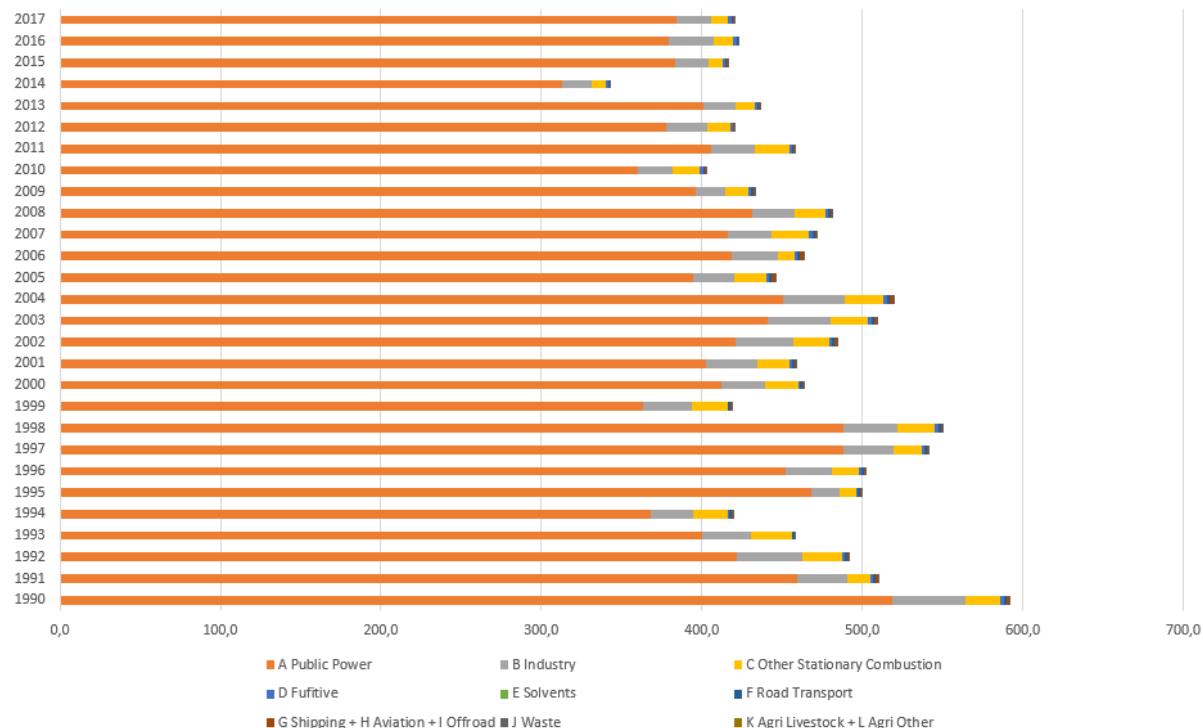


Figure 9. Distribution of SOx between sectors for period 1990 – 2017

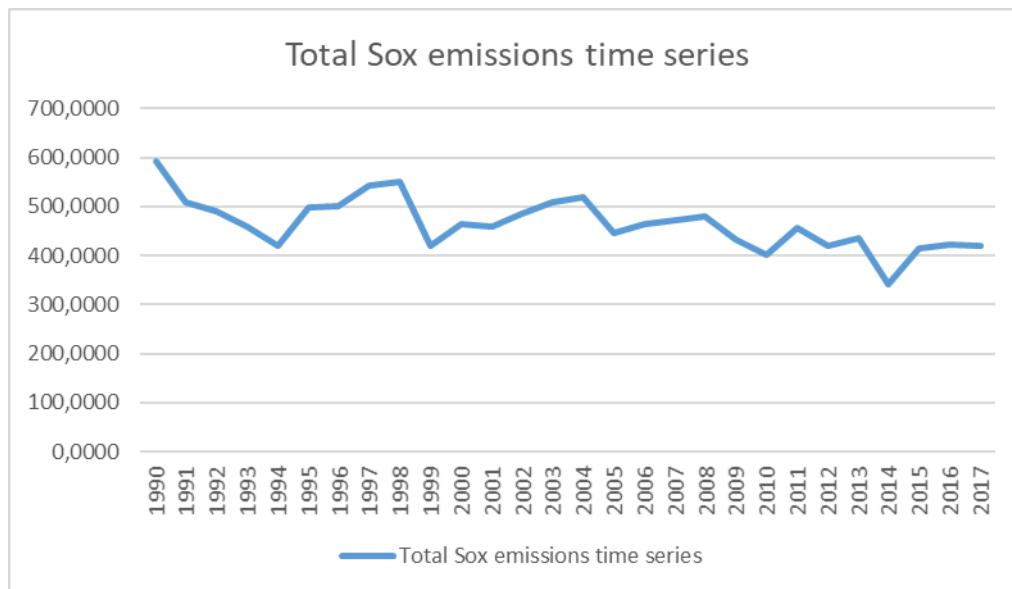


Figure 10. Total SOx emissions time series from 1990 to 2017.

Table 39. Total SOx emissions between sectors for years 1990 and 2017. Trends of dominant sources of SOx emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	SOx Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	518,2359	384,1179	-25,88%	1,19%	87,52%	91,41%
B Industry	45,7364	21,8019	-52,33%	-22,07%	7,72%	5,19%
C Other Stationary Combustion	22,0086	10,8618	-50,65%	-11,49%	3,72%	2,58%
D Fugitive	2,9316	2,0676	-29,47%	7,39%	0,50%	0,49%
E Solvents	NA	NA	NA	NA	NA	NA
F Road Transport	1,7353	0,9233	-46,80%	3,20%	0,29%	0,22%
G Shipping + H Aviation + I Offroad	1,4657	0,4249	-71,01%	-25,91%	0,25%	0,10%
J Waste	0,0001	0,0004	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	592,1135	420,1977	-29,03%	-0,72%	100,00%	100,00%

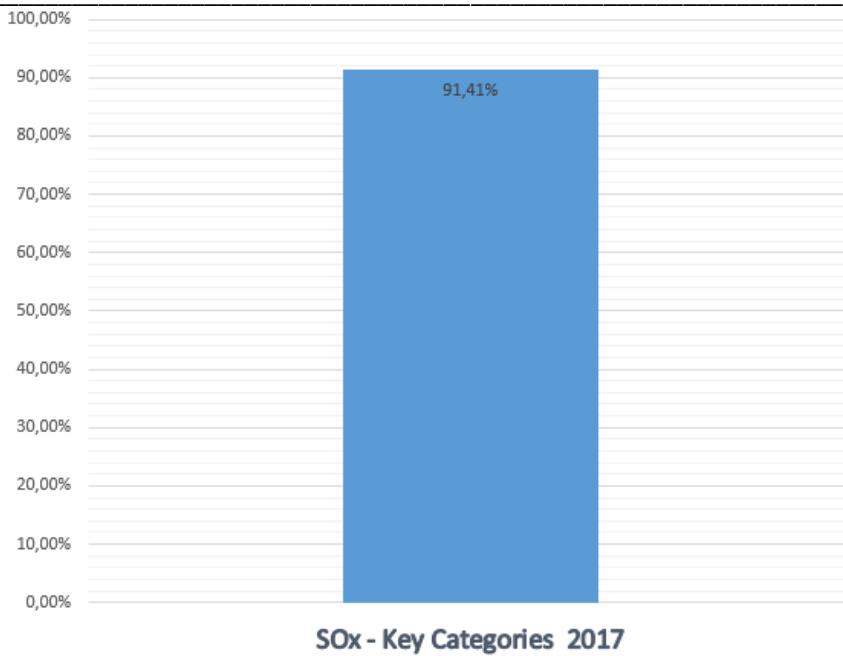


Figure 11. Key Categories assessments of SOx emissions for 2017.

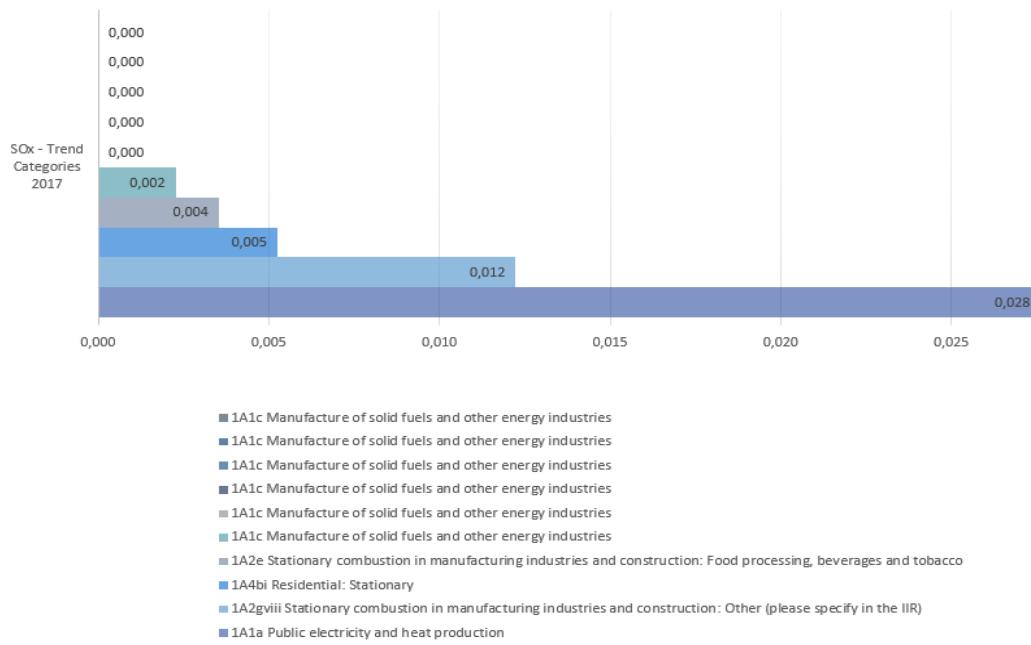


Figure 12. Trends assessments of SOx emissions for base year and 2017

2.4.4. Ammonia (NH₃)

NH₃ emissions in 2017. was 64,9145kt, which is 1.35 % decrease compared to 2016. Compared to the 1990 baseline emissions of NH₃ is 30.48 % lower.

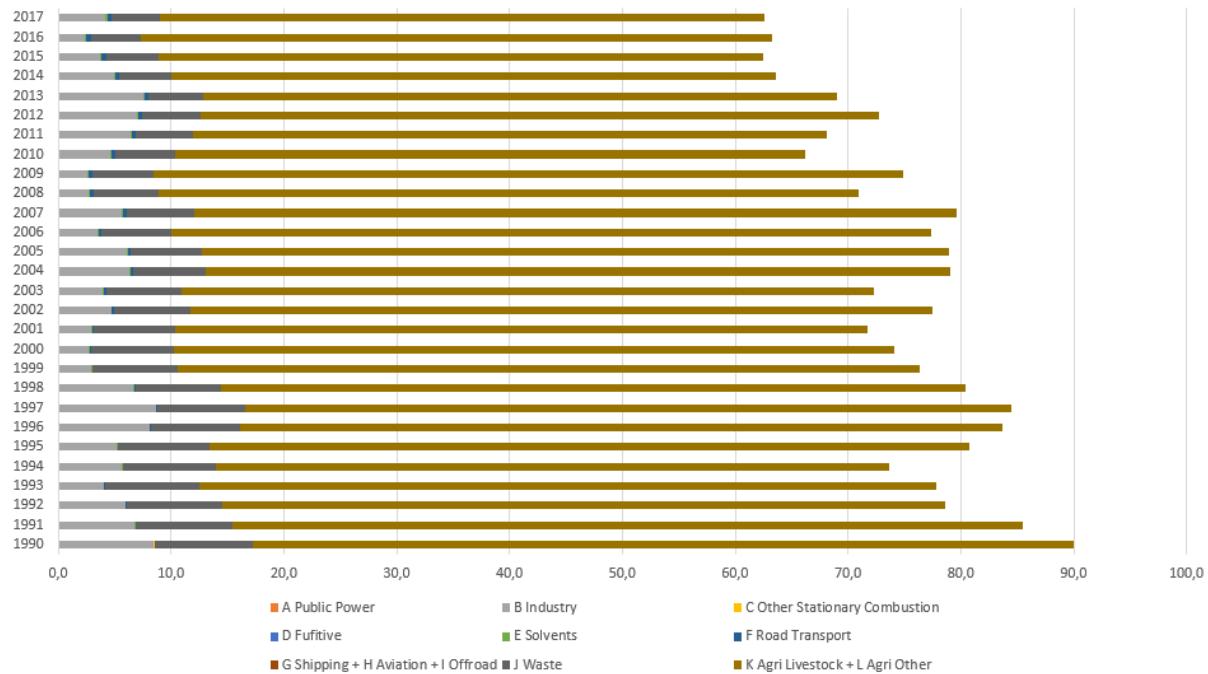


Figure 13. Distribution of NH₃ between sectors for period 1990 – 2017

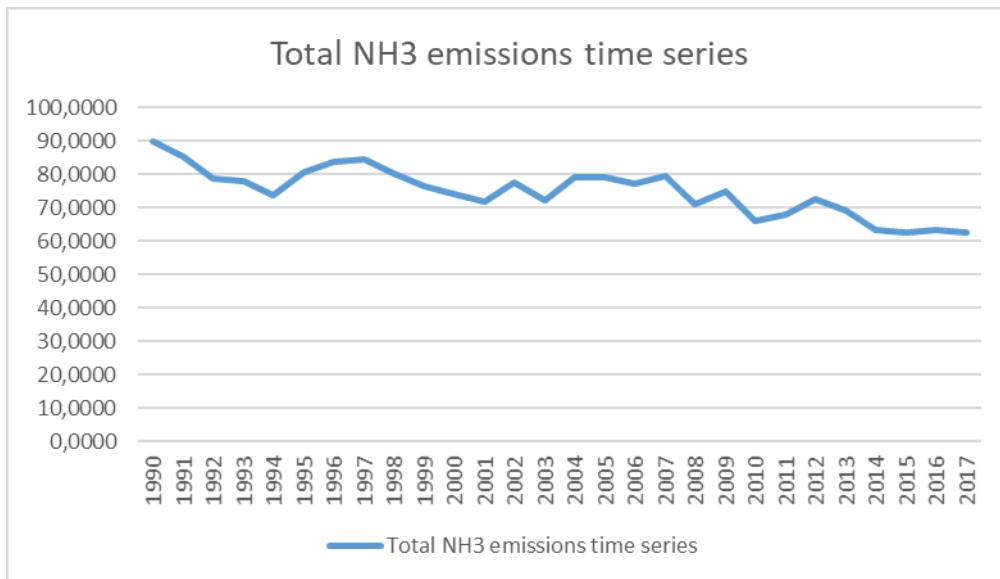


Figure 14.Total NH₃ emissions time series from 1990 to 2017.

Table 40. Total NH₃ emissions between sectors for years 1990 and 2017. Trends of dominant sources of NH₃ emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	NH3 Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	NA	NA	NA	NA	NA	NA
B Industry	8,5014	4,1386	-51,32%	77,39%	9,10%	6,38%
C Other Stationary Combustion	3,4316	2,3606	-31,21%	-7,96%	3,68%	3,64%
D Fugitive	0,0130	0,0071	-45,13%	14,00%	0,01%	0,01%
E Solvents	0,0631	0,1908	202,12%	10,15%	0,07%	0,29%
F Road Transport	0,0268	0,4244	1483,70%	2,02%	0,03%	0,65%
G Shipping + H Aviation + I Offroad	0,0008	0,0012	48,11%	-7,43%	0,00%	0,00%
J Waste	8,6285	4,2462	-50,79%	-2,84%	9,24%	6,54%
K Agri Livestock + L Agri Other	72,7121	53,5455	-26,36%	-4,26%	77,87%	82,49%
Total	93,3774	64,9145	-30,48%	-1,33%	100,00%	100,00%

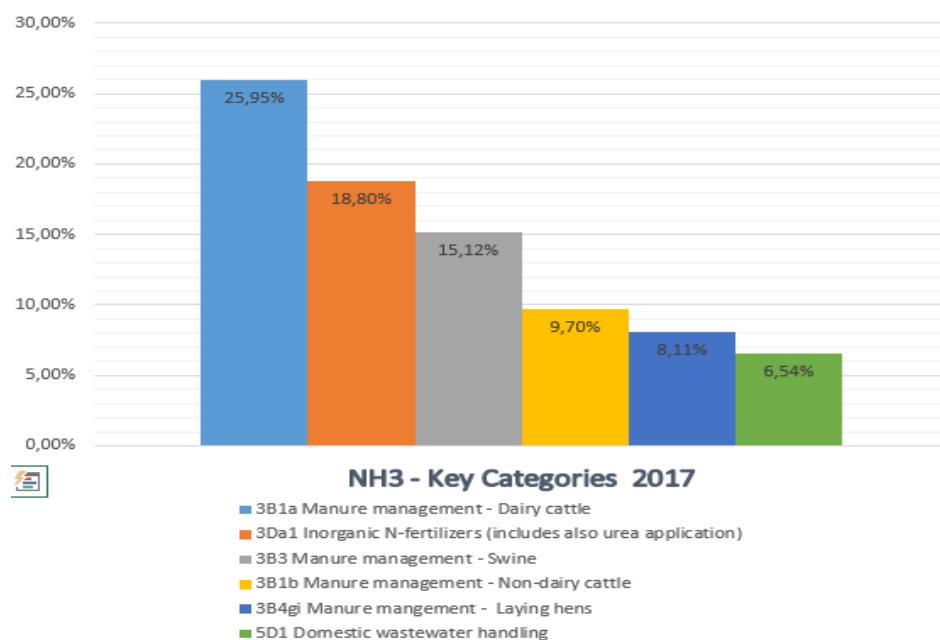


Figure 15. Key Categories assessments of NH3 emissions for 2017

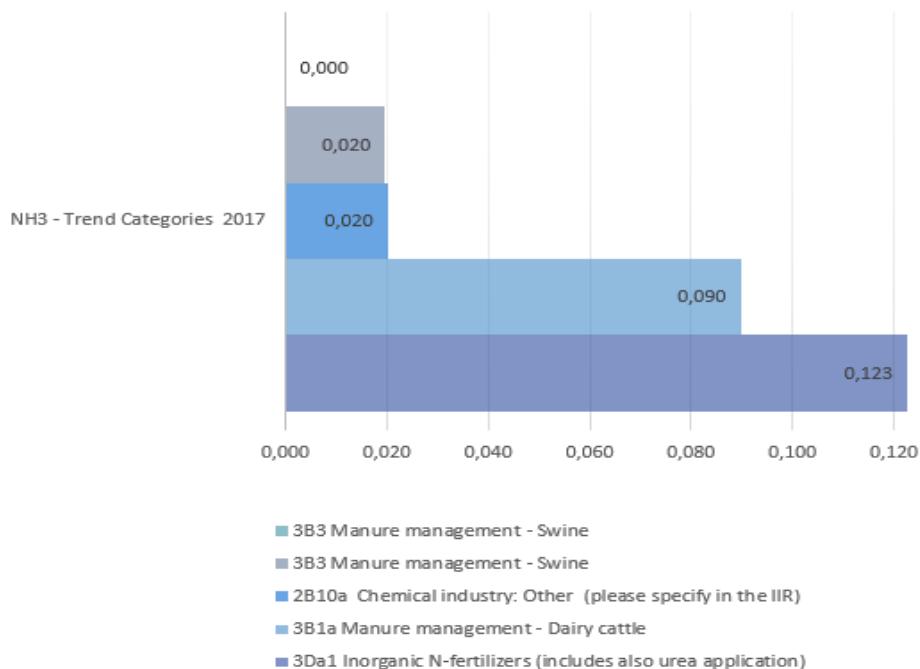


Figure 16. Trends assessments of NH₃ emissions for base year and 2017

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2.4.5. PM 2.5 Emission

PM 2.5 emissions in 2017. was 38,5137kt, which is 6.11 % decrease compared to 2016. Compared to the 1990 baseline emissions of PM 2.5 is 30.00 % lower.

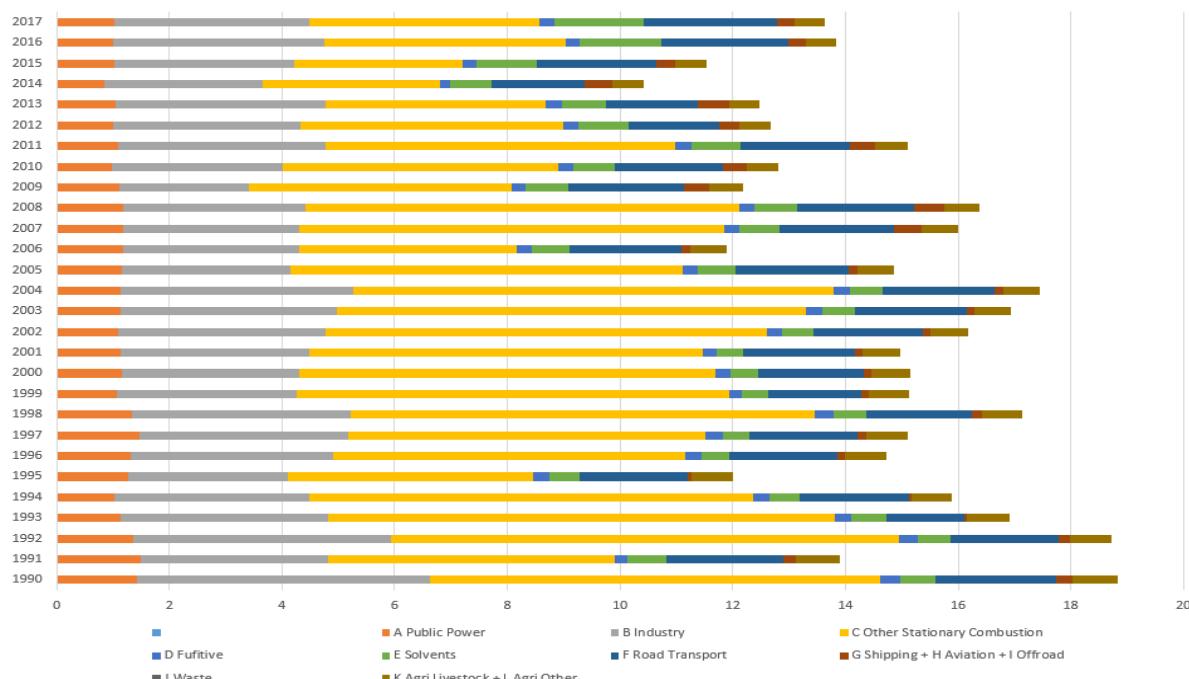


Figure 17. Distribution of PM_{2.5} between sectors for period 1990 - 2017

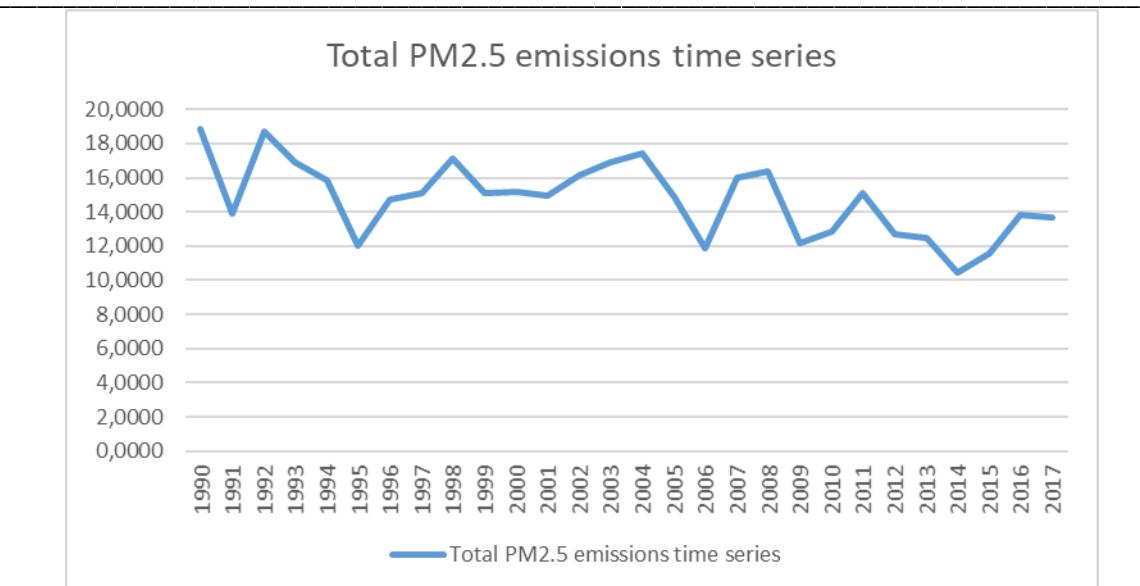


Figure 18. Total PM 2.5 emissions time series from 1990 to 2016.

Table 41. Total PM 2.5 emissions between sectors for years 1990 and 2017. Trends of dominant sources of PM 2.5 emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	PM2.5 Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	1,4183	1,0147	-28,45%	0,66%	2,58%	2,63%
B Industry	5,1978	3,4648	-33,34%	-7,46%	9,45%	9,00%
C Other Stationary Combustion	44,1754	28,9644	-34,43%	-7,48%	80,28%	75,21%
D Fugitive	0,3678	0,2703	-26,50%	6,25%	0,67%	0,70%
E Solvents	0,6197	1,5761	154,35%	9,15%	1,13%	4,09%
F Road Transport	2,1499	2,3657	10,03%	5,32%	3,91%	6,14%
G Shipping + H Aviation + I Offroad	0,2824	0,3068	8,64%	-4,12%	0,51%	0,80%
J Waste	0,0000	0,0001	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	0,8121	0,5508	-32,17%	0,66%	1,48%	1,43%
Total	55,0234	38,5137	-30,00%	-5,76%	100,00%	100,00%

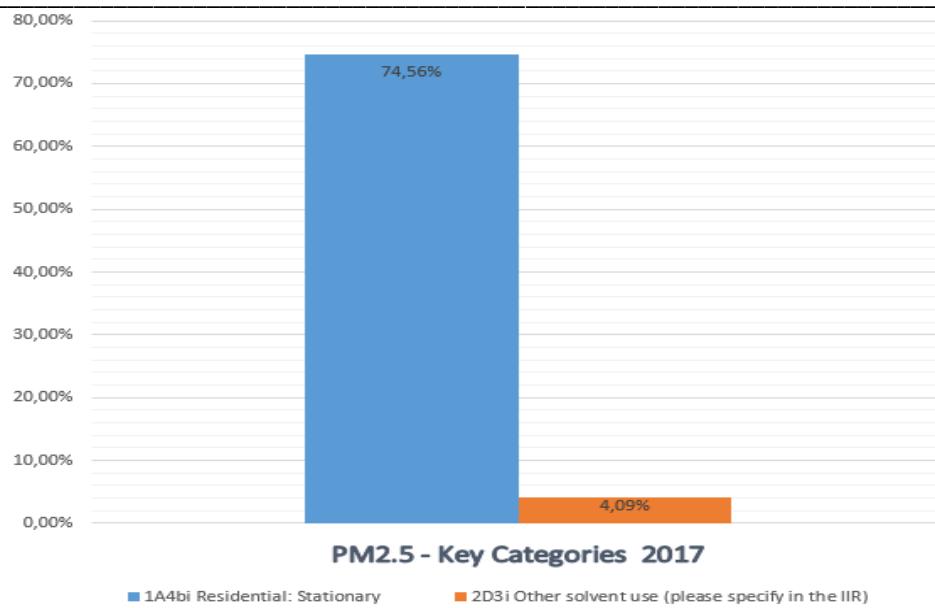


Figure 19. Key Categories assessments of PM 2.5 emissions for 2017.

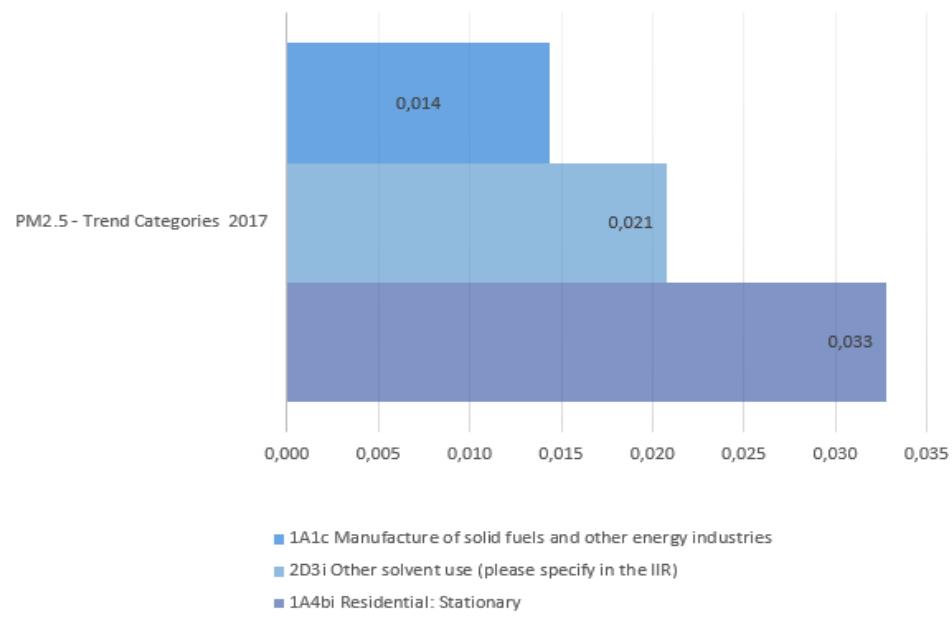


Figure 20. Trends assessments of PM 2.5 emissions for base year and 2017

2.4.6. PM₁₀ Emission

PM 10 emissions in 2017. was 52,8057 kt, which is 4.94 % decrease compared to 2016. Compared to the 1990 baseline emissions of PM 10 is 27.48 % lower.

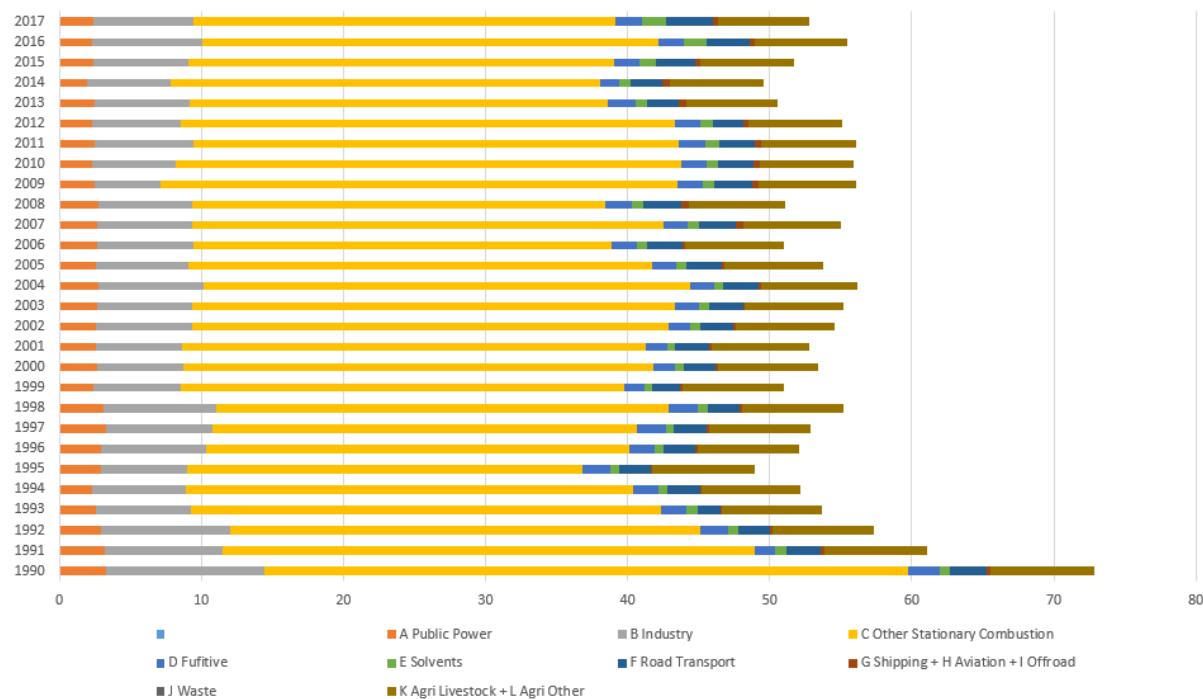


Figure 21. Distribution of PM10 between sectors for period 1990 – 2017.

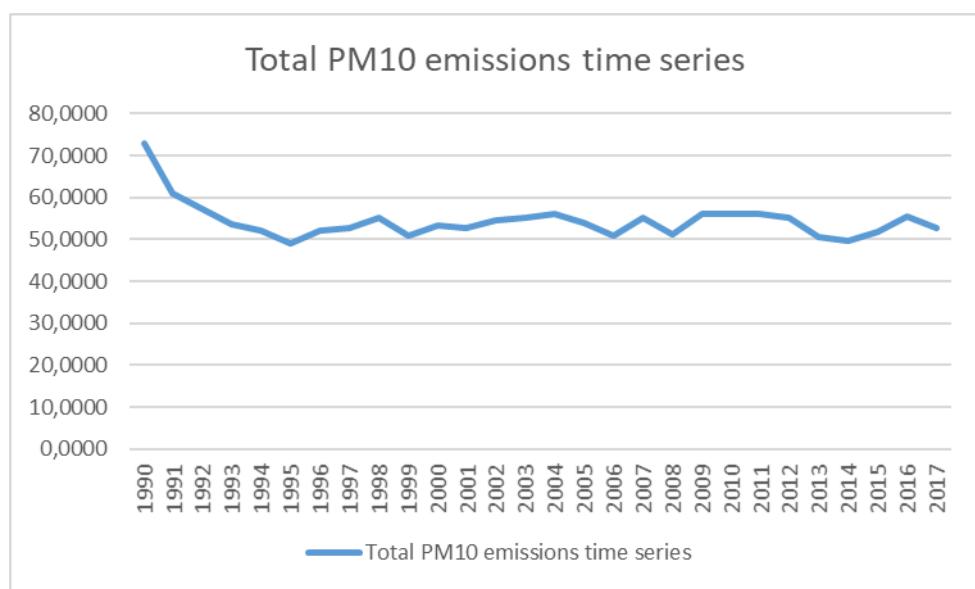


Figure 22.Total PM10 emissions time series from 1990 to 2017.

Table 42. Total PM10 emissions between sectors for years 1990 and 2017. Trends of dominant sources of PM10 emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	PM10 Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	3,2674	2,3695	-27,48%	0,90%	4,49%	4,49%
B Industry	11,1958	7,0557	-36,98%	-8,32%	15,38%	13,36%
C Other Stationary Combustion	45,3133	29,7141	-34,43%	-7,51%	62,23%	56,27%
D Fugitive	2,1932	1,8402	-16,09%	3,70%	3,01%	3,48%
E Solvents	0,7323	1,7436	138,08%	8,66%	1,01%	3,30%
F Road Transport	2,5266	3,2831	29,94%	7,57%	3,47%	6,22%
G Shipping + H Aviation + I Offroad	0,3085	0,3117	1,04%	-4,41%	0,42%	0,59%
J Waste	0,0000	0,0001	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	7,2767	6,4876	-10,85%	0,02%	9,99%	12,29%
Total	72,8141	52,8057	-27,48%	-4,71%	100,00%	100,00%

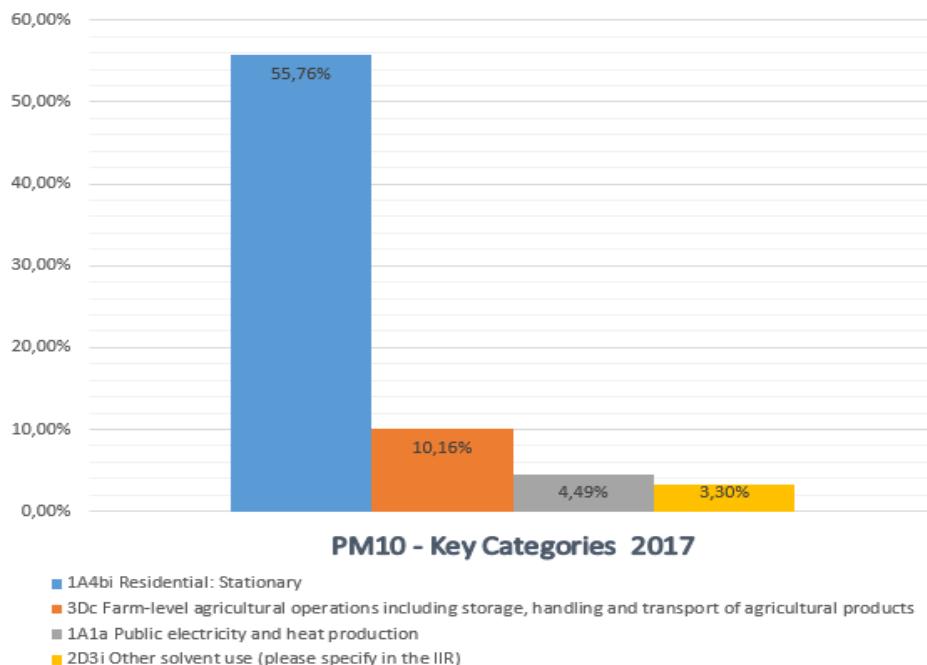


Figure 23. Key Categories assessments of PM10 emissions for 2017

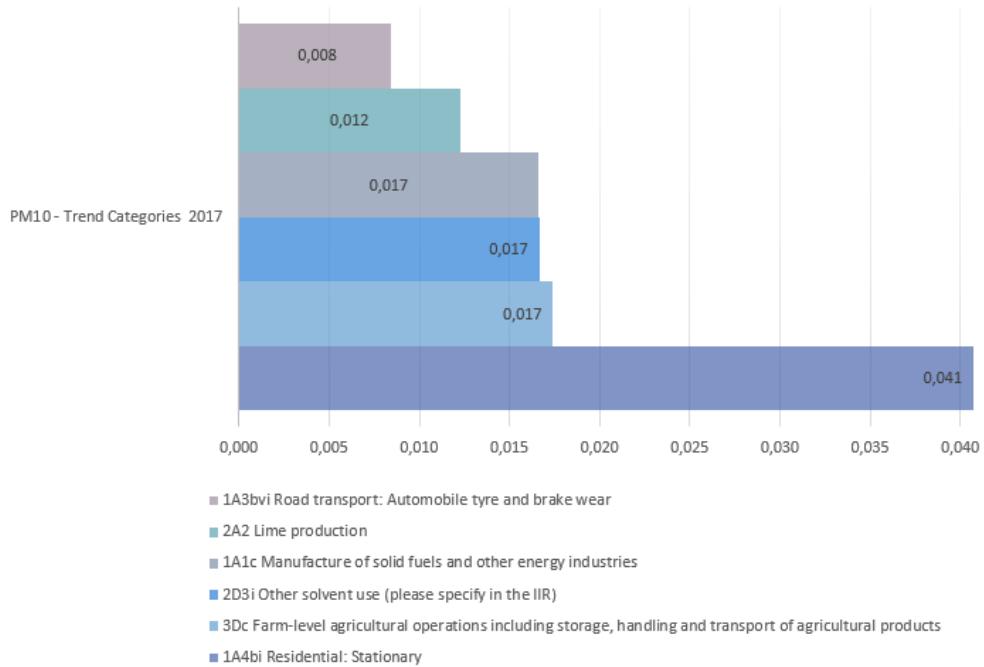


Figure 24. Trends assessments of PM10 emissions for base year and 2017

2.4.7. TSP Emission

TSP emissions in 2017. was 93,9493kt, which is 9.00 % increase compared to 2016. Compared to the 1990 baseline emissions of TSP is 38.95 % lower.

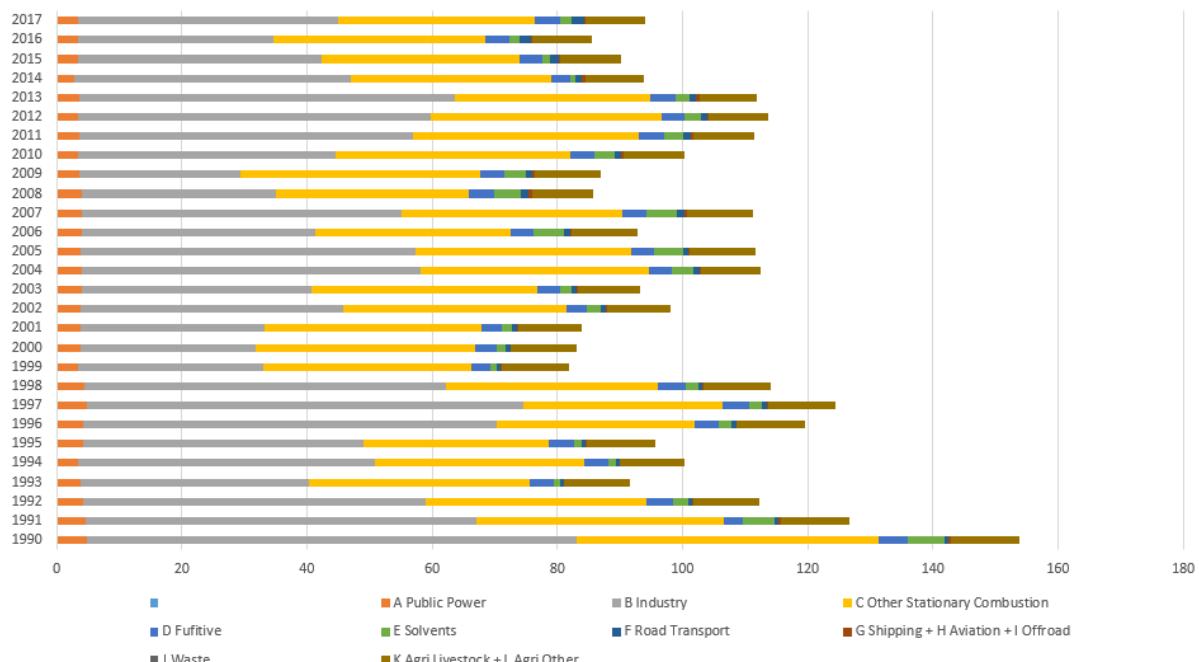


Figure 25.Distribution of TSP between sectors for period 1990 – 2017.

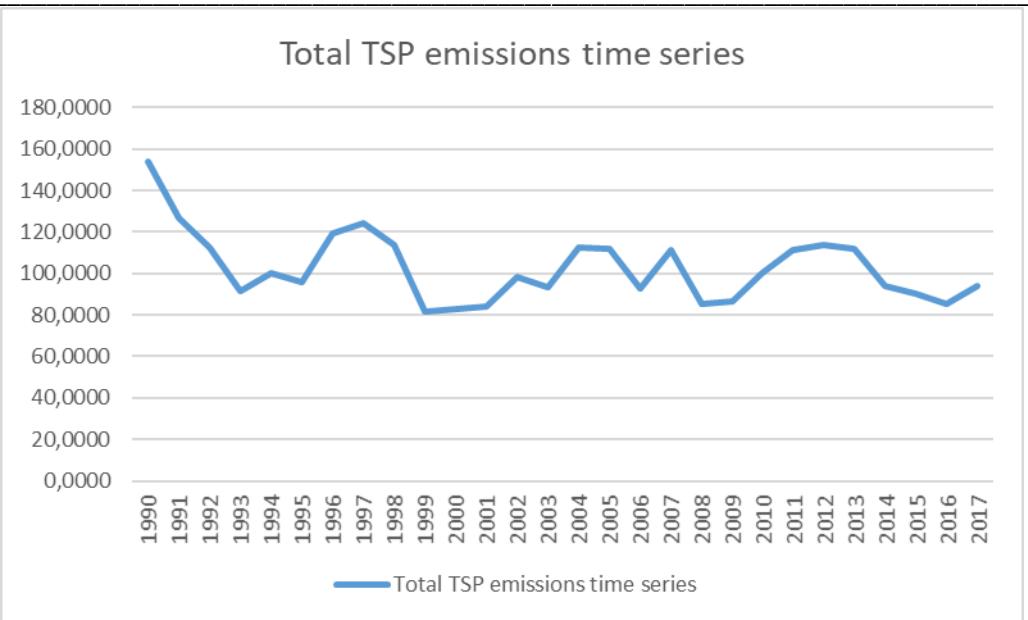


Figure 26. Total TSP emissions time series from 1990 to 2017.

Table 43. Total TSP emissions between sectors for years 1990 and 2017. Trends of dominant sources of TSP emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	TSP Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	4,8137	3,4825	-27,66%	0,92%	3,13%	3,71%
B Industry	78,3614	41,5403	-46,99%	33,50%	50,92%	44,22%
C Other Stationary Combustion	48,0503	31,4560	-34,54%	-7,48%	31,22%	33,48%
D Fugitive	4,7033	3,9182	-16,69%	3,83%	3,06%	4,17%
E Solvents	5,8847	1,8552	-68,47%	8,39%	3,82%	1,97%
F Road Transport	0,7354	2,0041	172,51%	19,92%	0,48%	2,13%
G Shipping + H Aviation + I Offroad	0,3078	0,3084	0,20%	-4,46%	0,20%	0,33%
J Waste	0,0000	0,0001	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	11,0368	9,3845	-14,97%	-0,69%	7,17%	9,99%
Total	153,8935	93,9493	-38,95%	9,89%	100,00%	100,00%

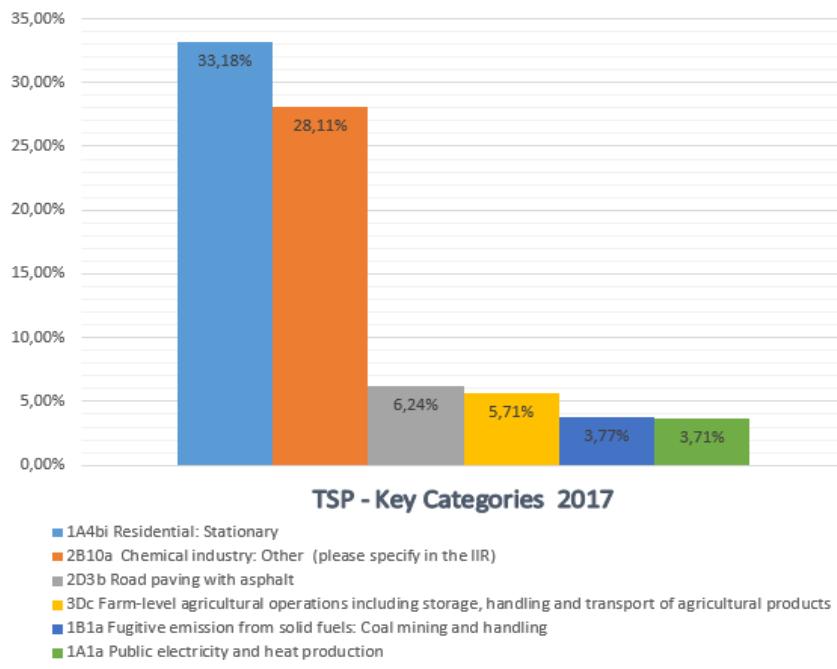


Figure 27. Key Categories assessments of TSP emissions for 2017

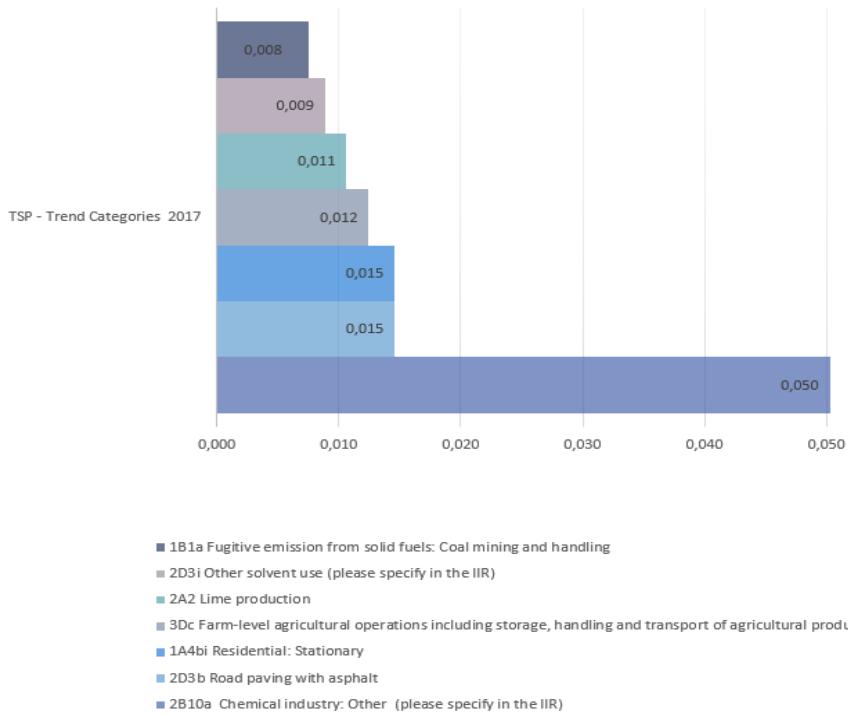


Figure 28. Trends assessments of TSP emissions for base year and 2017

2.4.8. Black Carbon (BC)

BC emissions in 2017. was 3,1918 kt, which is 6.66 % decrease compared to 2016. Compared to the 1990 baseline emissions of BC is 26.6 % lower.

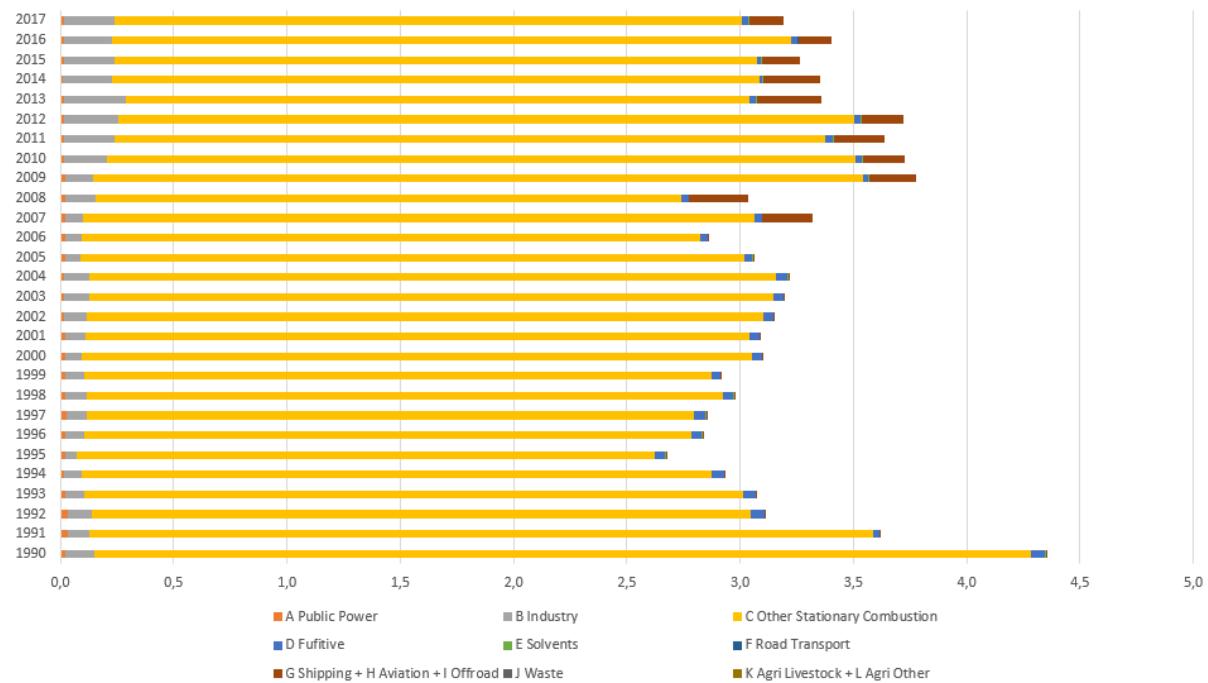


Figure 29. Distribution of BC between sectors for period 1990 – 2017.

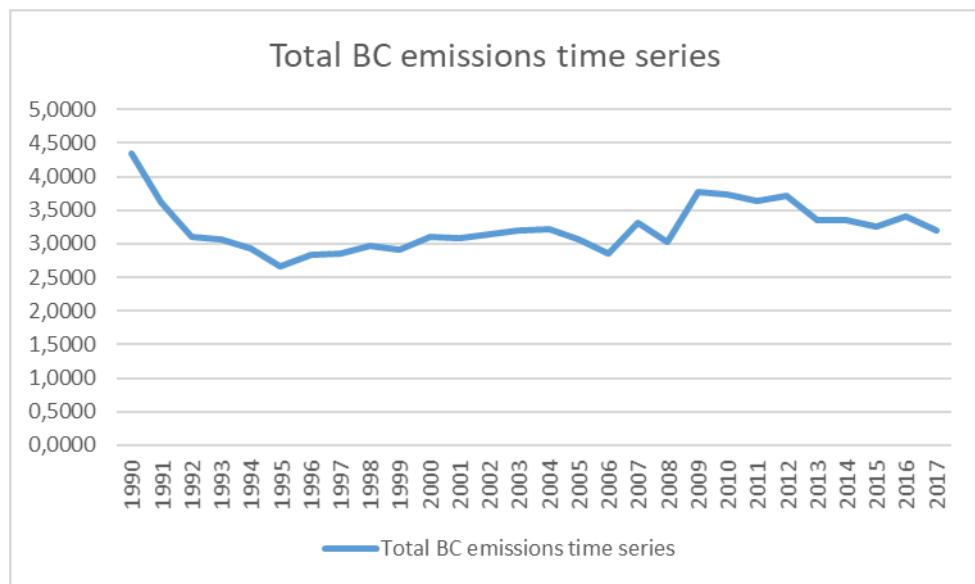


Figure 30.Total BC emissions time series from 1990 to 2017.

Table 44. Total BC emissions between sectors for years 1990 and 2017. Trends of dominant sources of BC emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	BC Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	0,0228	0,0139	-39,03%	-1,09%	0,52%	0,44%
B Industry	0,1284	0,2276	77,23%	5,50%	2,95%	7,13%
C Other Stationary Combustion	4,1311	2,7676	-33,01%	-7,66%	95,00%	86,71%
D Fugitive	0,0630	0,0280	-55,57%	21,96%	1,45%	0,88%
E Solvents	0,0018	0,0056	214,78%	10,56%	0,04%	0,17%
F Road Transport	0,0002	0,0004	180,13%	19,92%	0,00%	0,01%
G Shipping + H Aviation + I Offroad	0,0012	0,1487	11852,39%	-0,38%	0,03%	4,66%
J Waste	NA	NA	NA	NA	NA	NA
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	4,3485	3,1918	-26,60%	-6,25%	100,00%	100,00%

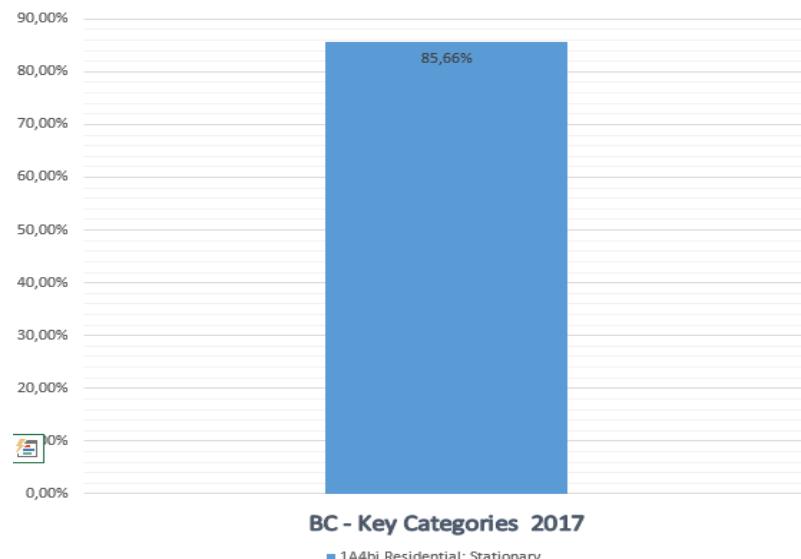


Figure 31. Key Categories assessments of BC emissions for 2017

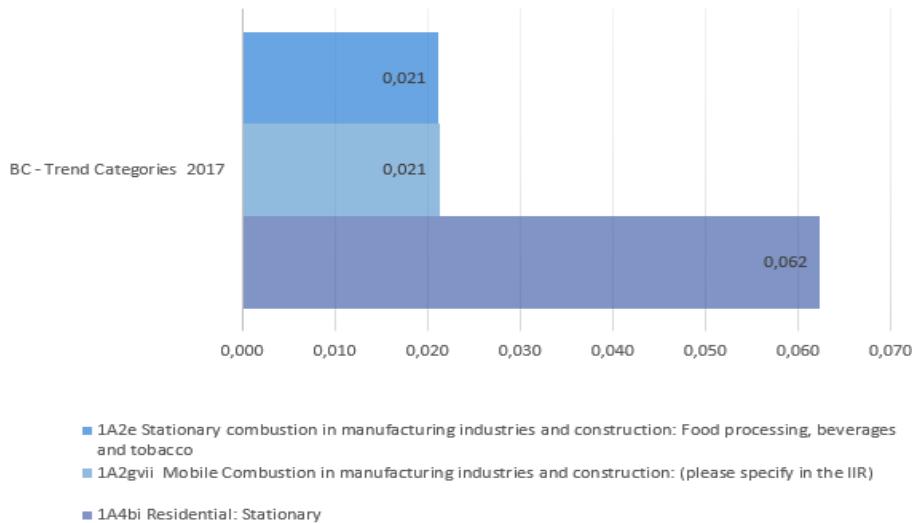


Figure 32. Trends assessments of BC emissions for base year and 2017

OTHER

2.4.9. Carbon Monoxide (CO)

Carbon monoxide (CO) emissions in 2017. was 268,3692 kt, which is 3.38 % decrease compared to 2016. Compared to the 1990 baseline emissions of CO is 48.2 % lower.

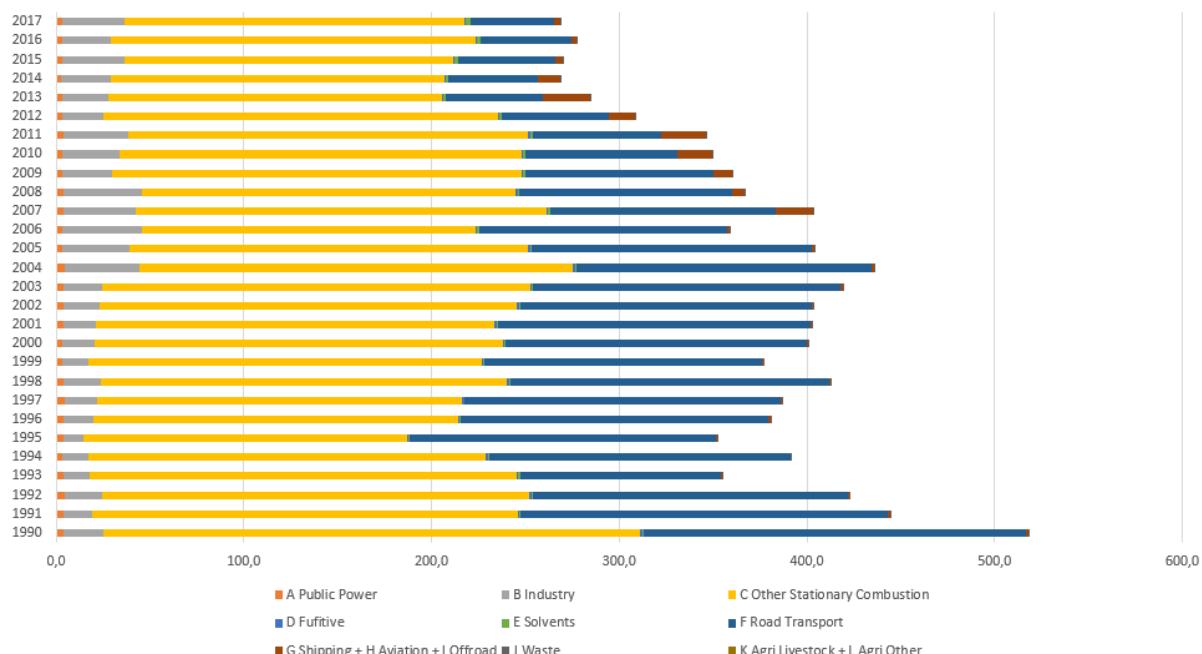


Figure 33. Distribution of CO between sectors for period 1990 – 2017

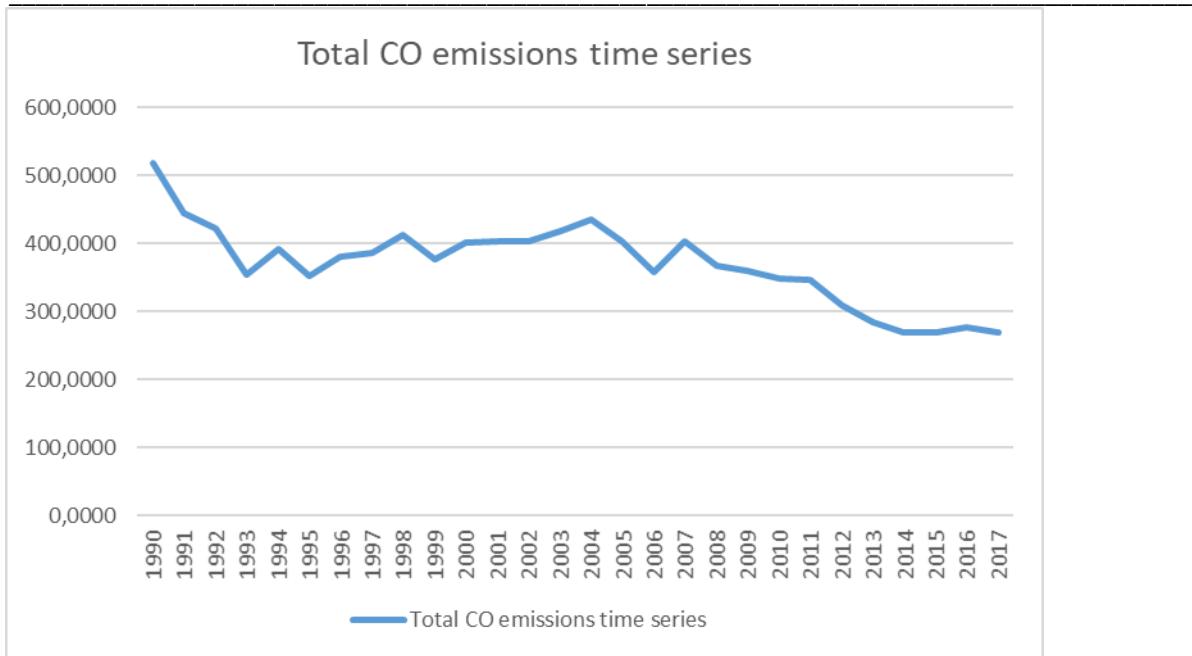


Figure 34. Total CO emissions time series from 1990 to 2017.

Table 45. Total CO₂ emissions between sectors for years 1990 and 2017. Trends of dominant sources of CO₂ emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	CO Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	4,1581	3,4892	-16,09%	2,89%	0,80%	1,30%
B Industry	20,7019	33,0144	59,48%	28,37%	4,00%	12,30%
C Other Stationary Combustion	286,0574	181,0333	-36,71%	-6,84%	55,22%	67,46%
D Fugitive	1,3950	0,7309	-47,61%	15,52%	0,27%	0,27%
E Solvents	0,8047	2,5330	214,78%	10,56%	0,16%	0,94%
F Road Transport	203,5089	44,2767	-78,24%	-7,72%	39,28%	16,50%
G Shipping + H Aviation + I Offroad	1,4480	3,2912	127,30%	5,91%	0,28%	1,23%
J Waste	0,0001	0,0005	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	518,0739	268,3692	-48,20%	-3,27%	100,00%	100,00%

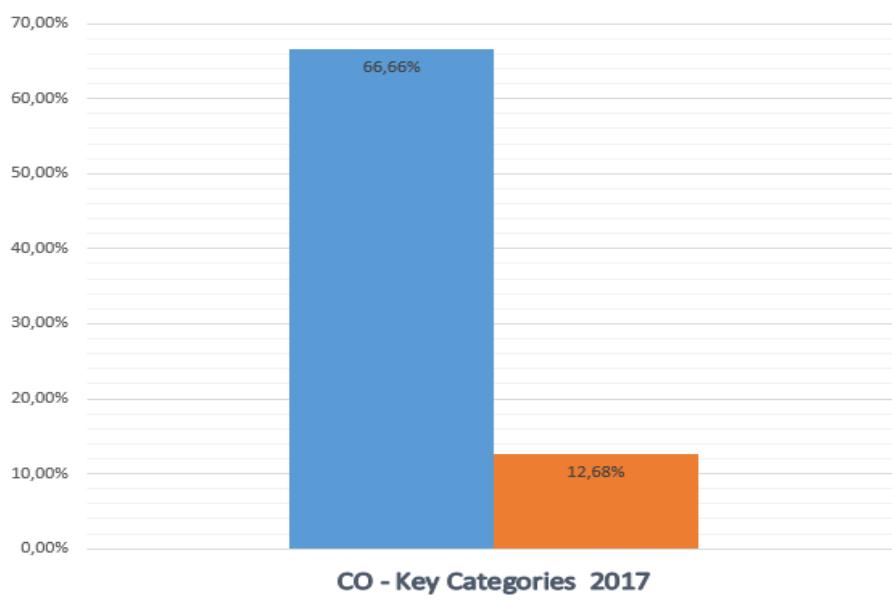


Figure 35. Key Categories assessments of CO₂ emissions for 2017.

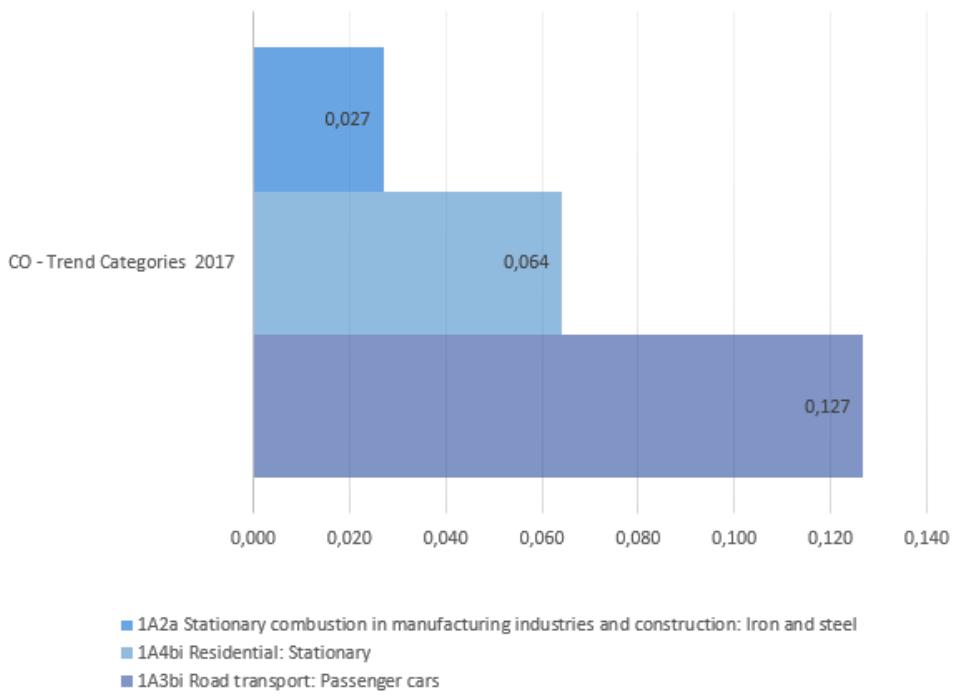


Figure 36. Trends assessments of CO emissions for base year and 2017

PRIORITY HEAVY METALS

2.4.10. Lead Emission (PB)

Lead (Pb) emissions in 2017. was 54,8038 kt, which is 27.23 % increase compared to 2016. Compared to the 1990 baseline emissions of Pb is 85.28 % lower.

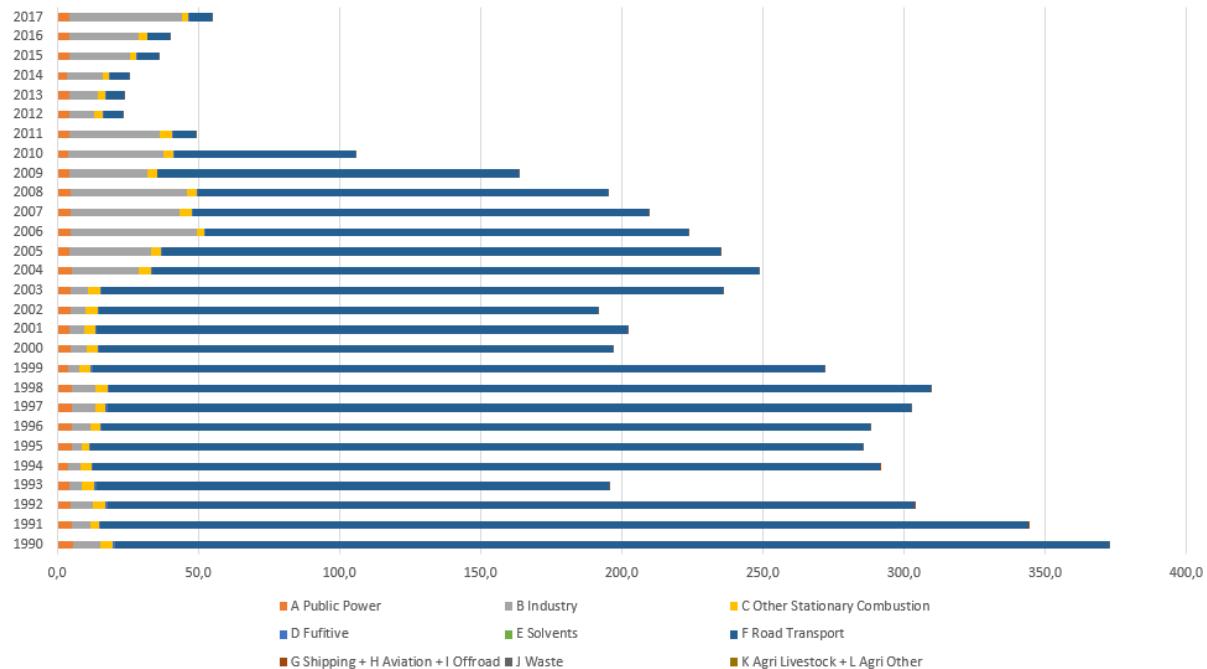


Figure 37. Distribution of Pb between sectors for period 1990 - 2017

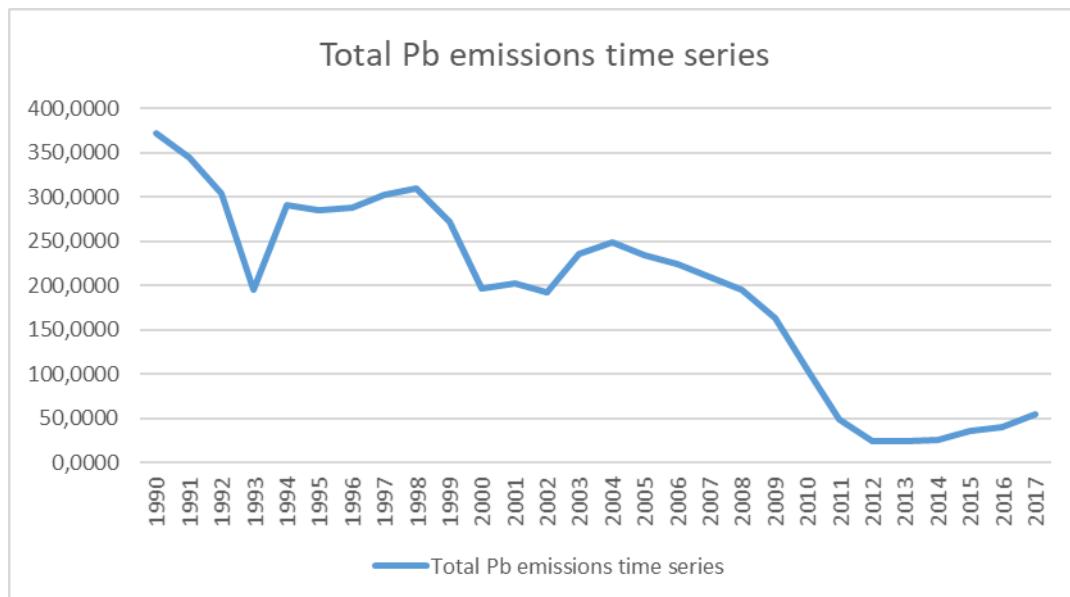


Figure 38. Total PB emissions time series from 1990 to 2017.

Table 46. Total Pb emissions between sectors for years 1990 and 2017. Trends of dominant sources of Pb emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	Pb Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	5,7416	4,2686	-25,65%	1,19%	1,54%	7,79%
B Industry	9,4790	39,7741	319,60%	59,91%	2,55%	72,58%
C Other Stationary Combustion	4,4439	2,4077	-45,82%	-10,26%	1,19%	4,39%
D Fugitive	0,8251	0,3729	-54,81%	21,21%	0,22%	0,68%
E Solvents	NA	NA	NA	NA	NA	NA
F Road Transport	351,8605	7,9791	-97,73%	2,38%	94,50%	14,56%
G Shipping + H Aviation + I Offroad	0,0072	0,0013	-82,50%	-22,22%	0,00%	0,00%
J Waste	0,0000	0,0001	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	372,3574	54,8038	-85,28%	37,43%	100,00%	100,00%

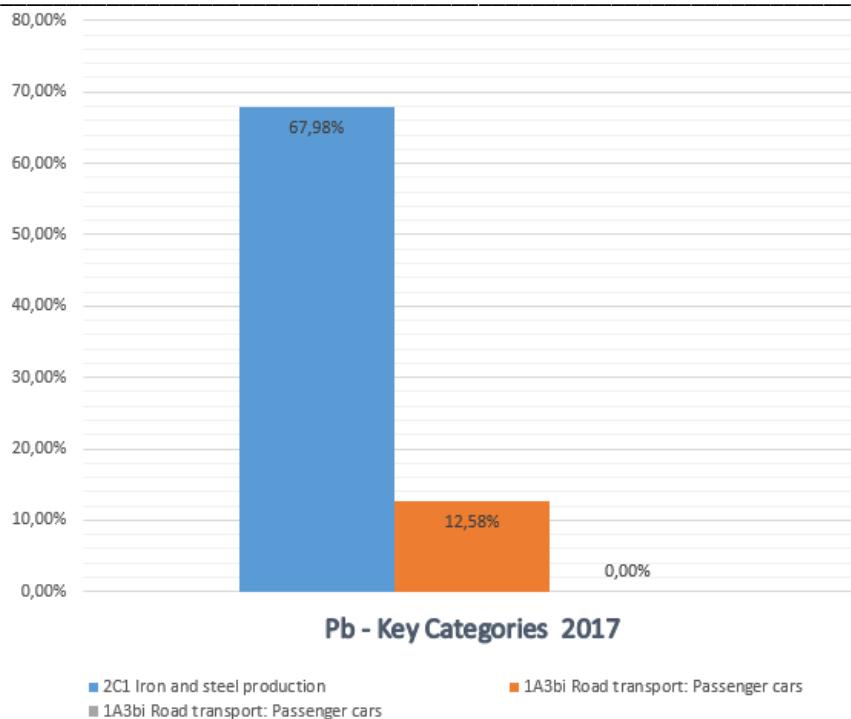


Figure 39. Key Categories assessments of Pb emissions for 2017.

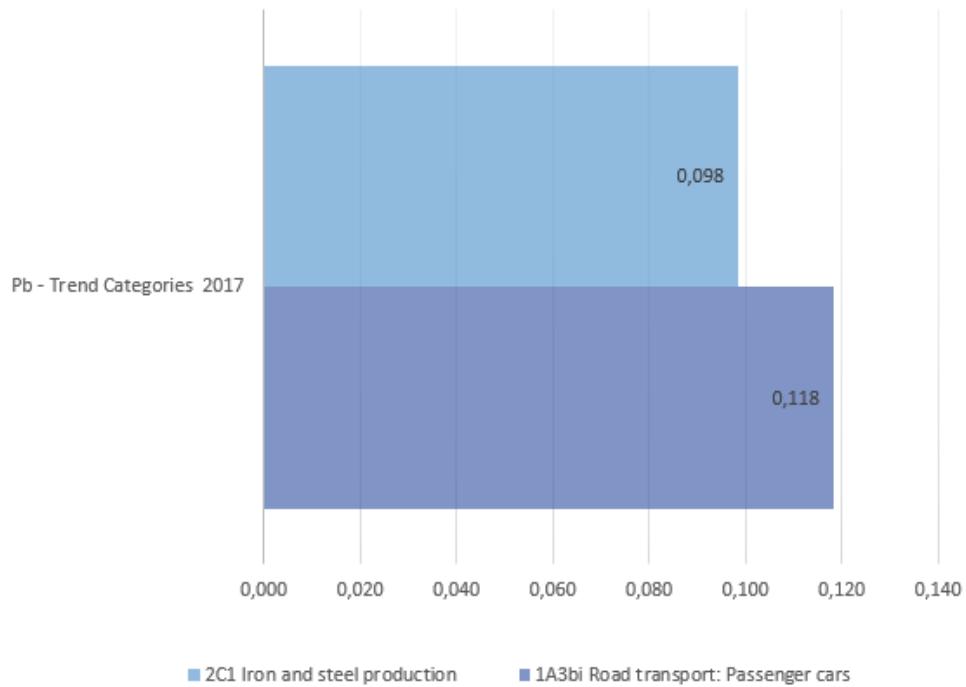


Figure 40. Trends assessments of Pb emissions for base year and 2017

2.4.11. Cadmium Emission (Cd)

Cadmium (Cd) emissions in 2017. was 2,6540 t, which is 7.45 % increase compared to 2016. Compared to the 1990 baseline emissions of Cd is 33.97 % lower.

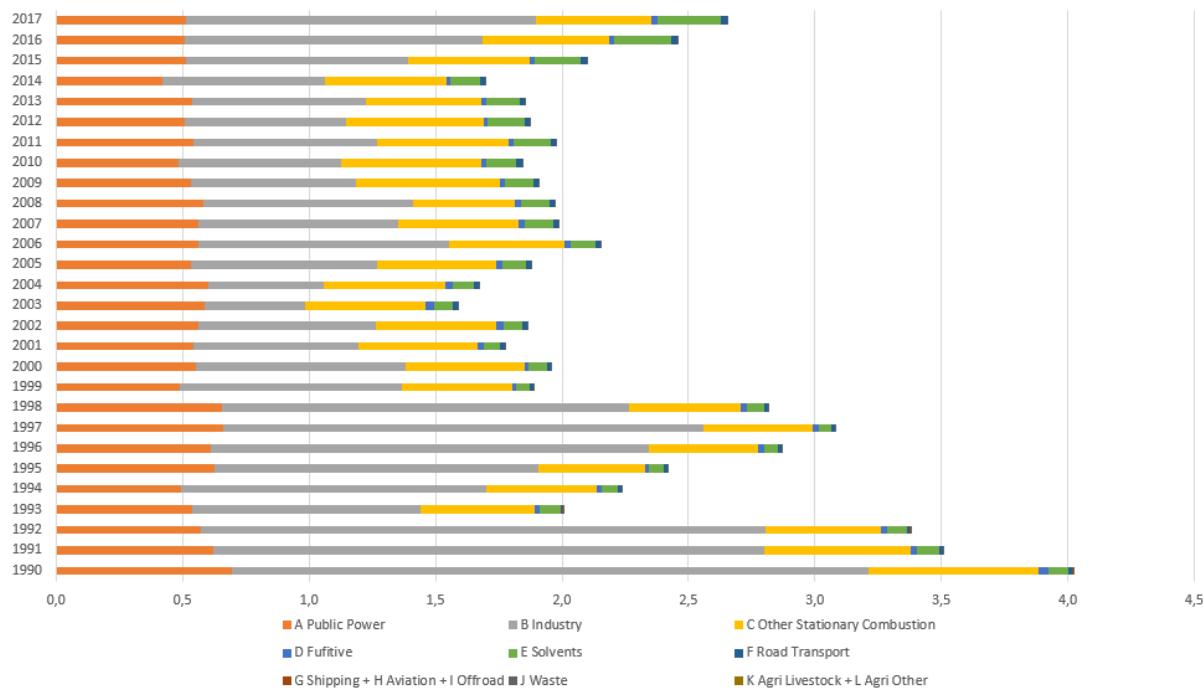


Figure 41. Distribution of Cd between sectors for period 1990 – 2017

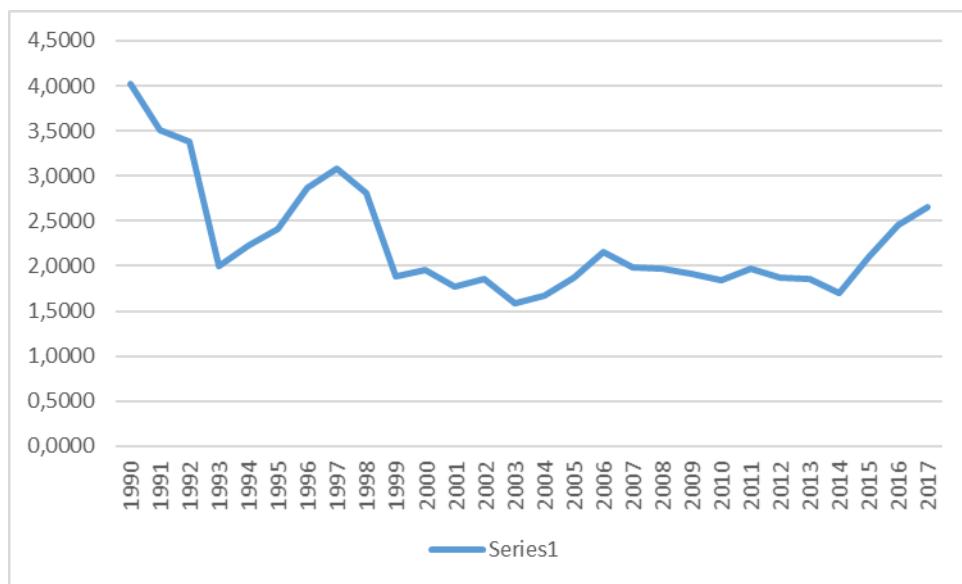


Figure 42.Total Cd emissions time series from 1990 to 2017.

Table 47. Total Cd emissions between sectors for years 1990 and 2017. Trends of dominant sources of Cd emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	Cd Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	0,6951	0,5143	-26,02%	1,16%	17,29%	19,38%
B Industry	2,5162	1,3834	-45,02%	17,46%	62,60%	52,13%
C Other Stationary Combustion	0,6736	0,4578	-32,05%	-8,18%	16,76%	17,25%
D Fugitive	0,0389	0,0236	-39,38%	11,07%	0,97%	0,89%
E Solvents	0,0789	0,2482	214,61%	10,56%	1,96%	9,35%
F Road Transport	0,0155	0,0265	70,80%	4,08%	0,39%	1,00%
G Shipping + H Aviation + I Offroad	0,0011	0,0002	-78,07%	-14,22%	0,03%	0,01%
J Waste	0,0000	0,0000	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	4,0193	2,6540	-33,97%	8,05%	100,00%	100,00%

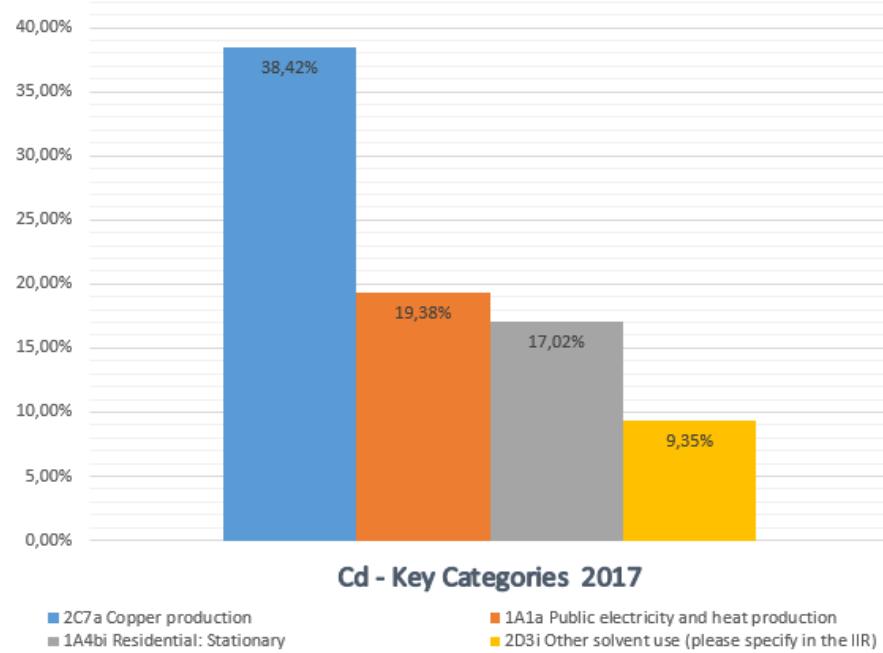


Figure 43. Key Categories assessments of Cd emissions for 2017.

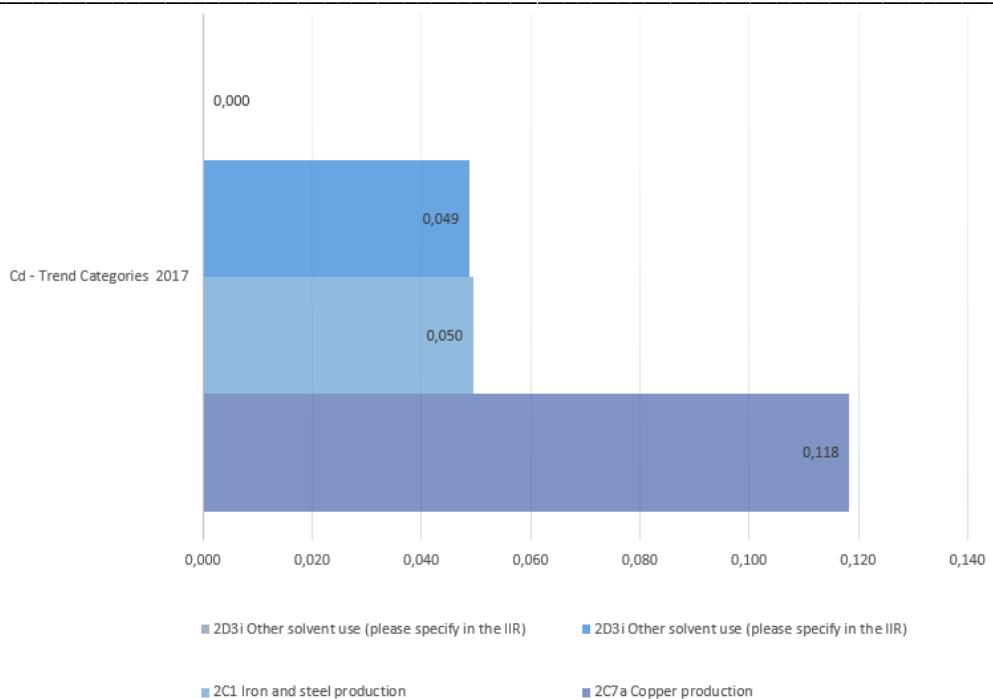


Figure 44. Trends assessments of Cd emissions for base year and 2017

2.4.12. Mercury Emission (HG)

Mercury (Hg) emissions in 2017. was 1,8845t, which is 13.65 % decrease compared to 2016. Compared to the 1990 baseline emissions of Cd is 29.54 % lower.

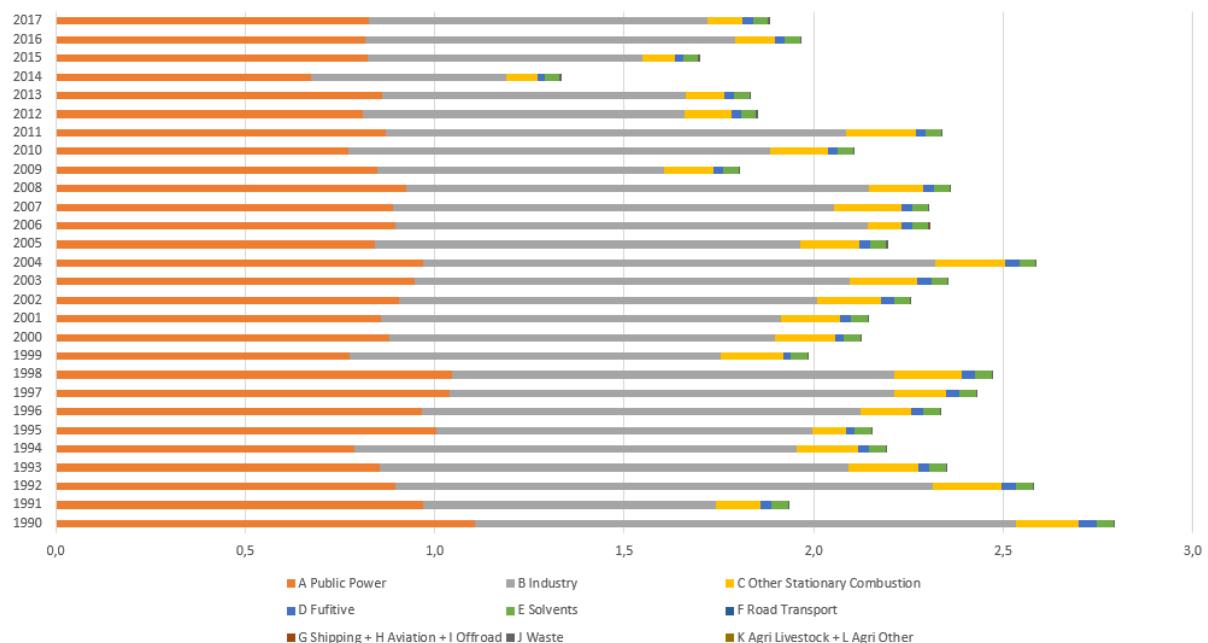


Figure 45. Distribution of Hg between sectors for period 1990 – 2017.

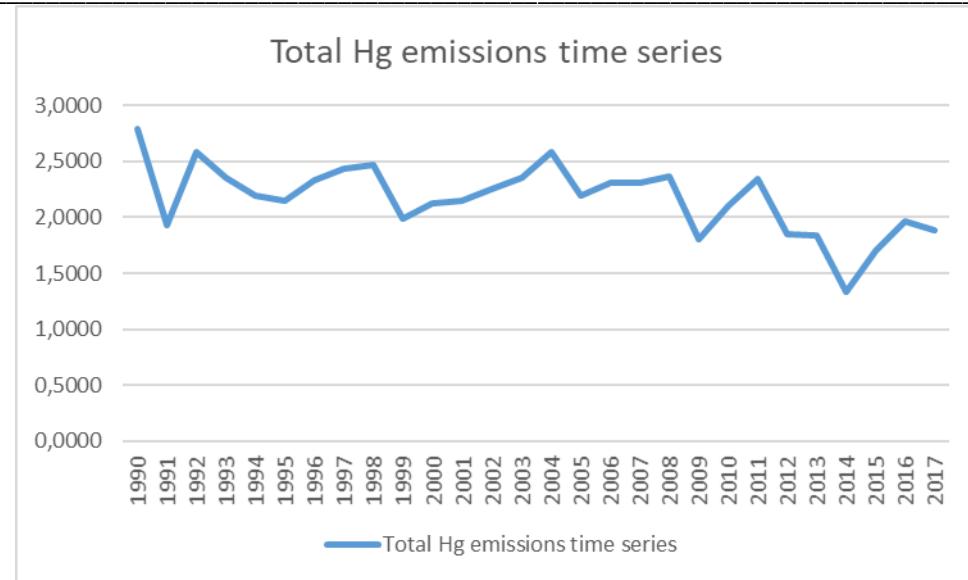


Figure 46. Total Hg emissions time series from 1990 to 2017.

Table 48. Total Hg emissions between sectors for years 1990 and 2017. Trends of dominant sources of Hg emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	Hg Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	1,1068	0,8255	-25,41%	1,23%	39,63%	43,81%
B Industry	1,4273	0,8925	-37,47%	-8,68%	51,10%	47,36%
C Other Stationary Combustion	0,1639	0,0937	-42,81%	-11,34%	5,87%	4,97%
D Fugitive	0,0494	0,0282	-42,84%	12,74%	1,77%	1,50%
E Solvents	0,0438	0,0393	-10,30%	-0,53%	1,57%	2,09%
F Road Transport	NA	NA	NA	NA	NA	NA
G Shipping + H Aviation + I Offroad	0,0008	0,0001	-82,50%	-22,22%	0,03%	0,01%
J Waste	0,0011	0,0050	368,20%	8,64%	0,04%	0,27%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	2,7930	1,8845	-32,53%	-4,24%	100,00%	100,00%

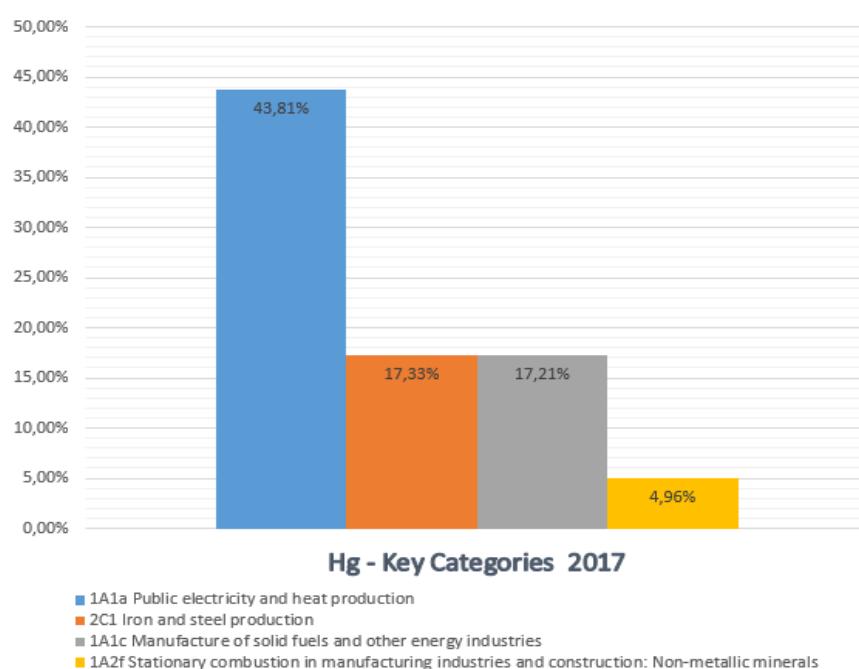


Figure 47. Key Categories assessments of Hg emissions for 2017.

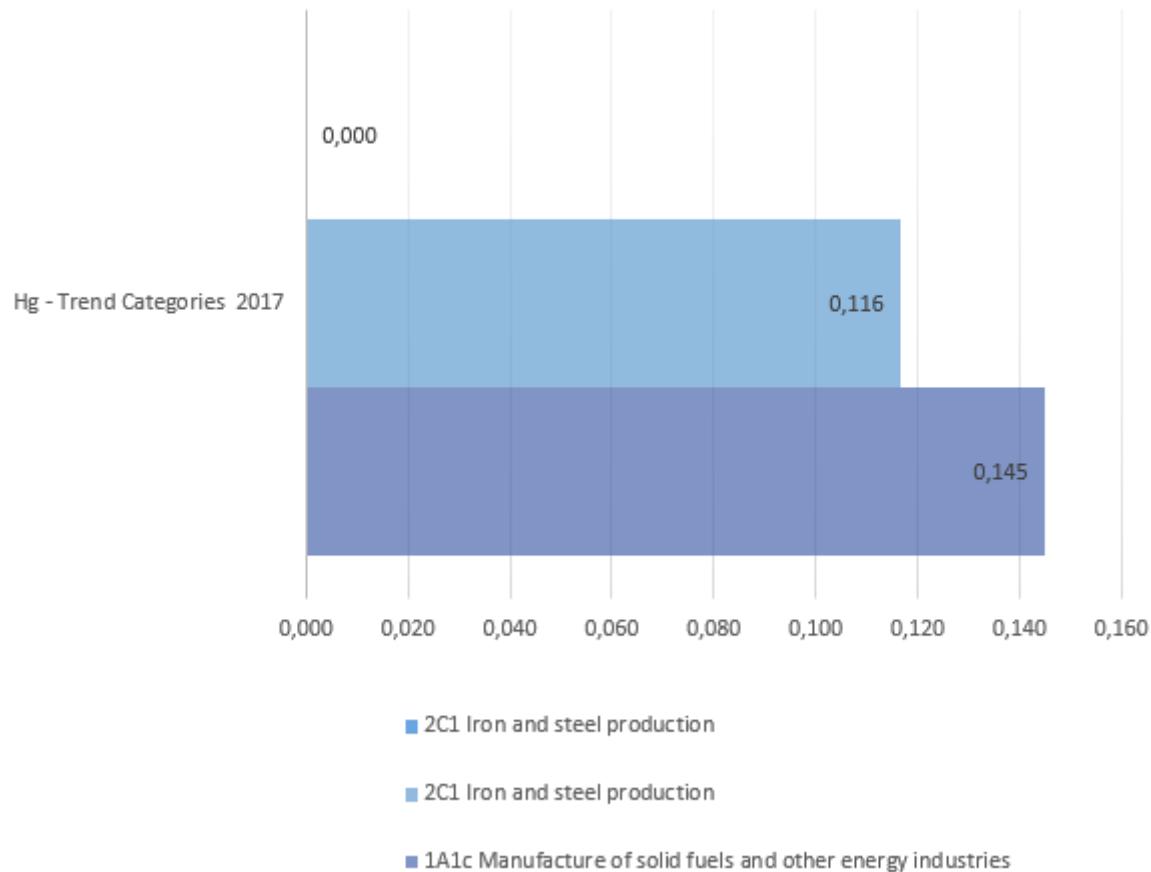


Figure 48. Trends assessments of Hg emissions for base year and 2017

Other Heavy Metals (AS, CR, CU, NI, SE AND ZN)

2.4.13. Arsenic emission (AS)

Arsenic (As) emissions in 2017. was 5,6420 t, which is 2.25 % increase compared to 2016. Compared to the 1990 baseline emissions of As is 28.54 % lower.

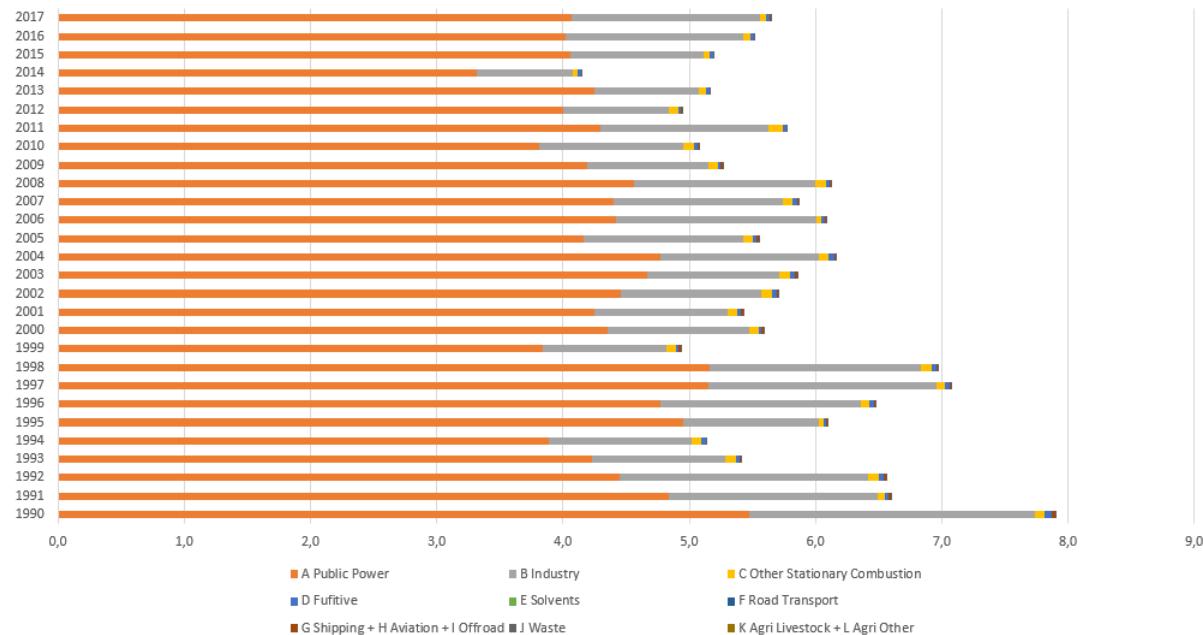


Figure 49. Distribution of As between sectors for period 1990 – 2017.

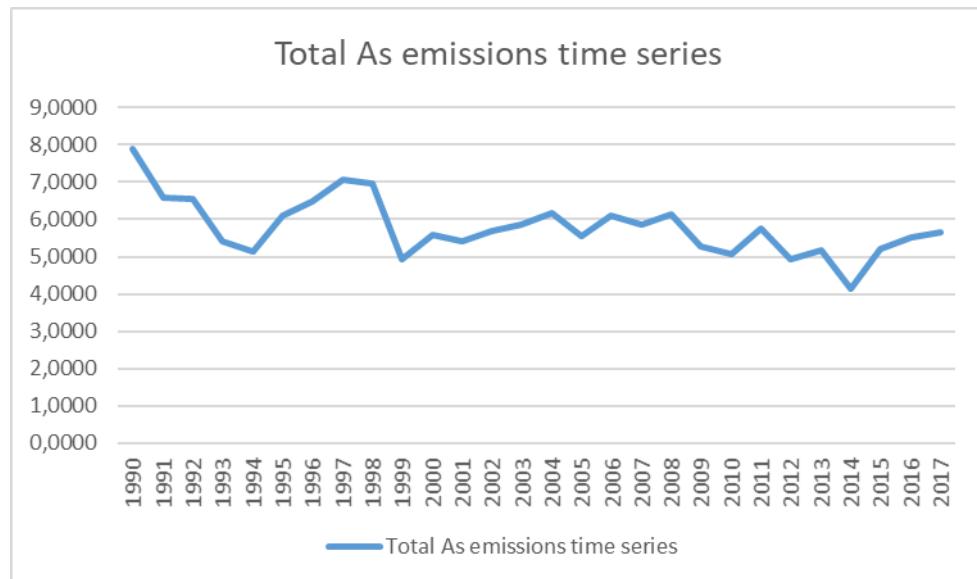


Figure 50.Total As emissions time series from 1990 to 2017.

Table 49. Total As emissions between sectors for years 1990 and 2017. Trends of dominant sources of As emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	As Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	5,4730	4,0693	-25,65%	1,20%	71,81%	72,12%
B Industry	2,2673	1,4869	-34,42%	6,03%	29,75%	26,35%
C Other Stationary Combustion	0,0769	0,0518	-32,59%	-12,73%	1,01%	0,92%
D Fugitive	0,0515	0,0292	-43,36%	13,02%	0,68%	0,52%
E Solvents	0,0002	NA	NA	NA	0,00%	NA
F Road Transport	NA	NA	NA	NA	NA	NA
G Shipping + H Aviation + I Offroad	0,0272	0,0048	-82,50%	-22,22%	0,36%	0,08%
J Waste	0,0000	0,0000	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	7,8961	5,6420	-28,55%	2,31%	103,60%	100,00%

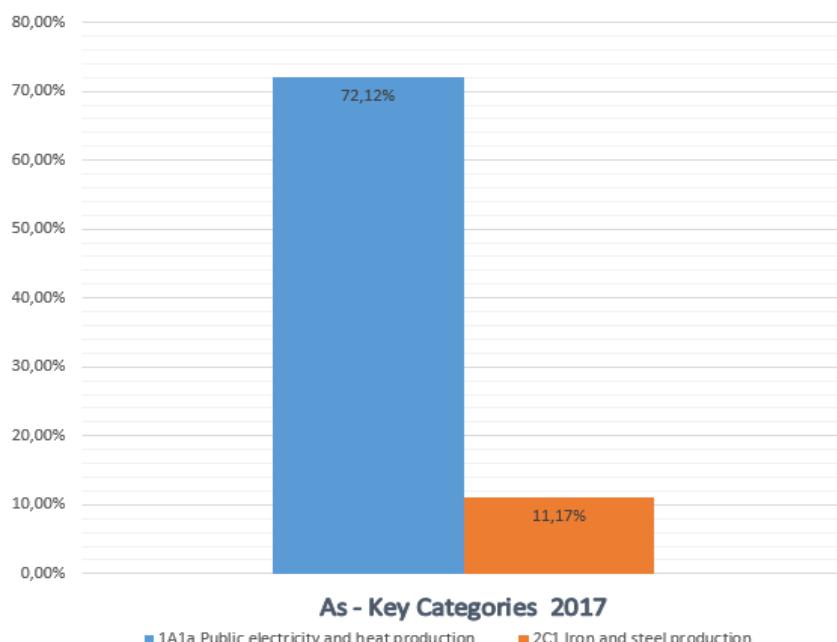


Figure 51. Key Categories assessments of As emissions for 2017

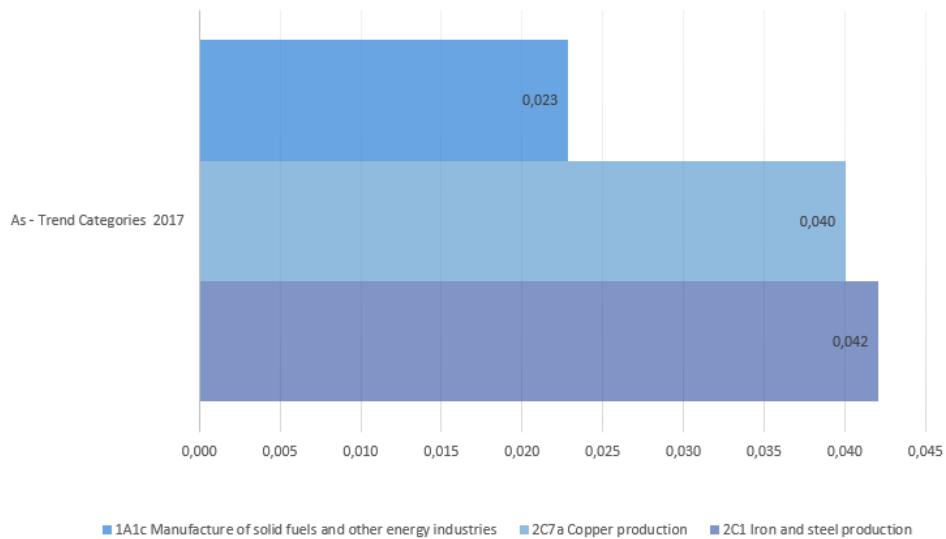


Figure 52. Trends assessments of As emissions for base year and 2017

2.4.14. Chromium emission (Cr)

Chromium (Cr) emissions in 2017. was 12,3468 t, which is 17.34 % increase compared to 2016. Compared to the 1990 baseline emissions of Cr is 5.4 % higher.

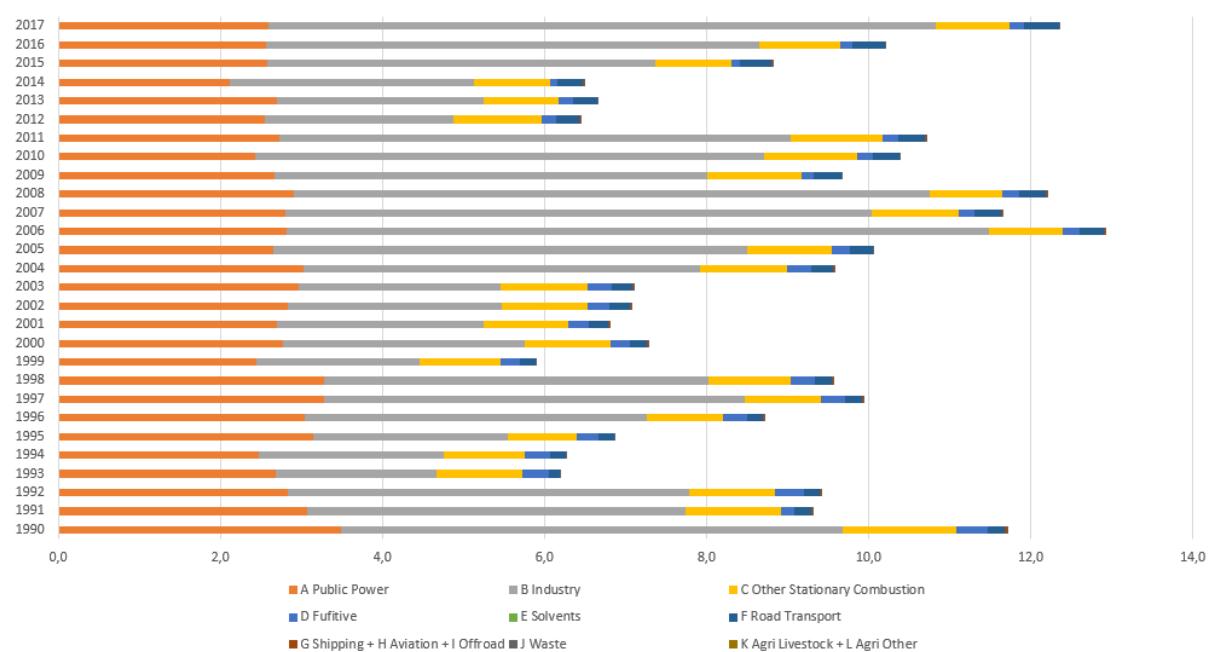


Figure 53. Distribution of Cr between sectors for period 1990 – 2017.

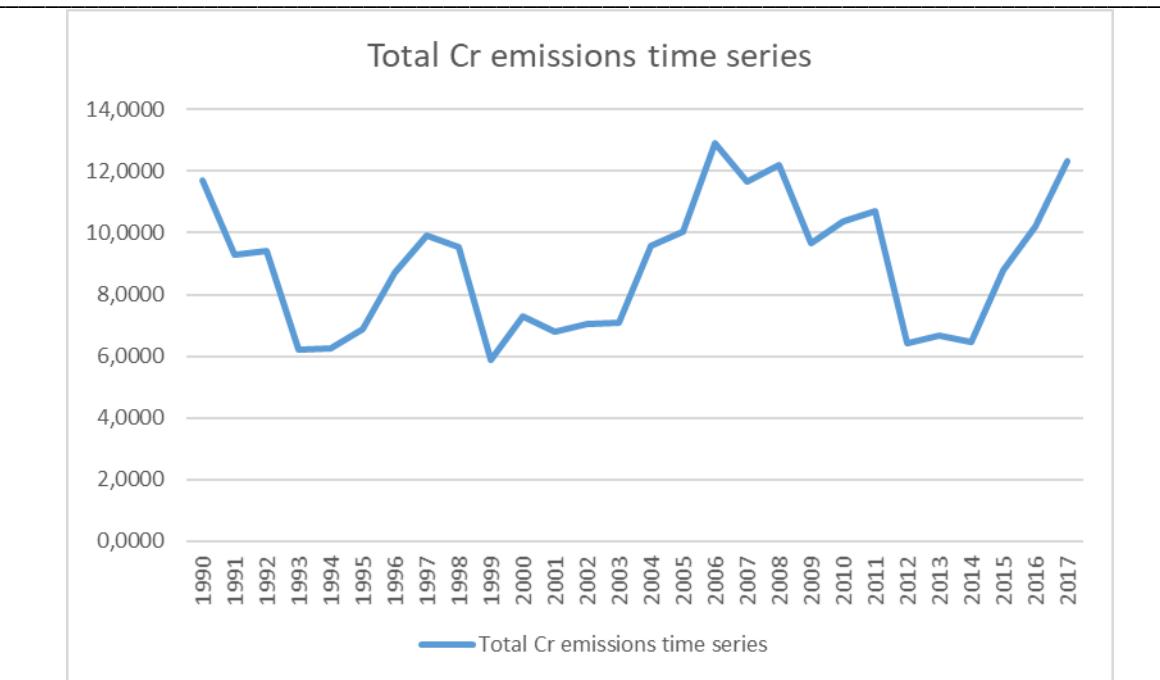


Figure 54. Total Cr emissions time series from 1990 to 2017.

Table 50. Total Cr emissions between sectors for years 1990 and 2017. Trends of dominant sources of Cr emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	Cr Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	3,4815	2,5883	-25,66%	1,20%	29,72%	20,96%
B Industry	6,1980	8,2436	33,00%	35,32%	52,91%	66,77%
C Other Stationary Combustion	1,4051	0,9099	-35,24%	-8,74%	12,00%	7,37%
D Fugitive	0,3825	0,1762	-53,92%	20,38%	3,27%	1,43%
E Solvents	0,0025	NA	NA	NA	0,02%	NA
F Road Transport	0,2136	0,4232	98,14%	4,20%	1,82%	3,43%
G Shipping + H Aviation + I Offroad	0,0303	0,0055	-81,70%	-20,61%	0,26%	0,04%
J Waste	0,0000	0,0000	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	11,7136	12,3468	5,41%	20,97%	100,00%	100,00%

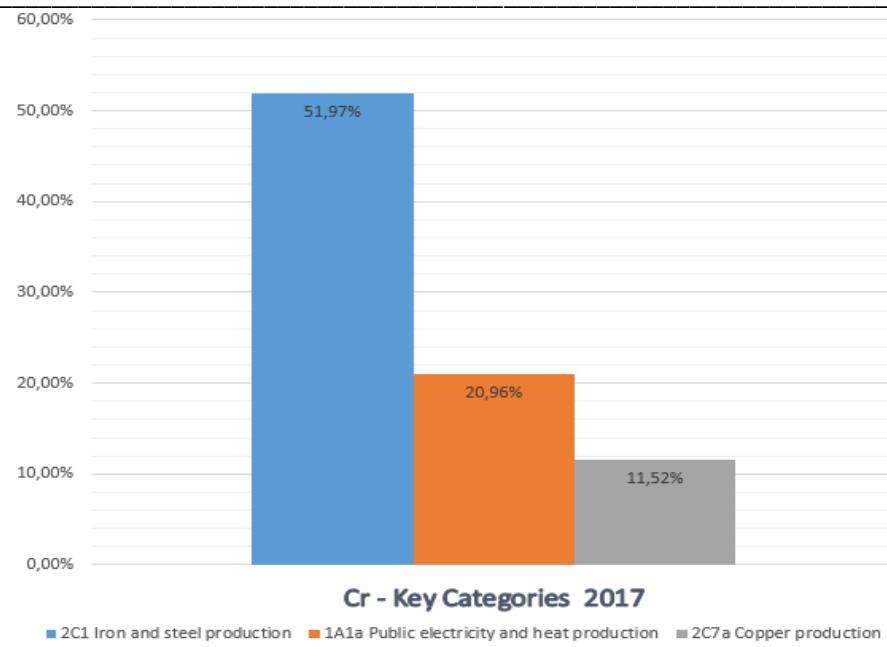


Figure 55. Key Categories assessments of Cr emissions for 2017.

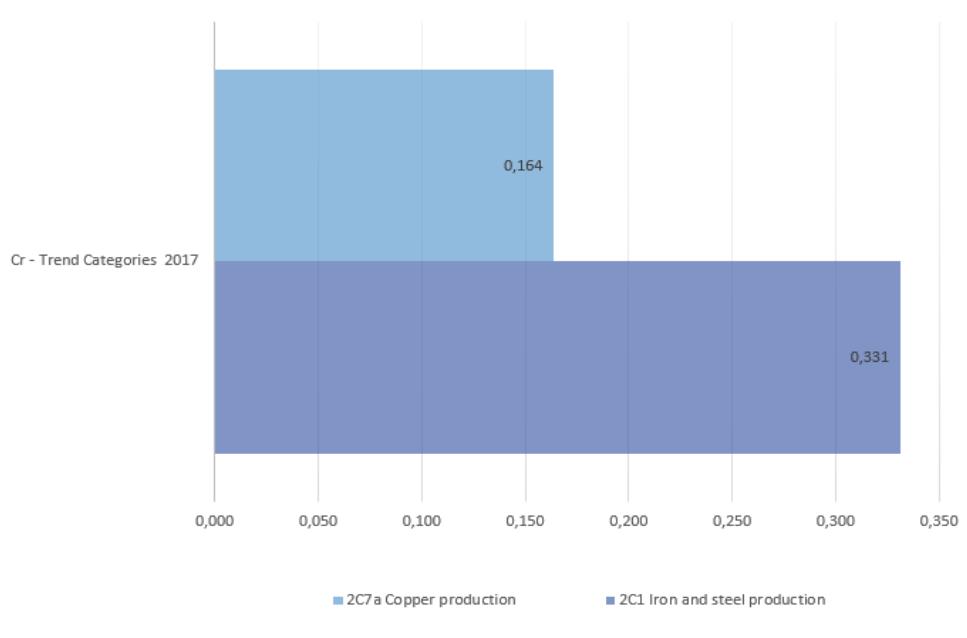


Figure 56. Trends assessments of Cr emissions for base year and 2017

2.4.15. Copper emission (Cu)

Copper (Cu) emissions in 2017. was 17,5475 t, which is 12.55 % increase compared to 2016. Compared to the 1990 baseline emissions of Cu is 11.89 % higher.

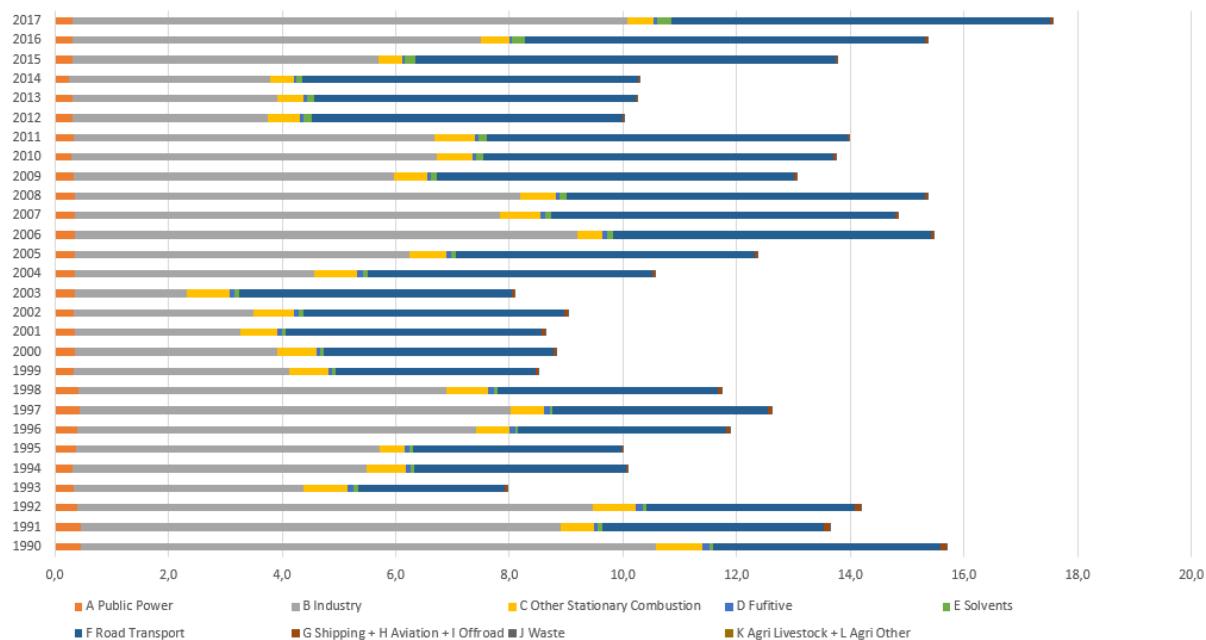


Figure 57. Distribution of Cu between sectors for period 1990 – 2017.

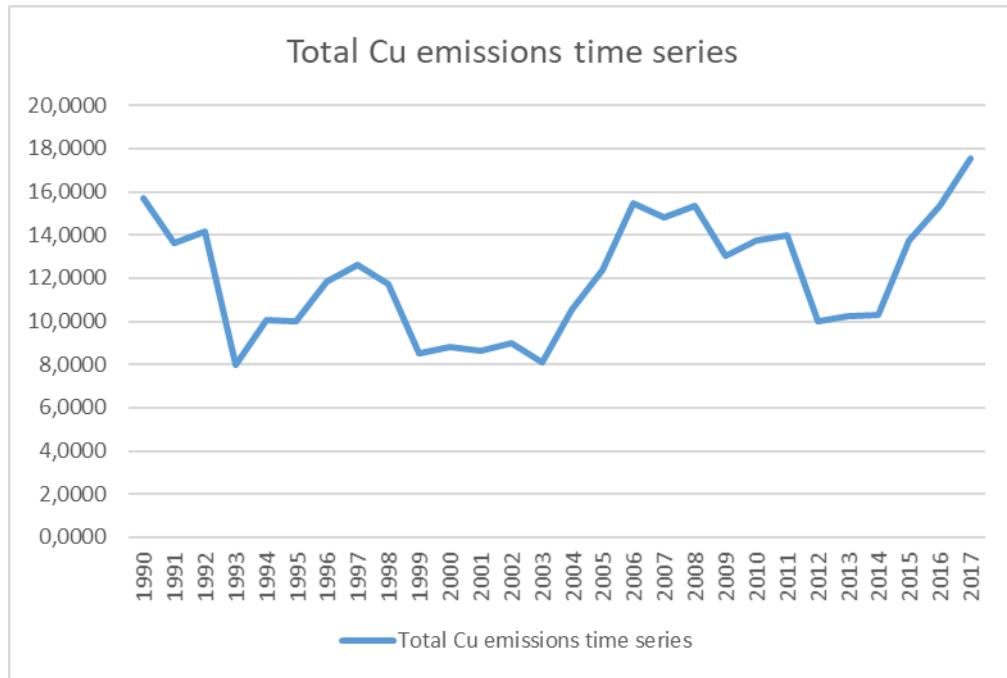


Figure 58.Total Cu emissions time series from 1990 to 2017.

Table 51. Total Cu emissions between sectors for years 1990 and 2017. Trends of dominant sources of Cu emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	Cu Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	0,4608	0,3044	-33,94%	0,64%	2,94%	1,73%
B Industry	10,1270	9,7726	-3,50%	35,81%	64,58%	55,69%
C Other Stationary Combustion	0,8002	0,4541	-43,25%	-8,89%	5,10%	2,59%
D Fugitive	0,1253	0,0620	-50,55%	17,58%	0,80%	0,35%
E Solvents	0,0789	0,2482	214,78%	10,56%	0,50%	1,41%
F Road Transport	3,9889	6,6801	67,47%	-5,15%	25,44%	38,07%
G Shipping + H Aviation + I Offroad	0,1010	0,0260	-74,30%	-8,78%	0,64%	0,15%
J Waste	0,0000	0,0000	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	15,6821	17,5475	11,89%	14,35%	100,00%	100,00%

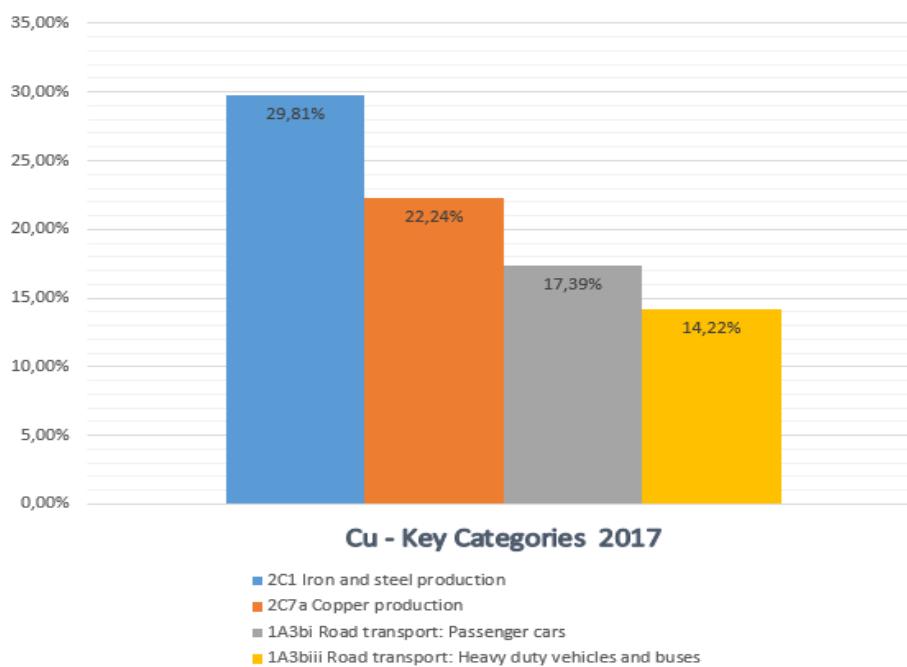


Figure 59. Key Categories assessments of Cu emissions for 2017

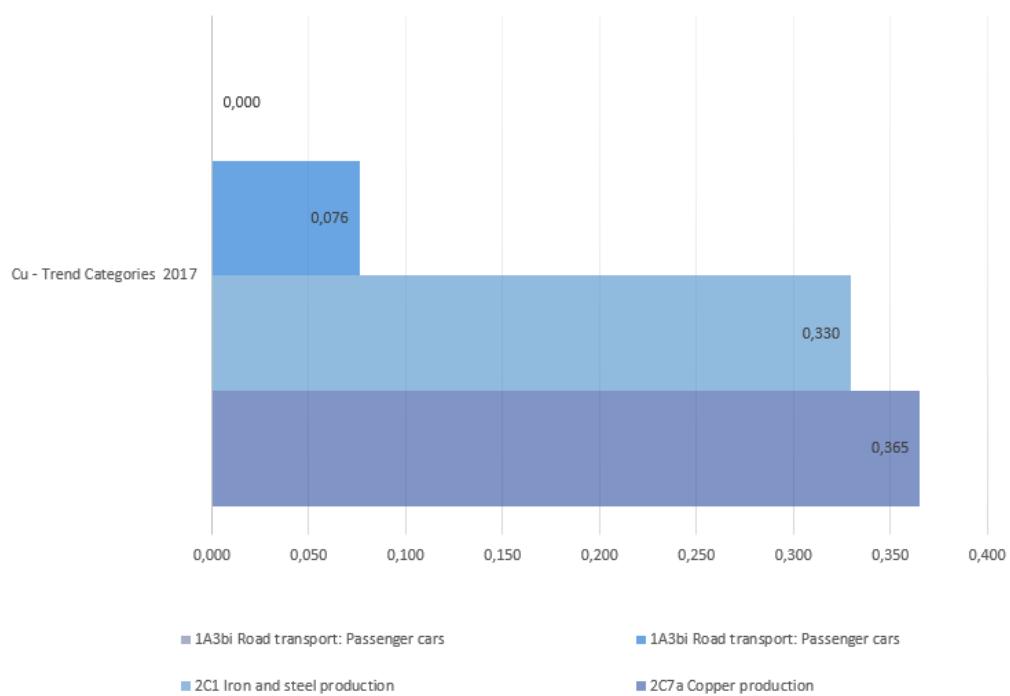


Figure 60. Trends assessments of Cu emissions for base year and 2017

2.4.16. Nickel emission (Ni)

Nickel (Ni) emissions in 2017. was 23,7283 t, which is 29.46 % increase compared to 2016. Compared to the 1990 baseline emissions of Ni is 9.68 % higher.

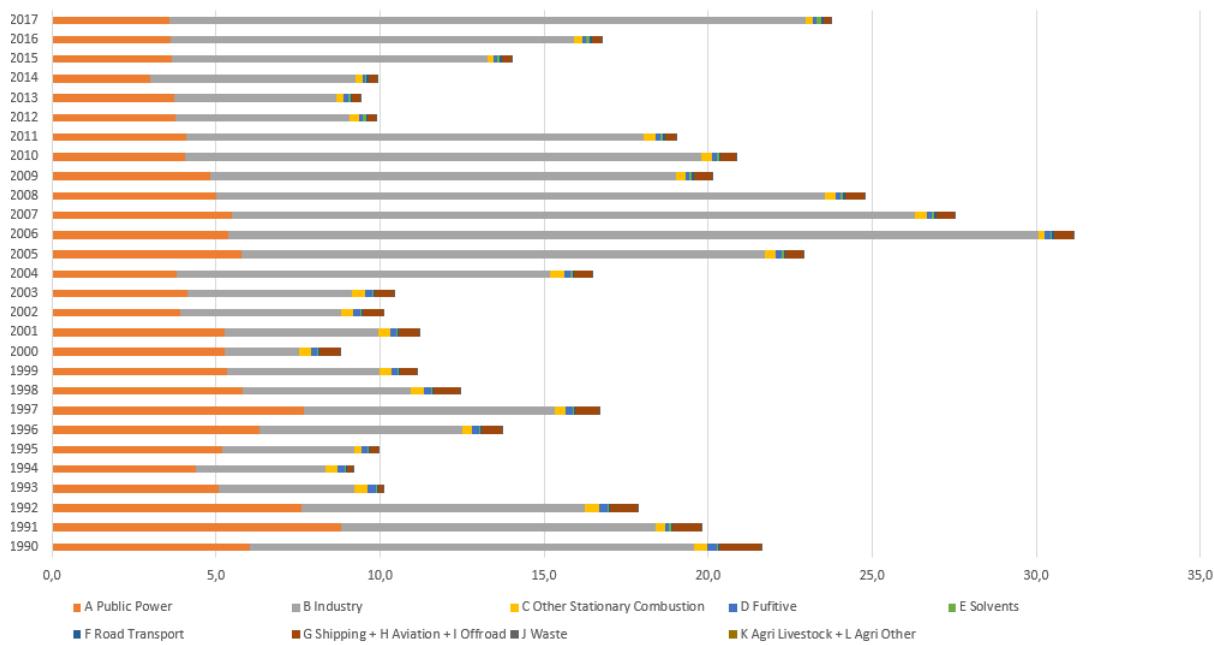


Figure 61. Distribution of Ni between sectors for period 1990 – 2017

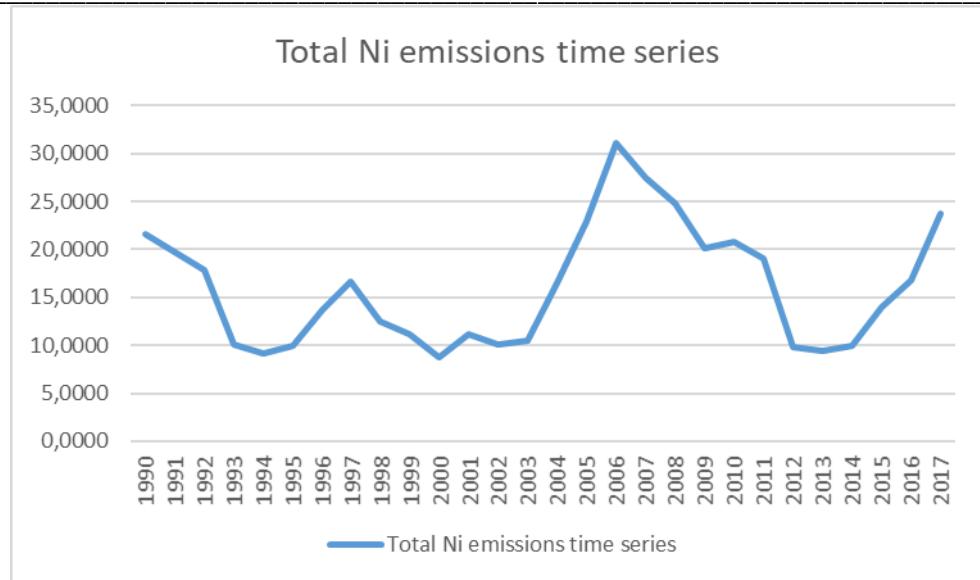


Figure 62.Total Ni emissions time series from 1990 to 2017.

Table 52. Total Ni emissions between sectors for years 1990 and 2017. Trends of dominant sources of Ni emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	Ni Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	6,0465	3,5797	-40,80%	-0,73%		15,09%
B Industry	13,5221	19,3860	43,37%	57,45%	62,50%	81,70%
C Other Stationary Combustion	0,4024	0,2143	-46,76%	-10,44%	1,86%	0,90%
D Fugitive	0,2771	0,1294	-53,30%	19,82%	1,28%	0,55%
E Solvents	0,0606	0,1241	104,87%	10,56%	0,28%	0,52%
F Road Transport	0,0430	0,0700	62,90%	-3,08%	0,20%	0,30%
G Shipping + H Aviation + I Offroad	1,2821	0,2247	-82,47%	-22,17%	5,93%	0,95%
J Waste	0,0000	0,0001	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	21,6338	23,7283	9,68%	41,76%	100,00%	100,00%

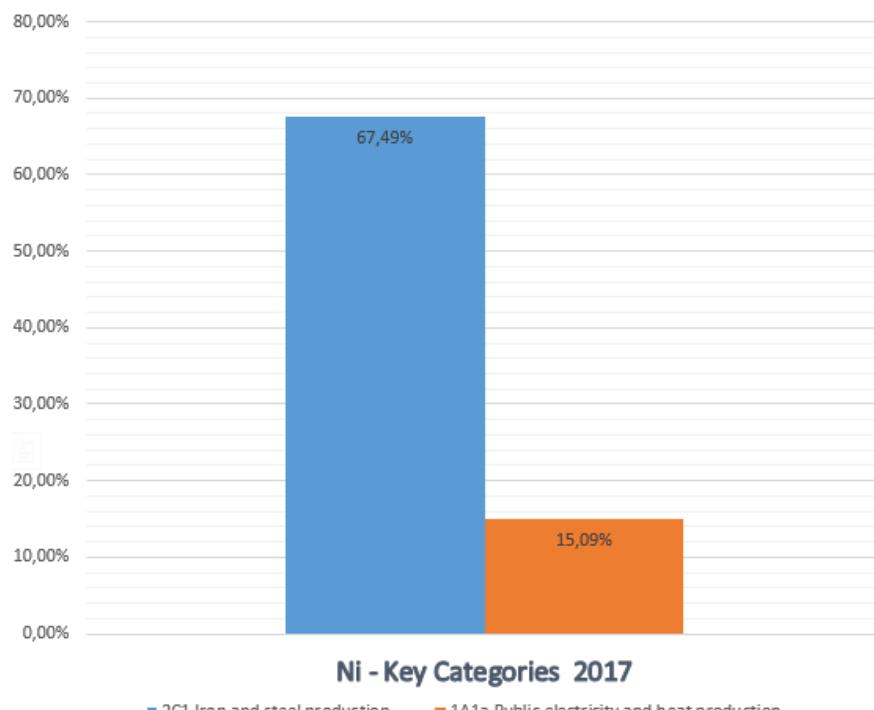


Figure 63. Key Categories assessments of Ni emissions for 2017

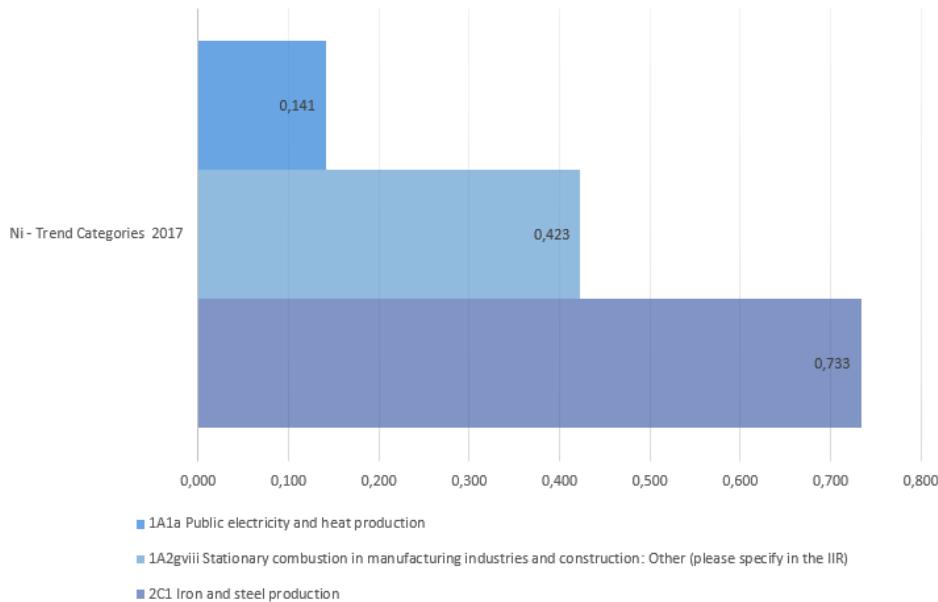


Figure 64. Trends assessments of Ni emissions for base year and 2017

2.4.17. Selenium emission (Se)

Selenium (Se) emissions in 2017. was 13,3752 t, which is 0.11 % increase compared to 2016. Compared to the 1990 baseline emissions of Se is 25.57 % lower.

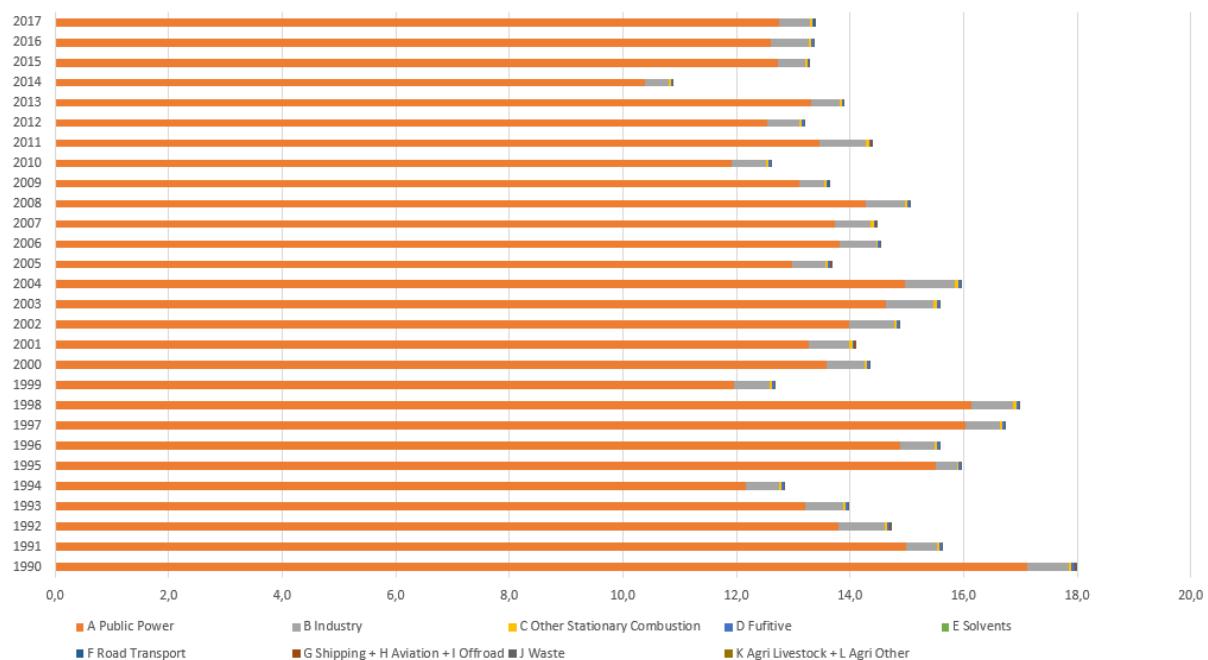


Figure 65. Distribution of Se between sectors for period 1990 – 2017.

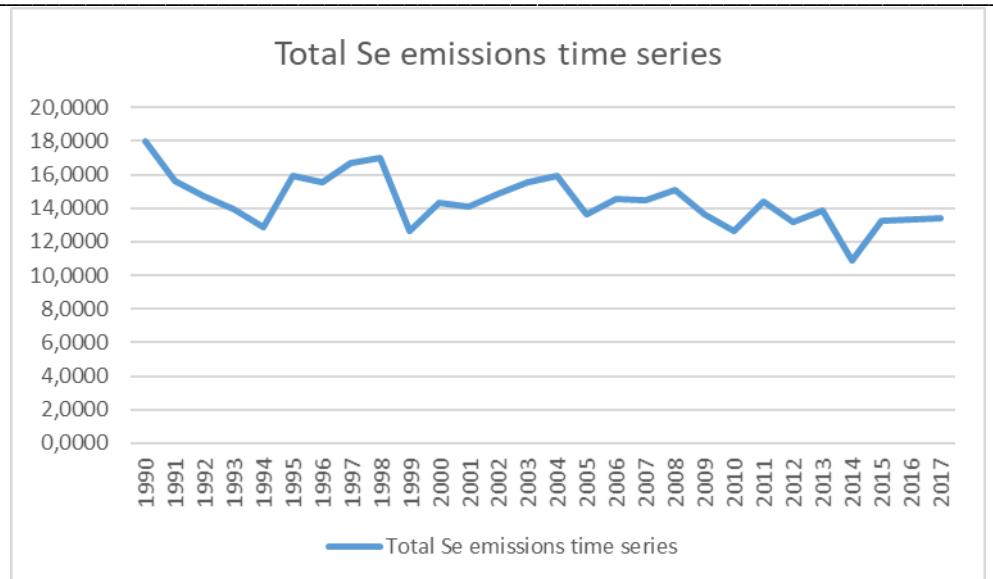


Figure 66.Total Se emissions time series from 1990 to 2017.

Table 53. Total Se emissions between sectors for years 1990 and 2017. Trends of dominant sources of Se emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	Se Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	17,1221	12,7574	-25,49%	1,23%	95,27%	95,38%
B Industry	0,7261	0,5419	-25,36%	-20,34%	4,04%	4,05%
C Other Stationary Combustion	0,0526	0,0365	-30,59%	-11,42%	0,29%	0,27%
D Fugitive	0,0578	0,0320	-44,69%	13,75%	0,32%	0,24%
E Solvents	0,0002	NA	NA	NA	0,00%	NA
F Road Transport	0,0038	0,0058	53,16%	-1,52%	0,02%	0,04%
G Shipping + H Aviation + I Offroad	0,0087	0,0016	-81,94%	-21,09%	0,05%	0,01%
J Waste	0,0000	0,0001	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	17,9713	13,3752	-25,57%	0,11%	100,00%	100,00%

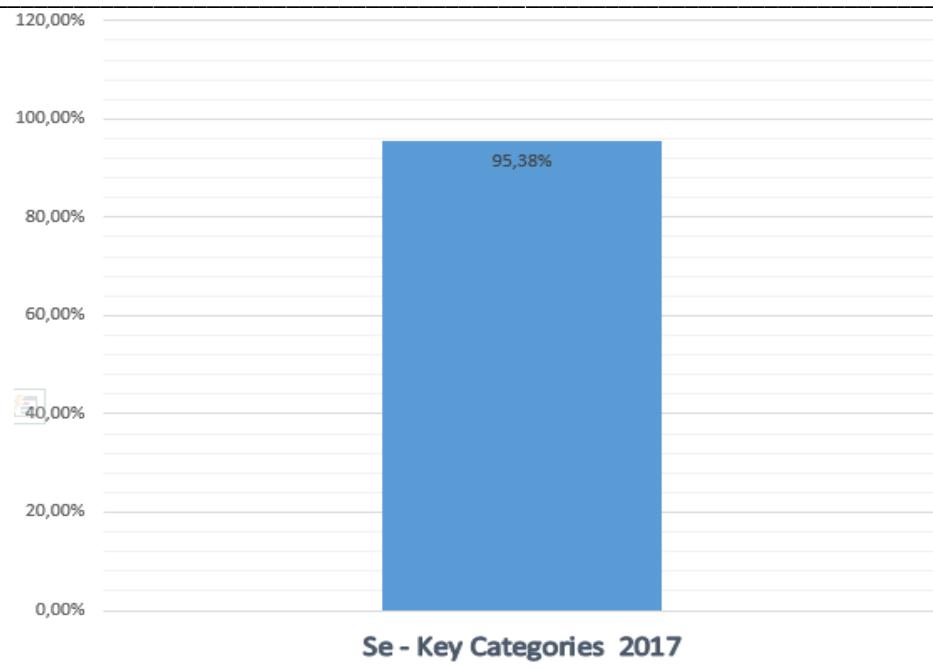


Figure 67. Key Categories assessments of Se emissions for 2017.

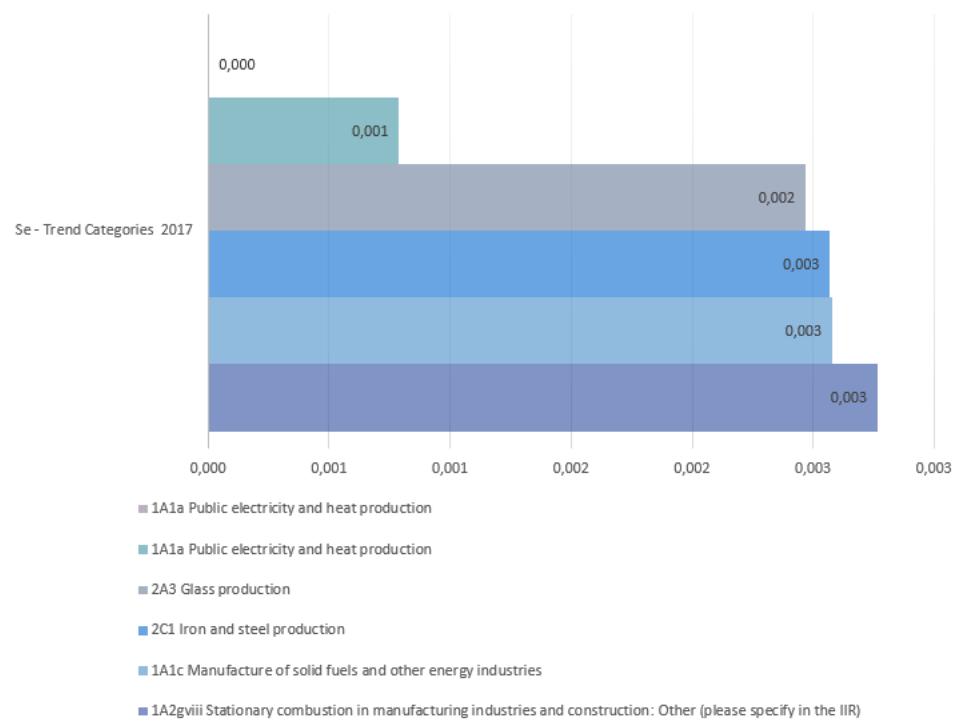


Figure 68. Trends assessments of Se emissions for base year and 2017

2.4.18. Zinc emission (Zn)

Zinc (Zn) emissions in 2017. was 63,2094t, which is 14.51 % increase compared to 2016. Compared to the 1990 baseline emissions of Zn is 22.62 % higher.

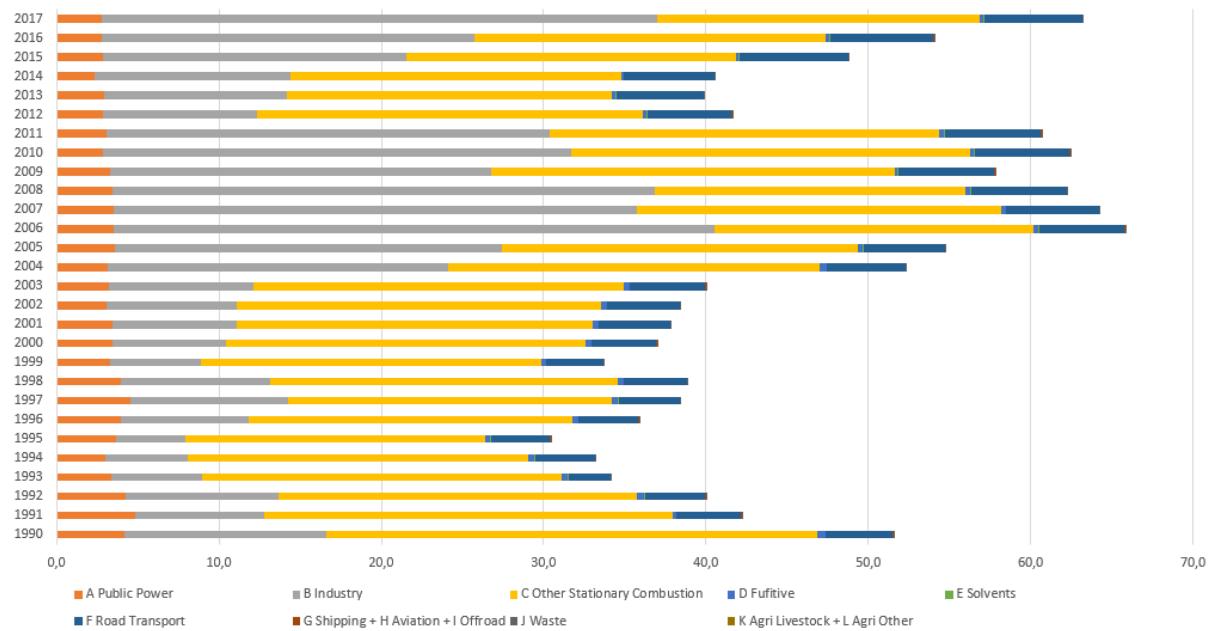


Figure 69. Distribution of Zn between sectors for period 1990 - 2017

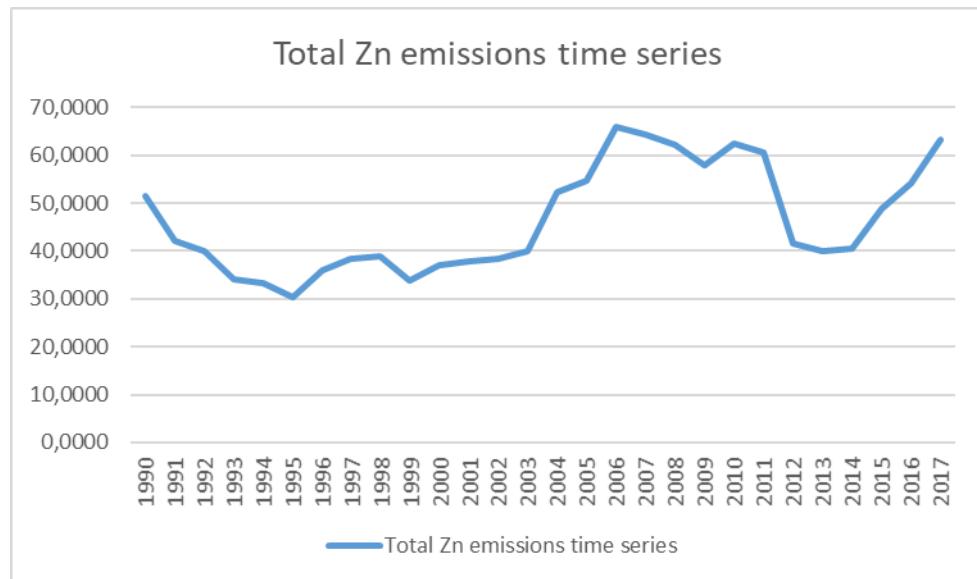


Figure 70.Total Zn emissions time series from 1990 to 2016.

Table 54. Total Zn emissions between sectors for years 1990 and 2017. Trends of dominant sources of Zn emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	Zn Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	4,2201	2,8107	-33,40%	0,28%	8,19%	4,45%
B Industry	12,4203	34,1731	175,14%	49,07%	24,09%	54,06%
C Other Stationary Combustion	30,2015	19,8504	-34,27%	-8,32%	58,59%	31,40%
D Fugitive	0,4879	0,2231	-54,28%	20,71%	0,95%	0,35%
E Solvents	0,0394	0,1241	214,78%	10,56%	0,08%	0,20%
F Road Transport	4,1025	6,0089	46,47%	-5,18%	7,96%	9,51%
G Shipping + H Aviation + I Offroad	0,0780	0,0185	-76,25%	-11,47%	0,15%	0,03%
J Waste	0,0001	0,0005	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	51,5499	63,2094	22,62%	16,98%	100,00%	100,00%

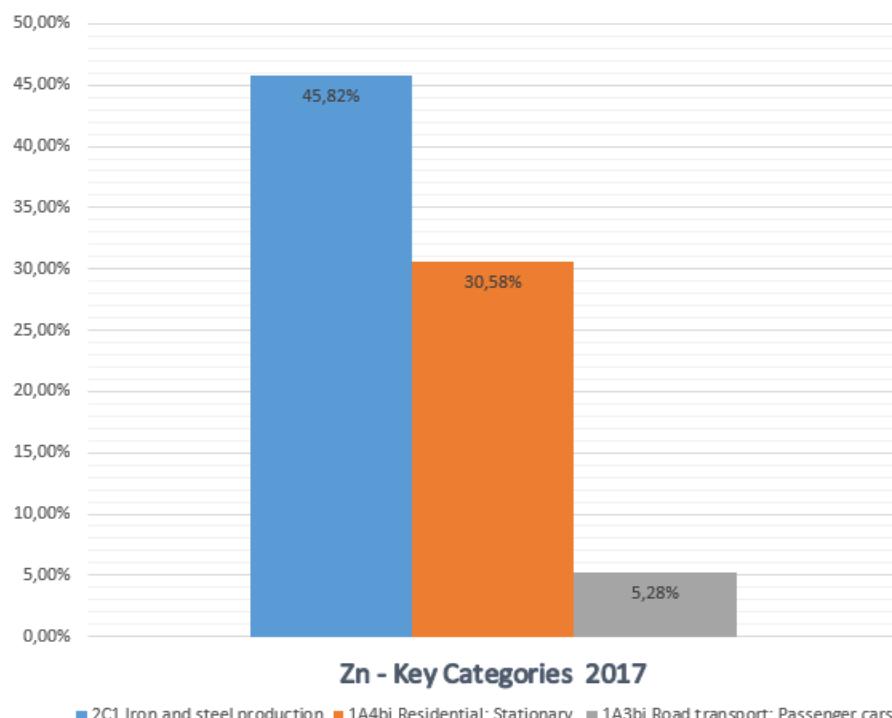


Figure 71. Key Categories assessments of Zn emissions for 2017

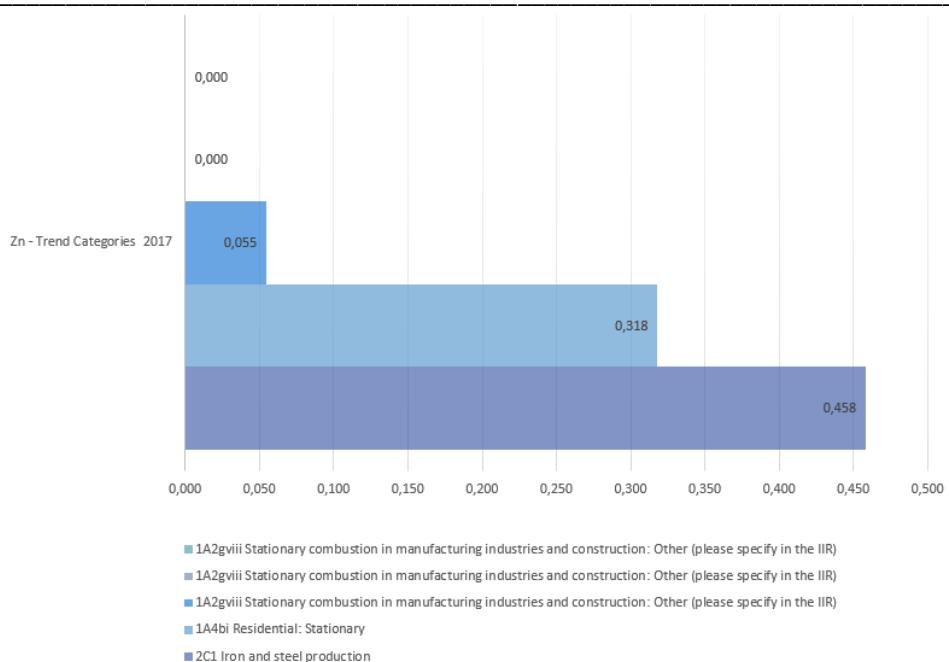


Figure 72. Trends assessments of Zn emissions for base year and 2017

PERSISTENT ORGANIC POLLUTANTS EMISSION (POP s)

2.4.19. DIOXINS AND FURANS EMISSION (PCDD/PCDF)

Dioxins and furans (PCDD/PCDF) emissions in 2017. was 51,3735g I-TEQ, which is 1.67 % increase compared to 2016. Compared to the 1990 baseline emissions of PCDD/PCDF is 26.01 % lower.

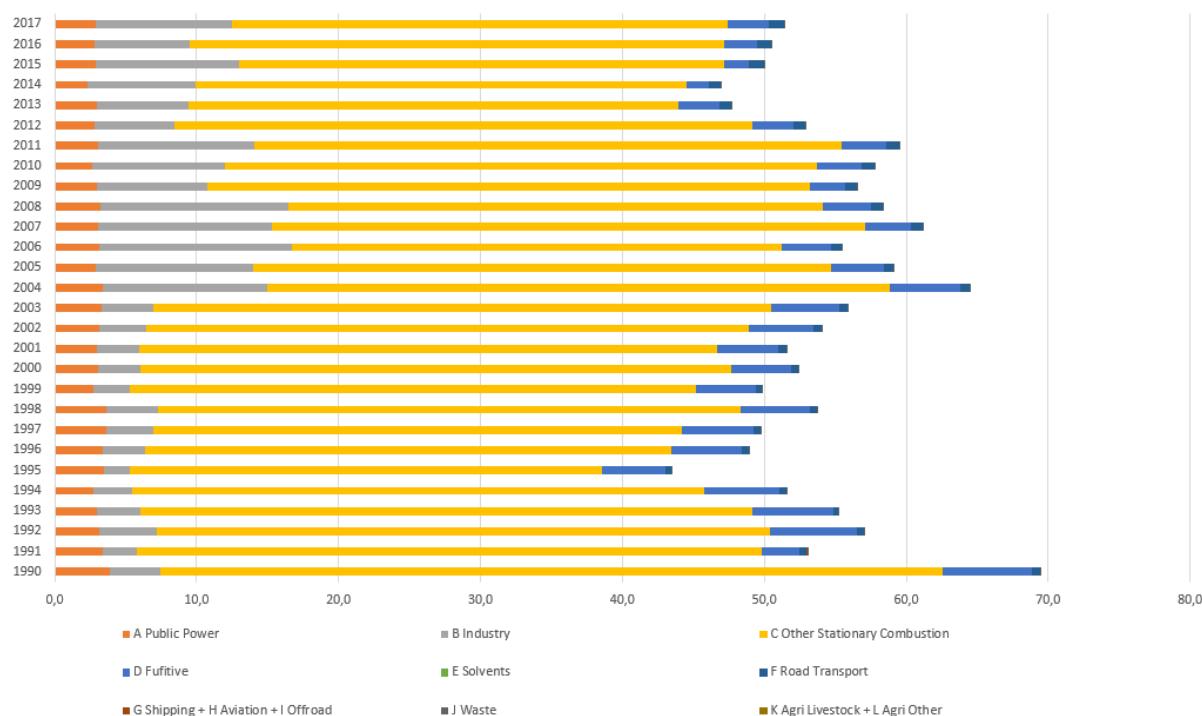


Figure 73. Distribution of PCDD/PCDF between sectors for period 1990 – 2017

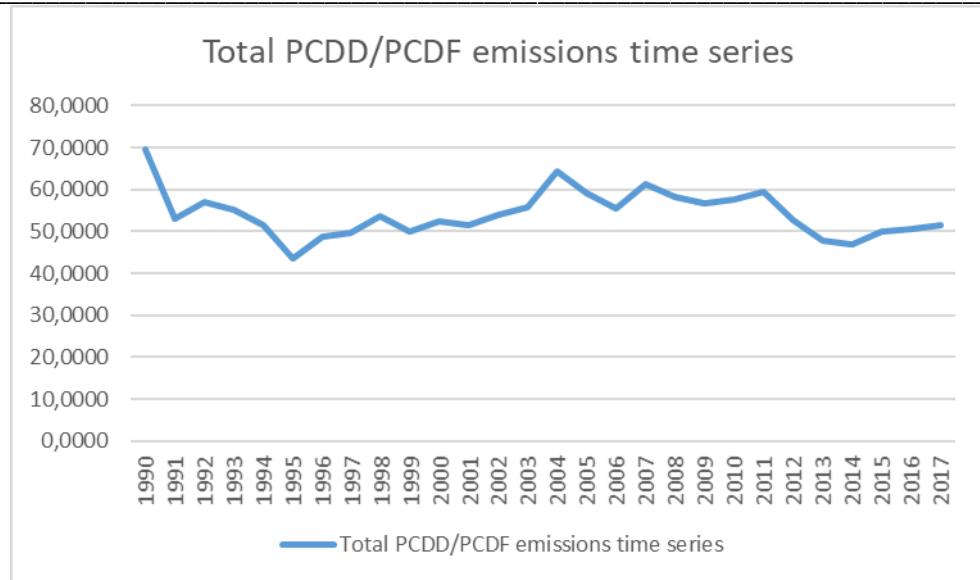


Figure 74. Total PCDD/PCDF emissions time series from 1990 to 2017.

Table 55. Total PCDD/PCDF emissions between sectors for years 1990 and 2017. Trends of dominant sources of PCDD emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	PCDD/PCDF Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	3,8539	2,8626	-25,72%	1,21%	5,55%	5,57%
B Industry	3,6053	9,5961	166,17%	44,50%	5,19%	18,68%
C Other Stationary Combustion	55,0742	34,9865	-36,47%	-7,11%	79,32%	68,10%
D Fugitive	6,3509	2,8289	-55,46%	21,85%	9,15%	5,51%
E Solvents	0,0015	0,0046	214,78%	10,56%	0,00%	0,01%
F Road Transport	0,5326	1,0915	104,93%	3,55%	0,77%	2,12%
G Shipping + H Aviation + I Offroad	0,0188	0,0033	-82,50%	-22,22%	0,03%	0,01%
J Waste	0,0000	0,0001	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	69,4371	51,3735	-26,01%	1,70%	100,00%	100,00%

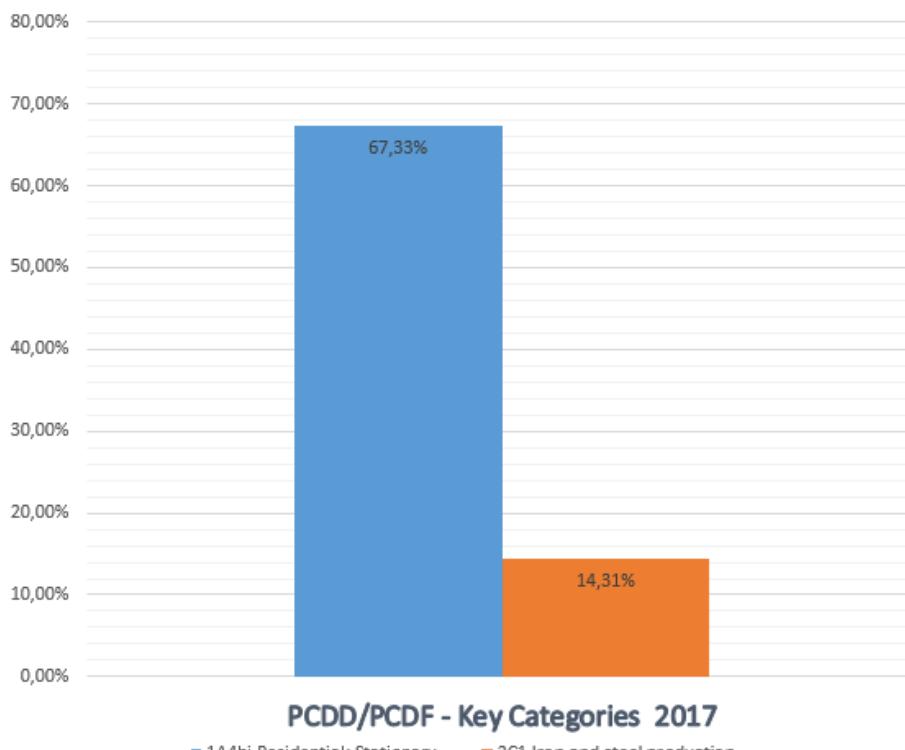


Figure 75. Key Categories assessments of PCDD/PCDF emissions for 2017.



Figure 76. Trends assessments of PCDD/PCDF emissions for base year and 2017

POLYCYCLIC AROMATIC HYDROCARBON (PAH) EMISSION

2.4.20. PAHs – Benzo (a) pyrene

Benzo (a) pyrene emissions in 2017. was 6,7632 t, which is 6.90 % decrease compared to 2016. Compared to the 1990 baseline emissions of Benzo (a) pyrene is 39.3 % lower.

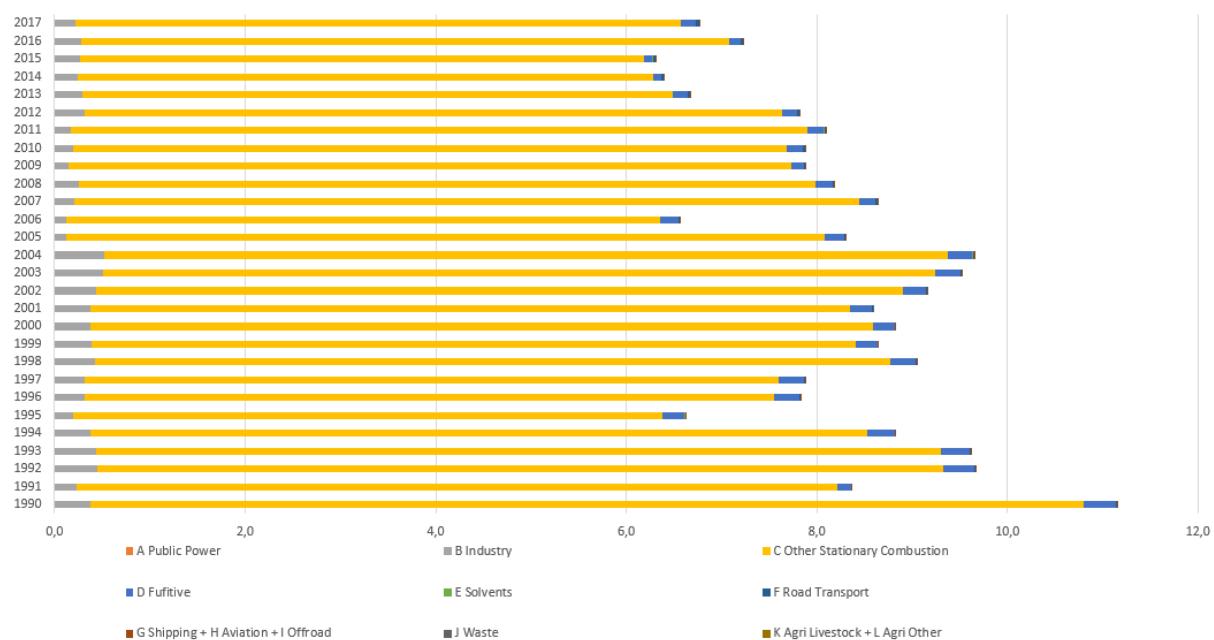


Figure 77. Distribution of Benzo (a) pyrene between sectors for period 1990 – 2017.

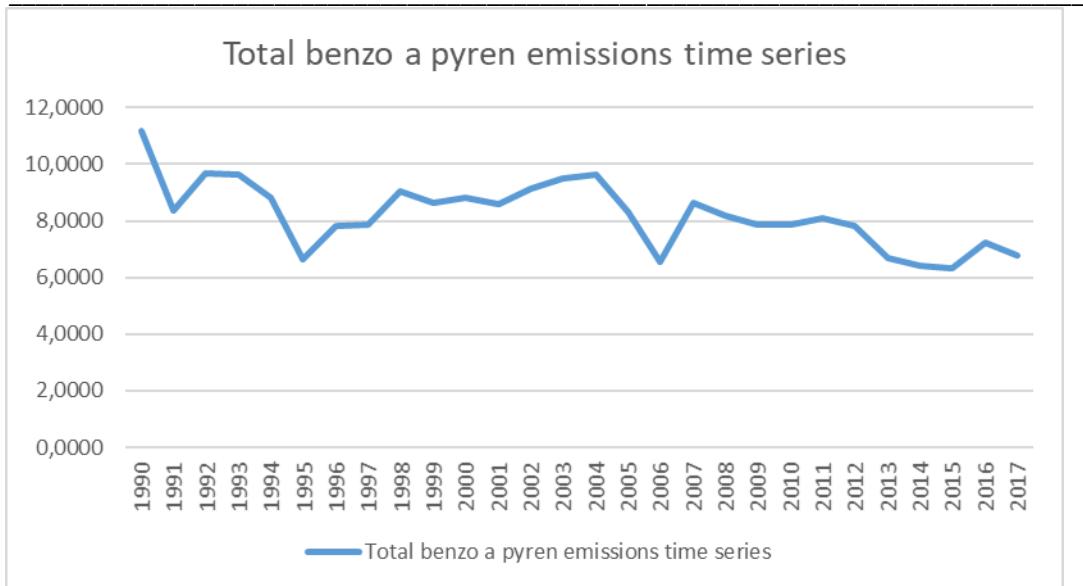


Figure 78.Total benzo a pyren emissions time series from 1990 to 2017.

Table 56. Total benzo (a) pyren emissions between sectors for years 1990 and 2017. Trends of dominant sources of benzo (a) pyren emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	benzo a pyren Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	0,0005	0,0006	14,94%	-1,29%	0,00%	0,01%
B Industry	0,3722	0,2201	-40,86%	-22,43%	3,50%	3,25%
C Other Stationary Combustion	10,4307	6,3564	-39,06%	-6,38%	98,06%	93,99%
D Fugitive	0,3373	0,1499	-55,57%	21,96%	3,17%	2,22%
E Solvents	0,0016	0,0051	214,78%	10,56%	0,02%	0,08%
F Road Transport	0,0092	0,0309	234,79%	7,78%	0,09%	0,46%
G Shipping + H Aviation + I Offroad	0,0009	0,0003	-66,26%	0,01%	0,01%	0,00%
J Waste	0,0000	0,0000	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	11,1524	6,7632	-39,36%	-6,46%	104,85%	100,00%

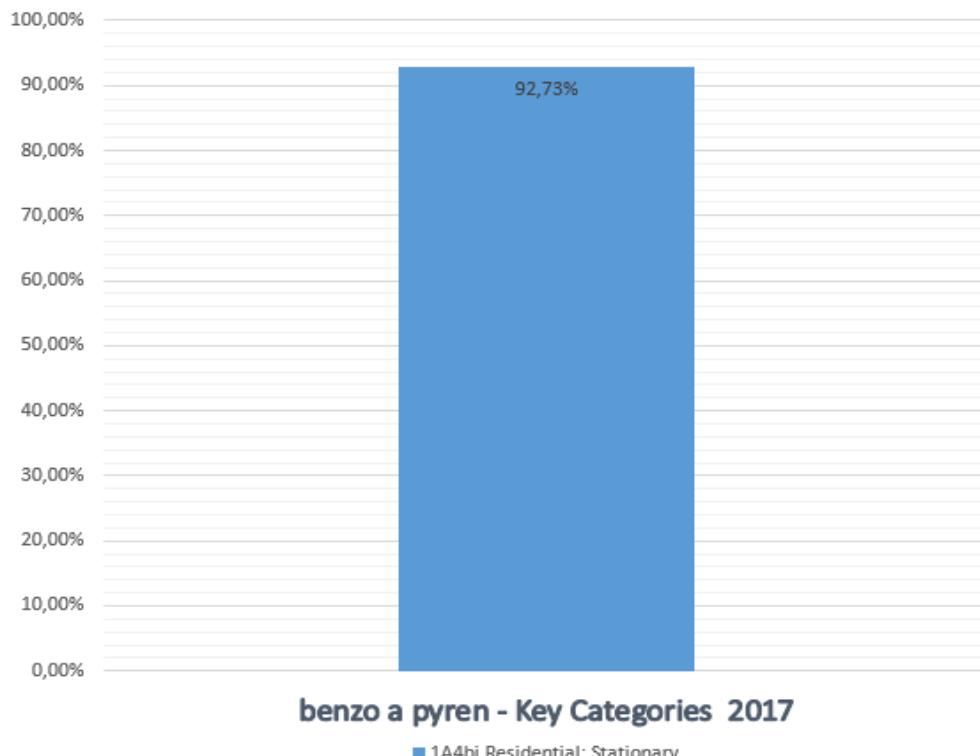


Figure 79. Key Categories assessments of benzo a pyren emissions for 2017.

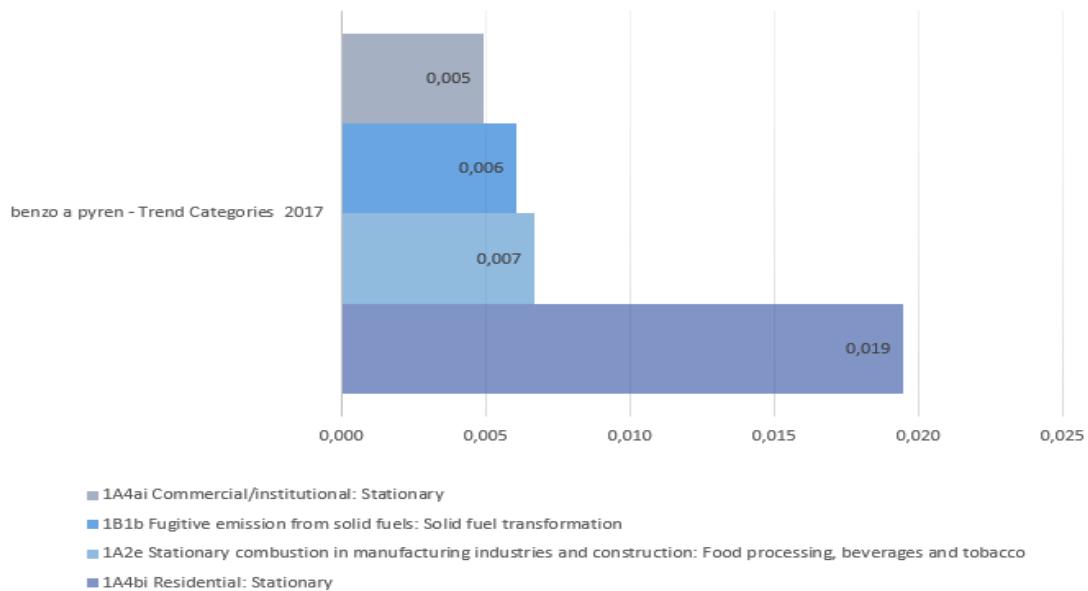


Figure 80. Trends assessments of Benzo a pyren emissions for base year and 2017

2.4.21. PAHs – Benzo (b) fluoranthene

Benzo (b) fluoranthene emissions in 2017. was 7,5976t, which is 6.31 % decrease compared to 2016. Compared to the 1990 baseline emissions of Benzo (b) fluoranthene is 40.81% lower.

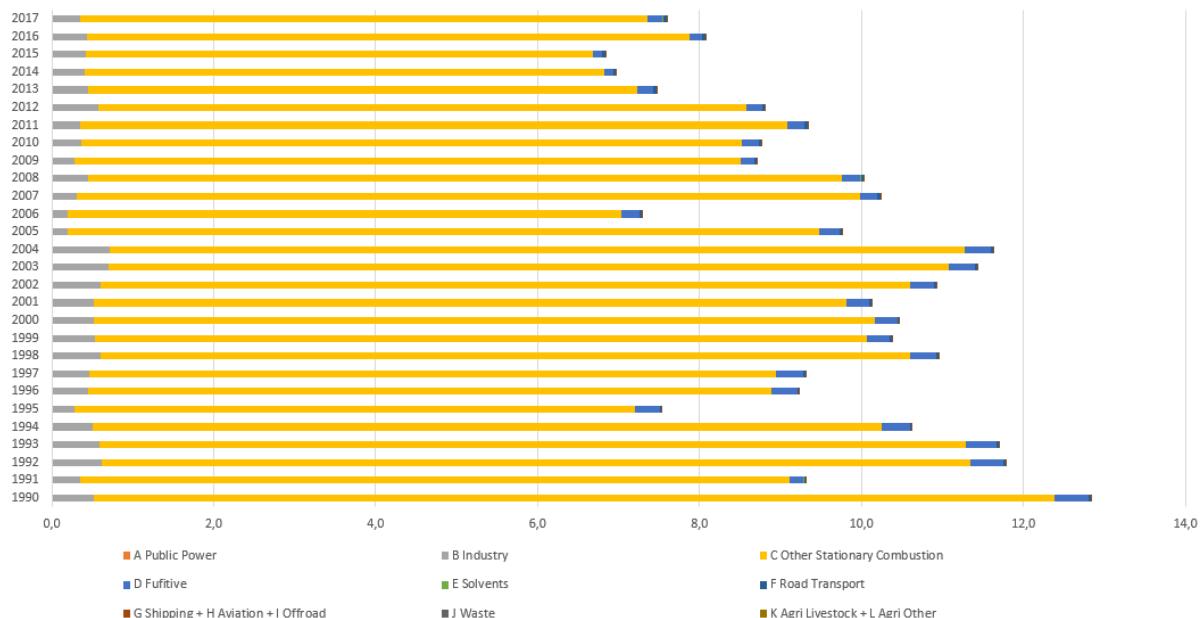


Figure 81. Distribution of benzo (b) fluoranthene between sectors for period 1990 – 2017.

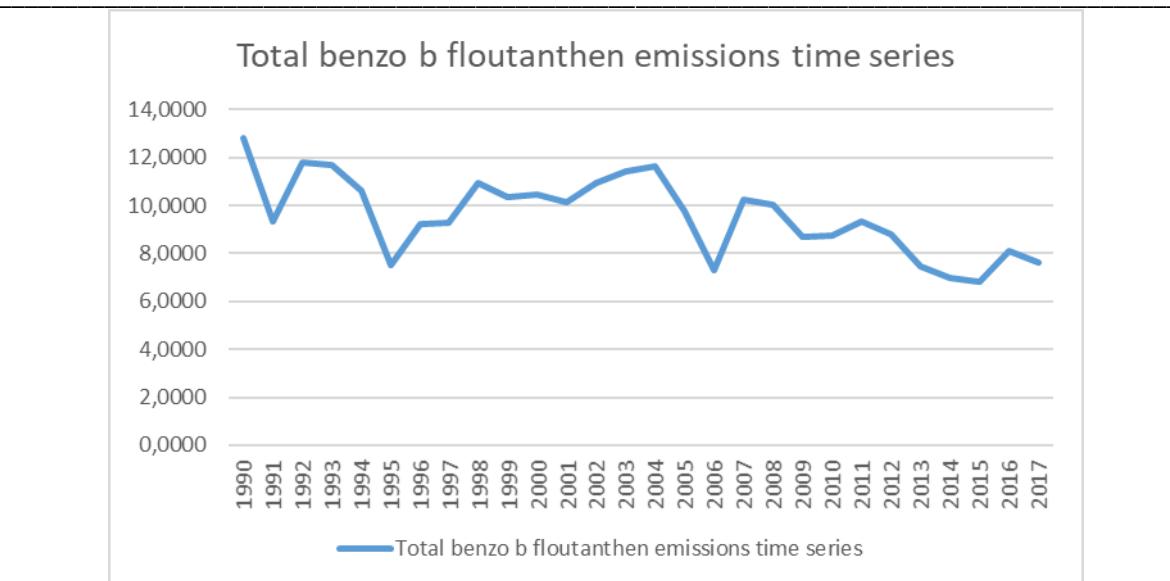


Figure 82. Total benzo b fluoranthene emissions time series from 1990 to 2017.

Table 57. Total benzo (b) fluoranthene emissions between sectors for years 1990 and 2017. Trends of dominant sources of benzo (b) fluoranthene emissions compared to years 1990-2017 and 2016-2017.

Share in National Total for years 1990 and 2017

NFR Category	benzo b fluoranthene Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	0,0142	0,0105	-25,86%	1,23%	0,11%	0,14%
B Industry	0,5060	0,3444	-31,93%	-20,08%	3,94%	4,53%
C Other Stationary Combustion	11,8677	7,0021	-41,00%	-5,78%	92,46%	92,16%
D Fugitive	0,4216	0,1873	-55,57%	21,96%	3,28%	2,47%
E Solvents	0,0007	0,0021	214,78%	10,56%	0,01%	0,03%
F Road Transport	0,0243	0,0506	107,86%	6,29%	0,19%	0,67%
G Shipping + H Aviation + I Offroad	0,0015	0,0005	-66,26%	0,01%	0,01%	0,01%
J Waste	0,0000	0,0000	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	12,8359	7,5976	-40,81%	-5,94%	100,00%	100,00%

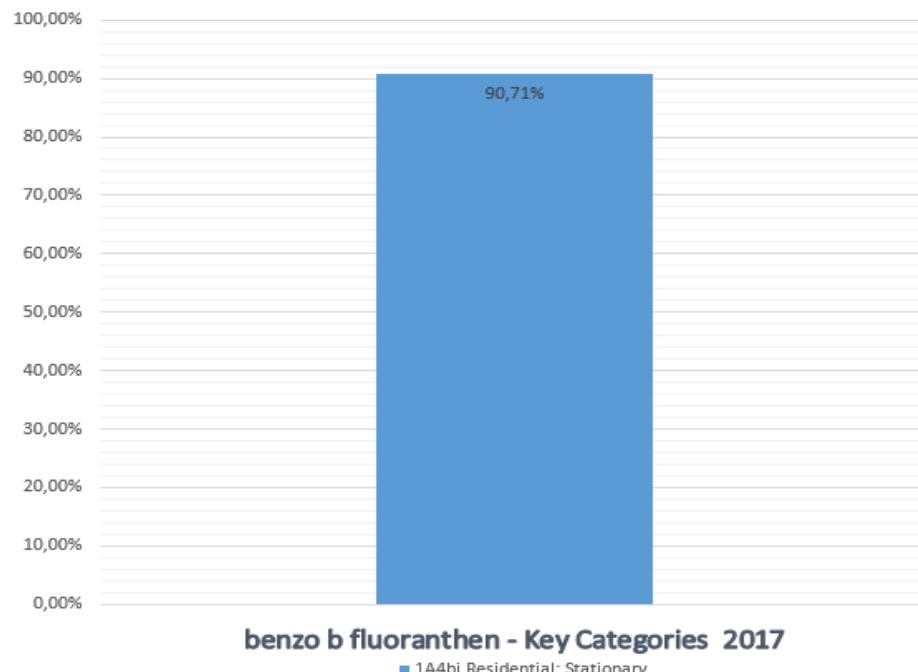


Figure 83. Key Categories assessments of benzo b fluoranthene emissions for 2017.

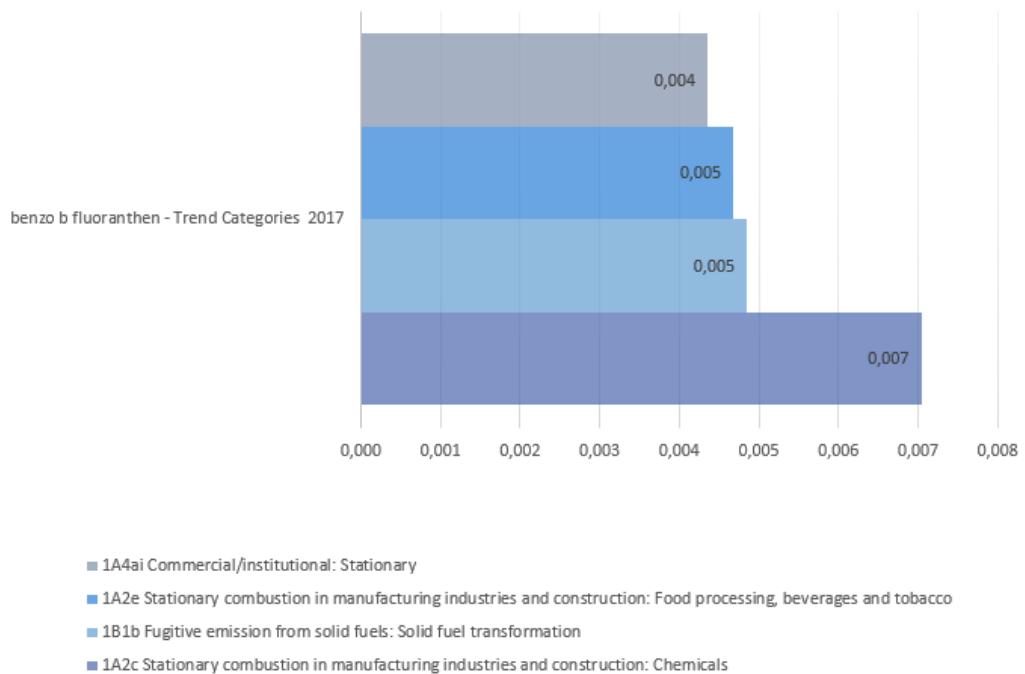


Figure 84. Trends assessments of benzo b fluoranthene emissions for base year and 2017

2.4.22. PAHs – Benzo (k) fluoranthene

Benzo (k) fluoranthene emissions in 2016. was 2,9723 t, which is 5.96 % decrease compared to 2016. Compared to the 1990 baseline emissions of Benzo (k) fluoranthene is 37.49 % lower.

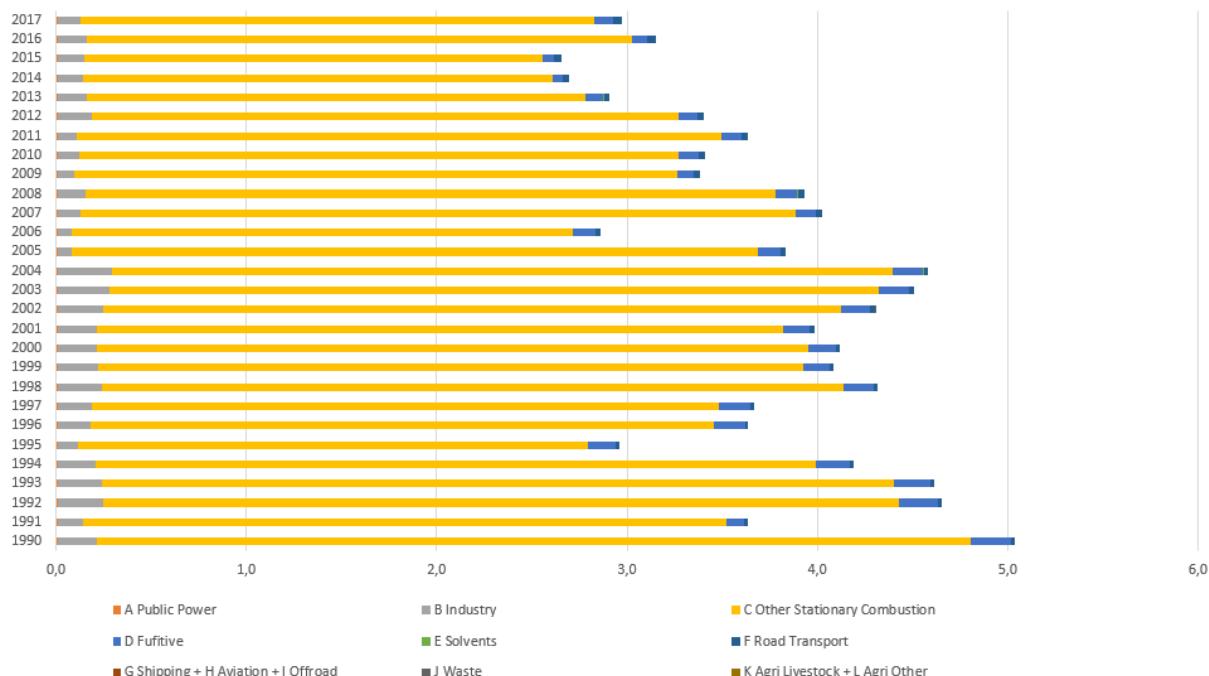


Figure 85. Distribution of benzo (k) fluoranthene between sectors for period 1990 – 2017.

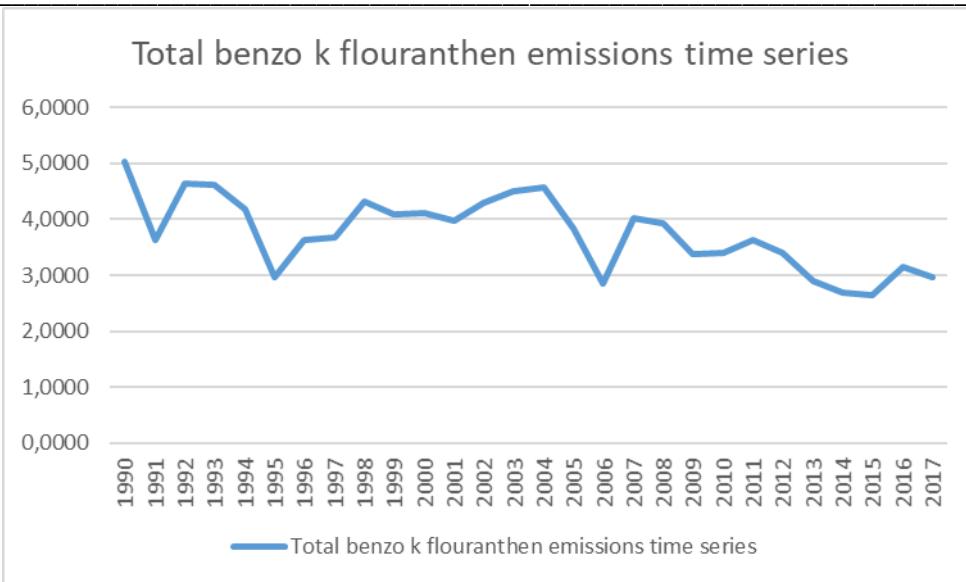


Figure 86.Total benzo k fluoranthen emissions time series from 1990 to 2017.

Table 58. Total benzo k fluoranthen emissions between sectors for years 1990 and 2017. Trends of dominant sources of benzo k fluoranthen x emissions compared to years 1990-2017 and 2016-2017.

Share in National Total for years 1990 and 2017

NFR Category	benzo k fluoranthen Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	0,0111	0,0083	-25,90%	1,23%	0,22%	0,28%
B Industry	0,2025	0,1212	-40,14%	-20,89%	4,02%	4,08%
C Other Stationary Combustion	4,5932	2,7012	-41,19%	-5,76%	91,16%	90,88%
D Fugitive	0,2108	0,0937	-55,57%	21,96%	4,18%	3,15%
E Solvents	0,0007	0,0021	214,78%	10,56%	0,01%	0,07%
F Road Transport	0,0202	0,0459	127,03%	6,23%	0,40%	1,54%
G Shipping + H Aviation + I Offroad	NA	NA	NA	NA	NA	NA
J Waste	0,0000	0,0000	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	5,0385	2,9723	-41,01%	-5,63%	100,00%	100,00%

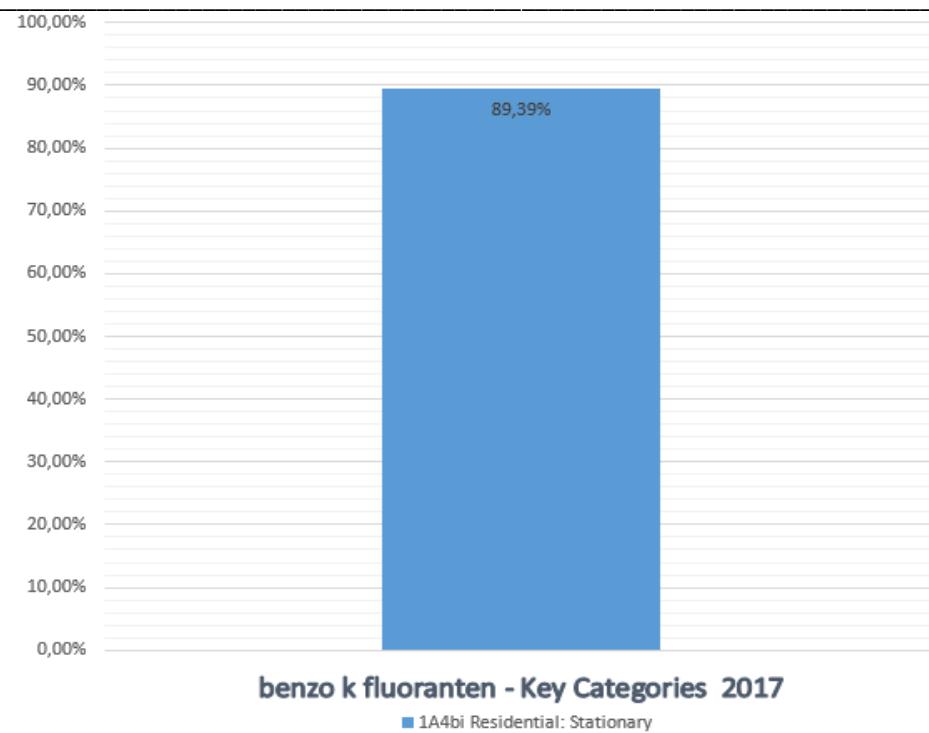


Figure 87. Key Categories assessments of benzo k fluoranthen emissions for 2017.

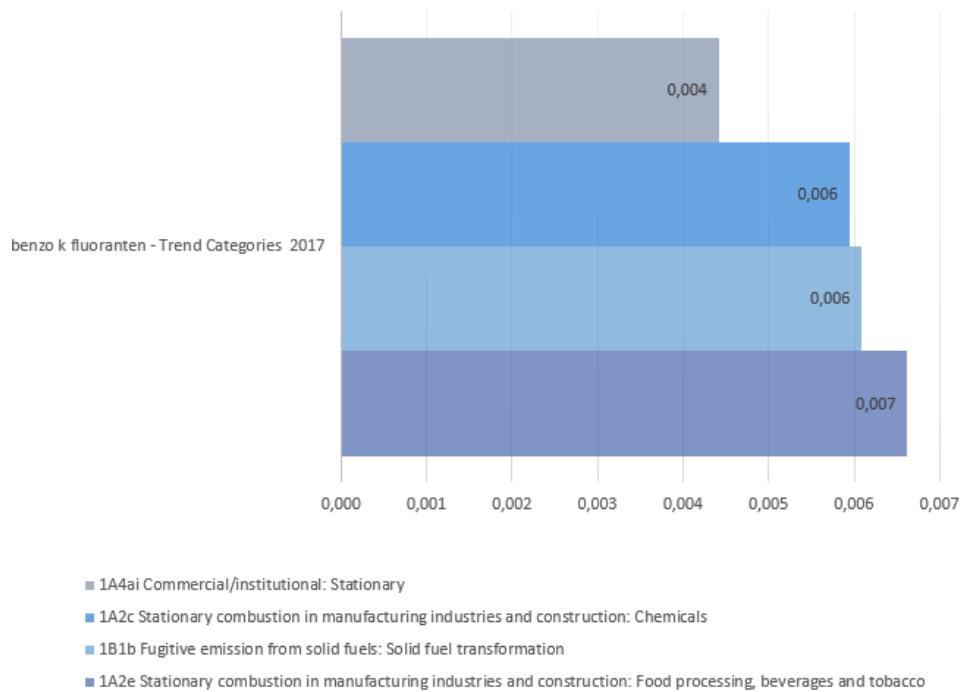


Figure 88. Trends assessments of benzo k fluoranthen emissions for base year and 2017

2.4.23. PAHs - Indeno (1,2,3-cd) pyrene

Indeno (1,2,3-cd) pyrene emissions in 2017. was 3,6734 t, which is 6.85 % decrease compared to 2016. Compared to the 1990 baseline emissions of Indeno (1,2,3-cd) pyrene is 38.16 % lower.

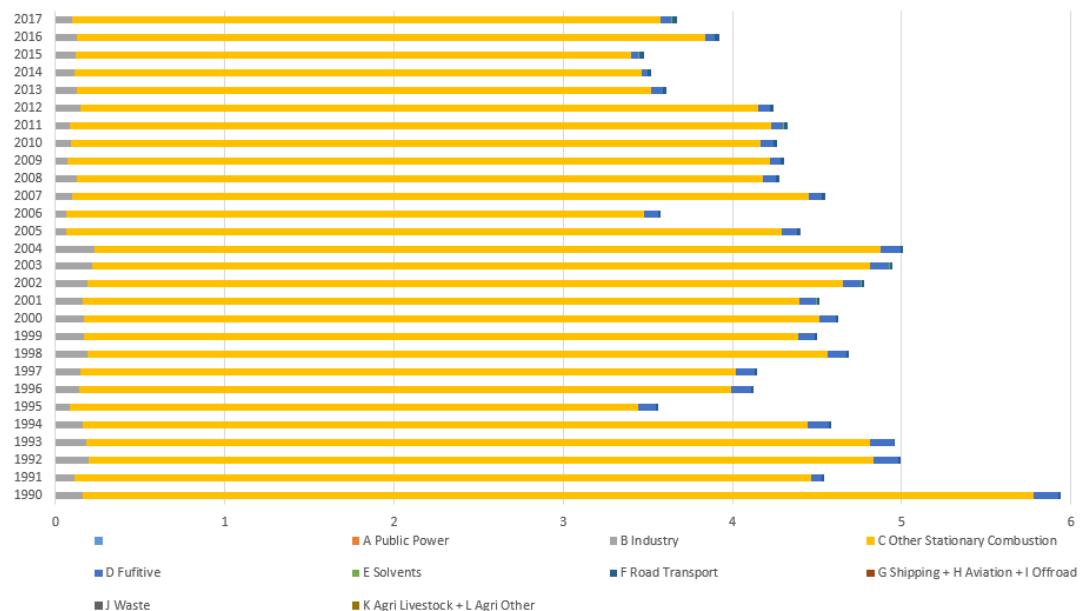


Figure 89. Distribution of Indeno (1,2,3-cd) pyrene between sectors for period 1990 – 2017.

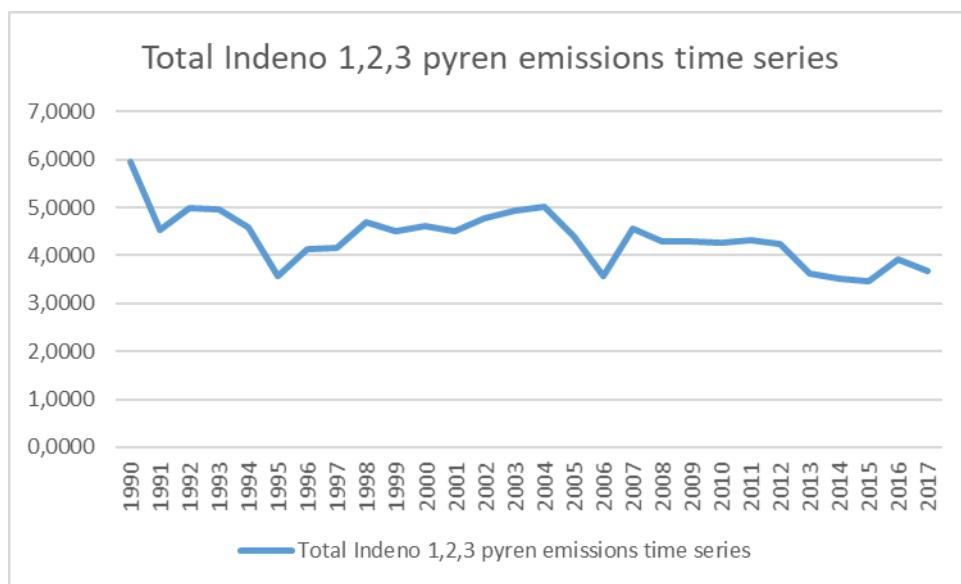


Figure 90. Total Indeno 1,2,3 pyren emissions time series from 1990 to 2017.

Table 59. Total Indeno 1,2,3 pyren emissions between sectors for years 1990 and 2017. Trends of

dominant sources of Indeno 1,2,3 pyren emissions compared to years 1990-2017 and 2016-2017.
 Share in National Total for years 1990 and 2017

NFR Category	Indeno 1,2,3 pyren Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	0,0009	0,0006	-26,48%	1,05%	0,01%	0,02%
B Industry	0,1621	0,0981	-39,47%	-19,94%	2,73%	2,67%
C Other Stationary Combustion	5,6140	3,4759	-38,08%	-6,48%	94,50%	94,62%
D Fugitive	0,1476	0,0656	-55,57%	21,96%	2,48%	1,78%
E Solvents	0,0007	0,0021	214,78%	10,56%	0,01%	0,06%
F Road Transport	0,0152	0,0310	103,71%	6,42%	0,26%	0,85%
G Shipping + H Aviation + I Offroad	NA	NA	NA	NA	NA	NA
J Waste	0,0000	0,0000	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	5,9404	3,6734	-38,16%	-6,41%	100,00%	100,00%

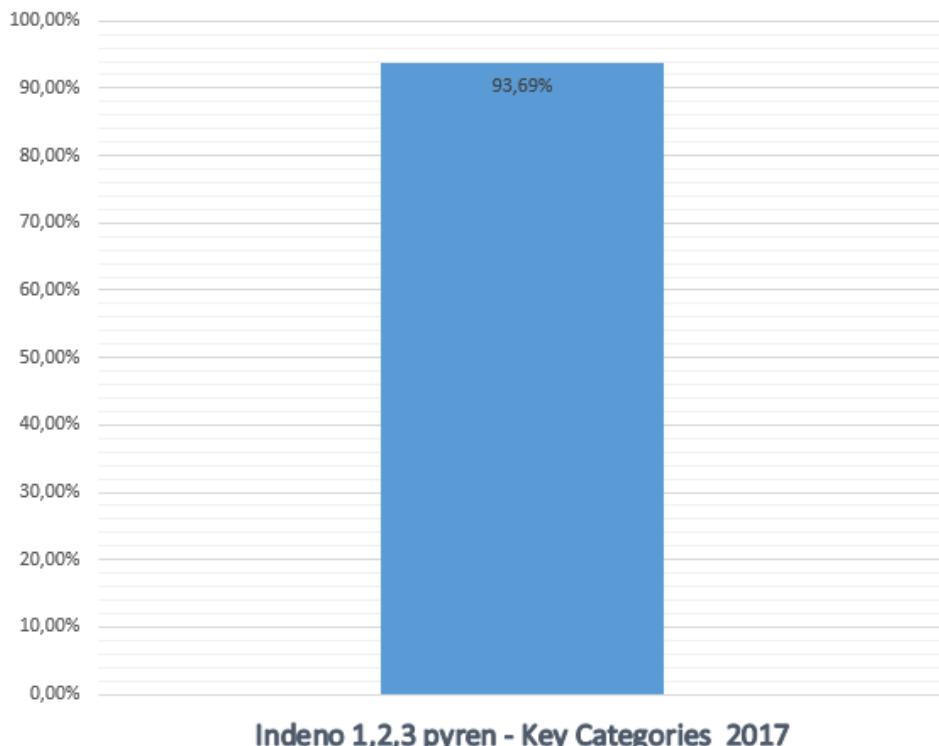


Figure 91. Key Categories assessments of Indeno 1,2,3 pyren emissions for 2017.

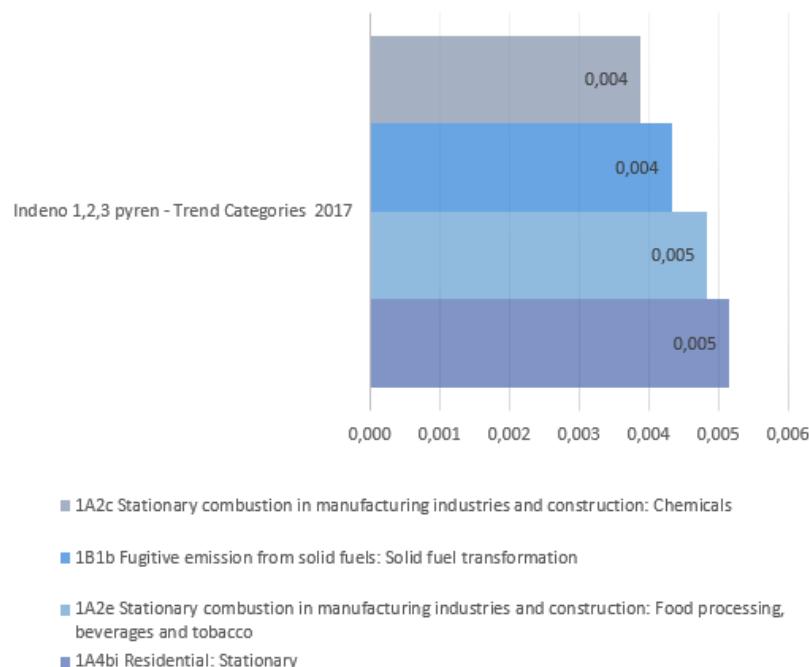


Figure 92. Trends assessments of Indeno 1,2,3 pyren emissions for base year and 2017

2.4.24. PAHs - Total 1-4 PAHs

Total 1-4 PAHs emissions in 2017. was 24,6077 t, which is 4.64 % decrease compared to 2016. Compared to the 1990 baseline emissions of Total 1-4 PAHs is 39.63 % lower.

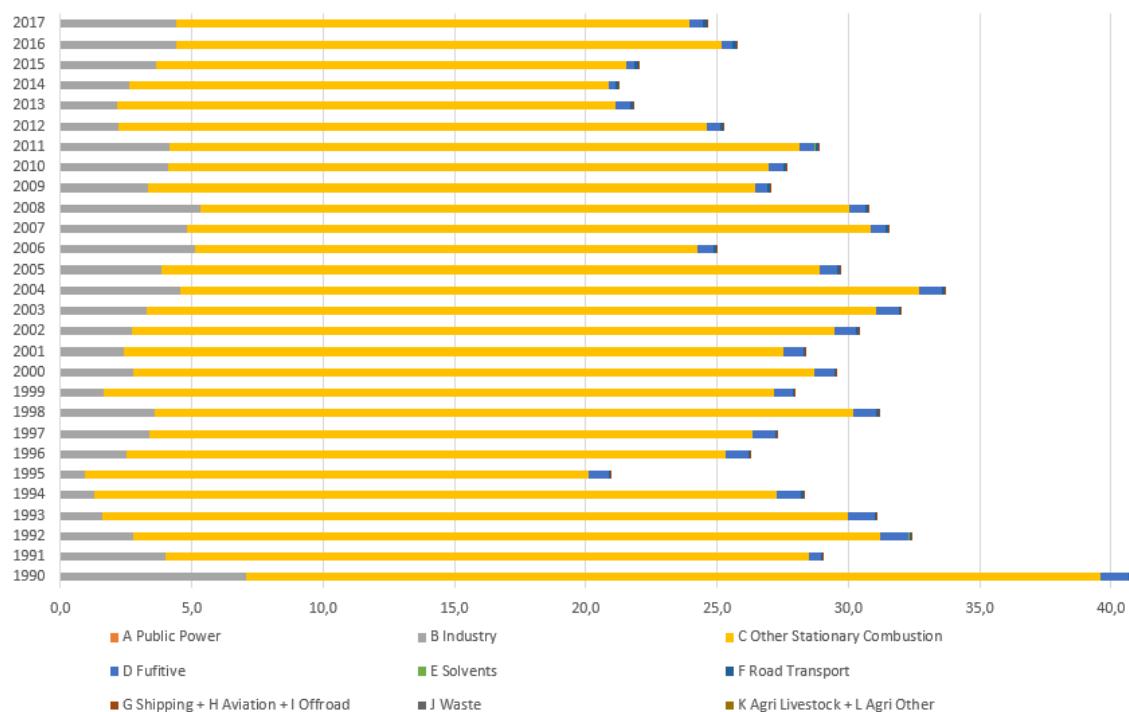


Figure 93. Distribution of Total 1-4 PAH between sectors for period 1990 – 2017.

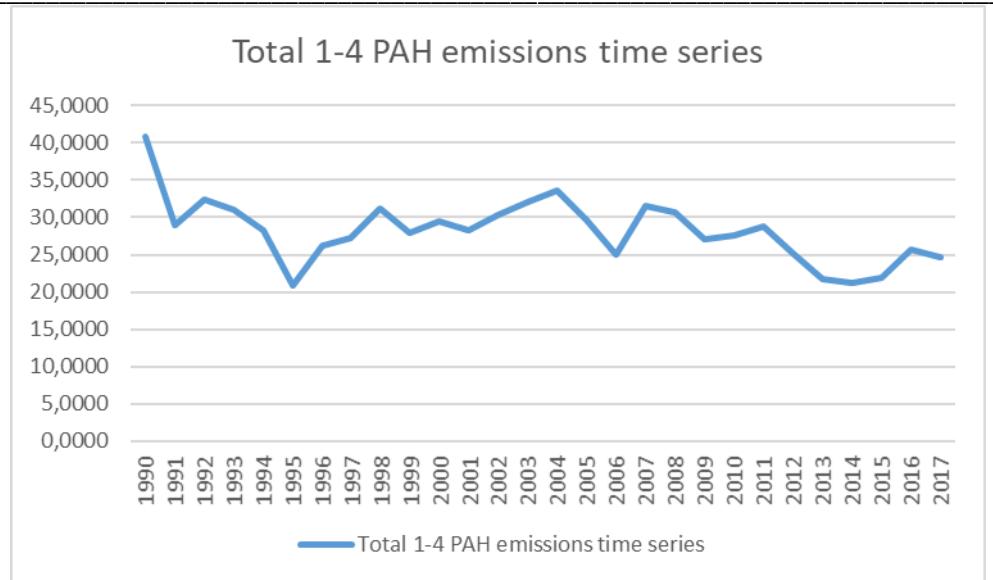


Figure 94. Total 1-4 PAH emissions time series from 1990 to 2017.

Table 60. Total 1-4 PAH emissions between sectors for years 1990 and 2017. Trends of dominant sources of Total 1-4 PAH emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	Total 1-4 PAH Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	0,0267	0,0200	-25,13%	1,15%	0,07%	0,08%
B Industry	7,0357	4,3852	-37,67%	0,58%	17,26%	17,82%
C Other Stationary Combustion	32,5056	19,5357	-39,90%	-6,10%	79,75%	79,39%
D Fugitive	1,1172	0,4964	-55,57%	21,96%	2,74%	2,02%
E Solvents	0,0036	0,0113	214,78%	10,56%	0,01%	0,05%
F Road Transport	0,0690	0,1583	129,37%	6,56%	0,17%	0,64%
G Shipping + H Aviation + I Offroad	0,0024	0,0008	-66,26%	0,01%	0,01%	0,00%
J Waste	0,0000	0,0000	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	40,7602	24,6077	-39,63%	-4,44%	100,00%	100,00%

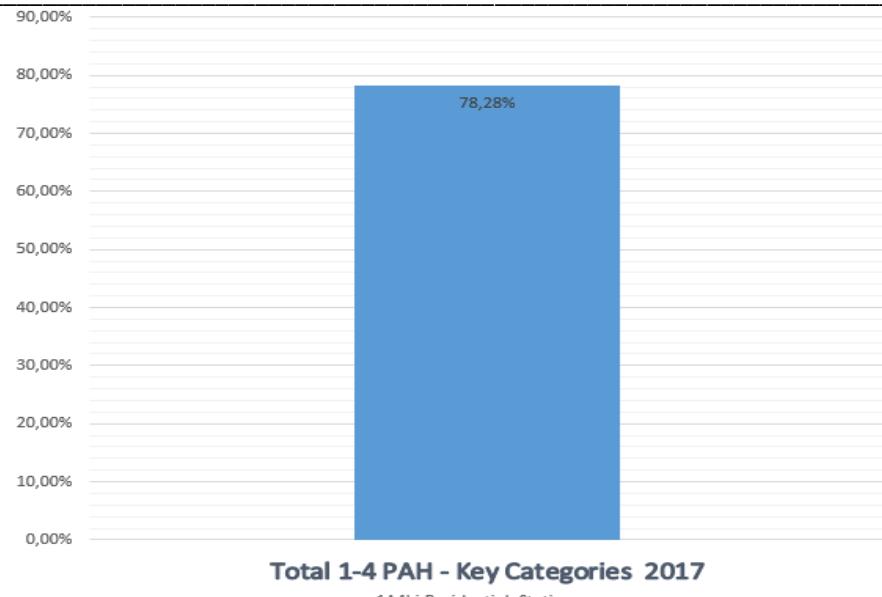


Figure 95. Key Categories assessments of Total 1-4 PAH emissions for 2017.

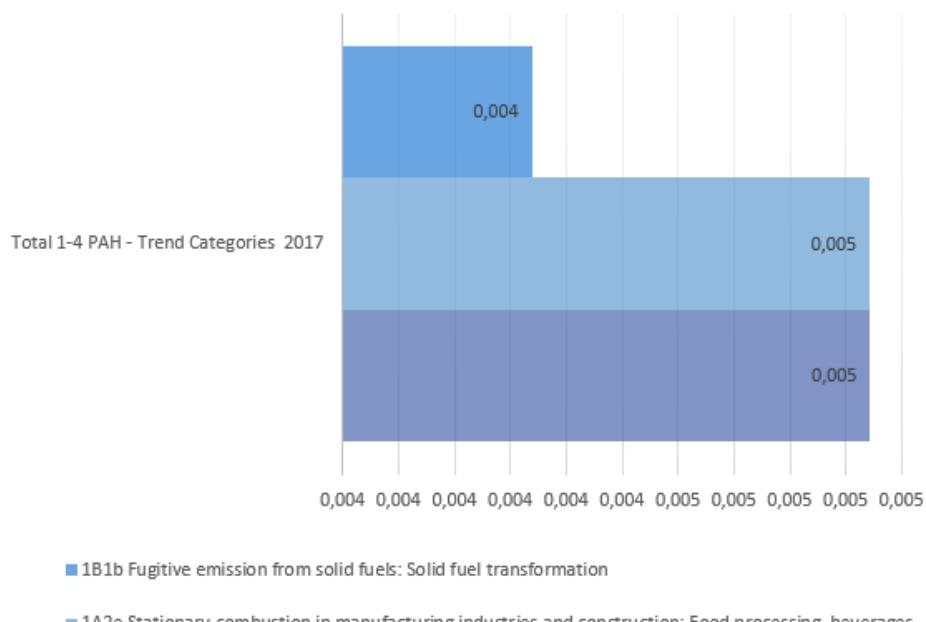


Figure 96. Trends assessments of Total 1-4 PAH emissions for base year and 2017

2.4.25. Emissions HCBs

HCBs emissions in 2017. was 2,2419kg, which is 1.01 % increase compared to 2016. Compared to the 1990 baseline emissions of HCBs is 22.60 % decrease.

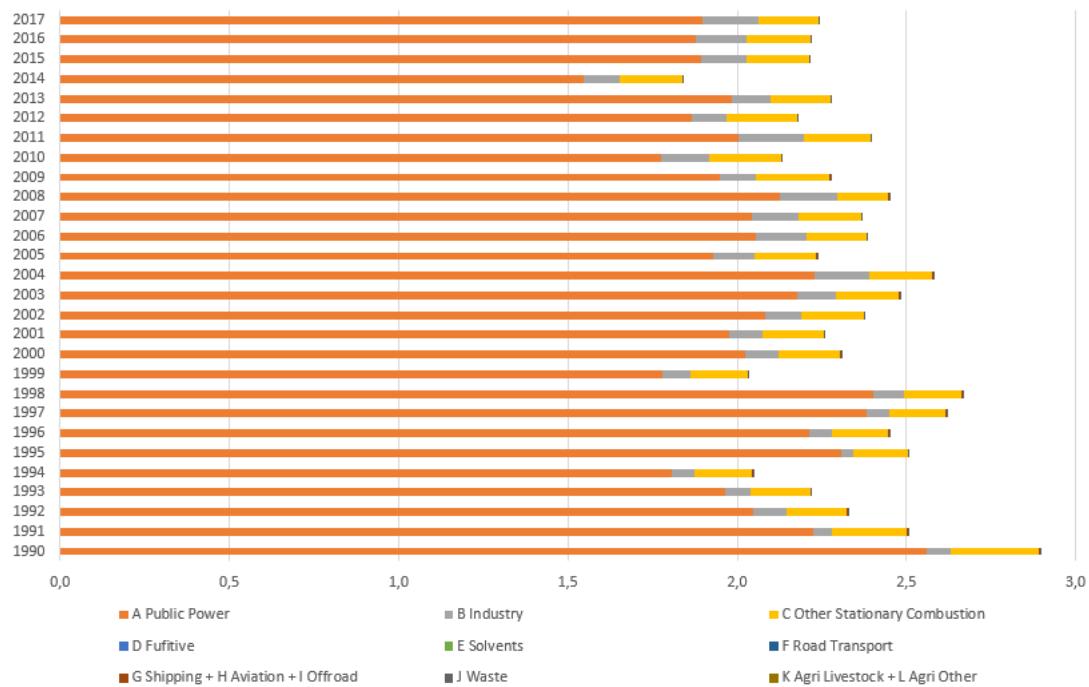


Figure 97. Distribution of HCB between sectors for period 1990 – 2017.

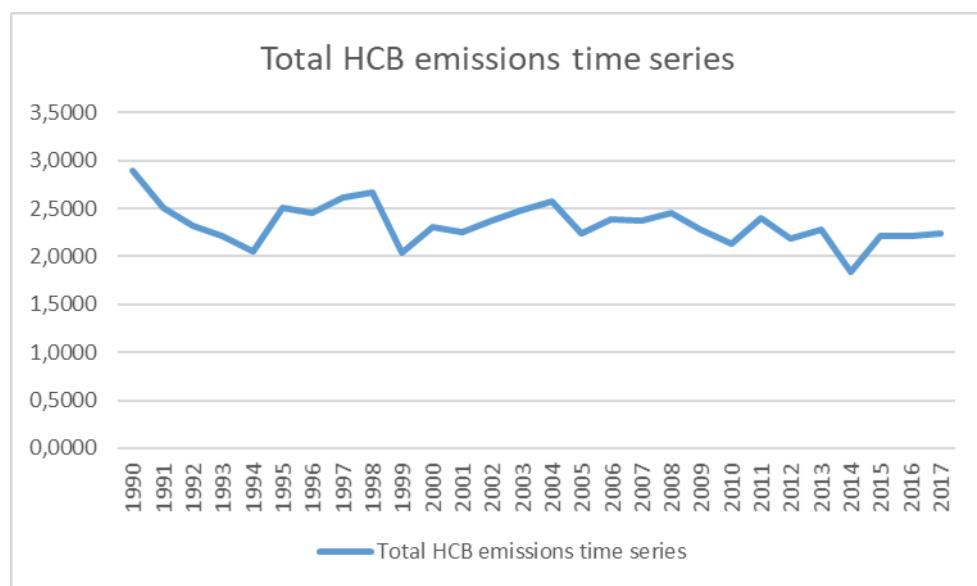


Figure 98.Total HCB emissions time series from 1990 to 2017.

Table 61. Total HCB emissions between sectors for years 1990 and 2017. Trends of dominant sources of HCB emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	HCB Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	2,5606	1,8992	-25,83%	1,23%	88,39%	84,71%
B Industry	0,0710	0,1656	133,15%	10,32%	2,45%	7,38%
C Other Stationary Combustion	0,2595	0,1757	-32,31%	-8,11%	8,96%	7,84%
D Fugitive	NA	NA	NA	NA	NA	NA
E Solvents	NA	NA	NA	NA	NA	NA
F Road Transport	NA	NA	NA	NA	NA	NA
G Shipping + H Aviation + I Offroad	0,0056	0,0010	-82,50%	-22,22%	0,19%	0,04%
J Waste	0,0001	0,0005	368,20%	8,64%	0,00%	0,02%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	2,8969	2,2419	-22,61%	1,03%	100,00%	100,00%

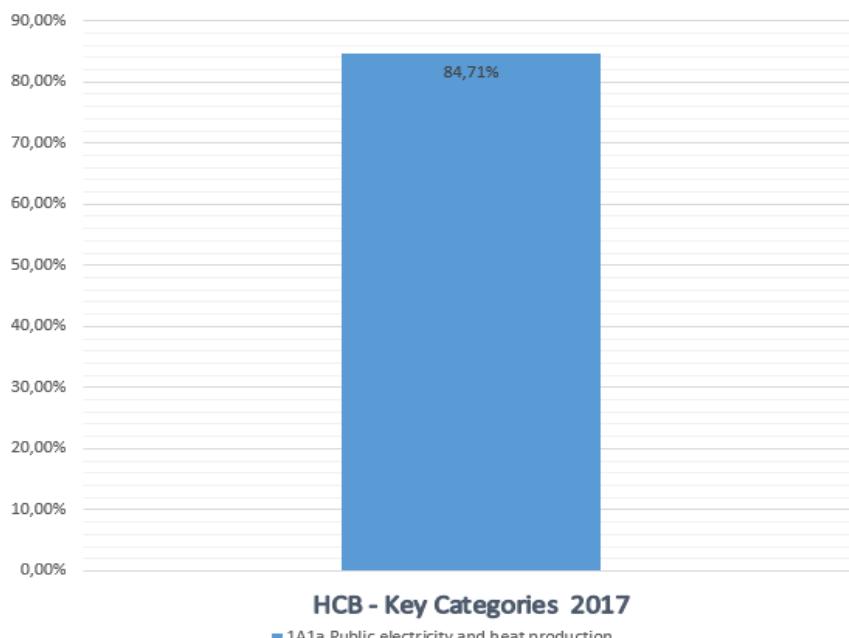
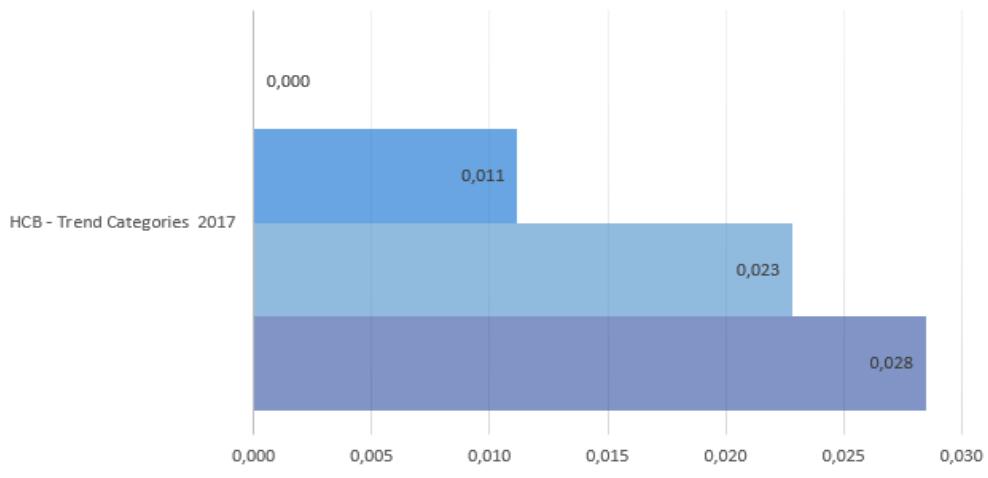


Figure 99. Key Categories assessments of HCB emissions for 2017.



- 1A2gviii Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)
- 1A2gviii Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)
- 2C1 Iron and steel production
- 1A1a Public electricity and heat production

Figure 100. Trends assessments of HCB emissions for base year and 2017

2.4.26. Emissions PCBs

PCBs emissions in 2017. was 717,5573kg, which is 0,85 % decrease compared to 2016. Compared to the 1990 baseline emissions of PCBs is 15.00 % lower.

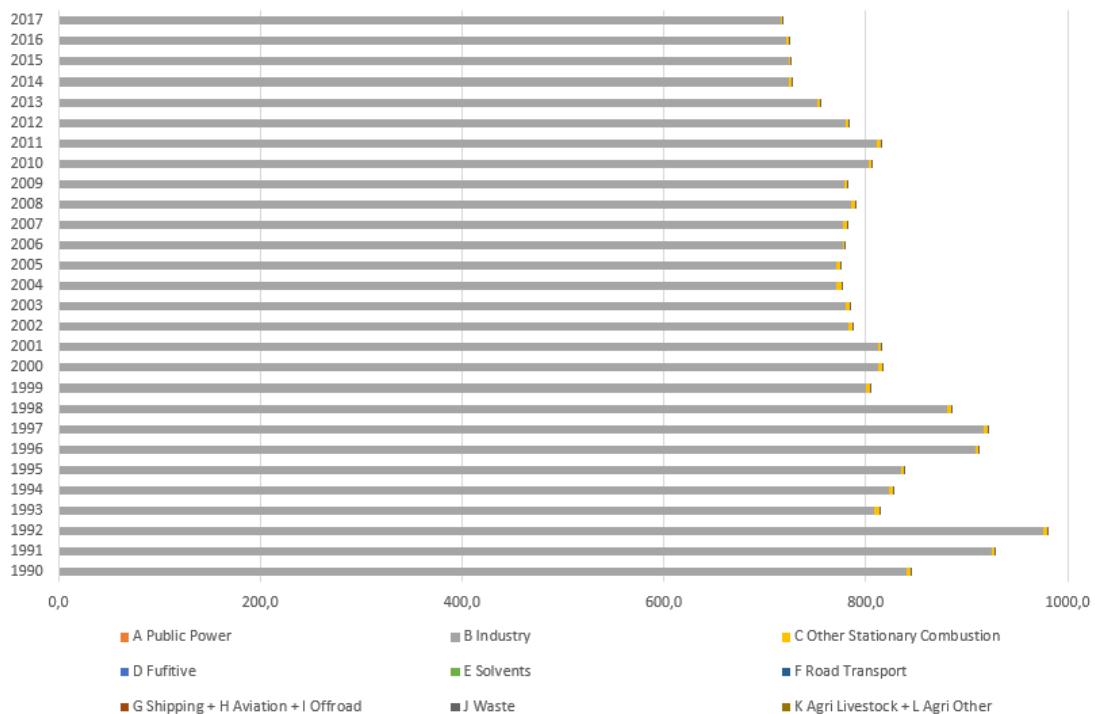


Figure 101. Distribution of PCB between sectors for period 1990 – 2017.

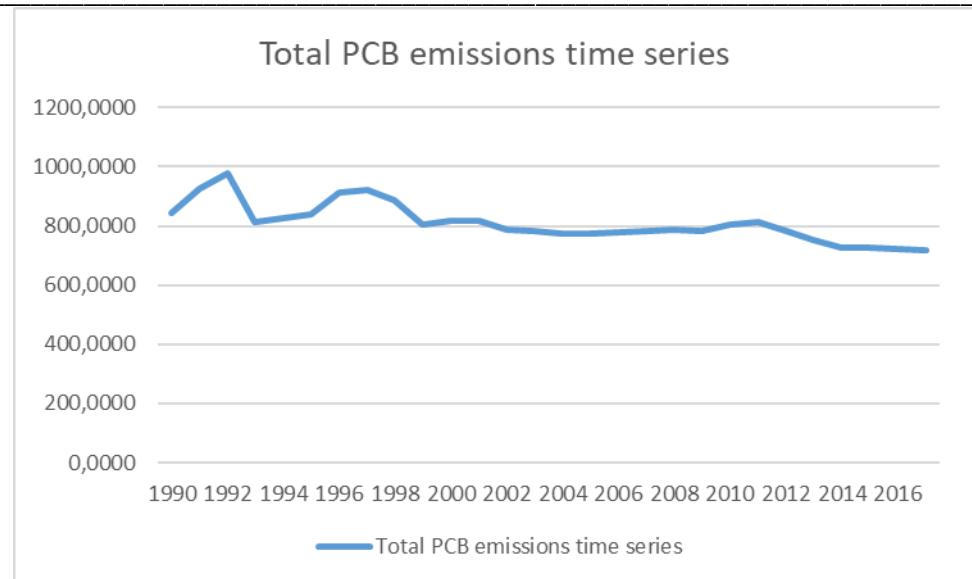


Figure 102.Total PCB emissions time series from 1990 to 2017.

Table 62. Total PCB emissions between sectors for years 1990 and 2017. Trends of dominant sources of PCB emissions compared to years 1990-2017 and 2016-2017. Share in National Total for years 1990 and 2017

NFR Category	PCB Emission in [kt]		Trend		Share in National Total	
	1990	2017	1990 - 2017	2016 - 2017	1990	2017
A Public Power	0,0013	0,0016	23,06%	-1,87%	0,00%	0,00%
B Industry	840,1467	715,6078	-14,82%	-0,81%	99,52%	99,73%
C Other Stationary Combustion	4,0584	1,9426	-52,13%	-11,36%	0,48%	0,27%
D Fugitive	NA	NA	NA	NA	NA	NA
E Solvents	NA	NA	NA	NA	NA	NA
F Road Transport	NA	NA	NA	NA	NA	NA
G Shipping + H Aviation + I Offroad	0,0228	0,0040	-82,50%	-22,22%	0,00%	0,00%
J Waste	0,0003	0,0014	368,20%	8,64%	0,00%	0,00%
K Agri Livestock + L Agri Other	NA	NA	NA	NA	NA	NA
Total	844,2295	717,5573	-15,00%	-0,84%	100,00%	100,00%

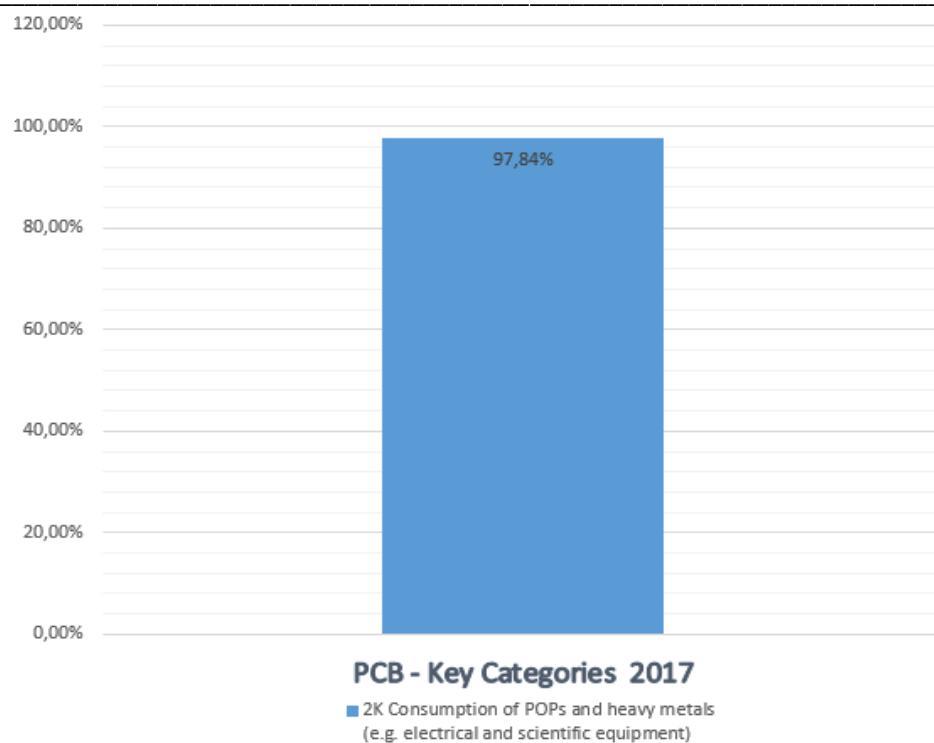


Figure 103. Key Categories assessments of PCB emissions for 2017.

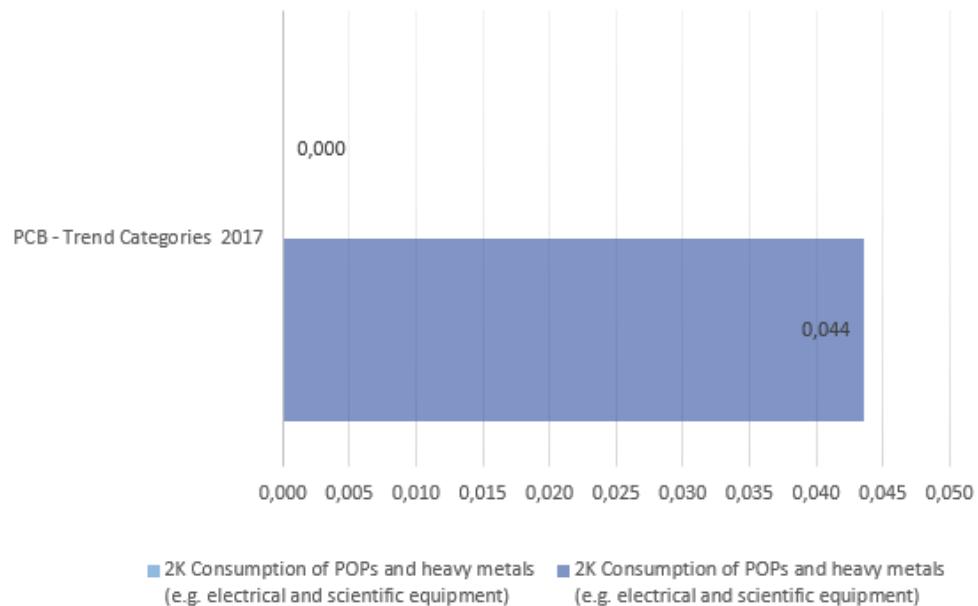


Figure 104. Trends assessments of PCB emissions for base year and 2017

SECTORAL METODOLOGIES

During 2015 SEPA implement two projects which have a very large impact on reporting for CLRTAP convention.

The first one were to determine the national emission factors for most used fuels in Serbia. In this project, data were collected, primarily, for coal (lignite) mined in Serbia whose annual volume exceeding 30 million tons each year.

The second project were is related to the harmonization of reporting between CLRTAP and UNFCCC. This particularly related to the use of the same activity data in the reports for both conventions.

3. ENERGY (NFR 1)

This chapter gives an overview of category 1 A Stationary Fuel Combustion Activities. It includes information on completeness, methodologies, activity data, emission factors, recalculations and planned improvements.

Sector 1.Energy considers emissions originating from fuel combustion activities, as well as fugitive emissions from fuels:

1.A	Combustion
1.A.1.a	Public electricity and heat production
1.A.1.b	Petroleum refining
1.A.1.c	Manufacture of solid fuels and other energy industries
1.A.2.a	Iron and steel
1.A.2.b	Non-ferrous metals
1 A 2 c	1 A 2 c Stationary combustion in manufacturing industries and construction: Chemicals
	1 A 2 d Stationary combustion in manufacturing industries and construction: Pulp, Paper
1 A 2 d	and Print
1 A 2 e	1 A 2 e Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco
1.A.2.f.i	Stationary combustion in manufacturing industries and construction: Other
1.A.3.a.ii.(i)	Civil aviation (domestic, LTO)
1 A 3 a i (i)	International aviation (LTO)
1.A.3.b.i	Passenger cars
1.A.3.b.ii	Light-duty trucks
1.A.3.b.iii	Heavy-duty vehicles including buses
1.A.3.b.iv	Motorcycles
1 A 3 b v	Road transport: Gasoline evaporation
1.A.3.b.vi	Road vehicle tyre and brake wear
1.A.3.b.vii	Road surface wear
1.A.3.c	Railways
1 A 3 d ii	National navigation (Shipping)
1 A 4 a i	Commercial / institutional: Stationary
1 A 4 b i	Residential: Stationary plants
1 A 4 c i	1 A 4 c i Agriculture/Forestry/Fishing: Stationary
1.B	Fugitive emissions from fuels
1.B.1.a	Fugitive emissions from solid fuels: Coal mining and handling

1.B.2.a.i	Oil – Exploration, production, transport
1.B.2.a.iv	Refining/storage
1.B.2.a.v	Distribution of oil products
1 B 2 b	Natural gas
1.B.2.c	Venting and flaring

1 A Fuel Combustion Activities

1 A 1 Energy Industries

1 A 1 a Public electricity and heat production

Methodology

The methodology used in this inventory for the emission calculation for category 1 A 1 a Public electricity and heat production is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emissions are calculated by multiplying fuel consumption (in TJ) by emission factors. Fuel amounts related to direct emissions were subtracted from the amount of fuel from an energy balance based on fuel type and activities.

Emission factors

Emission factors used in emission calculation are from EMEP/EEA Inventory Guidebook 2016 except for lignite (brown coal). Based on the obtained data for the period 2000 - 2013 years on the sulfur content in coal and net calorific value is determined by the emission factor for sulfur in lignite. Applying equation for calculation emission factor from percentage of sulphur and net calorific value calculate mean value 1350 g/GJ for SOx in lignite which the main coal in Serbia. This number was applied for whole time series.

For all other fuels emissions were calculated on the base of methodology (Tier 1), which implies multiplication with appropriate default emission factors.

During the preparation of the inventory, it was determined that there are two types of fuel oil - with share of 1% sulfur content and sulfur content with a share of 3%. Based on these data, the emission factor for fuel oil with 3% sulfur content and the amount of emitted sulfur dioxide were calculated.

Activity data

Sectors 1.A.1 Energy Industries include combustion of fuels in stationary sources.

Activity data for the Energy sector is the amount of consumed fuel by individual sector and are taken from the Serbian report to International Energy Agency.

Table 63. Activity data for sector-1 A 1 a

Year	Hard coal	Brown coal	Gaseous fuels	Heavy Fuel Oil	Light oil-gas oil	Biomass
1990	4338476	377845784	17777000	9255559		
1991	753504	331459896	10842000	21920000		
1992	0	305741340	38053000	18160000		
1993	0	293166638	23516000	8840000		
1994	0	269866978	19630000	7000000		
1995	0	344167993	21393000	7280000		
1996	0	330392736	22198000	12240000		
1997	0	355346494	24534000	16560000		
1998	0	358361221	22854000	9120000		
1999	0	265411585	16278000	10840000		
2000	614878	301241482	17380000	9200000		

2001	485610	294260477	22243000	9400000		
2002	485610	310125589	29345000	3600000		
2003	372439	324736788	30686000	3840000		
2004	486360	332384768	38972000	2280000		
2005	908900	287235007	20921000	11640000	298200	
2006	655325	306070381	19077000	9480000	724200	
2007	615300	304362925	21784000	9840000	681600	12000
2008	453822	316644158	21059000	7627612	911589	22000
2009	535054	290230650	18205000	7925516	1362791	62000
2010		264634947	22284000	5821571	43725	84000
2011		298973696	26691000	4609820	0	90000
2012		278334248	25708000	4129491	43725	73000
2013		295731558	21084000	3297813	43725	157000
2014		230783508	18826000	3006578	43725	168000
2015		282610048	21614000	3561454	43725	191000
2016		279888609	22715000	3483150	42913	188000
2017		283332225	24580478	3250310	35781	176285

Recalculations and other changes

Activity data were collect from Serbian report to International Energy Agency and no recalculations for this period.

Planned improvements

In the future, SEPA planned to report on higher Tier level.

1 A 1 b Petroleum refining

Sub-sector 1.A.1.b Petroleum refining takes into account consumptions of fossil fuels from two LCPs Oil refineries owned by legal entity NIS- Oil industry.

Methodology

The methodology used in this inventory for the emission calculation for category 1 A 1 b Petroleum refining is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

1.A.1.b	
Petroleum refining	
2000	512550
2001	3410718
2002	3621717
2003	3955657
2004	4508524
2005	3368386
2006	2717382
2007	2406119
2008	2463834
2009	2764820
2010	3089182
2011	2307484
2012	1790029
2013	2266534
2014	1738913
2015	2744436
2016	3119682
2017	2528778

Table 64. Activity data for sector-1 A 1 b Petroleum refining

Activity data

The activity data source for this category is Petroleum Industry of Serbia and Serbian report to International Energy Agency.

For now, all activity data for period 1990 – 1999 are not available.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.A.1.c Manufacture of solid fuels and other energy industries

Methodology

The methodology used in this inventory for the emission calculation for category 1 A 1 c Manufacture of solid fuels and other energy industries is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for this category are national emission factors for lignite (brown coal)

Activity data

The activity data for this category are obtained from Serbian report to International Energy Agency for period 1990 – 2017. (Table 9.2.)

Table 65. Activity data for category 1.A 1 c

Year	GJ	Year	GJ
1990	36000424	2004	27871296
1991	15028640	2005	21057174
1992	35163602	2006	19827558
1993	32653136	2007	18256382
1994	30057280	2008	19246906
1995	25377908	2009	9518455
1996	27922530	2010	19512496
1997	28400714	2011	23119740
1998	27615126	2012	17774367
1999	23635952	2013	16508402
2000	23977512	2014	6552194
2001	24421540	2015	10848032
2002	25787780	2016	18052608
2003	27222332	2017	10808676

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.A.2 Manufacturing Industries and Construction

- 1.A.2.a Iron and steel
- 1.A.2.b Non-ferrous metals
- 1 A 2 c 1 A 2 c Stationary combustion in manufacturing industries and construction: Chemicals
- 1 A 2 d 1 A 2 d Stationary combustion in manufacturing industries and construction: Pulp, Paper
- 1 A 2 d and Print
- 1 A 2 e 1 A 2 e Stationary combustion in manufacturing industries and construction: Food
- 1 A 2 e processing, beverages and tobacco
- 1.A.2.f.i Stationary combustion in manufacturing industries and construction: Other

1.A.2.a Stationary combustion in manufacturing industries and construction: Iron and steel

Methodology

The methodology used in this inventory for the emission calculation for category 1 A 2 a Stationary combustion in manufacturing industries and construction: Iron and steel is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Table 66. Activity data for category 1.A.2.a.

Year	Sinter (t)	Pellet (t)
1990	0	0
1991	0	0
1992	0	0
1993	0	0
1994	0	0
1995	0	0
1996	0	0
1997	0	0
1998	0	0
1999	0	0
2000	0	0
2001	0	0
2002	0	0
2003	0	0
2004	941349	641095
2005	1094502	889273
2006	1341834	1542287
2007	1137976	1338261
2008	1215427	1393685
2009	690020	973477
2010	773848	1208049
2011	967194	1058133
2012	336994	207266
2013	413968	235919
2014	624035	327470
2015	884550	623097
2016	384081	802219
2017	773232	1431960

Emission factors

Emission factors used in emission calculation for this category are Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

The sources for these data are World Steel Association for the period 1990 – 2003 and Iron and steel factory in Smederevo. (Table 9.2.)

Recalculations and other changes

There are no recalculations for the period 2003 - 2010. The activity data for the period 1990 - 2003 and for 2011, 2012 were added in time series for whole period.

Planned improvements

No planned improvements in the next period.

1.A.2.b Stationary Combustion in manufacturing industries and construction: Non-ferrous metals

Secondary aluminium is mainly used by two companies which uses scrap as raw materials.

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Table 67. Activity data for category 1.A.2.b. in tones

Year	Primary copper production	Secondary copper production	Primary lead production	Secondary lead production	Secondary aluminium	Magnesium production
1990	151000		6000			5788
1991	134000		51000			5360
1992	135000		78000			4055
1993	51000		8000			0
1994	72000		13000			0
1995	78000		19000			2560
1996	104000		44000			3090
1997	113000		42000			3742
1998	94000		36000			3965
1999	50000		4000			1203
2000	44900	720	5000	5146	494	0
2001	32300	50	5000	5144	526	0
2002	34900	970	5000	5272	487	0
2003	13500	560	5000	4893	603	0
2004	11200	820		5395	514	0
2005	29300	1990		4666	269	523
2006	38900	2520		6435	3293	181
2007	28800	2490		8107	10298	1649
2008	31100	2640		12001	10601	1478
2009	26300	1140		14036	9013	1341
2010	21200	950		24033	13867	933
2011	25740	2708		26148	12104	1582
2012	32166	2536		18383	12888	1387
2013	32408	3432			13529	2026
2014	31255	1921			13436	1800
2015	42439	2207			11941	3894
2016	59078	2231			13864	4131
2017	67752	1469			13989	4202

Emission factors

Emission factors used in emission calculation for this category are Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

Activity data are given in chapter Industry.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.A.2.c. Stationary combustion in manufacturing industries and construction: Chemicals

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions were calculated on the base of methodology (Tier 1), which implies multiplication with appropriate default emission factors.

During the preparation of the inventory, it was determined that there are two types of fuel oil - with share of 1% sulfur content and sulfur content with a share of 3%. Based on these data, the emission

factor for fuel oil with 3% sulfur content and the amount of emitted sulfur dioxide were calculated.

Activity data

The activity data for category Stationary combustion in manufacturing industries and construction: Chemicals are obtained from Serbian report to International Energy Agency for period 1990 – 2015.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.A.2.d Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions were calculated on the base of methodology (Tier 1), which implies multiplication with appropriate default emission factors.

During the preparation of the inventory, it was determined that there are two types of fuel oil - with share of 1% sulfur content and sulfur content with a share of 3%. Based on these data, the emission factor for fuel oil with 3% sulfur content and the amount of emitted sulfur dioxide were calculated.

Activity data

The activity data for this category are obtained from National Energy balance for period 1990 – 2011. Data for period 2012 -2017 were obtained from Statistical Office of Serbia, which is now responsible for development of National energy balances.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.A.2.e Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2013. National emission factors have not been developed.

During the preparation of the inventory, it was determined that there are two types of fuel oil - with share of 1% sulfur content and sulfur content with a share of 3%. Based on these data, the emission factor for fuel oil with 3% sulfur content and the amount of emitted sulfur dioxide were calculated.

Activity data

The activity data for this category are obtained from National Energy balance for period 1990 – 2017. Data from 2015 were obtained from Statistical Office of Serbia, which is now responsible for development of National energy balances.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1 A 2 gv iii Stationary combustion in manufacturing industries and construction: Other

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for this category are Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016. National emission factors have not been developed.

Activity data

This category included:

- Non-Metallic Minerals
- Transport equipment
- Machinery
- Mining and Quarrying
- Wood and wood Products
- Textiles and leather
- Non-specified (industry).
- Autoproducers

The activity data for this category are obtained from National Energy balance for period 1990 – 2017.

Recalculations and other changes

Recalculations were performed for the entire time series (1990-2017) in order to eliminate calculation error and improve data emissions.

Planned improvements

No planned improvements in the next period.

1.A.2.gv ii Mobile Combustion in manufacturing industries and construction:

This category is include in 1 A 3.

1.A.3 Transport

This category include:

- 1 A 3 a i (i) International aviation (LTO)
- 1.A.3.b.i Passenger cars
- 1.A.3.b.ii Light-duty trucks
- 1.A.3.b.iii Heavy-duty vehicles including buses
- 1.A.3.b.iv Motorcycles
- 1 A 3 b v Road transport: Gasoline evaporation
- 1.A.3.b.vi Road vehicle tire and brake wear
- 1.A.3.b.vii Road surface wear
- 1.A.3.c Railways
- 1 A 3 d ii National navigation (Shipping)

Fuels consumption in sector 1.A.3 takes into account fuels consumption in sub-sectors: 1.A.3.a Air

transport (1.A.3.a.i (i) International LTO and 1.A.3.a.ii (i) Domestic LTO) (data for period 1990-1999 are not available), 1.A.3.c Railways, 1.A.3.d.ii National navigation.

The emissions for Air transport were calculated using Tier 1 approach based on data provided by Airport "Nikola Tesla" in Belgrade and "Konstantin Veliki" in Nis.

For calculation of emissions of pollutants from category Road transport was done using COPERT 4 (9.1) package (Tier 3 method), which requires a very detailed set of data (contained in the vehicle base) on type of vehicles (passenger cars, light duty vehicles, heavy duty vehicles, buses, mopeds, motorcycles)

1.A.3.a Aviation

1.A.3.a ii (i) Civil aviation (Domestic, LTO) and 1.A.3.a i (i) International aviation (LTO)

Civil aviation		
1.A.3 a	(Domestic, LTO)	(International, LTO)
1990	19822	24848
1991	16872	21870
1992	9488	7714
1993	8534	0
1994	5446	1372
1995	17672	13204
1996	8314	17212
1997	9212	18886
1998	10996	17826
1999	6052	4168
2000	8790	10890
2001	8170	16172
2002	8660	20212
2003	9062	23422
2004	8710	27706
2005	8220	29394
2006	4838	37522
2007	736	42712
2008	232	44222
2009	64	40600
2010	92	44068
2011	80	44843
2012	80	44909
2013	80	46828
2014	80	58695
2015	80	56511
2016	80	58633
2017	80	58859

Table 68. The activity data for sector 1.A.3.a ii (i) Domestic aviation and 1.A.3.a i (i) International aviation

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

Activity data are taken from airport "Nikola Tesla" in Belgrade and airport "Konstantin Veliki" in Nis. Consumption of fuel was taken from Statistical Office of the Republic of Serbia (SORS).

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.A.3.b Road transport

This category includes:

- 1.A.3.b.i Passenger cars
- 1.A.3.b.ii Light-duty trucks
- 1.A.3.b.iii Heavy-duty vehicles including buses
- 1.A.3.b.iv Motorcycles
- 1.A.3.b.v Road transport: Gasoline evaporation
- 1.A.3.b.vi Road vehicle tyre and brake wear
- 1.A.3.b.vii Road surface wear

1.A.3.b (i-v) Road transport

Methodology

The COPERT 4 ver. 9.1 package (Tier 2/3 method) was used for air emission calculation from sub-sectors 1 A 3 b (i-v) Road transport. The COPERT calculates emission factors according to driving conditions data (the average speed per vehicle type and per road).

Emission factors

In a case of road transport, COPERT program contains all necessary emission factors, the methodology and calculation algorithm to estimate total road-transport emissions on a national, regional or urban level at a year to day-long time resolution.

The software calculates emission factors based on driving conditions (the average speed of vehicles by type of vehicle and type of road), changing characteristics of fuels and climatologically conditions (temperature and pressure).

The COPERT calculates emission factors according to driving conditions data (the average speed per vehicle type and per road), fuel variables and climate conditions (average monthly temperatures data).

Activity data

Due to missing activity data, it was made extrapolation for year 2017.

Recalculations and other changes

No recalculations were performed.

Planned improvements

There is no planned improvement.

1 A 3 b v Road transport: Gasoline evaporation

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

For the calculation, due to missing activity data were done extrapolation.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.A.3.b.vi Road vehicle tire and brake wear

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

For the calculation, due to missing activity data were done extrapolation.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.A.3.b.vii Road surface wear

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

For the calculation, due to missing activity data were done extrapolation.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.A.3.c Railways

Methodology

The methodology used in this inventory for the emission calculation for category 1 A 3 c Railways is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

1.A.3.c Railways			
year	tone fuel	year	tone fuel
1990	30000	2004	14000
1991	39000	2005	13000
1992	39000	2006	13000
1993	17000	2007	12000
1994	14000	2008	11000
1995	15000	2013	10000
1996	18000	2010	11000
1997	17000	2011	10000
1998	16000	2012	8500
1999	13000	2013	8700
2000	11000	2014	9000
2001	12000	2015	10000
2002	13000	2016	10000
2003	13000	2017	10000

Table 69. Total amount of fuel consumption in railway sector in Serbia in time period 1990 – 2017.

Activity data

For the calculation, activity data were obtained from the Statistical office of Serbia from 1990 to 2017.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period

1.A.3.d. Navigation

1 A 3 d ii National navigation (Shipping)

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

The main source for activity data concerning total amount of fuel consumption (t) is SORS.

1.A.3.d. ii National navigation - using bunker fuel oil			
year	tone fuel	year	tone fuel
1990	40000	2004	17000
1991	27000	2005	17000
1992	26000	2006	18000
1993	5000	2007	17000
1994	6000	2008	18000
1995	8000	2013	17000
1996	19000	2010	14000
1997	23000	2011	11000
1998	25000	2012	7600
1999	16000	2013	8000
2000	19000	2014	8000
2001	19000	2015	9000
2002	19000	2016	9000
2003	18000	2017	7000

Table 70. Activity data for category 1 A 3 d ii National navigation(Shipping) in Serbia in time period 1990 - 2017

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.A.4 Other Sectors (commercial and residential)

This category comprise:

1.A.4. a i Commercial / institutional: Stationary

1.A.4. b i Residential: Stationary plants

1.A.4. c i Agriculture/Forestry/Fishing: Stationary

Fuels consumptions in sector 1.A.4 takes into account fuels consumption in following sub-sectors 1.A.4.a.i Commercial/Institutional (stationary), 1.A.4.b.i Residential (stationary), 1.A.4.c.i Agriculture/Forestry/Fishing (stationary).

1.A.4. a i Commercial / institutional: Stationary

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions was calculated on the base of methodology (Tier 1), which implies multiplication with appropriate default emission factors.

Activity data

The activity data for this category are obtained from National Energy balance for period 1990 – 2017. Data from 2014 were obtained from Statistical Office of Serbia, which is now responsible for development of National energy balances.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.A.4. a ii Commercial / institutional: Mobile

This category is included in 1 A 3.

1.A.4. b i Residential: Stationary plants

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

The activity data for this category are obtained from National Energy balance for period 1990 – 2017. Data from 2014 were obtained from Statistical Office of Serbia, which is now responsible for development of National energy balances.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.A.4.b ii Residential: Household and gardening (mobile)

This category is included in 1 A 3.

1.A.4.c i Agriculture/Forestry/Fishing: Stationary

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions for this category were calculated on the base of methodology (Tier 1), which implies multiplication with appropriate default emission factors.

Activity data

The activity data for this category are obtained from National Energy balance for period 2005 - 2010. Data from 2011 were obtained from Statistical Office of Serbia, which is now responsible for development of National energy balances. All missing data were collected to fill time series.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements.

1.A.4.c ii Agriculture/Forestry/Fishing: Off-road vehicles and other machinery

This category is NE.

1.A.4.c iii Agriculture/Forestry/Fishing: National fishing

This category is included in 1 A 3.

1.A.5.a Other stationary (including military)

This category is included in 1 A 4 a i.

1.A.5.b Other, Mobile (including military, land based and recreational boats)

This category is included in 1 A 3.

1.B.1 Fugitive emission

1.B.1.a Fugitive emission from solid fuels: Coal mining and handling

Methodology

The methodology used in this inventory for the emission calculation for fugitive emissions from coal mining and handling is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

1.B.1.a			
Coal mining and handling			
kg/Mg			
1990	43778000	2004	34177000
1991	30221000	2005	34993000

1992	38385000	2006	36785000
1993	35982000	2007	37065000
1994	37121000	2008	38585000
1995	39715000	2013	38350000
1996	37008000	2010	37864000
1997	41618000	2011	41574000
1998	42480000	2012	38728000
1999	29000000	2013	40842000
2000	32557000	2014	30118000
2001	31049000	2015	38141000
2002	31622000	2016	38849000
2003	33356000	2017	39774000

Table 71. Total amount of coal mined in Serbia in the time period 1990 – 2017.

Emission factors

Emission factors used in emission calculation from coal mining and handling are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016, Table 3-1. (Table 3-1 Tier 1 emission factors for source category 1.B.1.a Coal mining

and handling). National emission factors have not been developed.

Activity data

The source for activity data concerning coal mining and handling is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.B.1. c Other fugitive emissions from solid fuels

This category does not occurred in Serbia.

1.B.2 Oil and natural gas

This category comprises:

- 1.B.2.a.i Oil – Exploration, production, transport
- 1.B.2.a.iv Refining/storage
- 1.B.2.a.v Distribution of oil products
- 1.B.2.b Natural gas
- 1.B.2.c Venting and flaring
- 1.B.2.a.i Exploration, production, transport

Methodology

The methodology used in this inventory for the emission calculation for fugitive emissions from oil exploration, production and transport is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

1.B.2.ai			
Exploration, production, transport			
Mg oil			
1990	1063000	2004	653000
1991	1100000	2005	648000
1992	1165000	2006	654000
1993	1148000	2007	640000
1994	1078000	2008	636000
1995	1066000	2013	663000
1996	1030000	2010	856000
1997	979000	2011	1020490
1998	913000	2012	1124794
1999	705000	2013	1163988
2000	805000	2014	1112303

2001	746000	2015	1026686
2002	682000	2016	933884
2003	671000	2017	893000

Table 72. Total amount of oil explored, product and transport in Serbia in the time period 1990 – 2017.

Emission factors

Emission factors used in emission calculation from oil exploration, production and transport are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016, Table 3-1. (Table 3-1 Tier 1 emission factors for source category 1.B.2.a.i Exploration, production).

National emission factors have not been developed.

Activity data

The source for activity data concerning oil exploration, production and transport is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.B.2.a.iv Refining / storage

Methodology

The methodology used for calculation of emissions for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

1.B.2.a.iv			
Refining/storage			
kg/Mg crude oil			
1990	4725651	2004	3920610
1991	3485539	2005	3113136
1992	2362331	2006	3132000
1993	1090288	2007	3248923
1994	1326861	2008	3157293
1995	1201986	2013	2880184
1996	2369108	2010	2856846
1997	3197544	2011	2359000
1998	3033429	2012	2142308
1999	816661	2013	2747370
2000	999341	2014	2613246
2001	2577170	2015	2935549
2002	3274015	2016	3103762
2003	3762698	2017	3332749

Table 73. Activity data for category 1.B.2.a.iv Refining / storage in Serbia in time period 1990 - 2017

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

Activity data

The activity data for this category are obtained from National Energy balance for period 2005 - 2011. Data from were obtained from Statistical Office of Serbia.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements.

1.B.2.a.v Distribution of oil products

Methodology

The methodology used in this inventory for the emission calculation for fugitive emissions from coal mining and handling is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

1.B.2.a.v			
Distribution of oil products			
kg/Mg			
1990	2500000	2004	2591000
1991	2296000	2005	2551000
1992	1646000	2006	2469000
1993	768000	2007	2481000
1994	716000	2008	2444000
1995	740000	2013	2209000
1996	936000	2010	2114000
1997	1826000	2011	1717000
1998	1340000	2012	1616000
1999	682000	2013	2165000
2000	913000	2014	2239000
2001	1446000	2015	2393902
2002	1829000	2016	2482231
2003	1919000	2017	2658813

Table 74. Activity data for category 1.B.2.a.v Distribution of oil products in Serbia in time period 1990 - 2017

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

Activity data

Activity data for this category is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.B.2.b Natural gas

Methodology

The methodology used in this inventory for the emission calculation for fugitive emissions from natural gas exploration, production and transport is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation from natural gas exploration, production and transport are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

Activity data

The source for activity data concerning natural gas exploration, production and transport is SORS.

1.B.2.b			
Natural gas			
m3 gas			
1990	646000000	2004	317000000
1991	749000000	2005	282000000
1992	846000000	2006	280000000
1993	962000000	2007	270000000
1994	823000000	2008	275000000
1995	907000000	2013	279000000
1996	670000000	2010	424000000
1997	688000000	2011	616381000
1998	731000000	2012	672137000
1999	679000000	2013	660406000
2000	729000000	2014	630868000
2001	507000000	2015	626118000
2002	400000000	2016	595346000
2003	364000000	2017	548000000

Table 75. Total amount of natural gas explored, product and transport in Serbia in the period 1990 – 2017

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.B.2.c Venting and flaring

Methodology

The methodology used in this inventory for the emission calculation for fugitive emissions from coal mining and handling is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

1.B.2.c	
Venting and flaring	
m3 refinery feed	
2000	10842
2001	14659
2002	23015
2003	17612
2004	20045
2005	24188
2006	26392
2007	22279
2008	29430
2013	21456
2010	16770
2011	6998
2012	3974
2013	3696
2014	5247
2015	5114
2016	4914
2017	7357

Table 76. Activity data for category Venting and flaring (m₃)

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

Activity data

The activity data were obtained by Oil Industry Serbia. For this reporting year the data for period 1990 – 2000 were not available.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

1.B.3 Other fugitive emissions from geothermal energy production , peat and other energy extraction not included in 1.B.2

This category does not occurred in Serbia.

4. INDUSTRIAL PROCESSES AND PRODUCTS USE (NFR 2)

This category comprises:

- 2.A.1 Cement production
- 2.A.2 Lime production
- 2.A.5 Asphalt roofing
- 2.A.6 Road paving with asphalt
- 2.A.7.a Quarrying and mining of minerals other than coal
- 2.A.7.b Construction and demolition
- 2.A.7.c Storage, handling and transport of mineral products
- 2.A.7.d Other mineral products
- 2.B.1 Ammonia production
- 2.B.2 Nitric acid production
- 2.B.5.a Other chemical industry
- 2.C.1 Iron and steel production
- 2.C.3 Aluminium production
- 2.C.5.a Copper production
- 2.C.5.b Lead production
- 2.C.5.e Other metal production (Magnesium production)
- 2.D.1 Pulp and paper
- 2.D.2 Food and drink
- 2.D.3 Wood processing
- 2.F Consumption of persistent organic pollutants and heavy metals

2.A Mineral industry

2.A.1 Cement production

Methodology

The methodology used in this inventory for the emission calculation for cement production is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

2.A.1			
Cement production			
1990	2713077	2004	2240000
1991	2410754	2005	2276000
1992	2035733	2006	2565000
1993	1088432	2007	2676000
1994	1612476	2008	2843000
1995	1696404	2013	2223000
1996	2204888	2010	2130000
1997	2011327	2011	2094583
1998	2252650	2012	1830710
1999	1574930	2013	1591702
2000	2117000	2014	1605436
2001	2418000	2015	1654422
2002	2396000	2016	1800849
2003	2075000	2017	1907689

Table 77.Total amount of cement production in Serbia in the time period 1990 – 2017.

Emission factors

Emission factors used in emission calculation from cement production are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

The activity data on cement production are collected from Annual Statistical Reports.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2.A.2 Lime production

Methodology

The methodology used in this inventory for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

2.A.2			
Lime production (Mg)			
1990	636238	2004	330300
1991	649870	2005	372000
1992	542949	2006	377000
1993	318252	2007	320200
1994	365523	2008	292300
1995	410296	2013	251100
1996	447224	2010	239500
1997	453131	2011	273715
1998	577465	2012	238556
1999	371991	2013	279122
2000	365900	2014	215050
2001	324600	2015	189350
2002	394900	2016	205472
2003	345000	2017	206624

Table 78. Total amount of lime production in Serbia in the time period 1990– 2017

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

Activity data

The activity data on lime production are collected from Annual Statistical Reports.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2.A.3 Glass production

Methodology

The methodology used in this inventory for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

Activity data

The activity data on lime production are collected from Annual Statistical Reports.

Recalculations and other changes

No recalculations were performed.

2.A.3			
Glass production (t)			
1990	141477	2004	50200
1991	157140	2005	47900
1992	134077	2006	48900
1993	91220	2007	64700
1994	76007	2008	54500
1995	88256	2013	42400
1996	85439	2010	42200
1997	70542	2011	35565
1998	72605	2012	26361
1999	44391	2013	33937
2000	63000	2014	48992
2001	64000	2015	49286
2002	62000	2016	44151
2003	47000	2017	49837

Table 79. Total amount of lime production in Serbia in the time period 1990– 2017

Planned improvements

No planned improvements in the next period.

2.A.4 Soda ash production and use

This category does not occurred in Serbia.

2.A.5 a Quarrying and mining of minerals other than coal

Methodology

The methodology used in this inventory for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

2.A.5 a			
Quarrying and mining of minerals other than coal (t)			
1990	26483000	2004	8609540
1991	25758000	2005	10661013
1992	23085000	2006	11061591
1993	18189000	2007	12165978
1994	17935000	2008	14404154
1995	21038657	2013	4455598
1996	21286987	2010	14538052
1997	21878747	2011	16480621
1998	21545986	2012	18604862
1999	16591350	2013	20525373
2000	14057685	2014	20799735
2001	8046340	2015	21252026
2002	8652308	2016	22171687

2003	6253038	2017	21747781
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Table 80. Total amount of quarrying and mining of minerals other than coal in Serbia in the time period 1990– 2017

Activity data

The source for activity data for this category is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

Activity data

The source for activity data for this category is SORS.

Recalculations and other changes

No recalculations were performed

2.A.5 b Construction and demolition

2.A.5 b			
Construction and demolition (Mg asphalt)			
1990	3204702	2004	1299132
1991	2156830	2005	1319767
1992	1860111	2006	1393052
1993	1365006	2007	1422055
1994	1260746	2008	1554431
1995	1055803	2013	1405891
1996	1082499	2010	1333653
1997	1049590	2011	1266883
1998	908380	2012	1038503
1999	922431	2013	935175
2000	853719	2014	810301
2001	865515	2015	749064
2002	896002	2016	782841
2003	1185141	2017	1018066

Methodology

The methodology used in this inventory for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Table 81. Total amount of asphalt for road paving in Serbia in the time period 1990 – 2017

Planned improvements

No planned improvements.

2 A 5 c Storage, handling and transport of mineral products

Methodology

The methodology used in this inventory for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

2.A.5 c			
Storage, handling and transport of mineral products (t)			
1990	4150544	2004	1756374
1991	3990420	2005	2479159
1992	4054776	2006	2684449
1993	1554452	2007	2923542
1994	1980214	2008	3688837
1995	1939669	2013	4030042
1996	1730000	2010	4436775
1997	1723000	2011	3170220
1998	1523000	2012	1867001
1999	999000	2013	1193438
2000	1249000	2014	2035192
2001	1061635	2015	1908022
2002	1997211	2016	6778890
2003	2039896	2017	1880000

Table 82. Total amount of Storage, handling and transport of mineral products in the time period 1990 – 2017

Emission factors

Emission factors used in emission calculation for this category are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

Activity data

The source for activity data for this category is SORS.

Recalculations and other changes

No recalculations were performed

Planned improvements

No planned improvements.

2.B Chemical industry

This category comprises:

- 2.B.1 Ammonia production
- 2.B.2 Nitric acid production
- 2.B.5.a Other chemical industry

2.B.1			
Ammonia production (t NH ₃)			
1990	178745	2004	167000
1991	170237	2005	135000
1992	147748	2006	97000
1993	99897	2007	104000
1994	158518	2008	57000
1995	135401	2013	64000
1996	235070	2010	102000
1997	235183	2011	161000
1998	171640	2012	170000
1999	56645	2013	202000
2000	70000	2014	109000
2001	80000	2015	89000
2002	140000	2016	73000
2003	74000	2017	207990

2.B.1 Ammonia production

Table 83. The ammonia production in Serbia in the time period 1990 – 2017

Methodology

The methodology used in this inventory for the emission calculation for category 2 B 1 Ammonia production is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in NO_x, CO and NH₃ emission calculation are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016. National emission factors have not been developed.

Activity data

The source for activity data concerning ammonia production is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2.B.2 Nitric acid production

Methodology

The methodology used in this inventory for the emission calculation for category 2 B 2 Nitric acid production is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

2.B.2			
Nitric acid production (Mg prod., 100% Acid)			
1990	236245	2004	173000
1991	188775	2005	171000
1992	167742	2006	95000
1993	116010	2007	152000
1994	156192	2008	72000
1995	148795	2013	69000
1996	229379	2010	126000
1997	240292	2011	171000
1998	185374	2012	188000
1999	79039	2013	202000
2000	76000	2014	133000
2001	81000	2015	98000
2002	133000	2016	81000
2003	87000	2017	137075

Table 84. Total amount of nitric acid production in Serbia in the time period 1990 – 2017.

Emission factors

Emission factors used in NOx emission calculation are Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

The source for activity data concerning nitric acid production is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2.B.3 Adipic acid production and 2.B.4 Carbide production

These two categories does not occurred in Serbia.

2.B.10.a Other chemical industry

In this IIR report category 2 B 10 a Other chemical industry included:

- Sulphuric acid

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

2.B.10.a			
Sulphuric acid production (Mg)			
1990	874246	2004	53900
1991	579097	2005	98500
1992	289045	2006	76900
1993	75034	2007	71900
1994	22856	2008	75900
1995	84953	2013	49800

1996	230514	2010	77300
1997	177271	2011	77679
1998	211309	2012	95000
1999	30486	2013	99000
2000	79900	2014	83365
2001	52000	2015	192000
2002	73700	2016	298000
2003	23100	2017	319000

Table 85. Total amount of sulphuric acid production in Serbia in the time period 1990 – 2017.

Emission factors

Emission factors used in this category is Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016. National emission factors have not been developed.

Activity data

The source for activity data for this category is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

- **Ammonium nitrate**

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in this category is Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016. National emission factors have not been developed.

Activity data

The source for activity data for this category is SORS.

2.B.10.a			
Ammonium nitrate (ton)			
1990	278637	2004	204600
1991	220627	2005	199600
1992	193297	2006	115000
1993	130835	2007	186200
1994	183943	2008	88600
1995	170276	2013	81200
1996	263429	2010	150400
1997	281778	2011	205043
1998	217236	2012	227492
1999	96130	2013	242623
2000	87700	2014	158399
2001	97300	2015	118314
2002	152100	2016	73000
2003	129800	2017	131495

Table 86. Total amount of ammonium nitrate production in Serbia in the time period 2000 – 2017

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

- **Urea**

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016

2.B.10.a			
Urea (ton)			
1990	56195	2004	63600
1991	53120	2005	46800
1992	51780	2006	24500

1993	39155	2007	31200
1994	50000	2008	12100
1995	40000	2009	51652
1996	72235	2010	0
1997	66390	2011	53185
1998	57529	2012	50442
1999	16761	2013	51652
2000	21600	2014	30975
2001	16100	2015	22827
2002	45100	2016	25315
2003	28600	2017	34287

Table 87. Total amount of urea production in Serbia in the time period 1990 – 2017

Emission factors

Emission factors used in this category is Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

The source for activity data for this category is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

- **Phosphate fertilizers**

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in this category is Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016. National emission factors have not been developed.

Activity data

The source for activity data for this category is SORS.

2.B.10.a			
Phosphate fertilizers (ton produced)			
1990	210860	2004	7300
1991	169616	2005	8100
1992	121751	2006	2200
1993	38473	2007	46400
1994	19115	2008	24100
1995	16616	2013	5200
1996	101606	2010	6900
1997	72255	2011	5703
1998	56211	2012	9435
1999	21589	2013	51687
2000	25000	2014	51755
2001	35000	2015	34741
2002	9000	2016	44638
2003	13500	2017	7300

Table 88. Total amount of phosphate fertilizers production in Serbia in the time period 1990 – 2017

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

- **Ethylene and propylene**

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission

Inventory Guidebook 2016.

2.B.10.a			
Ethylene and propylene (kton produced)			
1990	258	2004	243
1991	210	2005	251
1992	110	2006	254
1993	0	2007	266

1994	0	2008	229
1995	0	2013	156
1996	101	2010	191
1997	243	2011	227
1998	242	2012	71
1999	85	2013	231
2000	132	2014	166
2001	120	2015	113
2002	174	2016	212
2003	162	2017	158

Table 89. Total amount of ethylene and propylene production in Serbia in the time period 1990 – 2017.

Emission factors

Emission factors used in this category is Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016. National emission factors have not been developed.

Activity data

The source for activity data for this category is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period

- **Polyethylene Low Density**

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in this category is Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016. National emission factors have not been developed.

2.B.10.a			
Polyethylene low density (ton produced)			
1990	48555	2004	56900
1991	38292	2005	52400
1992	24271	2006	57200
1993	0	2007	55200
1994	0	2008	52700
1995	0	2013	41000
1996	27224	2010	58700
1997	52427	2011	58030
1998	49624	2012	21611
1999	21339	2013	61489
2000	38600	2014	47573
2001	48800	2015	40062
2002	52400	2016	50661
2003	45700	2017	58000

Table 90.Total amount of polyethylene low density production in Serbia in the time period 1990 – 2017.

Activity data

The source for activity data for this category is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

- **Polyethylene High Density**

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

2.B.10.a			
Polyethylene high density (ton produced)			

1990	60778	2004	90300
1991	44302	2005	80400
1992	23774	2006	88700
1993	0	2007	89000
1994	0	2008	88300
1995	0	2013	62400
1996	28944	2010	68000
1997	57799	2011	67963
1998	63378	2012	21325
1999	25033	2013	94622
2000	54500	2014	51892
2001	70600	2015	70118
2002	73500	2016	86035
2003	64000	2017	88740

Table 91. Total amount of polyethylene high density production in Serbia in the time period 1990 – 2017.

Emission factors

Emission factors used in this category is Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

The source for activity data for this category is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

- **Polypropylene**

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in this category is Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016. National emission factors have not been developed.

2.B.10.a			
Polypropylene (ton produced)			
1990	31122	2004	32200
1991	33292	2005	32100
1992	21077	2006	30600
1993	163	2007	32700
1994	1431	2008	30000
1995	437	2013	11000
1996	16004	2010	25600
1997	31270	2011	32224
1998	34267	2012	17217
1999	13208	2013	34719
2000	21200	2014	29881
2001	31000	2015	32229
2002	28900	2016	34119
2003	28700	2017	31860

Table 92. Total amount of polypropylene production in Serbia in the time period 1990 – 2017.

Activity data

The source for activity data for this category is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

- **Styrene-butadiene rubber (SBR)**

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

2.B.10.a	
Styrene (ton produced)	
2000	15200

2001	24500
2002	24600
2003	21700
2004	30400
2005	31400
2006	32000
2007	34300
2008	35000
2013	18000
2010	23800
2011	24387
2012	9518
2013	20683
2014	0
2015	0
2016	0
2017	0

Table 93. Total amount of styrene-butadiene rubber (SBR) production in period 1990 – 2017.

Emission factors

Emission factors used in this category is Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

The source for activity data for this category is petrochemical industry. The data were not available for the period 1990 -1999.

Recalculations and other changes

No recalculations were performed.

Planned improvements

In the next period, SEPA will try to collect all missing data and recalculate the amount of emissions for whole period.

2.C Metal industry

This category includes:

- 2.C.1 Iron and steel production
- 2.C.3 Aluminium production
- 2.C.5.a Copper production
- 2.C.5.b Lead production
- 2.C.5.e Other metal production (Magnesium production)

2.C.1 Iron and steel production

Methodology

The methodology used in this inventory for the emission calculation for category 2 C 1 Iron and steel production is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emissions calculation for this category are Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

The data for the emission calculation in category 2C1: Iron and steel, is derived from operator for sinter and pellet. For pellet and sinter there was no productions before 2003.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2.C.2 Ferroalloys production

The production of ferroalloys does not occurred in Serbia.

2.C.3 Aluminum production

Methodology

The methodology used in this inventory for the emission calculation for category 2 C 3 Aluminum production is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

2.c.3	
	Aluminium production (Mg)
1990	342
1991	178
1992	80
1993	36
1994	115
1995	86
1996	51
1997	2
1998	0
1999	0
2000	494
2001	526
2002	487
2003	603
2004	514
2005	269
2006	3293
2007	10298
2008	10601
2009	9013
2010	13867
2011	12104
2012	12888
2013	13529
2014	13436
2015	11941
2016	13864
2017	13989

Table 94. Total amount of Al production in Serbia in the period 1990 – 2017

Emission factors

Emission factors used in emissions calculation for this category are Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

National emission factors have not been developed.

Activity data

The source for activity data for this category is company which produced Aluminium.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2.C.4 Magnesium production

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions was calculated on the base of methodology (Tier 2), which implies multiplication with appropriate default emission factors.

Activity data

The source for activity data concerning this category is company which produced magnesium. This category covers magnesium production.

2.C.4			
Magnesium production (ton produced)			
1990	5788	2004	0
1991	5360	2005	523
1992	4055	2006	181
1993	0	2007	1649
1994	0	2008	1478

1995	2560	2013	1341
1996	3090	2010	933
1997	3742	2011	1582
1998	3965	2012	1387
1999	1203	2013	2026
2000	0	2014	1800
2001	203	2015	3894
2002	0	2016	4131
2003	0	2017	4202

Table 95. Total amount of Mg production in Serbia in the period 1990 – 2017

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2.C.5. Lead production

Methodology

The methodology used in this inventory for the emission calculation for lead production is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for lead production is Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

Table 96. Total amount of lead production in Serbia in the period 1990 – 2017

Year	Secondary lead	Primary lead	Year	Secondary lead	Primary lead
	Mg lead			Mg lead	
1990	5565	6000	2004	5395	0
1991	1629	51000	2005	4666	0
1992	475	78000	2006	6434	0
1993	284	8000	2007	8106	0
1994	2748	13000	2008	12000	0
1995	2415	19000	2009	14036	0
1996	3488	44000	2010	24032	0
1997	5025	42000	2011	26148	0
1998	4845	36000	2012	18383	0
1999	4077	4000	2013	7546	0
2000	5145	5000	2014	0	0
2001	5143	5000	2015	0	0
2002	5272	5000	2016	0	0
2003	4893	5000	2017	0	0

Activity data

The source for activity data concerning this category is operator for lead production. From 2014. Category 2 C 5 Lead production is not occur.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2.C.6. Zinc production

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Table 97. Total amount of zinc production in Serbia in the period 1990 – 2004

2.C.6	
Primary zinc production	
(Mg Zinc)	
1990	24000
1991	39000
1992	42000
1993	7000
1994	4000
1995	6000
1996	30000
1997	39000
1998	14000
1999	1000
2000	8000
2001	13000
2002	1500
2003	2000
2004	100

Emission factors

Emissions was calculated on the base of methodology (Tier 2), which implies multiplication with appropriate default emission factors.

Activity data

The source for activity data concerning this category is Serbian Statistical Office After 2004 Zink production does not occurred in Serbia.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2.C.7 a Copper production

Methodology

The methodology used in this inventory for the emission calculation for copper production is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Table 98. Total amount of copper production in Serbia in the period 1990 – 2017

Year	Secondary	Primary	Yera	Secondary	Primary
	copper	copper		copper	copper
	Mg			Mg	
1990	0	151000	2004	820	11200
1991	0	134000	2005	1990	29300
1992	0	135000	2006	2520	38900
1993	0	51000	2007	2490	28800
1994	0	72000	2008	2640	31100
1995	0	78000	2009	1140	26300
1996	0	104000	2010	950	21200
1997	0	113000	2011	2708	25740
1998	0	94000	2012	2536	32166
1999	0	50000	2013	3432	32408
2000	720	44900	2014	1921	31255
2001	50	32300	2015	2207	42439
2002	970	34900	2016	2231	59078
2003	560	13500	2017	1469	67752

Emission factors

Emission factors used in emission calculation for copper production is Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016, Table 3.2 Tier 2 emission factors for source

category 2.C.5.a Copper production, primary copper and Table 8.5 Tier 2 emission factors for source category 2.C.5.a Copper production, secondary copper

National emission factors have not been developed.

Activity data

The source for activity data for this category is operator for copper production for the period 2000 – 2012 and for previous period (1990 – 1999) data source was Serbian Statistical Office. There were no data for secondary copper before 2000.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2 D Other Industry

2 D 3 a Domestic solvent use including fungicides

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions was calculated on the base of methodology (Tier 2), which implies multiplication with appropriate default emission factors.

Activity data

The source for activity data concerning this category is Serbian Statistical Office.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2 D 3 b Road paving with asphalt

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions were calculated on the base of methodology (Tier 2), which implies multiplication with appropriate default emission factors.

Activity data

The source for activity data concerning this category is Serbian Statistical Office.

2 D 3 b			
Road paving with asphalt			
Year	Mg asphalt	Year	Mg asphalt
1990	423104	2004	233153
1991	335604	2005	308943
1992	135259	2006	345565
1993	17935	2007	350634
1994	32736	2008	291890
1995	47537	2013	204734
1996	122470	2010	197325
1997	118360	2011	172005
1998	98481	2012	123824
1999	40911	2013	107243
2000	73082	2014	300462
2001	86538	2015	456629
2002	124560	2016	489080
2003	92486	2017	418577

Table 99. Total amount of asphalt for road paving in Serbia in the period 1990 – 2017

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2 D 3 c Asphalt roofing

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions were calculated on the base of methodology (Tier 2), which implies multiplication with appropriate default emission factors.

Activity data

The source for activity data concerning this category is Serbian Statistical Office. According of Serbian Statistical Office data there are no production of roofing cards (activity data for calculating emissions for asphalt roofing). Because of that number in 2017 is 0.

2 D 3 c			
Asphalt roofing			
Year	Mg asphalt	Year	Mg asphalt
1990	13793	2004	6338
1991	15709	2005	6179
1992	11292	2006	4840
1993	8230	2007	4655
1994	5664	2008	5284
1995	6834	2013	6866
1996	8726	2010	8848
1997	11894	2011	9131
1998	11093	2012	6678
1999	5830	2013	5733
2000	7431	2014	5185
2001	6019	2015	4072
2002	5224	2016	4015
2003	5848	2017	0

Table 100. Total amount of asphalt for asphalt roofing in Serbia in the period 1990 – 2017

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2 D 3 d Coating applications/Paint application

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions were calculated on the base of methodology (Tier 2), which implies multiplication with appropriate default emission factors.

Table 101. Total amount of products for category 2.D.3.d in Serbia in the period 1990 – 2017

Year	2.D.3.d.				
	Construction and buildings	Leather finishing	Bus coating	Truck/van coating	Car coating
kg paint	kg leather	No bus	No vehicles	No cars	
1990	6982520	0	509	8421	141000
1991	4653500	0	365	8508	75000
1992	4029250	0	294	4252	23000
1993	4426500	0	36	278	8000
1994	2776210	0	102	696	8000
1995	2301780	0	90	693	8000
1996	2361597	0	147	826	10000
1997	2281071	0	104	1269	10000
1998	1937963	0	146	1144	10000
1999	1996551	0	59	425	8000
2000	1611963	2520	159	718	12000
2001	1938262	5520	182	590	7000
2002	2420932	7680	263	595	11000
2003	2710250	14280	180	466	11370
2004	2989606	15000	183	647	14549
2005	3237976	18600	352	501	15666
2006	2997677	30480	154	441	11016
2007	3062177	41760	101	473	9403
2008	3205233	118440	324	348	7748
2009	2641732	145920	97	155	16512
2010	2161301	195720	44	200	14955
2011	2310758	84630	163	245	10593
2012	2100244	67920	95	124	22459
2013	1567497	52800	49	38	113710
2014	1289444	63720	12	40	103332
2015	1875955	62520	74	15	91747
2016	1830178		60	11	84410
2017	2021396		53	28	72829

Activity data

The source for activity data concerning this category is Serbian Statistical Office.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2 D 3 e Degreasing and 2 D 3 f Dry cleaning

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions were calculated on the base of methodology (Tier 2), which implies multiplication with appropriate default emission factors.

Activity data

The source for activity data concerning this category is Serbian Statistical Office.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2 D 3 g Chemical products

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions were calculated on the base of methodology (Tier 2), which implies amount of products multiplication with appropriate default emission factors.

Activity data

The source for activity data concerning this category is Serbian Statistical Office.

Recalculations and other changes

No recalculations were performed.

Table 102. Total amount of products for category 2.D.3.g in Serbia in the period 1990 – 2017

Year	2 D 3 g				
	Chemical products				
	Rubber	Asphalt	Shoes	Raw hide	Paints, inks and glues
	kg	Mg	pairs	kg	kg
1990	35892500	423104	24752000	3735000	27704214
1991	29477000	335604	17212000	2265000	23687179
1992	30296000	135259	15396000	1785000	20674467
1993	5751000	17935	10020000	1035000	10590140
1994	7547000	28500	8582000	1067000	14484491
1995	7262000	47537	5847000	1042000	12105359
1996	9597000	122470	6265000	1213000	14545318
1997	11726000	118360	6656000	1124000	14502884
1998	13919000	98481	6976000	907000	13601495
1999	7553000	40911	3847000	944000	7462612
2000	12074000	73082	3806000	1200000	37355812
2001	12940000	86538	4184000	1550000	34889071

2002	13651000	124560	2876000	1880000	34787163
2003	12423000	92486	2310000	2030000	34167227
2004	11751000	233153	2775000	2153000	31395258
2005	11696000	308943	3143000	2207000	25450906
2006	10637000	345565	3679000	3033000	36687533
2007	12708000	350634	3481000	2873000	36860757
2008	14731000	291890	3327000	2993000	39252037
2013	7924000	204734	2225000	2308000	38264000
2010	10772000	197325	2250000	2190000	39562000
2011	7333000	172005	2480000	1421000	43782000
2012	6631000	123824	2379000	765000	47250000
2013	5314000	107243	2424000	816000	43832000
2014	7013000	300462	3859000	866000	47999000
2015	5558000	0	4852000	1060000	48749000
2016	5168000	0	4518000	930000	95152000
2017	9362113	0	5408000	0	17418362

Planned improvements

No planned improvements in the next period.

2 D 3 h Printing

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions were calculated on the base of methodology (Tier 2), which implies multiplication with appropriate default emission factors.

Activity data

The source for activity data concerning this category is Serbian Statistical Office.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2 D 3 i Other solvent and product use

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions were calculated on the base of methodology (Tier 2), which implies multiplication with appropriate default emission factors.

Activity data

The source for activity data concerning this category is Serbian Statistical Office.

Emission factors

Emissions were calculated on the base of methodology (Tier 2), which implies multiplication with appropriate default emission factors.

Activity data

The source for activity data concerning this category is Serbian Statistical Office.

Table 103. Total amount of products for category 2.D.3.i in Serbia in the period 1990 – 2017

Year	2 D 3 i				
	Other solvent and product use				
	Fat, edible and non-edible oil extraction	Wood preservation, Creosote preservative type	Treatment of vehicles	Tobacco combustion	Use of Shoes
kg seed	kg	person	Mg	pair	
1990	375593400	0	7827000	14604	24752000
1991	429253500	0	7825000	16336	17212000
1992	365289600	0	7832000	13903	15396000
1993	365375400	0	7841000	14797	10020000
1994	364661700	0	7849000	11549	8582000
1995	396516900	0	7856000	11217	5847000
1996	342345900	0	7844000	10052	6265000
1997	392191800	0	7828000	8506	6656000
1998	398447400	2151340	7807000	12234	6976000
1999	294645000	1203170	7781000	10645	3847000
2000	239866000	1078920	7747000	13264	3806000
2001	203855000	878980	7727000	12539	4184000
2002	298055000	515000	7500030	14247	2876000
2003	331489000	549400	7480590	14375	2310000
2004	302671000	1009730	7463155	15107	2775000
2005	323647000	577440	7440765	17324	3143000
2006	276803891	475680	7411565	18267	3679000
2007	229948151	366790	7381575	21304	3481000
2008	307228359	695830	7350220	20873	3327000
2009	345421300	260510	7320805	20482	2225000
2010	257666000	470460	7291435	21906	2250000
2011	229012001	596770	7258753	27326	2480000
2012	247708518	437450	7199077	27161	2379000
2013	236567000	652269	7164132	23832	3933000
2014	262232000	700950	7131787	21081	3859000
2015	274342000	533640	7095383	33378	4852000
2016	535374000	0	7058322	41582	4518000
2017	558161000	0	7020858	45971	5408000

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2.H.1 Pulp and paper

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in this category is Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016. National emission factors have not been developed.

Activity data

The source for activity data for this category is SORS.

2.H.1			
Pulp and paper (Mg air dried pulp)			
1990	348813	2004	233400
1991	308214	2005	231500
1992	253020	2006	224300
1993	128813	2007	270700
1994	137085	2008	293900
1995	163245	2009	275300
1996	148718	2010	329200
1997	139463	2011	383567
1998	169907	2012	404331
1999	136006	2013	444577
2000	182900	2014	429944
2001	190400	2015	444271
2002	185700	2016	484665
2003	149000	2017	470027

Table 104. Total amount of pulp and paper production in Serbia in the time period 1990 – 2017.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2.H.2 Food and drink

Methodology

The methodology used in this inventory for the emission calculation for food and drink production is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for emissions from food and drink production is Tier 2 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

Table 105. – Total amount of food and drink production in Serbia in the time period 1990-2017

2.D.2	Spirits	Beer	Wine	Animal feed	Margarine and solid cooking fats	Sugar	Meat, fish and poultry	Cakes, biscuits and breakfast cereals	Bread
	hl alcohol	hl alcohol	hl alcohol	Mg feed	Mg product	Mg sugar	Mg product	Mg product	Mg bread
1990	222185	5443580	988231	1541434	38968	619213	190944	48520	335022
1991	309778	5014543	1249532	1379919	40897	469520	170336	48500	282290
1992	362967	4295956	1169767	1202645	36501	314227	135883	45373	288909
1993	676649	2800718	836935	891811	32501	126646	81044	26028	350973
1994	139704	4677942	871245	775515	32222	209964	161289	31641	325631
1995	124750	5190133	676225	815291	36734	155750	100130	39305	331644
1996	56612	5608188	801073	691466	32499	382040	105529	38318	310188
1997	35294	5708069	931877	623470	32014	239527	95182	45098	270821
1998	38366	6174899	842158	665983	39237	212874	85690	53754	270140
1999	36607	6191445	602592	571766	39230	248442	87607	56415	290948
2000	229300	6171000	623900	492600	43700	115000	76500	86300	347500
2001	176100	5488000	558700	489300	41700	209000	67500	74100	303400
2002	171400	5462000	452200	564400	42400	282000	56200	82600	242700
2003	193600	5496000	631200	532000	41000	223000	59500	79900	222000
2004	203700	5328000	763900	493900	42300	340000	84400	102200	212200
2005	154400	5206000	363000	532300	42300	387000	96700	111900	200200
2006	179400	6451000	436900	620500	42600	430000	92400	119600	196100

2007	167100	6547000	482100	596600	43500	427000	102900	124700	190300
2008	167200	6470000	447100	821700	43500	445000	104700	129600	187900
2013	128300	5436000	368700	819100	40700	433000	91500	121900	173400
2010	112717	5289000	238200	837300	43600	469000	91000	122000	164800
2011	92275	5461617	226080	850245	41438	463103	195253	117465	145229
2012	76698	5794887	219592	958169	41880	402593	194077	129985	141532
2013	76646	5320652	230580	850054	37512	508452	178546	121299	136083
2014	58329	5229208	198215	892707	33750	545957	187909	102365	181363
2015	60662	5444191	241040	974038	32416	329440	211976	104751	204687
2016	65251	5412671	360250	1160846	32718	536121	0	108499	210185
2017	74639	5433229	332828	1208126	27298	528417	0	148679	171312

Activity data

The source for activity data for all subcategories in this category is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period

2.I Wood processing

Methodology

The methodology used in this inventory for the emission calculation for wood processing is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in emission calculation for emissions from wood processing is Tier 1 emission factors attained from EMEP/EEA Inventory Guidebook 2016.

2.I			
Wood processing (Mg wood product)			
1990	243788	2004	79600
1991	159846	2005	68000
1992	212357	2006	72900
1993	134151	2007	75600
1994	123509	2008	56700
1995	132074	2009	31600
1996	133407	2010	30800
1997	130006	2011	34307
1998	127720	2012	290100
1999	96265	2013	283386
2000	119250	2014	39987
2001	81700	2015	477821
2002	62500	2016	295314
2003	63700	2017	404157

Table 106. Total amount of wood production in Serbia in the time period 1990 – 2017

Activity data

The source for activity data for this category is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

2 J Production of POPs

Production of POPs does not occurred in Serbia.

2.K Consumption of POPs and heavy metal

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions were calculated on the base of methodology (Tier 1), which implies multiplication with appropriate default emission factors.

Activity data

The source for activity data for this category is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

5. AGRICULTURE (NFR 3)

This category comprises:

- 3.B.1.a Dairy cattle
- 3.B.1.b Cattle non-dairy
- 3.B.3 Sheep
- 3.B.4 Goats
- 3.B.6 Horses
- 3.B.8 Swine
- 3.B.9.a Laying hens
- 3.B.9.b Broilers
- 3.B.9.c Turkeys
- 3.B.9.d Other poultry
- 4.D.1.a Synthetic N-fertilizers

This chapter provides information on the estimated ammonia (NH_3) and nitric oxide (NO) emissions and emissions of particulate matter (PM_{10} , $\text{PM}_{2.5}$, TSP) of the sector Agriculture in Serbia.

This chapter describes emission calculation for the following source categories:

- 3 B Animal Husbandry and Manure Management
- 3 D Crop production and agricultural soils

Category Field burning of agricultural wastes include the burning of crop residues and wastes from crops in situ. This inventory doesn't include this category, because burning of agricultural residues in the fields in Serbia is legally restricted. For this reason, activity data are not available.

Category Other Agriculture - this inventory doesn't include this category, because in Serbia, according to the information and data from the Ministry of Agriculture and Environmental

Protection and Serbian Chemical Agency, pesticides from the list from Table 3-1 (Tier 1 source for EFs category 4 . G Pesticides) were not used in observed period.

3.B Animal Husbandry and Manure Management

Methodology

The methodology used in this inventory is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016. For the calculation of NH₃ and PM emissions from the NFR sector 4 B Animal husbandry and manure management, Tier 2 methodology was used. The Excel calculation worksheet was used for all calculation in this category.

Emission factors

Emission factors used in emission calculation are default factors attained from EMEP/EEA Inventory Guidebook 2016. National emission factors have not been developed.

Emissions were calculated on the base of methodology (Tier 1), which implies multiplication with appropriate default emission factors.

Activity data

The main source for all activity is SORS.

Category Other poultry includes ducks and geese. Categories Buffalo and Mules/assess were not included in inventory, because they do not exist in Serbia.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

Table 107. Activity data for category 3.B Animal Husbandry and Manure Management in Serbia in the time period 1990 – 2017

Year	3.B Animal Husbandry and Manure Management											
	Dairy cattle	Other cattle	Fattening pigs	Sows	Laying hens	Broilers	Turkeys	Other poultry	Goats	Sheeps	Horses	
	No	No	No	No	No	No	No	No	No	No	No	No
1990	923000	636000	354000	910000	12958000	266556	21063	32125	170717	1949283	54000	
1991	847000	636000	381500	911000	13587100	267944	19188	28494	171281	1955719	53000	
1992	776000	591000	323250	841000	12183440	233889	18625	26660	145915	1666085	48000	
1993	792000	619000	329750	873000	11468900	214139	16000	27319	165000	1884000	41000	
1994	710000	518000	304750	801000	11425900	190194	14250	35756	173000	1792000	42000	
1995	781000	573000	362250	884000	13977600	205861	19438	34775	228000	1852000	53000	
1996	770000	565000	421000	903000	13456700	238806	15675	31344	202000	1834000	53000	
1997	769000	548600	382000	892000	13129600	239778	12563	25156	184400	1757900	52200	
1998	756000	523800	350250	881000	12939500	253611	12006	21125	181400	1644800	50900	
1999	768000	514600	358500	922000	13340100	257972	16000	24688	193200	1598100	42800	
2000	754046	491954	316750	912000	11977500	217750	11688	23063	183300	1611100	36600	
2001	726000	436000	300750	827000	10886900	217667	12188	23250	179500	1489400	29500	
2002	694000	434000	291500	866000	11798100	178778	12375	23250	163900	1447600	29200	
2003	625014	487150	301750	869000	10655600	178806	12938	23563	169200	1515500	24200	
2004	654737	447214	323250	731000	9134200	178750	13625	30813	155300	1585600	26200	
2005	649685	429335	363250	684000	13805000	235928	13438	31688	152000	1576000	25000	
2006	607440	498000	455000	783000	13728518	234636	16500	31561	298563	1555864	19742	

2007	584000	503000	434250	697000	13523757	231463	14875	29744	275037	1606156	18495
2008	542000	515000	422500	652000	10112701	178765	9813	30176	283984	1605280	16831
2009	501000	501000	433000	687000	14439049	217668	10813	23312	263286	1503895	14499
2010	482000	456000	417000	646000	11614950	222737	9390	23275	236935	1475395	13721
2011	477000	460000	394250	595000	11641958	194496	8073	20651	238751	1460295	11576
2012	455285	465477	401250	574000	10518289	199717	9020	23859	231837	1635218	11414
2013	429025	484119	407500	514000	9230000	224302	6957	27750	225073	1616219	15605
2014	436959	483109	439250	559000	10650000	165236	11535	24000	218603	1748110	15606
2015	429512	486129	428750	526000	11538000	149495	12725	20438	202828	1789144	15222
2016	425954	466797	472000	521081	11163404	126240	9957	23423	200150	1664895	15337
2017	428552	470098	457564	427035	10964443	830118	39204	59051	182558	1704192	16560

3.D.a.1. Agricultural Soils

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emissions were calculated on the base of methodology (Tier 1), which implies multiplication with appropriate default emission factors.

Activity data

The main source of activity data for this category is FAOSTAT and SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

3.D.a.1.			
Year	Fertilizers applied kg-1 fertilizer-N applied	Year	Fertilizers applied kg-1 fertilizer-N applied
1990	21781776	2004	265249444
1991	18496193	2005	245487662
1992	21942000	2006	237073390
1993	16572000	2007	289453652
1994	23250000	2008	257989388
1995	40740000	2013	332070220
1996	49205000	2010	191248900
1997	76922000	2011	220631640
1998	67299000	2012	327196080
1999	41201000	2013	293019650
2000	45101000	2014	198181460
2001	77133000	2015	208354610
2002	173193618	2016	265880720
2003	132456976	2017	244025123

Table 108. Activity data for category 3Da1 Agricultural Soils in Serbia in the time period 1990 – 2017

3.D.c. Farm-level agricultural operations including storage, handling and transport of agricultural products

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

3.D.c..	
Year	Area Ha
1990	3619561
1991	3618051
1992	3616540
1993	3615030
1994	3613520
1995	3612009
1996	3610499
1997	3608989
1998	3607478
1999	3605968
2000	3604458
2001	3604729
2002	3605000
2003	3605272
2004	3605543
2005	3607565
2006	3537002
2007	3572865
2008	3603637
2013	3518046
2010	3520871
2011	3528258
2012	3462215
2013	3490632
2014	3506830
2015	3468519
2016	3439887
2017	3438130

Table 109. Activity data for category Farm-level agricultural operations including storage, handling and transport of agricultural products

Emission factors

Emissions were calculated on the base of methodology (Tier 1), which implies multiplication with appropriate default emission factors.

Activity data

The main source of activity data for this category is FAOSTAT and SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

3.D.e. Cultivated crops

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

3.D.e	
Year	Area Ha
1990	3619561
1991	3618051
1992	3616540
1993	3615030
1994	3613520
1995	3612009
1996	3610499
1997	3608989
1998	3607478
1999	3605968
2000	3604458
2001	3604729
2002	3605000
2003	3605272
2004	3605543
2005	3607565
2006	3537002
2007	3572865
2008	3603637
2013	3518046
2010	3520871

2011	3528258
2012	3462215
2013	3490632
2014	3506830
2015	3468519
2016	3439887
2017	3438130

Table 110. Activity data for category 3.D e. Cultivated crops

in Serbia in the time period 1990 – 2017

Emission factors

Emissions were calculated on the base of methodology (Tier 1), which implies multiplication with appropriate default emission factors.

Activity data

The main source of activity data for this category is FAOSTAT and SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

3.F Field burning of agricultural wastes

The inventory doesn't include this category, because burning of agricultural residues in the fields in Serbia is legally restricted.

6. WASTE (NFR 5)

Serbian report covered following source categories of the sector NFR 5 Waste:

5.A Solid waste disposal on land

5.D Waste water handling

5.C.1.b.v Cremation

5.A Solid Waste Disposal on Land

Methodology

The methodology for calculation emission of NMVOC for category Solid waste disposals on land was used it has been prepared for Ukraine on behalf of the Landfill Methane Outreach Program, U.S. Environmental Protection Agency, as part of the Methane to Markets program activities in Ukraine. The main purpose of the Ukraine LFG Model is to provide landfill owners and operators with a tool to use to evaluate the feasibility and potential benefits of collecting and using the generated LFG for energy recovery or other uses.

Emission factors

Emissions were calculated on the base of methodology (Tier 1), which implies multiplication with appropriate default emission factors. National emission factors have not been developed.

5.A			
Solid waste disposal on land (m ³ landfill gas)			
1990	23041	2004	43330
1991	24680	2005	44758
1992	26258	2006	46178
1993	27784	2007	47590
1994	29263	2008	49003

1995	30715	2009	50392
1996	32142	2010	54662
1997	33540	2011	58948
1998	34918	2012	62489
1999	36269	2013	66179
2000	37607	2014	69609
2001	38984	2015	72756
2002	40436	2016	74468
2003	41889	2017	70974

Table 111. The amount of landfill gas calculated in Serbia for period 1990 – 2017.

Activity data

The number of data has been developed and incorporated into Ukrainian software for the calculation of emissions of landfill gas into the air.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

5.C.1. Cremation

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

National emission factors have not been developed.

Table 112. The number of cremated bodies in Serbia for period 1990 – 2017.

5.C.1 bv			
Cremation (No of bodies)			
1990	717	2004	2355
1991	902	2005	2333
1992	859	2006	2467
1993	1153	2007	2608
1994	1019	2008	2633
1995	1112	2009	2747
1996	1101	2010	2900
1997	1196	2011	2784
1998	2215	2012	2818
1999	2350	2013	3063
2000	2363	2014	3044
2001	2177	2015	2687
2002	2315	2016	3090
2003	2514	2017	3357

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

Activity data

The main sources of activity data are data obtained from 2 existing crematorium in Belgrade and Novi Sad.

5.D.1. Wastewater Handling

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in this category are emission factors attained from EMEP/CORINAIR Guidebook – 2007.

National emission factors have not been developed.

Emissions were calculated on the base of methodology (Tier 1), which implies multiplication with appropriate default emission factors.

Activity data

The source for activity data for this category is SORS.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

5.C Waste incineration

Categories 5C 1 a Municipal waste incineration, 5 C 1 bi Industrial waste incineration and 5 C 1 biii Clinical waste incineration do not occurred in Serbia.

7. OTHER AND NATURAL EMISSIONS (NFR 11)

11. Natural sources

11.B Forest fires

Methodology

The methodology used in this inventory for the emission calculation for this category is in accordance with the EMEP/EEA Emission Inventory Guidebook 2016.

Emission factors

Emission factors used in this category is emission factors attained from EMEP/EEA Inventory Guidebook 2016. Emissions were calculated on the base of methodology (Tier 1), which implies multiplication with appropriate default emission factors.

National emission factors have not been developed.

Activity data

The source for activity data for this category is SORS.

11.B	ha	kg
1990	1514	69870000
1991	0	1083000
1992	0	6536000
1993	0	22309000
1994	0	6132000
1995	173	447000
1996	2707	2843000
1997	154	119000
1998	1403	2496000
1999	113	534000
2000	7944	5881000
2001	459	2979000
2002	969	12785000

2003	1402	37521000
2004	202	1502000
2005	52	528000
2006	494	1080000
2007	22161	5818000
2008	575	7149000
2009	1210	1932000
2010	503	57000
2011	2036	24570000
2012	7460	63118000
2013	561	7343000
2014	284	10256000
2015	827	5059000
2016	296	37114000
2017	1050	11415000

Table 113. The area and mass of timber burned in forest fires in Serbia for period 1990 – 2017.

Recalculations and other changes

No recalculations were performed.

Planned improvements

No planned improvements in the next period.

Republic of Serbia Informative inventory report to LRTAP convention for 2019

Serbian NFR tables for 2017

Table 114. NFR tables for 2017

Republic of Serbia Informative inventory report to LRTAP convention for 2019

Republic of Serbia Informative inventory report to LRTAP convention for 2019

Republic of Serbia Informative inventory report to LRTAP convention for 2019

Republic of Serbia Informative inventory report to LRTAP convention for 2019

Serbia: 07.12.2016: 2017	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)				POPs ⁽¹⁾ (from 1990)					Activity Data (from 1990)												
				NOx (as NO ₂)	NMVOCS	SO _x (as SO ₂)	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	Liquid Fuels	Solid Fuels	Gaseous Fuels	Biomass	Other Fuels	Other activity (specified)	Other Activity Units			
	NFR Code	Longname	Notes	kt	kt	kt	kt	kt	kt	kt	kt	t	t	t	t	t	t	t	t	t	g-TEQ	t	t	t	t	t	kg	kg	TJ NCV	TJ NCV	TJ NCV	TJ NCV	TJ NCV						
NFR Aggregation for Gridding and LPS (GWR)																																							
J_Waste	5C1biii	Clinical waste incineration	(c)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Waste incinerated [kg]								
J_Waste	5C1biv	Sewage sludge incineration	(c)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Incineration of corpses [Number]								
J_Waste	5C1bv	Cremation	(c)	0.0028	0.0000	0.0004	NA	0.0001	0.0001	0.0001	NE	0.0005	0.0001	0.0000	0.0050	0.0000	0.0000	0.0000	0.0001	0.0005	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0014	NA	NA	NA	NA	NA	3357.0					
J_Waste	5C1bvi	Other waste incineration (please specify in the IR)	(c)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify								
J_Waste	5C2	Open burning of waste		NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	Waste incinerated [kg]								
J_Waste	5D1	Domestic wastewater handling		NA	NE	NA	4,2462	NE	NE	NE	NA	NE	NE	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Population size (1000 head)								
J_Waste	5D2	Industrial wastewater handling		NA	0.0020	NA	NE	NE	NE	NE	NA	NE	NE	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	m ³ waste water handled (1000000)									
J_Waste	5D3	Other wastewater handling		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	m ³ waste water handled (1000000)									
J_Waste	5E	Other waste (please specify in IR)	(d)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	fire (t000)									
M_Other	6A	Other (included in national total for entire territory) (please specify in IR)		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify										
NATIONAL TOTAL	NATIONAL TOTAL for the entire territory (based on fuel sold)			147,6409	125,0663	420,1977	64,9145	38,5137	52,8057	93,9493	3,1918	268,3692	54,8038	2,6540	1,8845	5,6420	12,3468	17,5475	23,7283	13,3752	63,2094	51,3735	6,7632	7,5976	2,9723	3,6734	24,6077	2,2419	717,5573	21163.5	316789.4	86402.4	41467.9	NA	NA	NA			
ADJUSTMENTS	Sum of adjustments (negative value) from Annex (Net total)																																	NA					
NATIONAL TOTAL FOR COMPLIANCE	National total for compliance assessment (please specify all details in the IR)		(e)																															NA					
EMISSIONS NOT TO BE INCLUDED IN NATIONAL TOTALS																																							
O_AvCruise	1A3ai(ii)	International aviation cruise (civil)		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	LTO									
O_AvCruise	1A3ai(iii)	Domestic aviation cruise (civil)		0.6052	0.0059	0.0589	NE	0.0118	0.0118	NE	0.0001	0.1177	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NA	NA	NA	NA	NA	58859.0	LTO					
P_IntShipping	1A3di(i)	International maritime navigation		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	produced [kt]									
z_Memo	1A5c	Multilateral operations		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify										
z_Memo	1A3	Transport (fuel used)		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify										
z_Memo	6B	Other not included in national total of the entire territory (please specify in the IR)		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify										
N_Natural	11A	Volcanoes		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify										
N_Natural	11B	Forest fires		0,1470	0,3675	0,0284	0,0315	0,1027	0,1256	0,1941	0,0092	4,0350	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	1050,0	Area of forest burned [ha]					
N_Natural	11C	Other natural emissions (please specify in the IR)		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Please specify										

8. RECALCULATION AND IMPROVEMENTS

The main objective of recalculation is to improve the emissions inventory and the quality of reports.

For category 1 A 2 g viii Stationary combustion in manufacturing industries and construction: Other, recalculations were performed for the entire time series (1990-2017) in order to eliminate calculation error and improve data emissions.

9. PROJECTIONS

Parties shall report their latest available projections at least every four years, and provide any updated projections annually by 15-th of February for the years 2020, 2025 and 2030 etc.

The NEC Directive has been partially transposed into national legislation through the Law on Air Protection ("Official Gazette of the Republic of Serbia", No. 36/09 and 10/13), Regulation on emission limit values of pollutants in the air from stationary pollution sources, other than combustion plants ("Official Gazette of the Republic of Serbia", No. 111/15) and the Regulation on methodology for development of emission inventory and projections of air pollutants ("Official Gazette of RS", No. 03/2016).

For the calculation and evaluation of its emissions, both for the base year and the future emissions scenario, in order to fulfill its obligations under the NEC Directive, the Republic of Serbia will use the GAINS model. Emissions for 2005, as base, are calculated directly in the GAINS model, while the input data for the projections from the Energy and Agriculture sectors will be prepared in the PRIMES and CAPRI models, which are used in the framework of the Climate Change Strategy. This way of combining these models is in line with good EU practice.

10. REPORTING OF GRIDDED EMISSIONS AND LPS

In accordance with the ceip reporting instructions, Serbia will provide data on lps emissions by May 1

11. EMISSION TRENDS PER SECTOR

Table 115. Emission trends for NOx (kt) 1990-2017

NOx	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	97,1311	21,7962	6,8737	1,1361	0,0263	49,3183	8,9636	0,0006	0,9207	186,1665
1991	86,1057	17,2890	5,4525	0,8373	0,0294	48,0269	7,4387	0,0007	0,7884	165,9687
1992	81,4835	20,9143	6,4813	0,5688	0,0250	43,9833	5,3479	0,0007	0,9209	159,7258
1993	75,7604	13,7859	6,3424	0,2634	0,0266	31,0406	3,8019	0,0010	0,7069	131,7290
1994	69,3982	13,6771	5,7617	0,3200	0,0208	44,4823	3,6486	0,0008	0,9718	138,2814
1995	87,9472	12,3074	4,2460	0,2898	0,0202	43,5880	3,2040	0,0009	1,6767	153,2802
1996	85,3207	17,6898	5,3919	0,5701	0,0181	42,8326	6,2663	0,0009	2,0149	160,1053
1997	92,3056	18,9003	5,4537	0,7689	0,0153	43,1936	6,6135	0,0010	3,1224	170,3743
1998	91,8443	18,2597	6,3470	0,7295	0,0220	43,2303	6,8479	0,0018	2,7359	170,0184

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1999	68,5447	13,8823	5,9372	0,1972	0,0192	38,2825	4,6618	0,0019	1,6906	133,2175
2000	77,3884	13,9775	6,0374	0,2417	0,0239	43,8025	4,4458	0,0019	1,8446	147,7637
2001	76,0983	16,4524	5,8956	0,6206	0,0226	45,8723	4,9645	0,0018	3,1222	153,0503
2002	79,8254	18,5573	6,2073	0,7884	0,0256	44,8116	6,6430	0,0019	6,9641	163,8246
2003	83,5642	18,3120	6,4114	0,9054	0,0259	45,4910	7,0213	0,0021	5,3334	167,0666
2004	85,9930	21,2192	6,6030	0,9435	0,0272	45,1423	11,9756	0,0019	10,6451	182,5508
2005	74,6712	18,7176	5,9601	0,7496	0,0312	44,8415	12,2386	0,0019	9,8550	167,0667
2006	78,8274	19,0976	4,5519	0,7542	0,0329	43,2882	12,6627	0,0020	9,5189	168,7358
2007	78,6876	18,8839	7,3493	0,7819	0,0383	43,7389	12,2849	0,0022	11,6132	173,3802
2008	81,3244	19,2992	6,8053	0,7604	0,0376	43,6962	10,1795	0,0022	10,3529	172,4575
2009	74,6381	14,5760	7,2484	0,6932	0,0369	41,5340	9,3874	0,0023	13,3153	161,4314
2010	68,1844	17,3718	7,7006	0,6875	0,0394	38,5274	9,3832	0,0024	7,6807	149,5775
2011	76,8839	19,8995	9,3223	0,5675	0,0492	37,3025	10,1446	0,0023	8,8550	163,0268
2012	71,6317	20,3902	7,5808	0,5152	0,0489	30,2346	7,9774	0,0023	13,1183	151,4995
2013	75,4060	17,1192	6,0875	0,6605	0,0429	29,9274	12,0296	0,0025	11,7511	153,0267
2014	59,1224	14,9055	5,7318	0,6279	0,0379	29,9071	10,4197	0,0025	7,9592	128,7141
2015	72,2524	15,4219	5,9281	0,7053	0,0601	35,2210	7,7205	0,0022	8,3661	145,6776
2016	71,6667	16,4133	6,6022	0,7459	0,0748	35,1324	7,6164	0,0025	10,6660	148,9203
2017	72,6489	16,3214	6,1025	0,8011	0,0827	35,0437	6,8445	0,0028	9,7933	147,6409

Table 116. Emission trends for NMVOC (kt) 1990-2017

NMVOC	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	0,6008	15,9042	38,8170	41,2610	23,6752	36,8884	0,6932	0,0001	30,3395	188,1793
1991	0,5434	14,8424	31,4097	29,7676	21,6440	35,1548	0,5962	0,0002	29,0874	163,0456
1992	0,5687	14,0797	29,5498	34,8059	20,2969	32,8379	0,3811	0,0002	26,8886	159,4090
1993	0,4919	15,9435	29,5074	30,8802	19,0689	21,5815	0,3656	0,0002	27,3789	145,2181
1994	0,4450	8,4418	27,7685	31,7056	18,6348	32,2094	0,3468	0,0002	24,8519	144,4040
1995	0,5542	7,5087	23,6473	33,8077	18,3034	30,8332	0,2748	0,0002	27,3483	142,2778
1996	0,5484	9,1947	25,8642	32,2378	18,4477	30,5721	0,5442	0,0002	27,0361	144,4454
1997	0,5994	7,5446	25,9498	37,8633	18,5237	31,8345	0,5584	0,0002	26,7338	149,6077
1998	0,5821	7,6901	28,1709	37,5388	18,6655	33,6301	0,5730	0,0002	26,1666	153,0173
1999	0,4388	7,3675	27,4843	24,9469	17,7608	30,1250	0,3977	0,0002	26,3747	134,8960
2000	0,4887	9,4398	28,8522	28,3162	17,9876	35,2062	0,3542	0,0002	25,5986	146,2437
2001	0,4919	9,4777	28,3480	28,4576	17,9436	34,6655	0,4082	0,0002	24,1728	143,9655
2002	0,5192	10,1265	29,3715	29,7985	17,6840	33,2589	0,5899	0,0003	23,7651	145,1138
2003	0,5436	9,7805	29,9570	31,4582	17,6247	35,1062	0,6360	0,0003	22,8071	147,9136
2004	0,5724	11,6897	30,1941	33,4826	17,9444	32,6389	1,1842	0,0040	22,5409	150,2513
2005	0,4844	10,5191	28,3350	33,8864	18,0872	30,9157	1,2138	0,0040	22,9980	146,4436
2006	0,5011	11,5261	24,6996	35,1602	18,0602	29,1014	1,2525	0,0041	23,0437	143,3489

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2007	0,5066	11,5580	29,0391	35,4271	17,9319	28,5875	1,5802	0,0041	22,4944	147,1289
2008	0,5169	12,2142	26,0683	36,5509	18,0121	26,6757	1,0254	0,0036	21,2128	142,2800
2009	0,4740	10,6481	30,4546	35,8410	17,5407	24,4851	1,0287	0,0037	21,0004	141,4763
2010	0,4425	11,4325	29,7365	35,3123	17,2789	18,4762	1,2451	0,0035	19,6862	133,6137
2011	0,4992	11,4366	29,0509	37,4389	17,2025	16,8348	1,4693	0,0032	19,5187	133,4543
2012	0,4666	10,3763	29,2525	34,9425	17,0610	15,5231	1,0424	0,0030	18,9497	127,6170
2013	0,4776	12,3238	24,8013	37,8595	17,5922	13,6272	1,6989	0,0030	18,3843	126,7678
2014	0,3802	11,7360	25,2342	29,3845	17,3439	12,2495	1,2142	0,0024	18,8868	116,4318
2015	0,4615	9,9667	24,9196	36,1602	17,4816	14,0258	0,7675	0,0026	18,8275	122,6129
2016	0,4603	12,3485	27,1433	36,9166	18,1874	13,1940	0,7394	0,0027	18,4827	127,4750
2017	0,4694	12,3987	25,2545	38,0440	17,3903	12,3623	0,6713	0,0024	18,4734	125,0663

Table 117 Emission trends for SOx (kt) 1990-2017

SOx	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	518,2359	45,7364	22,0086	2,9316	NA	1,7353	1,4657	0,0001	NA	592,1135
1991	458,9422	31,2535	14,9363	2,1617	NA	1,6474	1,0510	0,0001	NA	509,9922
1992	421,7507	40,9196	25,1438	1,4663	NA	1,5000	0,7138	0,0001	NA	491,4942
1993	400,1574	30,6946	25,3482	0,6775	NA	1,0082	0,5068	0,0001	NA	458,3928
1994	367,7909	26,6239	22,0683	0,8241	NA	1,4949	0,5155	0,0001	NA	419,3177
1995	468,2364	17,1761	11,3939	0,7464	NA	1,4733	0,4347	0,0001	NA	499,4610
1996	452,0952	28,5426	17,6437	1,4702	NA	1,4739	0,9904	0,0001	NA	502,2162
1997	487,9219	31,4139	17,7504	1,9838	NA	1,5303	1,0825	0,0001	NA	541,6829
1998	488,3085	33,2699	23,9329	1,8820	NA	1,5739	1,1431	0,0003	NA	550,1105
1999	363,6760	30,3978	22,1210	0,5074	NA	1,4149	0,7582	0,0003	NA	418,8756
2000	411,7391	27,6097	21,2169	0,6215	NA	1,5773	0,7557	0,0003	NA	463,5206
2001	402,3091	32,5596	20,1432	1,6001	NA	1,6976	0,8295	0,0002	NA	459,1393
2002	420,8580	36,2034	22,4217	2,0329	NA	1,6951	1,0931	0,0003	NA	484,3044
2003	440,6095	39,5132	23,7635	2,3355	NA	1,7268	1,1460	0,0003	NA	509,0947
2004	450,2578	38,8362	24,3208	2,4336	NA	1,7252	1,9391	0,0003	NA	519,5130
2005	394,2941	25,8731	20,2215	1,9330	NA	1,6981	1,9901	0,0003	NA	446,0102
2006	418,4640	28,6149	10,6464	1,9448	NA	1,6460	2,0639	0,0003	NA	463,3803
2007	416,3032	27,1982	23,5422	2,0169	NA	1,5893	1,1353	0,0003	NA	471,7854
2008	431,6660	25,7391	19,7226	1,9607	NA	1,5224	0,6099	0,0003	NA	481,2209
2009	396,2424	18,0241	14,8789	1,7880	NA	1,4309	0,6960	0,0003	NA	433,0607
2010	360,1481	21,9050	17,1426	1,7734	NA	1,0041	0,7195	0,0003	NA	402,6931
2011	405,9048	27,0619	22,1193	1,4640	NA	0,8379	0,6917	0,0003	NA	458,0799
2012	377,8054	25,7497	14,5192	1,3293	NA	0,6885	0,4985	0,0003	NA	420,5908
2013	400,8797	20,4254	11,8212	1,7044	NA	0,6946	0,6808	0,0003	NA	436,2065
2014	313,0551	18,3508	8,7963	1,6210	NA	0,7154	0,5546	0,0003	NA	343,0936
2015	383,2967	20,6598	8,9776	1,8209	NA	0,8660	0,5355	0,0003	NA	416,1568
2016	379,5842	27,9755	12,2712	1,9253	NA	0,8946	0,5734	0,0003	NA	423,2246
2017	384,1179	21,8019	10,8618	2,0676	NA	0,9233	0,4249	0,0004	NA	420,1977

Table 118. Emission trends for NH3 (kt) 1990-2017

NH3	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	NA	8,5014	3,4316	0,0130	0,0631	0,0268	0,0008	8,6285	72,7121	93,3774
1991	NA	6,7533	2,9727	0,0071	0,0693	0,0255	0,0008	8,5512	70,0553	88,4352
1992	NA	5,9298	2,2125	0,0102	0,0589	0,0437	0,0005	8,4586	64,1406	80,8548
1993	NA	4,0239	2,2124	0,0083	0,0621	0,0274	0,0005	8,3679	65,3039	80,0064
1994	NA	5,6449	2,1614	0,0080	0,0487	0,0451	0,0005	8,2383	59,6293	75,7761
1995	NA	5,2096	2,1591	0,0068	0,0473	0,0488	0,0004	8,1074	67,2843	82,8637
1996	NA	8,0858	2,1603	0,0087	0,0425	0,0605	0,0007	7,9570	67,5528	85,8682
1997	NA	8,6217	2,1604	0,0097	0,0361	0,0757	0,0007	7,8030	67,9395	86,6466
1998	NA	6,6626	2,1616	0,0093	0,0514	0,0977	0,0007	7,6321	65,9567	82,5722
1999	NA	2,9264	2,1612	0,0060	0,0448	0,1025	0,0005	7,4822	65,7327	78,4564
2000	NA	2,6857	2,3570	0,0063	0,0559	0,1382	0,0004	7,3008	63,8832	76,4275
2001	NA	2,9601	2,3567	0,0081	0,0531	0,1456	0,0005	7,1583	61,3788	74,0612
2002	NA	4,6772	2,3573	0,0092	0,0604	0,1778	0,0008	6,7440	65,7959	79,8226
2003	NA	3,9662	2,3577	0,0100	0,0610	0,2043	0,0009	6,6428	61,3569	74,5998
2004	NA	6,2987	2,3578	0,0104	0,0642	0,2335	0,0017	6,4601	65,9744	81,4006
2005	NA	6,1064	2,3567	0,0080	0,0734	0,2488	0,0017	6,2502	66,2924	81,3376
2006	NA	3,5122	2,3508	0,0077	0,0779	0,2675	0,0018	6,1427	67,3756	79,7362
2007	NA	5,6650	2,3493	0,0075	0,0904	0,2941	0,0022	6,0270	67,5604	81,9960
2008	NA	2,6933	1,9631	0,0076	0,0887	0,3012	0,0019	5,8150	62,0408	72,9117
2009	NA	2,5892	2,9183	0,0063	0,0866	0,3226	0,0017	5,4436	66,4476	77,8158
2010	NA	4,5761	2,8175	0,0070	0,0924	0,3772	0,0017	5,2732	55,8577	69,0029
2011	NA	6,3614	2,5653	0,0065	0,1144	0,3787	0,0020	5,0366	56,1800	70,6449
2012	NA	6,9990	2,7737	0,0059	0,1132	0,3426	0,0015	5,1275	60,1399	75,5034
2013	NA	7,5591	2,3537	0,0067	0,0995	0,3480	0,0025	4,8618	56,1551	71,3864
2014	NA	4,9137	2,5031	0,0047	0,0881	0,3549	0,0021	4,7013	53,4825	66,0503
2015	NA	3,7008	2,4888	0,0054	0,1392	0,4076	0,0014	4,6319	53,5995	64,9747
2016	NA	2,3331	2,5648	0,0063	0,1732	0,4160	0,0013	4,3705	55,9265	65,7918
2017	NA	4,1386	2,3606	0,0071	0,1908	0,4244	0,0012	4,2462	53,5455	64,9145

Table 119. Emission trends for PM2,5 (kt) 1990-2017

PM2.5	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	1,4183	5,1978	44,1754	0,3678	0,6197	2,1499	0,2824	0,0000	0,8121	55,0234
1991	1,4959	3,3184	36,4507	0,2198	0,6986	2,0668	0,2181	0,0000	0,7827	45,2511
1992	1,3627	4,5789	32,3086	0,3277	0,5946	1,9035	0,2043	0,0000	0,7330	42,0133
1993	1,1297	3,6835	32,2879	0,3012	0,6187	1,3802	0,0609	0,0000	0,7464	40,2086
1994	1,0161	3,4711	30,6412	0,2987	0,5306	1,9339	0,0620	0,0000	0,6922	38,6459
1995	1,2609	2,8472	27,1088	0,2944	0,5408	1,9145	0,0731	0,0000	0,7439	34,7836
1996	1,3132	3,5863	29,0322	0,2950	0,4768	1,9125	0,1461	0,0000	0,7358	37,4980
1997	1,4786	3,7031	29,0998	0,3233	0,4650	1,9029	0,1676	0,0000	0,7288	37,8691
1998	1,3431	3,8681	31,0241	0,3241	0,5694	1,8842	0,1779	0,0001	0,7155	39,9064
1999	1,0730	3,1982	30,4347	0,2329	0,4642	1,6565	0,1178	0,0001	0,7187	37,8960
2000	1,1591	3,1437	32,2330	0,2527	0,5020	1,8742	0,1309	0,0001	0,7033	39,9991
2001	1,1445	3,3460	31,8119	0,2536	0,4609	1,9927	0,1342	0,0001	0,6740	39,8179
2002	1,0897	3,6797	32,6714	0,2643	0,5635	1,9474	0,1418	0,0001	0,6624	41,0202
2003	1,1418	3,8306	33,1649	0,2802	0,5870	1,9835	0,1380	0,0001	0,6411	41,7672
2004	1,1440	4,1128	33,3649	0,2873	0,5895	1,9966	0,1523	0,0001	0,6420	42,2894
2005	1,1658	2,9893	31,8059	0,2636	0,6619	2,0110	0,1521	0,0001	0,6503	39,7000
2006	1,1822	3,1187	28,6660	0,2682	0,6593	1,9923	0,1592	0,0001	0,6443	36,6902
2007	1,1875	3,1073	32,3079	0,2645	0,7132	2,0425	0,4895	0,0001	0,6364	40,7488
2008	1,1844	3,2322	28,3619	0,2752	0,7479	2,0784	0,5482	0,0001	0,6121	37,0405
2009	1,1091	2,3075	35,4366	0,2553	0,7603	2,0370	0,4580	0,0001	0,5982	42,9619
2010	0,9902	3,0348	34,5884	0,2658	0,7461	1,9174	0,4125	0,0001	0,5723	42,5276
2011	1,0814	3,6908	33,2220	0,2828	0,8752	1,9389	0,4590	0,0001	0,5701	42,1203
2012	1,0030	3,3231	33,8818	0,2620	0,8820	1,6227	0,3626	0,0001	0,5581	41,8954
2013	1,0497	3,7273	28,7048	0,2759	0,7854	1,6344	0,5484	0,0001	0,5482	37,2742
2014	0,8357	2,8271	29,4910	0,1927	0,7265	1,6518	0,4863	0,0001	0,5595	36,7708
2015	1,0178	3,2087	29,2090	0,2391	1,0658	2,1265	0,3422	0,0001	0,5573	37,7664
2016	1,0081	3,7442	31,3049	0,2544	1,4439	2,2461	0,3200	0,0001	0,5472	40,8690
2017	1,0147	3,4648	28,9644	0,2703	1,5761	2,3657	0,3068	0,0001	0,5508	38,5137

Table 120. Emission trends for PM10 (kt) 1990-2017

PM10	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	3,2674	11,1958	45,3133	2,1932	0,7323	2,5266	0,3085	0,0000	7,2767	72,8141
1991	3,1864	8,3303	37,4093	1,4323	0,8274	2,4328	0,2371	0,0000	7,2548	61,1104
1992	2,9069	9,0850	33,1248	1,9362	0,7041	2,2477	0,2226	0,0000	7,0982	57,3255

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1993	2,5597	6,6998	33,1066	1,8012	0,7284	1,6227	0,0651	0,0000	7,1034	53,6869
1994	2,3258	6,6050	31,4203	1,8292	0,6400	2,2833	0,0666	0,0000	7,0012	52,1715
1995	2,9214	6,1139	27,8044	1,8969	0,6597	2,2586	0,0790	0,0000	7,1926	48,9266
1996	2,9383	7,3832	29,7783	1,8165	0,5795	2,2562	0,1588	0,0000	7,1686	52,0793
1997	3,2464	7,5577	29,8464	2,0224	0,5826	2,2586	0,1825	0,0000	7,1332	52,8300
1998	3,0812	7,9803	31,8203	2,0503	0,6889	2,2488	0,1940	0,0001	7,0940	55,1579
1999	2,3844	6,1496	31,2166	1,4281	0,5526	1,9859	0,1283	0,0001	7,1184	50,9639
2000	2,6319	6,0796	33,0632	1,5823	0,5740	2,2515	0,1431	0,0001	7,0362	53,3620
2001	2,5851	6,0370	32,6344	1,5384	0,5220	2,4130	0,1465	0,0001	6,9345	52,8110
2002	2,5706	6,7637	33,5106	1,5810	0,6529	2,3768	0,1541	0,0001	6,9518	54,5616
2003	2,6924	6,6278	34,0140	1,6709	0,6865	2,4303	0,1497	0,0001	6,8828	55,1545
2004	2,7217	7,4182	34,2183	1,7125	0,6803	2,4615	0,1634	0,0001	6,8155	56,1915
2005	2,5891	6,4802	32,6293	1,6805	0,7590	2,4982	0,1632	0,0001	6,9953	53,7950
2006	2,6812	6,7894	29,4128	1,7455	0,7423	2,5113	0,1709	0,0001	6,9105	50,9639
2007	2,6806	6,6492	33,1518	1,7450	0,7822	2,6043	0,5005	0,0001	6,9280	55,0417
2008	2,7223	6,6567	29,0621	1,8164	0,8401	2,6645	0,5597	0,0001	6,8056	51,1275
2009	2,5268	4,5977	36,3861	1,7617	0,8639	2,6222	0,4689	0,0001	6,8144	56,0418
2010	2,2703	5,9499	35,5318	1,7722	0,8234	2,4965	0,4217	0,0001	6,6690	55,9347
2011	2,5158	6,8982	34,1366	1,9245	0,9439	2,5335	0,4663	0,0001	6,6650	56,0840
2012	2,3372	6,1710	34,7835	1,7893	0,9563	2,1380	0,3678	0,0001	6,5133	55,0565
2013	2,4626	6,7132	29,4644	1,8859	0,8564	2,1694	0,5538	0,0001	6,4858	50,5917
2014	1,9419	5,8708	30,2678	1,3647	0,8052	2,2101	0,4917	0,0001	6,5907	49,5431
2015	2,3713	6,7269	29,9852	1,7165	1,1481	2,8212	0,3483	0,0001	6,5559	51,6736
2016	2,3484	7,6959	32,1262	1,7745	1,6046	3,0521	0,3261	0,0001	6,4863	55,4143
2017	2,3695	7,0557	29,7141	1,8402	1,7436	3,2831	0,3117	0,0001	6,4876	52,8057

Table 121. Emission trends for TSP (kt) 1990-2017

TSP	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	4,8137	78,3614	48,0503	4,7033	5,8847	0,7354	0,3078	0,0000	11,0368	153,893 5
1991	4,6723	62,4021	39,5970	3,0508	4,9405	0,7138	0,2375	0,0000	11,0781	126,692 0
1992	4,2539	54,7400	35,2609	4,1685	2,4003	0,6723	0,2245	0,0000	10,5316	112,252 1
1993	3,7639	36,5866	35,2397	3,8833	1,0167	0,4745	0,0658	0,0000	10,4876	91,5182
1994	3,4227	47,4655	33,4171	3,9357	1,0550	0,6812	0,0673	0,0000	10,2231	100,267 5
1995	4,3035	44,7682	29,4619	4,0695	1,3095	0,6703	0,0780	0,0000	10,9701	95,6311
1996	4,3186	65,8947	31,6173	3,8990	2,1176	0,6696	0,1584	0,0000	10,9163	119,591 6
1997	4,7656	69,8394	31,6924	4,3322	2,0814	0,6928	0,1819	0,0000	10,7777	124,363 6
1998	4,5360	57,7169	33,8490	4,3904	1,9504	0,7092	0,1933	0,0001	10,6491	113,994 3
1999	3,5035	29,4656	33,1892	3,0743	1,1025	0,6409	0,1286	0,0001	10,7608	81,8656
2000	3,8727	27,8484	35,1222	3,4008	1,4990	0,7326	0,1426	0,0001	10,4119	83,0301

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2001	3,8009	29,4391	34,6518	3,3008	1,6012	0,8135	0,1457	0,0001	10,0430	83,7962
2002	3,7876	41,9823	35,6124	3,3907	2,2072	0,8306	0,1531	0,0001	10,1759	98,1400
2003	3,9669	36,7150	36,1640	3,5820	1,8626	0,8628	0,1485	0,0001	9,9160	93,2179
2004	4,0098	54,2157	36,3875	3,6708	3,5387	0,8956	0,1620	0,0001	9,5925	112,4727
2005	3,8036	53,4337	34,6454	3,5920	4,5311	0,9383	0,1616	0,0001	10,4786	111,5844
2006	3,9458	37,3867	31,1302	3,7268	4,9445	0,9983	0,1689	0,0001	10,5093	92,8106
2007	3,9423	51,2631	35,2123	3,7217	5,0358	1,0790	0,4984	0,0001	10,4243	111,1769
2008	4,0084	30,9827	30,9337	3,8757	4,4042	1,1247	0,5575	0,0001	9,7308	85,6177
2009	3,7181	25,5467	38,4879	3,7504	3,3898	1,1245	0,4668	0,0001	10,3690	86,8533
2010	3,3369	41,1401	37,5873	3,7806	3,2428	1,1152	0,4194	0,0001	9,7338	100,3562
2011	3,7004	53,1368	36,1644	4,1063	3,0538	1,1450	0,4640	0,0001	9,6856	111,4564
2012	3,4384	56,3350	36,8025	3,8173	2,4917	0,9899	0,3653	0,0001	9,3612	113,6014
2013	3,6229	60,0938	31,1760	4,0196	2,1906	1,0296	0,5512	0,0001	9,1050	111,7889
2014	2,8525	44,2297	31,9929	2,8979	0,8576	1,0738	0,4883	0,0001	9,4865	93,8793
2015	3,4850	38,8243	31,6853	3,6449	1,2030	1,3382	0,3452	0,0001	9,5574	90,0834
2016	3,4508	31,1159	33,9974	3,7737	1,7116	1,6712	0,3228	0,0001	9,4494	85,4929
2017	3,4825	41,5403	31,4560	3,9182	1,8552	2,0041	0,3084	0,0001	9,3845	93,9493

Table 122. Emission trends for BC (kt) 1990-2017

BC	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	0,0228	0,1284	4,1311	0,0630	0,0018	0,0002	0,0012	NA	NA	4,3485
1991	0,0346	0,0904	3,4629	0,0263	0,0020	0,0002	0,0011	NA	NA	3,6174
1992	0,0303	0,1092	2,9073	0,0615	0,0017	0,0001	0,0007	NA	NA	3,1108
1993	0,0195	0,0853	2,9060	0,0571	0,0018	0,0001	0,0006	NA	NA	3,0704
1994	0,0166	0,0771	2,7815	0,0526	0,0014	0,0001	0,0006	NA	NA	2,9299
1995	0,0194	0,0504	2,5554	0,0444	0,0014	0,0001	0,0005	NA	NA	2,6716
1996	0,0243	0,0799	2,6785	0,0489	0,0012	0,0001	0,0009	NA	NA	2,8339
1997	0,0298	0,0853	2,6828	0,0497	0,0010	0,0001	0,0010	NA	NA	2,8498
1998	0,0218	0,0935	2,8059	0,0483	0,0015	0,0002	0,0010	NA	NA	2,9722
1999	0,0206	0,0834	2,7682	0,0414	0,0013	0,0001	0,0007	NA	NA	2,9157
2000	0,0200	0,0755	2,9579	0,0420	0,0016	0,0002	0,0006	NA	NA	3,0978
2001	0,0201	0,0890	2,9310	0,0427	0,0015	0,0002	0,0007	NA	NA	3,0852
2002	0,0145	0,1014	2,9860	0,0451	0,0017	0,0002	0,0010	NA	NA	3,1499
2003	0,0153	0,1114	3,0176	0,0476	0,0017	0,0002	0,0011	NA	NA	3,1949
2004	0,0140	0,1159	3,0303	0,0488	0,0018	0,0002	0,0020	NA	NA	3,2131
2005	0,0224	0,0645	2,9306	0,0369	0,0021	0,0002	0,0020	NA	NA	3,0587
2006	0,0207	0,0721	2,7282	0,0347	0,0022	0,0002	0,0021	NA	NA	2,8602
2007	0,0211	0,0786	2,9621	0,0320	0,0026	0,0002	0,2219	NA	NA	3,3185

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2008	0,0192	0,1376	2,5823	0,0337	0,0025	0,0002	0,2601	NA	NA	3,0356
2009	0,0189	0,1275	3,3955	0,0251	0,0025	0,0002	0,2075	NA	NA	3,7773
2010	0,0156	0,1879	3,3039	0,0314	0,0027	0,0002	0,1849	NA	NA	3,7266
2011	0,0155	0,2210	3,1399	0,0317	0,0033	0,0003	0,2258	NA	NA	3,6376
2012	0,0143	0,2400	3,2501	0,0290	0,0033	0,0002	0,1809	NA	NA	3,7177
2013	0,0142	0,2770	2,7494	0,0294	0,0029	0,0002	0,2870	NA	NA	3,3601
2014	0,0118	0,2137	2,8574	0,0151	0,0026	0,0002	0,2503	NA	NA	3,3511
2015	0,0142	0,2273	2,8344	0,0175	0,0041	0,0003	0,1636	NA	NA	3,2614
2016	0,0141	0,2157	2,9971	0,0230	0,0051	0,0004	0,1492	NA	NA	3,4046
2017	0,0139	0,2276	2,7676	0,0280	0,0056	0,0004	0,1487	NA	NA	3,1918

Table 123. Emission trends for CO (kt) 1990-2017

CO	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	4,1581	20,7019	286,0574	1,3950	0,8047	203,5089	1,4480	0,0001	NA	518,0739
1991	3,6441	15,4384	226,7071	0,7185	0,9001	195,8315	1,3058	0,0001	NA	444,5456
1992	4,4182	19,7401	227,8617	1,1597	0,7661	167,9281	0,8995	0,0001	NA	422,7735
1993	3,6012	14,2938	227,4613	0,9776	0,8153	106,8649	0,5125	0,0002	NA	354,5268
1994	3,2191	13,6548	212,0495	0,9290	0,6363	160,5050	0,4627	0,0001	NA	391,4567
1995	3,9385	10,4784	172,5320	0,7917	0,6181	162,9824	0,7046	0,0002	NA	352,0459
1996	3,9250	16,0710	193,8862	0,9653	0,5539	164,0968	0,9190	0,0002	NA	380,4172
1997	4,2984	17,2900	194,7019	1,0528	0,4687	167,9950	0,9730	0,0002	NA	386,7800
1998	4,1468	19,9317	216,0483	1,0168	0,6741	169,7497	0,9953	0,0003	NA	412,5630
1999	3,1076	14,3486	209,4368	0,7101	0,5865	147,6170	0,5855	0,0003	NA	376,3926
2000	3,4429	16,8802	217,6316	0,7359	0,7308	160,6049	0,6642	0,0003	NA	400,6908
2001	3,5737	17,2653	212,8232	0,8899	0,6909	166,6089	0,7636	0,0003	NA	402,6159
2002	3,9011	18,9908	222,5956	0,9895	0,7850	155,3222	0,9532	0,0003	NA	403,5378
2003	4,0832	20,1066	228,1931	1,0721	0,7921	163,6719	1,0222	0,0004	NA	418,9415
2004	4,4503	40,2240	230,4788	1,1038	0,8324	157,3312	1,4625	0,0003	NA	435,8834
2005	3,5034	35,2685	212,7193	0,8477	0,9546	149,3755	1,4901	0,0003	NA	404,1592
2006	3,5674	41,9810	177,9232	0,8163	1,0065	131,9934	1,5776	0,0003	NA	358,8658
2007	3,6636	38,7705	218,8782	0,7844	1,1739	120,0394	19,8734	0,0004	NA	403,1837
2008	3,7120	41,7799	199,4026	0,8029	1,1501	112,9900	6,9681	0,0004	NA	366,8059
2009	3,3870	26,6911	217,9768	0,6454	1,1286	100,4683	9,5845	0,0004	NA	359,8820

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2010	3,2676	30,7786	213,9304	0,7412	1,2070	81,2390	17,9920	0,0004	NA	349,156 3
2011	3,7197	34,4066	213,5119	0,7009	1,5057	68,4027	23,6567	0,0004	NA	345,904 6
2012	3,4938	21,8983	209,8603	0,6386	1,4966	57,0285	13,9688	0,0004	NA	308,385 3
2013	3,4598	24,1138	177,8054	0,6990	1,3131	51,9667	25,0902	0,0004	NA	284,448 4
2014	2,8033	26,4351	177,7596	0,4680	1,1616	47,9613	11,7926	0,0004	NA	268,381 9
2015	3,3733	33,1263	175,1581	0,5338	1,8391	51,6860	3,9522	0,0004	NA	269,669 3
2016	3,3911	25,7190	194,3304	0,6327	2,2912	47,9814	3,1077	0,0004	NA	277,453 8
2017	3,4892	33,0144	181,0333	0,7309	2,5330	44,2767	3,2912	0,0005	NA	268,369 2

Table 124. Emission trends for Pb (kt) 1990-2017

Pb	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	5,7416	9,4790	4,4439	0,8251	NA	351,860 5	0,0072	0,0000	NA	372,357 4
1991	5,0774	6,6615	3,2538	0,3522	NA	328,613 0	0,0049	0,0000	NA	343,962 7
1992	4,6690	8,0620	4,4598	0,7945	NA	285,673 2	0,0047	0,0000	NA	303,663 2
1993	4,4378	4,1727	4,4910	0,7321	NA	181,642 3	0,0009	0,0000	NA	195,476 9
1994	4,0800	4,1210	3,9944	0,6756	NA	278,638 8	0,0011	0,0000	NA	291,510 9
1995	5,1957	3,7046	2,4362	0,5708	NA	273,549 4	0,0014	0,0000	NA	285,458 3
1996	5,0117	6,8001	3,3504	0,6334	NA	272,070 3	0,0034	0,0000	NA	287,869 4
1997	5,4057	8,2899	3,3655	0,6482	NA	284,644 2	0,0041	0,0000	NA	302,357 8
1998	5,4170	8,1065	4,2697	0,6299	NA	291,137 5	0,0045	0,0001	NA	309,565 3
1999	4,0306	3,9331	4,0052	0,5301	NA	259,400 3	0,0029	0,0001	NA	271,902 2
2000	4,5651	5,7670	3,9438	0,5386	NA	181,914 4	0,0034	0,0001	NA	196,732 4
2001	4,4603	5,2440	3,7880	0,5565	NA	188,050 9	0,0034	0,0001	NA	202,103 2
2002	4,6719	5,5426	4,1191	0,5905	NA	176,560 3	0,0034	0,0001	NA	191,487 9
2003	4,8913	5,8867	4,3143	0,6249	NA	219,989 5	0,0032	0,0001	NA	235,710 1
2004	4,9998	23,8597	4,3954	0,6402	NA	214,799 6	0,0031	0,0001	NA	248,697 8
2005	4,3695	28,7354	3,7998	0,4844	NA	197,326 8	0,0031	0,0001	NA	234,719 1
2006	4,6420	44,9770	2,3997	0,4572	NA	170,915 5	0,0032	0,0001	NA	223,394 7
2007	4,6179	38,8288	4,1668	0,4228	NA	161,569 5	0,0031	0,0001	NA	209,608 9
2008	4,7920	41,0985	3,5510	0,4444	NA	145,172 2	0,0032	0,0001	NA	195,061 3
2009	4,4004	27,6884	3,2257	0,3335	NA	127,966 2	0,0031	0,0001	NA	163,617 3
2010	3,9980	33,7904	3,5138	0,4143	NA	63,9534	0,0025	0,0001	NA	105,672

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										5
2011	4,5075	31,9434	4,1326	0,4156	NA	8,0347	0,0020	0,0001	NA	49,0359
2012	4,1956	9,0442	3,0788	0,3791	NA	6,4875	0,0014	0,0001	NA	23,1866
2013	4,4545	10,0204	2,5411	0,3872	NA	6,4049	0,0014	0,0001	NA	23,8096
2014	3,4791	12,8833	2,1648	0,2056	NA	6,5447	0,0014	0,0001	NA	25,2790
2015	4,2595	21,5617	2,1805	0,2377	NA	7,6080	0,0016	0,0001	NA	35,8491
2016	4,2183	24,8725	2,6831	0,3077	NA	7,7935	0,0016	0,0001	NA	39,8768
2017	4,2686	39,7741	2,4077	0,3729	NA	7,9791	0,0013	0,0001	NA	54,8038

Table 125. Emission trends for Cd (kt) 1990-2017

Cd	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	0,6951	2,5162	0,6736	0,0389	0,0789	0,0155	0,0011	0,0000	NA	4,0193
1991	0,6236	2,1780	0,5769	0,0239	0,0882	0,0150	0,0009	0,0000	NA	3,5067
1992	0,5721	2,2346	0,4531	0,0265	0,0751	0,0139	0,0009	0,0000	NA	3,3762
1993	0,5383	0,9020	0,4536	0,0189	0,0799	0,0096	0,0003	0,0000	NA	2,0026
1994	0,4942	1,2053	0,4384	0,0191	0,0624	0,0140	0,0003	0,0000	NA	2,2336
1995	0,6282	1,2786	0,4194	0,0165	0,0606	0,0138	0,0003	0,0000	NA	2,4175
1996	0,6094	1,7360	0,4307	0,0235	0,0543	0,0138	0,0006	0,0000	NA	2,8683
1997	0,6595	1,8986	0,4309	0,0279	0,0459	0,0141	0,0006	0,0000	NA	3,0776
1998	0,6560	1,6074	0,4420	0,0268	0,0661	0,0146	0,0007	0,0000	NA	2,8136
1999	0,4908	0,8739	0,4388	0,0139	0,0575	0,0130	0,0005	0,0000	NA	1,8883
2000	0,5538	0,8275	0,4735	0,0149	0,0716	0,0149	0,0005	0,0000	NA	1,9568
2001	0,5414	0,6527	0,4716	0,0232	0,0677	0,0163	0,0005	0,0000	NA	1,7734
2002	0,5630	0,7026	0,4756	0,0273	0,0769	0,0165	0,0005	0,0000	NA	1,8624
2003	0,5895	0,3949	0,4779	0,0303	0,0776	0,0172	0,0005	0,0000	NA	1,5880
2004	0,6015	0,4585	0,4789	0,0314	0,0816	0,0178	0,0005	0,0000	NA	1,6702
2005	0,5322	0,7369	0,4718	0,0245	0,0936	0,0185	0,0005	0,0000	NA	1,8780
2006	0,5639	0,9913	0,4539	0,0241	0,0987	0,0195	0,0005	0,0000	NA	2,1519
2007	0,5612	0,7902	0,4753	0,0241	0,1151	0,0210	0,0005	0,0000	NA	1,9873
2008	0,5808	0,8327	0,3991	0,0240	0,1127	0,0218	0,0005	0,0000	NA	1,9716
2009	0,5344	0,6514	0,5693	0,0206	0,1106	0,0217	0,0004	0,0000	NA	1,9085
2010	0,4835	0,6412	0,5551	0,0219	0,1183	0,0215	0,0004	0,0000	NA	1,8421
2011	0,5438	0,7235	0,5196	0,0195	0,1476	0,0217	0,0003	0,0000	NA	1,9761
2012	0,5062	0,6412	0,5426	0,0177	0,1467	0,0190	0,0002	0,0000	NA	1,8735
2013	0,5366	0,6860	0,4588	0,0209	0,1287	0,0194	0,0002	0,0000	NA	1,8507
2014	0,4194	0,6427	0,4814	0,0169	0,1138	0,0202	0,0003	0,0000	NA	1,6947
2015	0,5134	0,8803	0,4791	0,0191	0,1802	0,0244	0,0003	0,0000	NA	2,0968
2016	0,5084	1,1778	0,4986	0,0212	0,2245	0,0254	0,0003	0,0000	NA	2,4562
2017	0,5143	1,3834	0,4578	0,0236	0,2482	0,0265	0,0002	0,0000	NA	2,6540

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Table 126. Emission trends for Hg (kt) 1990-2017

Hg	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	1,1068	1,4273	0,1639	0,0494	0,0438	NA	0,0008	0,0011	NA	2,7930
1991	0,9708	0,7699	0,1187	0,0283	0,0438	NA	0,0005	0,0013	NA	1,9335
1992	0,8966	1,4162	0,1840	0,0368	0,0439	NA	0,0005	0,0013	NA	2,5792
1993	0,8555	1,2370	0,1837	0,0285	0,0439	NA	0,0001	0,0017	NA	2,3505
1994	0,7870	1,1690	0,1609	0,0279	0,0440	NA	0,0001	0,0015	NA	2,1904
1995	1,0027	0,9926	0,0895	0,0240	0,0440	NA	0,0002	0,0017	NA	2,1546
1996	0,9645	1,1581	0,1358	0,0317	0,0439	NA	0,0004	0,0016	NA	2,3361
1997	1,0386	1,1737	0,1369	0,0363	0,0438	NA	0,0005	0,0018	NA	2,4315
1998	1,0446	1,1663	0,1792	0,0349	0,0437	NA	0,0005	0,0033	NA	2,4726
1999	0,7750	0,9785	0,1650	0,0208	0,0436	NA	0,0003	0,0035	NA	1,9867
2000	0,8793	1,0171	0,1602	0,0219	0,0434	NA	0,0004	0,0035	NA	2,1258
2001	0,8595	1,0554	0,1536	0,0303	0,0433	NA	0,0004	0,0032	NA	2,1457
2002	0,9042	1,1046	0,1680	0,0348	0,0420	NA	0,0004	0,0034	NA	2,2574
2003	0,9466	1,1491	0,1768	0,0383	0,0419	NA	0,0004	0,0037	NA	2,3568
2004	0,9693	1,3524	0,1819	0,0396	0,0418	NA	0,0003	0,0035	NA	2,5888
2005	0,8407	1,1231	0,1551	0,0307	0,0417	NA	0,0003	0,0035	NA	2,1950
2006	0,8946	1,2467	0,0900	0,0299	0,0415	NA	0,0004	0,0037	NA	2,3068
2007	0,8900	1,1638	0,1764	0,0294	0,0413	NA	0,0003	0,0039	NA	2,3051
2008	0,9249	1,2207	0,1424	0,0296	0,0412	NA	0,0004	0,0039	NA	2,3630
2009	0,8489	0,7553	0,1310	0,0248	0,0410	NA	0,0003	0,0041	NA	1,8054
2010	0,7718	1,1136	0,1504	0,0272	0,0408	NA	0,0003	0,0043	NA	2,1085
2011	0,8714	1,2139	0,1855	0,0248	0,0406	NA	0,0002	0,0041	NA	2,3405
2012	0,8113	0,8483	0,1248	0,0226	0,0403	NA	0,0002	0,0042	NA	1,8517
2013	0,8612	0,8017	0,1018	0,0258	0,0401	NA	0,0002	0,0046	NA	1,8353
2014	0,6725	0,5170	0,0808	0,0194	0,0399	NA	0,0002	0,0045	NA	1,3343
2015	0,8233	0,7260	0,0840	0,0220	0,0397	NA	0,0002	0,0040	NA	1,6992
2016	0,8155	0,9773	0,1057	0,0250	0,0395	NA	0,0002	0,0046	NA	1,9678
2017	0,8255	0,8925	0,0937	0,0282	0,0393	NA	0,0001	0,0050	NA	1,8845

Table 127. Emission trends for As (kt) 1990-2017

As	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	5,4730	2,2673	0,0769	0,0515	0,0002	NA	0,0272	0,0000	NA	7,8961
1991	4,8338	1,6614	0,0552	0,0292	0,0002	NA	0,0184	0,0000	NA	6,5981
1992	4,4489	1,9661	0,0863	0,0388	0,0001	NA	0,0177	0,0000	NA	6,5580
1993	4,2303	1,0540	0,0870	0,0304	0,0000	NA	0,0034	0,0000	NA	5,4051

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1994	3,8893	1,1337	0,0759	0,0296	0,0000	NA	0,0041	0,0000	NA	5,1327
1995	4,9531	1,0690	0,0403	0,0254	0,0000	NA	0,0054	0,0000	NA	6,0933
1996	4,7760	1,5876	0,0625	0,0333	0,0001	NA	0,0129	0,0000	NA	6,4724
1997	5,1503	1,8081	0,0628	0,0379	0,0001	NA	0,0156	0,0000	NA	7,0749
1998	5,1636	1,6695	0,0840	0,0365	0,0000	NA	0,0170	0,0000	NA	6,9707
1999	3,8405	0,9775	0,0776	0,0222	0,0000	NA	0,0109	0,0000	NA	4,9286
2000	4,3508	1,1251	0,0748	0,0233	0,0000	NA	0,0129	0,0000	NA	5,5871
2001	4,2515	1,0554	0,0716	0,0317	0,0000	NA	0,0129	0,0000	NA	5,4232
2002	4,4561	1,1188	0,0787	0,0363	0,0001	NA	0,0129	0,0000	NA	5,7029
2003	4,6653	1,0522	0,0830	0,0399	0,0000	NA	0,0122	0,0000	NA	5,8527
2004	4,7703	1,2515	0,0850	0,0412	0,0001	NA	0,0116	0,0000	NA	6,1597
2005	4,1633	1,2683	0,0721	0,0319	0,0002	NA	0,0116	0,0000	NA	5,5474
2006	4,4228	1,5808	0,0397	0,0311	0,0002	NA	0,0122	0,0000	NA	6,0868
2007	4,3999	1,3377	0,0835	0,0305	0,0002	NA	0,0116	0,0000	NA	5,8634
2008	4,5660	1,4315	0,0820	0,0308	0,0001	NA	0,0122	0,0000	NA	6,1227
2009	4,1909	0,9617	0,0724	0,0256	0,0001	NA	0,0116	0,0000	NA	5,2623
2010	3,8110	1,1416	0,0830	0,0282	0,0001	NA	0,0095	0,0000	NA	5,0735
2011	4,2977	1,3269	0,1147	0,0258	0,0001	NA	0,0075	0,0000	NA	5,7728
2012	4,0005	0,8370	0,0747	0,0235	0,0001	NA	0,0052	0,0000	NA	4,9410
2013	4,2462	0,8267	0,0571	0,0268	0,0001	NA	0,0054	0,0000	NA	5,1623
2014	3,3161	0,7575	0,0465	0,0199	NA	NA	0,0054	0,0000	NA	4,1454
2015	4,0600	1,0565	0,0488	0,0226	NA	NA	0,0061	0,0000	NA	5,1940
2016	4,0209	1,4024	0,0594	0,0258	NA	NA	0,0061	0,0000	NA	5,5146
2017	4,0693	1,4869	0,0518	0,0292	NA	NA	0,0048	0,0000	NA	5,6420

Table 128. Emission trends for Cr (kt) 1990-2017

Cr	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	3,4815	6,1980	1,4051	0,3825	0,0025	0,2136	0,0303	0,0000	NA	11,7136
1991	3,0756	4,6695	1,1663	0,1674	0,0020	0,2080	0,0214	0,0000	NA	9,3101
1992	2,8286	4,9599	1,0493	0,3621	0,0008	0,1956	0,0207	0,0000	NA	9,4169
1993	2,6904	1,9764	1,0527	0,3306	0,0001	0,1384	0,0045	0,0000	NA	6,1930
1994	2,4737	2,2892	0,9928	0,3060	0,0002	0,1989	0,0050	0,0000	NA	6,2657
1995	3,1505	2,3998	0,8505	0,2588	0,0003	0,1958	0,0065	0,0000	NA	6,8622
1996	3,0378	4,2315	0,9350	0,2900	0,0007	0,1956	0,0146	0,0000	NA	8,7052
1997	3,2759	5,2016	0,9362	0,2990	0,0007	0,2018	0,0174	0,0000	NA	9,9326
1998	3,2844	4,7408	1,0195	0,2904	0,0006	0,2065	0,0188	0,0000	NA	9,5609
1999	2,4429	2,0187	0,9953	0,2394	0,0002	0,1860	0,0122	0,0000	NA	5,8948
2000	2,7675	2,9930	1,0469	0,2438	0,0004	0,2137	0,0142	0,0000	NA	7,2797
2001	2,7039	2,5483	1,0332	0,2562	0,0005	0,2385	0,0143	0,0000	NA	6,7950
2002	2,8335	2,6356	1,0627	0,2734	0,0007	0,2435	0,0143	0,0000	NA	7,0638
2003	2,9666	2,4915	1,0802	0,2902	0,0006	0,2537	0,0136	0,0000	NA	7,0964

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2004	3,0327	4,8784	1,0875	0,2974	0,0014	0,2643	0,0129	0,0000	NA	9,5748
2005	2,6480	5,8579	1,0345	0,2255	0,0019	0,2772	0,0129	0,0000	NA	10,0579
2006	2,8134	8,6738	0,9051	0,2133	0,0021	0,2951	0,0136	0,0000	NA	12,9163
2007	2,7986	7,2425	1,0700	0,1983	0,0021	0,3192	0,0128	0,0000	NA	11,6437
2008	2,9044	7,8472	0,8923	0,2077	0,0018	0,3330	0,0135	0,0000	NA	12,1999
2009	2,6661	5,3489	1,1526	0,1573	0,0012	0,3315	0,0127	0,0000	NA	9,6705
2010	2,4239	6,2794	1,1530	0,1934	0,0012	0,3232	0,0106	0,0000	NA	10,3848
2011	2,7332	6,2980	1,1399	0,1926	0,0010	0,3331	0,0084	0,0000	NA	10,7063
2012	2,5441	2,3246	1,0978	0,1757	0,0007	0,2869	0,0059	0,0000	NA	6,4358
2013	2,7011	2,5428	0,9237	0,1810	0,0006	0,2975	0,0062	0,0000	NA	6,6529
2014	2,1094	3,0244	0,9322	0,0993	NA	0,3107	0,0062	0,0000	NA	6,4823
2015	2,5826	4,7861	0,9306	0,1146	NA	0,3891	0,0070	0,0000	NA	8,8100
2016	2,5576	6,0919	0,9970	0,1464	NA	0,4062	0,0070	0,0000	NA	10,2061
2017	2,5883	8,2436	0,9099	0,1762	NA	0,4232	0,0055	0,0000	NA	12,3468

Table 129. Emission trends for Cu (kt) 1990-2017

Cu	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	0,4608	10,1270	0,8002	0,1253	0,0789	3,9889	0,1010	0,0000	NA	15,6821
1991	0,4537	8,4519	0,5909	0,0600	0,0882	3,8875	0,1001	0,0000	NA	13,6324
1992	0,4022	9,0560	0,7705	0,1109	0,0751	3,6606	0,0988	0,0000	NA	14,1740
1993	0,3401	4,0467	0,7738	0,0973	0,0799	2,5836	0,0352	0,0000	NA	7,9566
1994	0,3070	5,1739	0,6939	0,0912	0,0624	3,7176	0,0313	0,0000	NA	10,0775
1995	0,3828	5,3319	0,4491	0,0775	0,0606	3,6627	0,0355	0,0000	NA	10,0001
1996	0,3954	7,0223	0,5900	0,0906	0,0543	3,6642	0,0544	0,0000	NA	11,8710
1997	0,4433	7,5805	0,5929	0,0961	0,0459	3,7938	0,0577	0,0000	NA	12,6102
1998	0,4068	6,4893	0,7327	0,0931	0,0661	3,8877	0,0585	0,0000	NA	11,7341
1999	0,3230	3,8011	0,6914	0,0706	0,0575	3,5097	0,0421	0,0000	NA	8,4954
2000	0,3549	3,5564	0,6873	0,0725	0,0716	4,0301	0,0425	0,0000	NA	8,8153
2001	0,3480	2,9116	0,6616	0,0818	0,0677	4,5049	0,0442	0,0000	NA	8,6198
2002	0,3330	3,1531	0,7156	0,0892	0,0769	4,6059	0,0459	0,0000	NA	9,0197
2003	0,3480	1,9789	0,7472	0,0957	0,0776	4,7986	0,0446	0,0000	NA	8,0907
2004	0,3483	4,2186	0,7602	0,0983	0,0816	5,0043	0,0451	0,0000	NA	10,5564
2005	0,3569	5,8778	0,6629	0,0751	0,0935	5,2497	0,0434	0,0000	NA	12,3593
2006	0,3635	8,8376	0,4441	0,0717	0,0986	5,5987	0,0446	0,0000	NA	15,4589
2007	0,3635	7,4710	0,7174	0,0679	0,1150	6,0521	0,0420	0,0000	NA	14,8289
2008	0,3636	7,8162	0,6377	0,0702	0,1127	6,3187	0,0416	0,0000	NA	15,3607
2009	0,3415	5,6309	0,5826	0,0550	0,1106	6,2822	0,0385	0,0000	NA	13,0413
2010	0,2974	6,4329	0,6162	0,0651	0,1183	6,1680	0,0365	0,0000	NA	13,7344
2011	0,3254	6,3514	0,7074	0,0630	0,1476	6,3462	0,0311	0,0000	NA	13,9720
2012	0,3019	3,4532	0,5623	0,0574	0,1467	5,4703	0,0242	0,0000	NA	10,0160
2013	0,3167	3,5894	0,4663	0,0611	0,1287	5,6600	0,0252	0,0000	NA	10,2475
2014	0,2504	3,5408	0,4145	0,0376	0,1138	5,9076	0,0257	0,0000	NA	10,2905

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2015	0,3057	5,3946	0,4135	0,0431	0,1802	7,4060	0,0285	0,0000	NA	13,7716
2016	0,3025	7,1958	0,4984	0,0527	0,2245	7,0430	0,0285	0,0000	NA	15,3455
2017	0,3044	9,7726	0,4541	0,0620	0,2482	6,6801	0,0260	0,0000	NA	17,5475

Table 130. Emission trends for Ni (kt) 1990-2017

Ni	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	6,0465	13,5221	0,4024	0,2771	0,0606	0,0430	1,2821	0,0000	NA	21,6338
1991	8,8085	9,5884	0,2904	0,1234	0,0609	0,0416	0,8667	0,0000	NA	19,7798
1992	7,5965	8,6500	0,4150	0,2591	0,0443	0,0389	0,8347	0,0000	NA	17,8386
1993	5,0979	4,1141	0,4180	0,2350	0,0408	0,0272	0,1612	0,0000	NA	10,0943
1994	4,4027	3,9320	0,3700	0,2180	0,0326	0,0394	0,1930	0,0000	NA	9,1877
1995	5,1948	4,0237	0,2182	0,1845	0,0327	0,0388	0,2571	0,0000	NA	9,9497
1996	6,3260	6,1803	0,3072	0,2083	0,0333	0,0388	0,6093	0,0000	NA	13,7032
1997	7,6697	7,6700	0,3087	0,2159	0,0289	0,0402	0,7372	0,0000	NA	16,6706
1998	5,8017	5,1470	0,3968	0,2095	0,0380	0,0411	0,8011	0,0000	NA	12,4352
1999	5,3387	4,6548	0,3710	0,1702	0,0308	0,0370	0,5129	0,0000	NA	11,1155
2000	5,2711	2,2654	0,3633	0,1736	0,0395	0,0424	0,6088	0,0000	NA	8,7640
2001	5,2537	4,7054	0,3481	0,1847	0,0382	0,0471	0,6088	0,0000	NA	11,1861
2002	3,9286	4,8861	0,3804	0,1979	0,0447	0,0480	0,6089	0,0000	NA	10,0947
2003	4,1310	5,0121	0,3994	0,2105	0,0434	0,0501	0,5769	0,0000	NA	10,4235
2004	3,8079	11,3865	0,4073	0,2158	0,0524	0,0520	0,5450	0,0000	NA	16,4671
2005	5,7592	15,9650	0,3492	0,1638	0,0622	0,0544	0,5449	0,0000	NA	22,8989
2006	5,3905	24,6643	0,2128	0,1553	0,0666	0,0576	0,5769	0,0000	NA	31,1240
2007	5,4656	20,8208	0,3852	0,1448	0,0751	0,0620	0,5449	0,0000	NA	27,4984
2008	5,0203	18,5442	0,3297	0,1513	0,0710	0,0646	0,5768	0,0000	NA	24,7579
2009	4,8416	14,1921	0,2888	0,1154	0,0655	0,0644	0,5447	0,0000	NA	20,1125
2010	4,0527	15,7414	0,3176	0,1408	0,0690	0,0629	0,4488	0,0001	NA	20,8333
2011	4,0768	13,9424	0,3808	0,1395	0,0824	0,0643	0,3527	0,0000	NA	19,0390
2012	3,7540	5,3281	0,2761	0,1272	0,0795	0,0558	0,2438	0,0000	NA	9,8646
2013	3,7118	4,9591	0,2271	0,1319	0,0697	0,0576	0,2566	0,0001	NA	9,4139
2014	3,0077	6,2594	0,1892	0,0740	0,0569	0,0600	0,2566	0,0001	NA	9,9039
2015	3,6523	9,6282	0,1908	0,0853	0,0901	0,0745	0,2887	0,0000	NA	14,0099
2016	3,6059	12,3121	0,2392	0,1080	0,1123	0,0723	0,2887	0,0001	NA	16,7385
2017	3,5797	19,3860	0,2143	0,1294	0,1241	0,0700	0,2247	0,0001	NA	23,7283

Table 131. Emission trends for Se (kt) 1990-2017

Se	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	17,1221	0,7261	0,0526	0,0578	0,0002	0,0038	0,0087	0,0000	NA	17,9713
1991	14,9783	0,5583	0,0410	0,0319	0,0002	0,0037	0,0061	0,0000	NA	15,6194
1992	13,7962	0,8102	0,0489	0,0450	0,0001	0,0034	0,0059	0,0000	NA	14,7096
1993	13,2110	0,6692	0,0494	0,0362	0,0000	0,0024	0,0012	0,0000	NA	13,9694
1994	12,1587	0,5924	0,0445	0,0349	0,0000	0,0035	0,0014	0,0000	NA	12,8354
1995	15,5028	0,3862	0,0293	0,0299	0,0000	0,0035	0,0018	0,0000	NA	15,9536
1996	14,8931	0,6012	0,0387	0,0382	0,0001	0,0034	0,0042	0,0000	NA	15,5789
1997	16,0250	0,6135	0,0387	0,0429	0,0001	0,0036	0,0050	0,0000	NA	16,7288
1998	16,1453	0,7306	0,0478	0,0413	0,0000	0,0037	0,0054	0,0000	NA	16,9742
1999	11,9660	0,6218	0,0452	0,0263	0,0000	0,0034	0,0035	0,0000	NA	12,6663
2000	13,5892	0,6707	0,0452	0,0276	0,0000	0,0039	0,0041	0,0000	NA	14,3407
2001	13,2725	0,7205	0,0438	0,0360	0,0000	0,0043	0,0041	0,0000	NA	14,0814
2002	13,9746	0,7990	0,0468	0,0409	0,0001	0,0043	0,0041	0,0000	NA	14,8698
2003	14,6300	0,8458	0,0485	0,0447	0,0000	0,0045	0,0039	0,0000	NA	15,5775
2004	14,9736	0,8765	0,0493	0,0461	0,0001	0,0047	0,0037	0,0000	NA	15,9542
2005	12,9727	0,6019	0,0440	0,0356	0,0002	0,0049	0,0037	0,0000	NA	13,6631
2006	13,8129	0,6422	0,0303	0,0345	0,0002	0,0052	0,0039	0,0000	NA	14,5292
2007	13,7356	0,6282	0,0494	0,0337	0,0002	0,0057	0,0037	0,0001	NA	14,4566
2008	14,2816	0,6825	0,0468	0,0341	0,0001	0,0060	0,0039	0,0001	NA	15,0552
2009	13,0985	0,4429	0,0490	0,0281	0,0001	0,0059	0,0037	0,0001	NA	13,6283
2010	11,9212	0,5942	0,0532	0,0314	0,0001	0,0058	0,0031	0,0001	NA	12,6090
2011	13,4637	0,8038	0,0665	0,0290	0,0001	0,0059	0,0024	0,0001	NA	14,3715
2012	12,5342	0,5745	0,0495	0,0264	0,0001	0,0052	0,0017	0,0001	NA	13,1917
2013	13,3154	0,4985	0,0390	0,0297	0,0001	0,0055	0,0018	0,0001	NA	13,8900
2014	10,3922	0,4143	0,0353	0,0214	NA	0,0056	0,0018	0,0001	NA	10,8706
2015	12,7256	0,4881	0,0364	0,0243	NA	0,0060	0,0020	0,0001	NA	13,2824
2016	12,6029	0,6803	0,0412	0,0281	NA	0,0059	0,0020	0,0001	NA	13,3605
2017	12,7574	0,5419	0,0365	0,0320	NA	0,0058	0,0016	0,0001	NA	13,3752

Table 132. Emission trends for Zn (kt) 1990-2017

Zn	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	4,2201	12,4203	30,2015	0,4879	0,0394	4,1025	0,0780	0,0001	NA	51,5499
1991	4,8558	7,9199	25,1628	0,2114	0,0441	3,9488	0,0714	0,0001	NA	42,2143

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1992	4,2850	9,3808	22,0607	0,4650	0,0375	3,6769	0,0702	0,0001	NA	39,9764
1993	3,3561	5,6206	22,1036	0,4262	0,0400	2,5594	0,0230	0,0002	NA	34,1290
1994	2,9895	5,0814	20,9591	0,3940	0,0312	3,7202	0,0212	0,0002	NA	33,1967
1995	3,6679	4,2780	18,4316	0,3331	0,0303	3,6648	0,0246	0,0002	NA	30,4305
1996	3,9822	7,8780	19,9008	0,3718	0,0271	3,6585	0,0408	0,0002	NA	35,8594
1997	4,5811	9,6925	19,9282	0,3822	0,0230	3,7711	0,0446	0,0002	NA	38,4228
1998	3,9543	9,1926	21,3837	0,3712	0,0330	3,8649	0,0460	0,0004	NA	38,8462
1999	3,2874	5,5979	20,9558	0,3086	0,0287	3,4778	0,0322	0,0004	NA	33,6889
2000	3,4704	6,9652	22,1705	0,3140	0,0358	3,9742	0,0338	0,0004	NA	36,9643
2001	3,4241	7,6954	21,9117	0,3277	0,0339	4,3803	0,0348	0,0003	NA	37,8082
2002	3,0545	8,0171	22,4585	0,3489	0,0385	4,4518	0,0358	0,0004	NA	38,4053
2003	3,2020	8,9240	22,7795	0,3699	0,0388	4,6383	0,0346	0,0004	NA	39,9875
2004	3,1345	20,9837	22,9122	0,3790	0,0408	4,8067	0,0344	0,0004	NA	52,2917
2005	3,5675	23,8751	21,9279	0,2871	0,0468	5,0128	0,0334	0,0004	NA	54,7510
2006	3,5396	36,9970	19,6376	0,2714	0,0493	5,2856	0,0346	0,0004	NA	65,8155
2007	3,5575	32,1608	22,4689	0,2517	0,0575	5,7044	0,0326	0,0004	NA	64,2339
2008	3,4705	33,4080	19,1100	0,2640	0,0564	5,9136	0,0328	0,0004	NA	62,2557
2009	3,2738	23,4931	24,8354	0,1993	0,0553	5,9085	0,0306	0,0004	NA	57,7963
2010	2,8552	28,8150	24,5881	0,2460	0,0591	5,8349	0,0280	0,0005	NA	62,4268
2011	3,0520	27,3202	24,0019	0,2457	0,0738	5,9300	0,0234	0,0004	NA	60,6475
2012	2,8252	9,5562	23,7164	0,2241	0,0733	5,1856	0,0178	0,0005	NA	41,5992
2013	2,9205	11,2983	19,9845	0,2301	0,0643	5,3502	0,0186	0,0005	NA	39,8669
2014	2,3254	12,0555	20,4052	0,1246	0,0569	5,5561	0,0188	0,0005	NA	40,5430
2015	2,8343	18,6877	20,3171	0,1439	0,0901	6,6660	0,0209	0,0004	NA	48,7605
2016	2,8030	22,9237	21,6521	0,1848	0,1123	6,3375	0,0209	0,0005	NA	54,0347
2017	2,8107	34,1731	19,8504	0,2231	0,1241	6,0089	0,0185	0,0005	NA	63,2094

Table 133. Emission trends for PCDD/PCDF (kt) 1990-2017

PCDD/PCDF	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	3,8539	3,6053	55,0742	6,3509	0,0015	0,5326	0,0188	0,0000	NA	69,4371
1991	3,3824	2,4076	44,0430	2,6599	0,0016	0,4975	0,0127	0,0000	NA	53,0047
1992	3,1218	4,0640	43,1696	6,1905	0,0014	0,4631	0,0122	0,0000	NA	57,0226
1993	2,9655	3,0541	43,1262	5,7422	0,0015	0,3160	0,0024	0,0000	NA	55,2080
1994	2,7260	2,7079	40,3269	5,2876	0,0012	0,4652	0,0028	0,0000	NA	51,5175
1995	3,4706	1,7912	33,2833	4,4649	0,0011	0,4595	0,0038	0,0000	NA	43,4744
1996	3,3456	3,0293	37,1050	4,9185	0,0010	0,4662	0,0089	0,0000	NA	48,8746
1997	3,6071	3,3443	37,2410	5,0072	0,0009	0,4908	0,0108	0,0000	NA	49,7021
1998	3,6178	3,6370	41,0703	4,8683	0,0012	0,5109	0,0118	0,0001	NA	53,7173
1999	2,6894	2,6282	39,8984	4,1567	0,0011	0,4679	0,0075	0,0001	NA	49,8492
2000	3,0503	3,0041	41,5948	4,2177	0,0013	0,5360	0,0089	0,0001	NA	52,4131
2001	2,9821	2,9482	40,7509	4,3047	0,0013	0,5970	0,0089	0,0001	NA	51,5931
2002	3,1298	3,2783	42,4713	4,5487	0,0014	0,6045	0,0089	0,0001	NA	54,0430

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2003	3,2760	3,7058	43,4579	4,8034	0,0014	0,6301	0,0085	0,0001	NA	55,8833
2004	3,3539	11,6541	43,8557	4,9183	0,0015	0,6625	0,0080	0,0001	NA	64,4540
2005	2,9211	11,0394	40,7360	3,7167	0,0017	0,6886	0,0080	0,0001	NA	59,1117
2006	3,1009	13,5777	34,5172	3,5009	0,0018	0,7279	0,0085	0,0001	NA	55,4349
2007	3,0862	12,2200	41,8082	3,2255	0,0021	0,7948	0,0080	0,0001	NA	61,1449
2008	3,2021	13,2352	37,6560	3,3990	0,0021	0,8348	0,0085	0,0001	NA	58,3378
2009	2,9404	7,7855	42,4425	2,5334	0,0020	0,8396	0,0080	0,0001	NA	56,5515
2010	2,6763	9,3415	41,6891	3,1723	0,0022	0,8436	0,0066	0,0001	NA	57,7315
2011	3,0191	11,0665	41,3345	3,1994	0,0027	0,8573	0,0052	0,0001	NA	59,4848
2012	2,8102	5,5835	40,7508	2,9192	0,0027	0,7744	0,0036	0,0001	NA	52,8445
2013	2,9840	6,4049	34,5104	2,9617	0,0024	0,8103	0,0038	0,0001	NA	47,6775
2014	2,3332	7,5574	34,6523	1,5329	0,0021	0,8406	0,0038	0,0001	NA	46,9223
2015	2,8554	10,0902	34,2030	1,7747	0,0033	1,0167	0,0042	0,0001	NA	49,9476
2016	2,8284	6,6408	37,6635	2,3217	0,0042	1,0541	0,0042	0,0001	NA	50,5168
2017	2,8626	9,5961	34,9865	2,8289	0,0046	1,0915	0,0033	0,0001	NA	51,3735

Table 134. Emission trends for benzo a pyren (kt) 1990-2017

benzo a pyren	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	0,0005	0,3722	10,4307	0,3373	0,0016	0,0092	0,0009	0,0000	NA	11,1524
1991	0,0004	0,2340	7,9795	0,1408	0,0018	0,0084	0,0012	0,0000	NA	8,3661
1992	0,0004	0,4430	8,8833	0,3294	0,0015	0,0077	0,0012	0,0000	NA	9,6666
1993	0,0004	0,4339	8,8677	0,3059	0,0016	0,0052	0,0005	0,0000	NA	9,6152
1994	0,0004	0,3759	8,1563	0,2816	0,0013	0,0078	0,0004	0,0000	NA	8,8237
1995	0,0005	0,1919	6,1835	0,2378	0,0012	0,0077	0,0005	0,0000	NA	6,6230
1996	0,0004	0,3125	7,2431	0,2616	0,0011	0,0079	0,0005	0,0000	NA	7,8272
1997	0,0005	0,3169	7,2826	0,2661	0,0009	0,0083	0,0005	0,0000	NA	7,8758
1998	0,0005	0,4259	8,3480	0,2587	0,0036	0,0086	0,0005	0,0000	NA	9,0458
1999	0,0004	0,3885	8,0218	0,2214	0,0024	0,0079	0,0004	0,0000	NA	8,6428
2000	0,0004	0,3772	8,2103	0,2246	0,0026	0,0092	0,0003	0,0000	NA	8,8247
2001	0,0004	0,3737	7,9701	0,2288	0,0023	0,0107	0,0004	0,0000	NA	8,5863
2002	0,0004	0,4390	8,4581	0,2416	0,0021	0,0109	0,0004	0,0000	NA	9,1525
2003	0,0004	0,5091	8,7372	0,2550	0,0022	0,0117	0,0004	0,0000	NA	9,5160
2004	0,0005	0,5218	8,8484	0,2611	0,0027	0,0125	0,0004	0,0000	NA	9,6474
2005	0,0004	0,1229	7,9635	0,1973	0,0025	0,0132	0,0004	0,0000	NA	8,3002
2006	0,0004	0,1236	6,2319	0,1858	0,0025	0,0147	0,0004	0,0000	NA	6,5593
2007	0,0004	0,2008	8,2417	0,1710	0,0027	0,0166	0,0004	0,0000	NA	8,6337
2008	0,0004	0,2497	7,7297	0,1803	0,0030	0,0177	0,0003	0,0000	NA	8,1812
2009	0,0005	0,1477	7,5785	0,1342	0,0025	0,0183	0,0003	0,0000	NA	7,8821
2010	0,0005	0,1994	7,4829	0,1683	0,0029	0,0175	0,0003	0,0000	NA	7,8718
2011	0,0005	0,1679	7,7346	0,1699	0,0037	0,0189	0,0003	0,0000	NA	8,0958
2012	0,0005	0,3122	7,3258	0,1550	0,0035	0,0178	0,0003	0,0000	NA	7,8151

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2013	0,0006	0,2844	6,2041	0,1571	0,0033	0,0196	0,0003	0,0000	NA	6,6694
2014	0,0005	0,2472	6,0395	0,0810	0,0031	0,0212	0,0003	0,0000	NA	6,3927
2015	0,0006	0,2614	5,9200	0,0938	0,0043	0,0264	0,0003	0,0000	NA	6,3068
2016	0,0006	0,2837	6,7895	0,1229	0,0046	0,0286	0,0003	0,0000	NA	7,2302
2017	0,0006	0,2201	6,3564	0,1499	0,0051	0,0309	0,0003	0,0000	NA	6,7632

Table 135. Emission trends for benzo b fluoranthen (kt) 1990-2017

benzo b fluoranthen	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	0,0142	0,5060	11,8677	0,4216	0,0007	0,0243	0,0015	0,0000	NA	12,8359
1991	0,0124	0,3347	8,7637	0,1760	0,0007	0,0235	0,0020	0,0000	NA	9,3130
1992	0,0114	0,6033	10,7285	0,4118	0,0006	0,0220	0,0020	0,0000	NA	11,7796
1993	0,0109	0,5752	10,7037	0,3824	0,0007	0,0156	0,0009	0,0000	NA	11,6893
1994	0,0100	0,4970	9,7353	0,3520	0,0005	0,0224	0,0007	0,0000	NA	10,6180
1995	0,0128	0,2641	6,9309	0,2972	0,0005	0,0219	0,0008	0,0000	NA	7,5282
1996	0,0123	0,4357	8,4326	0,3270	0,0005	0,0217	0,0009	0,0000	NA	9,2307
1997	0,0132	0,4455	8,4897	0,3326	0,0004	0,0225	0,0009	0,0000	NA	9,3048
1998	0,0133	0,5839	10,0005	0,3234	0,0017	0,0227	0,0008	0,0000	NA	10,9463
1999	0,0099	0,5253	9,5372	0,2768	0,0011	0,0204	0,0007	0,0000	NA	10,3714
2000	0,0112	0,5124	9,6355	0,2808	0,0012	0,0233	0,0006	0,0000	NA	10,4649
2001	0,0110	0,5079	9,2919	0,2860	0,0010	0,0262	0,0006	0,0000	NA	10,1247
2002	0,0115	0,5922	9,9889	0,3020	0,0009	0,0265	0,0007	0,0000	NA	10,9228
2003	0,0121	0,6839	10,3871	0,3188	0,0009	0,0274	0,0007	0,0000	NA	11,4309
2004	0,0124	0,7093	10,5456	0,3264	0,0012	0,0285	0,0007	0,0000	NA	11,6241
2005	0,0107	0,1882	9,2817	0,2466	0,0011	0,0299	0,0007	0,0000	NA	9,7588
2006	0,0114	0,1907	6,8255	0,2322	0,0011	0,0318	0,0007	0,0000	NA	7,2933
2007	0,0113	0,2971	9,6748	0,2138	0,0012	0,0346	0,0006	0,0000	NA	10,2333
2008	0,0118	0,4311	9,3203	0,2254	0,0013	0,0363	0,0006	0,0000	NA	10,0268
2009	0,0108	0,2637	8,2282	0,1678	0,0011	0,0364	0,0005	0,0000	NA	8,7085
2010	0,0098	0,3479	8,1643	0,2104	0,0012	0,0334	0,0006	0,0000	NA	8,7676
2011	0,0111	0,3359	8,7353	0,2124	0,0015	0,0356	0,0005	0,0000	NA	9,3324
2012	0,0103	0,5608	8,0040	0,1938	0,0015	0,0307	0,0004	0,0000	NA	8,8015
2013	0,0110	0,4436	6,7775	0,1964	0,0014	0,0329	0,0004	0,0000	NA	7,4633
2014	0,0086	0,3985	6,4208	0,1012	0,0013	0,0351	0,0005	0,0000	NA	6,9660
2015	0,0105	0,4123	6,2559	0,1172	0,0018	0,0446	0,0005	0,0000	NA	6,8428
2016	0,0104	0,4310	7,4320	0,1536	0,0019	0,0476	0,0005	0,0000	NA	8,0769
2017	0,0105	0,3444	7,0021	0,1873	0,0021	0,0506	0,0005	0,0000	NA	7,5976

136. Emission trends for benzo k fluoranthen (kt) 1990-2017

benzo k fluorante n	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	0,0111	0,2025	4,5932	0,2108	0,0007	0,0202	NA	0,0000	NA	5,0385
1991	0,0097	0,1330	3,3814	0,0880	0,0007	0,0197	NA	0,0000	NA	3,6325
1992	0,0090	0,2409	4,1753	0,2059	0,0006	0,0187	NA	0,0000	NA	4,6505
1993	0,0086	0,2307	4,1658	0,1912	0,0007	0,0138	NA	0,0000	NA	4,6107
1994	0,0079	0,1994	3,7850	0,1760	0,0005	0,0192	NA	0,0000	NA	4,1879
1995	0,0100	0,1055	2,6782	0,1486	0,0005	0,0188	NA	0,0000	NA	2,9616
1996	0,0097	0,1740	3,2712	0,1635	0,0005	0,0187	NA	0,0000	NA	3,6375
1997	0,0104	0,1778	3,2937	0,1663	0,0004	0,0190	NA	0,0000	NA	3,6676
1998	0,0105	0,2336	3,8902	0,1617	0,0017	0,0191	NA	0,0000	NA	4,3168
1999	0,0078	0,2105	3,7073	0,1384	0,0011	0,0171	NA	0,0000	NA	4,0822
2000	0,0088	0,2052	3,7409	0,1404	0,0012	0,0199	NA	0,0000	NA	4,1164
2001	0,0086	0,2034	3,6055	0,1430	0,0010	0,0226	NA	0,0000	NA	3,9842
2002	0,0090	0,2373	3,8803	0,1510	0,0009	0,0230	NA	0,0000	NA	4,3017
2003	0,0095	0,2742	4,0374	0,1594	0,0009	0,0239	NA	0,0000	NA	4,5053
2004	0,0097	0,2841	4,0999	0,1632	0,0012	0,0249	NA	0,0000	NA	4,5830
2005	0,0084	0,0746	3,6015	0,1233	0,0011	0,0264	NA	0,0000	NA	3,8353
2006	0,0090	0,0756	2,6321	0,1161	0,0011	0,0285	NA	0,0000	NA	2,8623
2007	0,0089	0,1181	3,7582	0,1069	0,0012	0,0310	NA	0,0000	NA	4,0243
2008	0,0092	0,1484	3,6249	0,1127	0,0013	0,0327	NA	0,0000	NA	3,9293
2009	0,0085	0,0866	3,1725	0,0839	0,0011	0,0330	NA	0,0000	NA	3,3856
2010	0,0077	0,1115	3,1512	0,1052	0,0012	0,0306	NA	0,0000	NA	3,4075
2011	0,0087	0,1003	3,3838	0,1062	0,0015	0,0328	NA	0,0000	NA	3,6335
2012	0,0081	0,1784	3,0875	0,0969	0,0015	0,0278	NA	0,0000	NA	3,4002
2013	0,0086	0,1558	2,6139	0,0982	0,0014	0,0297	NA	0,0000	NA	2,9077
2014	0,0067	0,1369	2,4687	0,0506	0,0013	0,0317	NA	0,0000	NA	2,6959
2015	0,0082	0,1430	2,4045	0,0586	0,0018	0,0405	NA	0,0000	NA	2,6567
2016	0,0082	0,1532	2,8663	0,0768	0,0019	0,0432	NA	0,0000	NA	3,1495
2017	0,0083	0,1212	2,7012	0,0937	0,0021	0,0459	NA	0,0000	NA	2,9723

Table 137. Emission trends for Indeno 1,2,3 pyren (kt) 1990-2017

Indeno 1,2,3 pyren	A Public Power	B Industry	C Other Stationary Combustio n	D Fugitive	E Solvents	F Road Transpo rt	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestoc k + L Agri Other	Total
1990	0,0009	0,1621	5,6140	0,1476	0,0007	0,0152	NA	0,0000	NA	5,9404
1991	0,0009	0,1077	4,3582	0,0616	0,0007	0,0141	NA	0,0000	NA	4,5432
1992	0,0008	0,1924	4,6400	0,1441	0,0006	0,0129	NA	0,0000	NA	4,9909
1993	0,0007	0,1828	4,6313	0,1338	0,0007	0,0087	NA	0,0000	NA	4,9580
1994	0,0006	0,1578	4,2854	0,1232	0,0005	0,0128	NA	0,0000	NA	4,5804
1995	0,0008	0,0851	3,3553	0,1040	0,0005	0,0127	NA	0,0000	NA	3,5584
1996	0,0008	0,1403	3,8525	0,1145	0,0005	0,0128	NA	0,0000	NA	4,1214
1997	0,0009	0,1438	3,8716	0,1164	0,0004	0,0134	NA	0,0000	NA	4,1465
1998	0,0008	0,1869	4,3721	0,1132	0,0017	0,0138	NA	0,0000	NA	4,6885
1999	0,0006	0,1676	4,2185	0,0969	0,0011	0,0126	NA	0,0000	NA	4,4973
2000	0,0007	0,1635	4,3470	0,0983	0,0012	0,0141	NA	0,0000	NA	4,6248
2001	0,0007	0,1622	4,2327	0,1001	0,0010	0,0159	NA	0,0000	NA	4,5127
2002	0,0007	0,1887	4,4644	0,1057	0,0009	0,0159	NA	0,0000	NA	4,7764
2003	0,0007	0,2177	4,5967	0,1116	0,0009	0,0164	NA	0,0000	NA	4,9441
2004	0,0007	0,2264	4,6494	0,1142	0,0012	0,0172	NA	0,0000	NA	5,0092
2005	0,0007	0,0622	4,2291	0,0863	0,0011	0,0177	NA	0,0000	NA	4,3972
2006	0,0007	0,0631	3,4129	0,0813	0,0011	0,0190	NA	0,0000	NA	3,5781
2007	0,0007	0,0970	4,3559	0,0748	0,0012	0,0206	NA	0,0000	NA	4,5502
2008	0,0007	0,1219	4,0541	0,0789	0,0013	0,0214	NA	0,0000	NA	4,2783
2009	0,0007	0,0709	4,1514	0,0587	0,0011	0,0217	NA	0,0000	NA	4,3045
2010	0,0006	0,0901	4,0784	0,0736	0,0012	0,0197	NA	0,0000	NA	4,2637
2011	0,0007	0,0836	4,1415	0,0743	0,0015	0,0207	NA	0,0000	NA	4,3223
2012	0,0006	0,1447	4,0060	0,0678	0,0015	0,0191	NA	0,0000	NA	4,2396
2013	0,0007	0,1258	3,3954	0,0687	0,0014	0,0206	NA	0,0000	NA	3,6126
2014	0,0005	0,1102	3,3501	0,0354	0,0013	0,0220	NA	0,0000	NA	3,5196
2015	0,0006	0,1148	3,2884	0,0410	0,0018	0,0273	NA	0,0000	NA	3,4740
2016	0,0006	0,1226	3,7169	0,0538	0,0019	0,0292	NA	0,0000	NA	3,9249
2017	0,0006	0,0981	3,4759	0,0656	0,0021	0,0310	NA	0,0000	NA	3,6734

Table 138. Emission trends for Total 1-4 PAH (kt) 1990-2017

Total 1-4 PAH	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	0,0267	7,0357	32,5056	1,1172	0,0036	0,0690	0,0024	0,0000	NA	40,7602
1991	0,0234	3,9807	24,4827	0,4664	0,0040	0,0658	0,0031	0,0000	NA	29,0262
1992	0,0216	2,7639	28,4271	1,0913	0,0034	0,0614	0,0031	0,0000	NA	32,3718
1993	0,0206	1,5793	28,3684	1,0134	0,0036	0,0434	0,0014	0,0000	NA	31,0300
1994	0,0189	1,2866	25,9620	0,9328	0,0028	0,0623	0,0011	0,0000	NA	28,2665
1995	0,0241	0,9184	19,1479	0,7876	0,0028	0,0612	0,0012	0,0000	NA	20,9430
1996	0,0232	2,4819	22,7994	0,8666	0,0025	0,0612	0,0014	0,0000	NA	26,2362
1997	0,0250	3,3617	22,9376	0,8814	0,0021	0,0633	0,0014	0,0000	NA	27,2725
1998	0,0251	3,5651	26,6107	0,8570	0,0087	0,0643	0,0013	0,0000	NA	31,1322
1999	0,0186	1,6417	25,4848	0,7335	0,0058	0,0581	0,0010	0,0000	NA	27,9435
2000	0,0211	2,7603	25,9337	0,7441	0,0061	0,0666	0,0009	0,0000	NA	29,5328
2001	0,0207	2,3932	25,1002	0,7579	0,0054	0,0755	0,0010	0,0000	NA	28,3538
2002	0,0217	2,6756	26,7918	0,8003	0,0049	0,0764	0,0010	0,0000	NA	30,3717
2003	0,0227	3,2795	27,7584	0,8448	0,0050	0,0795	0,0010	0,0000	NA	31,9909
2004	0,0233	4,5441	28,1433	0,8650	0,0064	0,0832	0,0011	0,0000	NA	33,6663
2005	0,0202	3,8102	25,0758	0,6535	0,0058	0,0873	0,0010	0,0000	NA	29,6539
2006	0,0215	5,1212	19,1024	0,6153	0,0057	0,0940	0,0010	0,0000	NA	24,9613
2007	0,0214	4,7832	26,0306	0,5666	0,0062	0,1027	0,0010	0,0000	NA	31,5117
2008	0,0222	5,2889	24,7290	0,5973	0,0070	0,1081	0,0009	0,0000	NA	30,7534
2009	0,0204	3,3074	23,1306	0,4447	0,0057	0,1093	0,0008	0,0000	NA	27,0190
2010	0,0186	4,0813	22,8767	0,5576	0,0066	0,1012	0,0009	0,0000	NA	27,6429
2011	0,0210	4,1375	23,9953	0,5629	0,0083	0,1080	0,0008	0,0000	NA	28,8337
2012	0,0196	2,1661	22,4233	0,5136	0,0078	0,0954	0,0007	0,0000	NA	25,2264
2013	0,0208	2,1431	18,9909	0,5205	0,0076	0,1028	0,0007	0,0000	NA	21,7864
2014	0,0163	2,5750	18,2792	0,2682	0,0070	0,1099	0,0007	0,0000	NA	21,2564
2015	0,0200	3,6316	17,8689	0,3106	0,0096	0,1388	0,0008	0,0000	NA	21,9803
2016	0,0198	4,3598	20,8046	0,4070	0,0102	0,1485	0,0008	0,0000	NA	25,7507
2017	0,0200	4,3852	19,5357	0,4964	0,0113	0,1583	0,0008	0,0000	NA	24,6077

Table 139. Emission trends for HCB (kt) 1990-2017

HCB	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	2,5606	0,0710	0,2595	NA	NA	NA	0,0056	0,0001	NA	2,8969
1991	2,2258	0,0534	0,2221	NA	NA	NA	0,0038	0,0001	NA	2,5052
1992	2,0485	0,0990	0,1747	NA	NA	NA	0,0036	0,0001	NA	2,3260
1993	1,9642	0,0764	0,1748	NA	NA	NA	0,0007	0,0002	NA	2,2163
1994	1,8081	0,0676	0,1690	NA	NA	NA	0,0008	0,0002	NA	2,0456
1995	2,3059	0,0357	0,1616	NA	NA	NA	0,0011	0,0002	NA	2,5046
1996	2,2136	0,0666	0,1659	NA	NA	NA	0,0027	0,0002	NA	2,4490
1997	2,3808	0,0691	0,1660	NA	NA	NA	0,0032	0,0002	NA	2,6193
1998	2,4010	0,0926	0,1703	NA	NA	NA	0,0035	0,0003	NA	2,6677
1999	1,7783	0,0825	0,1690	NA	NA	NA	0,0022	0,0004	NA	2,0324
2000	2,0224	0,0998	0,1824	NA	NA	NA	0,0027	0,0004	NA	2,3076
2001	1,9748	0,0984	0,1816	NA	NA	NA	0,0027	0,0003	NA	2,2578
2002	2,0811	0,1092	0,1832	NA	NA	NA	0,0027	0,0003	NA	2,3765
2003	2,1782	0,1145	0,1841	NA	NA	NA	0,0025	0,0004	NA	2,4797
2004	2,2302	0,1607	0,1845	NA	NA	NA	0,0024	0,0004	NA	2,5781
2005	1,9306	0,1200	0,1817	NA	NA	NA	0,0024	0,0003	NA	2,2350
2006	2,0551	0,1508	0,1748	NA	NA	NA	0,0025	0,0004	NA	2,3835
2007	2,0434	0,1394	0,1828	NA	NA	NA	0,0024	0,0004	NA	2,3684
2008	2,1247	0,1693	0,1531	NA	NA	NA	0,0025	0,0004	NA	2,4500
2009	1,9484	0,1067	0,2182	NA	NA	NA	0,0024	0,0004	NA	2,2761
2010	1,7735	0,1422	0,2125	NA	NA	NA	0,0020	0,0004	NA	2,1305
2011	2,0036	0,1927	0,1979	NA	NA	NA	0,0015	0,0004	NA	2,3961
2012	1,8652	0,1049	0,2076	NA	NA	NA	0,0011	0,0004	NA	2,1793
2013	1,9822	0,1164	0,1759	NA	NA	NA	0,0011	0,0005	NA	2,2760
2014	1,5471	0,1060	0,1846	NA	NA	NA	0,0011	0,0005	NA	1,8393
2015	1,8944	0,1336	0,1836	NA	NA	NA	0,0013	0,0004	NA	2,2133
2016	1,8762	0,1501	0,1912	NA	NA	NA	0,0013	0,0005	NA	2,2192
2017	1,8992	0,1656	0,1757	NA	NA	NA	0,0010	0,0005	NA	2,2419

Table 140. Emission trends for PCB (kt) 1990-2017

PCB	A Public Power	B Industry	C Other Stationary Combustion	D Fugitive	E Solvents	F Road Transport	G Shipping + H Aviation + I Offroad	J Waste	K Agri Livestock + L Agri Other	Total
1990	0,0013	840,146 7	4,0584	NA	NA	NA	0,0228	0,0003	NA	844,229 5
1991	0,0011	924,534 9	2,7357	NA	NA	NA	0,0154	0,0004	NA	927,287 5
1992	0,0010	975,150 4	4,6852	NA	NA	NA	0,0148	0,0004	NA	979,851 9
1993	0,0010	808,609 2	4,7241	NA	NA	NA	0,0029	0,0005	NA	813,337 6
1994	0,0009	822,256 5	4,1060	NA	NA	NA	0,0034	0,0004	NA	826,367 2
1995	0,0011	834,934 0	2,0897	NA	NA	NA	0,0046	0,0005	NA	837,029 8
1996	0,0011	908,512 0	3,2700	NA	NA	NA	0,0108	0,0005	NA	911,794 4
1997	0,0012	916,893 3	3,2901	NA	NA	NA	0,0131	0,0005	NA	920,198 1
1998	0,0012	880,607 4	4,4579	NA	NA	NA	0,0143	0,0009	NA	885,081 7
1999	0,0009	799,668 7	4,1158	NA	NA	NA	0,0091	0,0010	NA	803,795 5
2000	0,0010	812,232 8	3,9394	NA	NA	NA	0,0108	0,0010	NA	816,185 0
2001	0,0010	811,658 1	3,7366	NA	NA	NA	0,0108	0,0009	NA	815,407 4
2002	0,0010	782,653 0	4,1670	NA	NA	NA	0,0108	0,0009	NA	786,832 8
2003	0,0011	779,557 0	4,4204	NA	NA	NA	0,0103	0,0010	NA	783,989 8
2004	0,0011	771,144 5	4,5255	NA	NA	NA	0,0097	0,0010	NA	775,681 8
2005	0,0010	770,620 4	3,7513	NA	NA	NA	0,0097	0,0010	NA	774,383 4
2006	0,0010	776,925 0	1,9428	NA	NA	NA	0,0103	0,0010	NA	778,880 1
2007	0,0010	777,022 9	4,2240	NA	NA	NA	0,0097	0,0011	NA	781,258 8
2008	0,0011	785,431 6	3,6307	NA	NA	NA	0,0103	0,0011	NA	789,074 7
2009	0,0012	778,799 1	2,7091	NA	NA	NA	0,0097	0,0011	NA	781,520 2
2010	0,0012	802,354 2	3,1225	NA	NA	NA	0,0080	0,0012	NA	805,487 0
2011	0,0013	811,157 8	4,0334	NA	NA	NA	0,0063	0,0011	NA	815,199 9
2012	0,0012	780,037 7	2,5891	NA	NA	NA	0,0043	0,0012	NA	782,633 5
2013	0,0015	751,776 5	2,1095	NA	NA	NA	0,0046	0,0013	NA	753,893 3
2014	0,0013	724,253 1	1,5506	NA	NA	NA	0,0046	0,0012	NA	725,810 9
2015	0,0016	723,633 1	1,5747	NA	NA	NA	0,0051	0,0011	NA	725,215 7
2016	0,0016	721,455 4	2,1916	NA	NA	NA	0,0051	0,0013	NA	723,655 1
2017	0,0016	715,607 8	1,9426	NA	NA	NA	0,0040	0,0014	NA	717,557 3

