

INFORMATIVE INVENTORY REPORT
for 2023 air emissions, presented in accordance with
Convention on Long Range Transboundary Air Pollution

Republic of Kazakhstan

MINISTRY OF ECOLOGY AND NATURAL RESOURCES OF THE
REPUBLIC OF KAZAKHSTAN

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This report has been prepared with the financial participation of the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan (MENR RK). This document is a report on the national inventory in accordance with the Convention on Long-range Transboundary Pollution. This edition cancels and replaces all previous editions related to the same inventory format.

To get information about the reports of the Republic of Kazakhstan on the national emission inventory, please contact the database of the RSE "Information and Analytical Center for Environmental Protection" of the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan.

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Executive Summary

Date of update - November 28, 2024.

The protocols established under the United Nations Economic Commission for Europe (UNECE) Convention on Long-range Transboundary Air Pollution provide for the regular transmission of information on emissions into the air of various substances and various sources of emissions. Kazakhstan has joined the parties to the Convention on Long-range Transboundary Air Pollution (hereinafter referred to as the Convention) in accordance with the Law of the Republic of Kazakhstan dated October 23, 2000 No. 89-I "On the accession of the Republic of Kazakhstan to the Convention on Long-range Transboundary Air Pollution". Not being a party to any of the Protocols to the Convention, the country provides reporting on a voluntary basis.

The data presented in the report relate to geographical, temporal and sectoral areas defined within the framework of the UNECE according to ECE/EB.AIR/125. This report includes the provision of the first version of the national pollutant emission inventory according to the nomenclature for reporting in the NFR 2019-1 format for 2023, the second version of the national pollutant emission inventory for 2022, the remaining inventories are unchanged.

The basis for the preparation of the inventory was emission data calculated using EEA Report No. 06/2023 [1]. The report has been prepared in accordance with the recommended structure for the inventory information report - Annex II, version 2021.

The report presents quantitative indicators of emissions of sulfur compounds (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), ammonia (NH_3), non-methane volatile organic compounds (NMVOC), particulate matter ($\text{PM}_{2.5}$, PM_{10} , BC, TSP), heavy metals and persistent organic pollutants for 2023 according to the methodology of EEA Report No. 06/2023 [1] and emission data for the periods from 1990 to 2022 according to the methodology of EEA Report No. 13/2019 [2]. When recalculating data for 2022, information on the initial statistical data was

supplemented and the change adopted by the results of an independent review was taken into account, in connection with which some data from the inventory for 2022 were changed.

1. Chapter 1: Introduction

1.1 National Inventory Background

Date of update - November 28, 2024.

The report was prepared in accordance with the Technical Guidelines for the Preparation of National Emission Inventories for 2023 [1].

The report includes a brief description of the methodologies and data sources used; a list of key categories distributed by type of pollutants and their analysis; a list of source categories for which no estimates of pollutant emissions were carried out; a list of source categories from which emissions were taken into account in other source categories.

For the entire period (since 1990), for each assessed substance presented in previous registries, they were reviewed and corrected taking into account updated statistical data, improved knowledge and possible changes in methodology.

The geographical coverage of the cadastre covers all 15 regions of Kazakhstan without any exceptions.

1.2 Institutional arrangements

Date of update - November 28, 2024.

The 2023 inventory was conducted in accordance with:

- Environmental Code of the Republic of Kazakhstan dated January 2, 2021 No. 400-VI LRK,

- Order of the Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated February 22, 2022 No. 46 "On approval of the Rules for monitoring the completeness, transparency and reliability of the State Inventory of Greenhouse Gas Emissions and Removals",

- Order of the Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated March 10, 2021 No. 63 "On approval of the Methodology for determining Emission standards into the environment",

- Order of the Chairman of the Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan dated February 21, 2020 No. 24 "On approval of statistical forms of national statistical observations on industry and environment statistics and instructions for filling them out";

- Order of the Minister of Health of the Republic of Kazakhstan dated November 30, 2020 "On approval of the rules for providing information on medical waste".

- Order of the Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated June 22, 2021 No. 207 "On approval of the Rules for maintaining the State Cadaster of ozone-depleting substances";

- Order of the Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated July 1, 2021 No. 227 "On approval of the form of summary data on accepted declarations on environmental impact";

- Order of the Acting Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated July 19, 2021 No. 262 "On approval of the Rules for the Inventory of stationary Emission sources, data adjustments, documentation and storage of data obtained as a result of Inventory and adjustments (for local executive bodies)";

- Order of the Acting Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated July 19, 2021 No. 257 "On approval of the Rules for the Development of environmental quality Targets, including the minimum list of indicators for which environmental quality targets are set".

The main source of data on gorenje sources is the fuel and energy balance, the maintenance of which was changed in 2023 due to amendments to the Order of the Minister for Investment and Development of the Republic of Kazakhstan dated March 31, 2015 No. 387 "On approval of the Rules for the formation and maintenance of the State Energy Register".

Inventory improvements are carried out in accordance with the recommendations of experts reviewing the National Report and on the basis of changes in the requirements of international and national RLA.

1.3 Inventory preparation process

Date of update - November 28, 2024.

The Ministry of Ecology and Natural Resources of the Republic of Kazakhstan is responsible for planning, preparing and managing the inventory of emission sources.

The development of the emission inventory in terms of the application of calculation methodologies, data collection and processing, preparation of application forms, control and quality management is entrusted to Eurasian GHG Management LLP in accordance with Agreement No. 159 dated 11/12/2024.

The initial data for the national inventory of air pollution are taken from the public website of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan <https://stat.gov.kz/>, on which they are placed based on the processing of statistical forms of industry and the environment submitted by legal entities before March 31 of the year following the reporting year.

The basis for the preparation of the inventory is the data on emissions of pollutants obtained using EEA Report No 06/2023 [1].

The main volume of emissions of pollutants is carried out according to Level 1 and Level 2 is applied for some key categories.

The basis for the preparation of data on emissions from large point sources for 2023 is the reporting data of enterprises provided by them for maintaining a Register of Emissions of pollutants, calculated using national methods or obtained by direct measurements. At the time of submission of the report, there is no access to the PRTR database, changes to the report will be submitted additionally.

1.4 Methods and data sources

Date of update - November 28, 2024.

Emissions are estimated for each of the main emission-related activities included in the inventory, taking into account separately, if necessary, different source categories (surface areas, large point sources and large linear sources).

Emissions from each activity are expressed by the following general and schematic formula:

$E_{s,a,t} = A_{a,t} \times F_{c,a}$, where:

E: emissions related to substance "s" and activity "a" during time "t"

A: the amount of activity related to activity "a" during time "t".

F: emission factor related to substance "s" and activity "a".

The data sources are the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan (<http://prtr.ecogofond.kz/>, <https://oos.ecogeo.gov.kz/>, <https://ecokadastr.kz/>), Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan (<https://stat.gov.kz/>).

Source data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan for 2023:

Industry of the Republic of Kazakhstan;

- Agriculture, forestry and fisheries;
- Environmental protection;
- Foreign trade;
- Fuel and energy balance;
- Key performance indicators of the industry;
- Gross output of products (services) of agriculture, forestry and fisheries;
- The main indicators of animal husbandry development;
- On the management of municipal waste;
- About transport products and services;

- About the activities of railway transport;
- On the execution of construction works and commissioning of facilities;
- The population of the Republic of Kazakhstan by regions, cities and districts.

The information obtained from the above databases includes: data on the fuel and energy balance, data on livestock and poultry, data on the production of certain types of products, data on the population and others.

Based on the data obtained, calculations of pollutant emissions are carried out for certain categories of NFR-2019-1 using the relevant sections of the EEA Report No. 06/2023 Level 1 and 2 Manuals

The list of calculated source categories is presented in table 1.

Table 1

Source categories from which emissions were calculated
according to EEA Report No. 06/2023

NFR code	Category name
1A1a	Public production of electricity and heat
1A1b	Oil refining
1A1c	Solid fuel production and other energy industries
1A2a	Stationary combustion in manufacturing and construction: cast iron and steel
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals
1A2c	Stationary combustion in manufacturing and construction: chemicals
1A2d	Stationary incineration in manufacturing and construction: pulp, paper and printing
1A2e	Stationary combustion in manufacturing and construction: food industry, beverages and tobacco
1A2f	Stationary combustion in manufacturing and construction: non-metallic minerals
1A2gvii	Mobile combustion in the manufacturing industry and construction (only on gasoline consumption)
1A2gviii	Stationary combustion in manufacturing and construction: Other (manufacture of tobacco, textile, leather, rubber products, etc.)
1A3ai(i)	International aviation LTO (civil)
1A3aii(i)	LTO Domestic Aviation (civil)
1A3bi	Road transport: Passenger cars (LCVs)
1A3bii	Road transport: Passenger cars (PC)
1A3biii	Road transport: heavy trucks and buses (LHD, bus)
1A3bv	Road transport: gasoline evaporation
1A3bvi	Road transport: wear of car tires and brakes

NFR code	Category name
1A3bvii	Road transport: abrasion of highways
1A3c	Railways
1A3di(ii)	International inland waterways
1A3dii	National Navigation (shipping)
1A4ai	Commercial / Institutional: stationary
1A4bi	Residential: Stationary
1A4bii	Residential: House and Garden (mobile)
1A4ci	Agriculture / Forestry / Fishing: Stationary
1A4cii	Agriculture / Forestry / Fishing: off-road vehicles and other equipment
1A5a	Other stationary (including military)
1B1a	Unorganized emissions from solid fuels: coal mining and transportation
1B1b	Volatile emissions from solid fuels: solid fuel conversion
1B2ai	Crude oil with unorganized emissions: Exploration, production, transportation
1B2aiv	Oil with volatile emissions: processing and storage
1B2av	Distribution of petroleum products
1B2b	Volatile emissions of natural gas (exploration, production, processing, transmission, storage, distribution, etc.)
1B2c	Discharge and combustion (oil, gas, combined oil and gas)
2A1	Cement production
2A2	Lime production
2A3	Glass production
2A5a	Quarrying and mining of minerals, except coal
2A5b	Construction and demolition
2B1	Ammonia production
2B2	Nitric acid production
2B5	Production of carbide
2B7	Soda ash production
2B10a	Chemical Industry: Other (040401, 040409, 040413, 040414, 040510)
2C1	Production of cast iron and steel
2C2	Production of ferroalloys
2C3	Aluminum production
2C5	Lead production
2C6	Zinc production
2C7a	Copper production
2C7c	Other metal products (production of other non-ferrous metals)
2C7d	Storage, processing and transportation of metal products.
2D3a	Use of household solvents, including fungicides
2D3b	Asphalting of roads
2D3c	Asphalt roof
2D3d	Application of coatings

NFR code	Category name
2D3e	Degreasing
2D3f	Dry cleaning
2D3g	Chemical products
2D3i	Use of other solvents (mineral wool)
2H1	Pulp and paper industry
2H2	Food and beverage industry
2H3	Other production processes (decipher)
2I	Wood processing
2K	"Consumption of pops and heavy metals (e.g. electrical and scientific equipment) " Manure
3B1a	management - Dairy cattle
3B1b	Use of manure - Non-dairy cattle
3B2	Manure Management - Sheep
3B3	Manure Management - Pig
3B4d	Manure Management - Goats
3B4e	Manure Management - Horses
3B4gi	Use of manure - Laying hens
3B4h	Manure management - Other animals (camels)
3Da1	Inorganic nitrogen fertilizers (including urea application)
3Da2a	Application of manure to soils
3Da3	Urine and manure left by grazing animals
3Dc	Agricultural operations at the farm level, including storage, processing and transportation of agricultural products
3De	Cultivated crops
3Df	Use of pesticides
3I	Agriculture other (straw ammonification)
5A	Biological waste treatment - placement of solid waste on land
5B1	Biological waste treatment - composting
5D1	Domestic wastewater treatment
5D3	Other wastewater treatment
11C	Other natural emissions (wild animals, humans)

1.5 Key Categories

Date of update - November 28, 2024.

The key categories include the most polluting industries, the total emissions of which correspond to more than 80% of pollutant emissions on the territory of the Republic of Kazakhstan.

Road transport (1A 3b) is a source of numerous pollutants (NO_x; PM_{2,5}; BC; Pb; As; Cr; Cu; Zn). In particular, copper emissions do not occur as a result of combustion or production processes, but mainly as a result of wear phenomena both in road transport (brake pads) and in railway transport (contact networks).

The indicators of fuel consumption by road transport for 2022 and 2023 in the statistical database are formed taking into account changes in the methodological approach to the formation of indicators of the activities of individual entrepreneurs engaged in commercial transportation of goods and passengers by road transport. In order to obtain comparable data with the same period last year, the main indicators of the Transport industry for 2022 have been reformed.

The residential sector (1A4b) is a source of significant emissions due, among other things, to the use of biomass as fuel.

In the category "Industrial processes", the metallurgy sector (2C) is mainly distinguished when analyzing key categories by the volume of pollution.

Agriculture (NFR 3) is the source contributing the majority of ammonia emissions, since in its two subsectors (animal waste disposal and agricultural soils) it accounts for the majority of emissions on a national scale in 2023. Tillage (plowing) is the leading source of TCP emissions. Agriculture is also a key category of HCB emissions from the use of pesticides.

According to the results of the analysis of key categories, it was revealed that the largest value of emissions by various indicators falls on category 1A4bi – stationary emissions in residential premises due to the fact that private houses use coal fuels for heating in the majority.

Table 2

Key categories for different pollutants

NFR Code	NFR Category	Pollutant					
		NO _x	SO _x	NMLOC	PM ₁₀	CO	PAH

1A4bi	Residential: Stationary	28,55	133,31	71,65	59,78	683,29	84,33
1A1a	Public production of electricity and heat	247,19	781,51	2,38	8,61	29,46	80,27
1A2b	Non-ferrous metals	14,22	55,59	5,63	7,32	57,63	9,14
1A3biii	Road transport: Heavy duty vehicles and buses	68,09	11,59	3,78	1,9	16,2	0,15
	Total	519,15	1142,86	582,78	222,28	1312,39	243,45

1.6 QA/QC and Verification methods

Date of update - November 28, 2024.

General quality control procedures include checking the integrity, correctness and completeness of data, identifying errors and deficiencies, documenting and archiving inventory data, as well as quality control actions.

The compliance of the initial statistical data for the period from 1990 to 2023 was monitored and the emission indicators were recalculated in accordance with the methodology of EEA Report No. 06/2023 [1].

The emission figures in sections 3Da1, 3Da2a, 3Da2b, 3Da2c for 1991-1993 are presented in the form of a calculation according to the 2013 Guidelines. since the website of the Bureau of National Statistics does not contain initial data on these categories for the specified period.

The initial data for sections 3dB 3Dc, 3Dd, 3De for 2008 are presented as the arithmetic mean of the corresponding values for 2007 and 2009, since there are no initial data for these categories for the specified period on the website of the Bureau of National Statistics.

The initial data for section 2C1 for 2017 are presented without an indicator of pig iron production, since there are no initial data for these categories for the specified period on the website of the Bureau of National Statistics.

When preparing the 2023 financial statements, statistical data for 2022 were verified and categories were added for which information was missing when preparing the 2022 report. Data quality control was carried out on the basis of graphical analysis of emissions by category. Verification by point sources and by indicators of background measurements was not carried out at the time of delivery of this report.

1.7 General uncertainty evaluation

Date of update - November 28, 2024.

A quantitative assessment of uncertainty for pollutants relevant to this report has been carried out at Level 1.

The statistical collection on the Protection of Atmospheric Air presents data on emissions of harmful substances into the atmosphere from stationary sources in 2023 according to NOX, SO₂, VOCs and CO indicators taken from the forms of statistical reports submitted by polluting enterprises based on direct measurements or by calculation method according to the methods specified in section 1.2 of this report.

Since most enterprises carry out production control not automatically, but once a quarter, the rating of uncertainty of statistical data on emissions of pollutants from stationary sources belongs to the category "B - Assessment based on data from a large number of measurements carried out on a large number of facilities or individual sources in the full range of operating conditions that are representative of most of a particular sector - 20-60%".

The uncertainty analysis will not be accurate, since when submitting statistical reports on emissions, enterprises report on emission indicators only from stationary sources, and NFR reports include statistical data on fuel consumption for any type of activity, including transport.

The error indicators are confirmed by the analysis of the error of the indicators of emissions of harmful substances into the atmospheric air from stationary sources in 2023 (Table 3)

Table 3

Analysis of the error of indicators of emissions of harmful substances into the atmosphere from stationary sources in 2023

	sulfur dioxide (SO ₂)	carbon monoxide (CO)	nitrogen oxides (in terms of NO ₂)	volatile organic compounds (VOCs)
According to the statistical collection on the Protection of Atmospheric Air (released into the air without treatment)	1785,1 (489,2)	1218,9 (351,7)	320,4 (257,7)	123,3 (113,2)
By calculation in accordance with [1]	1142,86	1312,39	519,15	582,78
Relative error, (%)	±0,64 (64%)	±0,08 (8%)	±0,62 (62%)	±3,72 (372%)

The NMVOC emission error indicator shows that laboratories performing measurements of industrial emissions are not equipped with VOC volume determination devices, as a result of which the volume of emissions is underestimated when preparing statistical reports.

Since 2021, large Kazakhstani thermal power plants have been equipped with automated injection metering stations. This will allow for more accurate real-time monitoring of emissions, local exceedances of maximum permissible emissions and the use of indicators to generate reports from point sources.

The national database of the most important environmental indicators is under development, therefore, at the time of reporting, there is no access to some indicators collected by this database and the error analysis is calculated only on the basis of statistical data on stationary sources.

If possible, the missing NFR reporting data will be supplemented during the next reporting preparation.

2. Chapter 2: Explanation of key trends

Date of update - November 28, 2024.

Data on emissions of pollutants for 2023 by key indicators are calculated by Level 1 and Level 2 in accordance with the requirements of EEA Report No 13/2019 (Annex Annex I).

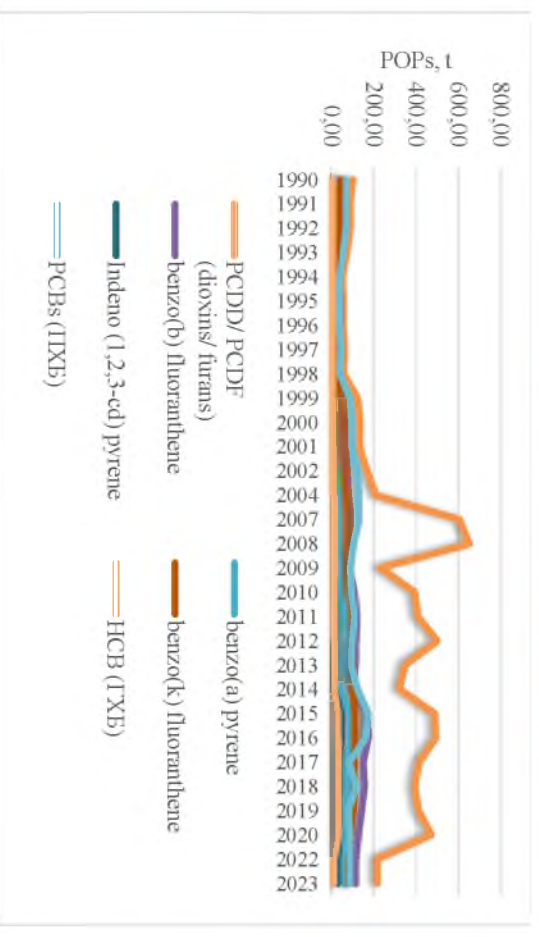
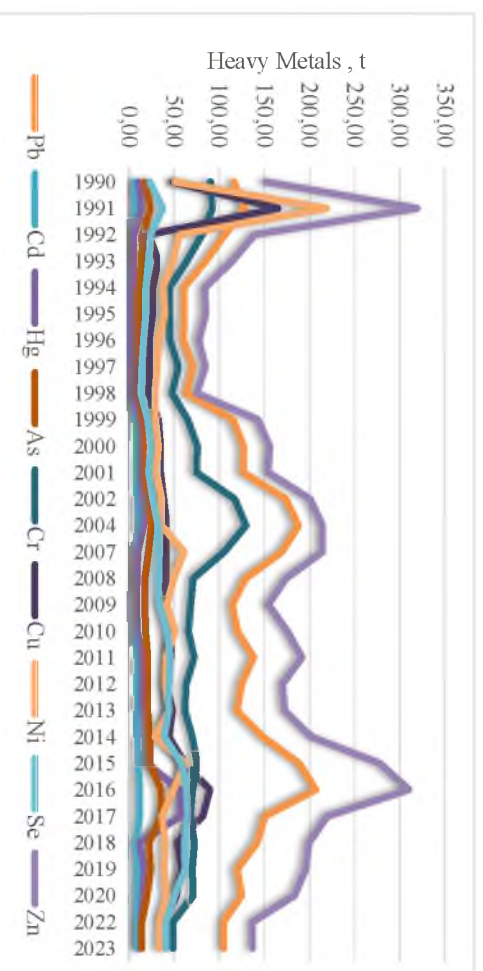
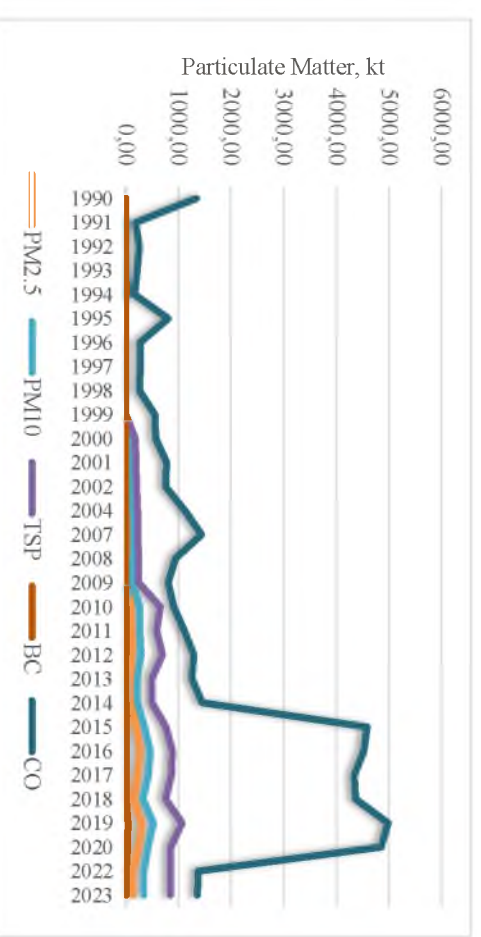
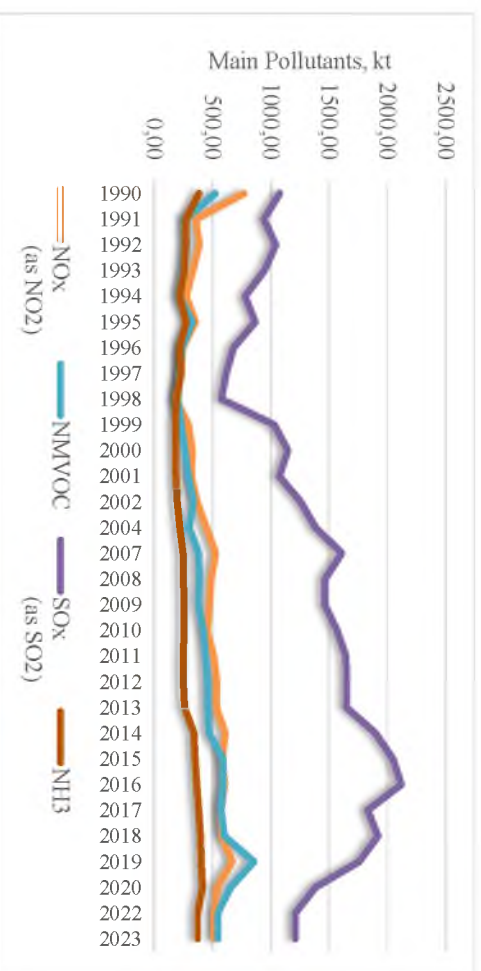
The analysis of the amount of emissions for 2023 and 1990, shown in Table 6, indicates an increase in production capacity and an overall increase in emissions of pollutants in Kazakhstan.

Analysis of 2023 and 1990 emissions

Table 6

-249,3	Difference ("+" - exceeding emissions, "-" - reduction of emissions)	768,97	1990	519,64	2023	NOx (as NO ₂)
64,36		521,74		586,10		NMVOC
67,75		1075,15		1142,90		SOx (as SO ₂)
40,4		381,88		422,28		NH ₃
112,56		0,00		112,56		PM _{2,5}
222,29		0,00		222,29		PM ₁₀
476,49		0,00		476,49		TSP
7,27		0,00		7,27		BC
-32,11		1344,53		1312,42		CO
-22,25		116,31		94,06		Pb
2,84		5,93		8,77		Cd
-0,02		10,61		10,59		Hg
-4,45		18,08		13,63		As
-43,18		90,58		47,40		Cr
-15,75		48,51		32,76		Cu
-17,44		50,55		33,11		Ni
17,53		23,07		40,60		Se
-26,06		151,93		125,87		Zn
251,62		102,20		353,82		PCDD/ PCDF (dioxins/ furans)
44,2		15,85		60,05		benzo(a) pyrene
63,85		48,78		112,63		benzo(b) fluoranthene
40,25		42,47		82,72		benzo(k) fluoranthene
21,26		4,85		26,11		Indeno (1,2,3- cd) pyrene
123,99		119,47		243,46		Total 1-4
27,73		6,17		33,90		HCB (ГХБ)
11,34		67,55		78,89		PCBs (ПХБ)

Analysis of changes in emissions since 1990



3 Chapter 3: Energy - NFR sector 1

Date of update - November 28, 2024.

The value of fuel consumption in TJ is taken from the fuel and energy balance (hereinafter FEB) for 2023 without recalculation of emission coefficients based on the calorific value of fuel, since statistical data processing software applies coefficients higher than the IPCC Guidelines for National Greenhouse Gas Inventories, 2006, which according to the principle of conservatism does not underestimate the indicators accepted in this reporting

The emission factors used in calculation formulas that taken into account the volume of fuel consumption (or production) are used only from the EEA Report No. 06/2023 manual. National coefficients are not applied in this report.

The main type of fuel consumed in this sector is coal.

In the Energy sector, the source categories presented in Table 7 were calculated using the relevant sections of EEA Report No. 06/2023.

Table 7

Source categories of the Energy sector

NFR code	Name
1A1a	Public production of electricity and heat
1A1b	Oil refining
1A1c	Solid fuel production and other energy industries
1A2a	Stationary combustion in manufacturing and construction: cast iron and steel
1A2b	Отрасли обрабатывающей промышленности и строительство (сжигание): Цветные металлы
1A2c	Stationary combustion in manufacturing and construction: chemicals
1A2d	Stationary combustion in manufacturing and construction: pulp, paper and printing
1A2e	Stationary combustion in manufacturing and construction: food industry, beverages and tobacco
1A2f	Stationary combustion in manufacturing and construction: non-metallic minerals
1A2gvii	Mobile combustion in the manufacturing industry and construction (only on gasoline consumption)
1A2gviii	Stationary combustion in manufacturing and construction: Other (manufacture of tobacco, textile, leather, rubber products, etc.)

NFR code	Name
1A3ai(i)	International aviation LTO (civil)
1A3aii(i)	LTO Domestic Aviation (Civil)
1A3bi	Road transport: Passenger cars (LCVs)
1A3bii	Road transport: Passenger cars (PC)
1A3biii	Road transport: heavy trucks and buses (LHD, bus)
1A3bv	Road transport: gasoline evaporation
1A3bvi	Road transport: wear of car tires and brakes
1A3bvii	Road transport: abrasion of highways
1A3c	Railways
1A3di(ii)	International inland waterways
1A3dii	National Navigation (shipping)
1A4ai	Commercial / Institutional: stationary
1A4bi	Residential: Stationary
1A4bii	Residential: House and Garden (mobile)
1A4ci	Agriculture / Forestry / Fishing: Stationary
1A4cii	Agriculture / Forestry / Fishing: off-road vehicles and other equipment
1A5a	Other stationary (including military)

FEB indicators for category 1A1c from 2021 are presented according to the format of the International Energy Agency, therefore, deviations in the emission schedule for this category are possible compared to previous reporting years. Data on category 1A1c from 2006 to 2010 were not separately allocated in national reporting, the value of the activity indicator under section 1A1a contains the amount of coal consumed for conversion to other types of energy and fuels.

Data on emissions from transport (1A3BI - 1A3c) are calculated with the assumption of the percentage of vehicles using different types of fuel. Quantitative data on motor transport are taken from the statistical table "On transport products and services in the Republic of Kazakhstan", while mileage data are calculated using a new methodology, therefore transport indicators for the periods 1990-2020 and 2021-2023 differ.

Quantitative data on railway transport are taken from the statistical table "On the activities of railway transport in the Republic of Kazakhstan". Based on these

initial data, emissions from transport were calculated according to the EEA Report No. 06/2023 Level 1 methodology.

Data on fuel consumption in shipping are accepted only for inland river and sea transport (Caspian Sea, river navigation), since statistics on international communications are not presented in 2023. In this regard, fuel consumption indicators of category 1A3dii are not presented.

Data on fuel consumption in aviation traffic are accepted only for domestic flights for take-off and landing (LTO) mode, since in 2023 statistics on fuel consumption are not presented in international communications. In this regard, there are no indicators of fuel consumption of category 1A3ai(i).

Data on intentional ventilated emission into the atmosphere are provided only for the group of companies of JSC NC KazMunaiGas, since only this company openly reports on the volumes of gas burned on the flare.

Emissions from other stationary sources of category 1A5a for 2022 and 2023 are calculated based on new baseline data from the FEB, which from 2021 provide information according to the format of the International Energy Agency, as a result of which deviations from previous reporting years are possible in the schedule of this category.

Since all emissions from transport in the FEB data are transferred to the "transport" category, emissions from mobile combustion are taken into account in category 1A3.

4 Chapter 4: Industrial Processes - NFR sector 2

Date of update - November 28, 2024.

Emissions data from the Industrial Processes sector are estimated using Level 1 and Level 2 of EEA Report No. 06/2023. The initial data is the bulletin of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan "Б-04-04-Г (2023) - Қазақстан Республикасы

өнеркәсібі жұмысының негізгі көрсеткіштері. The main performance indicators of the industry of the Republic of Kazakhstan".

For the period 1990-2022, the initial statistical data for each indicator were verified. If the initial data has not been confirmed and/or updated due to the lack of statistical information, the indicators by category for the unverified period are left unchanged according to the original version.

The emission indicators of category 1B1a and 1B1b for 2022 have been adjusted due to the clarification of statistical data on the volume of coal production and conversion.

The emission figures of category 2A5a for 2022 have been adjusted due to the clarification of statistics on the volume of mining, with the exception of coal.

Since the calculation of emissions from mining was carried out at Level 1, category 2A5c is included in category 2A5a.

Up to and including 2009, statistical indicators of the construction industry are presented in monetary terms, without specifying the distribution by type of work in kind, therefore, the volume of emissions in category 2A5b up to 2010 is marked as "not estimated".

This report presents data on emissions from the production of titanium of category 2B7 for the first time. Since the plant for the production of products containing titanium has currently submitted only financial statements, data on the volume of titanium production are calculated approximately from the financial report of this plant for 2023 based on average titanium prices.

When calculating emissions by categories 2D3b - 2D3i, the following additional calculations were made:

- the average density of road bitumen manufactured according to ST RK 1373-2013 [19] is 1500 kg/m³. According to ST RK 3.03-101-2013 [18] the average bitumen consumption per 1m² of road is 1 liter. Therefore, when determining emissions by key indicators, a multiplier (1.5 tons of bitumen per 1 m² of road surface) was added to the calculation formula. To calculate the 2D3d indicator, the average asphalt surface area of 5256000 m² was used (source 2023-B-06-05-G);

- according to the norms of the SP RK 2.04-108-2014 [17] for hot bitumen mastic, 2 kg of bitumen per 1 m² and 1 kg for cold mastic are consumed. The calculations take the average value of 1.5 kg of bitumen per 1 m² of surface area.

- when calculating emissions from coating with 2D3d paints, the calculation approach has been changed: for 2022 and 2023, indicators of paints sold on the domestic market have been adopted. For 2022, the amount of emissions from coatings has been adjusted.

- when determining the volumes of the chemical industry, indicators of the production of polyurethane, paints and varnishes based on polymers, medicines and pharmaceuticals, as well as other products were adopted (source C-20-G-2023);

- to calculate emissions for the key position 2D3i, the indicators of the production of mineral wool - 90250 tons, cigarettes - 18141.9 million pieces and the sale of shoes - 45136.9 thousand pairs were adopted.

For the indicator 2D3c for 2023, it is adopted:

- the area of bitumen coating in the production of roofing construction and installation works is 1144076 m² (source 2023-B-06-05-G).

To calculate emissions during the degreasing of category 2D3e, the volume of final consumption of white spirit from FEB for 2022 and 2023 was adopted (source B-05-03-G-2022 and B-05-03-G-2023). The emission indicators for 2022 for this category have been adjusted.

To calculate emissions from the use of printing ink of category 2D3h for 2022 and 2023, data from the release of the Bureau of National Statistics were used. -05-04-M "Resources and use of certain types of products (goods) and raw materials"

To calculate the 2D3i indicator, the volume of mineral wool output was adopted. Calculation of emissions from the production of cigarettes and shoes cannot be added to the calculation due to the fact that these products are accounted for in units, not in mass.

Category 2G indicators are not evaluated.

The indicators 2D3a, 2D3e, 2K up to and including 1997 have not been recalculated, since on the website www.stat.gov.kz there are no official data on

demographic statistics for these years. The population figures were adopted at the end of the reporting year.

From 1998 to 2001 inclusive, data on the volume of ammonia production were not verified, previously accepted values were left.

From 2016 to 2018 inclusive, data on the volume of carbide production were not verified, previously accepted values were left.

The emission indicators of category 2B5 for 2022 have been adjusted due to the clarification of statistics on the volume of carbide output.

The 2D3g indicator in the period from 1991 to 1994 was adopted only for the volume of polymer production, since there are no data on the volume of polymer-based paint production.

The emission indicators for 2022 for category 2H1 have been recalculated due to the clarification of the production volumes of paper and pulp products.

When calculating emissions for category 2H2, the following indicators are taken: production of canned meat, fish, sausage production, semi-finished meat products, meat feed additives, production of margarine, bread, cakes, cookies, confectionery (sweets), sweet juices, alcoholic beverages (wine, beer, vodka, cognac, liqueur), sweet soft drinks. The emission indicators for 2022 for the 2H2 category have been recalculated due to the clarification of the indicators.

5. Chapter 5: Agriculture – NFR sector 3

Date of update - November 28, 2024.

The assessment of emissions from agricultural activities was carried out for the categories NFR 2019-1 3B "Manure management" using Level 1 EEA Report No. 06/2023 and taking into account seasonal maintenance in stalls or outdoors.

The initial data are bulletins of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan:

- "B-03-01-M-2023 - Key indicators of livestock development in the Republic of Kazakhstan",

- «B-03-11-G - 2023 жылы Қазақстан Республикасында ауыл шаруашылығы дақылдарын жаппай жинау. The valley of agricultural cultures in the Republic of Kazakhstan for 2023", Volumes 1 and 2.

Category 3B4d was calculated together with indicator 3B2 until 2008, since 2009, goats have been counted separately from sheep.

When calculating key indicators for the 3Da1 category, the average nitrogen content in inorganic fertilizers accepted as 29%.

For category 3Da2a, the average nitrogen content in manure is 1.5%.

The 2022 emission indicators for category 3Da2a are presented, which were not included in the previous report due to the introduction of a new indicator calculation program and the delay in statistical data at the time of report development.

При представлении данных для категории 3Db приведены данные: посевная площадь / убранная площадь.

For the 3Df category, the area of cereals treated with glyphosphate-containing herbicides is taken at the rate of 1 kg of herbicides per 1 ha, by analogy with the norm for the Runway herbicide (picloram), which they replace, Units of measurement are presented in thousands of tons (source B-03-11-G).

There is no initial information on the use of herbicides until 2015.

The 2022 emission indicators for the 3Df category are presented, which were not included in the previous report due to the introduction of a new indicator calculation program and the delay in statistical data at the time of the report's development.

For category 3I, it is conventionally assumed that 20% of all collected straw is subjected to ammonification. Units of measurement are presented in tons (source B-03-01-M). Added emission indicators for 2022 for category 3I.

There is no initial information on the volume of harvested straw before 1997.

6 Chapter 6: Waste - NFR sector 5

Date of update - January 23, 2025.

In this sector, emission estimates were carried out for the following categories:

Table 8

NFR code	Name
5A	Biological waste treatment - Placement of solid waste on land
5B1	Biological waste treatment - composting

The initial information on the collection of municipal waste is the data of the bulletin of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan «Т-04-07-G - Қазақстан Республикасындағы коммуналдық қалдықтармен жұмыс істеу туралы. On the management of municipal waste in the Republic of Kazakhstan. 2023».

Prior to 2005, there were no initial data on the volume of collected municipal waste, so the calculated indicators were left unchanged, as calculated according to previous methods.

Prior to 2004, there were no initial data on the volume of hazardous waste incineration.

Prior to 2005, there were no initial data on the volume of medical waste incineration. The indicator 5C1biii for 2016-2020 differs from similar indicators for previous reporting periods, since in 2020 the Ministry of Health introduced Sanitary and epidemiological requirements for the collection, use, application, neutralization, transportation, storage and disposal of production and consumption waste [10]. The volume of medical waste incineration was recalculated for 2016-2020 according to the rules [10].

The 2022 emission indicators for category 5B1 are presented, which were not included in the previous report due to the introduction of a new indicator calculation program and the delay in statistical data at the time of report development.

The emission indicators for 2022 are presented for categories 5C1a, 5C1bi, 5C1bii, 5C1biii according to the National Data Bank on the State of the Environment and Natural Resources <https://waste.ndbecology.gov.kz/common/summary>

The indicators for waste are not presented due to the lack of data for category 5C1bv.

There are no initial data for category 5D1 before 1999, so the emissions indicator remained unchanged in the form calculated according to previous methods. There is no initial data for the 5D3 category until 2014.

7. Chapter 7: Other and Natural emission

Date of update - November 28, 2024.

The emission estimate for category 11B Forest fires was not provided at the time of the report due to the lack of information about fires. Changes and clarifications will be provided later.

Since currently the information in the Inventory of the fauna has not been updated since 2021, the calculation of emissions for 2022 and 2023 for category 11C takes into account the number of animals listed in the Red Book of Kazakhstan and the number of the population.

According to the statistical report "The main socio-economic indicators of the Republic of Kazakhstan" at the end of 2023 population were 20033842 people.

Unmanaged forests in Kazakhstan have been undergoing inventory since 2020, after receiving final data on the size of unmanaged forests, the indicator C11 will be recalculated. The forest fund managed by the Forestry and Wildlife Committee of the Ministry of Ecology, Geology and Natural Resources is not considered in category 11C.

8. Chapter 8: Recalculations and Improvements

Date of update - November 28, 2024.

8.1 Recalculations

Recalculations for all key indicators have been completed according to the methodology of EEA Report No. 06/2023 from 1990 to 2022. The fifth version of Annex I for the periods from 1990 to 2020, the second version for 2022 and the first version for 2023 are submitted for consideration.

Since the first FEB is presented in the statistical database based on the results of activities in 1990 and further from 1999, the initial data for 1991-1998 were not adjusted, nor were the initial data for 2003, 2005 and 2006 adjusted due to the fact that there is no FEB in the database for these years. The "Activity Data" section of the "Energy" category for 1991-1998, 2003, 2005, 2006 was left unchanged, formulas for calculating emission values were applied according to the methodology of EEA Report No. 06/2023.

In the presented analytical graphs, the changes in the indices are not reflected by the indicators for 2003, 2005, 2006 and 2021, as they are very different from the general presentation according to the available data. In 2021, the report is not presented for all key categories included in the report of Kazakhstan, with an error tolerance in units of measurement, and therefore this year is also excluded from the graphical representation.

For the reporting years 1990, 1999-2002, 2004, 2008-2022, the verification of the initial statistical data on all key indicators was carried out and the forms corresponding to the methodology of EEA Report No. 06/2023 were applied.

8.2 Planned improvements

If possible, some calculation methodologies were replaced from Level 1 to Level 2, if the initial information was available for the presentation of data on Level 2.

No key categories have been identified for any industries, on average, the entire industry of Kazakhstan affects the indicators of emissions into the atmosphere.

8.3 Status of recommendations for in-depth analysis

Based on the recommendations for an in-depth analysis of National Reporting for 1990-2022, the following work was carried out:

- the reporting data for 2021 have been adjusted;
- the methodology for calculating emission indicators for the use of solvents has been changed – instead of initial data on the number of people, initial data on the volume of sales of vegetable oil products in the domestic market have been adopted;
- uncertainty assessment was carried out;
- verification of ideas about the activity and correction of errors in the designations NE, NA, NO, IE were carried out;
- updated and corrected the initial data for category 2A3 for 1990-2019;
- statistical data on the category 2A5b have been collected since 2010, therefore, starting from 2010, information on emissions for these categories has been updated. It is not possible to provide information on emissions until 2010;
- updated and corrected the initial data for category 2B2 for 1990-2019;
- updated and corrected the initial data for category 2B10a for 1990-2019;
- updated and corrected the initial data for category 2C1, 2C2, 2C3, 2C5, 2C6, 2C7a,c for 1990-2019;
- updated and corrected the initial data for category 2H1, 2H2 for 1990-2019;
- key transport indicators have been updated and corrected in accordance with the Guidelines for 2019 and 2020. The remaining indicators for the entire sector 1A will be revised later;
- an assessment was carried out on pipeline transport (1A3ei), according to the methodology of fuel consumption by stationary sources, since enterprises

transporting gas or oil through pipelines mainly use small gas or diesel furnaces for heating small rooms;

- according to the categories of section 2D3, it is not possible to recalculate key indicators, since there is no initial statistical information until 2004, the presentation of data for the period 1990-2004 has been left in the form in which it was presented until 2020;

- category 2G was left without evaluation, since reliable data on the use of tobacco, shoes, pyrotechnics and other "others" is difficult to obtain, an analytical assessment of the use of goods was not carried out, there are no data in statistics;

- activity data for the entire 3B sector has been filled in and recalculated according to the EEA Report No. 06/2023 methodology;

- for category 5A, a recalculation was made according to the methodology of EEA Report No. 06/2023 for the period from 2005 to 2020, the periods 1990-2004 were left unchanged, since there is no initial information in the statistics on the volume of waste discharges to the soil before 2005;

- for category 5C, the initial data were clarified and recalculated for those categories for which statistical information is available, according to the methodology of EEA Report No. 06/2023 for the period from 2004 to 2020. A significant increase in the amount of incinerated waste since 2016 is explained by the fact that, in accordance with the newly approved rules [10] and [11], nature users have recalculated their emission indicators since 2016. No recalculation is provided for the previous years;

- the initial data have been clarified and recalculated according to the 5D1 category since 2000. Information on water consumption in the period from 1990 to 1999 was not shared in the statistics on purification, therefore, due to the lack of initial information, the presentation of emissions in the period from 1990 to 1999 was left unchanged

9 Chapter 9: Projections

Date of update - November 28, 2024.

In connection with the entry into force of the new Environmental Code and rules governing certain areas of environmental regulation, it is expected that nature users will carry out more accurate actual accounting of emissions by key indicators.

Since, according to the new rules for the formation of MPEs [5], orientation towards the use of the best available technologies (BAT) is provided, work has begun on the approval of national BAT reference books. It is expected that nature users will apply the recommendations of the BAT reference books and reduce their environmental impact. Automatic emission monitoring systems are being implemented at large thermal and power plants, therefore, after debugging the process of collecting and reporting on actual emissions, a transition to the 3rd level of emission accounting in the public energy production sector is expected.

Representatives of the Ministry were trained in the application of forecasting methodologies.

Approximate projections are presented in the [Annex_iv_projections_reporting_template_2023_Kazakhstan_en.xls](#).

10 Chapter 10: Reporting of gridded emissions and LPS

Date of update - January 23, 2025.

Annual emissions data (Annex 1: National sector emissions: Main pollutants, particulate matter, heavy metals and persistent organic pollutants) is submitted in an Excel table to the UNECE secretariat no later than February 15, 2025 and in paper form to the authorized body as Annex 1 to this information report in accordance with the terms of the agreement.

Projected total emissions of major pollutants and activity parameters (Annex IV A-WM. Emission projections reporting template - With Measures) are submitted in an Excel spreadsheet to the UNECE secretariat based on fuel consumption forecast data taken from the IAMC 1.5°C scenario study tool tables of the Gains online system <https://iiasa.ac.at/models-tools-data>.

Reporting on the EMEP grid cells for 2023 (Annex V. Aggregated Gridding NFR sector data) is submitted in Excel format to the UNECE secretariat no later than May 1, 2025.

Data on LPS for 2024 (Annex VI. Template for PC data for each relevant aggregated Gridding NFR sectors (GNFR)) will be submitted in Excel format to the UNECE secretariat no later than May 1, 2025.

11 Adjustments

List of references

- 1 Technical Guidelines for the Preparation of National Emission Inventories EEA Report No. 06/2023;
- 2 Technical Guidelines for the Preparation of National Emission Inventories EEA Report No. 13/2019;
- 3 Environmental Code Law of the Republic of Kazakhstan dated January 2, 2021, No. 400-VI);
- 4 Law of the Republic of Kazakhstan dated June 7, 2007 N 259. "On Ratification of the Stockholm Convention on Persistent Organic Pollutants";
- 5 Order of the Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated March 10, 2021 No. 63 "On approval of the Methodology for determining Emission standards into the environment";
- 6 Order of the Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated June 22, 2021 No. 207 "On approval of the Rules for maintaining the State Cadastre of ozone-depleting substances";
- 7 Order of the Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated July 1, 2021 No. 227 "On approval of the form of summary data on accepted declarations on environmental impact";
- 8 Order of the Acting Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated July 19, 2021 No. 262 "On approval of the Rules for the Inventory of Stationary Emission Sources, Data adjustments, Documentation and storage of data obtained as a result of Inventory and adjustments (for local executive bodies)";
- 9 9 Order of the Acting Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated July 19, 2021 No. 257 "On Approval of the Rules for the Development of environmental Quality Targets, including the minimum list of indicators for which environmental quality targets are set";;
- 10 10 Order of the Minister of Health of the Republic of Kazakhstan dated November 30, 2020 № ҚР ДСМ-219/2020 "On approval of the rules for providing information on medical waste";

11 Order of the Acting Minister of Health of the Republic of Kazakhstan dated December 25, 2020 № ҚР ДСМ-331/2020 "On the approval of Sanitary Rules "Sanitary and epidemiological requirements for the collection, use, application, neutralization, transportation, storage and disposal of production and consumption waste";

12 Order of the Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated June 22, 2021 No. 208 "On approval of the Rules for maintaining an automated system for monitoring emissions into the Environment during industrial environmental control";

13 Order of the Chairman of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan dated February 21, 2020 No.24 "On approval of statistical forms of nationwide statistical observations on industry and environment statistics and instructions for filling them out";

14 Order of the acting Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan dated August 6, 2021 No. 314 "On approval of the Waste Classifier";

15 Order of the Minister of Energy of the Republic of Kazakhstan "On approval of the Plan for fulfilling the obligations of the Republic of Kazakhstan under the Stockholm Convention on Persistent Organic Pollutants for 2017-2028" No. 312 dated September 14, 2017;

16 Order of the Minister of Environmental Protection of the Republic of Kazakhstan dated February 24, 2012 No. 40-ө "On approval of the Rules for the management of persistent organic pollutants and waste containing them";

17 SP RK 2.04-108-2014 Insulation and finishing coatings;

18 SP RK 3.03-101-2013 Highways;

19 ST RK 1373-2013 Bitumen and bitumen binders. Bitumen oil road viscous. Technical conditions.

Abbreviations

FEB – Fuel and energy balance

HM - heavy metals;

CLRTAP - Convention on Long-Range Transboundary Air Pollution;

BAT - Best Available Technology;

MPC - maximum permissible concentration;

MPE - maximum permissible emissions;

IIR - Inventory Information Report;

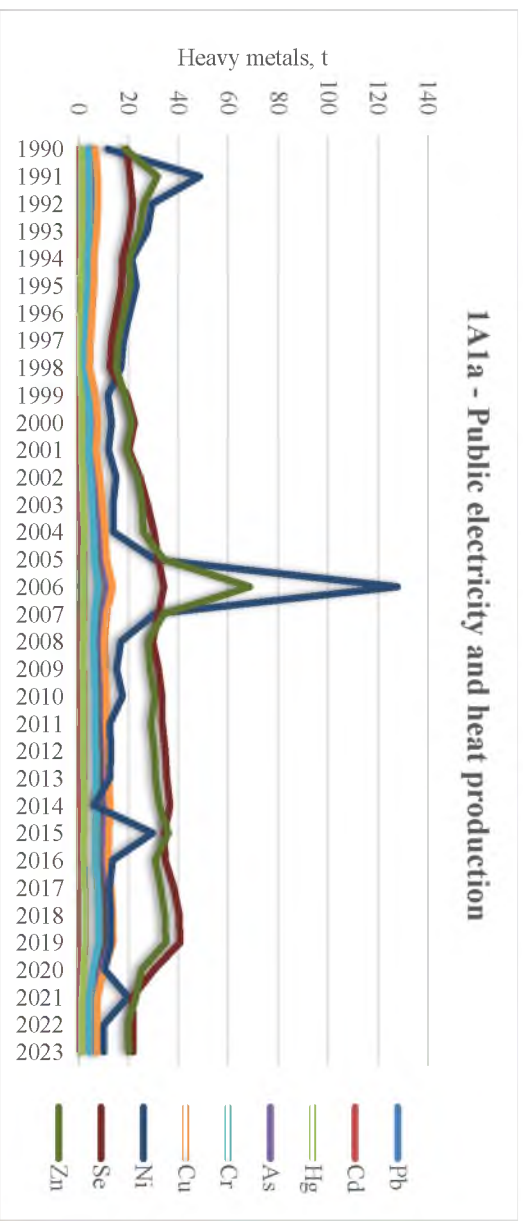
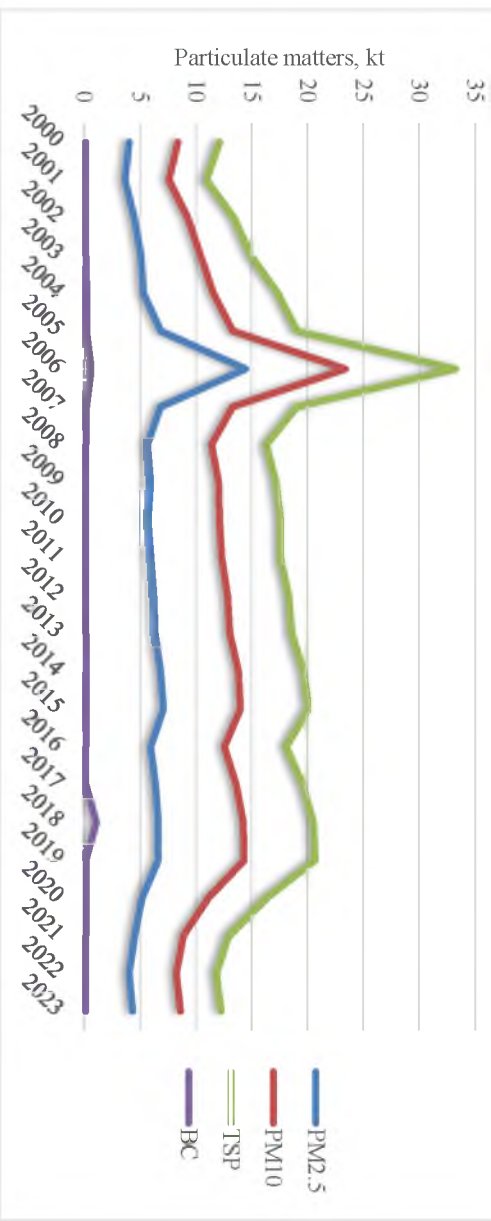
NMVOC (VOC) - non-methane volatile organic compounds;

Compliance plan - Plan for the fulfillment of the obligations of the Republic of Kazakhstan under the Stockholm Convention on Persistent Organic Pollutants;

POPs - persistent organic pollutants;

LPS - large point sources;

NR - National report.

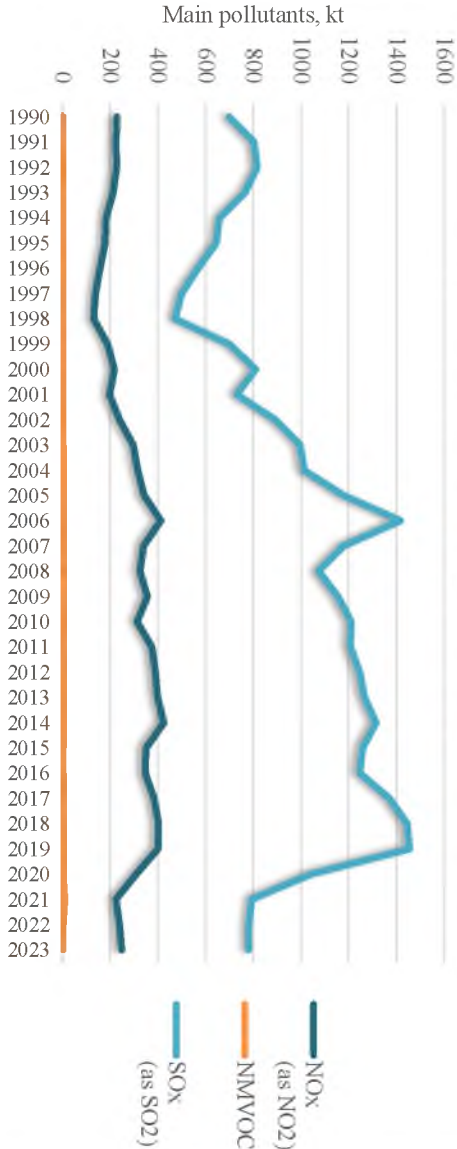


Analysis of key categories

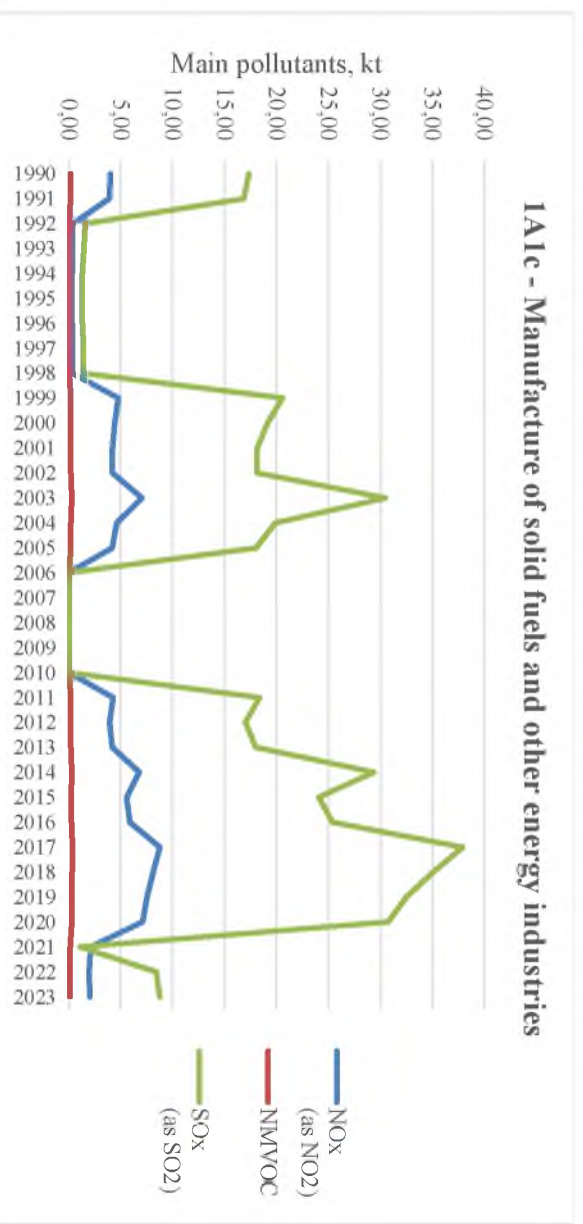
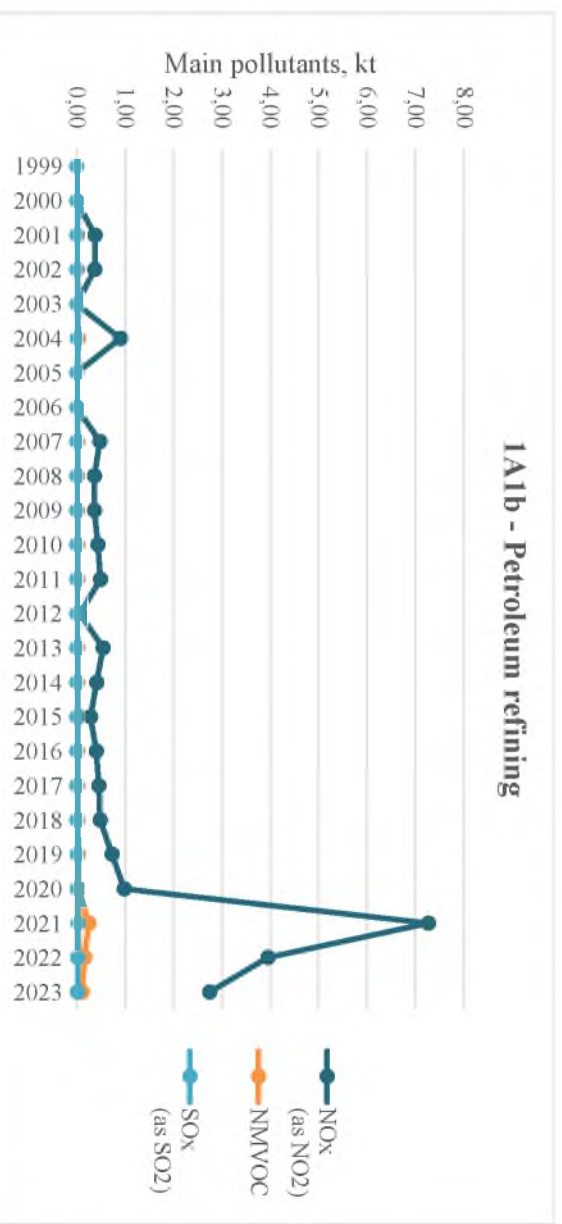
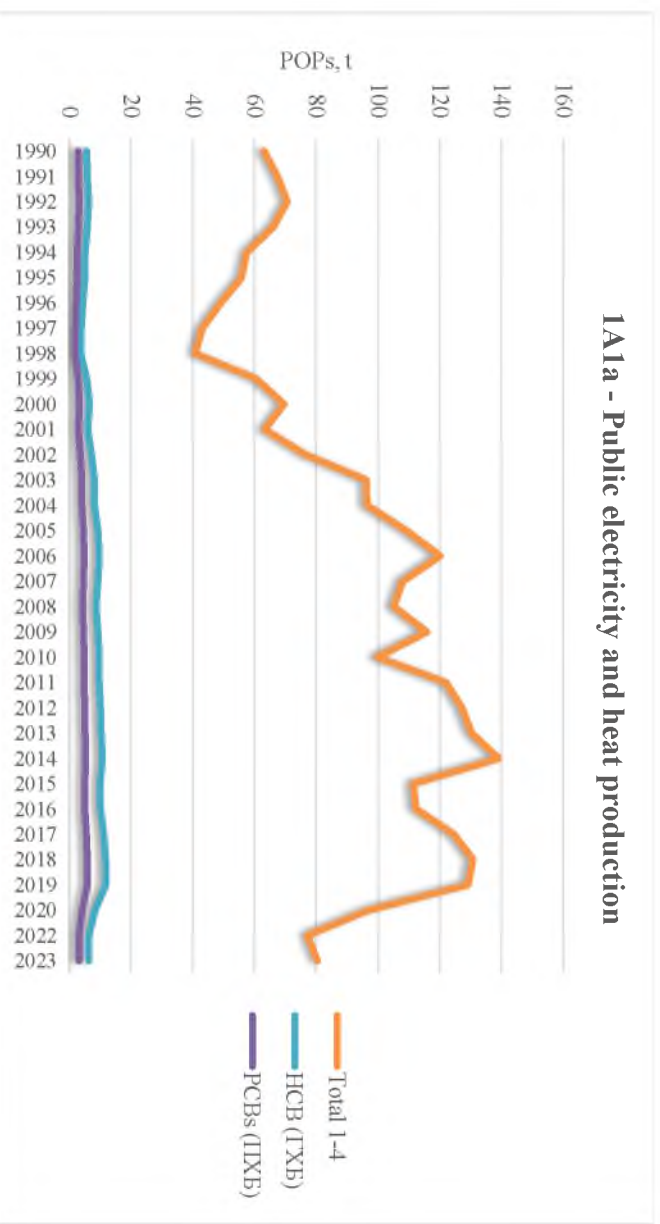
Analysis of emissions changes in the period 1990-2020.

1A – emissions in the energy sector

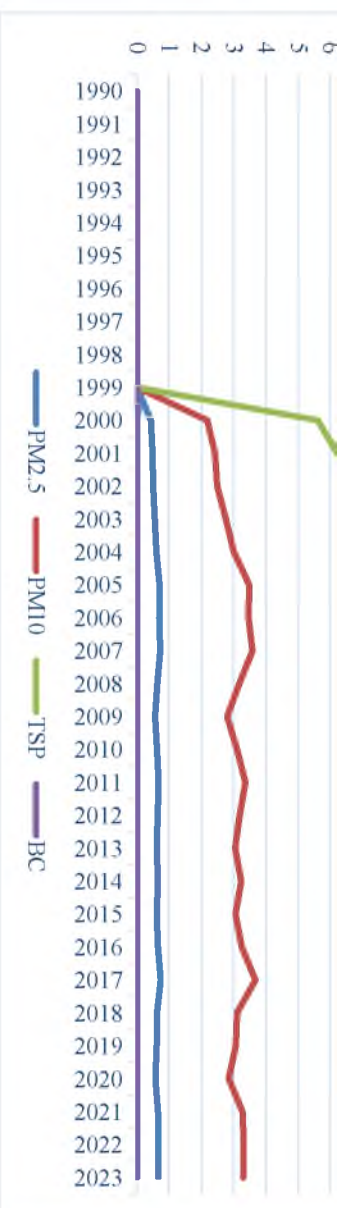
1A1a - Public electricity and heat production



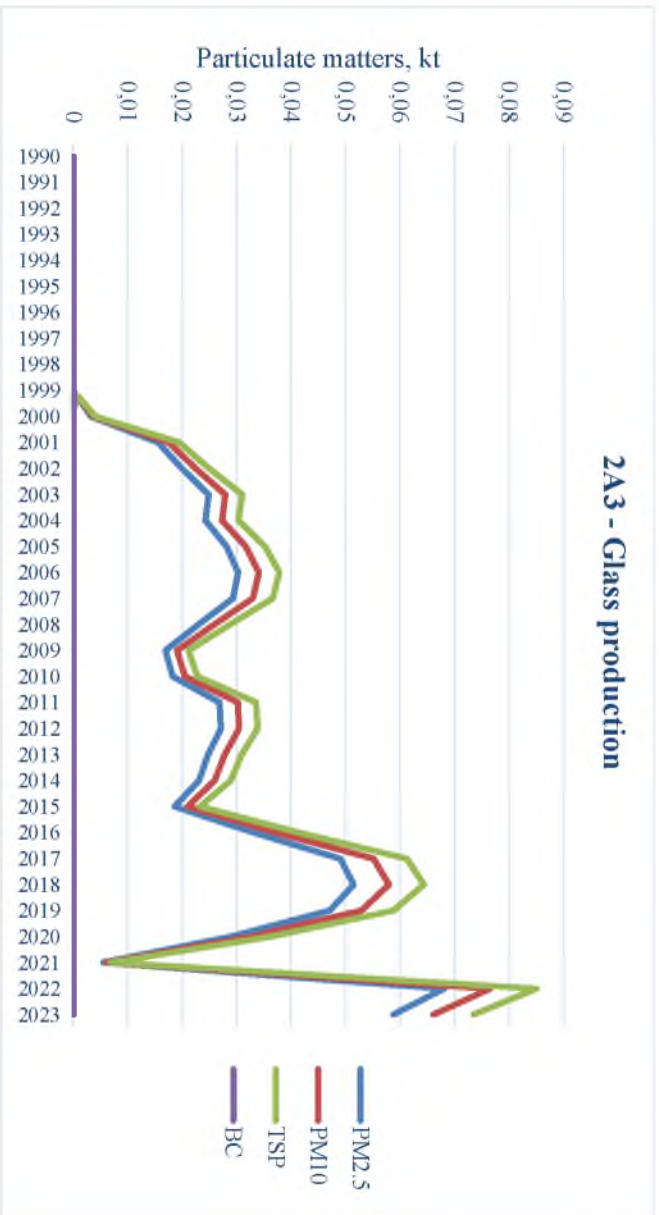
1A1a - Public electricity and heat production



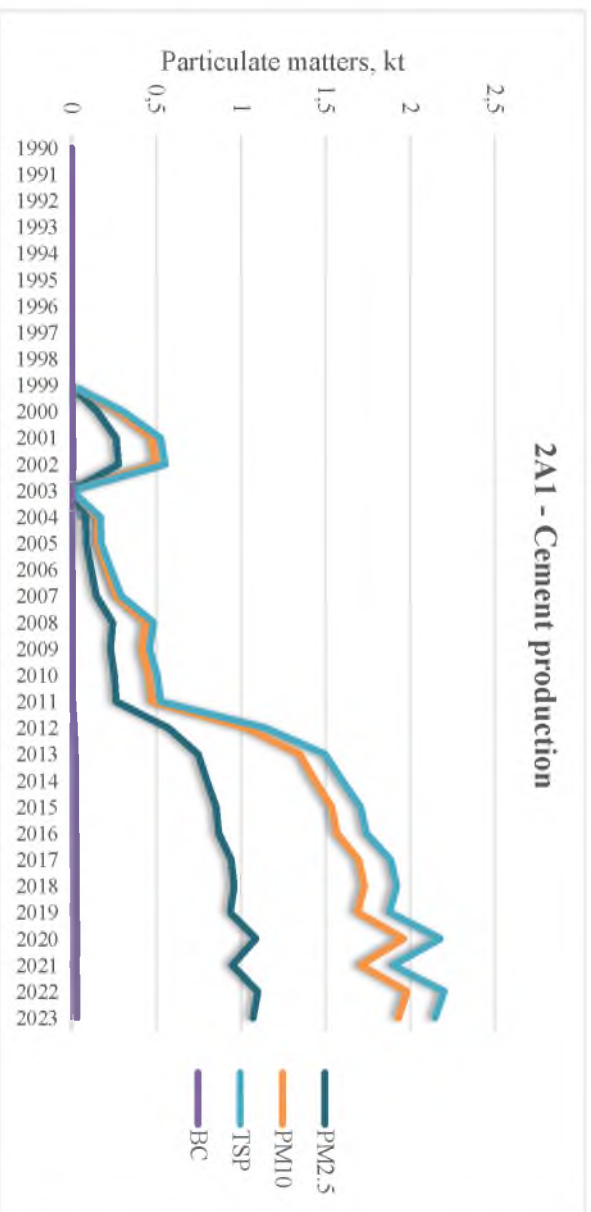
Coke production has been reduced since 2022. There is no data for 2006-2010.

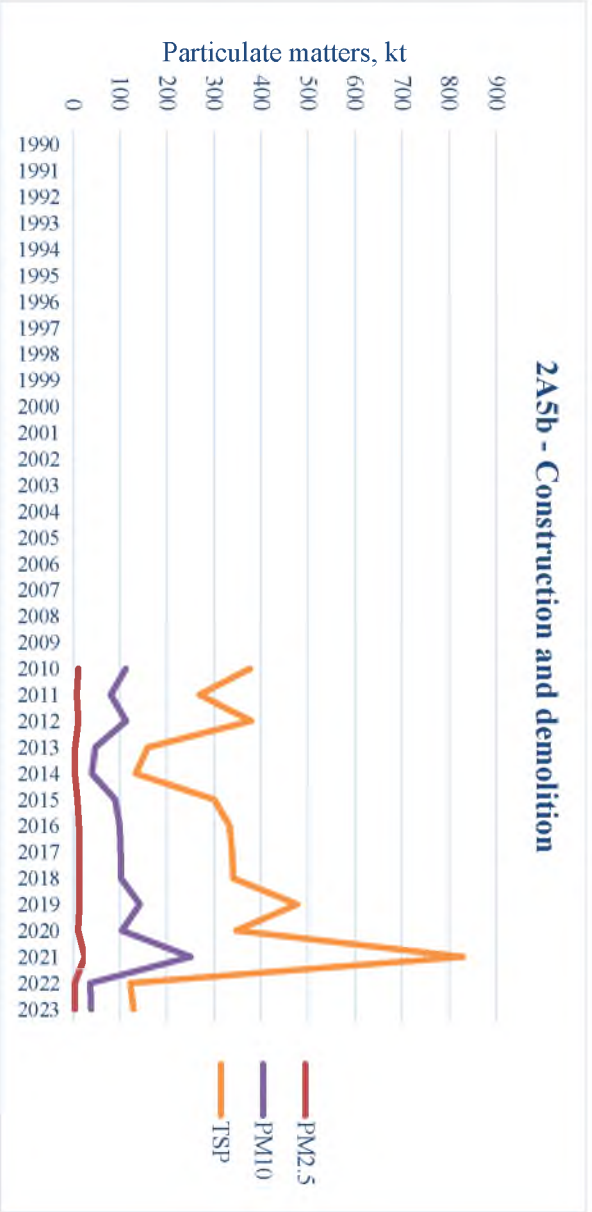
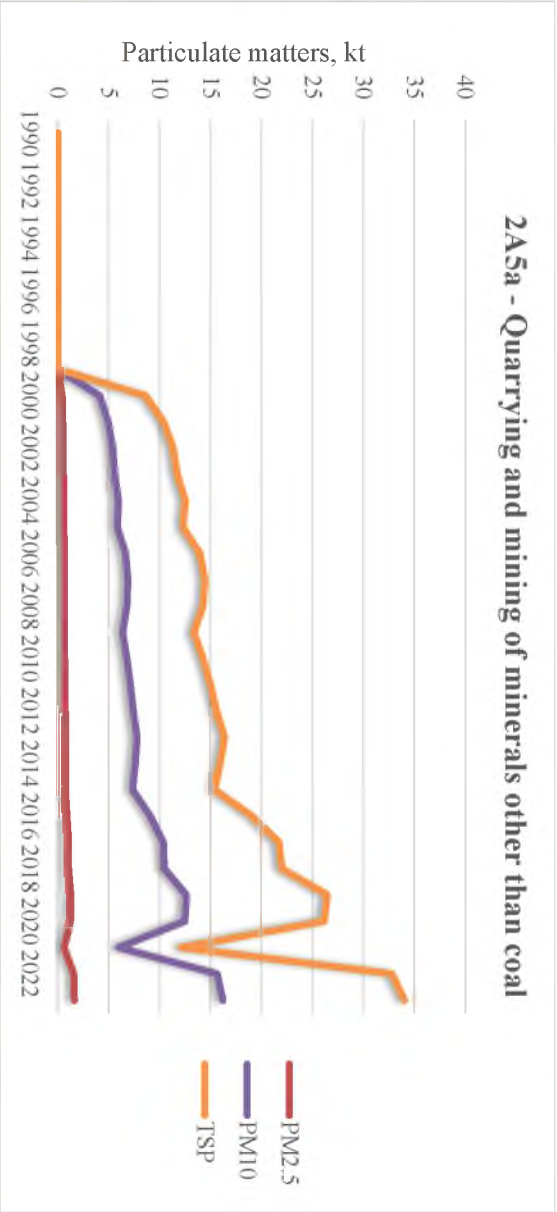
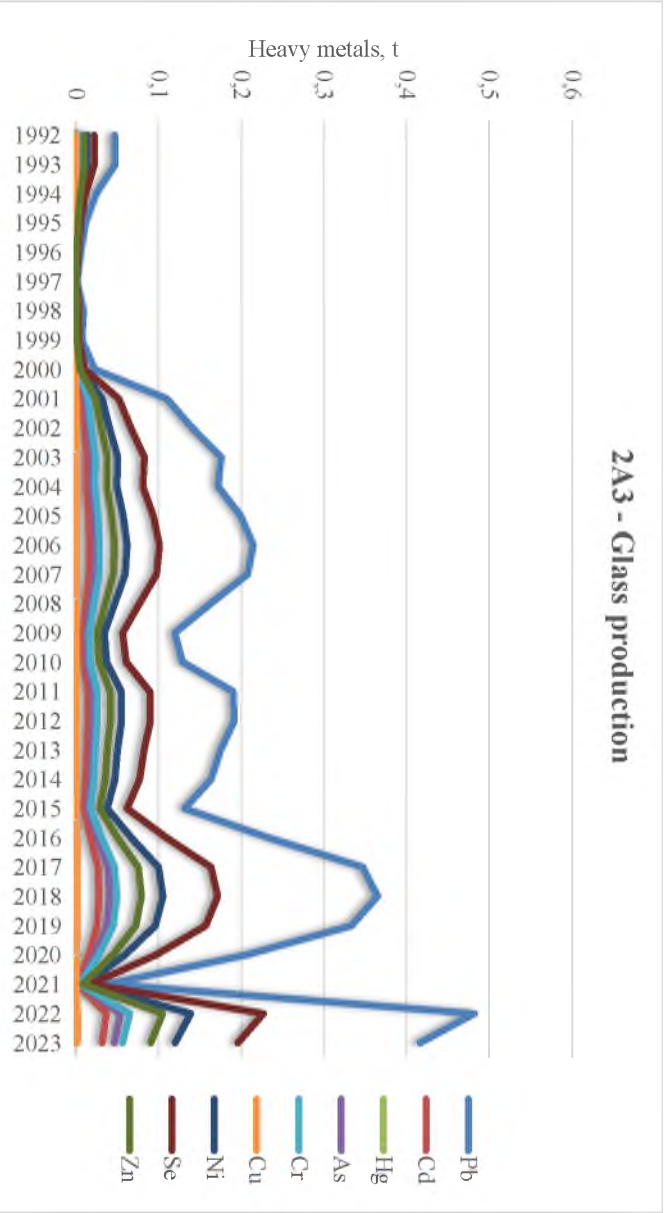


2A3 - Glass production



2A – emissions from the production of mineral products

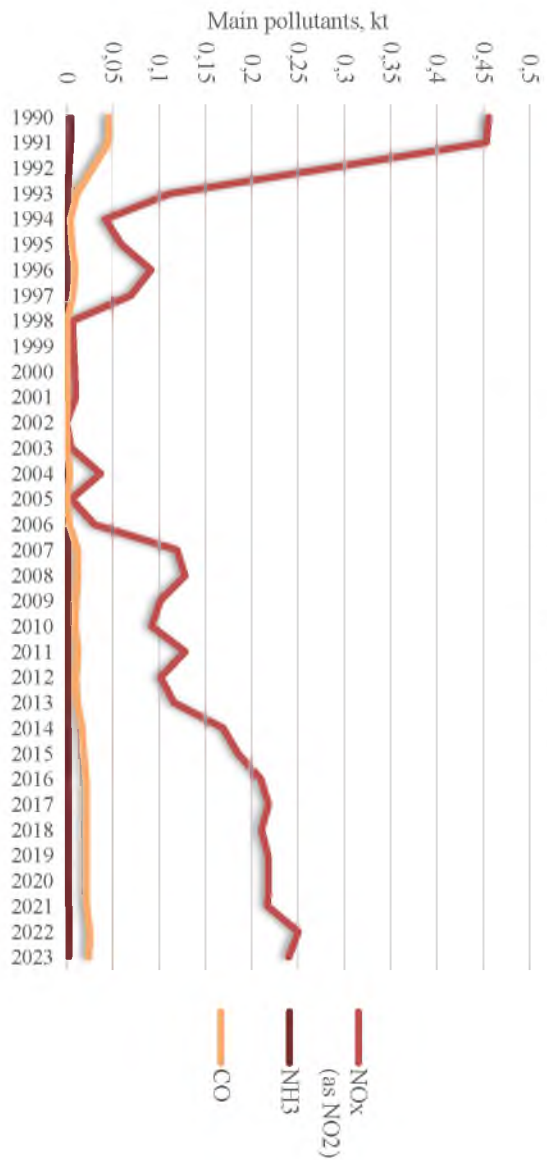




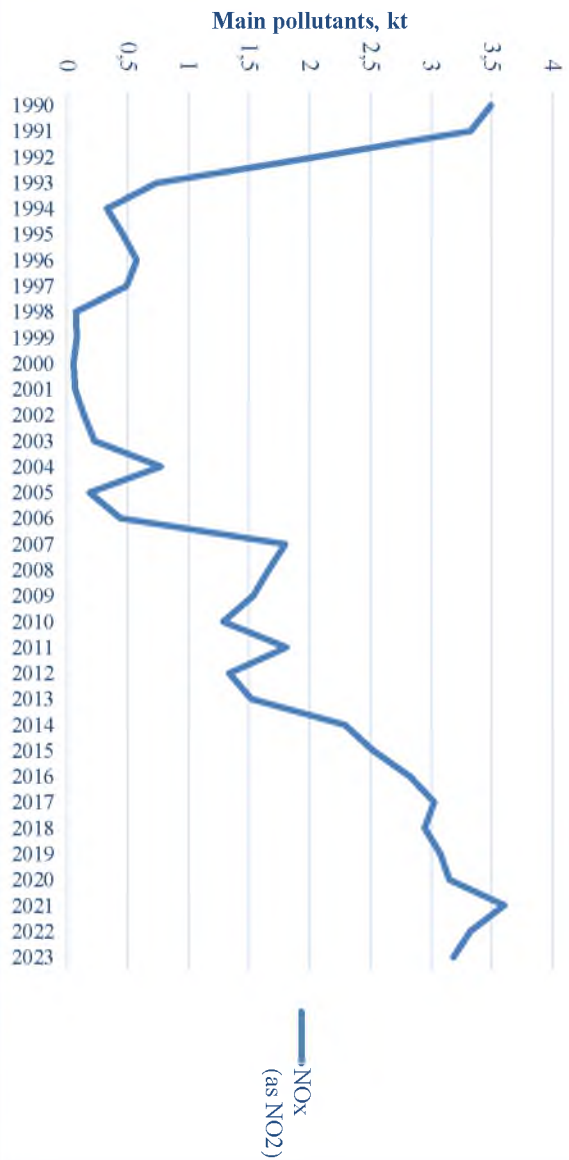
The volume of construction has been accounted since 2010.

2B – Emissions from the production of chemical products

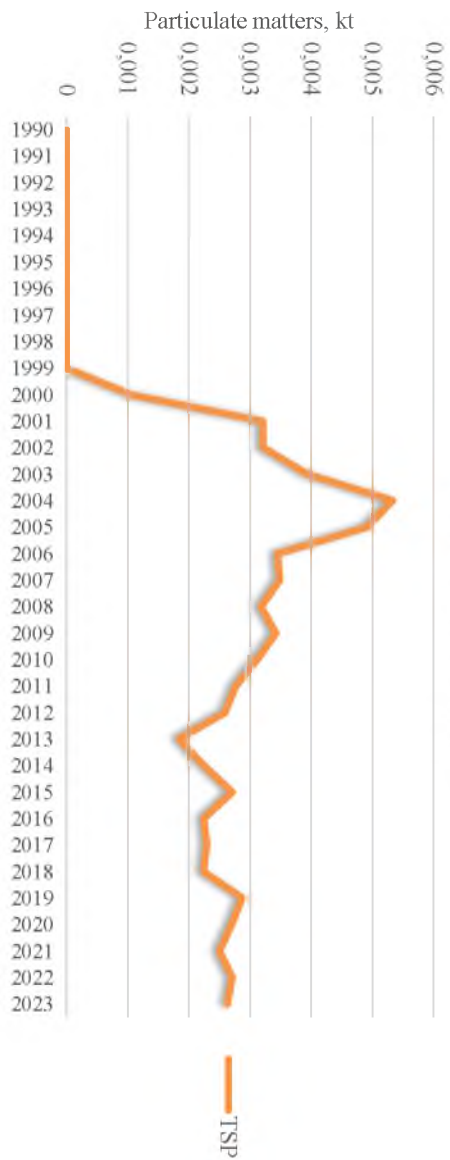
2B1 - Ammonia production



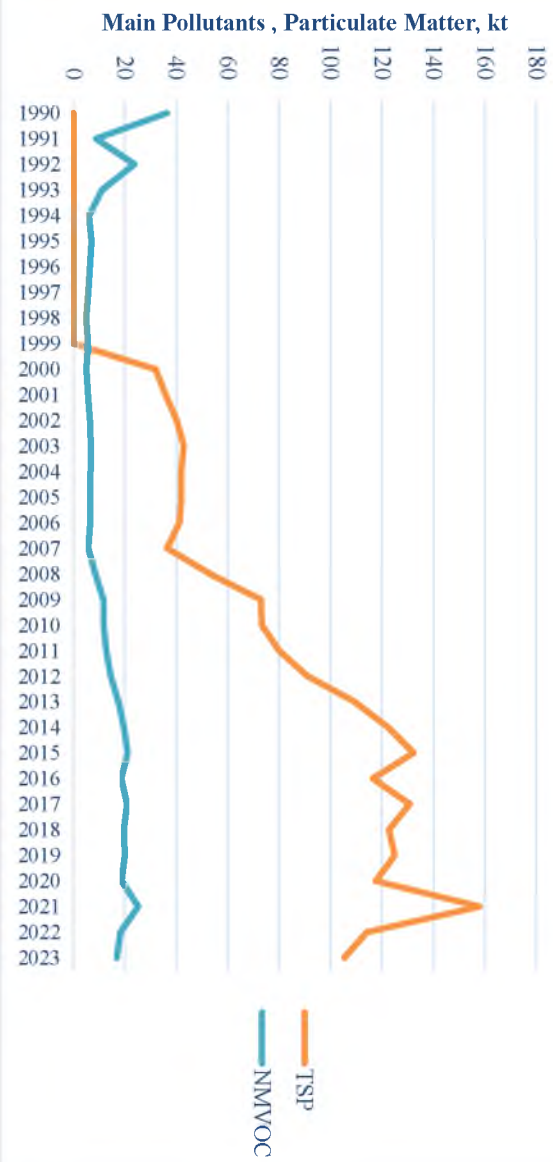
2B2 - Nitric acid production



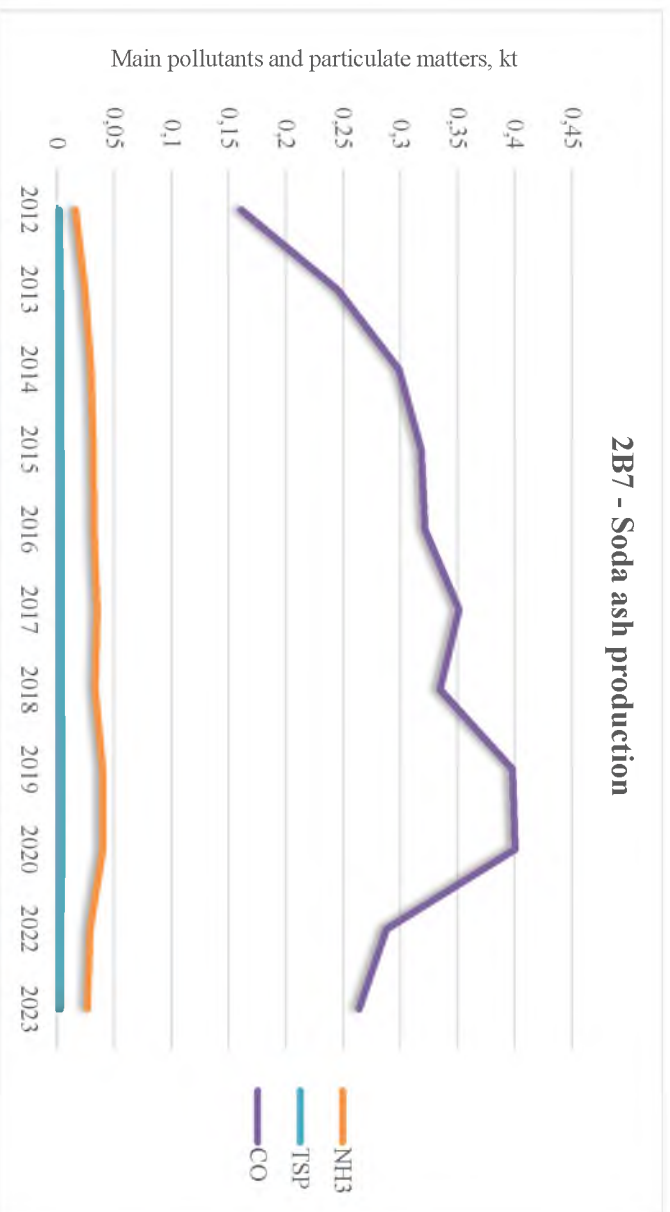
2B5 - Carbide production



2B10a - Other chemical industry (sulfuric acid, carbon, chlorine, phosphate fertilizers, styrene)



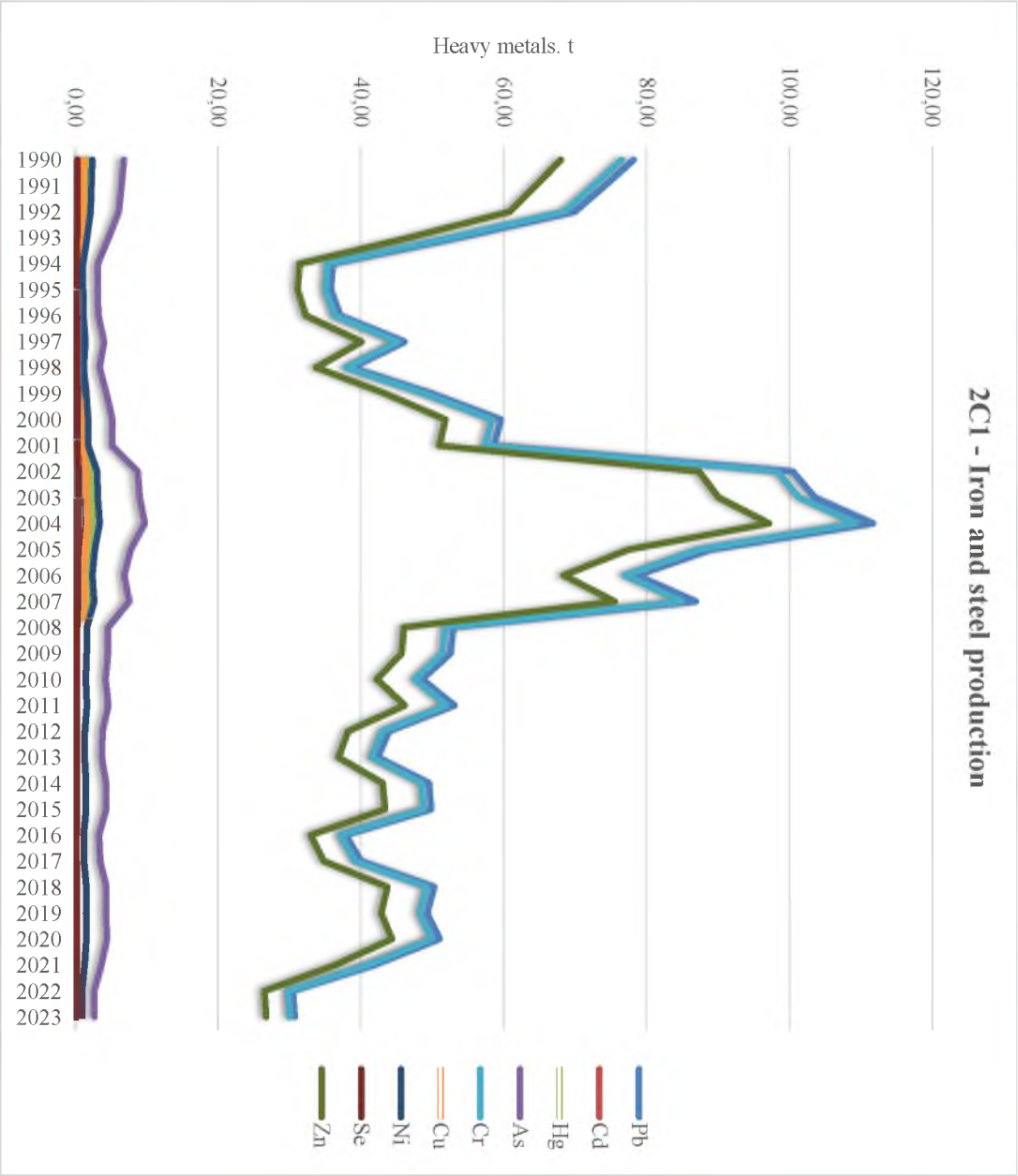
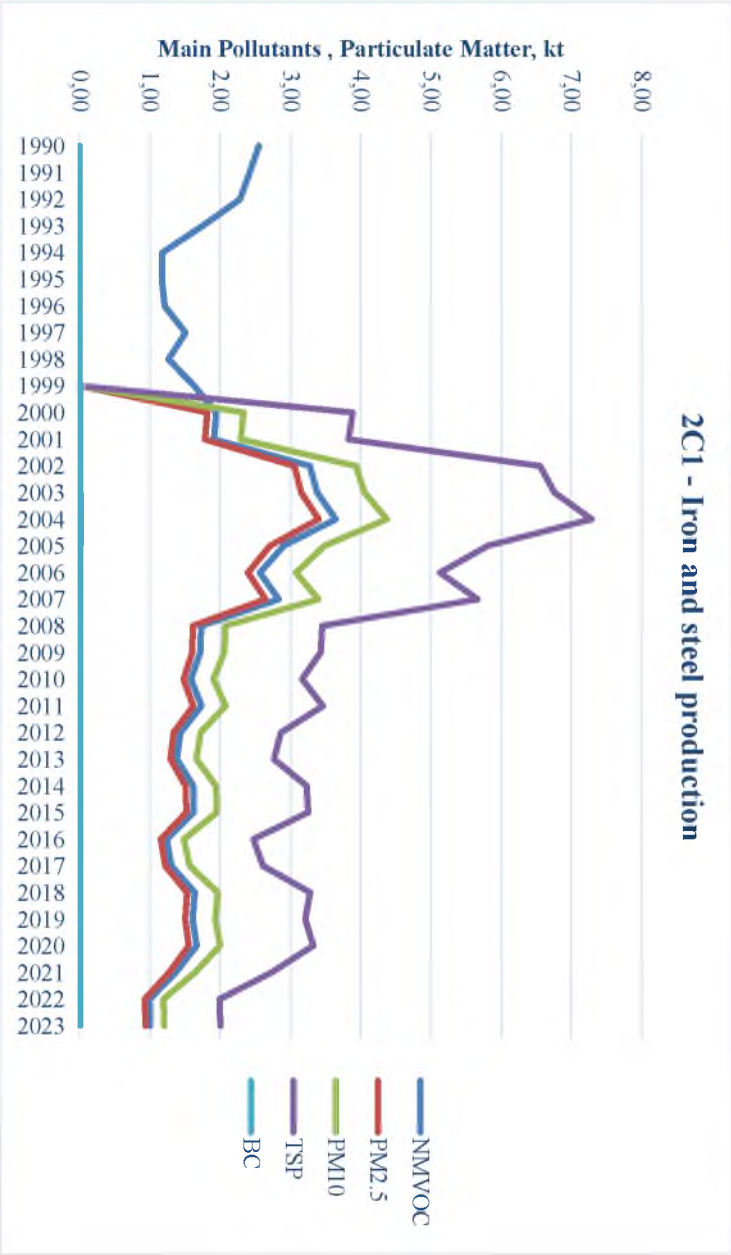
2B7 - Soda ash production

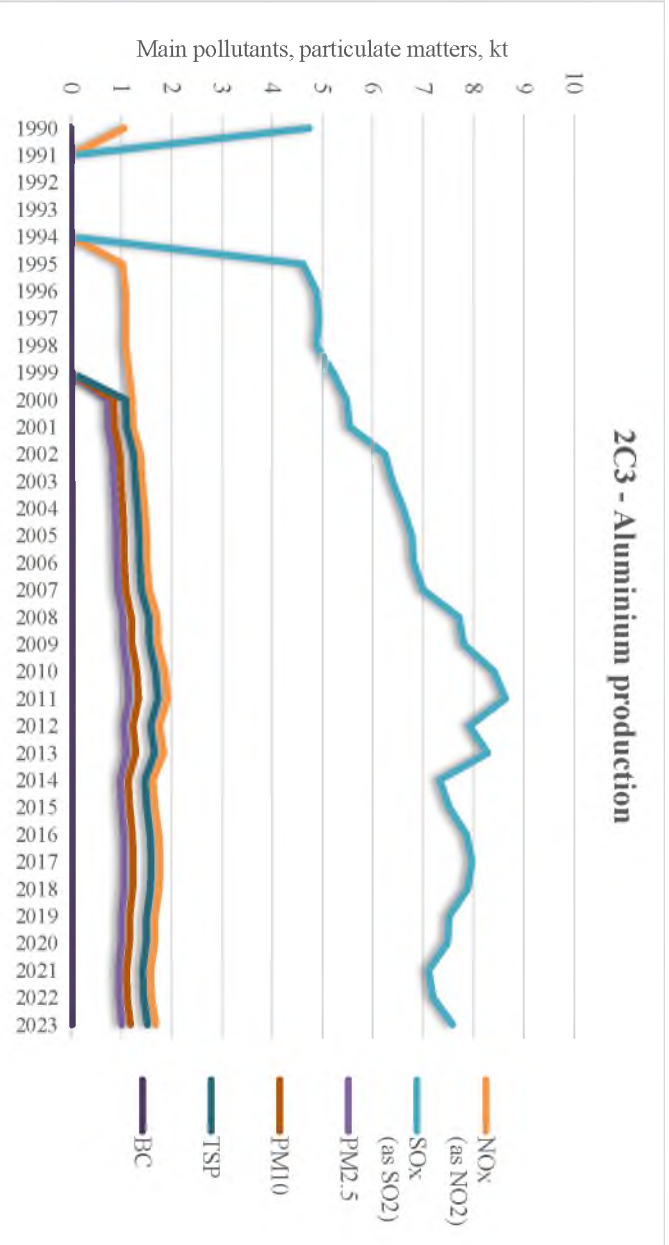
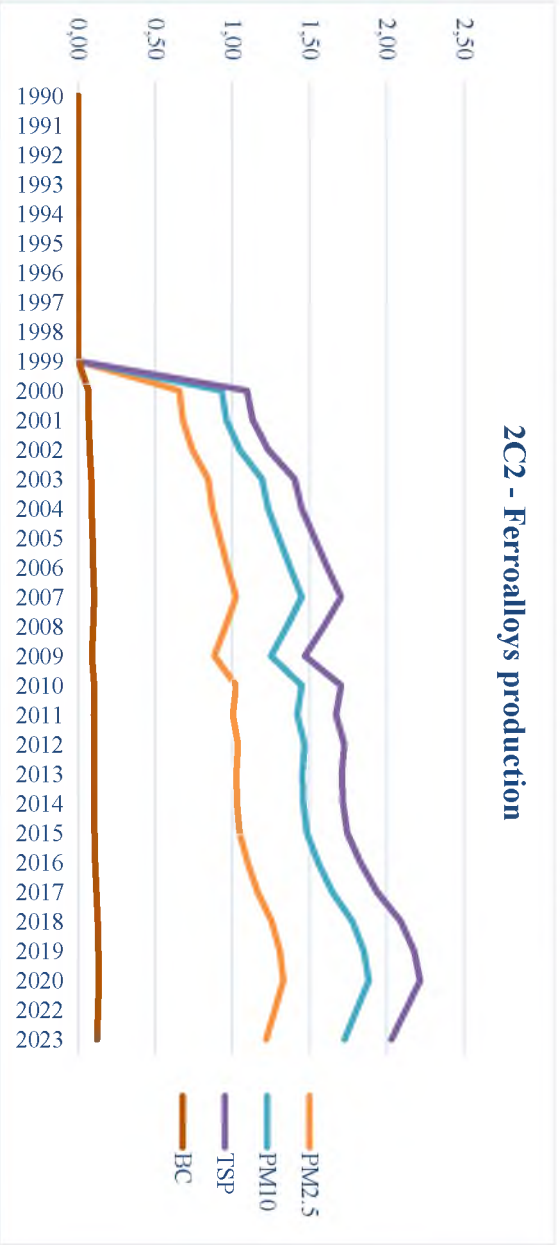
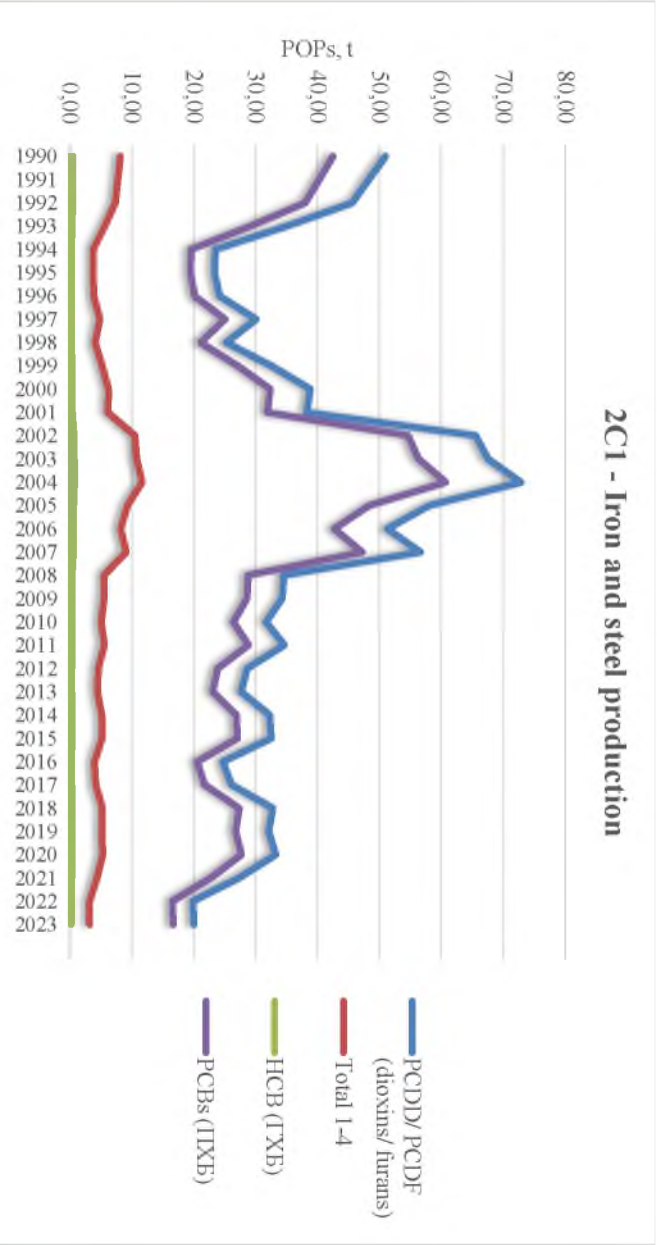


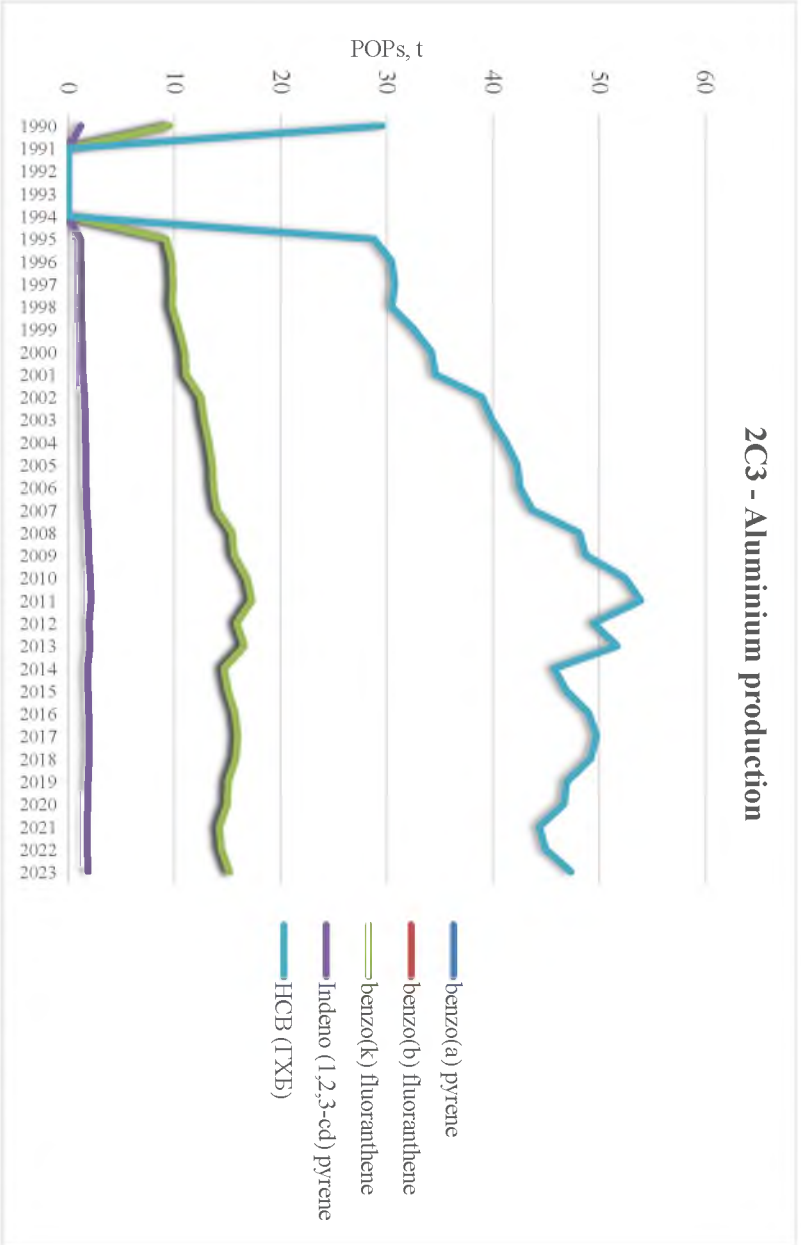
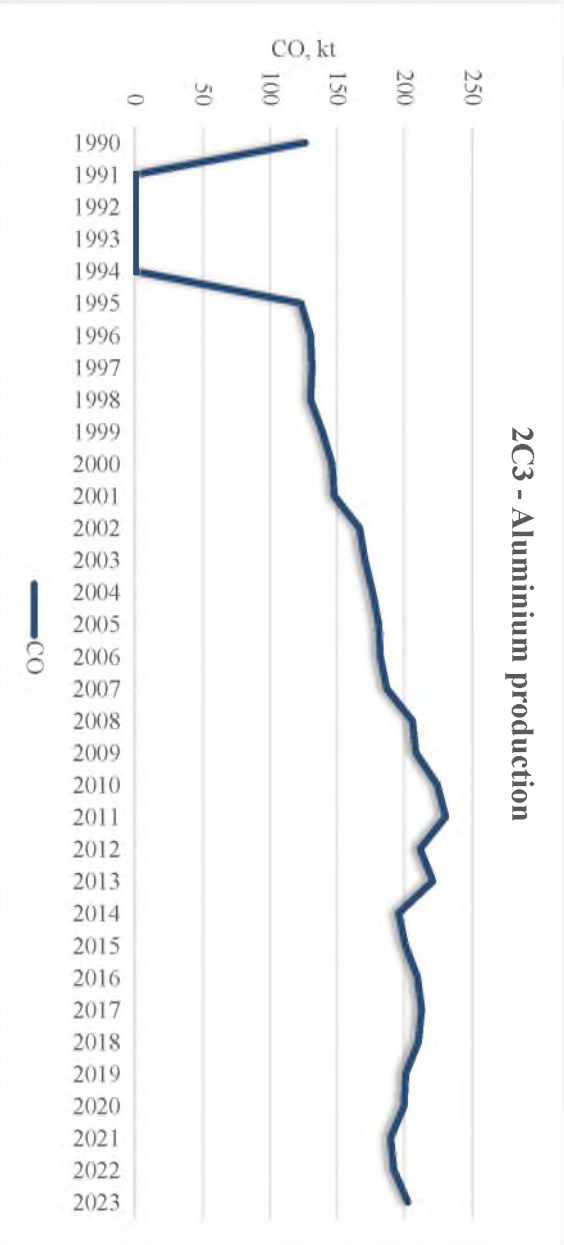
ash.

Prior to 2012, there was no initial information on the production of soda

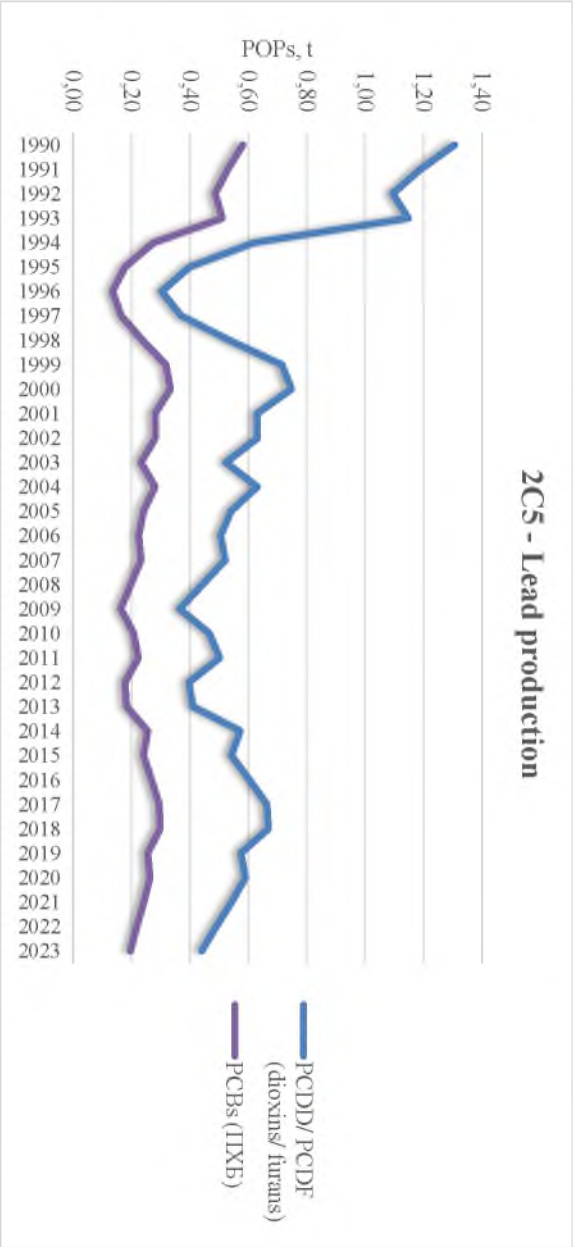
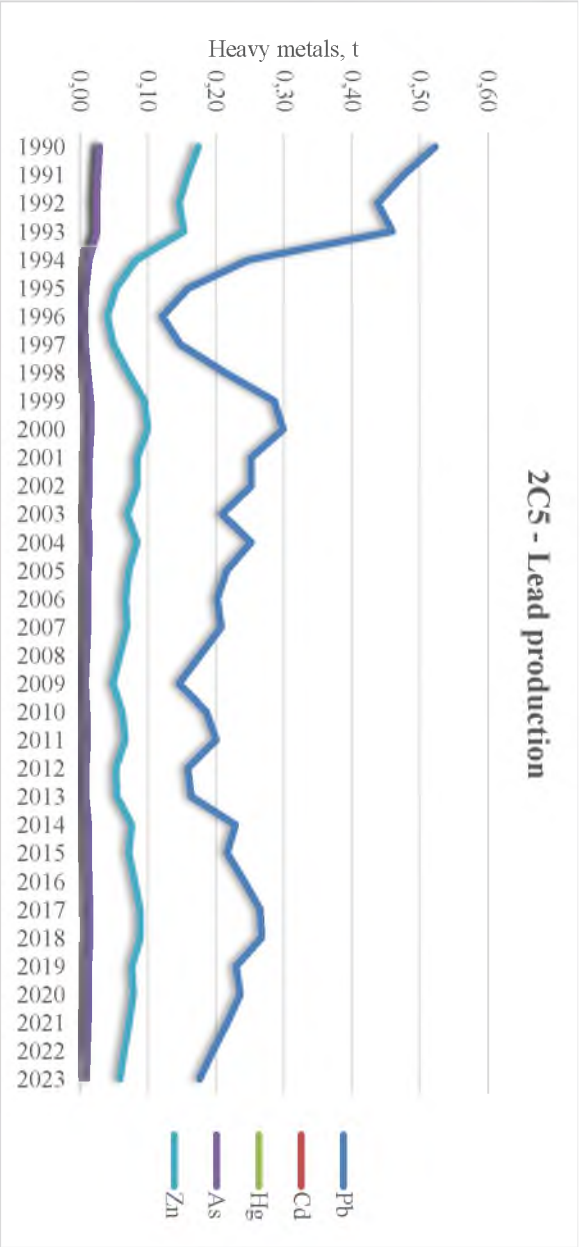
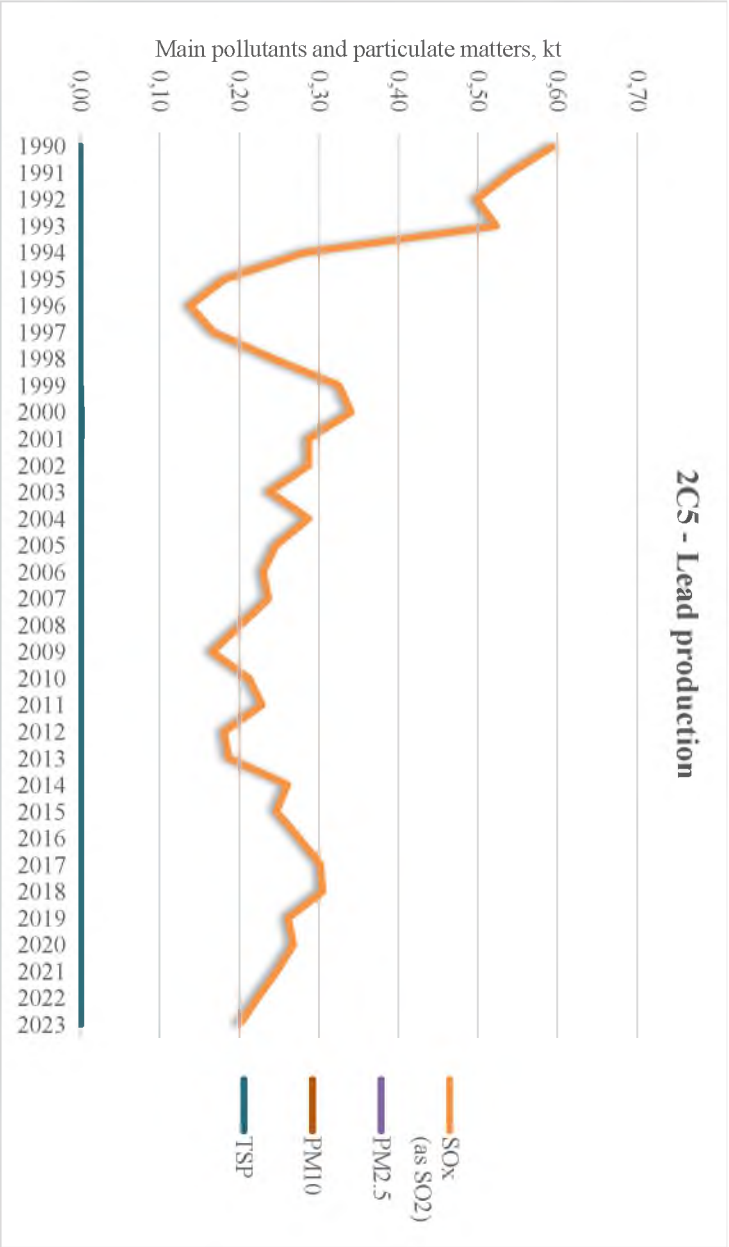
2C – emissions from the production of metallurgical products.

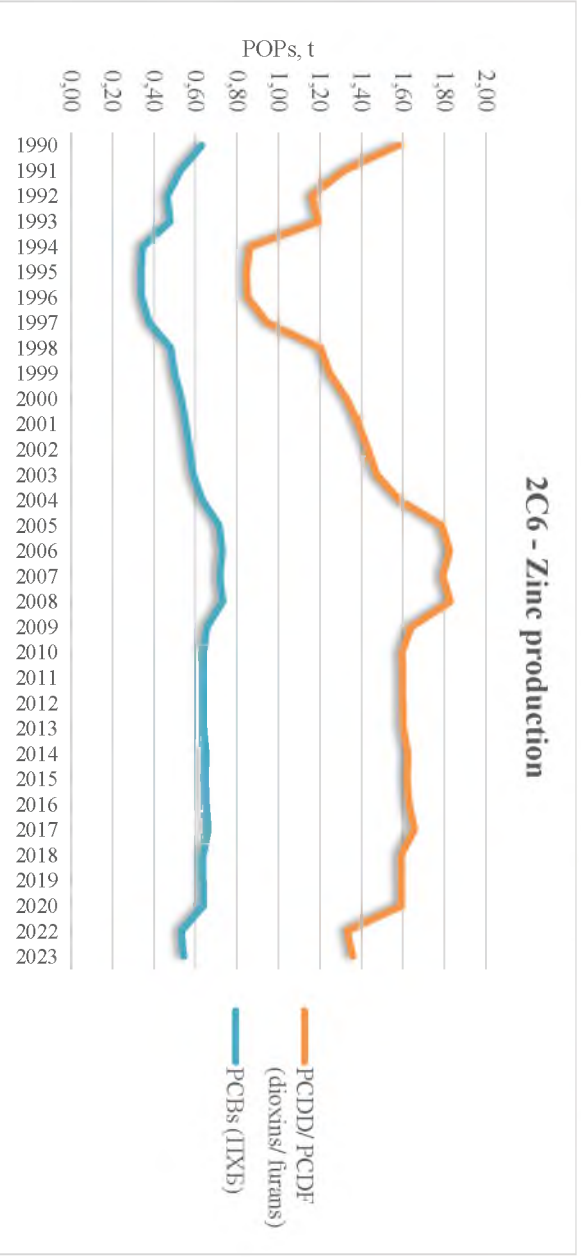
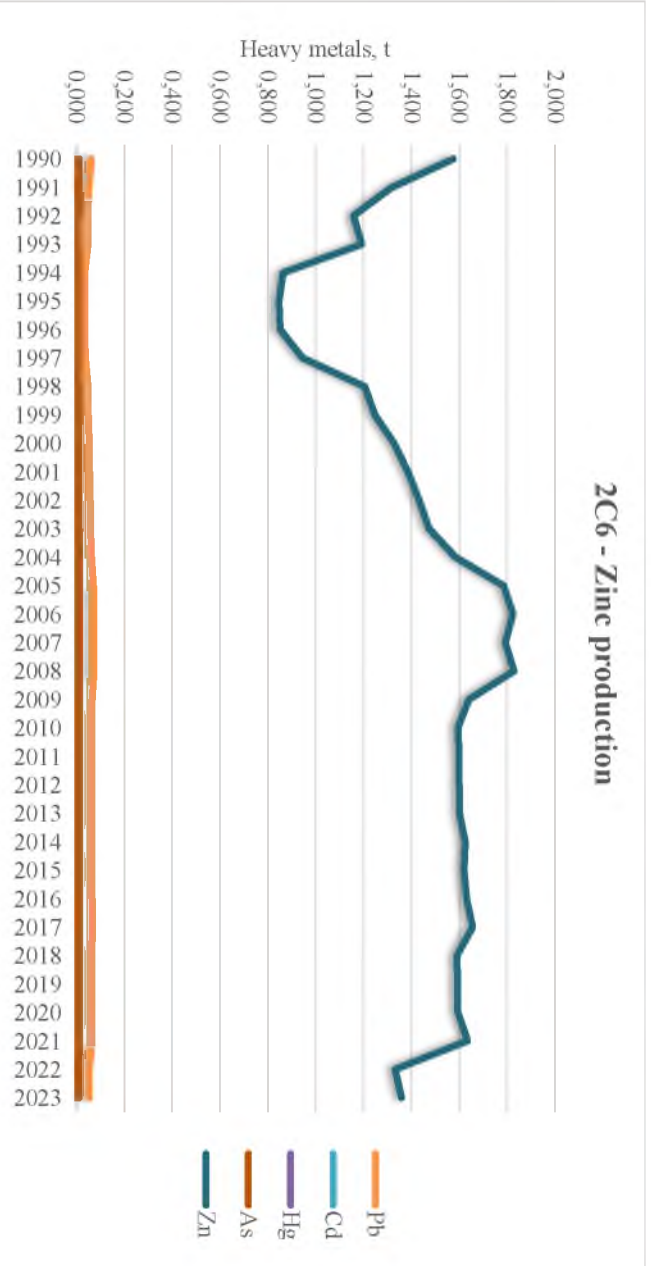
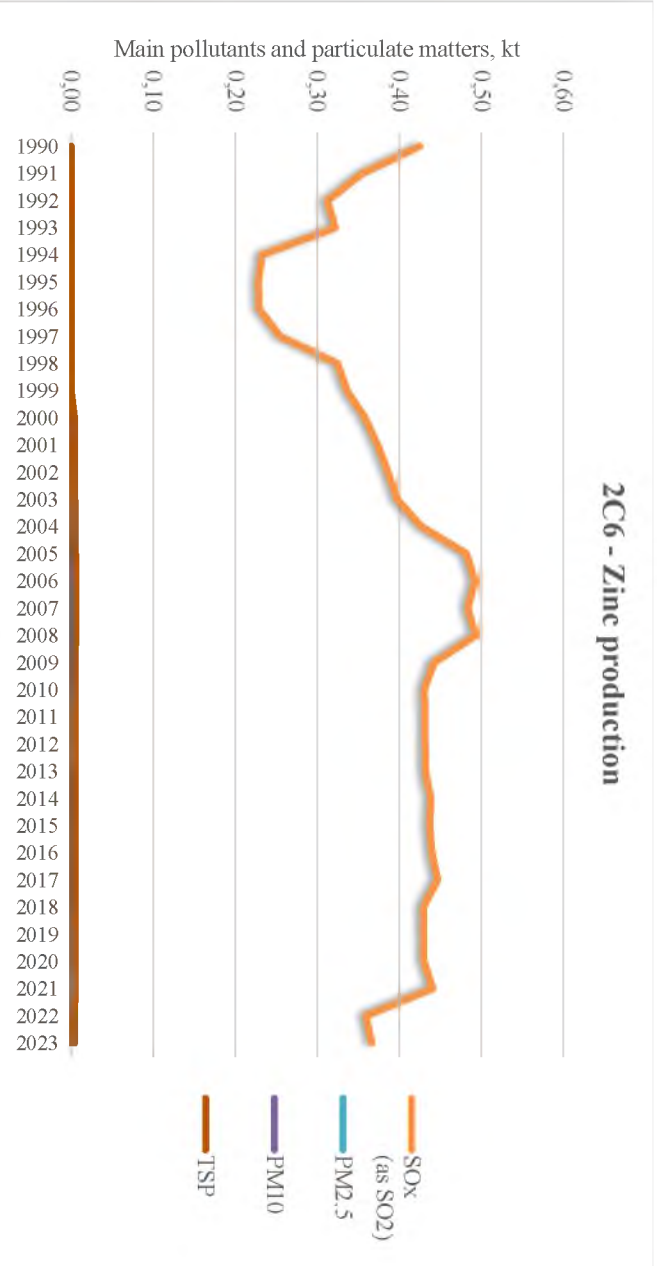


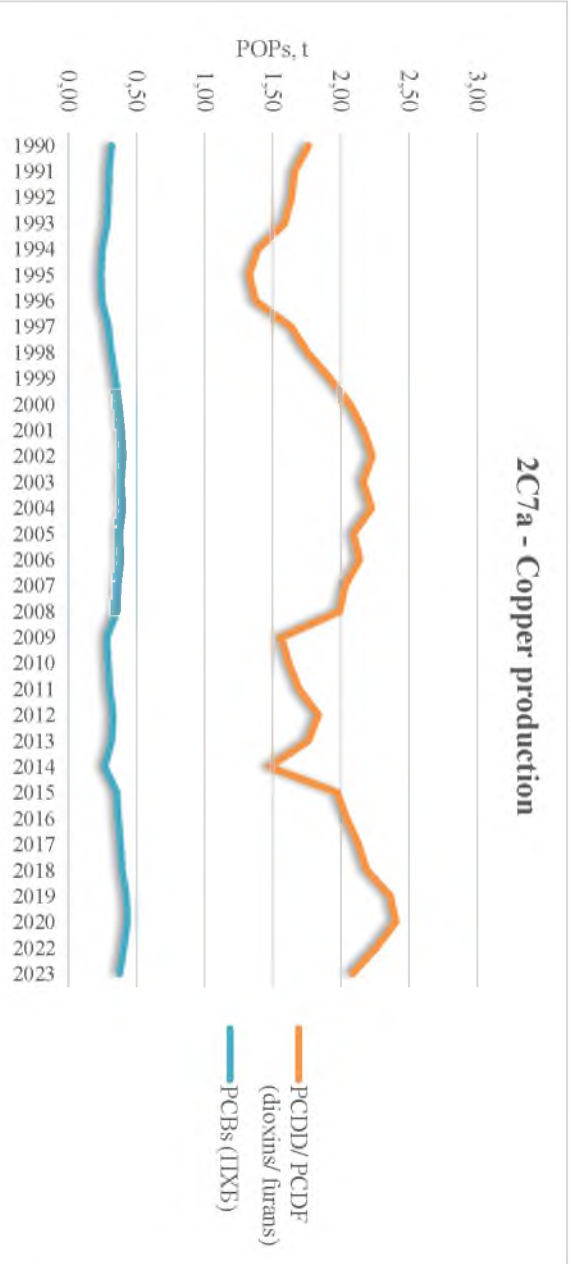
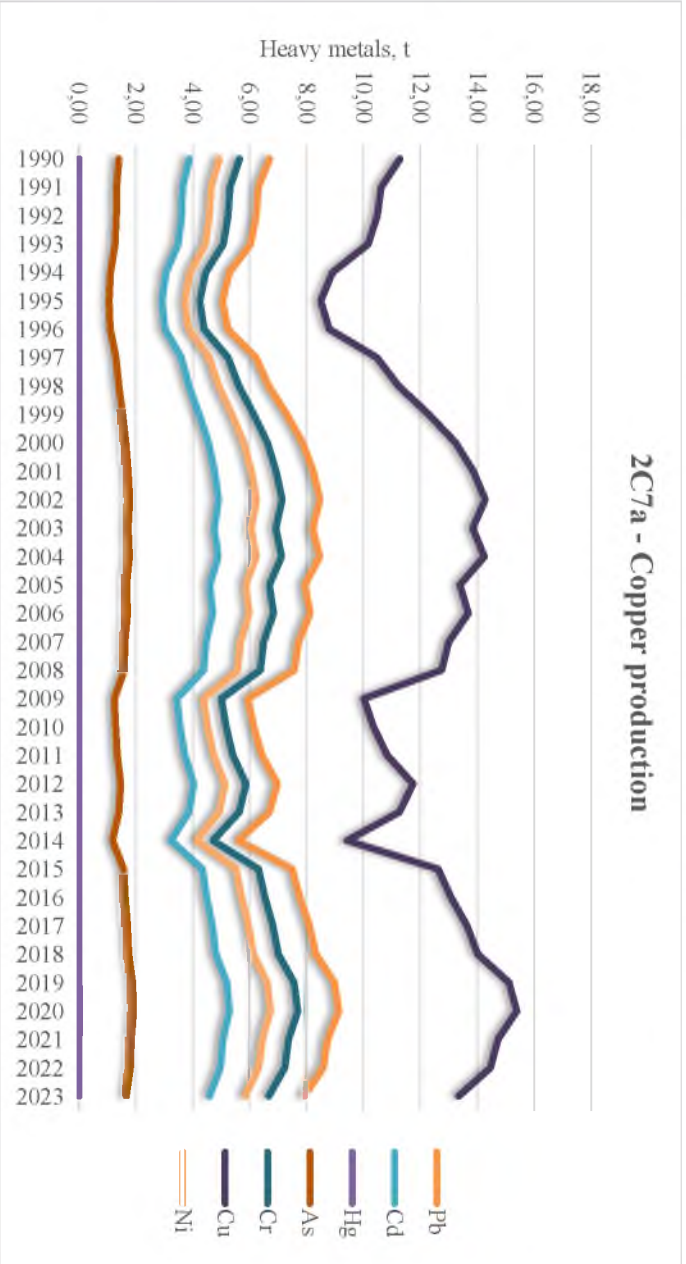
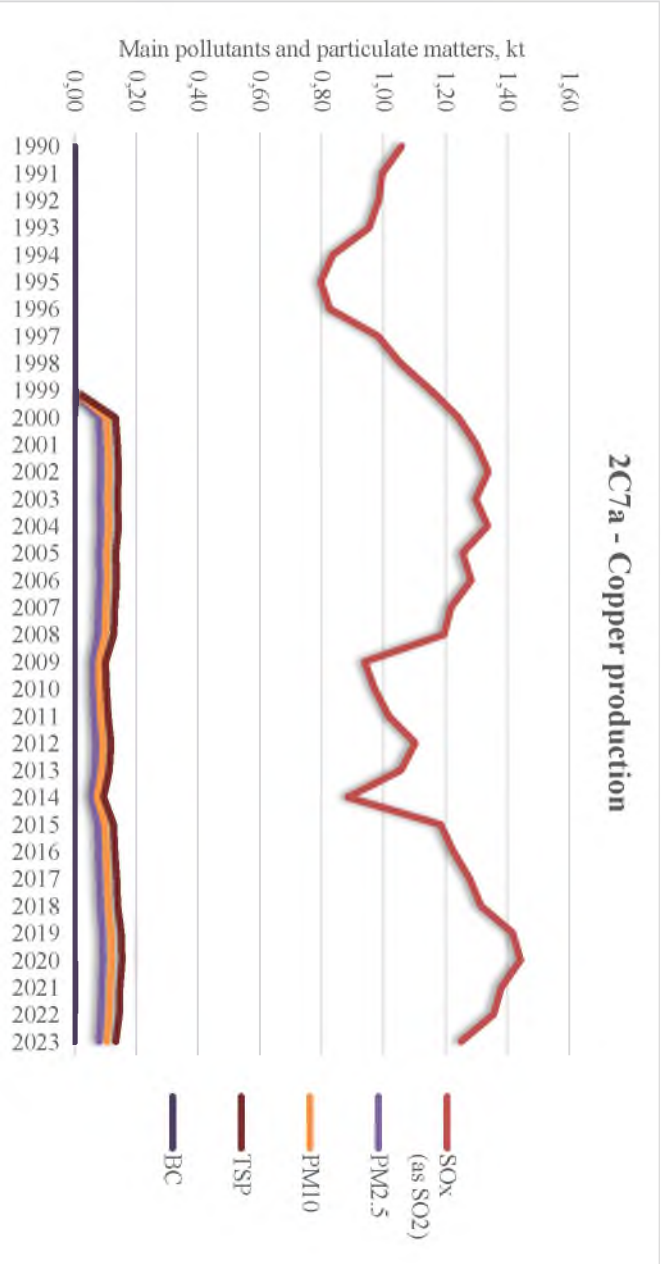


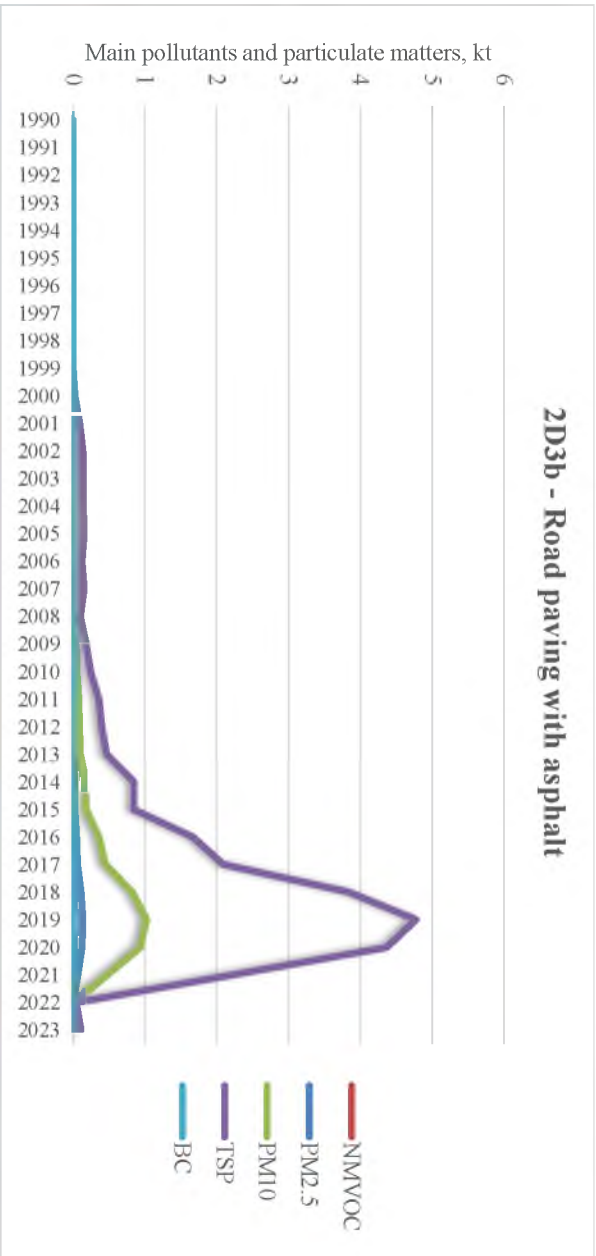
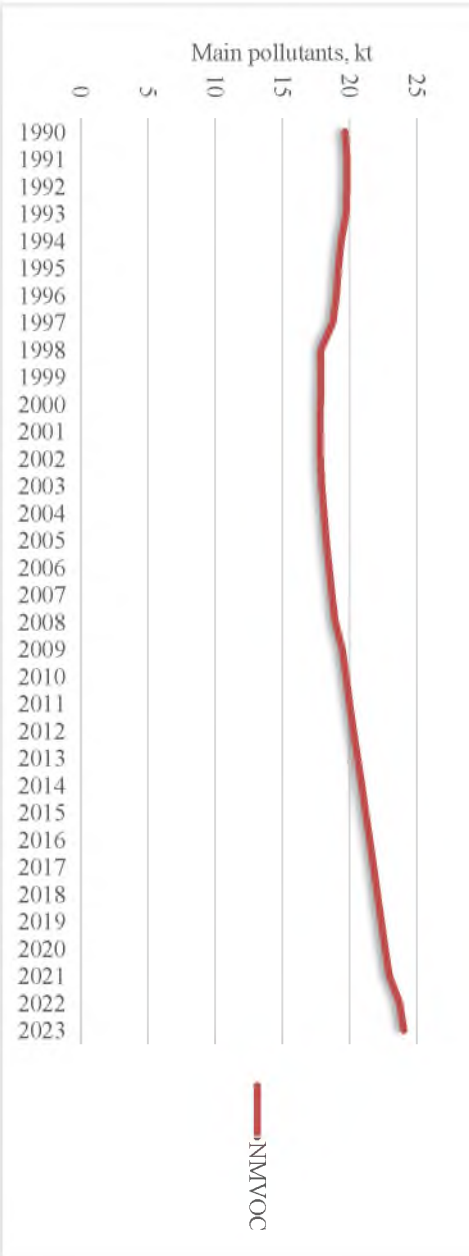


In the period 1991-1993, there is no baseline information on aluminium production.

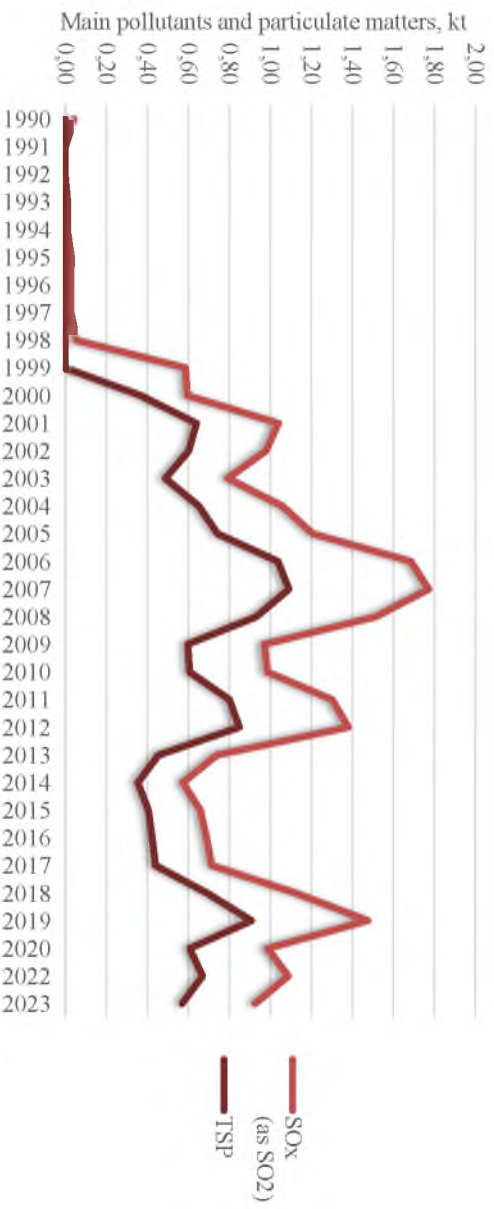






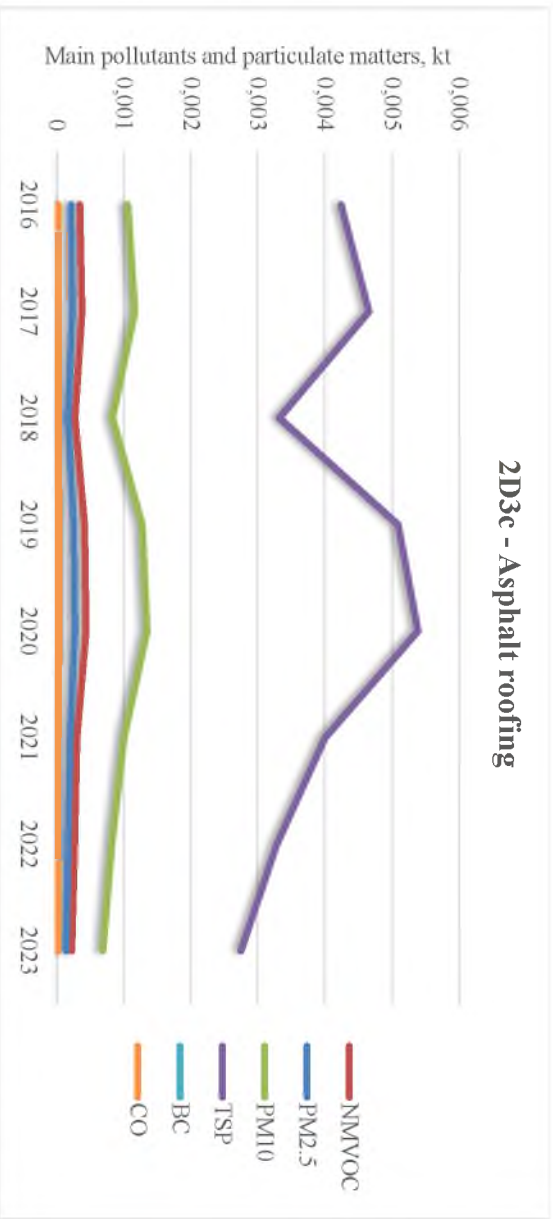


2C7c - Other metal production (production of other non-ferrous metals)

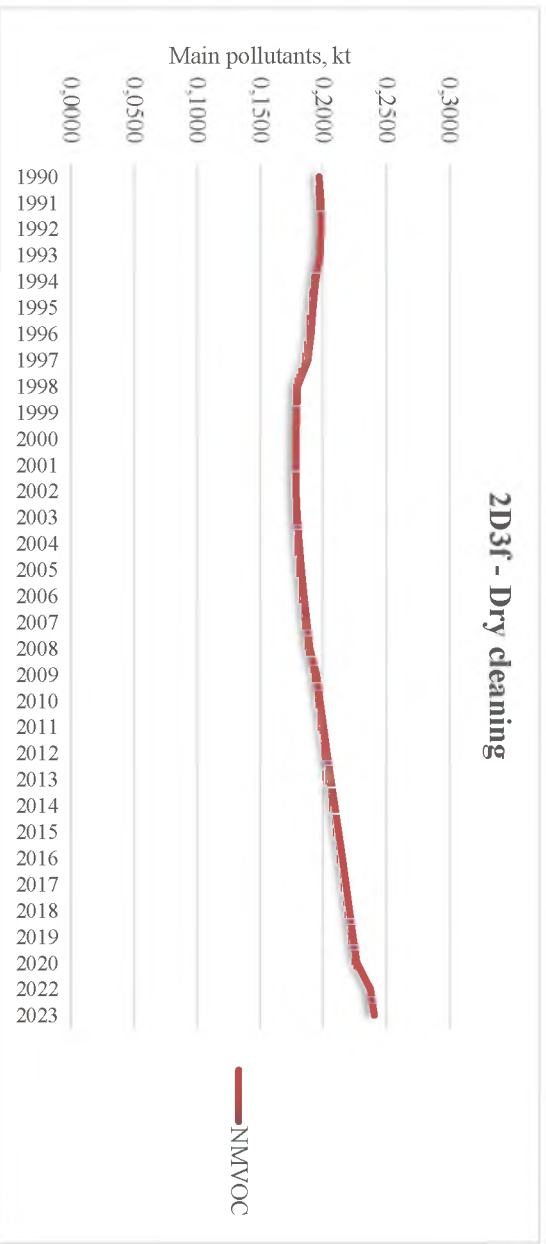
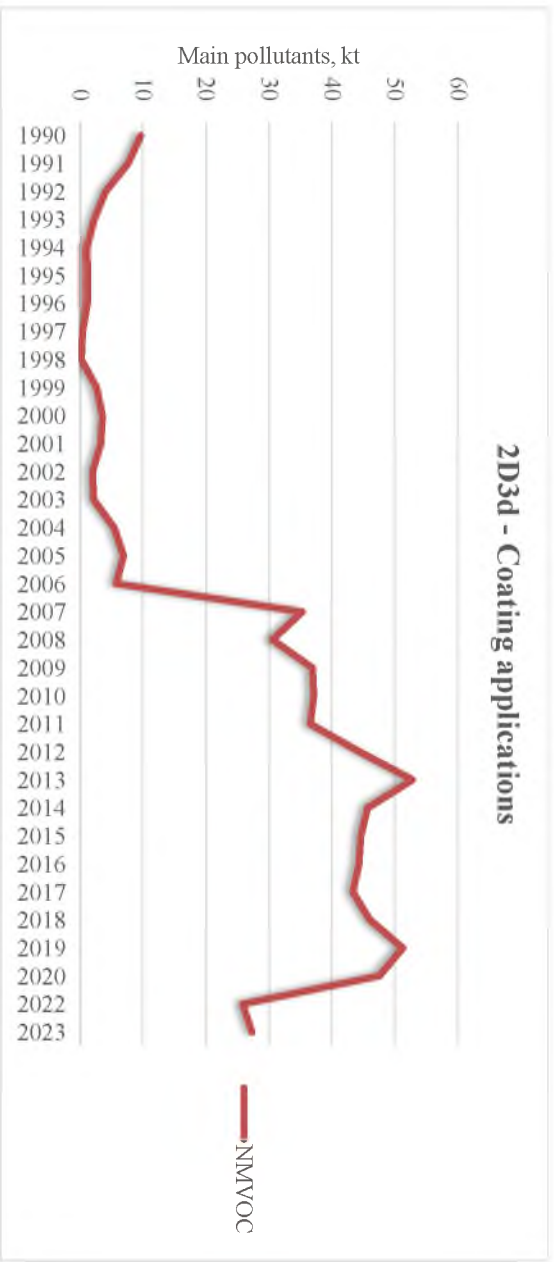


2D – emissions from the use of chemical products.

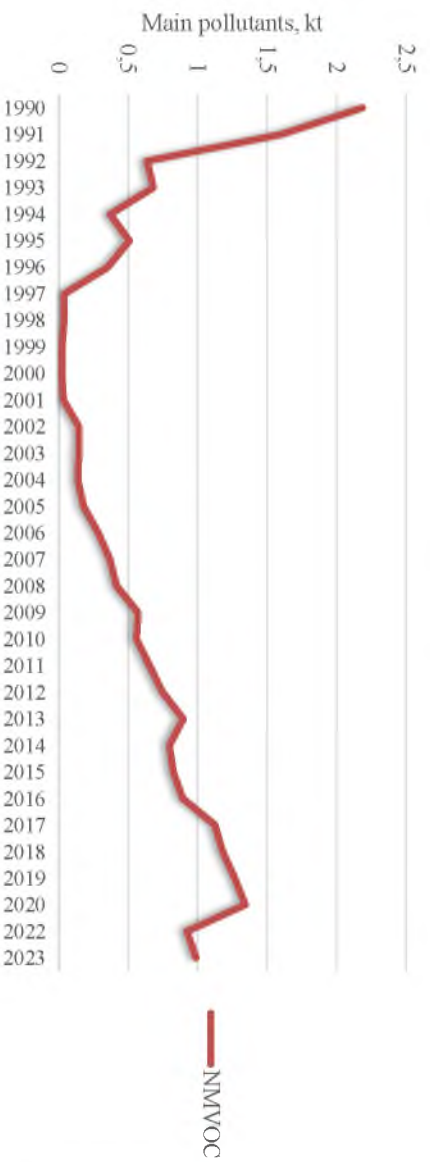
2D3a - Domestic solvent use including fungicides



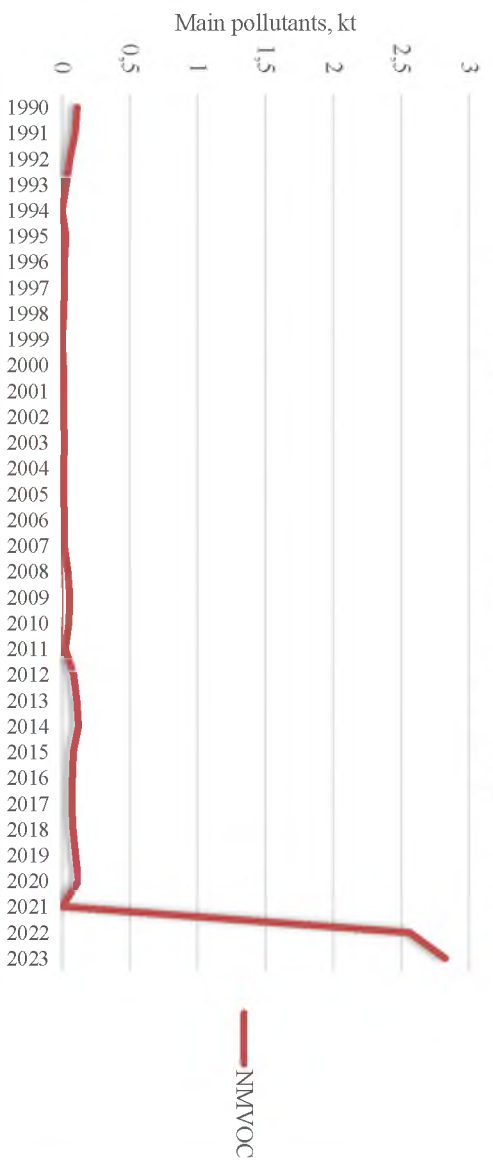
Since 2016, the forms of presentation of data on consumption of bitumen materials have been changed, so earlier indicators are not reflected.



2D3g - Chemical products (polyurethane, polymer-based paints and varnishes, other medicines and pharmaceutical preparations)

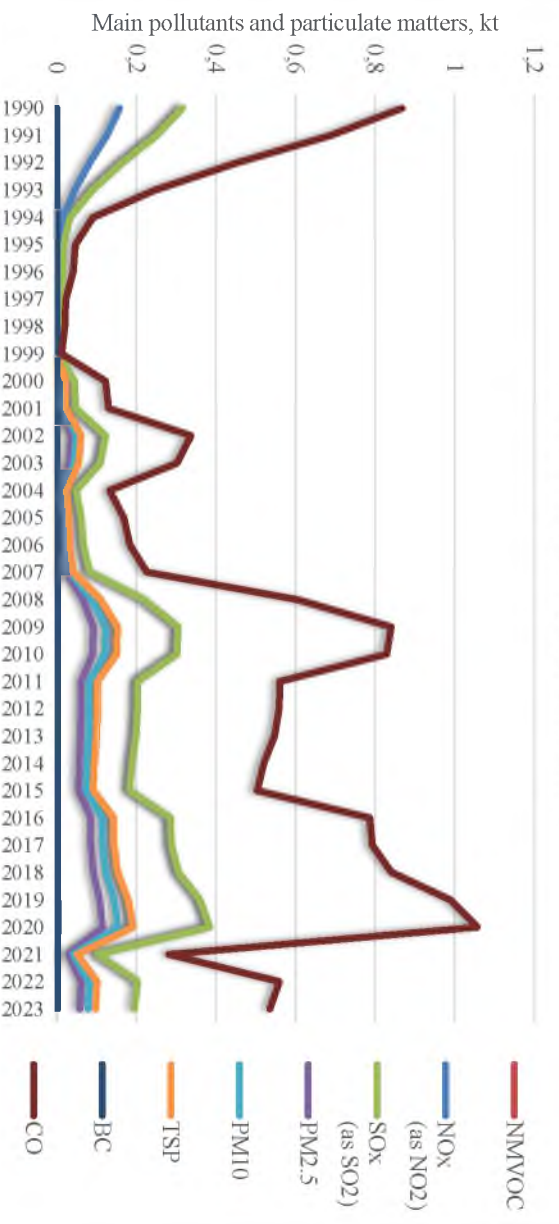


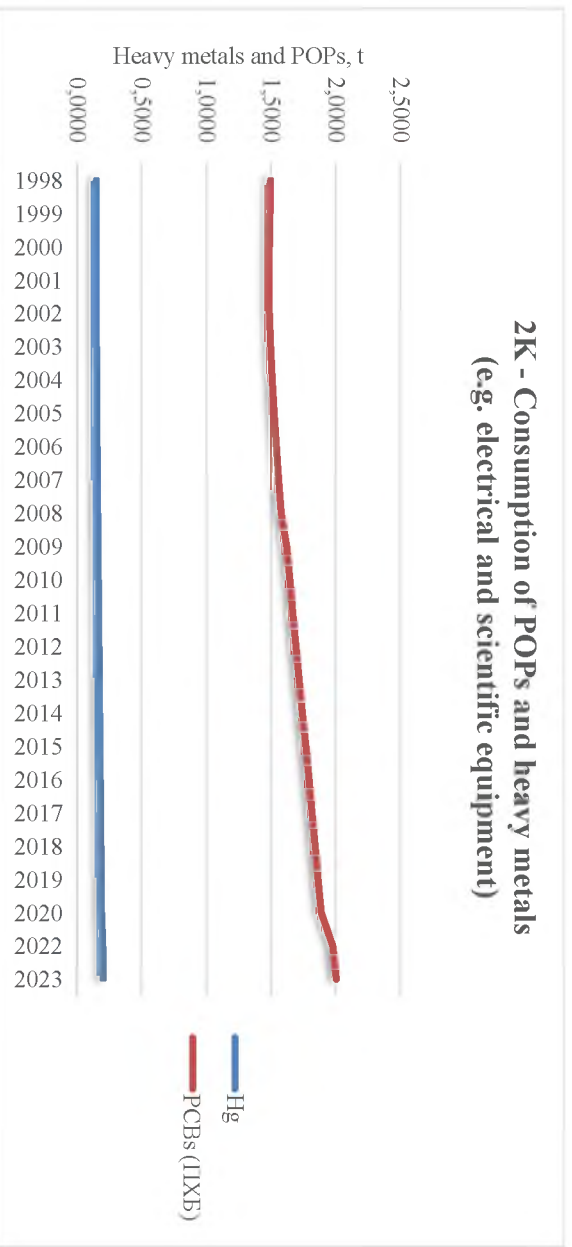
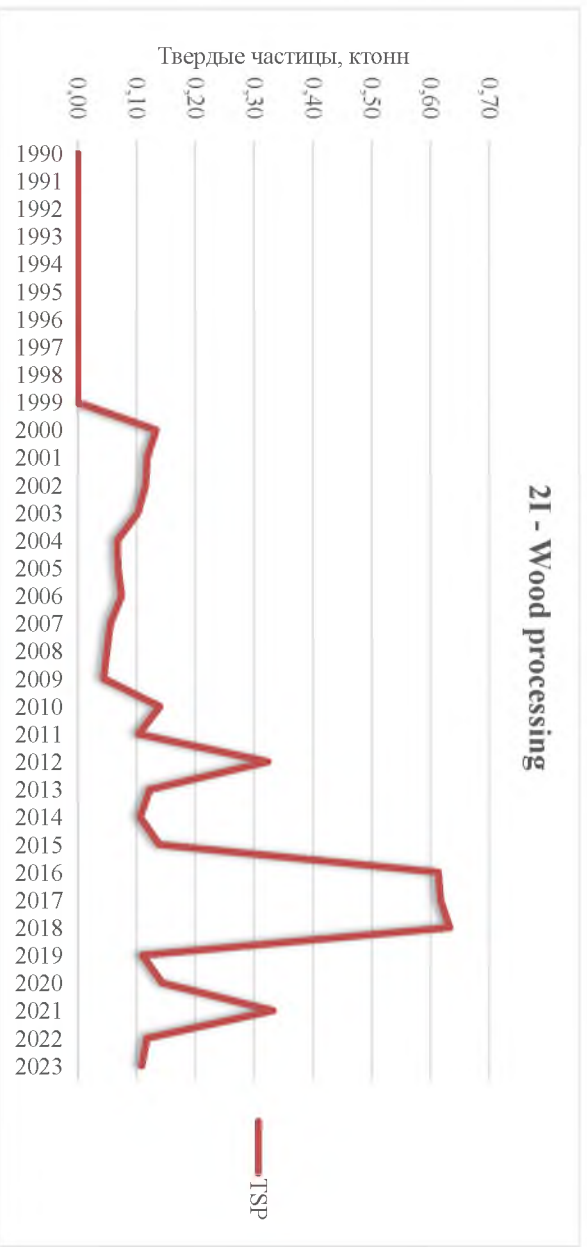
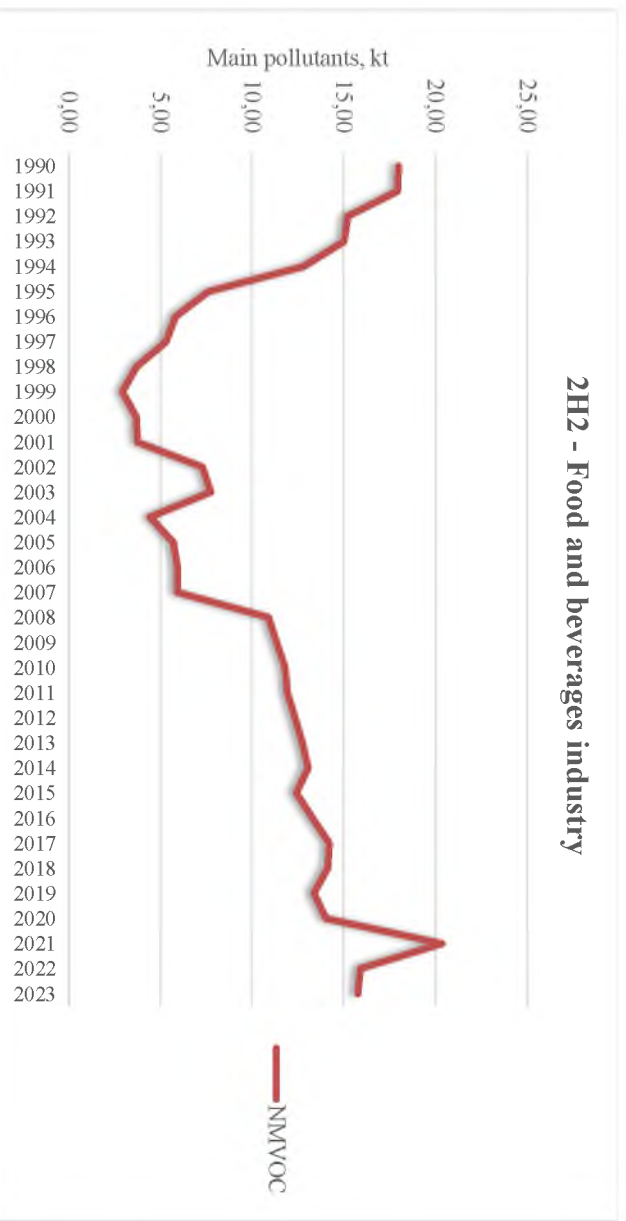
2D3i - Use of other solvents (mineral wool production)



Since 2022, cigarette production and shoe consumption have been added to the accounting for the use of other solvents.

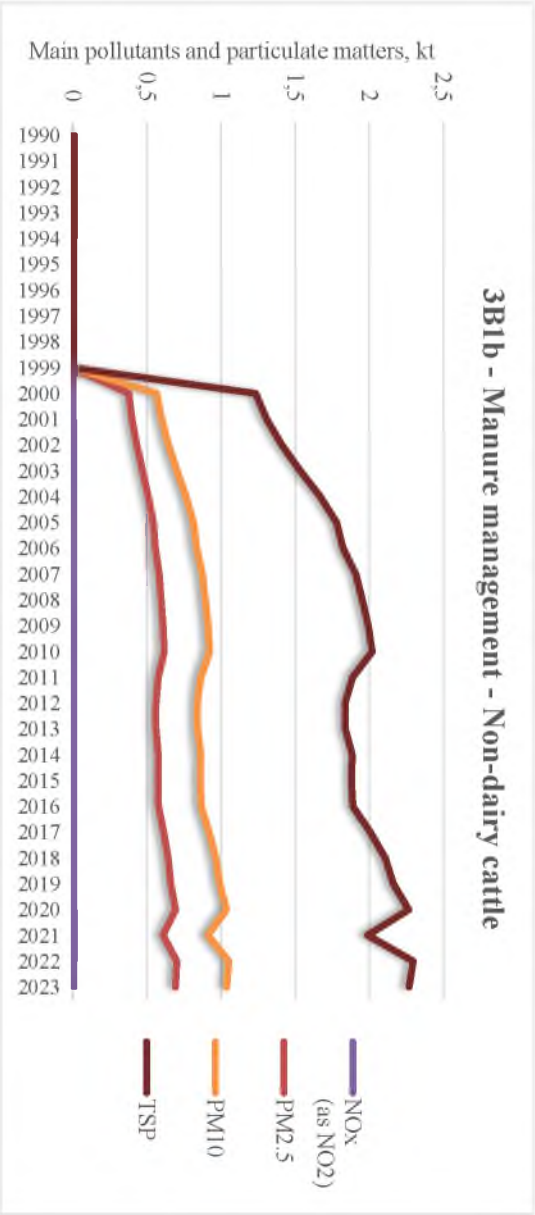
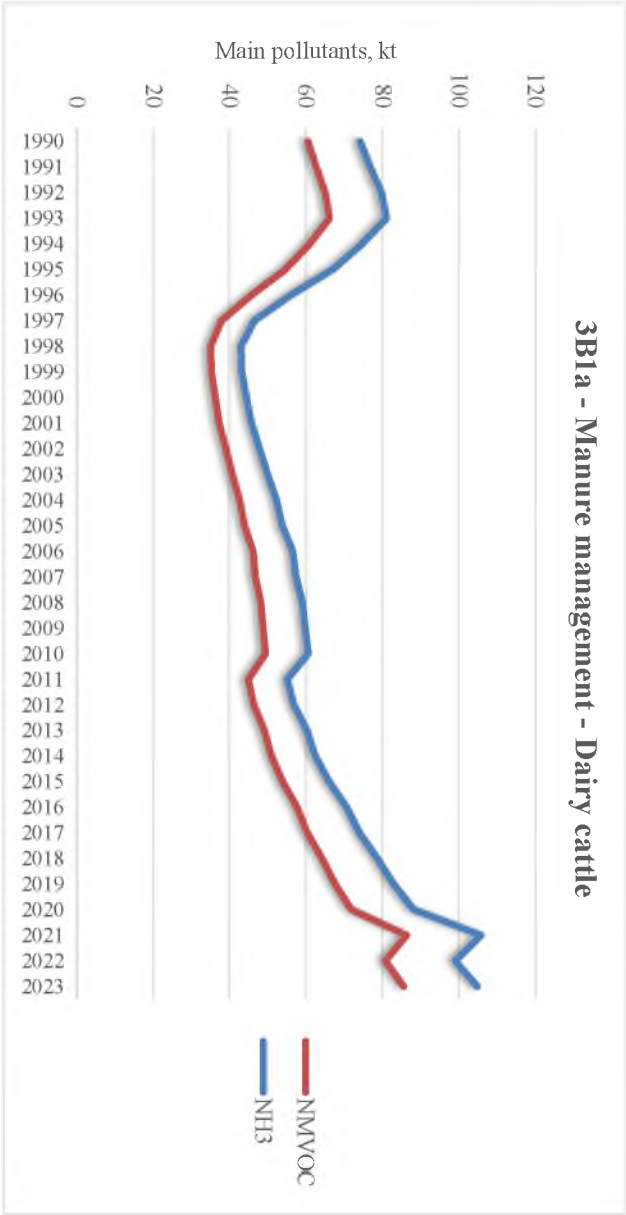
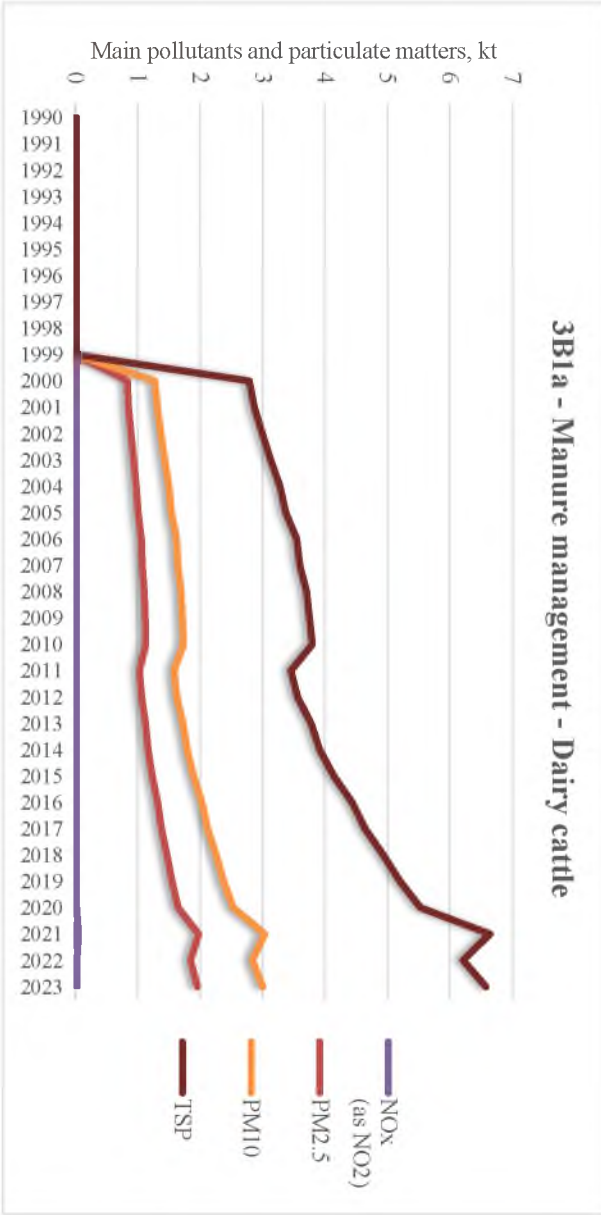
2H1 - Pulp and paper industry

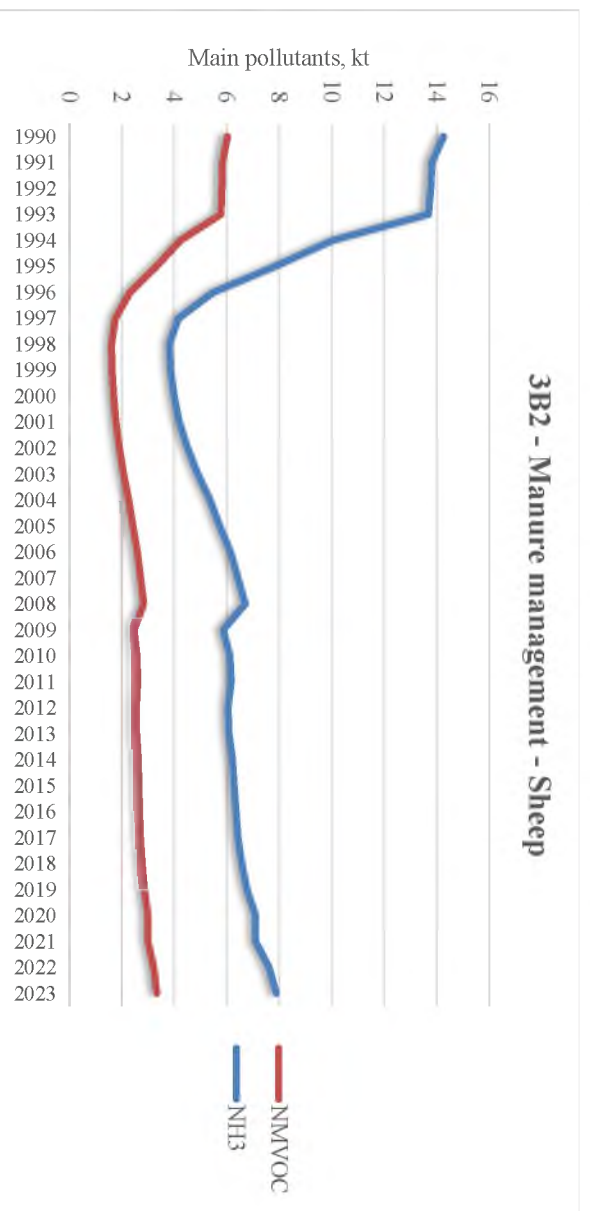
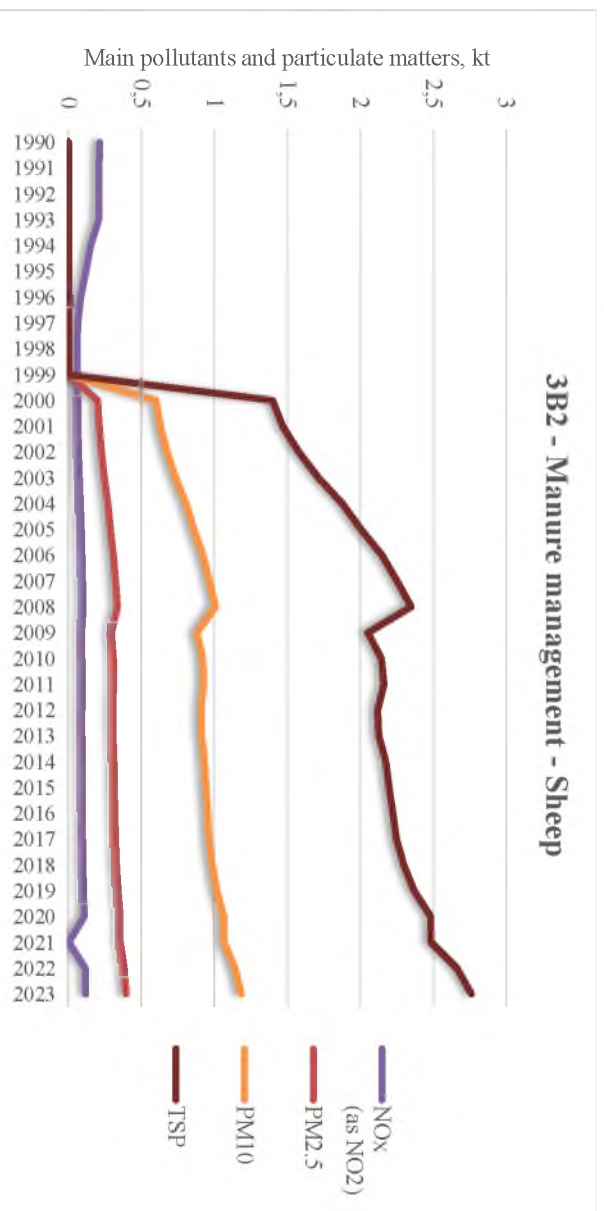
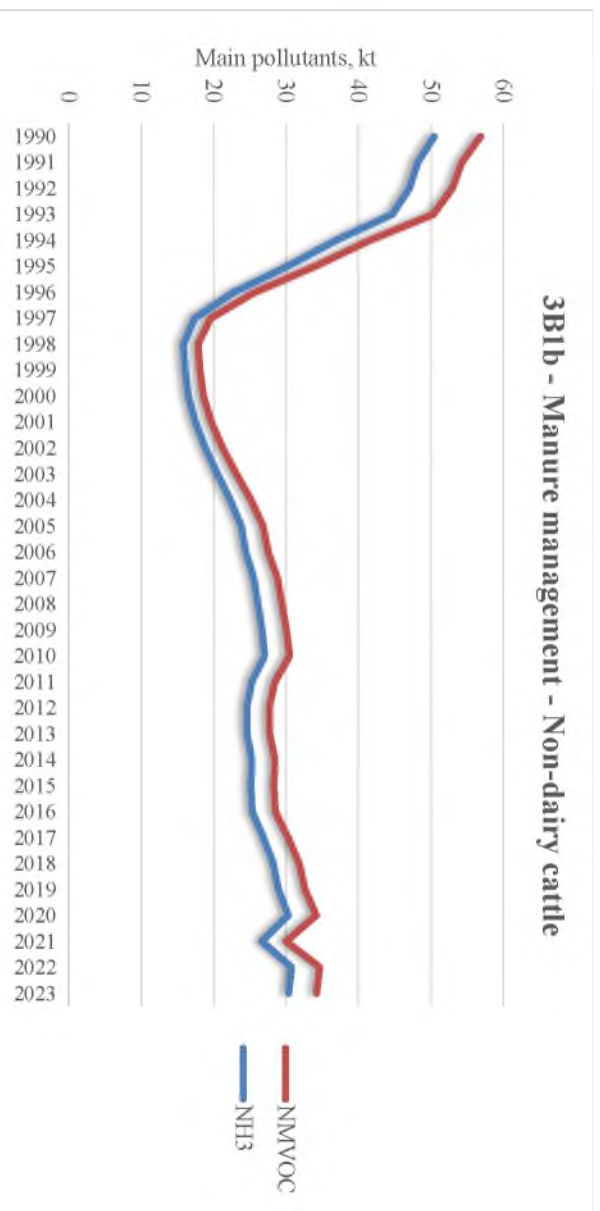


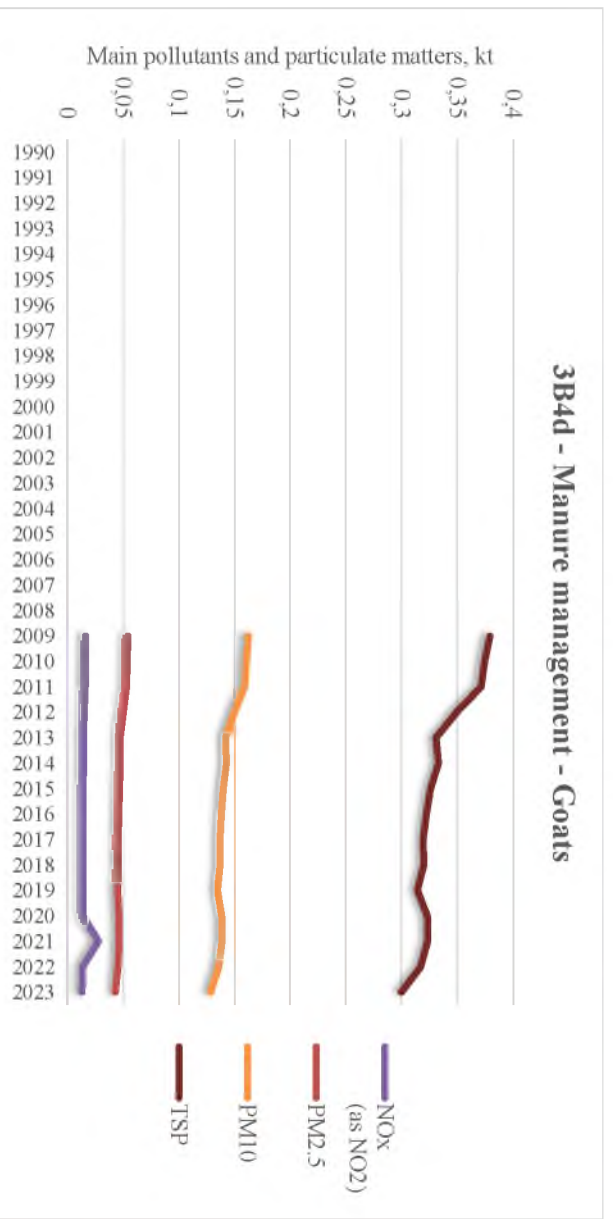
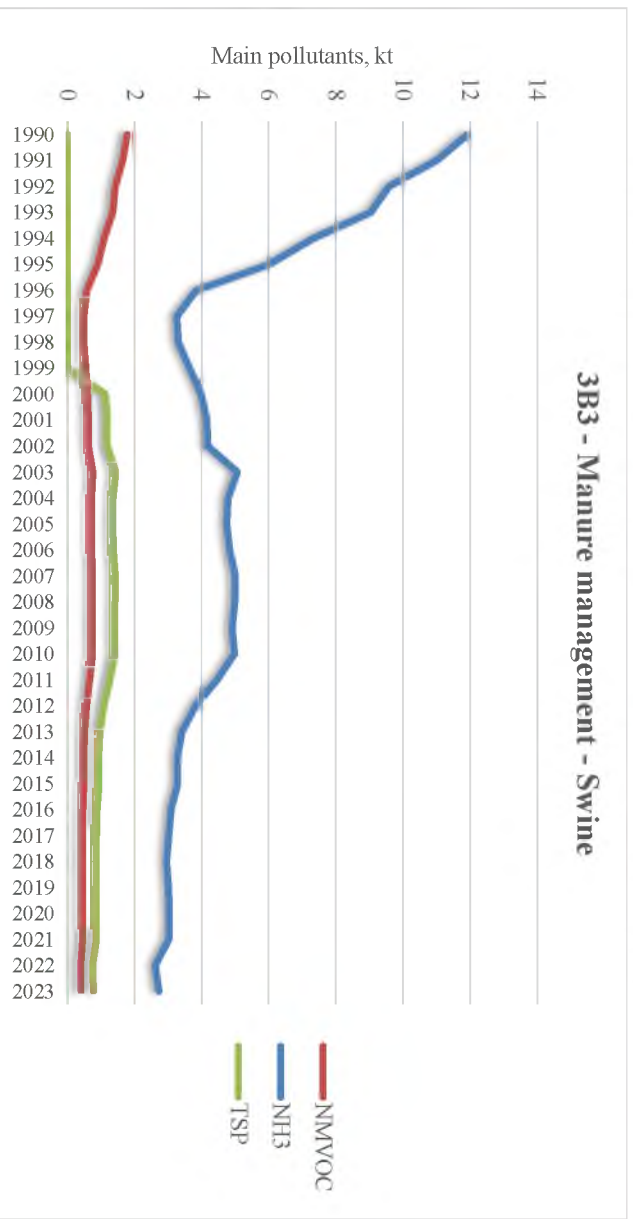
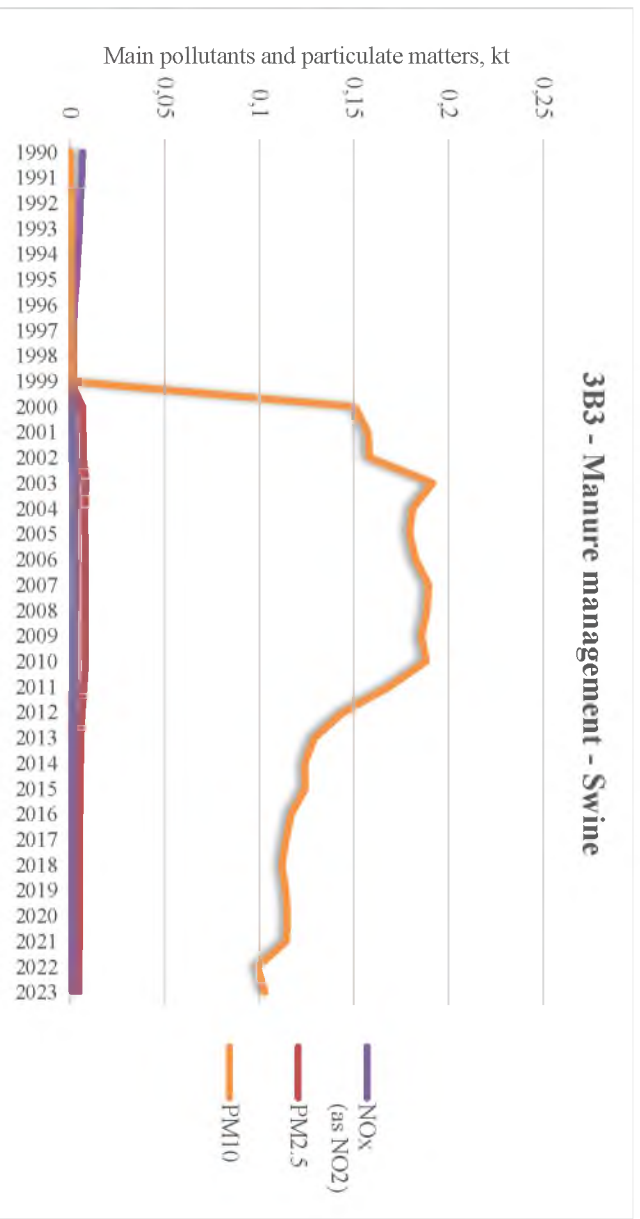


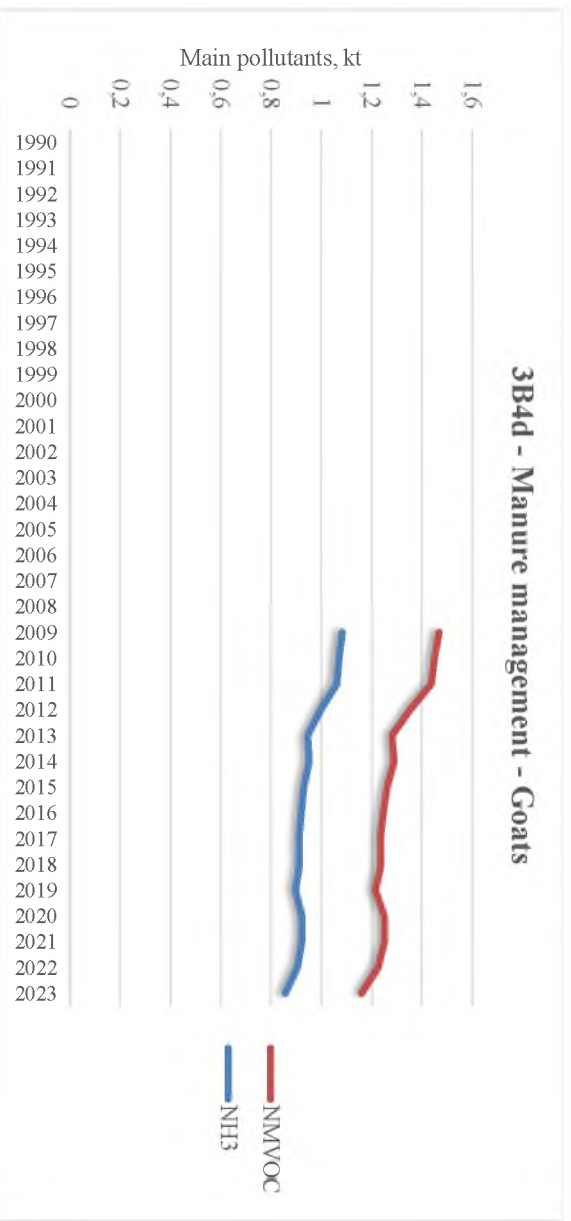
The year 2021 is excluded.

3B – emissions from manure management

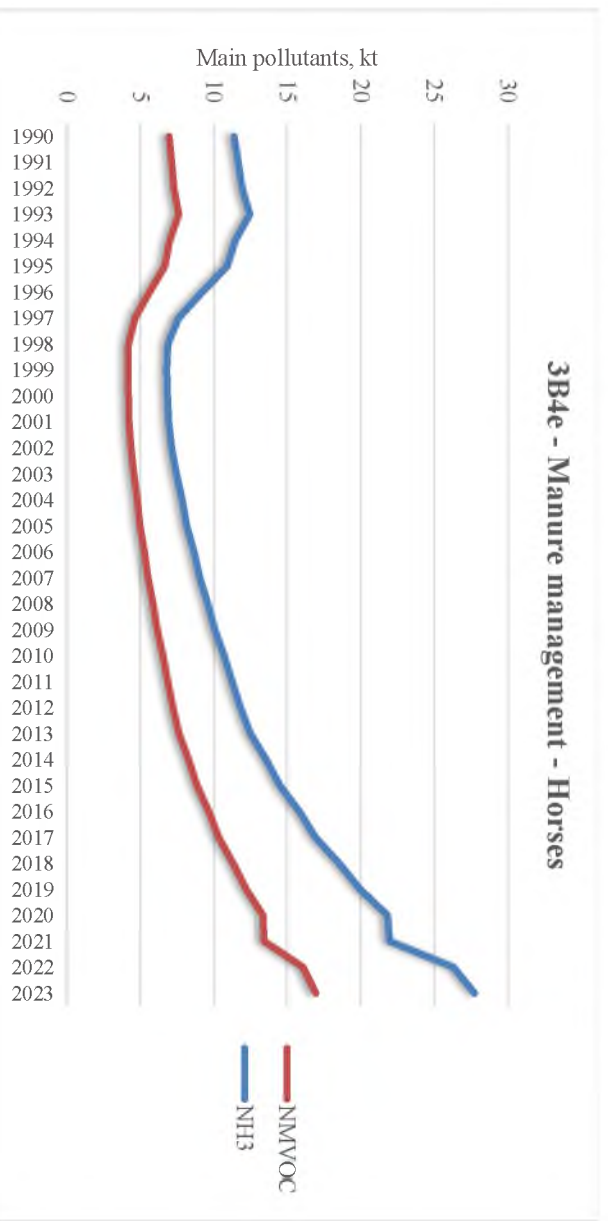
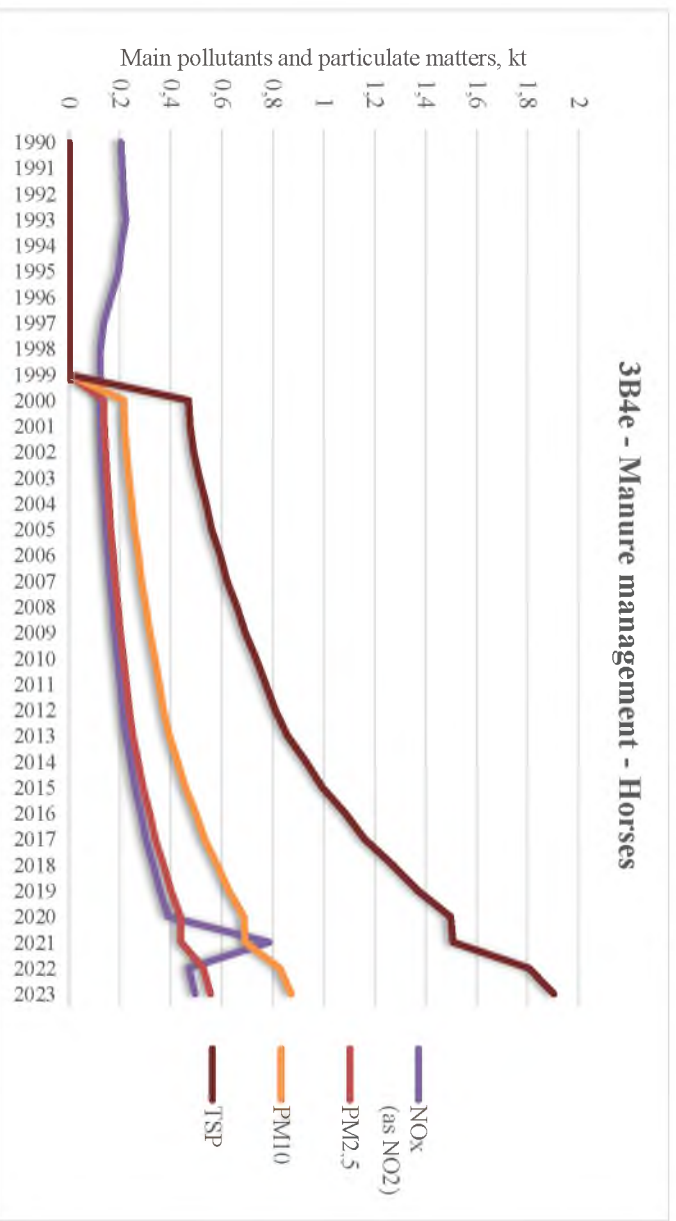




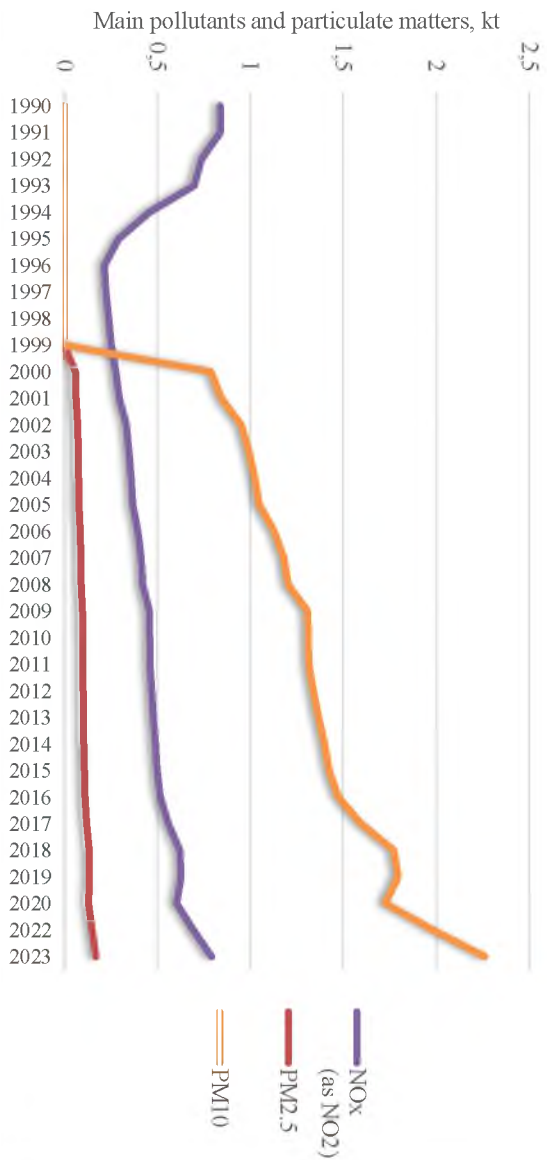




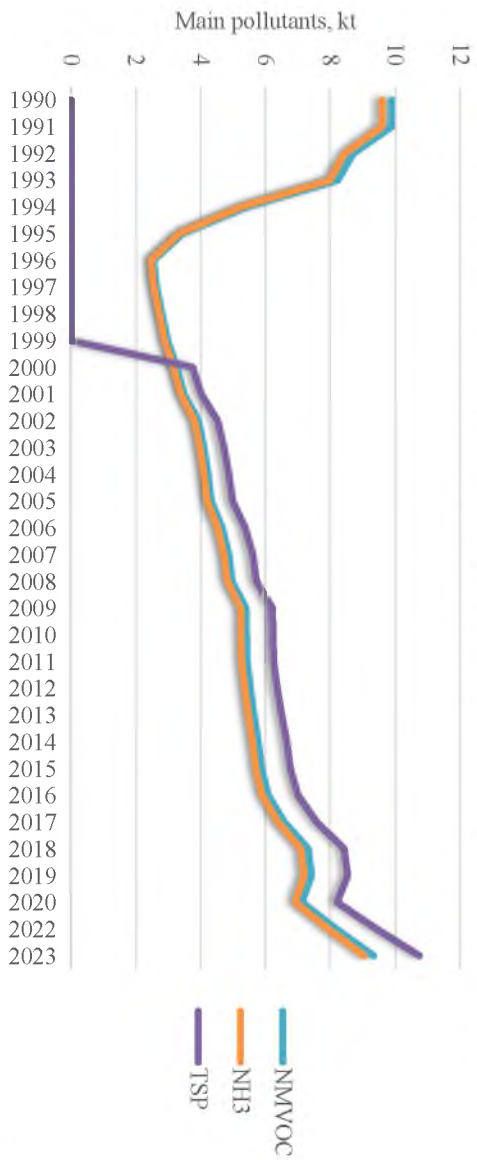
Until 2008, statistics on goats were combined with sheep.



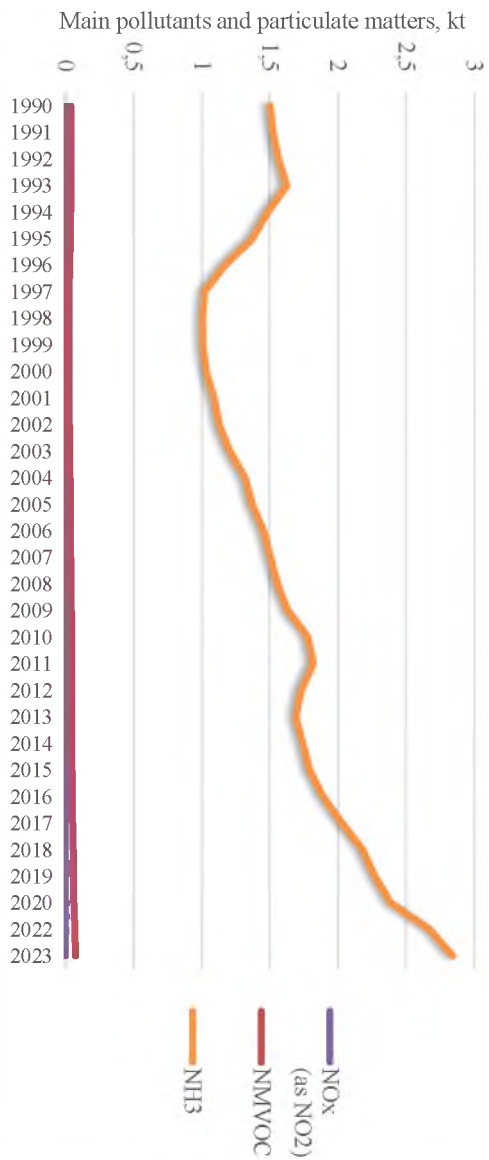
3B4gi - Manure management - Laying hens (broilers, turkeys, others)



3B4gi - Manure management - Laying hens (broilers, turkeys, others)

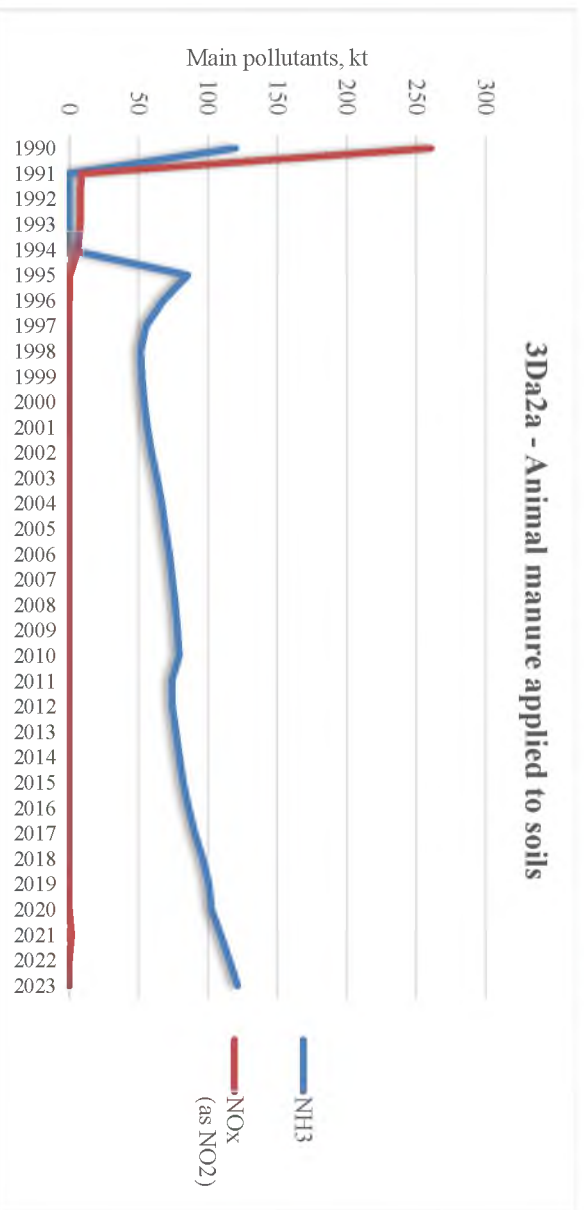
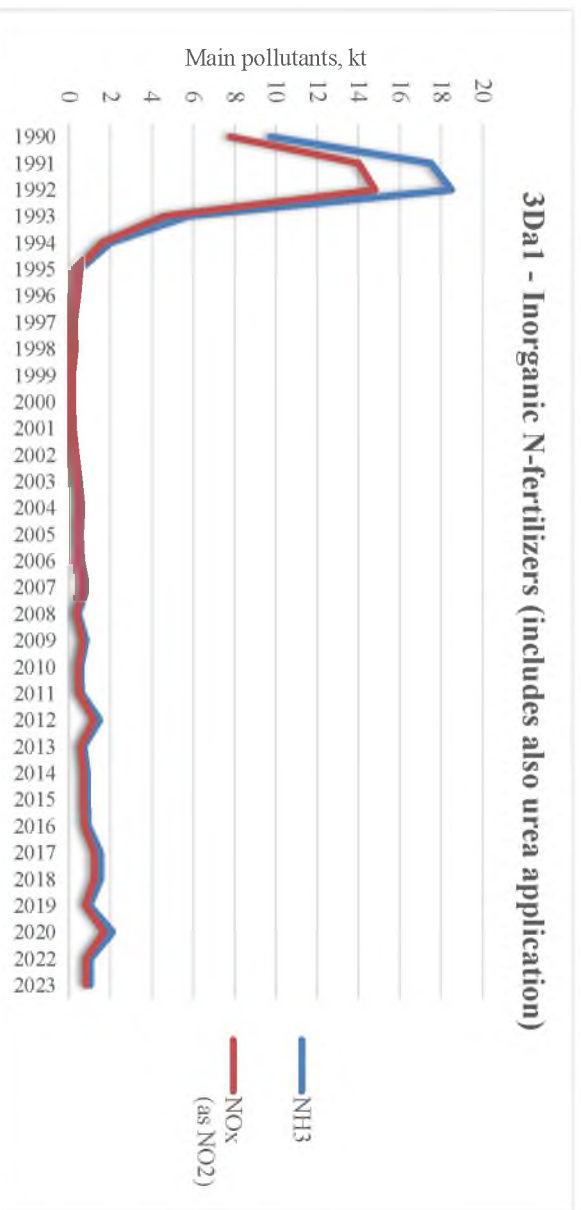


3B4h - Manure management - Camels

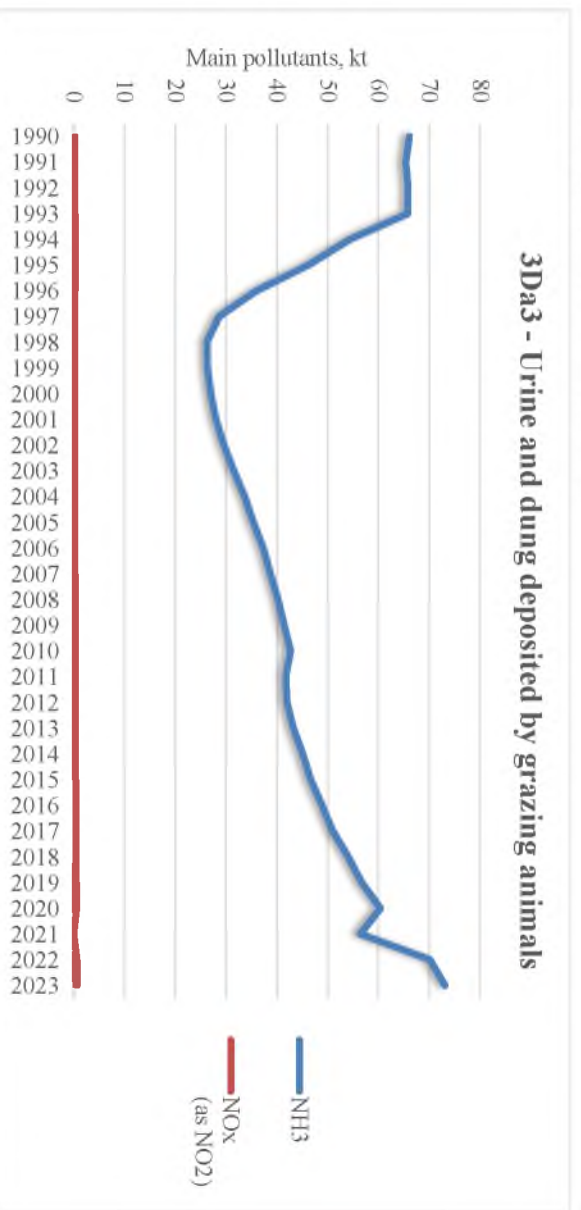


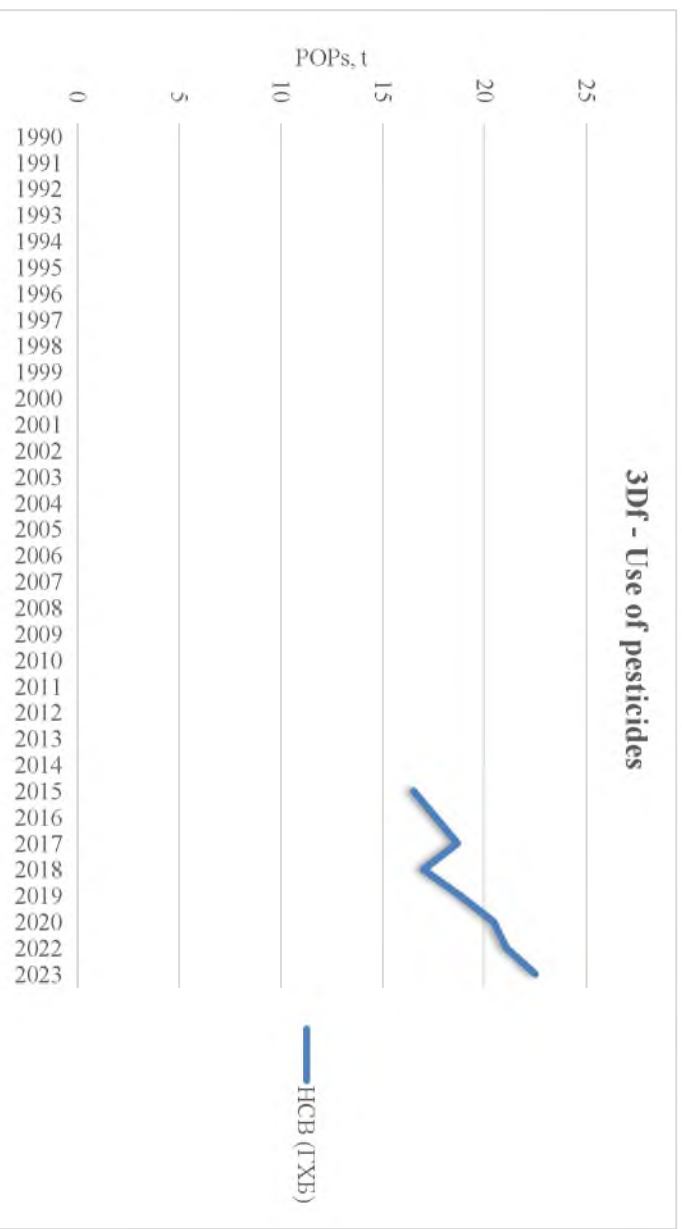
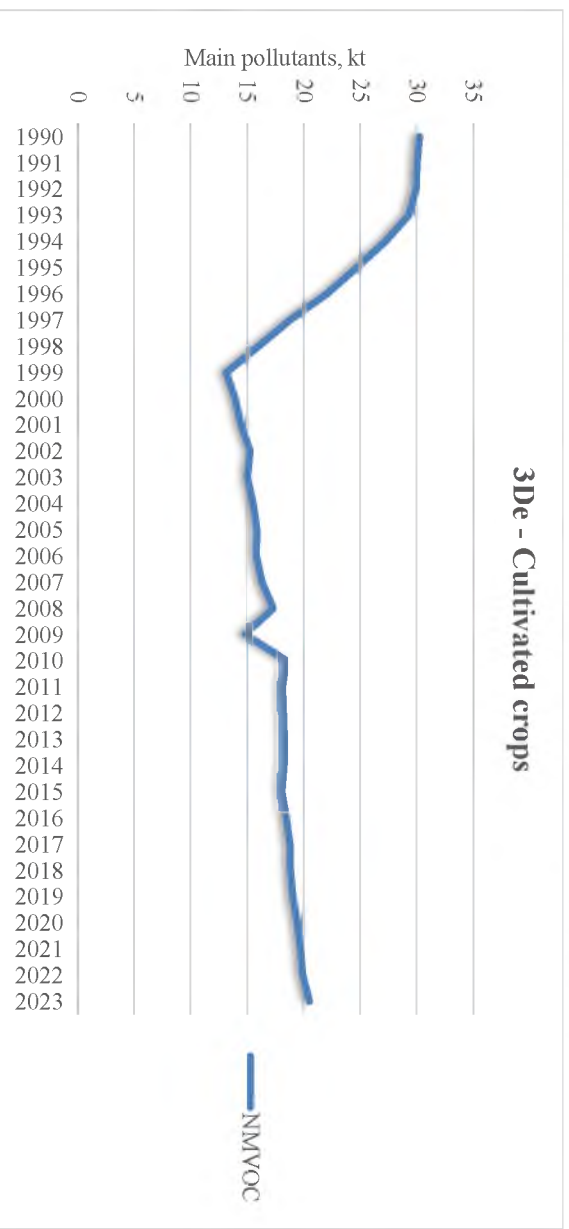
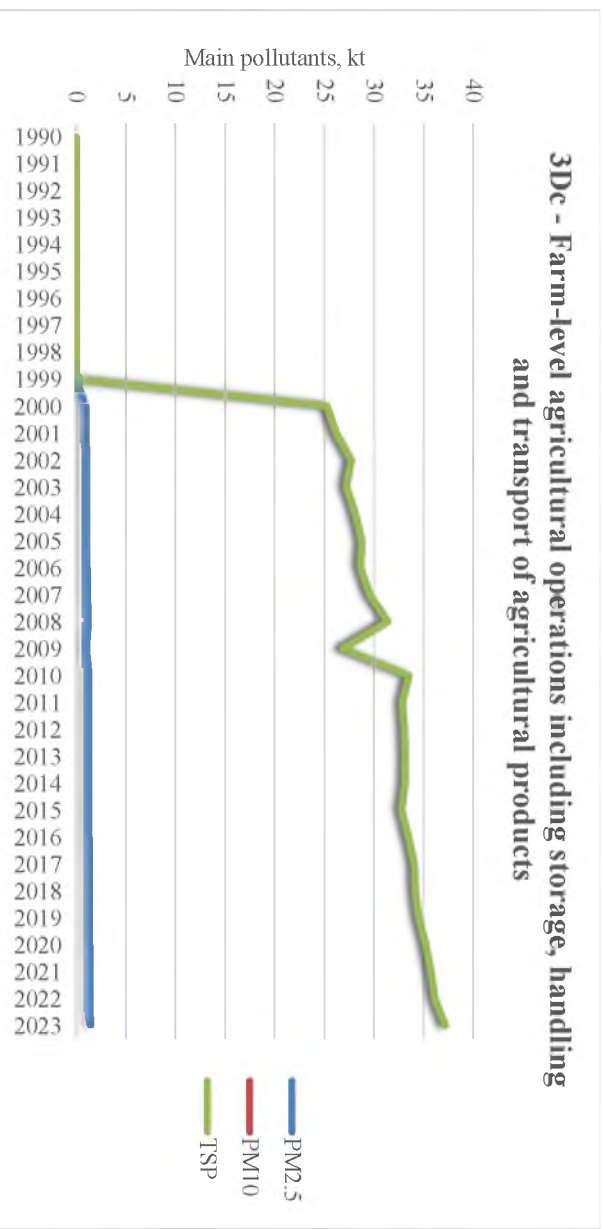
The year 2021 is excluded.

3D – emissions of plant agricultural products management

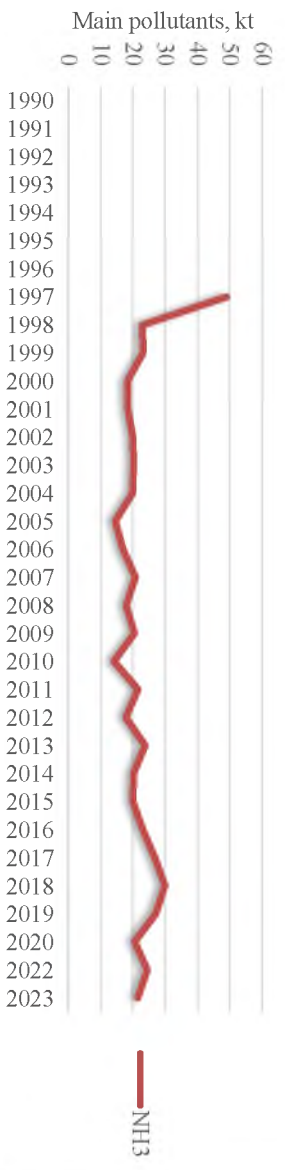


The year 2021 is excluded.





3I - Сельское хозяйство (аммонизация кормов)

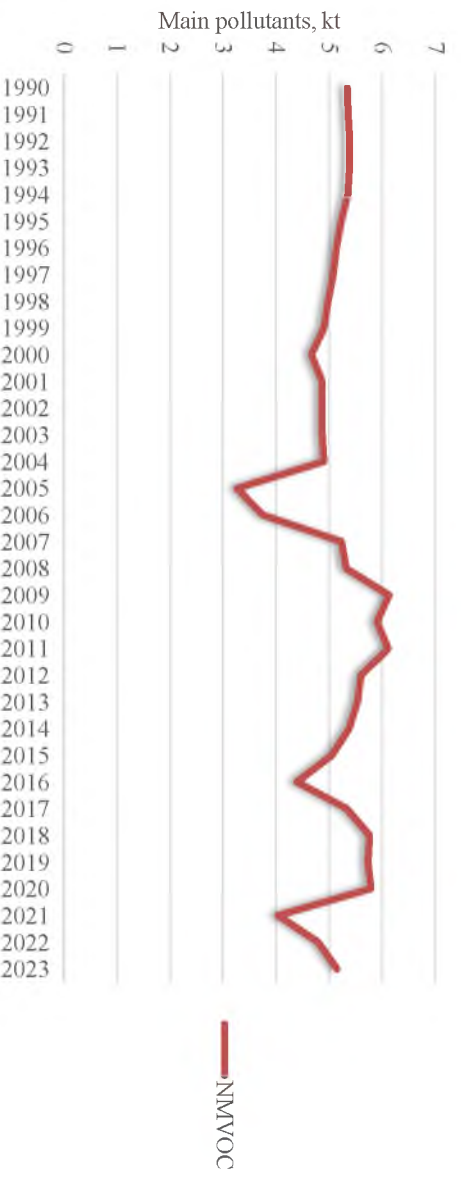


The year 2021 is excluded.

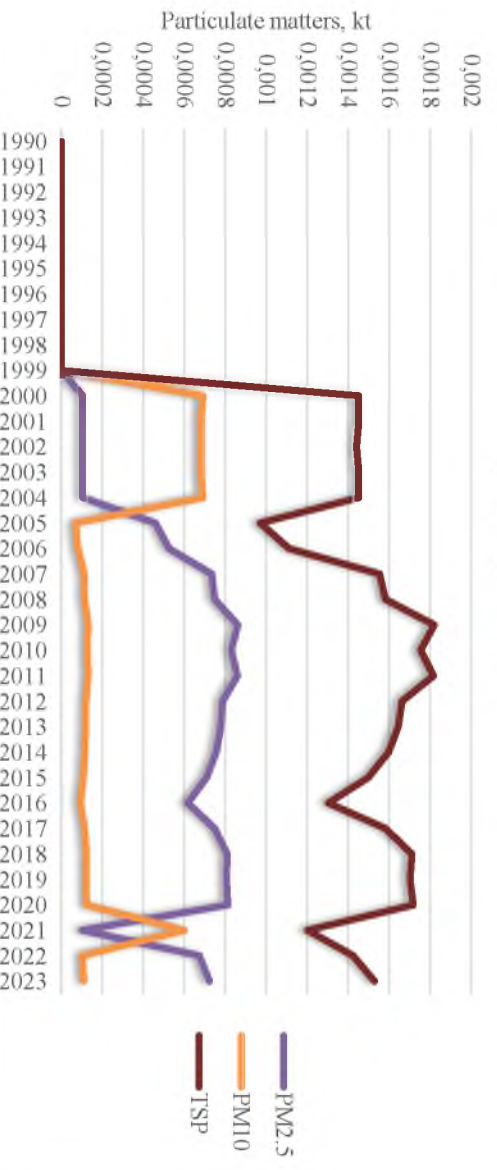
Categories 5A, C, D – Waste management emissions

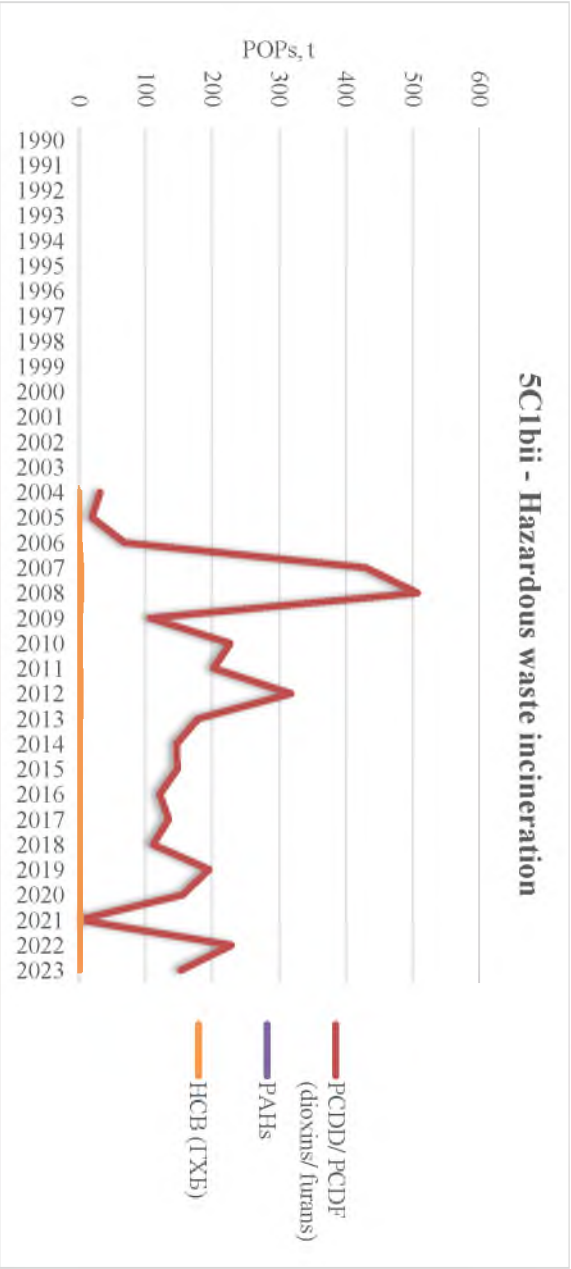
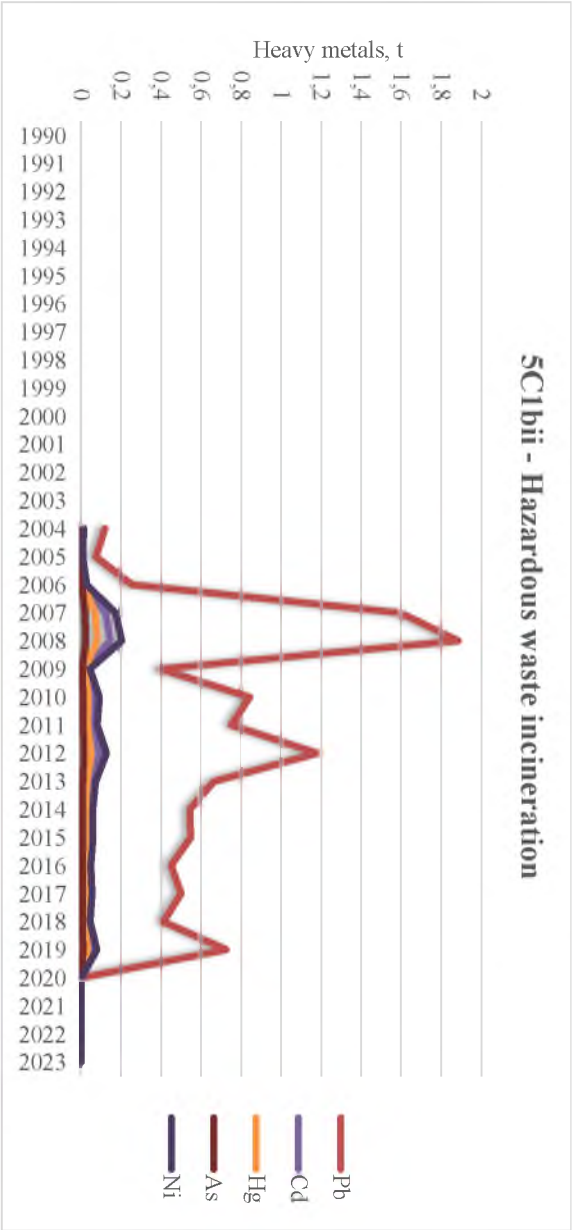
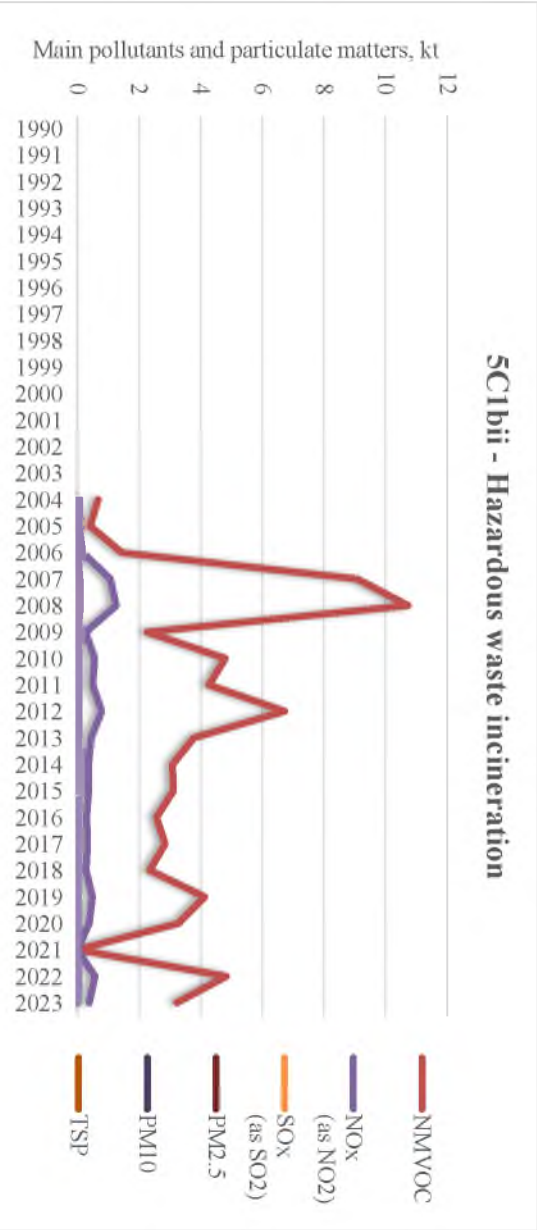
As of the date of submission on 11/28/2024, data on waste incineration in 2022 and 2023 are not provided.

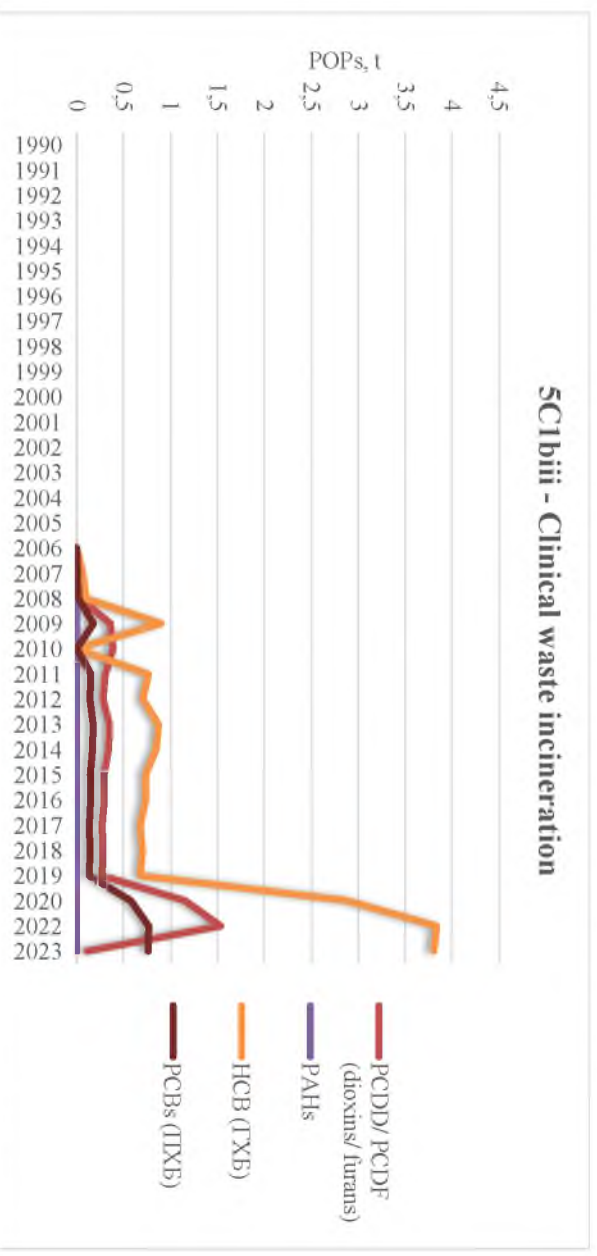
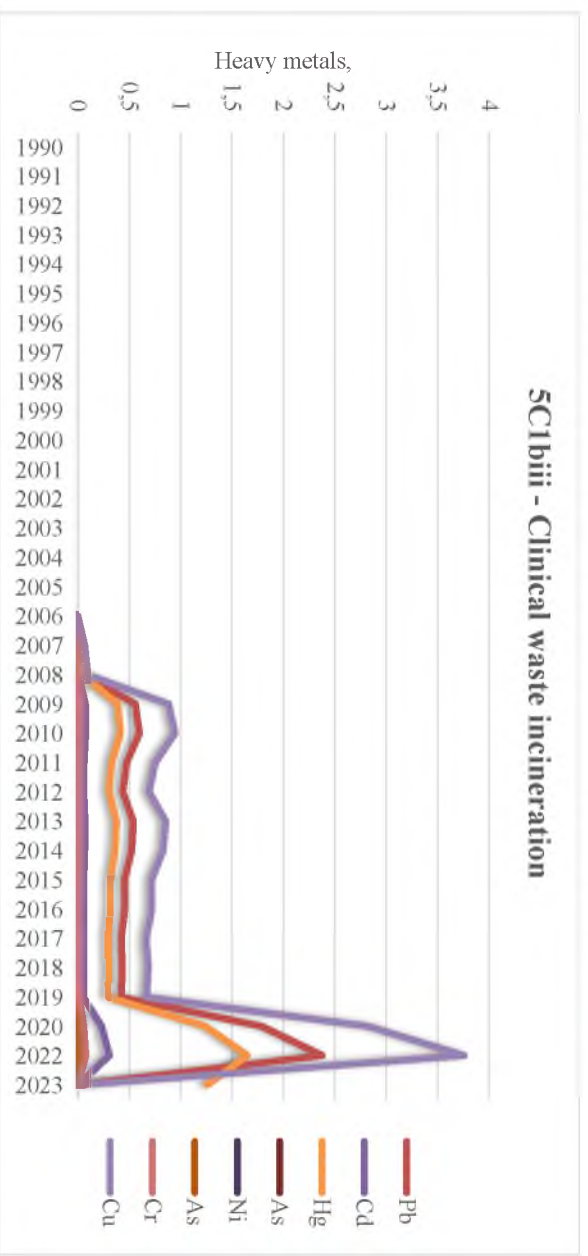
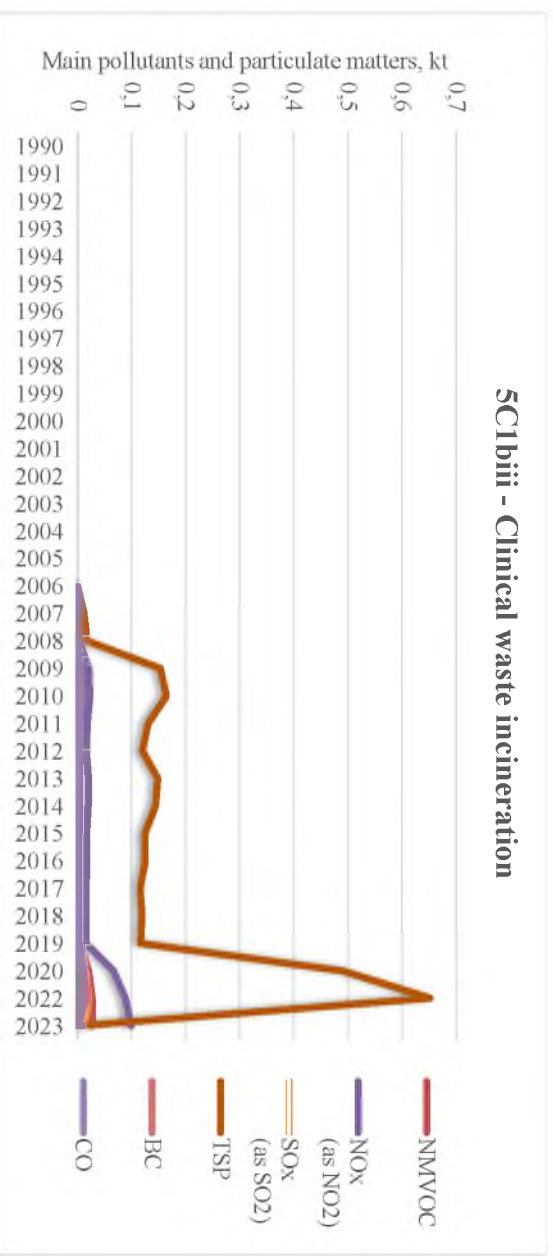
5A - Biological treatment of waste - Solid waste disposal on land (municipal waste)



5A - Biological treatment of waste - Solid waste disposal on land (municipal waste)



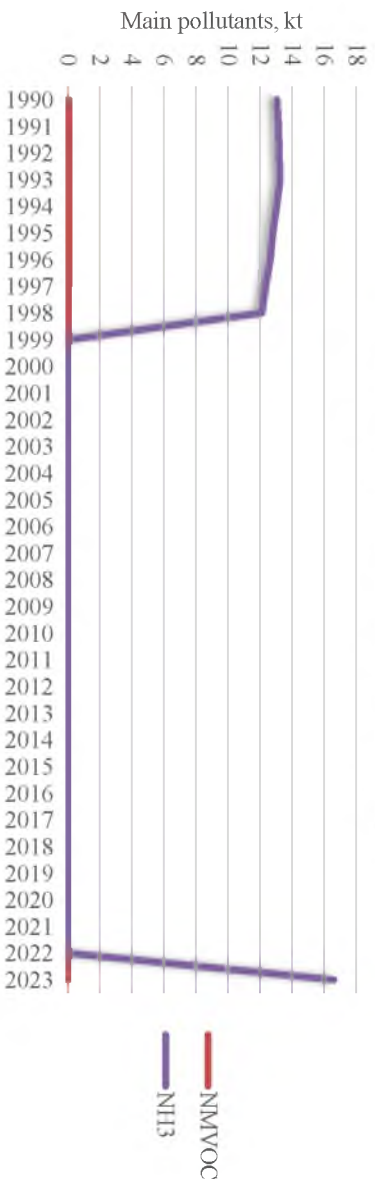




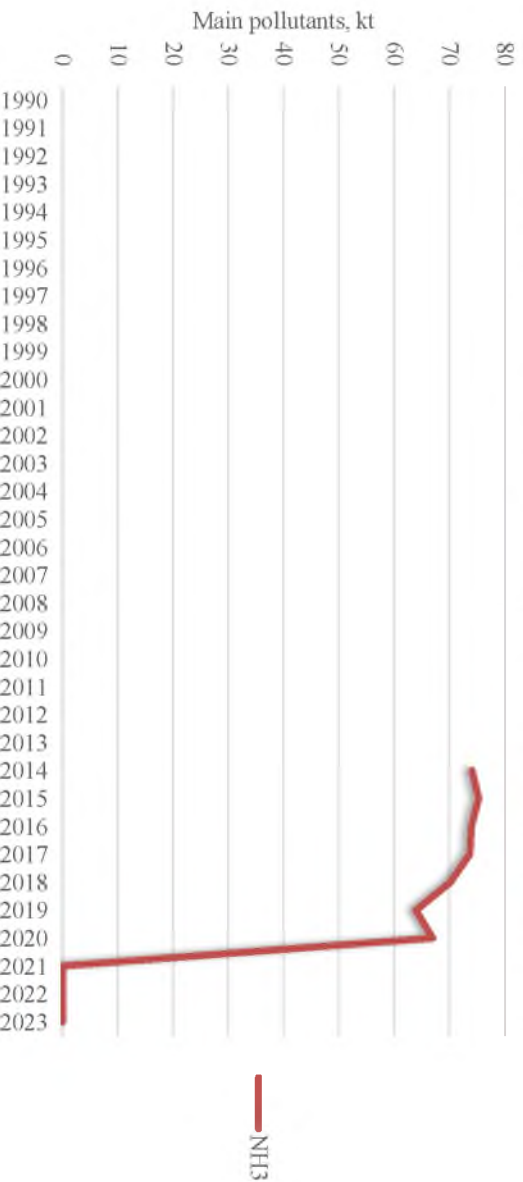
Since 2020, the reporting methodology for medical waste has been changed. There are no data on burned medical waste for 2021 and 2023.

Since 2022, the Level 2 of calculations for wastewater treatment has been introduced, so the indicator from section 2D3 is reflected in 2D1. From 1999 to 2012, there is no data on the use of outdoor toilets.

SD1 - Domestic wastewater handling



SD3 - Other wastewater handling (outdoor non-equipped toilets)



Analysis of the process of implementing measures to meet the requirements of the Convention

A review of the assessment of the current situation in Kazakhstan on air pollution control in general and compliance with the requirements of the LRTAP in particular shows that a lot of work is being done in the country to inventory emissions in accordance with the Guidelines for Reporting Emission Data and Forecasts according to the updated methodologies of the UNECE Convention on Long-range Transboundary Air Pollution ECE/EB.AIR.125, as well as on the approximation of national legislation with the basic requirements established in the EU legislation on the protection of the atmosphere Partnership Agreement with the EU, 2016.

The HM protocol. Heavy metals are released into the atmosphere in the steel industry, metallurgical and mining industries, as well as in coal-fired power plants, hot-dip galvanizing plants and other industries, the observed trend in heavy metal emissions demonstrates a significant reduction in arsenic emissions, stability of cadmium and mercury emissions; the total number of emissions of other metals fluctuates.

Obligations under the HM Protocol provide for the reduction of emissions of pollutants. The list contains 12 metallic substances, including cadmium (Cd), lead (Pb) and mercury (Hg). There are no special rules to reduce the total amount of HM in the atmosphere, there are only legislative requirements for annual emission reporting for statistics. which partially comply with the requirements of Directive 2004/107/EC on arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in the ambient air.

Обязательства- по HM Protocol предусматривают также применение наилучших доступных технологий (далее - НДТ) и норм предельно допустимых выбросов (далее - ПДВ) для стационарных источников

связанных с НДТ. В настоящее время ПДВ основанные на НДТ не применяются. В Приложении III к новому Экологическому кодексу установлены НДТ и перечислены виды деятельности, к которым они должны применяться, Национальные справочники и заключения по НДТ, в которых будут рассмотрены уровни выбросов, связанные с НДТ, находятся в стадии разработки (среди прочих загрязнителей выбросы тяжелых металлов).

Permits for activities polluting the environment are issued for stationary sources of pollution without the establishment of technological MPE. The maximum permissible emissions of air pollutants established in permits are based on the power of the source and the norms of maximum permissible concentrations (MPC) of harmful substances in the environment (a continuing practice of the past). In 2021, a Methodology for determining environmental emission standards related to BAT were put into effect.

The transition to a system of integrated permits (2024) is being implemented. Next is the implementation of a project to monitor the operability of the previously implemented integrated permits system (2030). taking into account the requirements of Directive 2004/107/EC on arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in the ambient air and Directive 2010/75/EC of the European Parliament and of the Council on Industrial Emissions (integrated pollution prevention and control).

The obligations under the HM Protocol stipulate the adoption of measures to control the quality of products (limiting the lead (Pb) content in gasoline and mercury (Hg) content in batteries). Currently, GOST 32513-2013 "Fuel engine. Unleaded gasoline. Technical characteristics", according to which the lead content should not exceed 5 mg/dm³. The mercury (Hg) content in batteries is not regulated. It provides for the development and implementation of amendments to existing product standards (2022), as well as the development of a legal act defining the maximum concentration of mercury in alkaline manganese batteries (2022) in accordance with the requirements of Directive 2004/107/EC on arsenic,

cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in the ambient air.

The obligations under the HM Protocol determine the need to consider the possibility of applying control measures to other products containing heavy metals. The product control measures provided for by the Protocol have been partially implemented in Kazakhstan: Additional product management measures are regulated by ST RK 1513-2019 "Resource Conservation. Waste management at all stages of the technological cycle. Classification and methods of processing mercury-containing waste. The main provisions". - Utilization of energy-saving lamps - By the Law "On Energy Saving and Energy Efficiency Improvement" dated January 13, 2012 No. 541-IV. It is necessary to assess the current situation and explore the possibility of introducing regulatory or voluntary measures (2024) in accordance with the requirements of Directive 2004/107/EC on arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in the ambient air.

In 2023, the Government of the Republic of Kazakhstan issued a decree "On approval of the Concept for the development of energy conservation and energy Efficiency of the Republic of Kazakhstan for 2023-2029", according to which energy policy encourages the introduction of renewable energy sources and the modernization of coal-fired thermal and electric power plants.

HM obligations include the position: Development and maintenance of emission inventories of cadmium (Cd), lead (Pb) and mercury (Hg). Kazakhstan annually provides an Information Report on the Inventory (IRI) and national reporting (NR), which does not yet fully comply with the EMEP/EEA Guidelines on the Inventory of Air Pollutant Emissions and the ECE Guidelines on Reporting.

According to the report "Prospects for ratification of the Minamata Convention in Kazakhstan" (author Nina Gor, March 27, 2017, Moscow, UNDP project), an inventory of mercury emissions showed that the total intake of mercury into the air in 2014 amounted to 54.5 tons, of which 10.3 tons (or 18.8%) accounted for coal combustion and other natural fuels and biomass.

The Minamata Convention has been ratified by 170 countries. Kazakhstan is conducting domestic procedures for accession to the Convention.

In 2024, an order was adopted "On approval of the handbook on the best available techniques "Fuel Combustion at large installations for energy production", which applies the requirements of the Minamata Convention.

The Law on Ratification of the Stockholm Convention on Persistent Organic Pollutants of June 7, 2007 No. 259 prohibits the production, use, import and export of POPs. In 2009, Kazakhstan submitted its Compliance plan of the POPs Convention, which meets most of the requirements included in the Protocol on POPs to the Convention on Long-range Transboundary Air Pollution, with the exception of unintended and new POPs. Although POPs are not produced in Kazakhstan, obsolete and unusable pesticides in agriculture and equipment containing pops in industry, energy and transport remain a problem that needs to be addressed. The rules for the treatment of Persistent organic pollutants and waste containing them establish such requirements.

According to the Compliance plan for the period up to 2028, the national priorities are: a detailed list of pops, including new pops included in the Stockholm Convention list; development of a POPs monitoring system; creation of a unified POPs control system; development of legislation on chemical safety and the creation of mechanisms for its implementation; improvement of human potential in the field of POPs.

In order to fulfill the obligations of the **Protocol on POPs** under the LRTAP to eliminate or limit the use of substances listed in Annex I and II, and to reduce the total annual emissions of each of the substances listed in Annex III, it is necessary to stop the production and/or use of certain substances listed in Annex I. The obligations are regulated by program documents: the Law on Ratification of the Stockholm Convention, the Environmental Code of the Republic of Kazakhstan, the plan for fulfilling the obligations of the Stockholm Convention.

The obligations under the POPs Protocol to the LRTAP provide for the development of strategies to identify products still in use, and waste containing

certain substances, and the adoption of appropriate measures. Additional actions are not defined.

In 2024, an order was introduced "On approval of requirements for the destruction or disposal or processing, or re-export outside the Republic of Kazakhstan of seized products that are not subject to use in economic and other activities that do not meet the requirements of technical regulations and pose a threat to the rights and legitimate interests of individuals and legal entities, human life and health, the environment".

Obligations under the Protocol of POPS to the LRTAP for the use of MPE or BAT specified in the Manual: National manuals and conclusions on BAT, which will introduce MPE based on BAT for certain pollutants and certain categories of installations, are under development.

In 2021, an order was issued "On approval of the Rules for Issuing Environmental Permits, submitting an Environmental impact Declaration, as well as forms of environmental impact permit Forms and the procedure for filling them out".

The implementation of the project on monitoring the operability of the previously implemented integrated permits system (roadmap to 2030) continues, which are implemented in accordance with the requirements of Directive 2010/75/EC of the European Parliament and of the Council on Industrial Emissions (integrated pollution prevention and control) - Conclusions on BAT (Decisions of the Implementation Commission - in accordance with Article 13 (5) Directive 2010/75/EC).

In 2022, an order was adopted "On approval of the rules for the treatment of persistent organic pollutants and waste containing them", containing requirements for compliance with the Stockholm Convention.

The new Environmental Code provides for the introduction of BAT, which, among other things, will concern the reduction of POPs emissions. Several national manuals of BAT conclusions have been developed. According to Annex 3 to the Environmental Code, the national BAT handbook includes certain

activities not covered by the EU Industrial Emissions Directive (for example, mining activities).

The Gothenburg Protocol. The emissions of pollutants provided for by the Protocol are controlled and regulated in Kazakhstan in the process of issuing environmental permits, which determine the maximum permissible emissions for combustion plants and other industrial installations.

In 2021, the orders "On Approval of Methods for determining Emission standards into the Environment" and "On Approval of the Rules for Maintaining an automated system for monitoring emissions into the Environment during industrial environmental control" were issued, which applied the requirements of the Gothenburg Protocol for determining ceiling emissions and automated accounting of emissions from large sources.

According to the new Environmental Code, it is possible to issue two types of environmental permits - "environmental permit" and "integrated environmental permit". Comprehensive environmental permits will be issued at the central level and will be mandatory for Category I facilities that have the potential for the greatest degree of environmental impact.

As of the end of 2024, more than 15 BAT reference books have been adopted, taking into account the requirements of the Gothenburg Protocol.

The Gothenburg Protocol contains special requirements aimed at limiting emissions in the transport sector, which accounts for a significant amount of emissions in Kazakhstan. Since 2018, Kazakhstan has banned the import of cars with emissions below Euro-4 standards. Kazakhstan also switched to the new Euro-5 environmental standard for most categories of vehicles in 2016, for the rest - in 2018. - The Euro-5 standard is now valid for new cars produced in Kazakhstan or imported. Also, in order to reduce emissions from motor transport, it is prohibited to import cars older than five years and with an engine capacity of more than 3 liters into the country. In addition, from January 1, 2018, gasoline and diesel fuel entering the retail market of Kazakhstan must also comply with environmental classes K4 and K5 (comparable to Euro-4 and -5), which means a

decrease in sulfur content in gasoline by 3 times (for K4) and 15 times (for K5), in diesel fuel - from seven-fold (for K4) to 35- fold (for K5).

The Gothenburg Protocol. To meet the requirements of the Protocol, Kazakhstan needs to develop a national strategy and follow an action plan to reduce emissions of pollutants specified in the Protocol (SO₂, NO₂, VOCs, NH₃, PM_{2.5}), as well as introduce targets for reducing emissions or pollutants specified in Annex II to the Protocol.

Obligations to comply with the requirements of the Gothenburg Protocol to reduce emissions of SO₂, NO_x, VOCs, NH₃ and PM_{2.5} necessitate the development of legal acts taking into account targets in accordance with EU Directives and their implementation into national legislation, including technical regulations. (2023).

Obligations to comply with the requirements of the Gothenburg Protocol include: the application of MPE standards based on BAT to new and existing stationary sources. In 2020, emission limits were applied in accordance with Technical Regulation No. 1232 "Requirements for emissions from the combustion of various fuels in boiler rooms of thermal power plants" dated December 14, 2007.

The new Environmental Code (Annex III) lists the types of activities to which MPE developed on the basis of technologies that will be implemented in accordance with the requirements of Directive 2010/75/EC of the European Parliament and of the Council on Industrial Emissions (integrated pollution prevention and control) should be applied.

The obligations to implement the Gothenburg Protocol also include the application of MPE based on BAT to mobile sources. The national action plan provides for the implementation of a project aimed at developing the optimal and most effective policy introducing a transition to stricter emission limits for mobile sources. (2023).

The EU legislation does not provide for personal BAT for mobile sources. Separate Euro emission standards can be considered based on BAT and applied

in determining the MPE: Regulation (EU) No 715/2007 of the European Parliament and of the Council of June 20, 2007 on the approval of the type of motor vehicles in relation to emissions of light passenger and commercial vehicles (Euro-5 and Euro-6) and on access to information on vehicle repair and maintenance, as amended. Regulation (EU) No 595/2009 of the European Parliament and of the Council of 18 June 2009 on the approval of the type of vehicles and engines with respect to emissions from heavy-duty vehicles (Euro VI) and on access to information on the repair and maintenance of vehicles and amendments to Regulation (EU) No 715/2007 and Directive 2007/46/EC and repeal of Directives 80/1269/EEC, 2005/55/EC and 2005/78/EC as amended.

Obligations to implement the Gothenburg Protocol on improving the quality of motor fuels imply that gasoline and diesel fuel entering the retail market of Kazakhstan must comply with environmental classes K4 and K5 (comparable to Euro-4 and -5), which requires the development and implementation of changes to existing product standards (2022) in accordance with the requirements of Directive 2004/42/EC on the control of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and products for the repair of vehicles: establishment of maximum VOC content limits for paints and varnishes (Article 3 and annex II), Directive 98/70/EC of the European Parliament and of the Council of October 13, 1998 on the quality of gasoline and diesel fuel, as amended.

The obligations of the Gothenburg Protocol also include the application of limit values for the concentration of VOCs in products. Currently, the regulation of VOCs in products will be determined by the Law "On the Safety of Chemical Products" dated July 21, 2007 No. 302-III and Technical Regulations for Paints and Varnishes No. 1398 dated December 29, 2007. A study is planned to assess the potential for reducing VOC emissions through the introduction of regulatory control over the content of VOCs in specific products (2024), taking into account the application of the requirements of Directive 2004/42/EC on the control of emissions of volatile organic compounds due to the use of organic solvents in

certain paints and products for vehicle repair: setting maximum limit values for the content of VOCs for paints and varnishes (Article 3 and annex II).

The obligations of the Gothenburg Protocol determine the need for the use of special control measures for NH₃ and BAT in agriculture. In Kazakhstan, Intensive breeding of pigs and poultry is included in the list of BAT of the new Environmental Code. There is no proper Code of Agricultural Practice. The national action plan provides for the implementation of a project aimed at promoting environmentally friendly agricultural practices or its equivalent, as well as the creation of the necessary legal framework (2024). During the development and implementation of the project, it is planned to use the requirements of Directive 91/676/EC on the protection of waters from pollution caused by nitrates from agricultural sources, as amended by Regulation (EC) No. 1882/2003.

The obligations to implement the Gothenburg Protocol contain requirements for the provision of data in the Inventory Information Report (IIR) and emission forecast (SO₂, NO₂, VOCs, NH₃ and PM_{2.5}). Kazakhstan annually provides IIR and national reporting on economic sectors (NR).

Obligations to implement the Gothenburg Protocol include: Introduction and implementation of air quality standards (critical levels of O₃, PM, NH₃ (Annex II); critical loads of acidity and biogenic nitrogen; concentrations and deposition of sulfur and nitrogen compounds in the environment; concentrations of O₃, VOCs and PM in the environment; assessment of the effects of O₃ and PM. In Kazakhstan, "Sanitary and hygienic standards for atmospheric air in urban and rural settlements are applied (Order of the Minister of National Economy, 2015, No. 168). The National Action Plan provides for the development of a number of projects: "Improving the air quality monitoring system in accordance with international standards" (2025), "Improving the understanding of the spatial distribution of pollution concentrations through pollution dispersion modeling and indicative air quality measurements" (2025), "Assessment (modeling and mapping) of critical loads and levels based on available data" (2025). The projects

will focus on using the requirements of 2008/50/EC on ambient air quality and cleaner air for Europe

The obligations to implement the Gothenburg Protocol include the requirement to develop and update the BAT database. The development of national reference documents on BAT and conclusions on BAT is planned until December 31, 2023 by the national Bureau of BAT created by the institution, which should support the Ministry of Environment, mainly in the development of reference documents on BAT. In addition, the National Action Plan provides for the implementation of a project aimed at disseminating information on BAT principles and developing a national information exchange structure (2024), taking into account the requirements of Directive 2010/75/EC of the European Parliament and of the Council on Industrial Emissions (integrated pollution prevention and control, Conclusions on BAT - Decisions of the Implementation Commission in accordance with Article 13 (5), Directive 2010/75/EC).

Commitments to implement the Gothenburg Protocol also include measures to reduce emissions from waste containing volatile organic compounds. There are no regulatory mechanisms. The National Action Plan provides for the implementation of a project to assess possible options for reducing emissions from waste containing VOCs (2024) in accordance with the basic requirements established in EU legislation on the protection of atmospheric air.

With the adoption of the new Environmental Code in Kazakhstan, important strategic steps have been taken to bring the national environmental protection system (including air protection) in line with international requirements and best practices. However, given the severity of the system changes, additional steps are required to ensure the implementation of the new requirements and a smooth transition to the new system.

To implement the requirements of the Convention and Protocols on Long-range Transboundary Air Pollution, additional measures are formulated in the National Action Plan for the Ratification of the Protocols of the LRTAP and the implementation of relevant obligations in the form of tasks.

Gothenburg Protocol, Protocol on POPs, The HM Protocol: - Development and approval of National Strategic Documents. - Compilation of emission inventories. - Maintenance of emission inventories and projections and submission of reports to the Executive Body of the Convention/EMEP. - Introduction of limit values and the best available technologies. - Facilitating the exchange of technologies and information on BAT. - Stimulating the development of research in the field of air quality. - Improvement of air quality monitoring in accordance with the requirements of protocols and EU legislation.

Gothenburg Protocol, The HM Protocol: Development and integration of legal acts, including: - Harmonization of fuel quality standards with the requirements of Protocols. - Development of a legislative act on the limitation of mercury content in alkaline-manganese batteries.

The HM Protocol: - Development and implementation of measures to reduce emissions, including: - Exploring the possibilities of implementing measures to control mercury content in products such as electrical and electronic devices, medical equipment, fluorescent lamps, pesticides, paints, etc.

The Gothenburg Protocol. Compilation of emission inventories, emission forecasts and regular reporting to the Convention secretariat, including: - Development of emission forecasts. - Development and integration of legal acts, including: - Introduction of national emission targets into National legislation. - Development and implementation of emission limits for mobile sources.

- Development and implementation of measures to reduce emissions, including: - Development of measures to reduce VOC emissions. - Develop and enforce a Code of Good Agricultural Practice or Develop and enforce a Code of Good Agricultural Practice or its equivalent to reduce ammonia (NH₃) emissions.

- Development of economic, voluntary or regulatory measures to reduce emissions, including: Further improving energy efficiency and encouraging the use of renewable energy sources and less polluting fuels or/and facilitating the implementation of existing programs. Taking measures to develop less polluting transport systems and promoting the implementation of existing programs.

Meeting the requirements of the protocols will entail a certain level of expenses of two types: administrative expenses, which will be paid from the state budget or other external sources, and expenses for society and the national economy. The costs borne by society and the economy include the costs associated with the introduction of new low-emission technologies in almost all major sectors (energy, industry, agriculture, transport and waste), which implies an increase in capital investments, including investments.

The implementation of the tasks set to reduce emissions of pollutants into the atmosphere is aimed at the sustainable development of economic potential and increasing the competitiveness of Kazakhstan products, which requires the consolidation of actions of state organizations, business and the public.