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Estonian Informative Inventory Report 1990-2015

Gridded Emissions and Large Point Sources

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Gridded Emissions and Large Point Sources

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Cover photo by Jaak Sarv (2011) *"Thermonuclear Fusion in the Bog"*

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10. REPORTING OF GRIDDED EMISSIONS AND LPS

10.1. Overview of the Gridded Emissions

10.1.1. Description of Gridded Emissions

The updated GRID emissions for 1990, 1995, 2000, 2005 and 2010 for each GNFR (aggregated sectors) code and GRID data by GNFR for the 2015 were submitted on 1 March 2017. Emissions data are disaggregated to the extended EMEP grid with a resolution of 50 km x 50 km.

Table 10.1 lists the aggregated sectors used for reporting emissions data and pollutants on grid, based on the Estonian air pollutants emission inventory.

Table 10.1 Activities and emissions reported for GRID data

GNFR	Emissions reported	Notes
A_PublicPower	NO_x, NMVOC, SO_x, NH_3, PM_{10}, $PM_{2.5}$, CO, Pb, Cd, Hg, PCDD/F, PAHs, HCB, PCB	PM since 2000; NH_3 for 2015
B_IndustrialComb	NO_x, NMVOC, SO_x, NH_3, PM_{10}, $PM_{2.5}$, CO, Pb, Cd, Hg, PCDD/F, PAHs, HCB, PCB	PM since 2000; NH_3 since 2010
C_SmallComb	NO_x, NMVOC, SO_x, NH_3, PM_{10}, $PM_{2.5}$, CO, Pb, Cd, Hg, PCDD/F, PAHs, HCB, PCB	PM since 2000
D_IndProcess	NO_x, NMVOC, SO_x, NH_3, PM_{10}, $PM_{2.5}$, CO, Pb, Cd, Hg	PM since 2000; HM since 2010 (Pb also in 2000)
E_Fugitive	NOx, NMVOC, SO_x, NH_3, PM_{10}, $PM_{2.5}$, CO, Pb, PCDD/F, PAHs	For 1990 and 1995 only NMVOC; PM since 2000
F_Solvents	NO_x, NMVOC, SO_x, NH_3, PM_{10}, $PM_{2.5}$, CO, Pb, Cd, Hg, PCDD/F, PAHs	PM since 2000
G_RoadRail	NO_x, NMVOC, SO_x, NH_3, PM_{10}, $PM_{2.5}$, CO, Pb, Cd, Hg, PCDD/F, PAHs, HCB, PCB	PM since 2000; Hg for 1990, 1995 and 2000
H_Shipping	NO_x, NMVOC, SO_x, NH_3, PM_{10}, $PM_{2.5}$, CO, Pb, Cd, Hg, PCDD/F, PAHs, HCB, PCB	PM since 2000; Pb, Hg, PCDD/F, HCB, PCB since 2005
I_OffRoadMob	NO_x, NMVOC, SO_x, NH_3, PM_{10}, $PM_{2.5}$, CO, Pb, Cd, PAHs	PM since 2000
J_AviLTO	NO_x, NMVOC, SO_x, PM_{10}, $PM_{2.5}$, CO	PM since 2000
L_OtherWasteDisp	NO_x, NMVOC, SO_x, NH_3, PM_{10}, $PM_{2.5}$, CO, Pb, Cd, Hg, PCDD/F	For 1990 and 1995 only NMVOC, NH_3 and CO; PM since 2000
M_WasteWater	NO_x, NMVOC, SO_x, NH_3	NO_x, SO_x, and NH_3 since 2010
N_WasteIncin	NO_x, NMVOC, SO_x, NH_3, PM_{10}, $PM_{2.5}$, CO, Pb, Cd, Hg, PCDD/F, PAHs, HCB, PCB	PM since 2000; NH_3 since 2010
O_AgriLivestock	NO_x, NMVOC, NH_3, PM_{10}, $PM_{2.5}$	PM since 2000
P_AgriOther	NO_x, NMVOC, NH_3, PM_{10}, $PM_{2.5}$	PM since 2000

10.1.2. Methodological Issues

The disaggregation of emissions is similar to Estonia's emissions inventory structure.

The disaggregation of emissions for the 1990, 1995, 2000 and 2005 are based on data pertaining to the large point sources and diffuse sources. The disaggregation of emissions for 2010 and 2015 are based on data pertaining to the point sources (about 1990 in 2015) and diffuse sources.

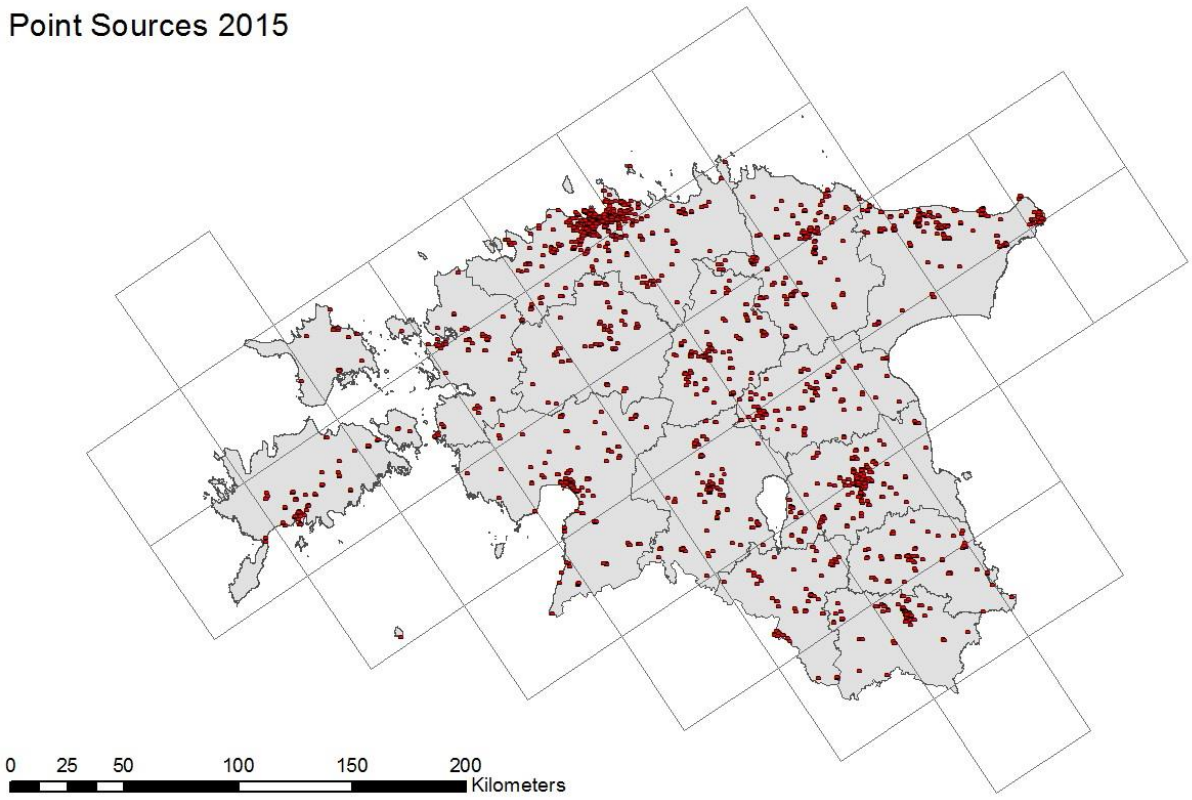

Figure 10.1 Point Sources distribution used for gridded emissions in 2015

LPS data for 1990, 1995, 2000 and 2005 and point sources data for 2010 and 2015 were allocated directly to the grid by using their X and Y coordinates. The diffuse data were distributed by using mainly different statistical data from Statistics Estonia (Table 10.2). Also the distributions of point sources data in 2010 were used for previous years, where it was reasonable.

Table 10.2 Distribution of Point and Diffuse Sources by aggregated sectors

GNFR	Description	Distribution of diffuse sources
A_PublicPower	Point and diffuse sources	Fuel consumption data by county; distributions of point sources data since 2010
B_IndustrialComb	Point and diffuse sources	Fuel consumption data by county; distributions of point sources data since 2010
C_SmallComb	Point and diffuse sources	Fuel consumption data by county; population density
D_IndProcess	Point and diffuse sources	Construction data by county; distributions of point sources data since 2010
E_Fugitive	Point and diffuse sources	Petrol and natural gas distribution by county; distributions of point sources data since 2010
F_Solvents	Point and diffuse sources	Population density; distributions of point sources data since 2010
G_RoadRail	Diffuse sources	Number of vehicles by county; the length of the railway and main roads (by grids)
H_Shipping	Diffuse sources	Ferry traffic data by county
I_OffRoadMob	Diffuse sources	Number of vehicles by county
J_AviLTO	Emissions by Airports	
L_OtherWasteDisp	Point and diffuse sources	Number of fires by county; distributions of point sources data since 2010; population density, amount of landfilled waste by county

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GNFR	Description	Distribution of diffuse sources
M_WasteWater	Point and diffuse sources	Amounts of sewage by county; distributions of point sources data since 2010
N_WasteIncin	Point and diffuse sources	Population density; distribution of point sources data
O_AgriLivestock	Diffuse sources	Livestock data by county; CORINE Land Cover
P_AgriOther	Diffuse sources	Data about application of nitrogen fertilizers and field preparation by county; CORINE Land Cover

10.1.3. Planned Improvements

For the 2018 submission, Estonia is planning to report disaggregated 2015 air pollutant emissions on the new EMEP grid with the resolution of 0.1° x 0.1° long-lat.

10.2. Overview of the Large Point Sources (LPS)

10.2.1. Description of LPS emissions

The emissions data from the Large Point Sources are presented for the years 1990, 1995, 2000, 2010 and 2015 by GNFR (aggregated sectors) codes in NFR 2014-1 format and submitted into EIONET's Central Data Repository on 28 April 2017.

The description of data collection system from facilities is presented in the Chapter 1 of the Estonian Informative Inventory Report 1990-2015.

Table 10.3 and Figure 10.2 presents the number of LPS in 2015 by GNFR sectors used for reporting LPS emissions and reported pollutants, the number of LPS and E-PRTR facilities there are in each sector and the height classes. Each LPS emission has been aggregated by GNFR sectors and stack height classes. For identification of LPS, the principle of pollutant emission thresholds has originally been used. If in previous submissions, the data on emissions of all substances from facility were reported, then now only for substances exceeding the threshold. In case, if the total emission of the facility exceeded the applicable threshold value and the facility has different activities or stack height classes, then the data is submitted on each activity or stack class separately, regardless of a threshold.

It should be noted that for some facilities there is a difference in the data under E-PRTR and the present report. For example, E-PRTR report does not include emissions from the combustion activity for the Kiviõli Keemiatööstus OÜ (Kiviõli Oil Shale Processing & Chemical Plant), because the heat input for that combustion installation is less than 50 megawatts. But since emissions for some pollutants exceeded the emission thresholds, the data was included in the LPS table. The big difference between the number of LPS and E-PRTR facilities in agriculture sector is explained by the fact that the majority of farms are raising cattle (non-Annex 1 activity).

Table 10.3 Activities and pollutants Under LPS in 2015

GNFR	Emissions reported	Number of LPS facilities	Number of E-PRTR facilities	Height class
A_PublicPower	NO_x, SO_x, NMVOC, PM_{10}, $PM_{2.5}$, Pb, Cd, Hg, PCDD/F, PAHs, HCB	11	9	2,3,4,5
B_Industry	NOx, SOx, NMVOC, NH_3, PM_{10}, $PM_{2.5}$, CO, PAHs	13	6	1,2,3,4
C_OtherStationaryComb	NMVOC, PAHs	2		1
D_Fugitive	NMVOC, NH_3, CO	5	4	1
E_Solvents	NMVOC	2	-	1
K_AgriLivestock	NH_3	120	17	1

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GNFR	Emissions reported	Number of LPS facilities	Number of E-PRTR facilities	Height class
L_AgriOther	NH_3	117		1
J_Waste	PCDD/F	1	1	1

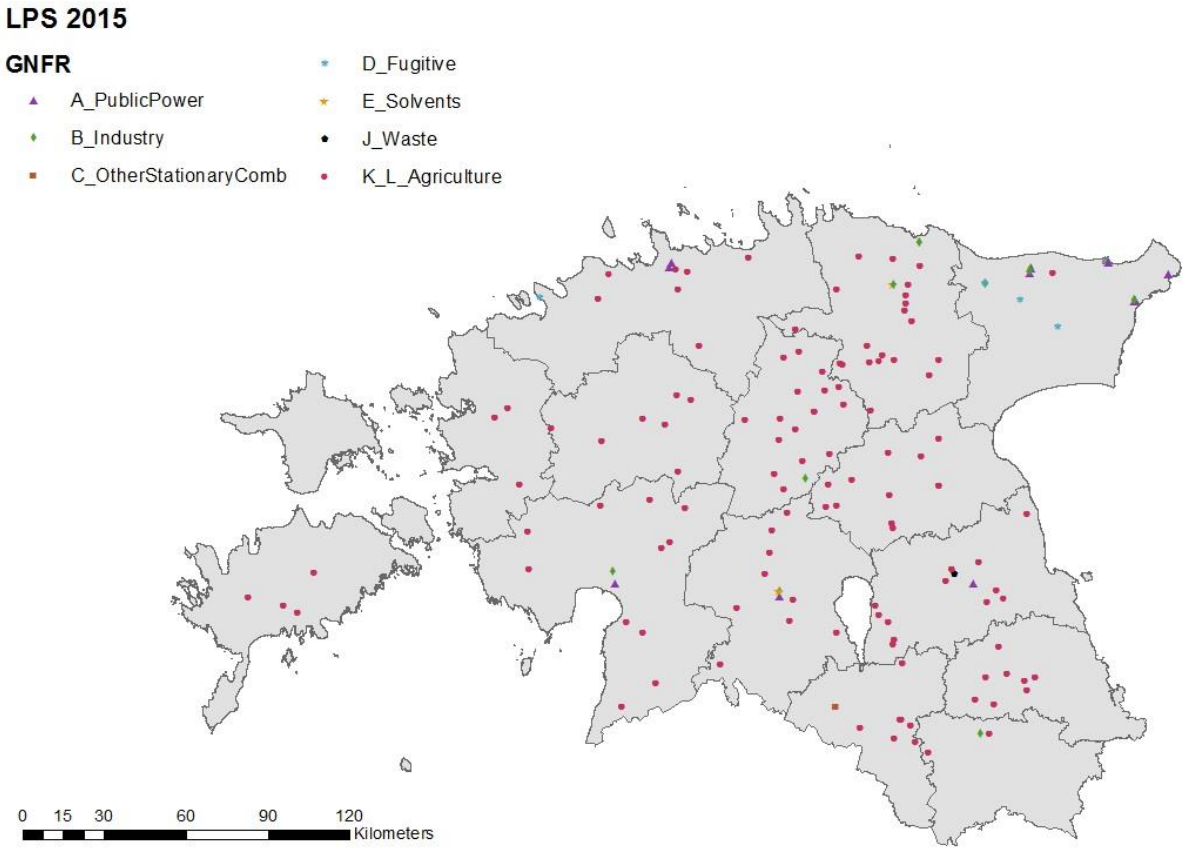
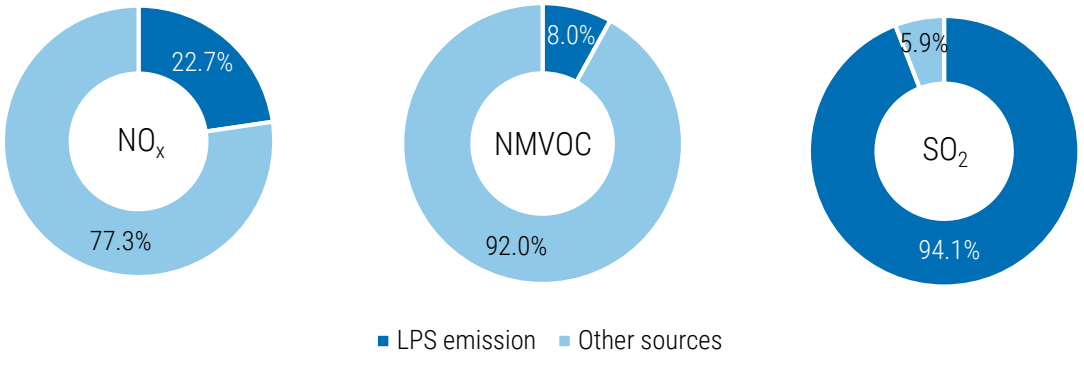


Figure 10.2 LPS locations in 2015

As can be seen on the Figure 10.3, the share of some pollutants from LPS in total emissions is very large: for SO_2 – 94,1%, Pb – 90.4%, Cd – 64%, Hg – 88.3%, NH_3 – 32%, NO_x – 23%, and PM_{10} – 21%. The share of other substances from LPS is not so significant.



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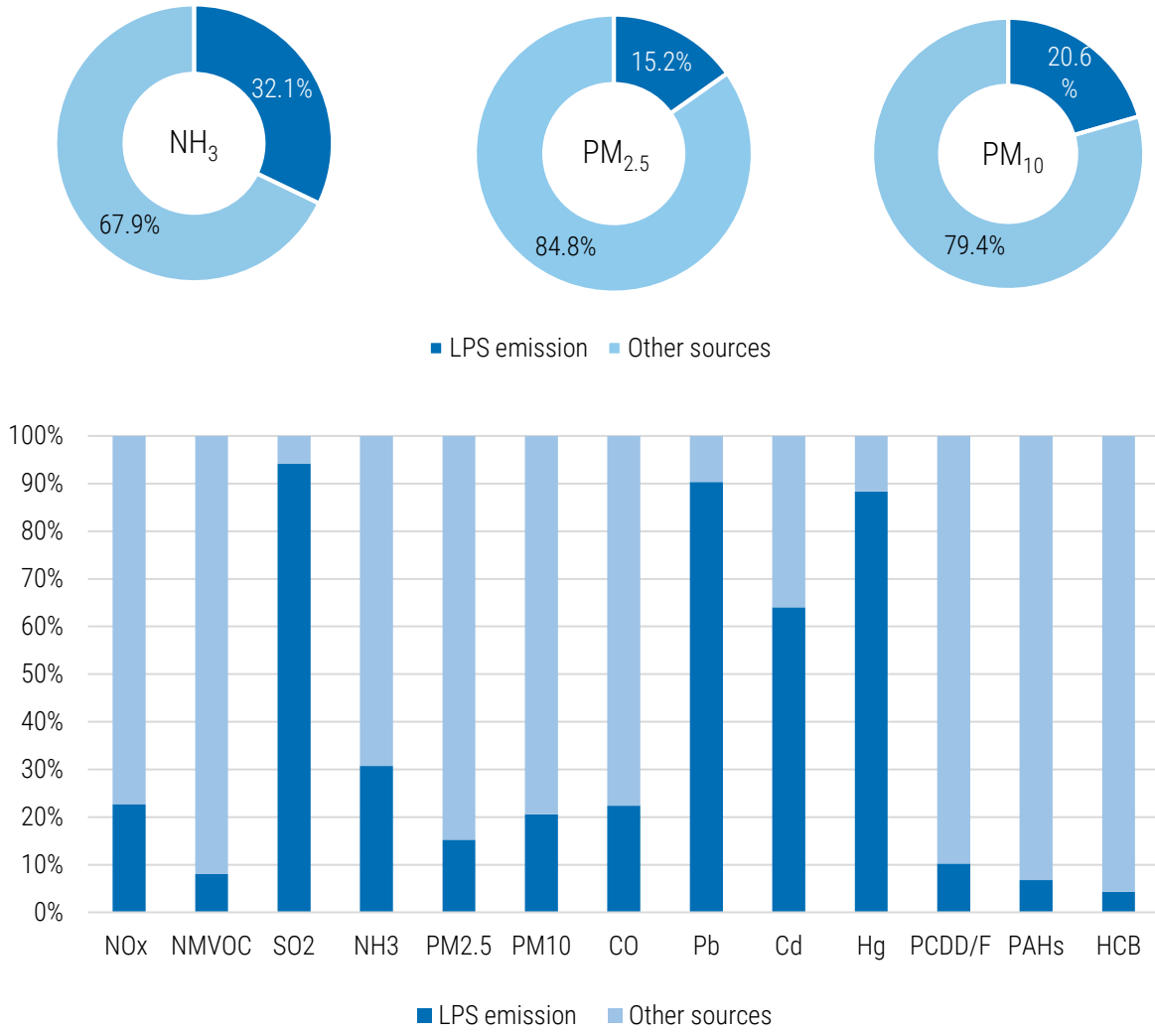

Figure 10.3 The contribution of LPS emissions in 2015 total emission

Figures 10.4 and 10.5 illustrate the contribution of LPS emissions inside A_PublicPower and B_Industry sectors. For other sectors the LPS contribution in total emissions is not so significant.

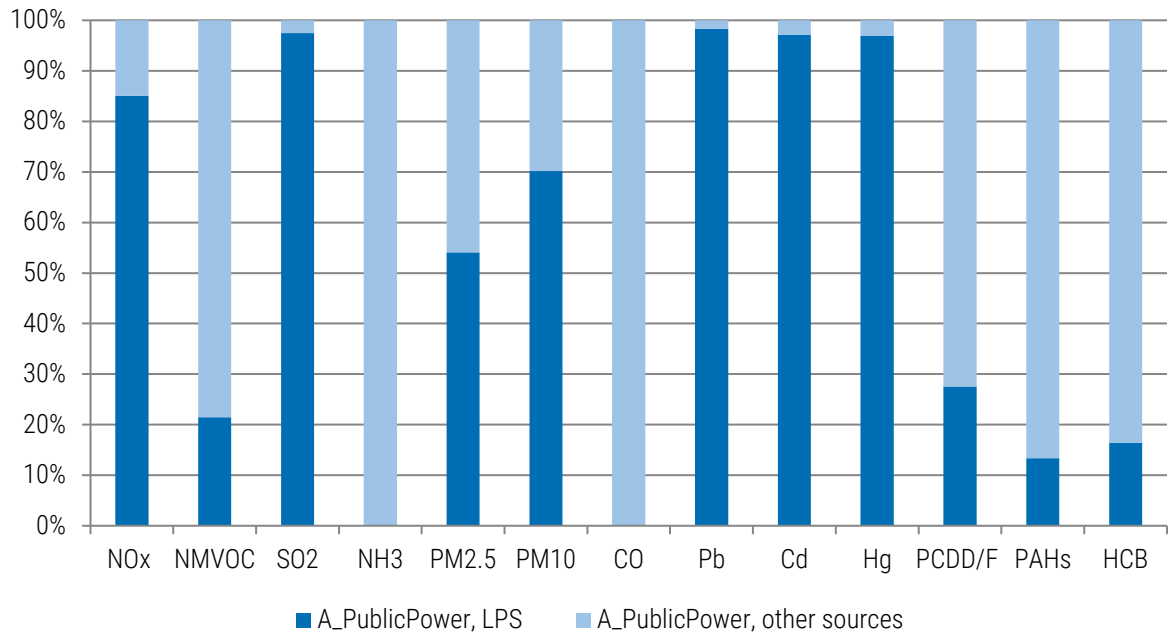

Figure 10.4 The contribution of LPS emissions into A_PublicPower sector

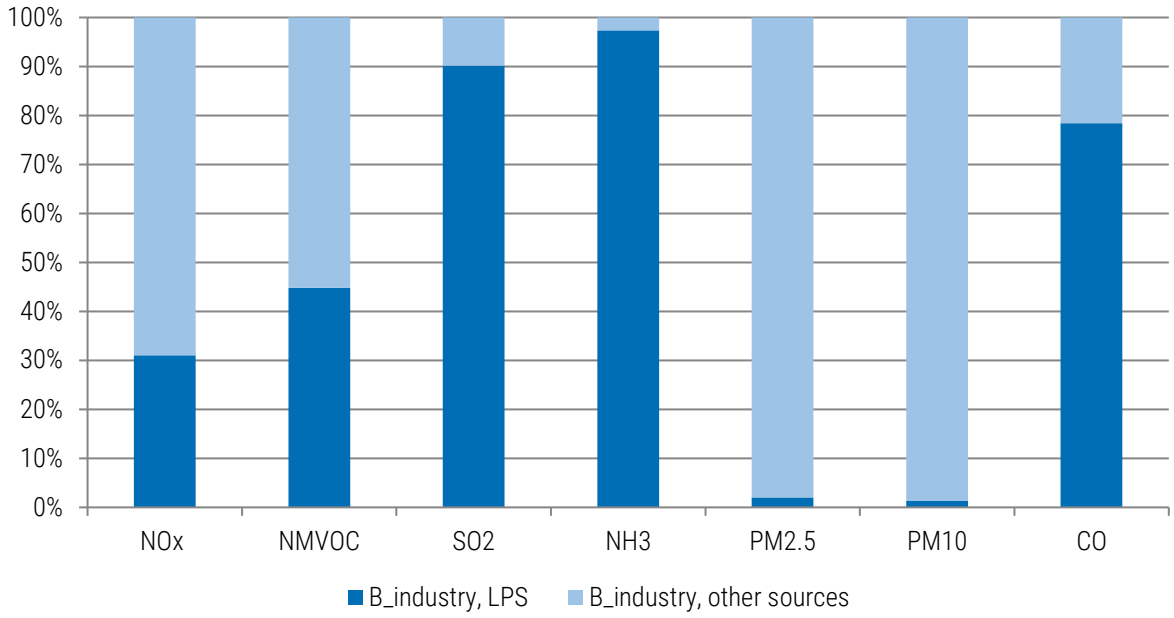

Figure 10.5 The contribution of LPS emissions into B_Industry sector

During the period of 1990–2015, the number of LPS facilities had increased from 18 to 145 (Figure 10.6). The main reason is that since 2007, agricultural facilities that have an integrated emission permit or have exceeded the national ammonia emission threshold are required to report emissions. For example, in 2015, out of 145 facilities, 116 are agricultural. That explains the growth of ammonia emissions from the LPSs (Table 10.4).

It should be noted that during the same period, the main large point sources, such as oil shale power plants, shale oil, cement, pulp and paper production factories, continued their operations. Emissions of SO_2, particulates and heavy metals are significantly dropped (Figures 10.7 and 10.8), mainly due to the reduction in energy production and also introduction of new technologies at oil shale power plants and a renovation of clearing installations in cement production. The detailed

description can be found in the Pollutants Emission Trends and Energy Sector Chapters of IIR. Emission of carbon monoxide has increased about 3 times since 1990 mainly due to the increase in shale oil production in Eesti Energia Oil Industry plant.

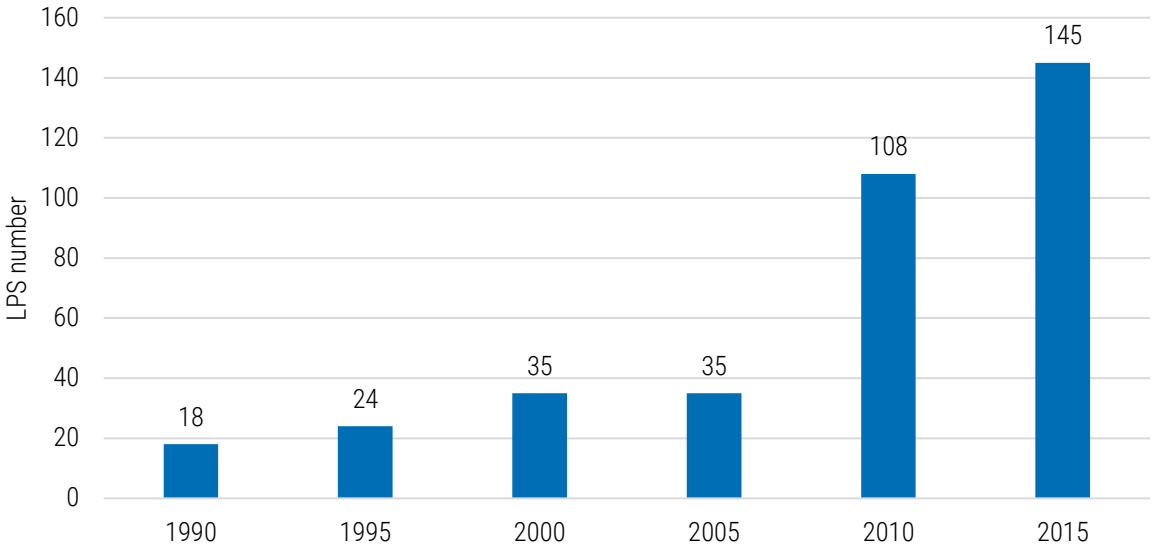

Figure 10.6 The number of large point sources in the period of 1990-2015

Table 10.4 The number of LPSs by GNFR in the period of 1990-2015

GNFR	1990	1995	2000	2005	2010	2015
A_PublicPower	6	7	9	8	11	11
B_Industry	10	11	19	18	9	13
C_OtherStationaryComb			2			2
D_Fugitive		1	4	7	6	5
E_Solvents		2	2	2	1	2
K_AgriLivestock				3	88	120
L_AgriOther				1	72	117
J_Waste			1	1		1

Table 10.5 Pollutant emissions from LPSs in the period 1990-2015

Year	NO_x	NMVOC	SO_2	NH_3	$PM_{2.5}$	PM_{10}	CO	Pb	Cd	Hg
1990	19.000	14.412	202.713	0.529	NR	NR	10.570	120.977	4.194	1.054
1995	11.348	4.794	94.52	0.099	NR	NR	10.705	56.162	1.817	0.547
2000	12.510	4.046	87.447	0.092	5.229	19.704	9.668	28.436	0.482	0.457
2005	11.222	4.763	71.242	0.316	2.861	7.247	13.611	30.043	0.484	0.484
2010	14.318	1.176	80.578	2.279	5.960	12.687	20.878	35.977	0.592	0.593
2015	6.974	1.835	29.937	3.579	1.392	2.881	28.637	25.690	0.478	0.478
Trend 1990-2015, %	**-63.3**	**-87.3**	**-85.2**	**576.5**	**-73.4**	**-85.4**	**170.9**	**-78.8**	**-88.6**	**-54.6**

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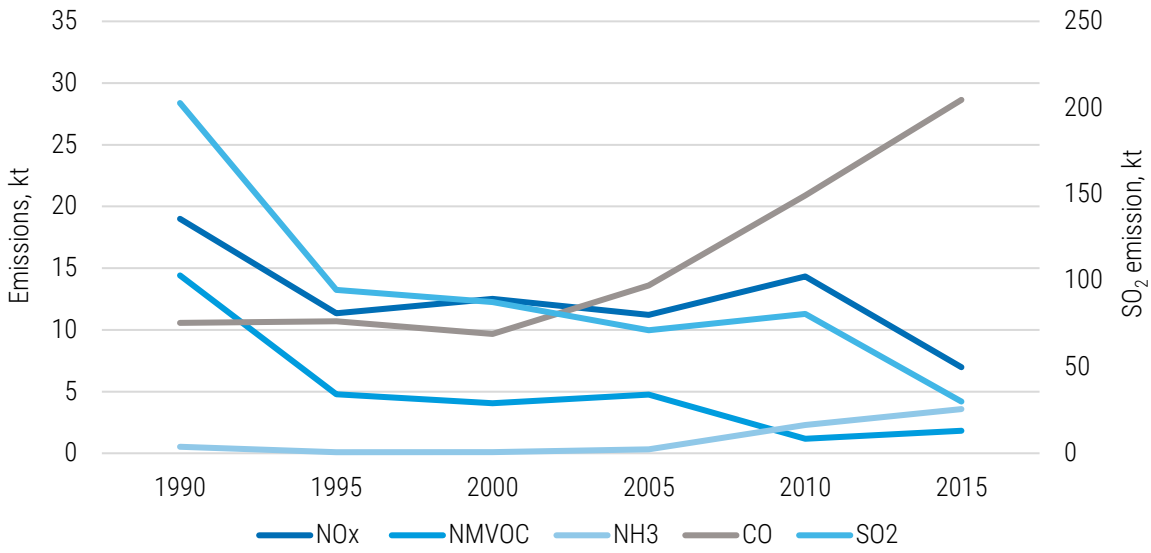

Figure 10.7 Pollutant emissions from LPS in the period of 1990-2015

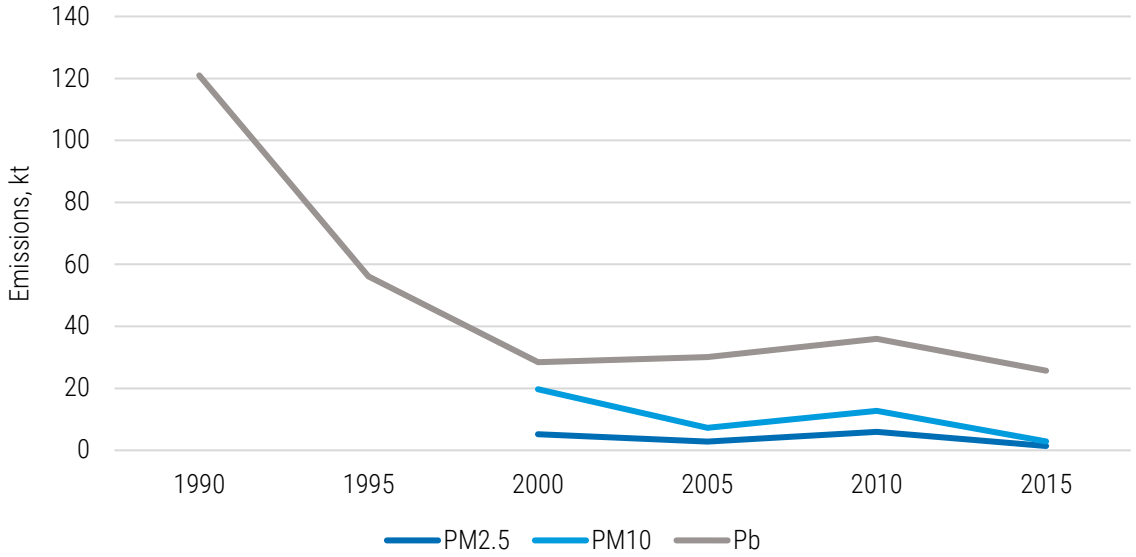

Figure 10.8 Pollutant emissions from LPS in the period of 1990-2015