

VII. AREAS WHERE THE POLLUTION LIMIT VALUES ARE EXCEEDED

VII.1 Areas where the pollution limit values for protection of human health are exceeded

Annually, areas are defined where the pollution limit values are exceeded overall for all the pollutants that are monitored from the aspect of human health. The map of areas where at least one pollution limit value¹, not including ground-level ozone, is exceeded provides comprehensive information on ambient air quality in the Czech Republic. In 2019, 8.4% of the territory of the Czech Republic, inhabited by approx. 27.5% of the population, was designated as an area where the pollution limit values were exceeded (Fig. VII.1.1; Tab. VII.1.1). Assignment of these areas is, in the vast majority of cases, a result of exceeding the annual pollution limit values for benzo[a]pyrene (Tab. VII.1.1). To a lesser degree, assignment of a territory to these areas in 2019 was a result of exceeding the daily pollution limit value for suspended particulates PM₁₀ and the annual pollution limit value

for PM_{2.5}. The areas exceeding the limit values were the most extent in the Ostrava/Karviná/Frýdek-Místek agglomeration (71%), and in the Moravian-Silesia (49%) and Central Moravia (29%) zones (Tab. VII.1.2). In the year-on-year comparison 2018/2019, the area of territories where at least one pollution limit value was exceeded, except for ozone, decreased. Figures VII.1.2 and VII.1.3 show a comparison of the territory with exceeded limit values in 2019 with that in 2018 and with the five-year average for the period 2014 to 2018. Based on the year-on-year comparison it can be stated that the most significant reduction of the above-limit concentration area took place in the Kladno area, the Ústí nad Labem and Zlín districts, and the Brno municipality where the area with exceeded pollution limit values for benzo[a]pyrene and PM₁₀ suspended particulates decreased between years (Chap. VII.1 and Chap. VII.2). The longer-term comparison (Fig. VII.1.3) shows that in 2019 the delimited above-limit concentration area is of a lower extent than in the five-year average 2014–2018 and that the territories of the Moravian-Silesia, Olomouc, and Zlín regions remain the most affected. The identified area with at least one pollution limit value exceeded in 2019, except for ozone, is the smallest within the evaluation period between 2012 and 2019 (Fig. VII.1.4). The improvement in the situation can be attributed to a combination of factors.

Tab. VII.1.1 Percentage of the area exceeding the pollution limit (%) and percentage of population resident in areas exposed to above-limit values (%) in the Czech Republic, 2019

	Pollutants specified in Annex 1 to Act No. 201/2012 Coll., as amended						
	Item 1 of the Annex			Item 3 of the Annex		Item 4 of the Annex	
	PM ₁₀ 36th max. 24-h average > 50 µg.m ⁻³	PM _{2.5} annual average > 25 µg.m ⁻³	Total LV exceedances	BaP annual average > 1 ng.m ⁻³	Total exceedances, ozone excluded	O ₃ 26. highest values max. daily 8-h runing average (in the three-year average) > 120 µg.m ⁻³	Total exceedances, including ozone
Inhabitants	0.9	0.1	0.9	27.5	27.5	56.9	75.6
Area	0.3	0.04	0.3	8.4	8.4	70.5	77.1

1 The annual pollution limit values for PM₁₀, PM_{2.5}, benzo[a]pyrene, NO₂, lead, cadmium, arsenic, nickel and benzene, the pollution limit value for CO (max. daily 8-hour moving average), the daily pollution limit values for PM₁₀ and SO₂, the hourly pollution limit value for SO₂ and NO₂.

Tab. VII.1.2 Limit value (LV) exceedances in the zones/agglomerations, regions and municipalities with extended competencies of the Czech Republic, % of the area of the administrative unit, 2019

Zone / agglomeration	Region	Pollutants specified in Annex 1 to Act No. 201/2012 Coll., as amended										
		Item 1. of the Annex		Item 3 of the Annex		Item 4 of the Annex		Item 3 of the Annex		Item 4 of the Annex		
		PM ₁₀ 36 th max. 24-h average > 50 µg.m ⁻³	PM _{2,5} annual average > 25 µg.m ⁻³	Total LV exceedances	BaP annual average > 1 ng.m ⁻³	Total exceedances, including ozone	O ₃ 26. highest values max. daily 8-h running average (in the three-year average) > 120 µg.m ⁻³	Total exceedances, including ozone	Total exceedances, including ozone			
Agglomeration of Prague	Prague	-	-	-	0.22	0.22	-	0.22	0.22	99.8	99.8	99.8
Central Bohemia zone	Central Bohemia region	0.01	-	-	1.59	1.59	-	1.59	1.59	98.79	98.79	98.79
South-western zone	South Bohemia region	-	-	-	0.29	0.29	-	0.29	0.29	57.4	57.4	57.69
	Plzeň Region	-	-	-	0.25	0.25	-	0.25	0.25	91.16	91.16	91.34
North-western zone	Karlovy Vary region	-	-	-	-	-	-	-	-	99.12	99.12	99.12
	Ústí nad Labem region	0.04	-	0.04	2.1	2.14	-	2.14	2.14	99.96	99.96	99.96
North-eastern zone	Liberec region	-	-	0.02	1.3	1.32	-	1.32	1.32	99.64	99.64	99.64
	Hradec Králové region	-	-	-	1.42	1.42	-	1.42	1.42	97.47	97.47	97.69
	Pardubice region	-	-	-	9.63	9.63	-	9.63	9.63	70.37	70.37	77.9
	Vysočina region	-	-	-	0.64	0.64	-	0.64	0.64	36.1	36.1	36.67
South-eastern zone	South Moravia region without agglomeration of Brno	-	-	-	4.28	4.28	-	4.28	4.28	64.8	64.8	67.75
	Agglomeration of Brno	-	-	-	0.03	0.03	-	0.03	0.03	53.58	53.58	53.61
Central Moravia zone	Olomouc region	-	-	-	0.07	0.07	-	0.07	0.07	91.73	91.73	91.74
	Zlín region	-	-	-	0.04	0.04	-	0.04	0.04	73.33	73.33	73.34
Moravia-Silesia zone	Agglomeration of Brno	-	-	-	0.87	0.87	-	0.87	0.87	64.88	64.88	65.32
	Central Moravia zone	-	-	-	34.31	34.31	-	34.31	34.31	36.94	36.94	63.09
Moravia-Silesia zone	Agglomeration of Olomouc	-	-	-	21.57	21.57	-	21.57	21.57	41.07	41.07	60.16
	Central Moravia zone	-	-	-	28.84	28.84	-	28.84	28.84	38.71	38.71	61.83
Agglomeration of Ostrava/Karviná/ Frýdek-Místek	Moravia-Silesia region	0.35	-	0.35	49.68	49.68	-	49.68	49.68	24.84	24.84	65.41
	Agglomeration of Ostrava/Karviná/ Frýdek-Místek	10.14	1.63	10.14	70.13	70.13	-	70.13	70.13	8.97	8.97	72.9
		3.77	0.57	3.77	56.82	56.82	-	56.82	56.82	19.3	19.3	68.03

VII. Areas with Exceedances of Limit Values

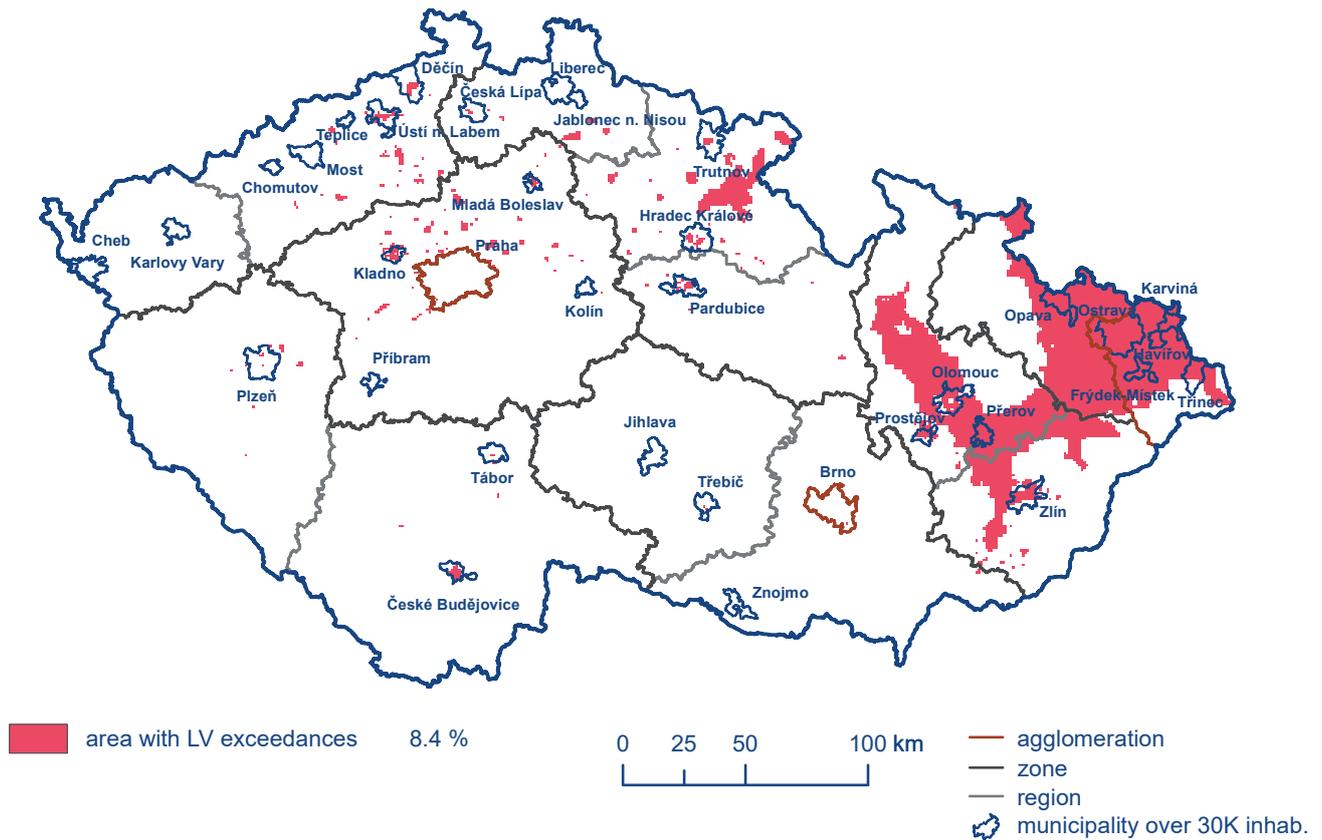


Fig. VII.1.1 Areas with exceeded air pollution limits for health protection excluding ground-level ozone, 2019

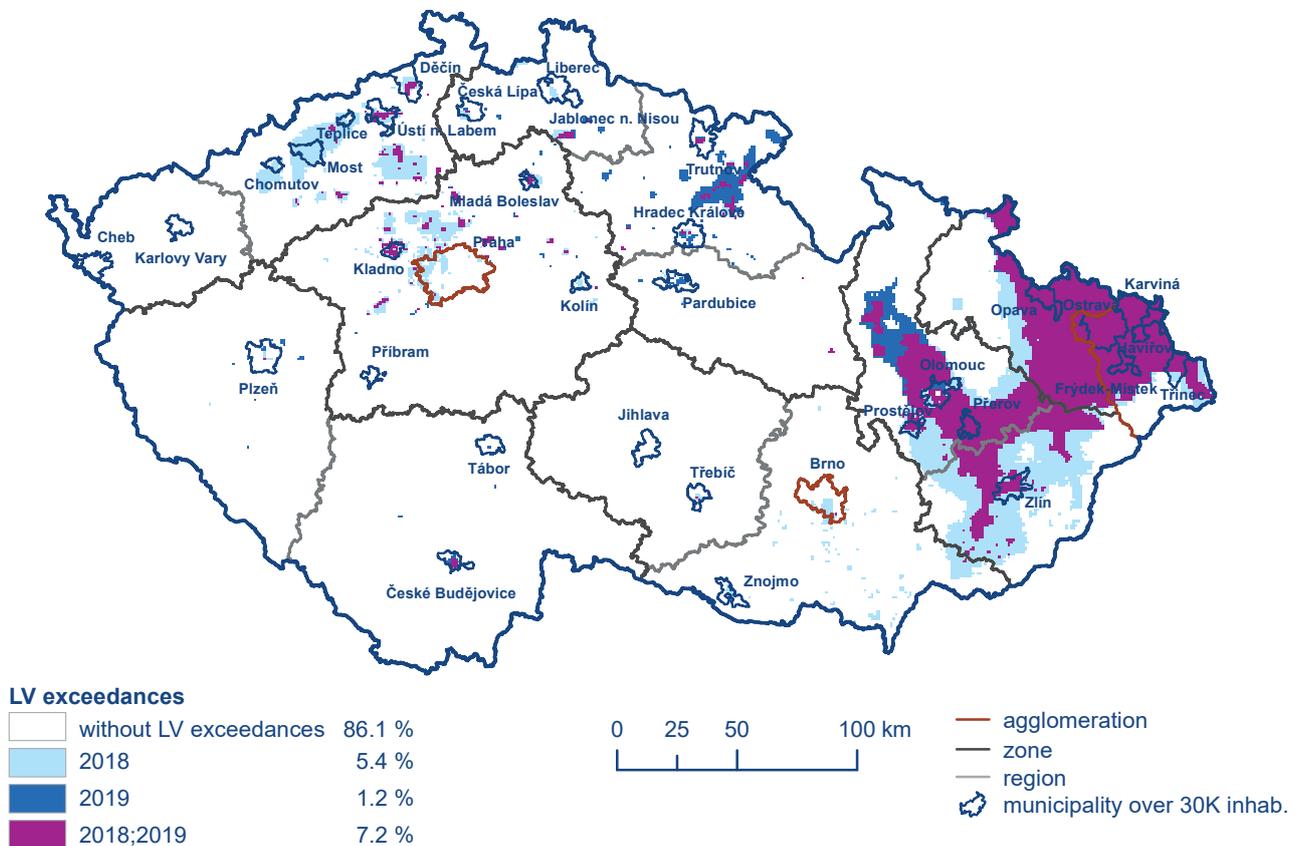


Fig. VII.1.2 Comparison of areas with exceeded air pollution limits for health protection excluding ground-level ozone in 2019 and 2018

The year 2019 was extremely above normal in terms of temperature and normal in terms of precipitation. In addition, in 2019, compared with the ten-year average, there were significantly improved dispersion conditions. These factors lead to lower emissions from heating and better dispersion of emissions from various sources. At the end of the year – in November and December – poor dispersion conditions did not occur, as usual in comparison with other years (for more details see Chap. III). The decrease in concentrations can also be attributed to measures already implemented to improve air quality (particularly the replacement of boilers), the continuing renewal of the vehicle fleet and measures taken at places of large sources (see Chapters II and IV.1.3).

After including ground-level ozone, the areas where at least one pollution limit value was exceeded in 2019 corresponded to 77.1% of the territory of the Czech Republic (Fig. VII.1.5) with approximately 75.6% of population (Tab. VII.1.1). In the year-on-year comparison 2018/2019 there was a decrease by 10% of the area exceeding at least one limit value, including ozone, however, this is still the second largest area with above-limit concentrations in the evaluated period 2012–2019 (Fig. VII.1.4). The graph shows an increase in the extent of the above-limit concentration area in the last three years in relation to increasing ozone concentrations (Chap. IV.4).

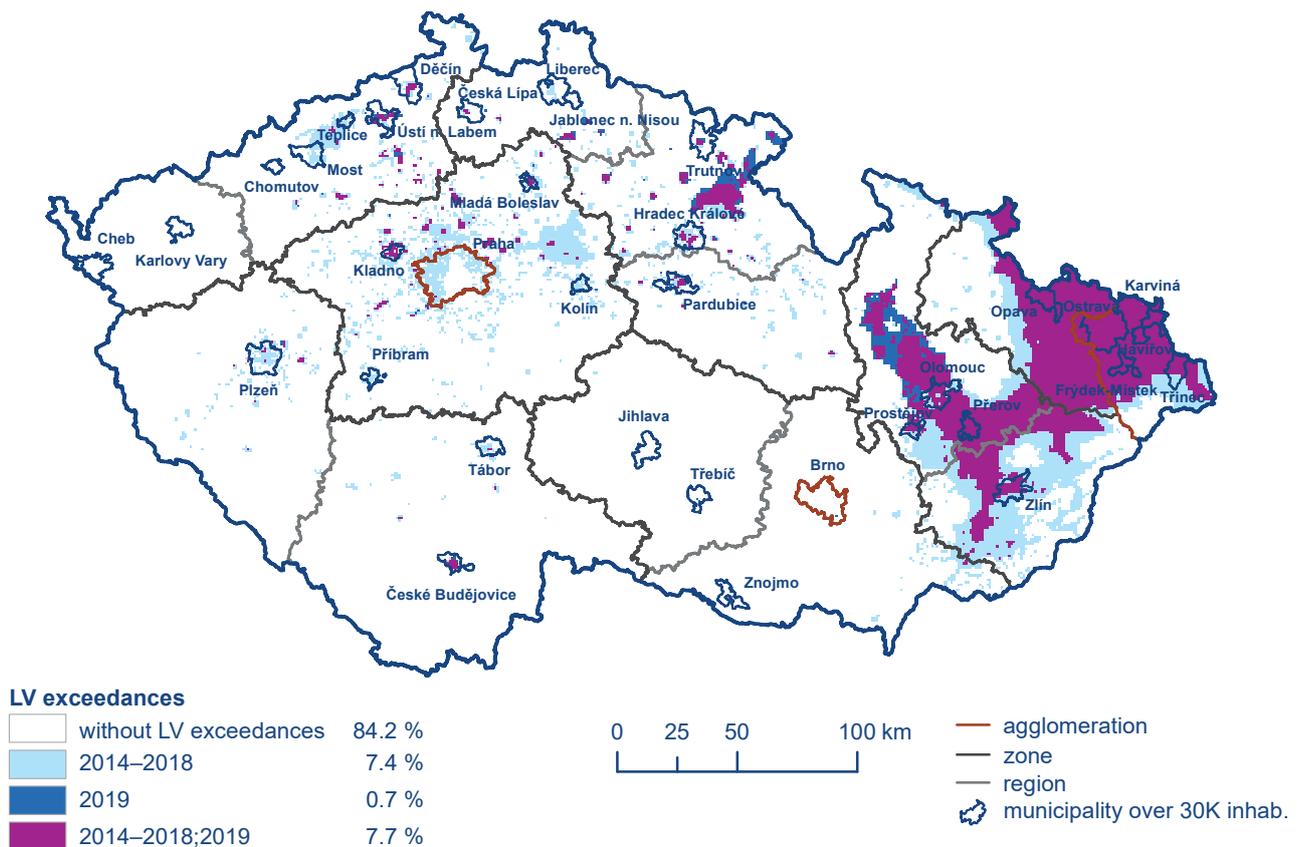


Fig. VII.1.3 Comparison of areas with exceeded air pollution limits for health protection excluding ground-level ozone in 2019 and in the five-year average 2014–2018

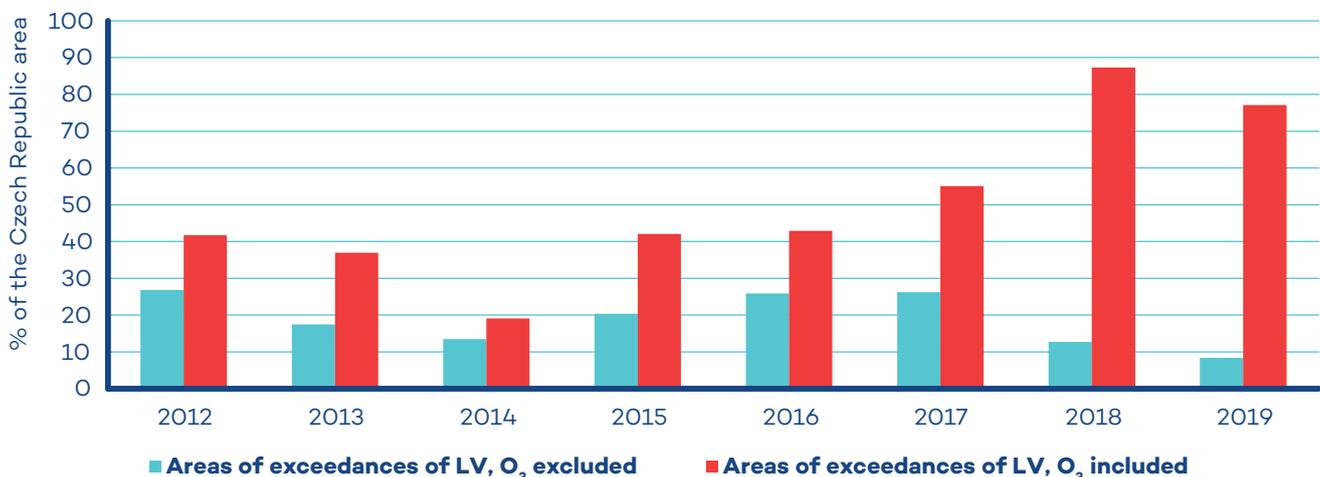


Fig. VII.1.4 Exceeded air pollution limit in the Czech Republic, percentage of the area, 2012–2019

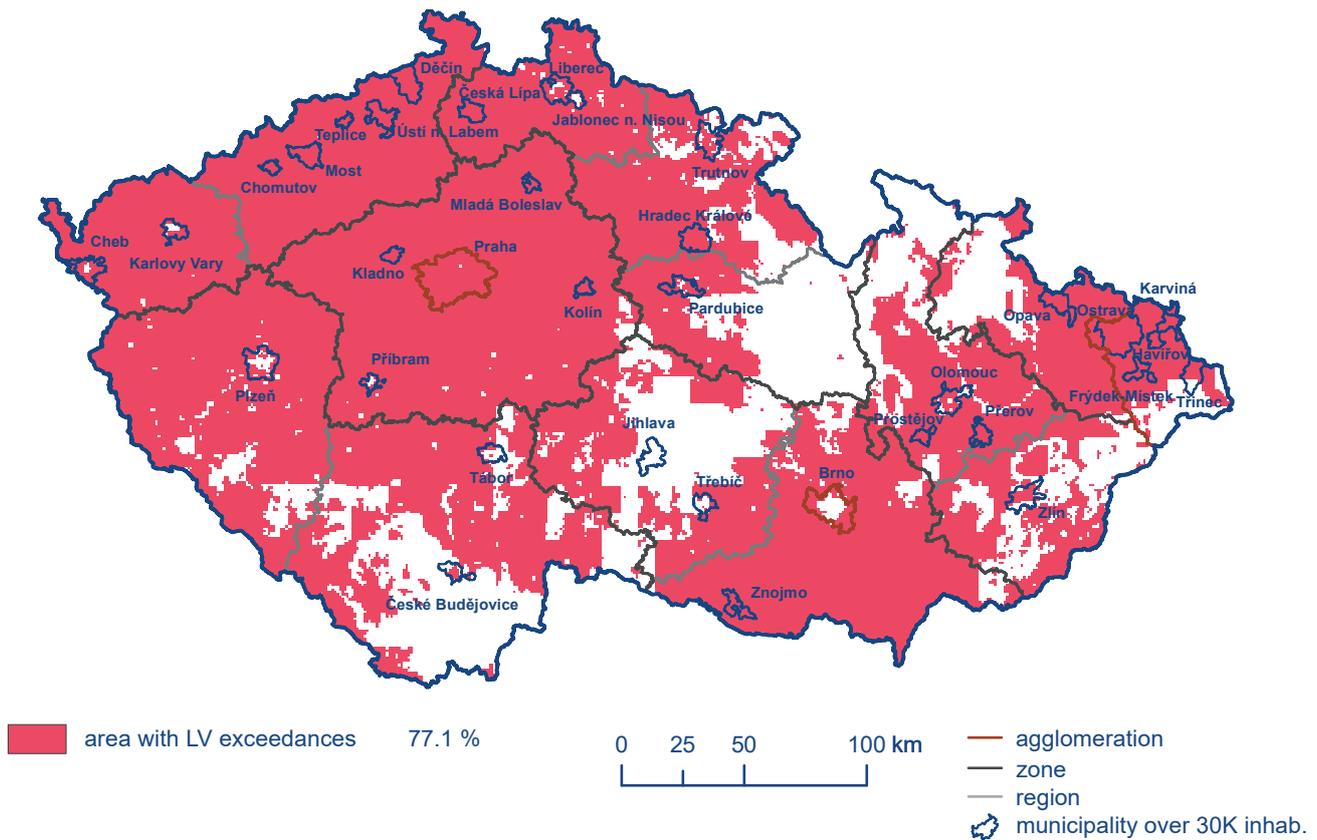


Fig. VII.1.5 Areas with exceeded air pollution limits for health protection including ground-level ozone, 2019

Regional differences in terms of air quality in the Czech Republic

As part of the population exposure assessment, the average population-weighted concentrations were calculated for PM₁₀ and PM_{2.5} suspended particulates and NO₂ for municipalities with population over 30,000 inhabitants (Fig. VII.1.6). In simple terms, the value represents a pollutant concentration that a person living in a given municipality is exposed to. This characteristic, classified according to Member States, is published in the framework of the European air quality assessment (ETC/ACM, 2018).

A comparison of the population-weighted concentration in large cities of the Czech Republic shows that population exposed to the highest concentrations of suspended PM₁₀ and PM_{2.5} particles are in the cities of the Moravian-Silesia and Olomouc regions which are the regions with the highest pollution exposure in terms of air quality country-wide in the long-term (Chap. V.3). In 2019, the weighted average concentrations of suspended PM₁₀ and PM_{2.5} particles did not exceed the pollution limit value. The Cheb, Karlovy Vary, Jablonec nad Nisou and Přebíram cities are among the purest cities in terms of the evaluation of suspended particles concentrations. Relatively low concentration levels in cities located in the Karlovy Vary and South Bohemia regions are related to the local low regional background concentrations of suspended particles. Unlike the most heavily exposed regions, long-range transport of air pollution is not as important here and the landscape character allows good ventilation (especially in the South

Bohemia area). The low emission load of these areas is also a not negligible factor.

The situation is somewhat different in terms of assessing the air exposure to NO₂ concentrations. This is mainly due to different major emission sources than that for suspended particles where those include public energy, heat generation and road transport. In connection with intensive traffic and restrained traffic flow, the population exposed to the highest NO₂ concentrations belong to three most populous cities of the Czech Republic, i.e. in Prague, Brno and Ostrava where there is also higher regional pollution due to the presence of large pollution sources. In 2019, within large cities, population in the Jablonec nad Nisou, Trutnov, Třebíč, Přebíram and Tábor cities was exposed to the lowest NO₂ values. Relatively low NO₂ concentrations occur in cities with a lower population and associated lower traffic intensity and in areas with lower regional background concentrations of NO₂ caused by lower emissions from large sources of pollution and less significant long-range pollution transport (the South Bohemia, Karlovy Vary, Vysočina and Liberec regions). Average weighted NO₂ concentration levels in the Czech Republic do not exceed the pollution limit value, however, following long-term measurements of NO₂ in some traffic localities, particularly in sites with high traffic intensity experiencing poor ventilation (dense build-up areas) and frequent restrictions of traffic flow, instances exceeding the pollution limit values in the immediate vicinity of heavily busy roads can be assumed.

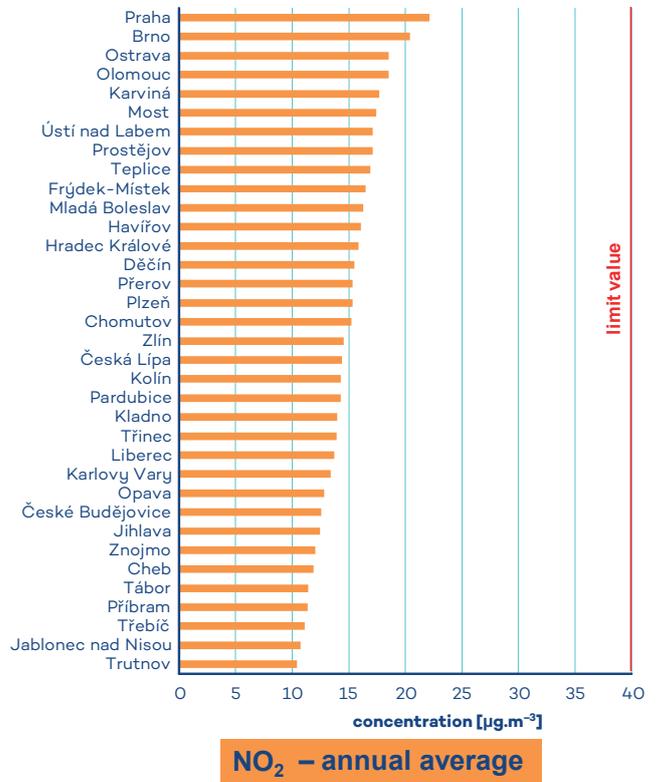
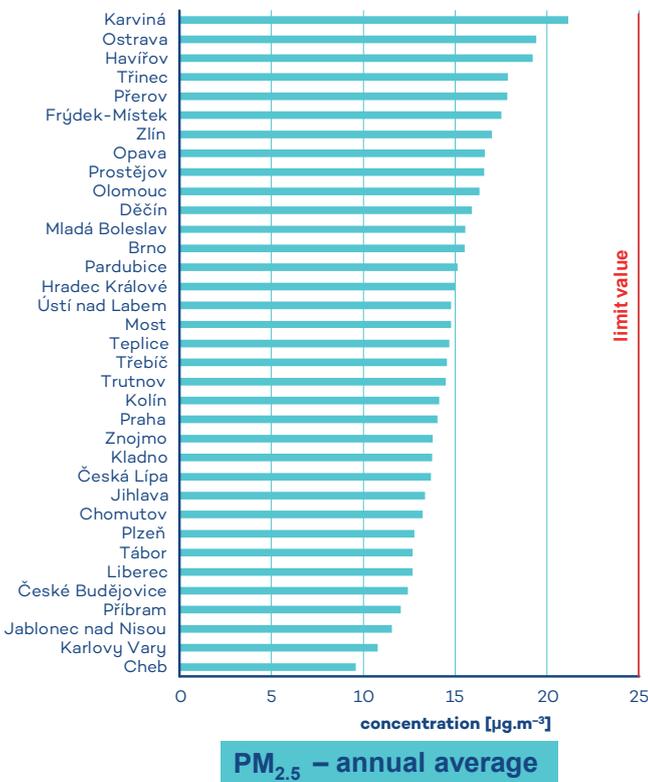
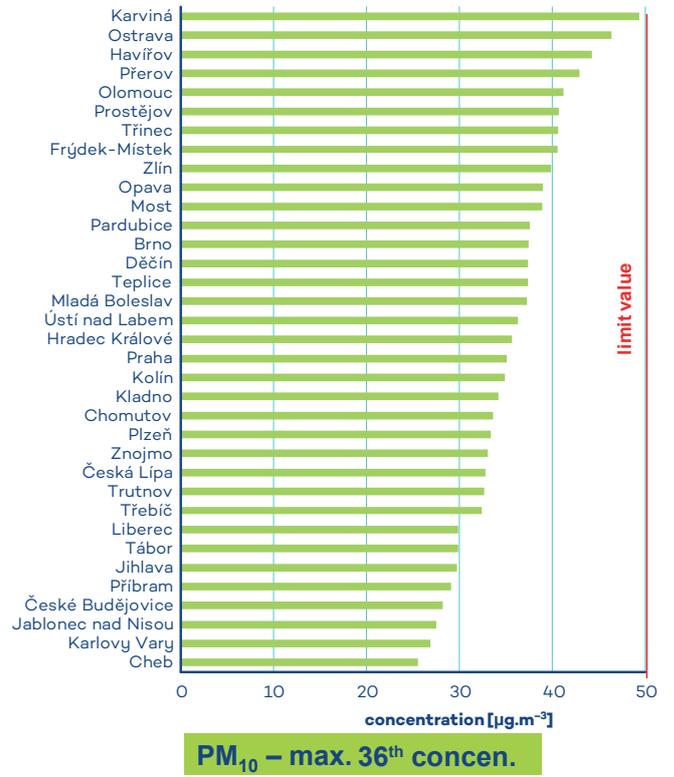
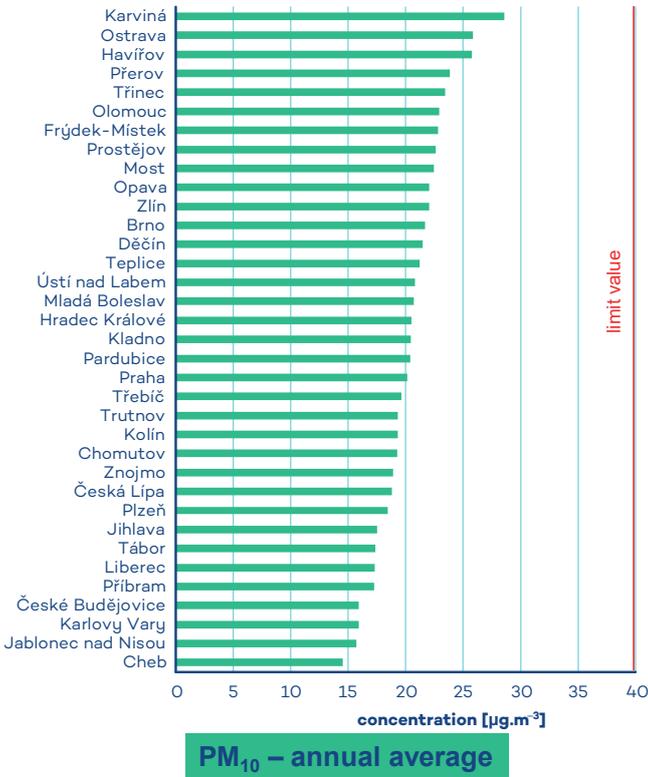


Fig. VII.1.6 Average population-weighted concentrations of pollutants in municipalities with more than 30,000 inhabitants, 2019

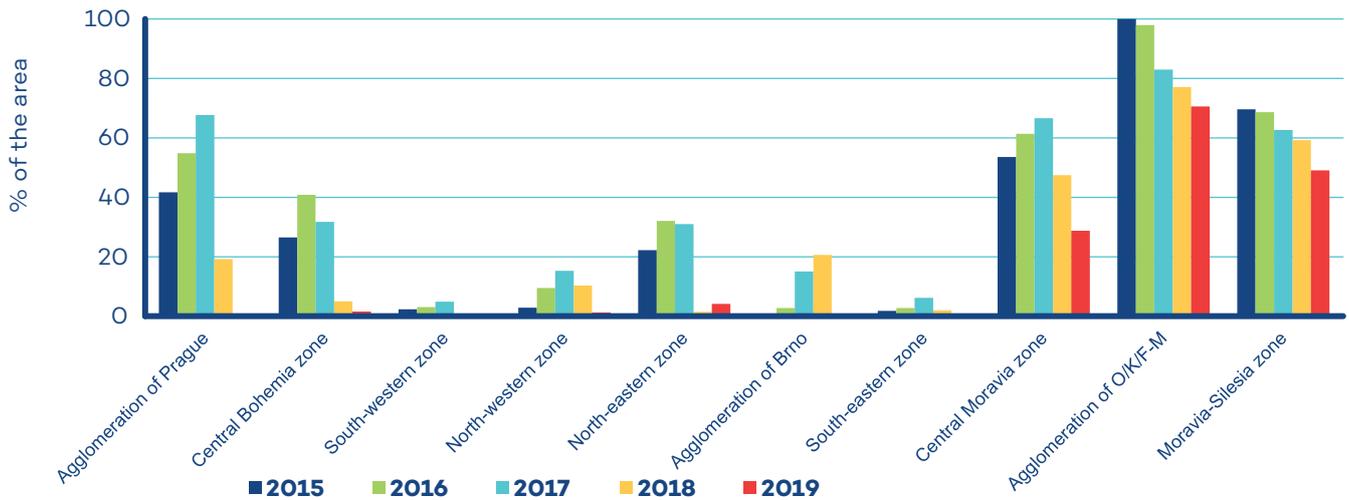


Fig. VII.1.7 Exceeded air pollution limit in the zones and agglomerations of the Czech Republic, percentage of the area, 2015–2019

Within the Czech Republic, there are considerable regional differences in terms of air quality as shown in Fig. VII.6 presenting variation of the area of territories with above-limit concentrations except for ozone in zones and agglomerations in the last five-year period 2015–2019. The most affected regions in terms of air quality have long been the O/K/F-M agglomeration and the Moravian-Silesia and Central Moravia zones. Regions with deteriorated air quality include the Prague and Brno agglomerations and the Central Bohemia, Northeast and Northwest zones. On the other hand, in the Southwest and Southeast zones the pollution limit values are exceeded only in very small areas. In 2019, the area with above-limit concentrations decreased most significantly due to a decrease in benzo[*a*]pyrene and PM₁₀ suspended particulates concentrations in the Prague and Brno agglomerations and in the Central Moravia zone.

VII.2 Areas where the pollution limit values for protection of ecosystems and vegetation are exceeded

From the viewpoint of protection of the most valuable natural locations of the Czech Republic, exceeding of the pollution limit values for the protection of ecosystems and vegetation² in the territory of NPs and PLAs is also evaluated (Tab. VII.2.1). In 2019, at least one of these limit values was exceeded over nearly 79% of the territory of NPs and PLAs (Fig. VII.2.1).

Above-limit NO_x concentrations occur particularly around transport roads; the pollution limit value for NO_x for the most valuable natural parts of the Czech Republic was exceeded over only a very small area of several PLAs (Tab. VII.2.1, Fig. VII.2.2).

In 2019, all NPs and PLAs except for Poodří and Jeseníky PLAs were exposed to the above-limit ozone concentrations (Tab. VII.2.1).

The pollution limit value for the annual and winter average concentration of SO₂ was not exceeded in 2019 in the territory of any PLA or NP, similar to the previous years.

² Limit values for the annual and winter average concentrations of SO₂. Limit value for the annual average concentration of NO_x and the pollution limit value for O₃ expressed as the AOT40 exposure index.

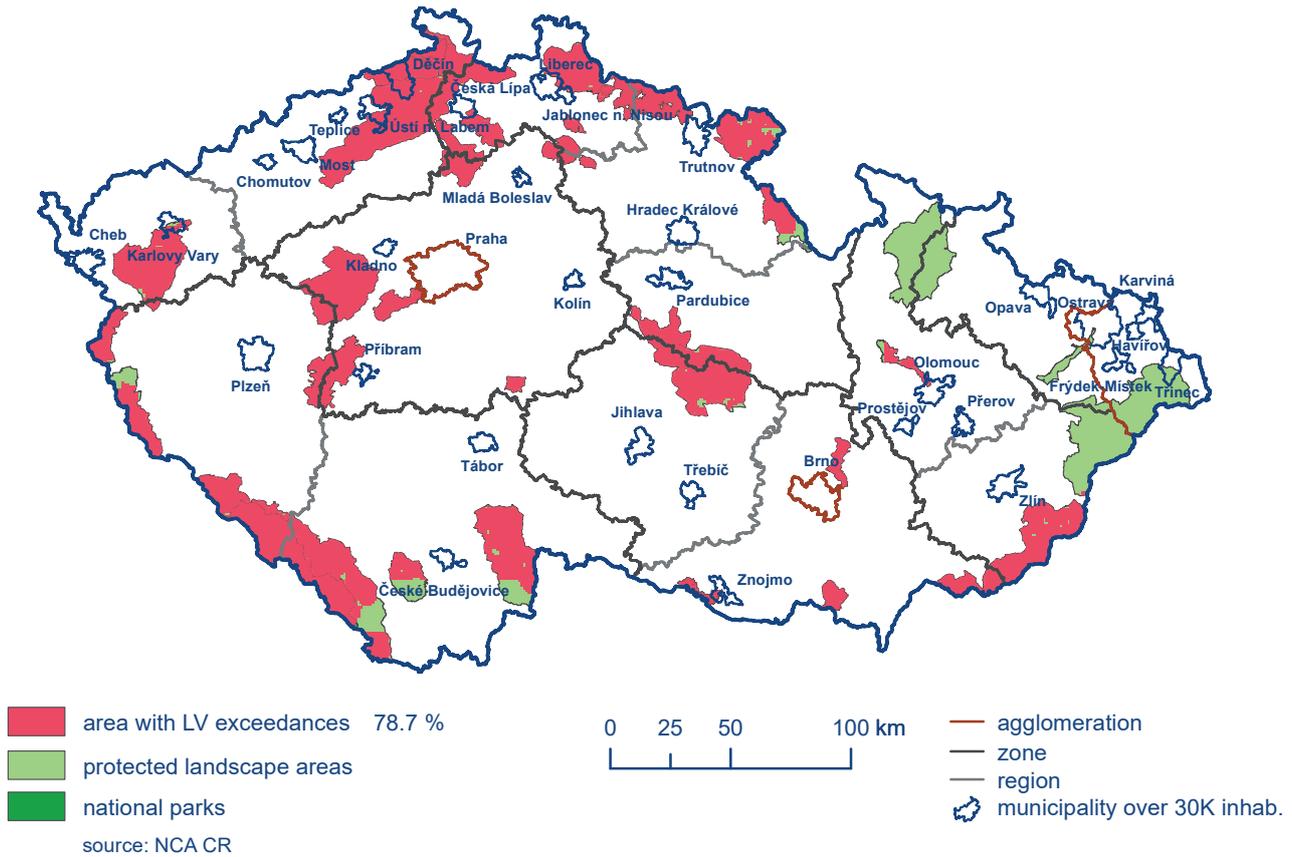


Fig. VII.2.1 Areas with exceeded air pollution limits for ecosystems and vegetation in national parks and protected landscape areas including ground-level ozone, 2019

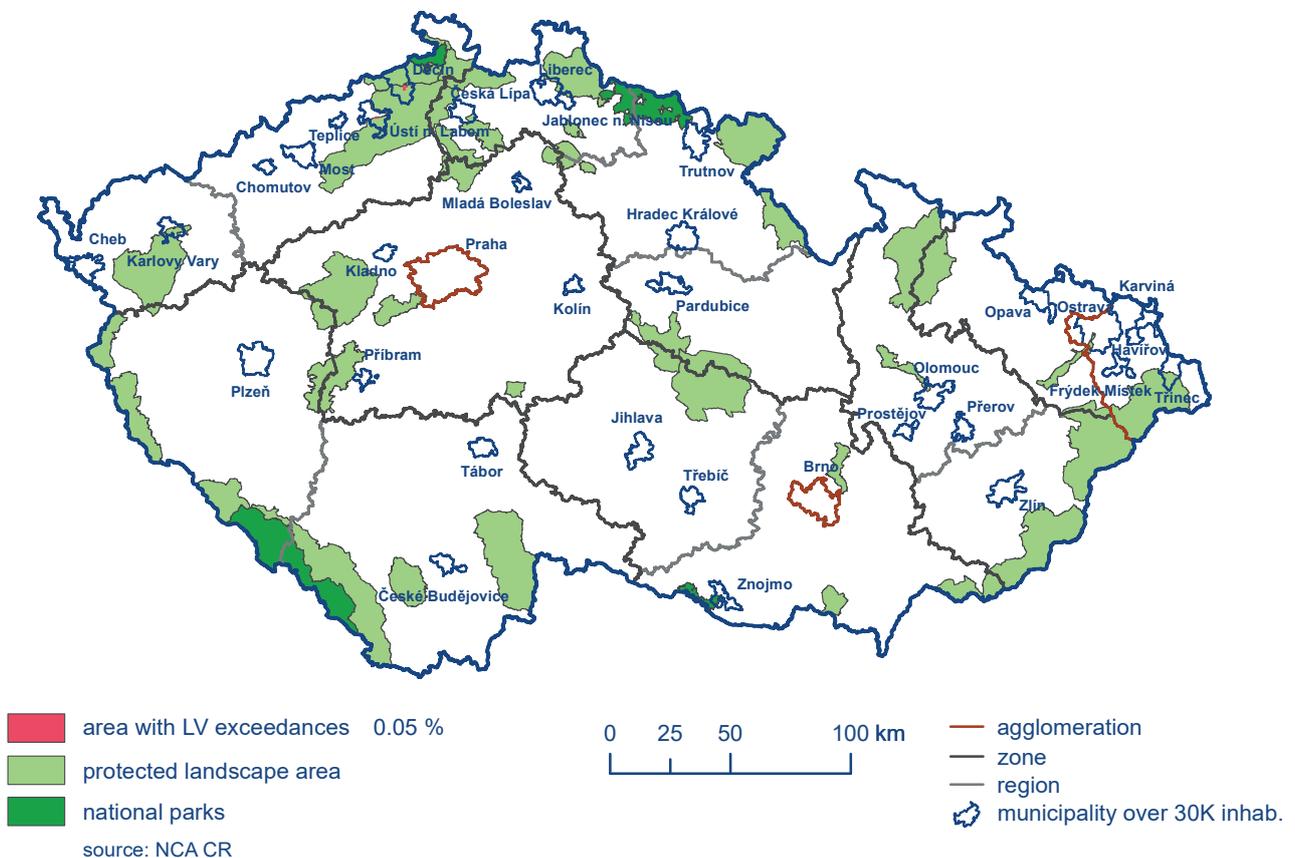


Fig. VII.2.2 Areas with exceeded air pollution limits for ecosystems and vegetation in national parks and protected landscape areas excluding ground-level ozone, 2019

Tab. VII.2.1 Exceedances of the limit value (NO_x and AOT40) for the protection of ecosystems and vegetation within NP and CHKO, % of the territory of NP and CHKO, 2019

National park and protected landscape area	NO _x Annual average > 30 µg.m ⁻³	O ₃ AOT 40 > 18000 µg.m ⁻³ .h	Sum
NP České Švýcarsko	–	100	100
Krkonošský národní park	–	99.9	99.9
NP Podjí	–	100	100
NP Šumava	–	99.5	99.5
CHKO Beskydy	–	0.3	0.3
CHKO Bílé Karpaty	–	98.5	98.5
CHKO Blaník	–	100	100
CHKO Blanský les	–	52.6	52,6
CHKO Brdy	–	100	100
CHKO Broumovsko	–	90.4	90.4
CHKO České středohoří	0.4	99.8	99.8
CHKO Český kras	1	100	100
CHKO Český les	–	82.8	82.8
CHKO Český ráj	–	100	100
CHKO Jeseníky	–	–	–
CHKO Jizerské hory	–	98.2	98.2
CHKO Kokořínsko - Máchův kraj	–	100	100
CHKO Křivoklátsko	–	100	100
CHKO Labské pískovce	–	99.7	99.7
CHKO Litovelské Pomoraví	0.1	81.5	81.6
CHKO Lužické hory	–	99.1	99.1
CHKO Moravský kras	–	100	100
CHKO Orlické hory	–	70.9	70.9
CHKO Pálava	–	100	100
CHKO Poodří	–	–	–
CHKO Slavkovský les	–	97.1	97.1
CHKO Šumava	–	86.1	86.1
CHKO Třeboňsko	–	82.5	82.5
CHKO Žďárské vrchy	–	95.5	95.5
CHKO Železné hory	–	99.6	99.6