VI. SMOG WARNING AND REGULATION SYSTEM

With credentials issued by the Ministry of the Environment (MoE), the CHMI operates the Smog Warning and Regulation System (SWRS). Information provided through this system serves both for issuing warnings of extreme levels of air pollution (smog situations, or local exceeding of threshold values) and for regulating (reducing) the release of pollutants from selected sources significantly affecting ambient air quality in the respective area. The monitored pollutants include PM_{10} suspended particles, sulphur dioxide (SO_2), nitrogen dioxide (NO_2) and ground-level (tropospheric) ozone (O_3).

Since 1 September 2012, the SWRS has been regulated by Act No. 201/2012 Coll., on air protection, and Decree No. 330/2012 Coll., as amended. The respective rules are summarized in Tab. VI.3. When announcing the smog situation and regulation for PM_{10}, SO_2 and NO_2, the expected outlook for the next 24 hours is also evaluated. In contrast, when declaring a smog situation for O_3 and warnings for O_3, NO_2 and SO_2, the expected evolution of concentrations is not assessed and the public is informed, in accordance with Article 13 of Directive 2008/50/EC, immediately after the relevant threshold value is exceeded. For the same reason, exceeding the threshold value at one station is sufficient to announce a smog situation and a warning for ozone.

The current list of SWRS areas is given in Tab. VI.2. Areas and representative stations for PM_{10}, SO_2, and NO_2 (Figs. VI.1, VI.3, and VI.4) are specified by the Bulletin of the MoE, and for O_3 (Fig. VI.2) by the CHMI Director's Directive. Throughout 2021, a list published in the MoE Bulletin No. 4/2021 (MŽP 2021) applied for PM_{10}, SO_2 and NO_2, while for O_3, the list specified by the CHMI Director's Directive No. 2019/12, as amended. Compared to the previously valid lists, the Karviná station (TKARA; representative for PM_{10}, SO_2, NO_2 and O_3) was removed as of 1 January 2021 inclusive due to the commencement of long-term construction activities in the vicinity of the station, which reduced its representativeness and led to a change in classification from background to industrial. Furthermore, on November 6, 2021, the Jihlava (JJIHA) station, representative for PM_{10}, SO_2, NO_2 and O_3, stopped measuring due to the termination of the lease agreement by the landowner. Its exclusion from the list of representative stations was retroactively confirmed by the MoE Bulletin No. 3/2022 (MŽP 2022).

Announced smog situations and regulations (warnings)

In 2021, the only one smog situation was announced due to exceeding the threshold values of suspended PM_{10} particles, namely for the territory of the O/K/F-M agglomeration without Třinec on 27–29 December. Its total duration was 58 h (Tab. VI.1). The threshold values for NO_2 and O_3 were not exceeded at any representative SWRS station. The informative threshold value for SO_2 was exceeded at the Lom station (3 March 2021) and it concerned a single hour in the whole the year.

Synoptic situation during smog situations

27–29 December 2021

On the night of December 25, a cold front crossed the Czech Republic from the north, behind which an anticyclone expanded on the territory. Cold air penetrated the territory from the north and in the north-east of the Czech Republic, the temperature dropped temporarily to –10 °C at 850 hPa pressure level. During 26 December, the anticyclone advanced further east from Central Europe via Ukraine. In the first half of 27 December, a warm front crossed the Czech Republic from the south-west, behind which warmer air began to flow to the territory in the upper atmosphere. This created an inverse air stratification preventing the dispersion of pollutants in the air, leading to increased PM_{10} concentrations, especially in the Ostrava-Karviná region. In the following days, a depression advanced from the Atlantic over western Europe. The associated frontal system quickly occluded and as an occlusion front crossed Moravia and Silesia on the night of 29 December. The mild wind associated with this front led to improved dispersion conditions, which together with occurrence of precipitation caused a subsequent decrease in concentrations.

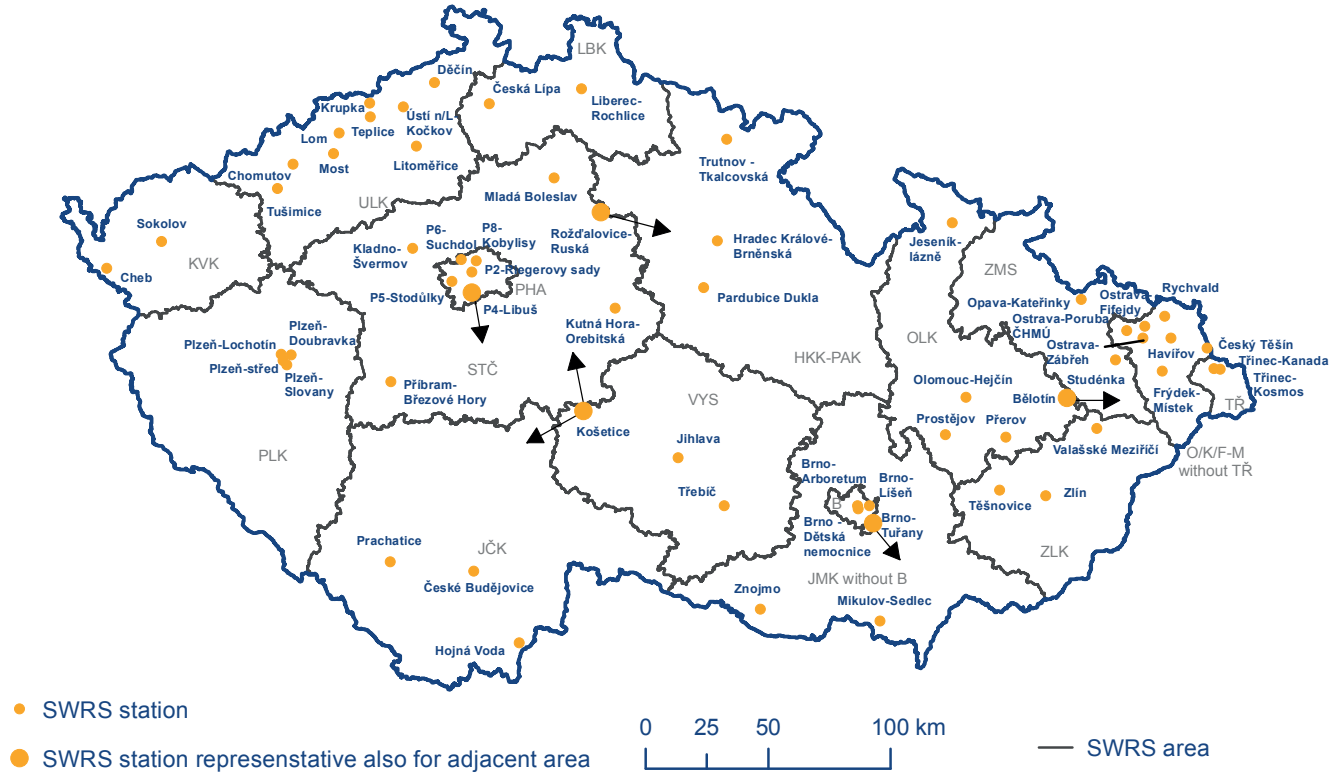

Fig. VI.1 SWRS areas and representative stations for PM_{10} (in effect as of 1 January 2021)

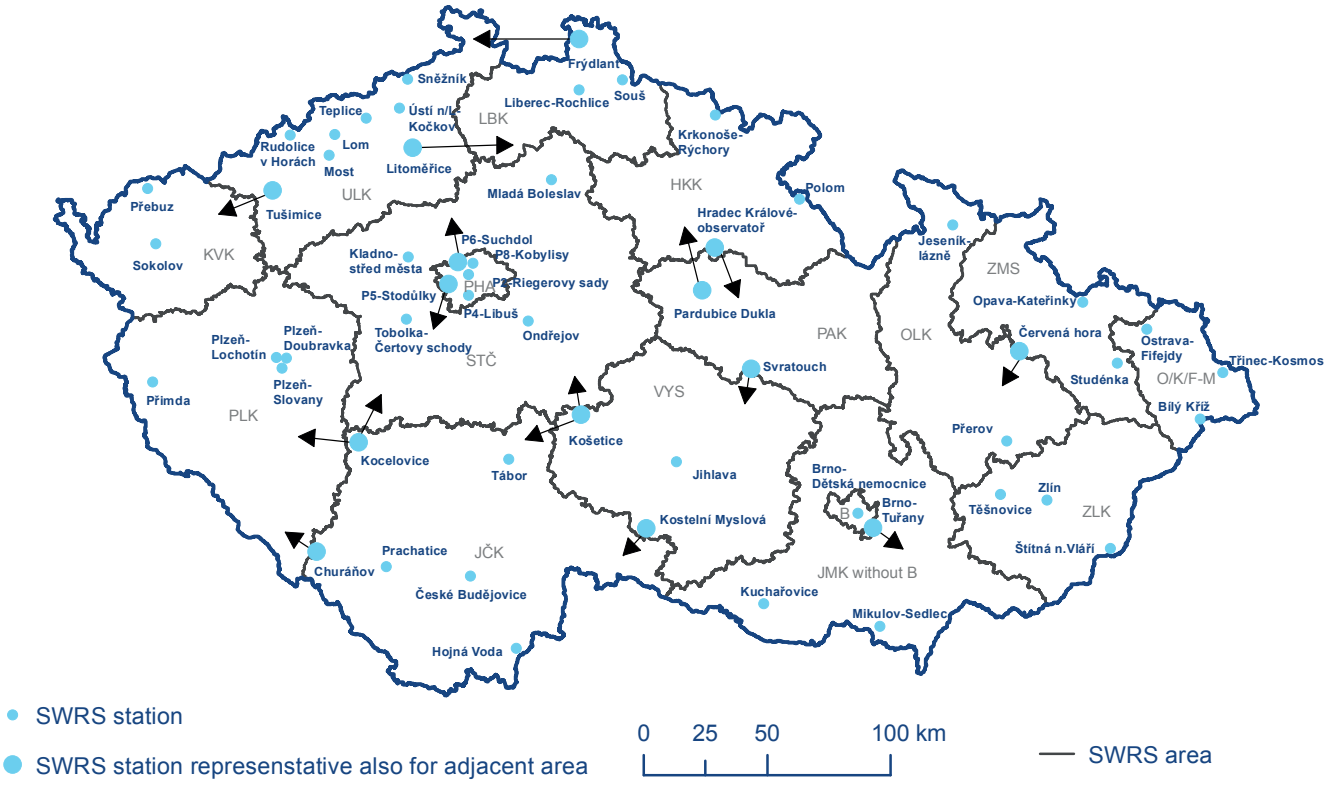

Fig. VI.2 SWRS areas and representative stations for O_3 (in effect as of 1 January 2021)

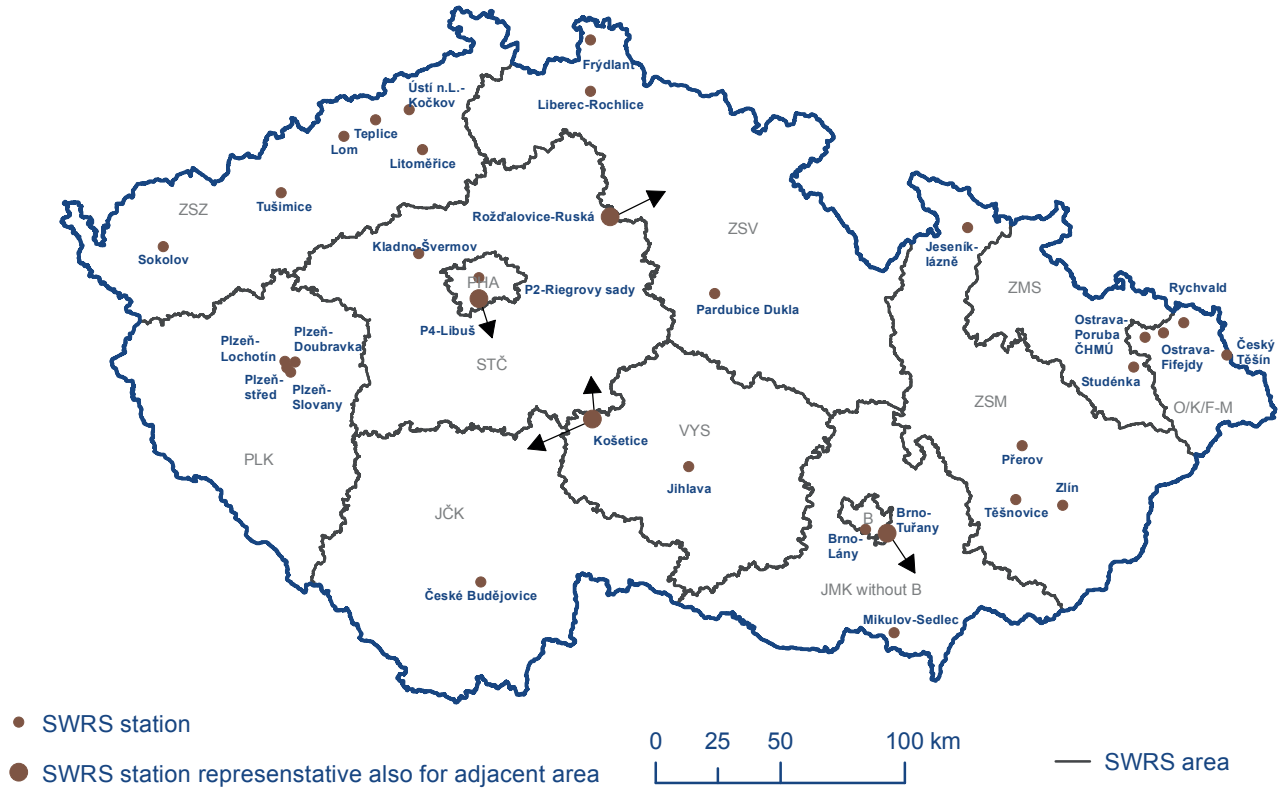

Fig. VI.3 SWRS areas and representative stations for SO_2 (in effect as of 1 January 2021)

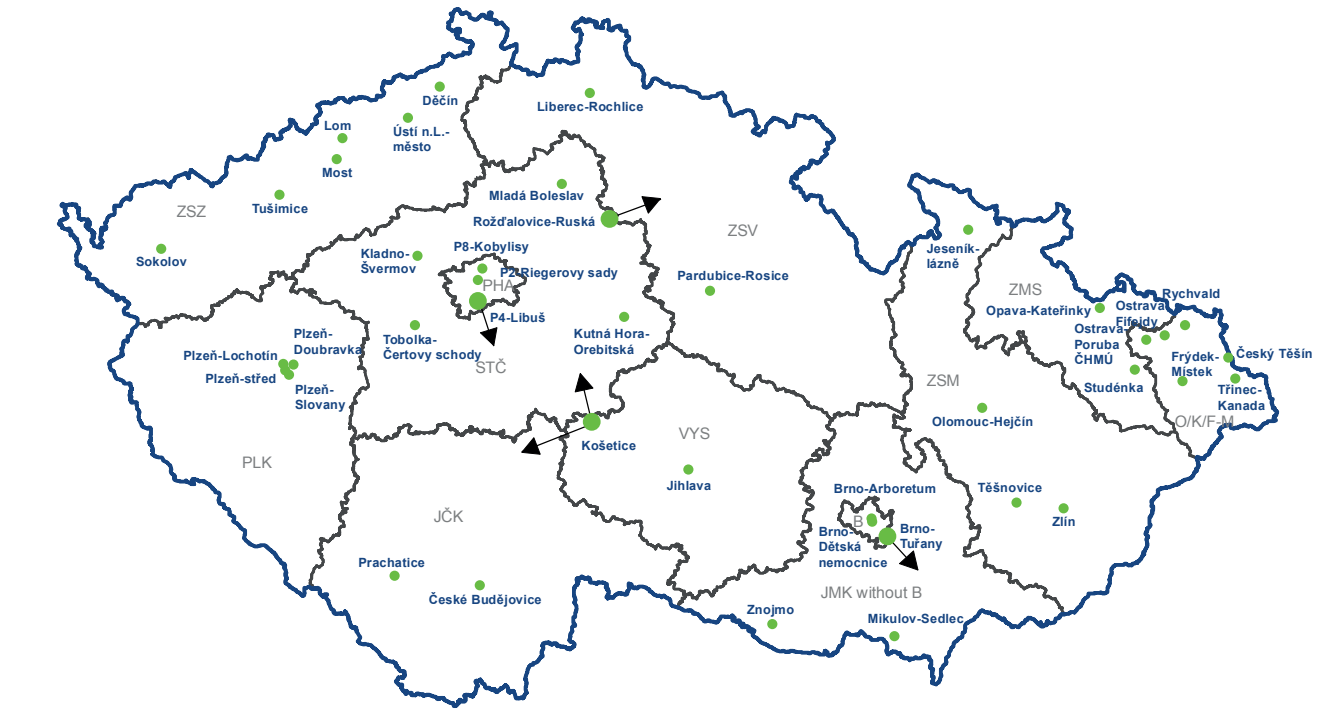

Fig. VI.4 SWRS areas and representative stations for NO_2 (in effect as of 1 January 2021)

Tab. VI.1 Smog situations and regulations for PM_{10} – dates and times of announcement, 2021

Announcement		Cancellation		Duration	
Smog situation	**Regulation**	**Regulation**	**Smog situation**	**Smog situation**	**Regulation**
day and hour CET				**[h]**	
Agglomeration of Ostrava/Karviná/Frýdek-Místek without Třinec area					
27.12.2021 1:51 AM	x	x	29.12. 2021 12:00 PM	58	x

Note: CET – local time, i.e. Central European Time. The duration of the smog situation includes also the duration of the regulation, if announced.

Tab. VI.2 SWRS areas for individual pollutants

Zone / Agglomeration	SWRS area* (abbreviation)		
	SO_2, NO_2	PM_{10}	O_3
Agglomeration of Prague	PHA		
Central Bohemia zone	STČ		
South-western zone	Plzeň region (PLK)		
	South Bohemia region (JČK)		
North-western zone	ZSZ	Ústí nad Labem region (ULK)	
		Karlovy Vary region (KVK)	
North-eastern zone	ZSV	Hradec Králové region and Pardubice region (HKK-PAK)	Hradec Králové region (HKK)
			Pardubice region (PAK)
		Liberec region (LBK)	
South-eastern zone	Vysočina region (VYS)		
	South Moravia region without agglomeration of Brno (JMK without B)		
Agglomeration of Brno	B		
Central Moravia zone	ZSM	Olomouc region (OLK)	
		Zlín region (ZLK)	
Moravia-Silesia zone	ZMS		
Agglomeration of Ostrava/ Karviná/Frýdek-Místek	O/K/F-M	Agglomeration of Ostrava/Karviná/Frýdek-Místek without Třinec area (O/K/F-M without TŘ)	O/K/F-M
		Třinec area (TŘ)**	

* the name of the SWRS area indicated if it differs from the name of the zone or agglomeration
** territory of municipalities with extended powers - Jablunkov (8110) and Třinec (8121)

Tab. VI.3 The rules for the announcement and cancellation of smog situations and regulations (alerts)

Substance	Threshold value			Exceedance duration	Number of stations*	Supplementary condition
	Abbreviation	µg·m^{-3}	Interval			
Announcement of smog situation						
PM_{10}	**IPH**	100	12 h	1 h	50 % (two stations if there are just two of them)	Based on an evaluation of the forecast of meteorological conditions and pollution situation no decrease of the concentration below the informative threshold value can be expected during next 24 hours.
NO_2		200	1 h	3 h	1 station	
SO_2		250				
O_3		180		1 h		---
Announcement of regulation						
PM_{10}	**RPH**	150	1 h	1 h	50 % (two stations if there are just two of them)	Based on an evaluation of the forecast of meteorological conditions and pollution situation no decrease of the concentration below the informative threshold value can be expected during the next 24 hours.
NO_2		400		3 h		
SO_2		500				
Announcement of alert						
O_3	**VPH**	240	1 h	1 h	1 station	---
NO_2	**RPH**	400		3 h		
SO_2	**RPH**	500				
Cancellation						
The smog situation terminates and the regulation is revoked if no measuring site representative for the pollution level in an area of minimum 100 km^2 reports the concentration of polluting substances above the corresponding threshold value and this state lasts continuously for at least 12 hours and no recurrent instance of exceeding the informative, regulatory or warning threshold value can be expected in the next 24 hours based on the meteorological forecast.						
12-hour time interval is being reduced up to 3 hours in a case when meteorological conditions cannot be assessed as leading to the smog situation and recurrent instance of exceeding the informative, regulatory or warning value can almost be excluded in the next 24 hours in accordance with the meteorological forecast.						

* Station must be representative for the pollution level in an area of minimum 100 km^2.
Note: **IPH** – information threshold value, **RPH** – regulatory threshold value, **VPH** – alert threshold value. The requirements for the number of stations are related to the representative stations for the given SWRS area.