

Europe's air quality status 2024

Key messages

- Despite ongoing overall improvements in air quality, current EU standards are still not met across Europe.
- 96% of the EU's urban population is exposed to unsafe concentrations of fine particulate matter (PM_{2.5}).
- The new EU air quality standards introduced in the revised ambient air quality directive -proposed to come into force in 2030- are more ambitious than the current ones.

This briefing is one in a series to be published by the EEA as part of the Air quality in Europe 2024 package.

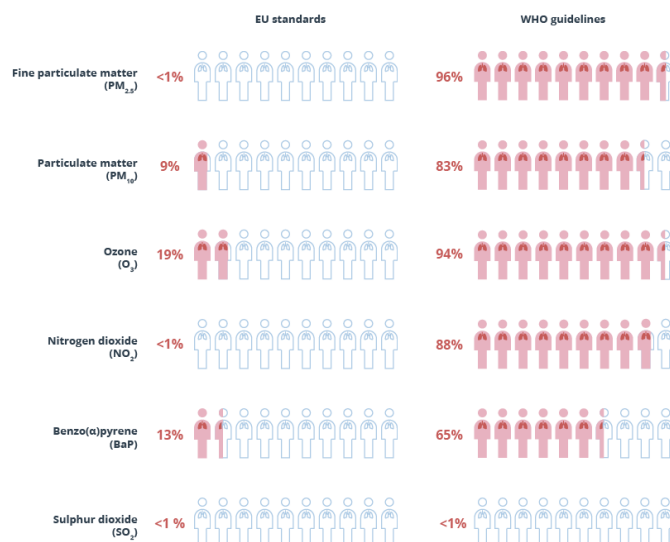
It assesses concentrations of air pollutants in ambient air across Europe, comparing them against current EU standards and the 2021 WHO global air quality guidelines. The EU standards were set out in the 2004 and 2008 ambient air quality directives.

Under the European Green Deal (EGD)'s zero pollution action plan, the European Commission set the interim 2030 goal of reducing the number of premature deaths caused by fine particulate matter (PM_{2.5}, a key air pollutant) by at least 55% compared with 2005 levels. The ultimate objective is for air pollution to have no significant impact on health by 2050. To this end, the Commission published a proposal to review the ambient air quality directives in 2022. Among other things, it aimed to align the air quality standards more closely with WHO recommendations.

Co-legislators agreed to more ambitious EU air quality standards in February 2024. However, they are still less strict for all pollutants than what the WHO outlines in their air quality guideline levels.

In 2022, despite ongoing reductions in emissions, most of the EU's urban population continued to be exposed to levels of key air pollutants that are damaging to health (see Figure 1). In particular, almost all of the urban population was exposed to concentrations of PM_{2.5} above the 2021 WHO annual guideline level of 5µg/m³ and to concentrations of ozone (O₃) above the short-term guideline level of 100µg/m³.

Figure 1. Share of the EU urban population exposed to air pollutant concentrations above certain EU standards and WHO guidelines in 2022



Notes: Exposure above EU standards: the EU urban population is exposed to PM_{2.5} annual concentrations above 25µg/m³; PM₁₀ daily concentrations above 50µg/m³ for more than 35 days per year; O₃ maximum daily 8-hour mean concentrations above 120µg/m³ for more than 25 days per year; NO₂ annual concentrations above 40µg/m³; Benzo[a]pyrene (BaP) annual concentrations above 1ng/m³; and Sulphur dioxide (SO₂) daily concentrations above 125µg/m³ for more than three days per year.

Exposure above WHO guidelines: the EU urban population is exposed to PM_{2.5} annual concentrations above 5µg/m³; PM₁₀ annual concentrations above 15µg/m³; O₃ maximum daily 8-hour mean concentrations exceeding 100µg/m³ for more than 3-4 days per year; NO₂ annual concentrations above 10µg/m³; BaP annual concentrations above 0.12ng/m³; and SO₂ daily concentrations above 40µg/m³ for more than three or four days per year.

Source: EEA, 2024.

Methodology

This analysis highlights pollutants deemed most harmful to human health and those that most frequently exceed the current EU air quality standards and WHO guideline levels. The concentrations are obtained from monitoring station measurements and are officially reported to the EEA by its members and other collaborating countries[1]. The classification of the monitoring stations and the criteria used to determine their inclusion in the analysis are described here. The number of countries that submitted data and the number of monitoring stations with the minimum data coverage required vary for each pollutant. This is summarized in Table 1 for 2022 and Table 2 for 2023. When referring to countries reporting data above certain levels, it means that they reported at least one station with concentrations that surpassed them.

Data for 2022 and 2023 were extracted from the EEA's reporting system on 5 March 2024.

The analysis for 2022 is based on officially validated data reported by countries. The analysis for 2023 is based on provisional up to date (UTD) data. It may change once fully validated data is received by the EEA and more countries are considered. Validated data for 2023 will only be available later in 2024 and will be presented in the 2025 briefing.

Additional information and further analysis are available in the Eionet status reports ETC/HE 2024/3 (Targa et al., 2024a) and ETC/HE 2024/5 (Targa et al., 2024b), prepared by the European Topic Centre on Human Health and the Environment (ETC HE).

Further information on the concentrations of air pollutants, including those for previous years, can be found at the EEA's statistics viewer. Data can be downloaded [here](#).

Apart from the measurements from monitoring stations, some countries also reported 2022 official data from modelling applications, which are available from the Air Quality Modelling Viewer. The results from these modelling applications have been included in this analysis where they implied concentrations above the EU standards.

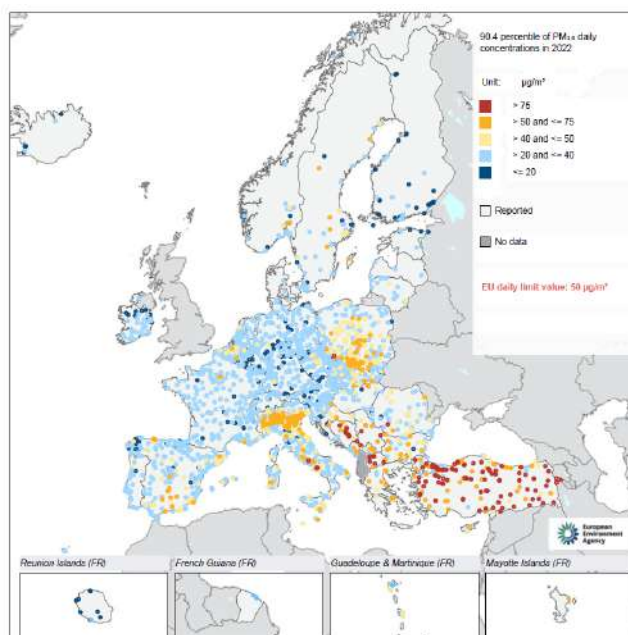
Navigate the tabs for information on each pollutant:

PM10 PM2.5 Ozone NO2 BaP Other pollutants

PM₁₀ stands for particulate matter with a diameter of 10µm or less. PM₁₀ is emitted mainly by the combustion of solid fuels for domestic heating, although industrial activities, agriculture and road transport are also important sources. Some also come from natural sources such as sea salt, Saharan dust or volcanoes, and some (secondary PM) form in the atmosphere as a combination of different gases (for instance, ammonia and nitrogen dioxide). Member States can discount the contribution of natural sources to the total concentrations for compliance assessments as these sources are out of their control, but we do not exclude these sources in this status analysis.

Concentrations above the EU daily limit value for PM₁₀ are seen mainly in Italy and some eastern European countries (Map 1 and Figure 3). In most central and eastern European countries, solid fuels such as coal and wood are widely used for heating households and in some industrial facilities and power plants. The Po Valley in northern Italy is a densely populated and industrialized area with specific meteorological and geographical conditions that favor the accumulation of air pollutants in the atmosphere. Some concentrations are also above the EU daily limit value in southern Spain and the Canary Islands, mainly due to the natural contributions of Saharan dust (MITECO, 2023).

Map 1. Concentrations of PM₁₀ in 2022 and 2023 in relation to the EU daily limit value



Note: The map shows the 90.4th percentile of the PM₁₀ daily mean concentrations, representing the 36th-highest value in a complete series. It is related to the PM₁₀ daily limit value, allowing 35 exceedances of the 50µg/m³ threshold over one year.

Source: EEA’s AQ e-reporting database.

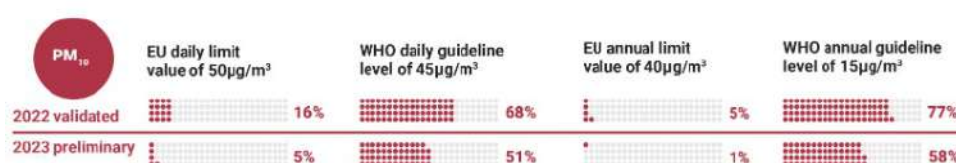
Table 3. Country status for PM₁₀ in 2022 and 2023

Number of countries/Member States > EU daily limit value (50µg/m ³)	23/16	15/12
Number of countries/Member States > EU annual limit value (40µg/m ³)	9/4	6/3
Number of countries/Member States > WHO daily guideline level (45µg/m ³)	37 ^(a) /27	34 ^(c) /26
Number of countries/Member States > WHO annual guideline level (15µg/m ³)	35 ^(b) /26	35 ^(a) /27

Note: (a) all the reporting countries; (b) all the reporting countries except Estonia and Iceland; (c) all the reporting countries except Luxembourg.

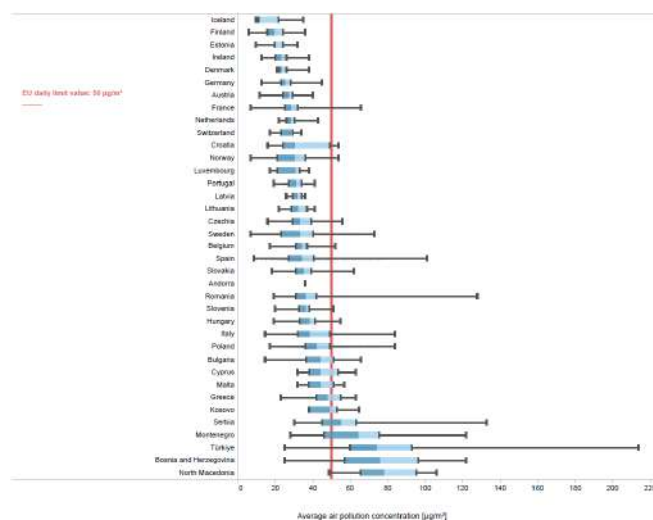
Source: EEA’s AQ e-reporting database.

Figure 2. Percentage of reporting monitoring stations registering PM₁₀ concentrations above the EU limit values and the WHO guideline levels in 2022 and 2023



In 2022, 16% of monitoring stations measured concentrations of PM₁₀ above the EU daily limit value (Figure 2), 84% of which were urban and 12% suburban. Furthermore, Italy and Poland reported 2022 exceedances of the PM₁₀ daily limit value based on assessment models for 7 and 13 air quality zones, respectively.

Figure 3. PM₁₀ concentrations in 2022 by country in relation to the EU daily limit value



Note: The figure shows, per country, the average concentrations of each reported station; the minimum and maximum concentrations; the median and the 25th and 75th percentiles of all the measurements (90.4th percentile of the PM₁₀ daily mean concentrations).

Notes

[1] The 27 European Union Member States, plus Iceland, Liechtenstein, Norway, Switzerland and Türkiye. The six West Balkan countries are cooperating countries. These include Albania, Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia and Kosovo (the designation is without prejudice to position on status and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo Declaration of Independence). Andorra reports data on a voluntary basis.

[2] The Average Exposure Indicator (AEI) is based on a three-year average measured at urban background stations. The AEI for 2022 is based on 2020-2022. It assesses the general population's long-term exposure in urban areas.

[3] As well as the EU-27, Iceland and Norway also reported an AEI₂₀₂₂ below the exposure concentration obligation. The AEI₂₀₂₂ estimated for Switzerland, Andorra, Kosovo, Türkiye and Montenegro was also below the exposure concentration obligation. On the contrary, the estimated AEI₂₀₂₂ for Serbia, North Macedonia, and Bosnia and Herzegovina was above the exposure concentration obligation.

[4] Plus Iceland and Norway.

[5] The 99.18th percentile of the daily values has been considered, meaning three days of exceedance per year.