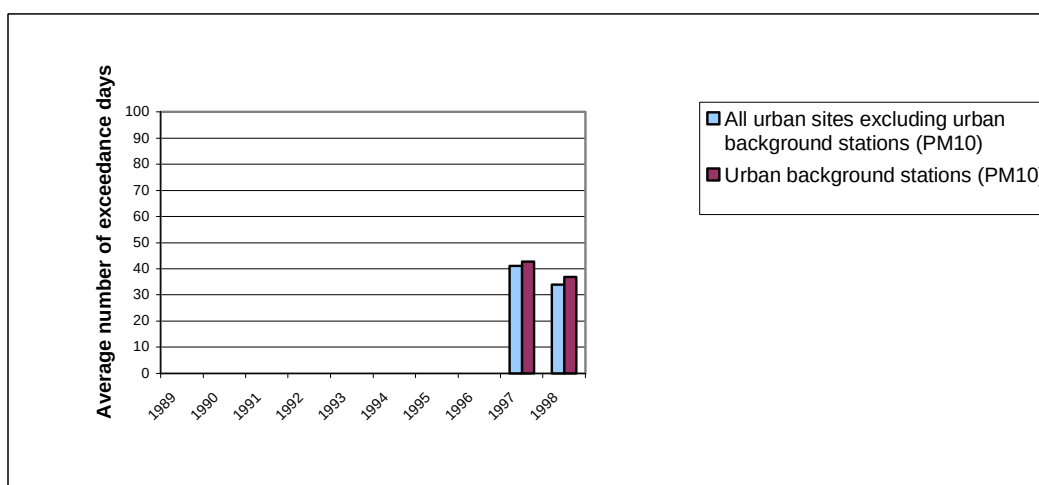
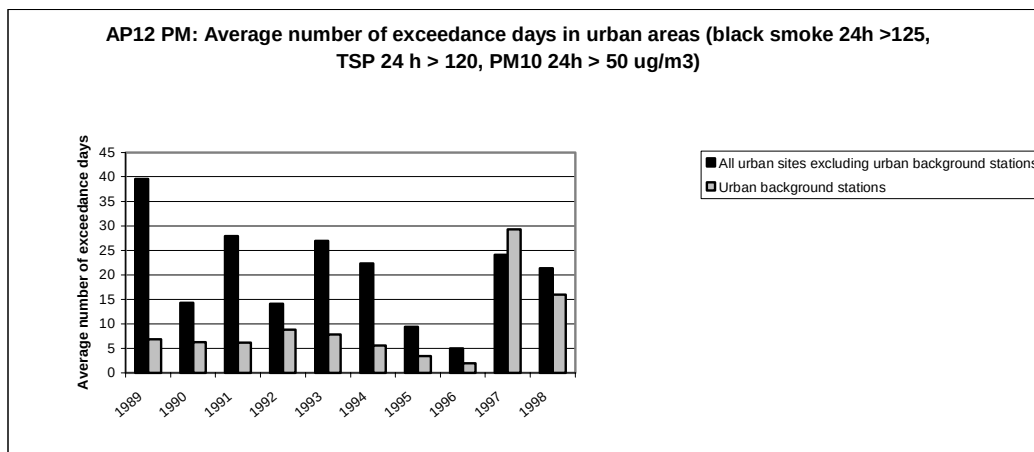




Indicator Fact Sheet Signals 2001 – Air Pollution

AP12b Exceedance days of air quality threshold value of Particulate Matter



Title: Average number of exceedance days of particulate matter exceeding EC threshold values.

Notes: Exceedance days are defined as days with black smoke (BS) 24-hours average concentrations above 125 µg/m³, Total Suspended Particles (TSP) 24-hours average above 120 µg/m³, PM₁₀ 24-hours average above 50 µg/m³. Number and set of cities and measuring methods vary from year to year, and this may cause much of the year-to-year variation. The ambient concentrations of suspended particles have been monitored over the years by widely different techniques, which precludes conclusions on a possible trend. The increase after 1996 is mainly due to the introduction of PM₁₀ data into the statistics. Only for the most recent years are monitoring data on fine particulates (PM₁₀) available to a significant extent; these are shown separately in the lower diagram.

Source: EEA-ETC/AQ

⊗ A large fraction of the urban population is exposed to levels of fine particulate matter in excess of threshold values set for the protection of human health.

Results and assessment

Relevance of the indicator for describing developments in the environment

Breathing in fine particulate matter at concentrations commonly occurring in large parts of Europe can have adverse effects on human health. The impact is associated with PM₁₀ (particulate matter with diameter less than 10 µm) or even smaller particles. Inhalation of such particles can increase the frequency and severity of respiratory symptoms and the risk of premature death. Particles result partly from the same emissions that cause acidification; they may also play a role in global climate change, having a regional cooling effect.

Policy relevance and policy references

The recently-adopted Daughter Directive for sulphur dioxide, oxides of nitrogen, particulate matter and lead in ambient air (Council Directive 1999/30/EC) sets a limit value for PM₁₀ of 50 µg/m³ (24-h average), not to be exceeded more than 35 times a calendar year. Note that if the average number of exceedance days as shown in this indicator is below 36, there may still be individual stations where the limit value is not met. Previously, limit values for suspended particles were set in Council Directive 80/779/EEC: 150 µg/m³ annual average, measured as Total Suspended Particulates (TSP) and 100-150 µg/m³ 24-h average, measured as Black Smoke. The threshold values used here are based on the WHO recommendations (WHO, 1987, Air Quality guidelines for Europe).

Assessment

PM₁₀ in the atmosphere can result from direct emissions (primary PM₁₀) or emissions of particulate precursors (nitrogen oxides, sulphur dioxide and ammonia) which are partly transformed into particles by chemical reactions in the atmosphere (secondary PM₁₀). Emissions of the gaseous precursors for secondary PM₁₀ are being reduced by enforcement of EU legislation and UN-ECE CLRTAP protocols (see indicators AP1 and AP2). Application of abatement techniques to reduce precursor emissions often also reduces the primary particulate emissions. Other measures (e.g. traffic measures from Auto-Oil-I, waste incineration directives) should further reduce PM₁₀ emissions.

Suspended particle measurements

The data on exposures are presented in terms of the limit values for suspended particles set in Council Directive 80/779/EEC, which are based on WHO recommendations. The averaging procedure is as for ozone. It is, however, difficult to derive any conclusions on trends, because ambient concentrations of suspended particles have been monitored over the years by widely different techniques, and monitoring of PM₁₀ has only started recently. The apparent increase after 1996 is due mainly to the inclusion of recent PM₁₀ monitoring data. However, the number of monitoring stations is still small and may not be representative. Measured PM₁₀ concentrations may also be affected by weather conditions so no conclusions should be drawn from the apparent slight decrease from 1997 to 1998. In spite of all these limitations the indicator may serve to underpin the conclusion formulated in the box above and demonstrate the need to harmonise particle monitoring in Europe.

Despite the likely future reductions in emissions, concentrations of PM₁₀ in most of the urban areas in the EEA are expected to remain well above the limit values in the near future.

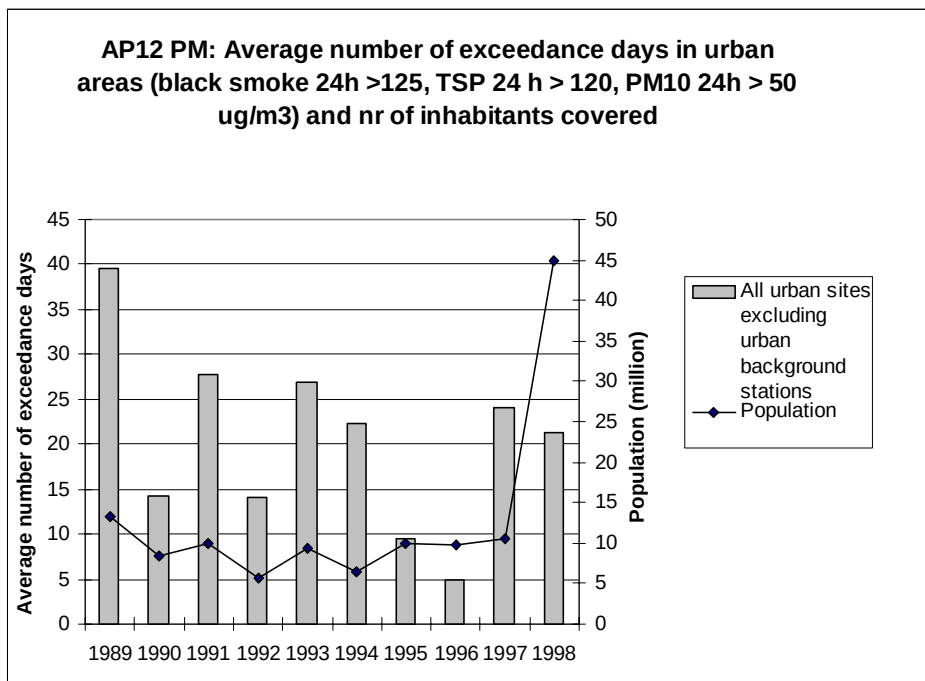
PM₁₀ measurements

Measurements of PM₁₀ are presented for the years 1997 and 1998. These include consistent measurements in the same stations (47) in Belgium, United Kingdom, The Netherlands and Finland. Unfortunately, the number of stations is very limited but this sample represents the only consistent set of measurements over more than one year for PM₁₀ in urban stations in Europe existing in the Airbase. Indications on possible trends on PM might be drawn in future years as additional data on PM₁₀ levels becomes available.

Data

AP12: AV. Nr OF DAYS WITH EXCEEDANCE OF LIMIT VALUES FOR PARTICULATE MATTER										
A: ALL URBAN STATIONS EXCLUDING URBAN BACKGROUND STATIONS										
POPULATION (IN MILLIONS) REFERS TO THE POPULATION IN CITIES WITH AT LEAST ONE STATION										
Exceedance days	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Austria							3.46	3.50		7.27
Belgium									41.14	29.7
Belgium									0.11	
Denmark	37.75				29.50	21.00	7.00	26.00	3.50	1.33
Finland									7.00	20.8
France	5.00									
France	1.00									
Germany										87
Germany	7.00	1.17								2.88
Greece	78.00	58.00	29.00	32.00	114.00	78.50	45.00		26.20	
Iceland										
Ireland	13.00	13.00	8.00	7.50	2.00	1.50	0.00	0.00		
Italy										0
Liechtenstein										
Luxembourg										
Netherlands									95.60	72.2
Netherlands		7.00	42.00		5.00	10.00	9.00	5.00	0.33	0.33
Norway										
Portugal										
Spain	162.33	5.67	19.17	14.00	11.14		1.50	0.29		22.49
Spain	52.00		68.00				0.00	0.00		
Sweden										
United Kingdom										0.019
United Kingdom	0.00	1.00	1.00	3.00	0.00	0.67		0.00	19.20	11.5
Average	39.56	14.31	27.86	14.13	26.94	22.33	9.42	4.97	24.14	21.29
Ex.Urb. PM10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.04	33.86
Urb. PM10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.74	36.79
Population	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Austria							2.10	2.10		2.41
Belgium									1.91	1.91
Belgium									0.87	
Denmark	1.78				1.48	1.48	0.18	1.48	1.48	1.68
Finland									0.54	0.8
France	0.30									
France	2.10									
Germany										0.05
Germany	1.10	0.75								14.13
Greece	2.00	2.00	2.00	2.00	2.00	2.00	2.00		2.00	
Iceland										
Ireland	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13		
Italy										2.97
Liechtenstein										
Luxembourg										
Netherlands									1.10	1.1
Netherlands		0.23	0.23		0.23	0.23	0.23	0.23	0.31	0.31
Norway										
Portugal										
Spain	2.30	2.75	4.00	2.00	4.00		4.00	4.00		6.2
Spain	1.05		0.60				0.30	0.30		
Sweden										
United Kingdom										9.98
United Kingdom	1.43	1.43	2.00	0.53	0.53	1.53		0.53	2.32	3.33
Total	13.20	8.30	9.96	5.66	9.37	6.37	9.95	9.77	10.53	44.87

Notes: that the exceedance statistics are based on a combination of particulate-related air quality parameters: black smoke (BS), Total suspended particulates (TSP) and PM₁₀. Both for ambient levels as well as for limit values, there is no one-to-one relation between these three parameters. The monitoring method is indicated in the column titled Param. A dash (-) indicates that no measurements in urban area are available.



Notes: the number of reporting monitoring stations and therewith the population living in cities for which information is available varies from year to year.

Meta data

Technical information

1. *Data sources*

A subset of the EUROAIRNET monitoring stations stored in the European air quality database AIRBASE;

Urban population data from AIRBASE/APIIS .

2. *Description of data*

Air quality data (1h or 24 h) are selected from all urban stations;

3. *Geographical coverage*

EEA 18 countries (as far as data are available)

4. *Temporal coverage*

1989-1998

5. *Methodology and frequency of data collection*

Data are collected and stored annually using the AIRBASE Data Exchange Module

6. *Methodology of data manipulation*

Calculation (mostly from hourly data) of average number of exceedance days per city, as total number on all stations divided by number of stations. Only time series with a data capture of at least 75 % are used. The selected urban stations include station types *traffic*,

industrial and *unknown* and exclude the *urban background stations*. This implies that generally the worst air quality situations are considered. Population is taken from AIRBASE directly, or calculated as median from APIS population class data. Calculation (for cities with measurement data) by population weighted addition of city averages to national totals.

Quality information

7. *Strength and weakness (at data level)*

Most data are officially submitted to the Commission under the Exchange of Information Decision. Most of the data are validated. Station characteristics and representativeness is often insufficiently documented and coverage of territory and in time is incomplete.

8. *Reliability, accuracy, robustness, uncertainty (at data level)*

The number of PM₁₀ time series (and number of years) available is yet too small to generate fully an indicator trend. This is the reason why also BS and TSP measurements have been used in the indicator for particulate matter. The scatter in the indicator is caused by changes in pollutant (BS, TSP or PM₁₀) and in monitoring techniques as well as in the set of cities and stations from year to year. The threshold values for daily average concentrations (PM₁₀: 50µg/m³ according to EU Directive; BS: 125µg/m³ and TSP: 120µg/m³, both according to WHO AQ Guidelines) are not equivalent. For the last two data years (1997 and 1998), PM₁₀ data only allow a preliminary trend analysis to be made.

The number of available data series varies considerably from year to year and for some years is very low. The translation into urban population covered partially compensates the deficit. The data is generally not representative for the total urban population in a country. Availability of data before 1990 is too limited to include in the indicator; data for non-EU countries is missing. Locally, the indicator is subject to large year-to-year variations due to meteorological variability. When averaging over EEA18 this meteorologically-induced variation decreases in importance provided spatial data coverage is sufficient.

Due to deficiencies in information on station characteristics, the selection of urban sites might not always result in a representative selection of polluted zones. The representativeness of the selection will differ from city to city, which hampers intercomparisons.

It is not possible in this stage to select a sufficiently large set of stations covering the entire time period since the stations with available data change from year to year. The indicator may be biased due to insufficient representative coverage of the pollution situation.

9. *Further work required (for data level and indicator level)*

Better coverage in space and time by better national reporting is expected for the future. Better documentation of station representativeness and measuring accuracy is needed. Co-ordination with OECD air pollution indicator work has been initiated.