Air pollution fact sheet 2013

Portugal

European Environment Agency

Design and cover photo: EEA
Layout: EEA

Information about the European Union is available on the Internet. It can be accessed through the Europa server (www.europa.eu).

European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark
Tel.: +45 33 36 71 00
Fax: +45 33 36 71 99
Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

Introduction

Air pollution harms human health and the environment. In Europe, emissions of many air pollutants have decreased substantially in recent decades, resulting in improved air quality across the region. However, air pollutant concentrations are still too high, and air quality problems persist.

This fact sheet presents compiled information based on the latest official air pollution data reported by the European Environment Agency's (EEA) member countries. A comprehensive overview of information about Europe's air quality is also published each year by the EEA in the report 'Air quality in Europe'. A number of other publications addressing air pollution are also published by the EEA each year. Information on the data sources used is provided at the back of this fact sheet, together with a glossary explaining the various abbreviations and acronyms used throughout.

Air pollutant emissions and projections

Air pollutants are emitted from a range of both man-made and natural sources including:

- burning of fossil fuels in electricity generation, transport, industry, and households;
- industrial processes and solvent use, for example in the chemical and mining industries;
- agriculture;
- waste treatment;
- natural sources, including volcanic eruptions, windblown dust, sea-salt spray and emissions of volatile organic compounds from plants.

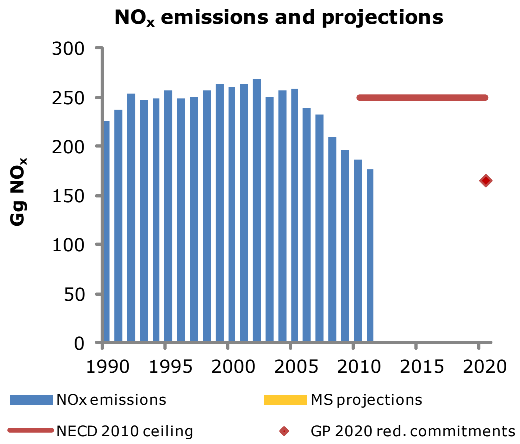
For EU Member States, the National Emission Ceilings Directive (NEC Directive) sets emission ceilings (or limits) for the year 2010 and thereafter for man-made emissions of four key air pollutants (nitrogen oxides, sulphur dioxide, non-methane volatile organic compounds, and ammonia). These pollutants harm human health and the environment. Information concerning the revision of the NEC Directive is available on the website of the European Commission's DG Environment here. Internationally, the issue of air pollution emissions is also addressed by the UNECE Convention on Long-range Transboundary Air Pollution (the LRTAP Convention) and its protocols. The Gothenburg 'multi-pollutant' protocol under the LRTAP Convention was amended in May 2012. In addition to emission ceilings for 2010 (that for the EU Member States, are either equal to or less ambitious than those in the EU NEC Directive), the revised protocol now includes emission reduction commitments for 2020 expressed as a percentage of 2005 emissions. The revised Protocol also introduced a 2020 emission reduction commitment for $PM_{2.5}$.

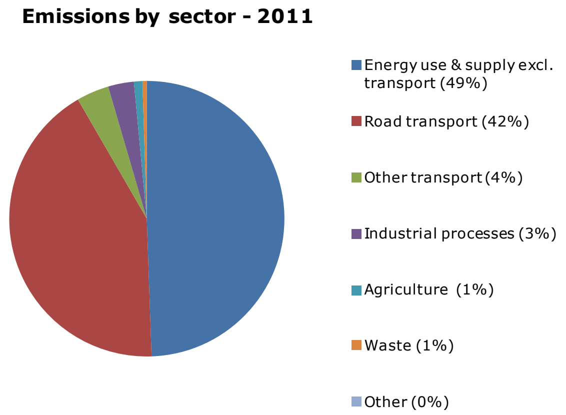
The following section shows information on the past emission trends of key air pollutants. It also compares the latest reported data with respective national ceiling limits and, shows (where this information is available) information on the expected level of future emissions.

Box 1. Facts about air pollutants

Pollutant	Description and sources	Health and environment effects
Sulphur dioxide (SO_2)	SO_2 is formed by oxidation of sulphur (S), mainly through combustion of fuels containing S. The electricity generation sector is the most important source of SO_2. SO_2 also can contribute to the formation of secondary sulphate particles in the atmosphere.	SO_2 aggravates asthma and can reduce lung function and inflame the respiratory tract. It can cause headache, general discomfort and anxiety. SO_2 contributes to acid deposition, the impacts of which can be significant, causing damage to forests and ecosystems in rivers and lakes.
Nitrogen oxides (NO_x)	NO_x is emitted during fuel combustion e.g. from industrial facilities and the road transport sector. NO_x is a group of gases comprising nitrogen monoxide (NO) and nitrogen dioxide (NO_2). NO makes up the majority of NO_x emissions. NO_x contributes to the formation of ozone and particulate matter.	NO_2 is associated with adverse effects on health: it can affect the liver, lung, spleen and blood. It can also aggravate lung diseases leading to respiratory symptoms and increased susceptibility to respiratory infection. As with SO_2, NO_x contributes to acid deposition but also to eutrophication of soil and water.
Particulate matter (PM)	PM is a mixture of aerosol particles (solid and liquid) covering a wide range of sizes and chemical compositions. PM_{10} ($PM_{2.5}$) refers to particles with a diameter of 10 (2.5) micrometres or less. PM is either directly emitted as primary particles or it forms in the atmosphere from emissions of SO_2, NO_x, NH_3 and NMVOCs. PM is emitted from many anthropogenic sources, including both combustion and non-combustion sources. Important natural sources of PM are sea salt and natural re-suspended dust.	PM can cause or aggravate cardiovascular and lung diseases, heart attacks and arrhythmias. It can also affect the central nervous system and the reproductive system, and can cause cancer. One outcome of exposure to PM can be premature death. PM also acts as a greenhouse gas, mainly cooling the earth's climate, although in some cases it can lead to warming. PM in the atmosphere can also alter rainfall patterns, and affect the surface albedo properties of snow (the extent to which the snow reflects light).
Ozone (O_3)	Ground-level (tropospheric) ozone is not directly emitted into the atmosphere. Instead, it forms in the atmosphere from a chain of chemical reactions following emissions of certain precursor gases: NOx, carbon monoxide (CO) and NMVOCs and methane (CH_4).	Elevated levels of ozone can cause respiratory health problems, including decreased lung function, aggravation of asthma, and other lung diseases. It can also lead to premature mortality. Ozone is also a greenhouse gas contributing to warming of the atmosphere.
Ammonia (NH_3)	The vast majority of NH_3 emissions come from the agricultural sector, in connection with activities such as manure storage, slurry spreading, and the use of synthetic nitrogenous fertilisers. It also contributes to the formation of secondary particles.	Exposure to high levels of ammonia may irritate skin, eyes, throat, and lungs and cause coughing. People with asthma may be more sensitive to breathing ammonia than others. NH_3, like NO_x, contributes to eutrophication and acidification.
Non methane volatile organic compounds (NMVOCs)	NMVOCs produce photochemical oxidants by reacting with NO_x in the presence of sunlight. Anthropogenic NMVOCs are emitted from sources including paint application, road transport, dry-cleaning and other solvent uses. Biogenic NMVOCs are emitted by vegetation, with the amounts emitted dependent on species and on temperature.	NMVOCs include a variety of chemicals. Certain NMVOC species, such as benzene (C_6H_6) and 1,3-butadiene, are directly hazardous to human health. NMVOCs are also precursors of ground-level ozone.
Carbon monoxide (CO)	CO is emitted due to incomplete combustion. Important sources of CO include road transport, businesses, households, and industry. CO reacts with other pollutants producing ground-level ozone.	CO can lead to heart disease and damage to the nervous system. It can also cause headache, dizziness and fatigue.
Methane (CH_4)	CH_4 is produced by both anthropogenic and natural sources. Significant anthropogenic sources include the agriculture sector (from the enteric fermentation of CH_4 from livestock), the waste sector, and 'fugitive' emissions from coal mining and gas.	Methane is an important greenhouse gas, and is one of the gases controlled under the UNFCCC's Kyoto protocol. At the regional and global scale methane also contributes to the formation of ground level ozone.

Nitrogen oxides (NO_x) — Portugal



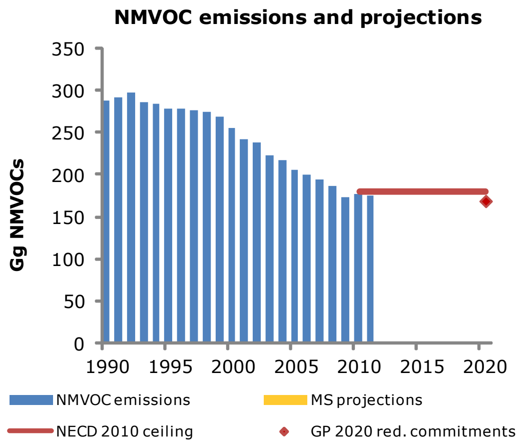


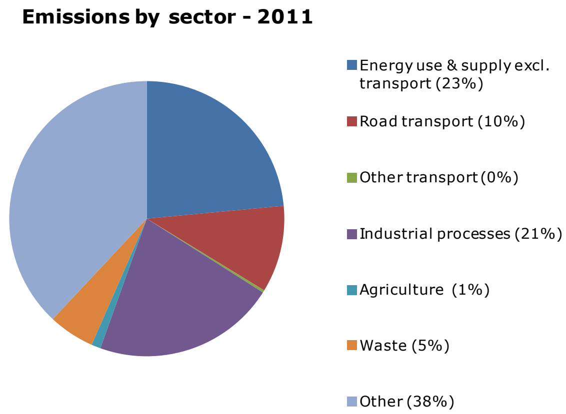
Progress towards ceilings

Current and projected progress towards ceilings	Value	Unit	
2010 NECD emission ceiling for NO_x	250	(Gg)	
2020 Gothenburg protocol (GP) reduction commitment for NO_x	166*	(Gg)	
2015 WM projections	n/a	(Gg)	
2020 WM projections	n/a	(Gg)	
	Absolute	**Unit**	**Relative (%)**
Distance of latest year NO_x emission data to emission ceiling in 2020	10	(Gg)	6
Trend of total NO_x emissions 1990-2011	- 51	(Gg)	- 22
Trend of total NO_x emissions 2001-2011 for comparison with air quality trends	- 88	(Gg)	- 33

* calculated based on the percentage emission reduction commitment for 2020 expressed relative to 2005 emissions

Non methane volatile organic compounds (NMVOCs) — Portugal



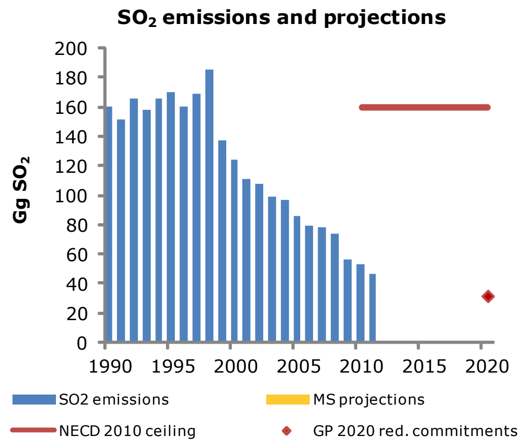


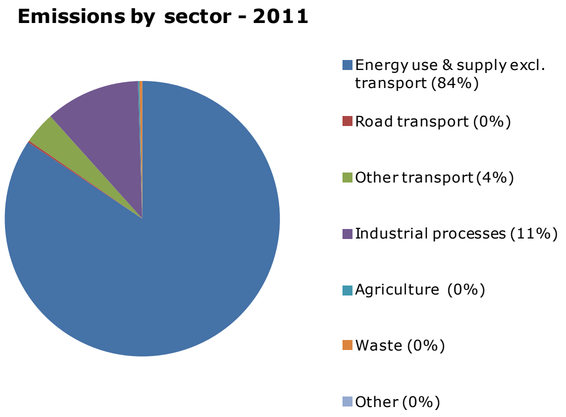
Progress towards ceilings

Current and projected progress towards ceilings	Value	Unit	
2010 NECD emission ceiling for NMVOCs	180	(Gg)	
2020 Gothenburg protocol (GP) reduction commitment for NMVOCs	169*	(Gg)	
2015 WM projections	n/a	(Gg)	
2020 WM projections	n/a	(Gg)	
	Absolute	**Unit**	**Relative (%)**
Distance of latest year NMVOC emission data to emission ceiling in 2020	7	(Gg)	4
Trend of total NMVOC emissions 1990-2011	- 113	(Gg)	- 39
Trend of total NMVOC emissions 2001-2011 for comparison with air quality trends	- 65	(Gg)	- 27

* calculated based on the percentage emission reduction commitment for 2020 expressed relative to 2005 emissions

Sulphur dioxide (SO_2) — Portugal



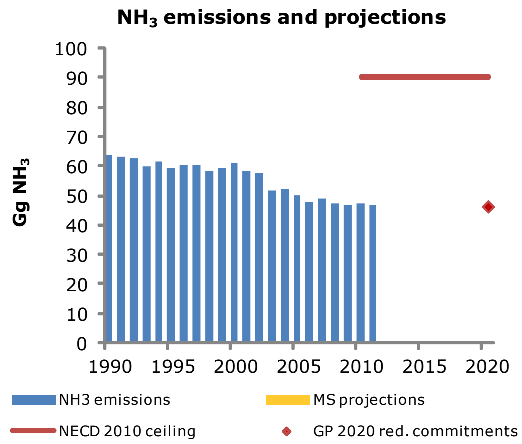


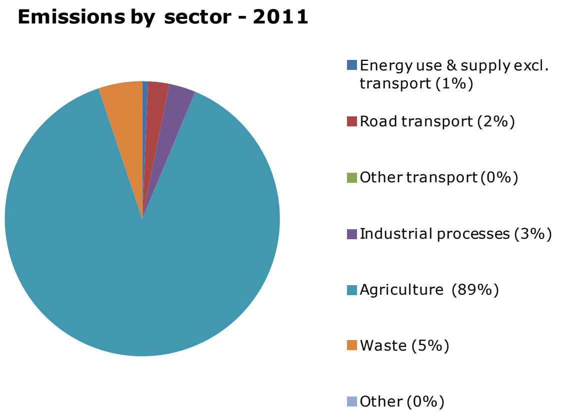
Progress towards ceilings

Current and projected progress towards ceilings	Value	Unit	
2010 NECD emission ceiling for SO_2	160	(Gg)	
2020 Gothenburg protocol (GP) reduction commitment for SO_2	32*	(Gg)	
2015 WM projections	n/a	(Gg)	
2020 WM projections	n/a	(Gg)	
	Absolute	**Unit**	**Relative (%)**
Distance of latest year SO_2 emission data to emission ceiling in 2020	15	(Gg)	46
Trend of total SO_2 emissions 1990-2011	- 113	(Gg)	- 71
Trend of total SO_2 emissions 2001-2011 for comparison with air quality trends	- 64	(Gg)	- 58

* calculated based on the percentage emission reduction commitment for 2020 expressed relative to 2005 emissions

Ammonia (NH_3) — Portugal



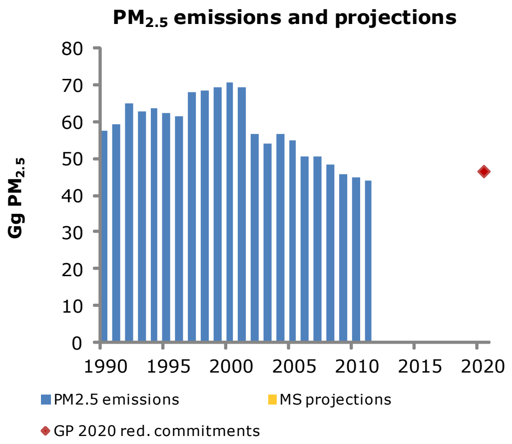


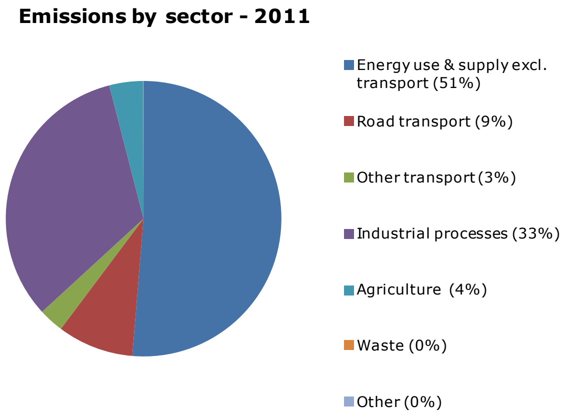
Progress towards ceilings

Current and projected progress towards ceilings	Value	Unit	
2010 NECD emission ceiling for NH_3	90	(Gg)	
2020 Gothenburg protocol (GP) reduction commitment for NH_3	46*	(Gg)	
2015 WM projections	n/a	(Gg)	
2020 WM projections	n/a	(Gg)	
	Absolute	**Unit**	**Relative (%)**
Distance of latest year NH_3 emission data to emission ceiling in 2020	0	(Gg)	1
Trend of total NH_3 emissions 1990-2011	- 17	(Gg)	- 27
Trend of total NH_3 emissions 2001-2011 for comparison with air quality trends	- 12	(Gg)	- 20

* calculated based on the percentage emission reduction commitment for 2020 expressed relative to 2005 emissions

Fine particulate matter ($PM_{2.5}$) — Portugal

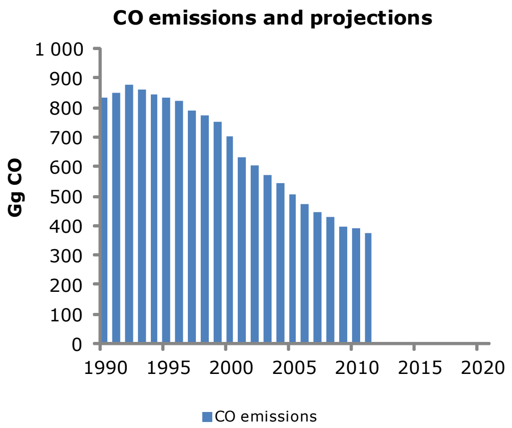


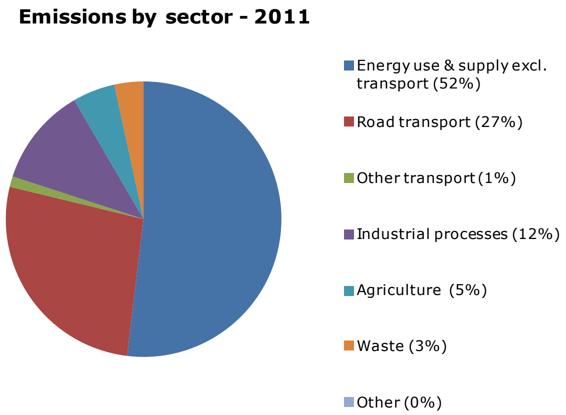


Progress towards ceilings

Current and projected progress towards ceilings	Value	Unit	
2020 Gothenburg protocol (GP) reduction commitment for $PM_{2.5}$	47*	(Gg)	
2015 WM projections	n/a	(Gg)	
2020 WM projections	n/a	(Gg)	
	Absolute	**Unit**	**Relative (%)**
Distance of latest year $PM_{2.5}$ emission data to emission ceiling in 2020	- 3	(Gg)	- 5
Trend of total $PM_{2.5}$ emissions 1990-2011	- 13	(Gg)	- 23
Trend of total $PM_{2.5}$ emissions 2001-2011 for comparison with air quality trends	- 25	(Gg)	- 36
Trend of total $PM_{2.5}$ emissions 2001-2011 for comparison with air quality trends	- 25	(Gg)	- 36

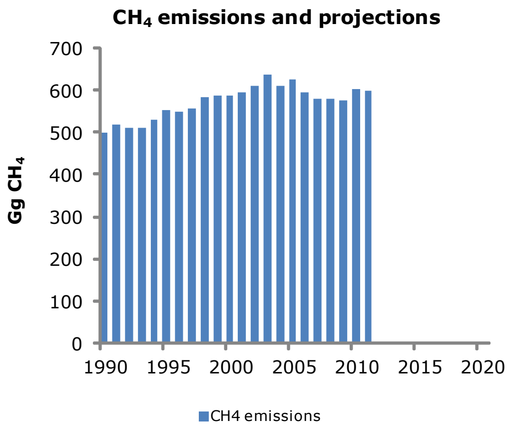
Carbon monoxide (CO) — Portugal

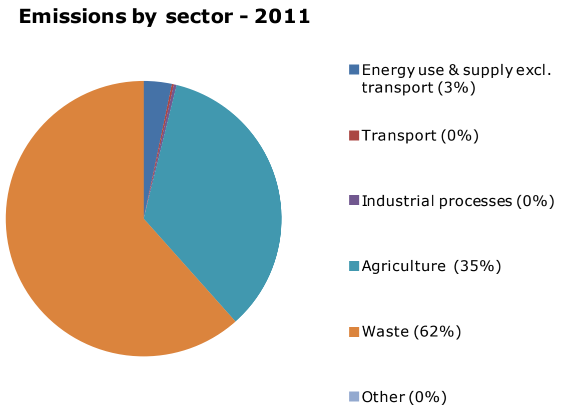




Progress towards ceilings

Current and projected progress towards ceilings	Value	Unit	
2015 WM projections	n/a	(Gg)	
2020 WM projections	n/a	(Gg)	
	Absolute	**Unit**	**Relative (%)**
Distance of latest year CO emission data to emission ceiling in 2020	n/a	(Gg)	n/a
Trend of total CO emissions 1990-2011	- 461	(Gg)	- 55
Trend of total CO emissions 2001-2011 for comparison with air quality trends	- 262	(Gg)	- 41





Progress towards ceilings

Current and projected progress towards ceilings	Value	Unit	
2015 WM projections	n/a	(Gg)	
2020 WM projections	n/a	(Gg)	
	Absolute	**Unit**	**Relative (%)**
Distance of latest year CH_4 emission data to emission ceiling in 2020	n/a	(Gg)	n/a
Trend of total CH_4 emissions 1990-2011	98	(Gg)	20
Trend of total CH_4 emissions 2001-2011 for comparison with air quality trends	2	(Gg)	0

Linking air emissions and air quality

Emissions of the main air pollutants in Europe have declined since 1990. Over the past decade, this reduction in emissions has resulted – for some of the pollutants – in improved air quality across the region. However, due to the complex links between emissions and air quality, emission reductions do not always produce a corresponding drop in atmospheric concentrations, especially for PM and O_3.

For example, while reductions of O_3-forming substances (i.e. O_3 precursor gases) have been substantial in Europe, O_3 concentrations in Europe have remained stable. Concentration levels depend on year-by-year variations in weather conditions including sunlight; natural emissions of ozone precursor substances by vegetation; the increase in global background ozone concentrations; and transportation of ozone and of ozone precursor substances from source areas outside Europe. All these contributing factors mean that European emission reductions of pollutants contributing to the formation of ozone may not result in equivalent reductions of ozone concentrations.

Improving our understanding of air pollution therefore remains a challenge. Developing and implementing effective policy to reduce air pollution should be a priority. For further information, see the EEA annual report Air quality in Europe.

Exposure of urban population to selected air pollutants

Exposure of urban population [1]

Percentage of the urban population exposed to air pollutant concentrations above the EU air quality objectives (2009-2011) [2]

Portugal	EU reference value	Exposure estimate (%) (minimum and maximum over the period)
PM_{10}	day (50 µg/m³)	12 – 30
O_3	8-hour (120 µg/m³)	0 – 6
NO_2	year (40 µg/m³)	0

The colour coding of exposure estimates refers to the fraction of urban population exposed to concentrations above the reference level:

< 5 %	5-50 %	50-75 %	> 75 %

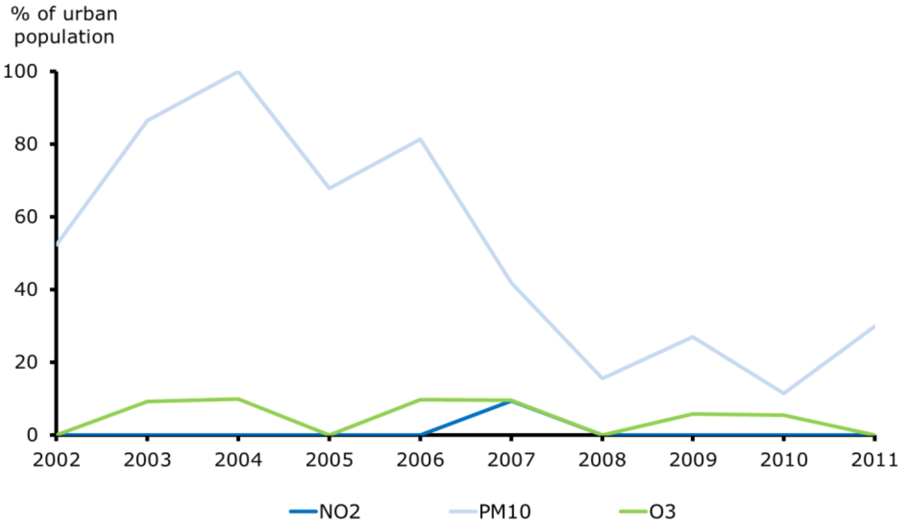
(1) The detailed methodology of the calculation can be found at: http://www.eea.europa.eu/data-and-maps/indicators/exceedance-of-air-quality-limit-1/

(2) The pollutants in this table are ordered in terms of their relative risk for health damage. The reference levels include EU limit or target values. For PM_{10} and NO_2 the estimates are related to the most stringent EU limit value set for the protection of human health. For O_3 there is only one target value.

Trends of exposure of urban population

Percentage of the urban population potentially exposed to air pollution exceeding EU air quality objectives (the most stringent EU limit values for PM_{10} and NO_2 and the target value for O_3 set for the protection of human health have been chosen)

Portugal



Trends of exposure of total population

Percentage of the total population exposed to PM_{10} concentrations above the limit values (LV); and the population-weighted concentration for the human health PM_{10} indicators annual average and for the 36th maximum daily average for 2006 to 2010 [3]

Portugal PM_{10}	**2006**	**2007**	**2008**	**2009**	**2010**
Annual average					
Population-weighted concentration (µg/m³)	28.4	27.0	21.8	22.9	21.7
Population exposed > ALV (%)	0	0	0	0	0
36th maximum daily average					
Population-weighted concentration (µg/m³)	48.3	45.0	35.5	38.5	35.6
Population exposed > DLV (%)	57.2	24	0	0	0.2

Percentage of the total population exposed to ozone concentrations above the target value (TV) for the 26th highest daily maximum 8-hour average; and the population-weighted concentrations for 2006 to 2010

Portugal ozone	**2006**	**2007**	**2008**	**2009**	**2010**
26th highest daily maximum 8-hr. average					
Population-weighted concentration (µg/m³)	119.3	111.0	102.7	112.4	112.1
Population exposed > TV (%)	46.5	5.0	0.0	18.5	23.2

(3) The methodology to calculate concentrations can be found at:
http://acm.eionet.europa.eu/reports/docs/ETCACM_TP_2012_12_AQMaps2010.pdf

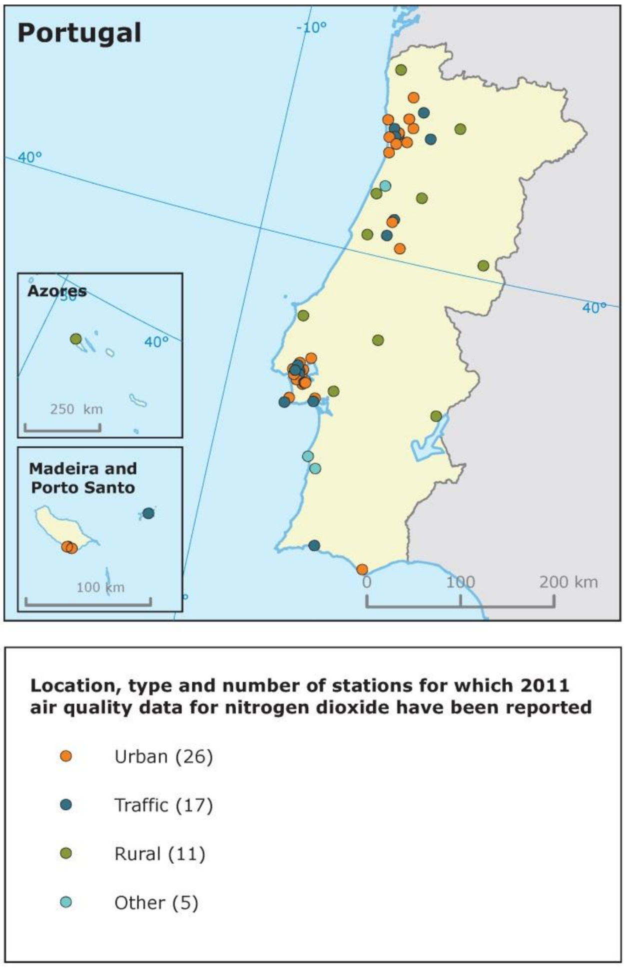
Air quality status

The calculations for the attainment status presented below have been made for stations with a data capture of at least 75 % per calendar year.

Nitrogen dioxide (NO_2)

NO_2 monitoring stations in the EEA´s air quality database – AirBase (year 2011)

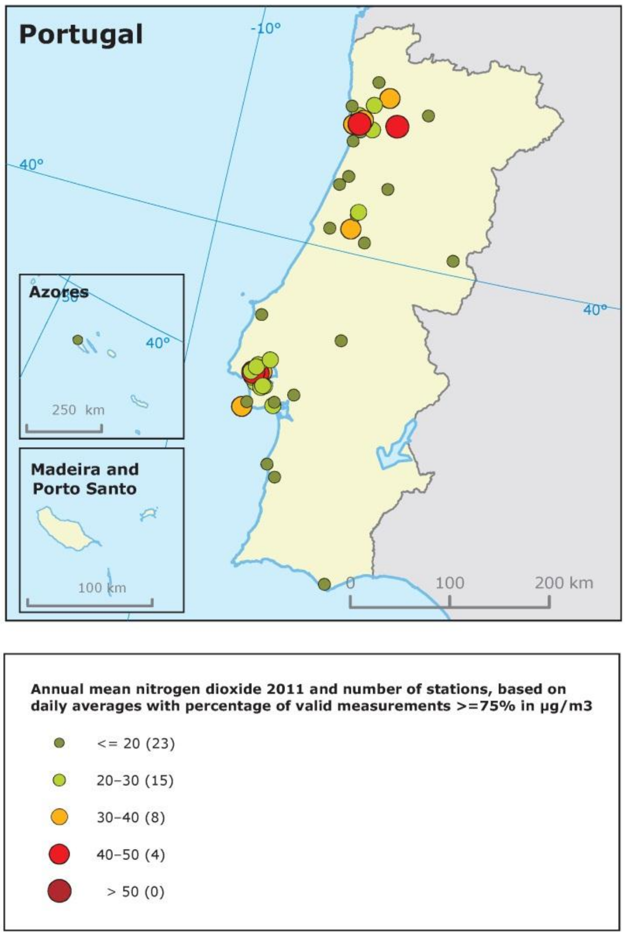
Station classification	Number of stations	Percentage
Other	5	8.5
Rural	11	18.6
Traffic	17	28.8
Urban	26	44.1
Total	**59**	**100.0**



Directive 2008/50/EC annual limit value (ALV): 40 μg/m³

NO_2 ALV attainment status at monitoring stations (year 2011)

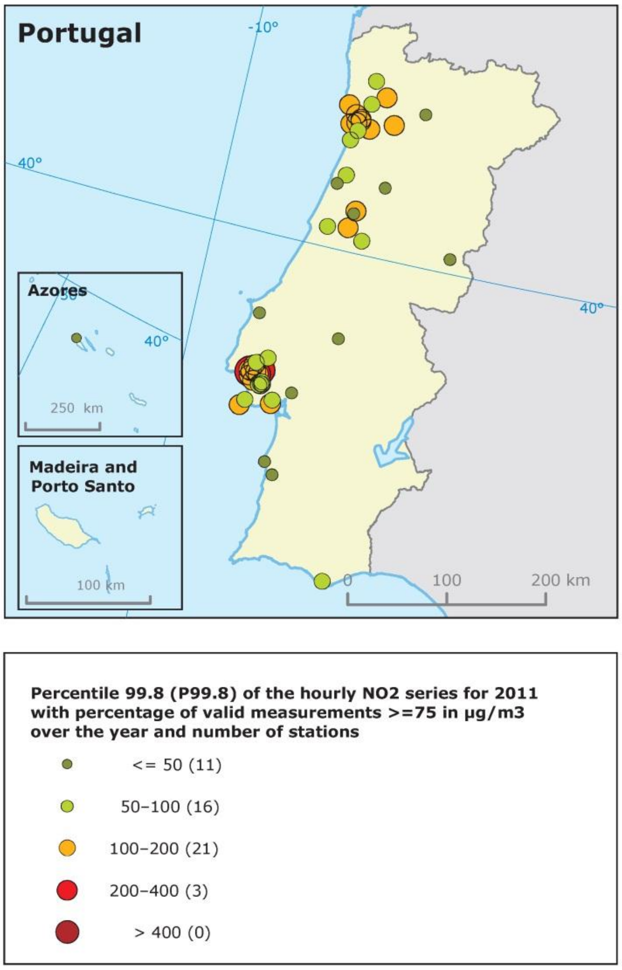
Station classification	Number of stations	Number of stations in non-attainment of ALV	Percentage of stations in non-attainment of ALV (percentage of total)	Percentage of stations in non-attainment of ALV (percentage of station type)
Other	5	0	0.0	0.0
Rural	9	0	0.0	0.0
Traffic	14	5	9.8	35.7
Urban	23	0	0.0	0.0
Total	**51**	**5**	**9.8**	**-**



Directive 2008/50/EC hourly limit value (HLV): 200 µg/m³, not to be exceeded more than 18 times

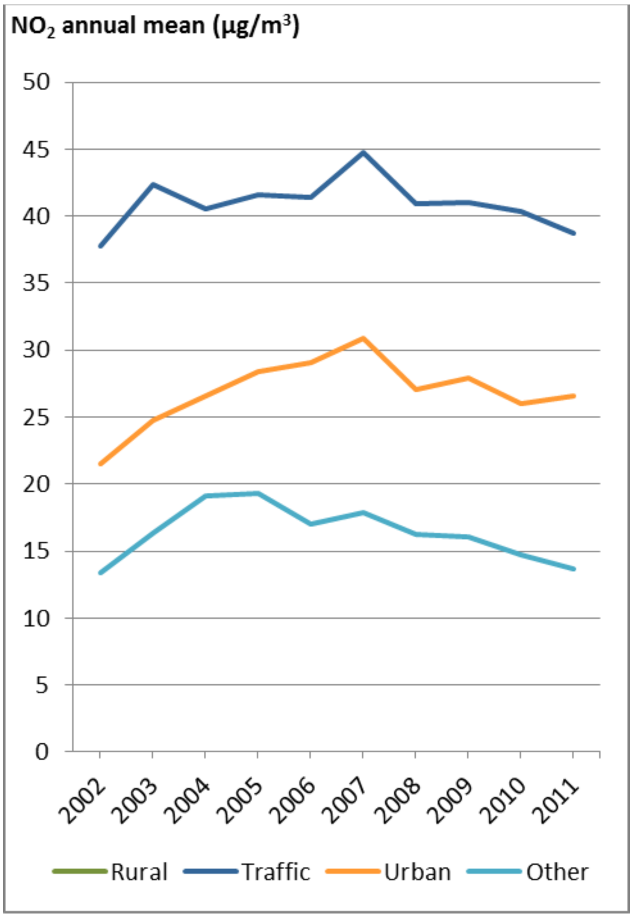
NO_2 HLV attainment status at monitoring stations (year 2011)

Station classification	Number of stations	Number of stations in non-attainment of HLV	Percentage of stations in non-attainment of HLV (percentage of total)	Percentage of stations in non-attainment of HLV (percentage of station type)
Other	5	0	0.0	0.0
Rural	9	0	0.0	0.0
Traffic	14	1	2.0	7.1
Urban	23	1	2.0	4.3
Total	**51**	**2**	**3.9**	**-**



Trends in NO_2 concentrations

Trends in annual mean concentrations of NO_2 (2002-2011) per station type

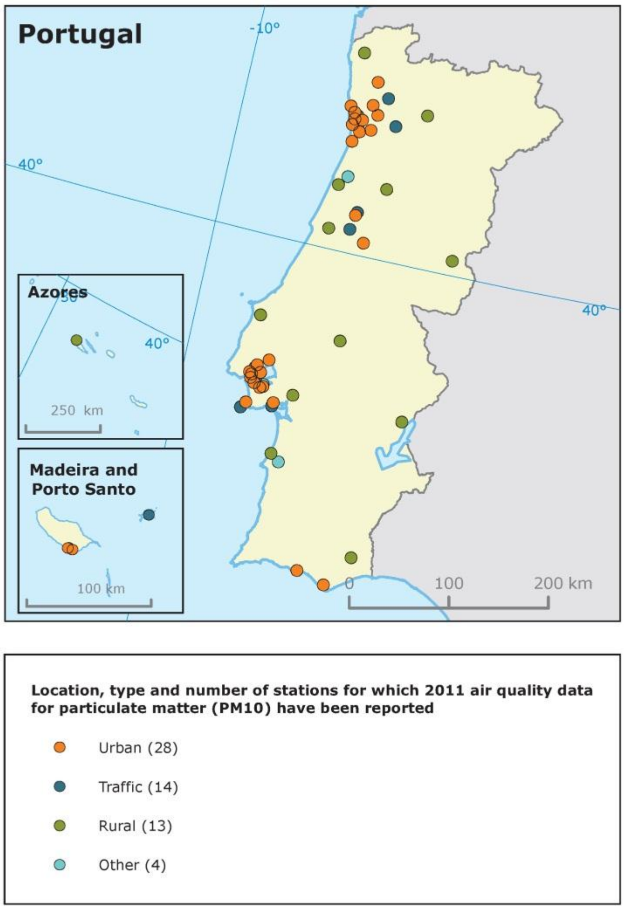


Particulate matter (PM_{10})

According to current legislation, Member States can subtract contributions from natural sources and from re-suspension due to sanding or salting of roads in the winter. The results below do not take into account these subtractions.

PM_{10} monitoring stations in the EEA´s air quality database – AirBase (year 2011)

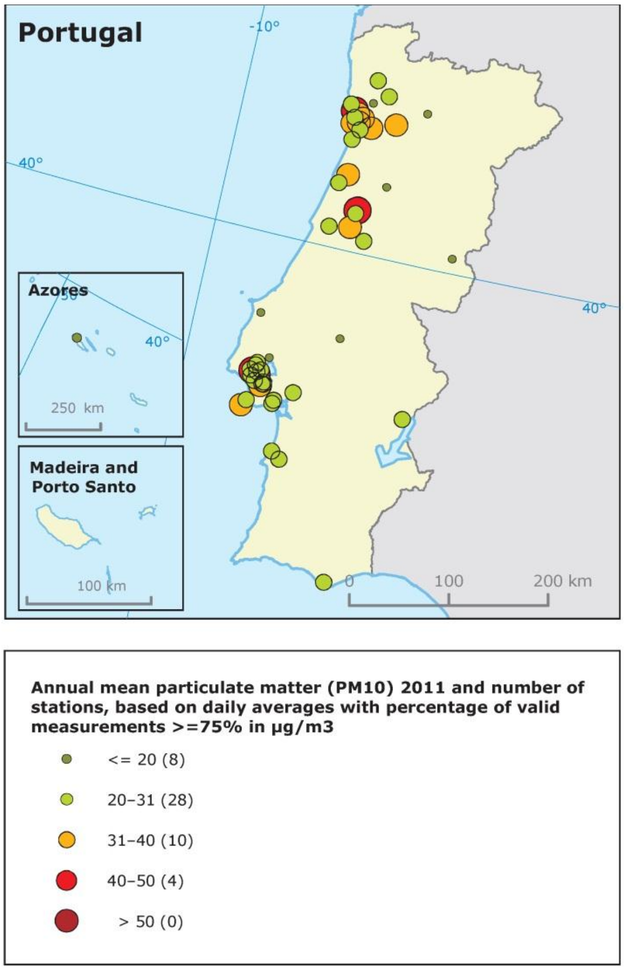
Station classification	Number of stations	Percentage
Other	4	6.8
Rural	13	22.0
Traffic	14	23.7
Urban	28	47.5
Total	**59**	**100.0**



Directive 2008/50/EC annual limit value (ALV): 40 µg/m³

PM_{10} ALV attainment status at monitoring stations (year 2011)

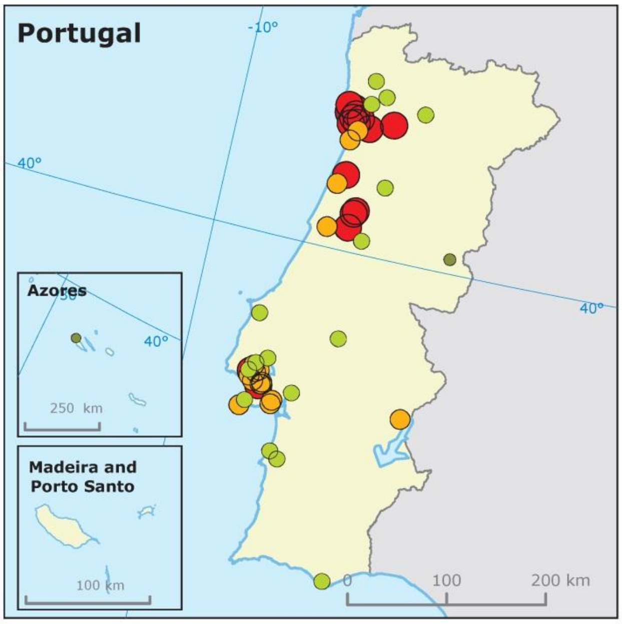
Station classification	Number of stations	Number of stations in non-attainment of ALV	Percentage of stations in non-attainment of ALV (percentage of total)	Percentage of stations in non-attainment of ALV (percentage of station type)
Other	4	0	0.0	0.0
Rural	11	0	0.0	0.0
Traffic	12	3	6.0	25.0
Urban	23	1	2.0	4.3
Total	**50**	**4**	**8.0**	**-**

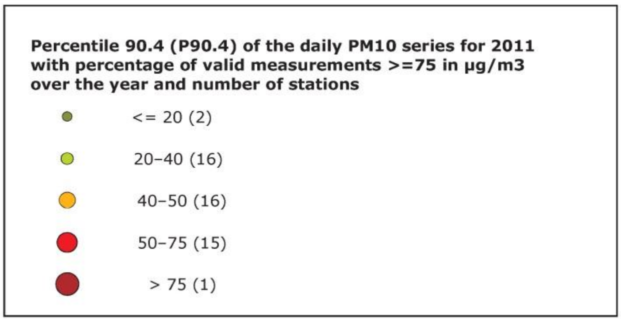


Daily limit value: 50 µg/m³, not to be exceeded more than 35 times

PM_{10} DLV attainment status at monitoring stations (year 2011)

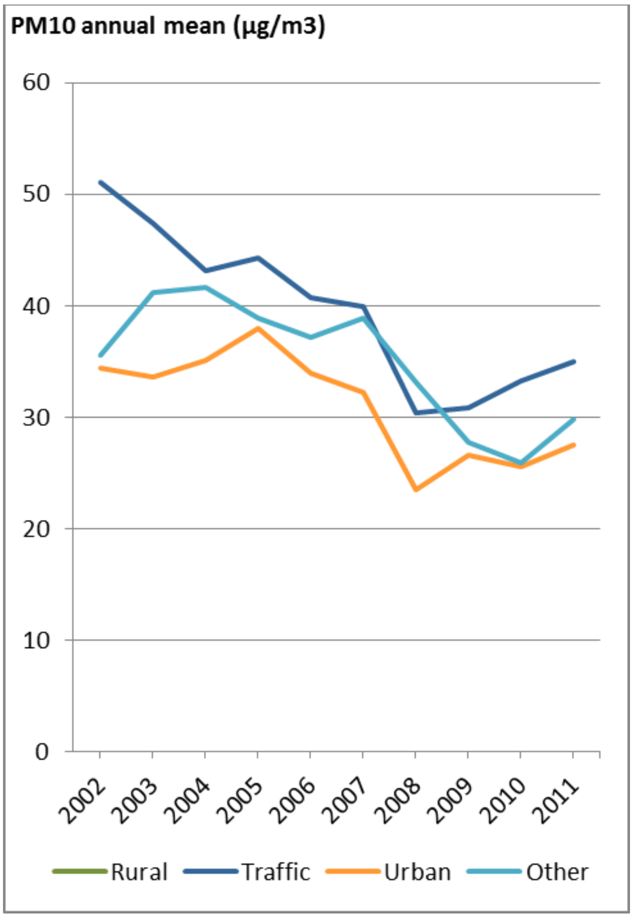
Station classification	Number of stations	Number of stations in non-attainment of DLV	Percentage of stations in non-attainment of DLV (percentage of total)	Percentage of stations in non-attainment of DLV (percentage of station type)
Other	4	1	2.0	25.0
Rural	11	0	0.0	0.0
Traffic	12	7	14.0	58.3
Urban	23	8	16.0	34.8
Total	**50**	**16**	**32.0**	**-**





Trends in PM_{10} concentrations

Trends in annual mean concentrations of PM_{10} (2002-2011) per station type

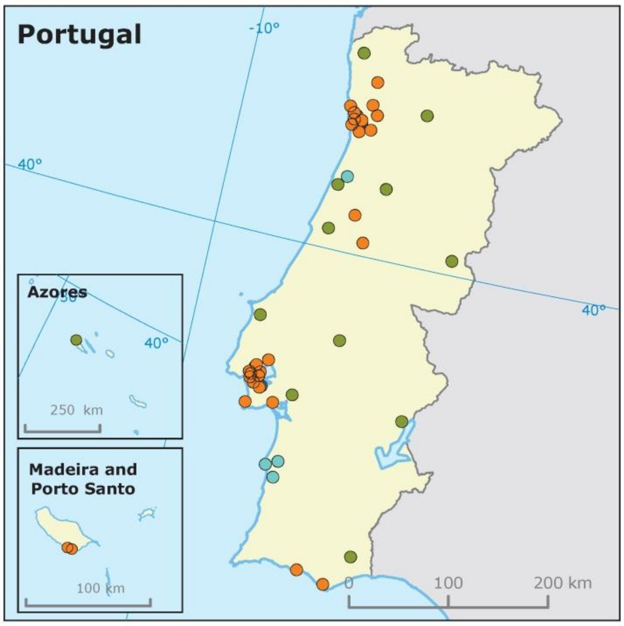


Ozone (O_3)

The results presented below have been calculated for the target value threshold (TVt) as defined in the annual summer ozone reports published by EEA ([4]).

Ozone monitoring stations in the EEA´s air quality database – AirBase (for protection of human health, year 2011)

Station classification	Number of stations	Percentage
Other	5	10.0
Rural	12	24.0
Traffic	6	12.0
Urban	27	54.0
Total	**50**	**100.0**



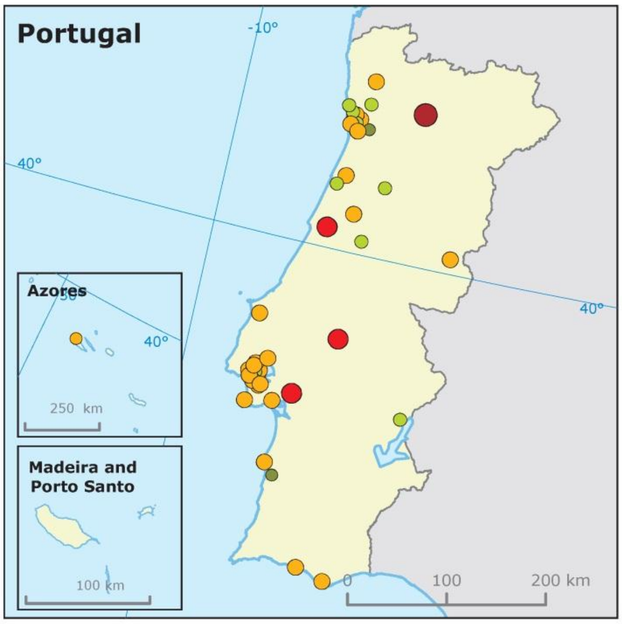
Location, type and number of stations for which 2011 air quality data for ozone have been reported

- Urban (27)
- Traffic (6)
- Rural (12)
- Other (5)

Protection of human health: Directive 2008/50/EC long term objective (LTO): Maximum daily eight-hour mean = 120 µg/m³. Target value threshold (TVt): 25 exceedances of the LTO

Ozone TVt attainment status at monitoring stations (year 2011)

Station classification	Number of stations	Number of stations in non-attainment of TVt	Number of stations in non-attainment of LTO but of TVt	Percentage of stations in non-attainment of TVt (percentage of total)	Percentage of stations in non-attainment of LTO but TVt (percentage of total)	Percentage of stations in non-attainment of TVt (percentage of station type)	Percentage of stations in non-attainment of LTO but TVt (percentage of station type)
Other	4	0	3	0.0	6.8	0.0	75.0
Rural	10	4	3	9.1	6.8	40.0	30.0
Traffic	6	0	6	0.0	13.6	0.0	100
Urban	24	0	22	0.0	50.0	0.0	91.7
Total	**44**	**4**	**34**	**9.1**	**77.3**	**-**	**-**



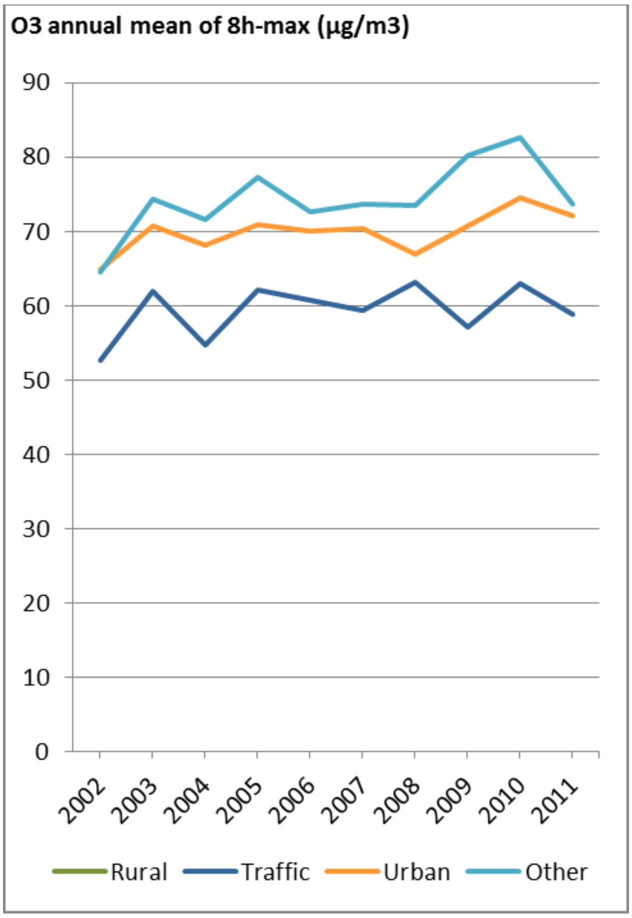
Percentile 93.2 (P93.2) of the daily maximum 8-h average O3 series with percentage of valid measurements >=75 in µg/m3 over the year and number of stations

- <= 80 (2)
- 80–100 (12)
- 100–120 (26)
- 120–140 (3)
- > 140 (1)

([4]) EEA technical report No 3/2013: [Air pollution by ozone across Europe during summer 2012]

Trends in ozone concentrations

Trends in annual mean of the daily maximum 8-h average O_3 (2002-2011) per station type



Changes in concentrations and impacts of air pollutants caused by emissions from other countries

Source-receptor (SR) relationships are a type of data developed by the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP). SRs provide information on the change in air concentrations, deposition or impacts that arise from changes in emissions from different emitting countries.

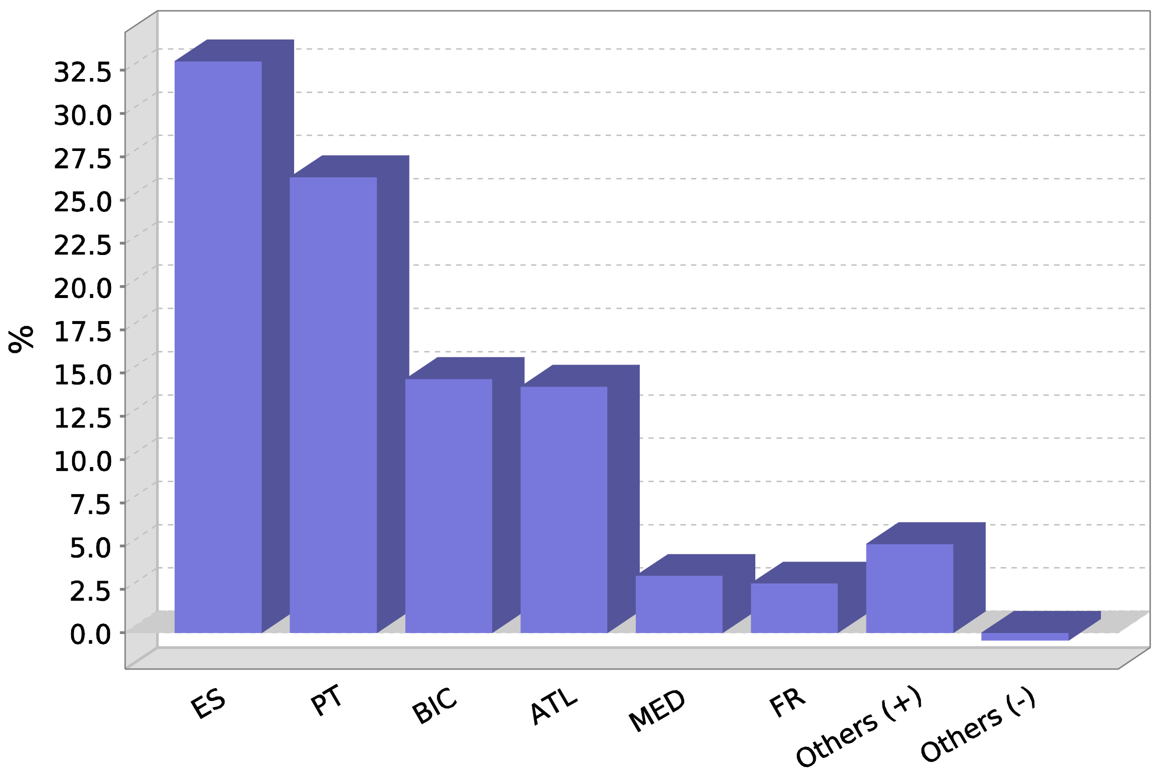
Each figure which follows provides an indication of the distribution of imported air pollution by country. Results are dependent upon the version of the EMEP model being used, the absolute magnitude of emissions, and meteorological drivers.

The charts below show the source-receptor relationships for each country for three selected parameters:

- Ground-level mean ozone over 35 ppb (SOMO35) (effect of a 15% reduction in precursor NO_x emissions);
- Ground-level mean ozone over 35 ppb (SOMO35) (effect of a 15% reduction in precursor NMVOC emissions);
- $PM_{2.5}$. Effect on $PM_{2.5}$ concentrations caused by a 15% reduction in all precursor emissions (i.e. primary $PM_{2.5}$, SO_x, NO_x, NH_3 and VOC).

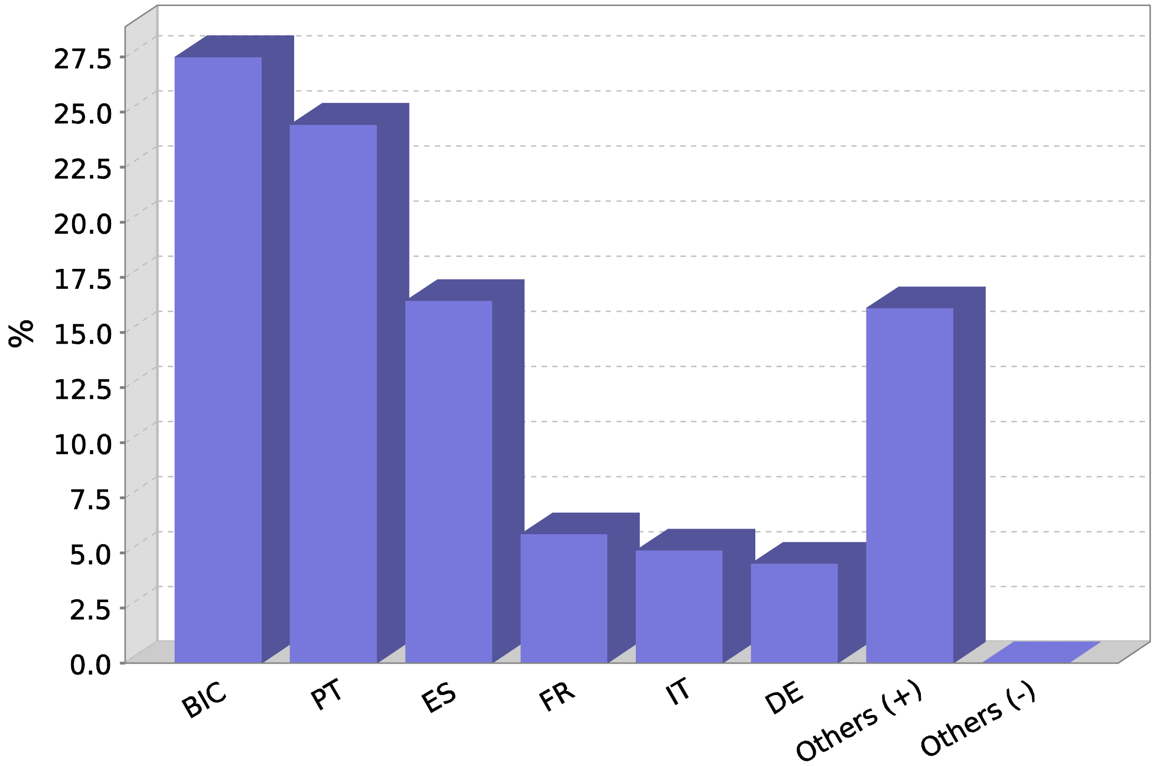
Further information on the source-receptor matrices is available from the EMEP website.

The six most important emitter countries, or regions, with respect to the reduction in SOMO35 in Portugal that would result from a 15 % decrease in NO_x emissions



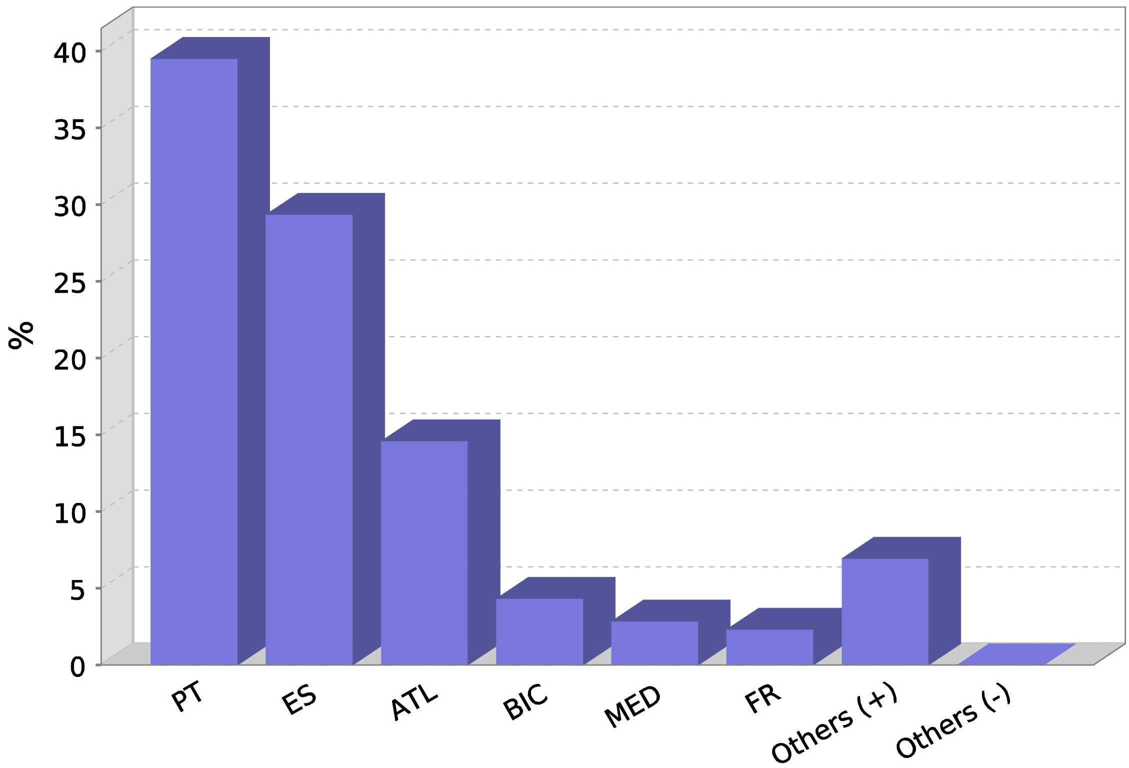
Source: EMEP/MSC-W
Note: BIC – Boundary and Initial Conditions; ATL – Remaining N.E. Atlantic; MED – Mediterranean Sea

The six most important emitter countries, or regions, with respect to the reduction in SOMO35 in Portugal that would result from a 15 % decrease in NMVOC emissions



Source: EMEP/MSC-W

The six most important emitter countries, or regions, with respect to the reduction in primary and secondary $PM_{2.5}$ in Portugal that would result from a 15 % reduction in emissions



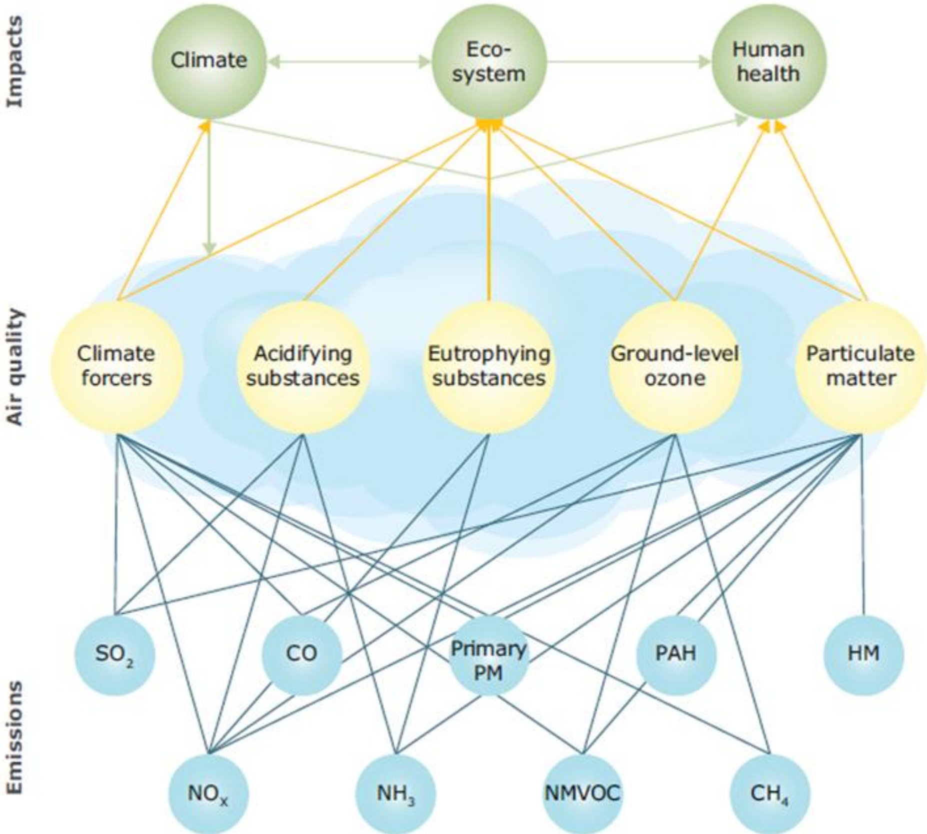
Source: EMEP/MSC-W

Background

Air pollution is a complex problem. Different pollutants interact in the atmosphere, affecting our health, environment and climate.

Air pollutants are emitted from almost all economic and societal activities. Across Europe as a whole, emissions of many air pollutants have decreased in recent decades, and much progress has been made in tackling air pollutants such as sulphur dioxide (SO_2), carbon monoxide (CO) and benzene (C_6H_6). However, air pollutant concentrations are still too high and harm our health and the ecosystems we depend on. A significant proportion of Europe's population lives in areas – especially cities – where exceedances of air quality standards occur. Particulate matter (PM) and ozone (O_3) pollution are particularly associated with serious health risks.

Air pollutants released in one European country may contribute to or result in poor air quality elsewhere. Moreover, important contributions from intercontinental transport influence O_3 and PM concentrations in Europe. Addressing air pollution requires local measures to improve air quality, greater international cooperation, and a focus on the links between climate policies and air pollution policies.



Note: From left to right the pollutants shown are as follows: sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), ammonia (NH_3), particulate matter (PM), non-methane volatile organic compounds (NMVOC), polycyclic aromatic hydrocarbons (PAH), methane (CH_4), heavy metals (HM).

Further information and data sources

Data sources

Air quality concentration data are from AirBase v. 7, the EEA´s public air quality database, which stores data reported by EEA member countries. Concentration data measured in the year 'x' are submitted by 30 September of the following year (x+1) and become publicly available in Airbase by March of year x+2. These data correspond to measurements taken at air quality monitoring stations. Stations are defined according to the type of area they represent and the dominant emission sources in that area.

Station types include:

- **rural stations** located outside of built-up urban areas;
- **urban stations** located in built-up areas where pollution levels are not influenced significantly by any single source or street, but rather by a combination of many sources;
- **traffic stations** located such that the pollution levels they record are determined predominantly by the emissions from nearby traffic; and
- **other stations,** mainly industrial stations, located such that the pollution levels they record are influenced predominantly by emissions from nearby single industrial sources or by emissions from industrial areas with many pollution sources.

European legislation establishes air quality objectives (limit and target values) for the different pollutants. These are concentrations that must not be exceeded in a given period of time.

The estimations of the population exposure were obtained from the EEA´s Core Set Indicator 004 and from interpolated AQ maps.

Estimated emissions of air pollutants 1990-2011 and projections data are from the annual European Union emission inventory submitted under the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP), and data submitted under the EU National Emission Ceilings Directive (81/2001/EC). Emissions data for some countries is gap-filled – further details are contained in the annual EU emission inventory report submitted to the LRTAP Convention. Methane data is from GHG data reported under the EU GHG Monitoring Mechanism (280/2004/EC)/UNFCCC.

The 'with measures' projections illustrated refer to projections of anthropogenic emissions that encompass the effects, in terms of air pollutant emission reductions, of policies and measures that have been adopted at the time the projection is calculated.

Information on source-receptor relationships was obtained from EMEP for the year 2010 (website accessed 20 June 2013).

Units, abbreviations and acronyms

ALV	Annual limit value
BaP	Benzo(a)pyrene
C_6H_6	Benzene
CH_4	Methane
CO	Carbon monoxide
DLV	Daily limit value
EEA	European Environment Agency
Eionet	European Environment Information and Observation Network
EMEP	European Monitoring and Evaluation Programme (Cooperative programme for monitoring and evaluation of the long-range transmissions of air pollutants in Europe)
ETC/ACM	European Topic Centre on Air Pollution and Climate Change Mitigation of the EEA
EU	European Union
Gg	1 gigagram = 10^9 g = 1 kilotonne (kt)
GHG	Greenhouse gas
GP	Gothenburg Protocol of the LRTAP Convention
HLV	Hourly limit value
kg	1 kilogram = 10^3 g (gram)
LRTAP	Long-range Transboundary Air Pollution (Convention)
LTO	Long-term objective
LV	Limit value
n/a	Not applicable/not available
NEC Directive	EU National Emission Ceilings Directive (2001/81/EC)
NH_3	Ammonia
NMVOC(s)	Non-methane volatile organic compound(s)
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
O_3	Ozone
PAH(s)	Polycyclic aromatic hydrocarbon(s)
PM	Particulate matter
PM_{10}	Coarse particulate matter (particles measuring 10 μm or less)
$PM_{2.5}$	Fine particulate matter (particles measuring 2.5 μm or less)
SO_2	Sulphur dioxide
SO_x	Sulphur oxides
SOMO35	The sum of the amounts by which maximum daily 8-hour concentrations of ozone exceed 70 μg m^{-3} (cut-off value) on each day in a calendar year.
SR	Source-receptor relationships
t	1 tonne (metric) = 1 megagram (Mg) = 10^6 g
TV	Target value
TVt	Target value threshold
μg/m^3	micrograms per cubic meter
UNECE	United Nations Economic Commission for Europe
VOC(s)	Volatile organic compound(s)

European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark

Tel.: +45 33 36 71 00
Fax: +45 33 36 71 99

Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

European Environment Agency