

# Air Quality Legislation and Standards in the European Union: Background, Status and Public Participation

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## Abstract

In order to improve air quality, the European Union introduced the New Air Quality Directive in 2008 and set its Member States strict targets on air pollution concentrations for the most harmful and challenging substances, such as fine particles. The law enforcement relies on a monitoring and reporting system to inform the European Commission and the public, for it is the citizens' right to be informed about harmful air quality.

With sectoral measures, air quality could be improved in the past 20 years, but some emissions concentrations have stagnated in recent years and emissions temporarily exceed thresholds in nearly half of the Member States. The European Emission Inventory allows the commission to identify the substances, areas, and times of exceedances, and to implement sectoral measures leading to air quality improvements, all of which have to be made available publicly. This manuscript introduces the air quality legislation and reviews the quality of European air for recent years.

**Keywords:** air quality; European Union; public participation; standards

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## 1 Introduction and objective

Air quality and climate policies can provide mutual benefits: climate change mitigation actions can help to reduce air pollutants, and clean air measures can help to reduce greenhouse gas (GHG) emissions. The improvement of air quality in some areas is often the result of measures that are taken for mitigating GHG emissions such as efficiency measures or fuel standards in fossil fuels burning in electricity generation, transport, industry and households or emission caps in industrial processes. Air pollution damages the environment and worsens the negative impacts of climate change as it causes acidification of sensitive ecosystem areas, eutrophication, and crop damage. In

turn, air pollution policies that are required to reduce aerosols can accelerate global warming as the cooling effect of these aerosols on climate is removed. Therefore, air pollution and climate change are interrelated.

Air pollution cause harm not only to ecosystems but also to human health. Since the Industrial Revolution, the air quality in Europe has decreased as a result of human activities. Since the early 1970s, the European Union (EU) has taken measures to improve air quality, e.g., by controlling emissions of harmful substances into the atmosphere, improving the quality of fossil fuels, and integrating environmental protection requirements into the transport and energy sectors. As a result, emissions of many air pollutants, mostly sulphur dioxide (SO<sub>2</sub>), lead (Pb), nitrogen oxides (NO<sub>x</sub>),

carbon monoxide (CO) and benzene (C<sub>6</sub>H<sub>6</sub>), have decreased over the past decades. This has resulted in improved air quality across the continent [EEA, 2010]. During the 1990s, the EU developed and adopted a series of directives on air quality management and assessment, setting the air quality limit and target values, and methods to monitor and assess air quality. These directives have paved the way for the effective data exchange on air quality, station networks extension, and harmonization of measuring and modeling methodologies. The most important factor for improving air quality was the setting of binding targets for the EU Member States and establishing monitoring and reporting systems.

Although emissions have been reduced at their sources, air pollutant concentrations have not sufficiently declined in recent years. A significant proportion of Europe's population lives in cities where air quality standards are exceeded frequently. The most stringent is summer smog, which originates in potentially harmful ground-level ozone (O<sub>3</sub>). Fine particulates present a health risk, which is of increasing public concern. Air pollution in Germany as an example has decreased significantly between the 1990s and the early 2010s. However, this decrease has been stagnating since the beginning of the 2010s. Pollution by particulate matter (PM), nitrogen dioxide (NO<sub>2</sub>) and O<sub>3</sub> remains stable despite a continuous decline in emissions [EEA, 2011]. Emissions, of course, have impact on pollution of the ambient atmosphere, but reductions do not cause a linear drop of pollution concentrations. The annual mean O<sub>3</sub> concentration in Europe did not change significantly although O<sub>3</sub> emissions have been cut significantly between 1999 and 2009. O<sub>3</sub> concentrations show distinct differences between traffic stations (measuring at infrastructures), urban stations, rural-low stations, and rural-high stations.

This manuscript introduces European air quality legislation and standards and shows how air pollution and exceedance of standards are communicated with the public. It also provides a brief status of the Euro-

pean air in 2011.

## 2 Legislative background: Air quality and public participation in the EU

### 2.1 Legislation for air quality targets

The Directive 2008/50/EC of the European Parliament and of the European Council on ambient air quality and cleaner air for Europe, in brief New Air Quality Directive, entered into force on 11 June 2008 [CEC, 2008]. It is currently among the strictest acts of legislation worldwide concerning PM<sub>10</sub> air pollution [de Leeuw and Ruysseenaars, 2011] and includes the following key elements: (1) merging of most of the existing legislation<sup>Ⓢ</sup> into a single directive with no change to existing air quality objectives; (2) new air quality objectives for PM<sub>2.5</sub> (fine particles) including the limit value and exposure related objectives (exposure concentration obligation and exposure reduction target); (3) the possibility to discount natural sources of pollution when assessing compliance against limit values; (4) the possibility for time extensions up to 2014 (PM<sub>10</sub>) or up to 2015 (NO<sub>2</sub>, C<sub>6</sub>H<sub>6</sub>) for complying with limit values, based on conditions and the assessment by the European Commission, i.e., relevant EU legislation is fully implemented and all appropriate abatement measures are being taken.

### 2.2 Air quality targets and assessments

Table 1 summarizes the air quality standards as set by the directives, commission decisions, and council decisions mentioned above. It shows the substances considered in the assessment and management of ambient air quality. Standards and priorities for initial assessments have been modified over the years with the evolution of the legislation. A limit value is legally binding from the date it enters into force but allows limited short-term exceedances. A target value has to be attained as far as possible by the attainment date and compliance is checked but not legally binding. An

<sup>Ⓢ</sup> Council Directive 96/62/EC or Air Quality Framework Directive [CEC, 1996], Council Directive 1999/30/EC or First Daughter Directive [CEC, 1999], Directive 2000/69/EC or Second Daughter Directive [CEC, 2000a], Directive 2002/3/EC or Third Daughter Directive [CEC, 2002], Directive 2004/107/EC or Fourth Daughter Directive [CEC, 2004a], Council Decision 97/101/EC or exchange of information (EoI) decision [CEC, 1997], Commission Decision 2004/461/EC [CEC, 2004b]

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