

Particulate matter as a key air pollutant in Germany and the whole EU: Sources and abatement strategies

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Abstract

EU-Directive 2008/50/EC on ambient air quality and cleaner air for Europe aims to prevent or reduce harmful effects on human health and the environment as a whole. Within urban areas, air quality control focuses clearly on the harmful effects of air pollutants on human health, whereas effects on ecosystems like acidification or eutrophication are more important in rural areas.

The most important instrument for air quality control on a local level in Europe is air quality plans. If limit or target value for air pollutants are exceeded, air quality plans have to be established. Therefore, measures by local authorities are driven mainly by the level of existing limit or target values. Unfortunately, limit values for particulate matter in the EU are considerably higher compared to the values recommended by the World Health Organization (WHO). In parts of Eastern Europe and Northern Italy, concentrations of ambient particles are frequently above the limit values and can trigger local measures. In most parts of Western Europe and especially in Germany, however, particle concentrations are usually below the limit values. Here, the most urgent problem for local authorities is wide-spread exceedances of limit values for nitrogen dioxide at traffic-related measurement sites. In the case of nitrogen dioxide, the limit value in the EU reflects the WHO recommendations. Therefore, measures to reduce ambient nitrogen dioxide, including bans on older diesel passenger cars, are needed to ensure compliance with the limit value and protect the health of people living in the polluted areas. Unfortunately, only limited additional measures to reduce particle pollution are implemented, although many studies show that even in Western Europe particles cause stronger health effects compared to nitrogen dioxide.

To implement appropriate measures to abate air pollution, sufficient knowledge of relevant sources is very important. Analyses of urban and local traffic increments provide hints of relevant sources. In Germany, local traffic increments for nitrogen dioxide in urban environments are in the range of 50 percent, indicating that road traffic is the major source for this pollutant. For PM₁₀, local traffic increments in Germany are currently below 20 percent showing the success of measures like the introduction of particle filters for diesel passenger cars. However, other sources like residential wood combustion or secondary particles formation caused by ammonia emitted by agriculture, which has been proved by many source apportionment studies, become more important. Especially the reduction of secondary particles required more regional/national or even international measures to reduce emissions of precursors. To trigger these measures, member states of the EU have to draw up, adopt and implement national air pollution control programs under Directive 2016/2284 on the reduction of national emissions of certain atmospheric pollutants. This Directive sets up national reduction commitments for emissions, including emissions of primary PM_{2.5} and precursors of secondary particles, and will provide a cornerstone for further improvement of air quality in Europe.

Keywords: *Particulate matter, air pollutant, air quality, Germany and EU,*

Biography

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Working at the German Environment Agency since 2013, Marcel Langner focused on the assessment of measures to reduce ambient concentrations of air pollutants and on scenarios of future emission trends and their impacts on air quality in Germany. His work includes the evaluation of measurements of air pollutants and results from model outputs, both at the local and the regional scale. His expertise