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Latest emission control technology could eradicate harmful air pollution hotspots

Switching to the best available emission control technologies could eliminate 99% of particulate matter pollution 'hotspots', a new study suggests. The researchers reached this conclusion by expanding the local-scale capabilities of an existing computer model that estimates the effects of air pollution policies and control measures.

Particulate matter (PM) **pollution** has been linked to a wide range of health problems in humans, from heart disease to lung cancer and diabetes. In the EU, the Air Quality Directive[1] (AQD) sets limits on the airborne concentrations of several pollutants, including PM. However, many Member States have found it difficult to keep all areas below the limit values set by the AQD, particularly in densely populated urban areas. The recent Commission Clean Air Policy Package proposes new emission limits for PM and its precursors, so it is important to assess the possible effects of different emission mitigation and policy scenarios on pollutant concentrations.

Computer modelling offers a way of doing this, by allowing the estimated effectiveness of different policies and control measures to be compared. One such model is GAINS, a Europe-wide model. It has a resolution of seven by seven kilometres, which means it can underestimate PM concentrations in smaller towns and settlements, and at local hotspots, such as streets lined with buildings.

This study addresses this limitation by providing a more accurate estimation of PM_{10} (PM with a diameter of less than 10 micrometres) concentrations over smaller scales, to the level of streets. It adapted GAINS to include past PM_{10} monitoring data, including street-level data, from the European Air Quality Database (AirBase) with a new way of estimating PM_{10} levels based on how and where they are produced. This allowed areas with higher traffic levels, and therefore higher PM_{10} emissions, to be better accounted for.

The researchers modelled two scenarios and estimated their effect on PM_{10} levels by 2030. The first scenario used only currently approved legislation ('CLE'), while the second assumed that the most efficient control technologies currently available are used (maximum technically feasible reductions scenario or 'MTFR'), but without any behavioural changes, fuel switches or local measures. The modelling covered more than 1850 monitoring stations, including those in over 700 European cities and towns. This included 80% of the stations which had exceeded EU limit values in 2009.

Exceedances on PM10 levels are mainly related to daily limit value, while the model is designed to work with annual mean concentrations. To deal with this discrepancy, the authors used an 'equivalent annual mean concentration limit' of 30 $\mu g/m^3$ (micrograms per cubic metre). This was used as the equivalent annual standard above which daily AQD limits would be exceeded with a statistical uncertainty of ±5 $\mu g/m^3$. Therefore, if levels were 25 $\mu g/m^3$ or below, a station was considered 'safe' from non-compliance with AQD limits.

Under the CLE scenario, 80 stations (4%) remained above 30 $\mu g/m^3$ PM_{10}, compared with 17% in 2009. More than 10% were estimated to be higher than 25 $\mu g/m^3$. Areas in southern Poland, the Czech Republic, Slovakia, northern Italy and Bulgaria were still at risk of non-compliance by 2030.

Under the MTFR scenario, compliance by 2030 was much improved, with 99% of stations below the 25 $\mu g/m^3$ limit, although several stations were still close to the 30 $\mu g/m^3$ limit. However, even under the MTFR scenario the authors concluded that some hotspots may persist due to one-off events, such as forest fires. An additional problem noted by the authors, for which there is currently no simple solution, is the resuspension of road dust by passing traffic.

These results suggest that if current legislation is successfully implemented, average PM_{10} values can be expected to fall by 2030. However, a large proportion of the European population, particularly in Eastern Europe, is likely to continue to be exposed to PM_{10} concentrations exceeding AQD standards unless further action is taken.

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