Is better regulation of ammonia emissions required?

Road traffic is a major source of reactive nitrogen compounds (RNC). Engine combustion produces RNCs including: nitric oxide and nitrogen dioxide (which trigger the formation of ozone) and ammonia, which is classed as a reactive toxic pollutant. Swiss researchers used improved detection technologies to measure different RNCs in exhaust fumes and found that ammonia had the most substantial impact on air quality.

The European Union has established quality standards for about a dozen pollutants, and, since the late 1970s, overall air quality standards in the Community have improved. European countries have restricted the release of all RNCs under the Gothenburg protocol (United Nations Economic Commission for Europe (UN-ECE), 1999) and the EU Directive 2001/81/EC (European Union (EU), 2001) has set individual RNC emission ceilings for all EU member states and associated states like Switzerland.

The researchers measured different reactive nitrogen compounds in the tail-pipe emissions from 10 petrol Euro-3 cars (models of cars which meet European emissions standards for 2000-2001) and 10 Euro-4 cars (model year 2001-2004). These were chosen to represent the existing Swiss vehicle mix. They found that although the vehicles were within the limits of NOx emissions, levels of ammonia were unexpectedly high, between 40-80 mol per cent of the total RNC.

While current vehicle legislation puts a cap on the amount of total NOx that are released, it does not distinguish between NO and NO2. NOx emissions have been successfully lowered through fitting vehicles with catalytic converters, but there are currently no limits for ammonia emissions from light duty vehicles. Although not toxic to human health at ambient air concentrations, ammonia is a toxic gas that contributes to secondary aerosols and can have an adverse impact on the local environment. Furthermore, it is readily transported in the atmosphere, and can acidify land and surface waters, meaning its negative impacts can be felt in remote ecosystems. As yet there are no systems in place to provide accurate measurements of ammonia. The research findings reflect the fact that there is a trade-off between NOx and ammonia emissions and highlight the need to measure ammonia accurately when judging urban air quality. This would allow a greater understanding of vehicle contributions and enable limits to be set for this important pollutant.

The research also suggests that levels of reactive nitrogen compounds are rising due to the current trend to replace petrol-fuelled cars with diesel-powered vehicles. Diesel cars are chosen because they provide better mileage than petrol cars. However, the permitted levels of reactive nitrogen compounds emitted from diesel vehicles are three times higher than those for petrol-fuelled cars.


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