European Commission

Science for Environment Policy

**14 January 2016**
**Issue 442**

**Subscribe to free weekly News Alert**

**Source:** Dunmore, R., Hopkins, J., Lidster, R., Lee, J., Evans, M., Rickard, A., Lewis, A. & Hamilton, J. (2015). Diesel-related hydrocarbons can dominate gas phase reactive carbon in megacities. *Atmospheric Chemistry and Physics Discussions*, 15(6), pp.9541-9571. DOI: 10.5194/acp-15-9983-2015

**Contact:**
jacqui.hamilton@york.ac.uk

**Read more about:**
Air pollution, Chemicals, Environment and health, Sustainable mobility, Urban environment



**To cite this article/service:** "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

# Air quality impact of diesel 'severely underestimated'

**Hydrocarbons are precursors to hazardous air pollutants including ozone and particulate matter.** Hydrocarbons from diesel make up over 50% of all hydrocarbons in the air in London, a new study has found. The authors also estimate that they contribute up to half of total ozone production potential in London, and say future air quality control strategies must focus more on these pollutants.

**Around three quarters of the European population now live in urban areas**[1], and as a result are exposed to hazardous air pollution. The primary urban air pollutants are particulate matter (PM), nitrogen oxides ($NO_x$), ozone ($O_3$) and volatile organic compounds. These pollutants are linked to respiratory and cardiac disease and can reduce life expectancy[2].

Hydrocarbons (chemicals made up of hydrogen and carbon) are precursors to two priority air pollutants: ozone and PM. Small hydrocarbons (containing between two and seven carbons) are relatively simple to observe and levels have been successfully reduced in many cities. However, those with longer carbon chains — typically released from diesel vehicles — are more difficult to measure, and therefore are not explicitly considered in air quality strategies.

British researchers recently measured these elusive pollutants in their capital city, London, a typical large European city. They conducted two, five-week studies at a background site as part of the Clean Air for London project. The researchers continuously monitored the hydrocarbons present in the atmosphere in January/February and July/August 2012.

The comprehensive chemical measurements show that, on average, diesel-related hydrocarbons make up over half of atmospheric hydrocarbons (by mass). They are also an important source of secondary pollutants, such as ozone — a major component of urban smog that damages vegetation and is a risk factor for respiratory disease.

The researchers went on to more precisely calculate how these hydrocarbons contribute to ozone formation. They assessed the effects on local ozone production by calculating the 'ozone formation potential' of each emission source. They estimate that diesel-related hydrocarbons contribute up to 50% of London's ozone production potential.

Finally, the researchers compared their measurements to emissions inventories, finding that diesel-related compounds in the atmosphere are under-reported in emission inventories. Although it is thought to represent best practice for international reporting methodologies, the UK national emissions inventory under-reported various diesel-related hydrocarbons by factors of 4 up to 70. As diesel use in the UK is within the European average, the authors say this underestimation is likely the case across the EU. These underestimations are significant, because national emissions estimates drive policy.

There are existing policy challenges for cities when it comes to controlling the nitrogen dioxide emitted by modern diesel vehicles. This study shows there may be a similar — but as-yet unrecognised — challenge when it comes to controlling reactive carbon emissions. There is a need to focus policy on these diesel-related hydrocarbons, as the fuel is estimated to take over petrol as the main transport fuel used globally by 2020[3].

This is the first direct evidence of significant diesel hydrocarbons in London's ambient air, although the authors do note limitations to the study, including a lack of data on the atmospheric fate of long chain hydrocarbons, and say methodological improvements are needed to more accurately measure diesel hydrocarbons.



1.http://www.eea.europa.eu/themes/urban

2.Kampa, M. and Castanas, E. (2008). Human health effects of air pollution. *Environmental Pollution*, 151(2), pp.362-367. http://www.sciencedirect.com/science/article/pii/S0269749107002849

3.Exxon Mobil: The Outlook for Energy: A view to 2040, Tech. rep., Exxon Mobil Corporation, Texas, 2014