# Global fossil fuel emissions of hydrocarbons are underestimated

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Global levels of ethane and propane in the atmosphere have been underestimated by more than 50%, new research involving scientists at the University of York has revealed.

These hydrocarbons are particularly harmful in large cities where, through chemical reactions with emissions from cars, they form ozone -

a greenhouse gas which is a key component of smog and directly linked to increases in mortality.

Ethane and propane escape into the air from leaks during natural gas extraction and distribution, including from fracking - the process of drilling down into the earth and fracturing rock to extract shale gas. This new study shows that global fossil fuel emissions of these hydrocarbons have been underestimated and are a factor of 2-3 times higher than previously thought.

The authors of the international study involving researchers from York, Oslo and Colorado are now calling for further investigation into fossil fuel emissions of methane, a potent greenhouse gas which is emitted along with ethane and propane from natural gas sources.

Co-author of the study, Professor Lucy Carpenter from the Department of Chemistry at the University of York, said: "We know that a major source of ethane and propane in the atmosphere is from "fugitive" or unintentional escaping emissions during fossil fuel extraction and distribution. If ethane and propane are being released at greater rates than we thought, then we also need to carefully re-evaluate how much of the recent growth of methane in the atmosphere may also have come from oil and natural gas development. The current policy case for fracking, for example, is partly based on the belief that it is less polluting that coal."

The study used data collected from 20 observatories world-wide. The researchers from the University of York provided high-resolution data from a monitoring station in Cape Verde - a crucial location in the Atlantic which captures air blown over the Sahara, from North America, the Middle East and North Africa.

Like other hydrocarbons, when ethane and propane mix with nitrogen

oxides from vehicles and power plants they form ozone in the troposphere - the lowest layer of the atmosphere that constitutes the air we breathe. While ozone in the Earth's second layer of atmosphere - the stratosphere - is desirable, ground level ozone has damaging consequences for ecosystems and human health.

Scientists need to understand accurately the levels of hydrocarbons in the atmosphere to predict the exposure of populations to ozone. This is particularly important for some suburban and rural areas which are already known to be on the edge of the limits of safe exposure.

Professor Ally Lewis, a co-author of the study from the Department of Chemistry at the University of York added: "Levels of ethane and propane declined in many places the 1980s and 1990s, but global growth in demand for natural gas means these trends may be reversing. The effects of higher ozone would be felt in the rural environment where it damages crops and plants, and in cities on human health.

"Tropospheric ozone causes a variety of serious health complaints and along with particulate matter and nitrogen dioxide is one of the three major causes of pollution-related deaths."

**More information:** Stig B. Dalsøren et al, Discrepancy between simulated and observed ethane and propane levels explained by underestimated fossil emissions, *Nature Geoscience* (2018). DOI: 10.1038/s41561-018-0073-0

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