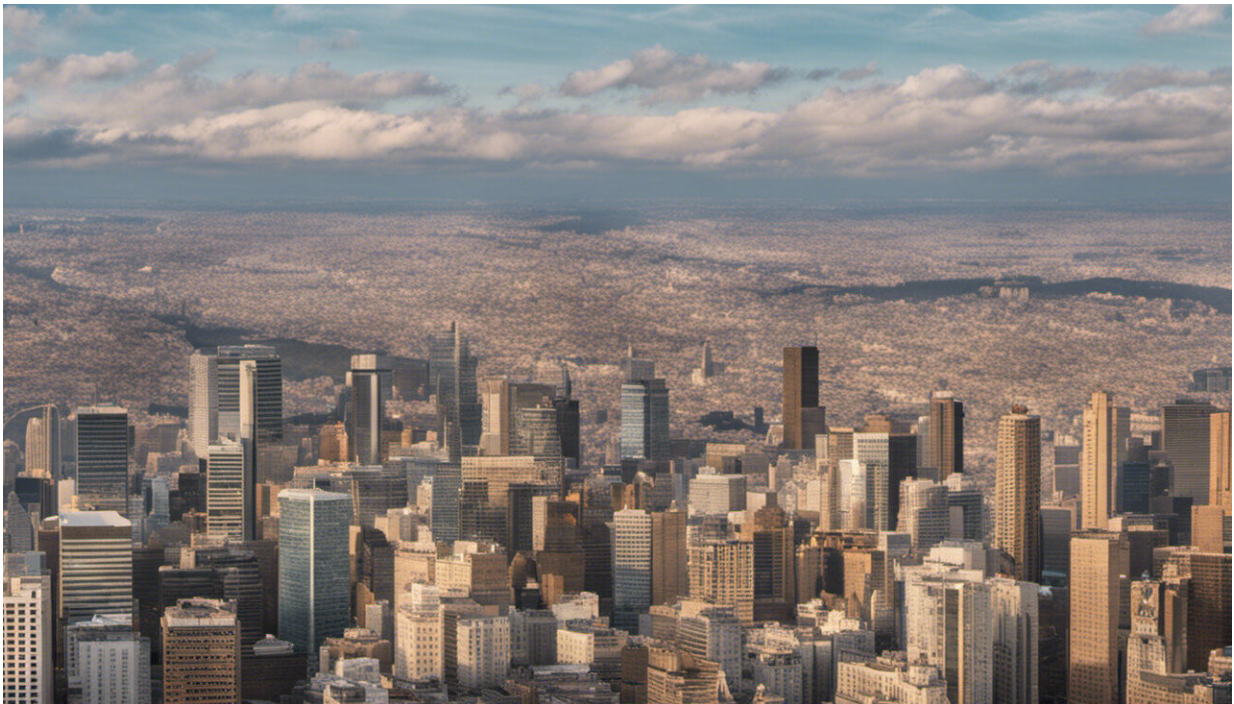


New insight into improving air quality measurements

March 12 2015



Credit: AI-generated image ([disclaimer](#))

Researchers from the National Physical Laboratory (NPL) and King's College London have identified a mechanism which is responsible for under-reporting of peak nitrogen dioxide concentrations at some air quality monitoring stations, and the best ways to minimise this.

Nitrogen dioxide (NO₂) is an air pollutant formed when fuels are burned, for example, in car engines, domestic boilers and power stations. High levels of nitrogen dioxide can have harmful effects on both our health and the environment.

Nitrogen dioxide levels in ambient air are routinely measured across the globe to check compliance with regulations and investigate health effects. To ensure reliable performance, air quality monitors are regularly tested against calibration cylinders containing a known quantity of a gas.

Cylinders used to calibrate nitrogen dioxide analysers contain a binary mixture of [nitric oxide](#) (NO) in nitrogen. However, low levels of nitrogen dioxide (created by the reaction of nitric oxide with oxygen) are often found within cylinders because of impurities in the gases used to fill them and the ingress of air.

New research from NPL and King's College London, published in the journal *Atmospheric Environment*, looked at over 1,000 measurements from nitric oxide calibration cylinders being used at monitoring stations across the London Air Quality Network. The researchers found that significant amounts of nitric oxide had degraded to nitrogen dioxide in many of the cylinders.

Failure to account for oxidation within the cylinders used to calibrate nitrogen dioxide analysers leads to underestimated nitrogen dioxide levels. High-pollution sites such as roadsides are particularly affected - potentially by as much as 20%. This could mean that many monitoring stations are under-reporting the number of hours in which nitrogen dioxide levels exceed the threshold value of 200 µg m⁻³, one of the criteria in the EU Ambient Air Quality Directive.

The researchers believe that [air quality](#) data both in and outside the UK

are affected by this degradation of the calibration gases, and have been for some time. They propose that current quality assurance procedures are improved to avoid under-reporting of [nitrogen dioxide](#) levels. Steps which could be taken to overcome the problem include regular measurements of degradation within calibration cylinders and the use of more stable calibration cylinders and regulator systems.

More information: "Quantifying the impact of nitric oxide calibration gas mixture oxidation on reported nitrogen dioxide concentrations," *Atmospheric Environment*, Volume 105, March 2015, Pages 169-172, ISSN 1352-2310, [dx.doi.org/10.1016/j.atmosenv.2015.01.023](https://doi.org/10.1016/j.atmosenv.2015.01.023).

Provided by National Physical Laboratory

Citation: New insight into improving air quality measurements (2015, March 12) retrieved 24 June 2024 from <https://phys.org/news/2015-03-insight-air-quality.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--