

London Air Quality Index

Preliminary calculation to the end of 2010

Provisional results for the LAQN air quality index for 2010 show:

- Continued decreases in the index for CO and SO₂ during 2010.
- Relative stability in the index for NO_X with an increase of 3% in the index value for NO_2 .
- The index for O_3 is now 31% above the 1996 value.
- A steady decrease in PM₁₀ since 2008, which appears to be driven by a combination of decreases in PM₁₀ from road transport sources within London and a decrease in PM₁₀ transported from continental Europe.

It is important to note that measurements from 2010 are provisional.

The LAQN air quality index

Analysis of air pollution trends is important to determine the effect of air quality management interventions and progress towards the attainment of air quality objectives. The LAQN index tracks changes in annual mean pollution concentrations at a sample of long-term monitoring sites. The index was set to 100 for each pollutant during the year ending November 1996. Measurements of PM_{10} used in the index calculation were all made by TEOM instruments and thus the index is not directly affected by recent changes in the PM_{10} measurement method at some sites in London.

CO, PM₁₀ and SO₂

Figure 1 shows the LAQN index values for CO, PM_{10} and SO_2 . Over the period of the index CO and SO_2 exhibited statistically significant downward trends at the 95% confidence interval. The annual mean concentration of SO_2 demonstrated the most dramatic change having fallen by 85% to the end of 2010. Recently, the rate of SO_2 decrease diminished compared to that experienced during the late 1990s, with the index value decreasing by 3% during 2010. Similar decreases have been measured in the annual mean concentration of CO, which fell by 78% to the end of 2010, with a decrease of 4% in the index value during 2010.

No statistically significant trend was present for PM_{10} up to the end of 2007. Although the PM_{10} index fell by a total of 35% up to the end of 2007, the decrease was achieved in the period up to late 2000 and the index then increased at a mean rate of around 0.4 % per year until the end of 2007. Since this time there has been an indication of a decrease in annual mean PM_{10} concentrations with the index decreasing by 4% in 2010. Encouragingly, this does not appear to be solely driven by decreasing PM_{10} from distant sources originating in mainland Europe and it may also reflect emission changes from within London. Disentangling the cause of these improvements in PM_{10} levels would yield important feedback for the air quality management process in London and the wider UK.





Figure 1 LAQN annual mean index values for CO PM₁₀ and SO₂.

NO_x, O₃ and NO₂

Figure 2 shows the LAQN index values for NO_x, O₃ and NO₂. Over the period of the index, statistically significant downward trends were exhibited by NO_x and NO₂. O₃ showed a statistically significant upward trend. The annual mean index value for NO_x showed the greatest overall decrease of these three pollutants with a fall of 43% to the end of 2010. However, there is evidence to suggest that annual mean concentrations of NO_x are moving toward stability despite the continued turn-over in the vehicle fleet with older vehicles being replaced by newer ones that emit less pollution. This relative stability in NO_x concentrations contrasts with the continued decrease in CO. This is thought to be due to the fact that the main source of CO is petrol vehicles, while the main source of NO_x is diesel vehicles. Abatement of NO_x emissions are needed to control NO₂ concentrations. Within this context, medium term stability in NO_x concentrations, and therefore NO_x emissions give rise to concern regarding future NO₂ concentrations. However, the index value for NO₂ did decrease by 14% over the whole period of the index, around 1/3 of the decrease in concentrations of NO_x. The slow response of the annual mean index for NO₂ relative to NO_X is due to the role that atmospheric chemistry plays in the formation of NO₂ and changes in the fraction of NO_x that is directly emitted from vehicle exhaust as NO2. In this respect the index masks considerable site to site variations with substantial increases in NO₂ at many roadside monitoring sites. The NO₂ index value increased by 3% during 2010.

The annual mean concentration of O_3 is the only pollutant to have increased during the period of the index. Up to the end of 2010 the annual mean index value for O_3 increased by 31%, though the index decreased by 5% during 2010.





Figure 2 LAQN annual mean index values for NO_X , O_3 and NO_2 .

More information

For more information on London's air pollution please see www.londonair.org.uk

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