Local Air Quality Management Helpdesk, September 2010

Measured nitrogen oxides (NOx) and/or nitrogen dioxide (NO_2) concentrations in my local authority area do not appear to be declining in line with national forecasts. Should I take this into account in my Review and Assessment work?

Defra and the devolved administrations have published "year –adjustment" factors for roadside NO_2 concentrations, and background (1x1 km) maps for NOx and NO_2 concentrations for all years up until 2020. Technical Guidance (LAQM.TG(09)) advises local authorities to use this information to adjust measured concentrations to future years (e.g. annual mean NO_2 concentrations measured in 2009 can be projected forwards to 2013). Background maps for future years are also used to support modelling studies for Reviews and Assessments.

These projections are based on the Pollution Climate Modelling studies carried out on behalf of Defra and the devolved administrations, and take full account of current understanding of the expected changes in sector-based emissions up until 2020. They also take account of the expected changes to primary NO_2 emissions.

However, recent analyses of historical monitoring data have identified a disparity between the measured concentrations and the projected decline in concentrations associated with the emissions forecasts. Trends in ambient concentrations of NOx and NO_2 in the UK have generally shown two characteristics; a decrease in concentration from about 1996 to 2002-2004, followed by a period of more stable concentrations from 2002-2004 up until 2009.

As a whole, urban roadside sites show evidence that NOx concentrations have declined very weakly over the past 6 – 8 years. NOx concentrations at urban background sites broadly reflect the same trend, and have been close to stable over this same period. For NO_2, levels have largely remained stable at urban roadside and background sites, but show a slight upward trend in inner London. At monitoring sites close to motorways and dual-carriageways, there is evidence that NOx concentrations have fallen at some, but not all locations, while NO_2 concentrations have levelled off.

In all cases there are differences between individual sites (with some showing upward or downward trends) but overall, there is little evidence of a consistent downward trend in either NOx or NO_2 concentrations, that would be suggested by emission inventory estimates.

The precise reason for this disparity is not fully understood, and is currently under investigation, but it is thought to be related to the actual on-road performance of diesel road vehicles when compared with calculations based on the Euro standards. Preliminary studies suggest that:

- NO_x emissions from **petrol** vehicles appear to be in line with current projections and have decreased by 96% since the introduction of the 3 way catalysts in 1993;
- NO_x emissions from **diesel cars**, under urban driving conditions, do not appear to have declined substantially, up to and including Euro 5. There is limited evidence that the same pattern may occur for motorway driving conditions.
- NO_x emissions from **HGV** vehicles equipped with SCR reduction are much higher than expected when driving at low speeds.

On this basis, it might also be expected that the forecast reductions in background NO_x and NO_2 concentrations associated with the road traffic component are optimistic. There is no evidence to suggest that background concentrations associated with the other (non-traffic) source contributions should not behave as forecast.

This disparity in the historical data highlights the uncertainty of future year projections of both NO_x and NO_2, but at this stage there is no robust evidence upon which to base any revised road traffic emissions projections.

Defra and the devolved administrations are currently investigating these issues, and once the reasons are fully understood updated guidance will be issued. However, the preliminary findings would suggest that the Euro standards will deliver only marginal, if any, reductions in NO_x and NO_2 concentrations until the Euro 6 emission standards begin, as is currently forecast, to play a major role (i.e. *circa* post-2015).

Where existing forecasting information is used for decision making or review and assessment and action planning work, local authorities may wish to take account of the emerging findings on the performance of different vehicle types, the performance of Euro standards overall, and the expected effect on forecast background concentrations.