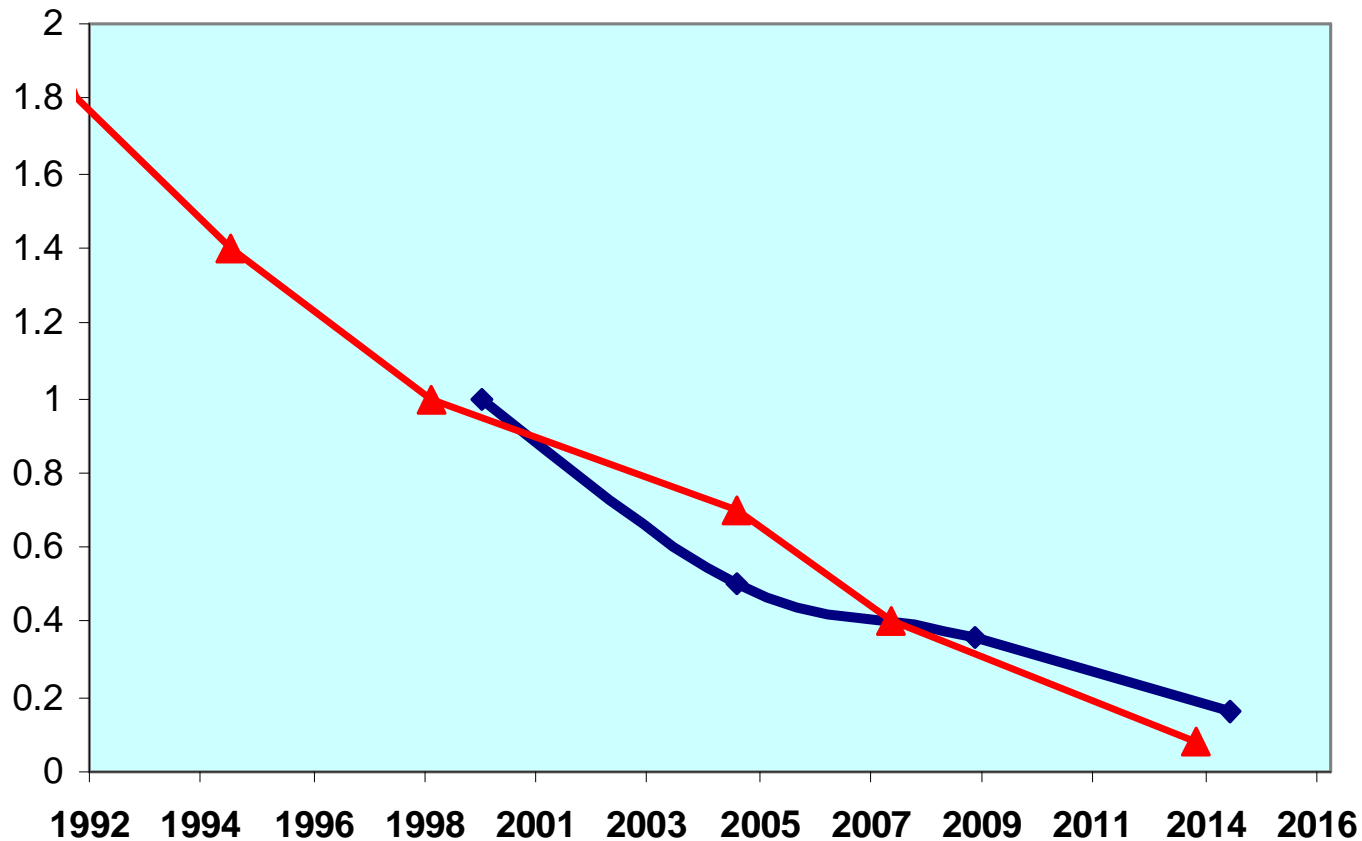




What advice for modelling future nitrogen dioxide?

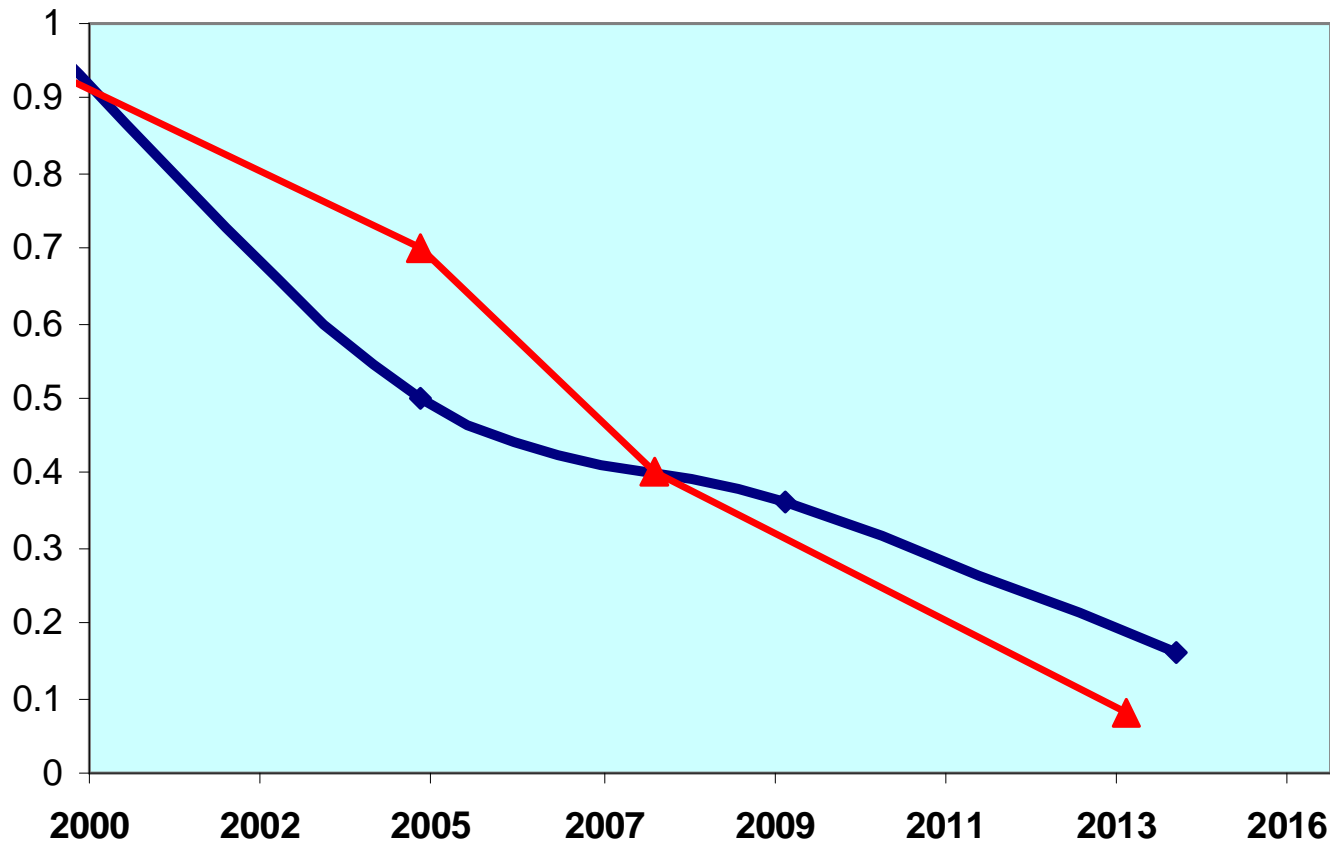
Prof. Duncan Laxen

Trend in NO_x Emission Standards



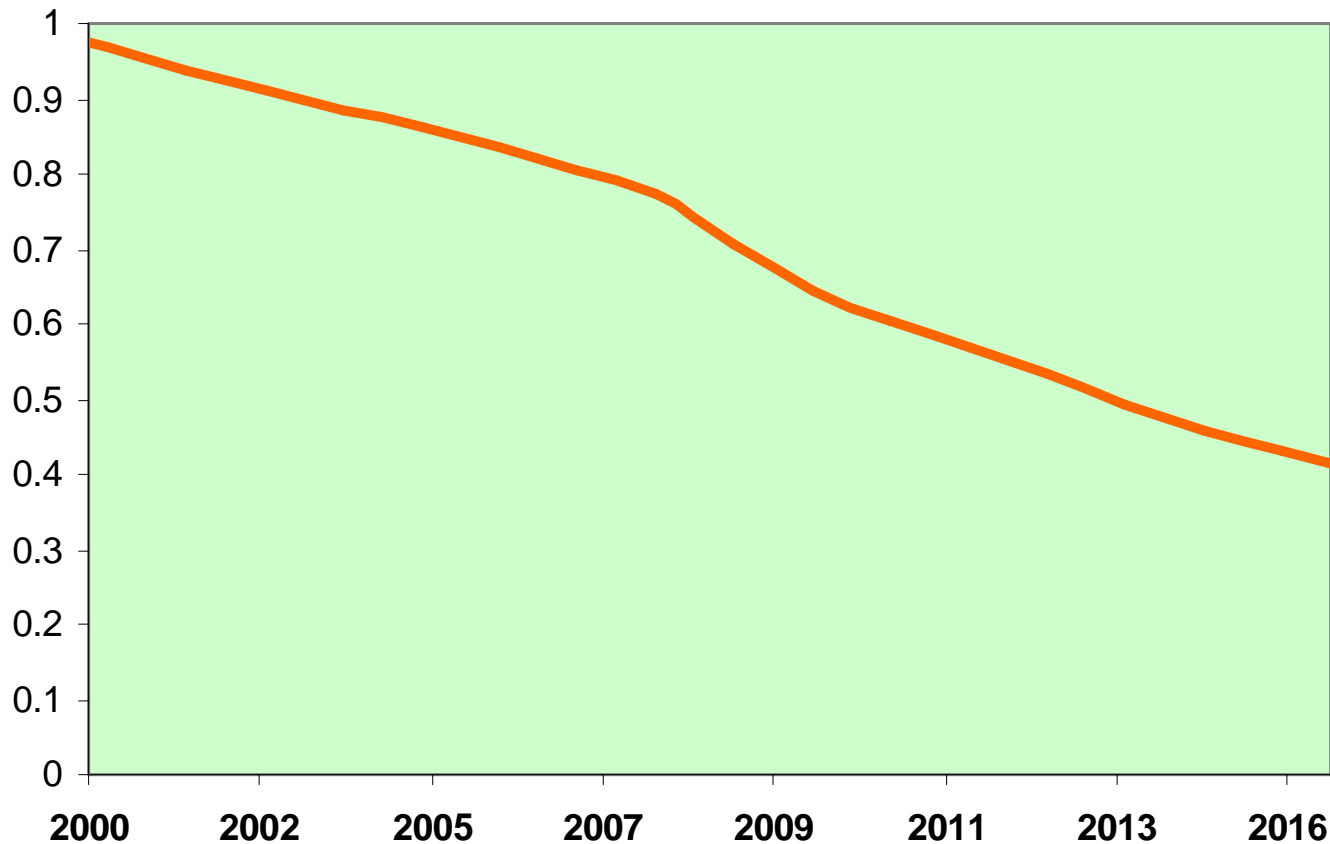
NO_x emissions
from Road
Vehicles
1992-2015
Light duty – blue
Heavy duty - red

Trend in NO_x Emission Standards



NO_x emissions
from Road
Vehicles
2000-2015
Light duty – blue
Heavy duty - red

Official NO₂ trend in roadside concentrations



NO₂
concentrations
2000-2015

Actual trends

- Looked at sites with long records 1998-2010

Ø8 - high NO_x sites >100 µg/m³

Ø7 - medium NO_x sites 40-100 µg/m³

Ø4 - low NO_x sites <40 µg/m³

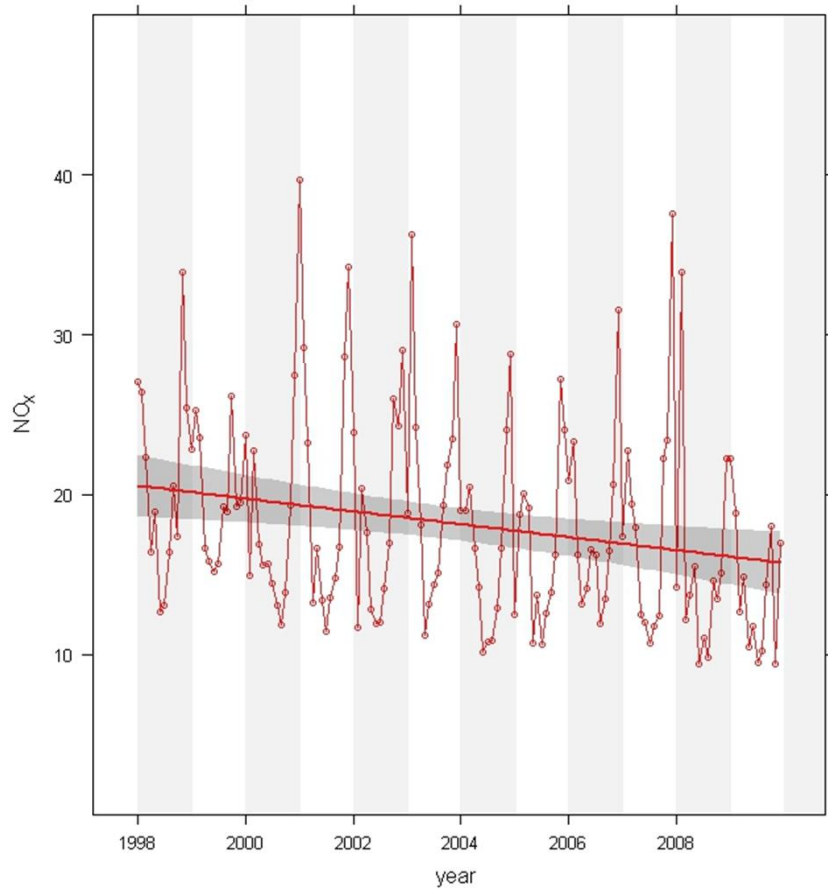
Ø High = Marylebone Road, London Bloomsbury, Bath, Harringey Roadside, Hillingdon, Exeter, Southampton, Bury

Ø Medium = Thurrock, Leicester, Leamington Spa, Teddington, Plymouth, Glasgow Centre, Cardiff

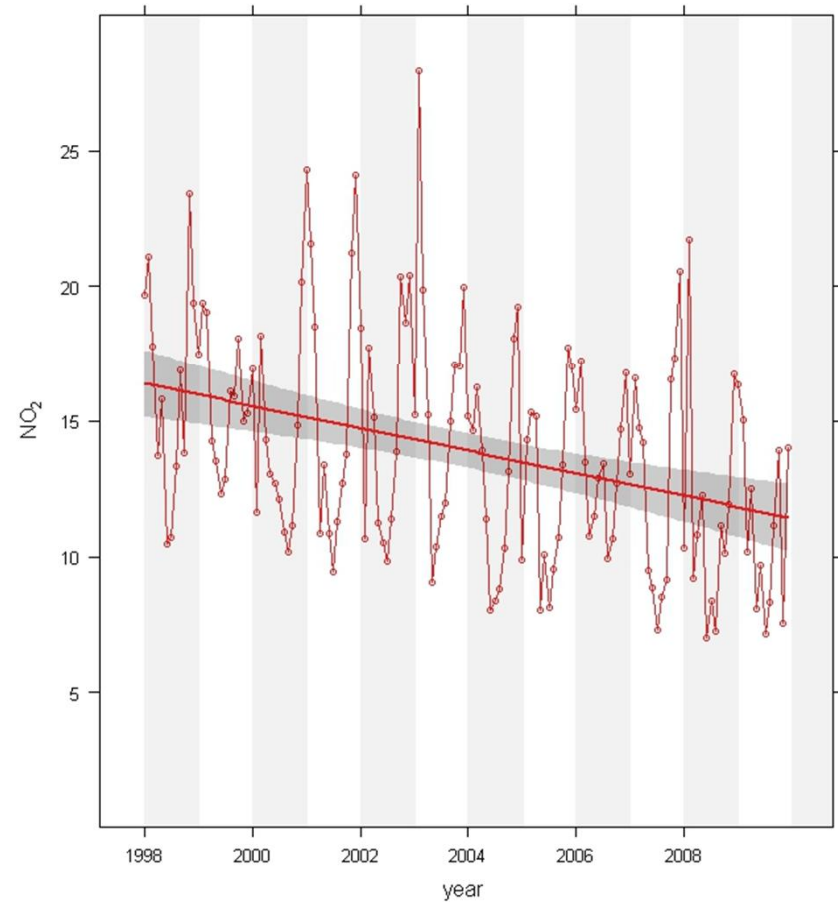
Ø Low = Ladybower, Lullington Heath, Rochester Stoke, Harwell

Trends at Low NO_x Sites

NO_x

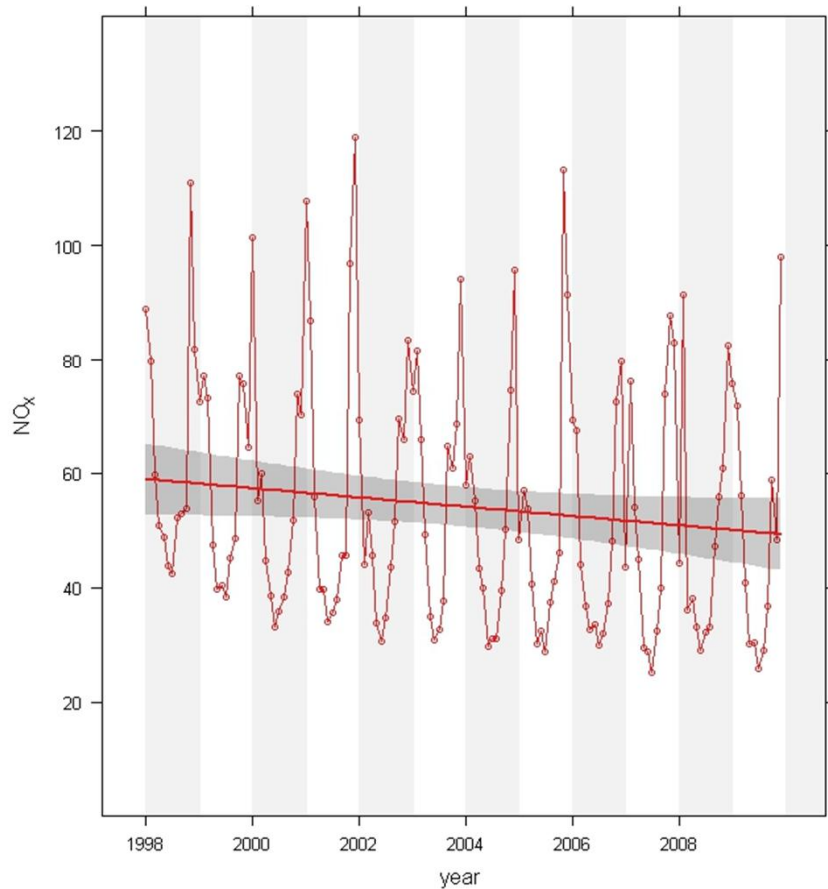


NO₂

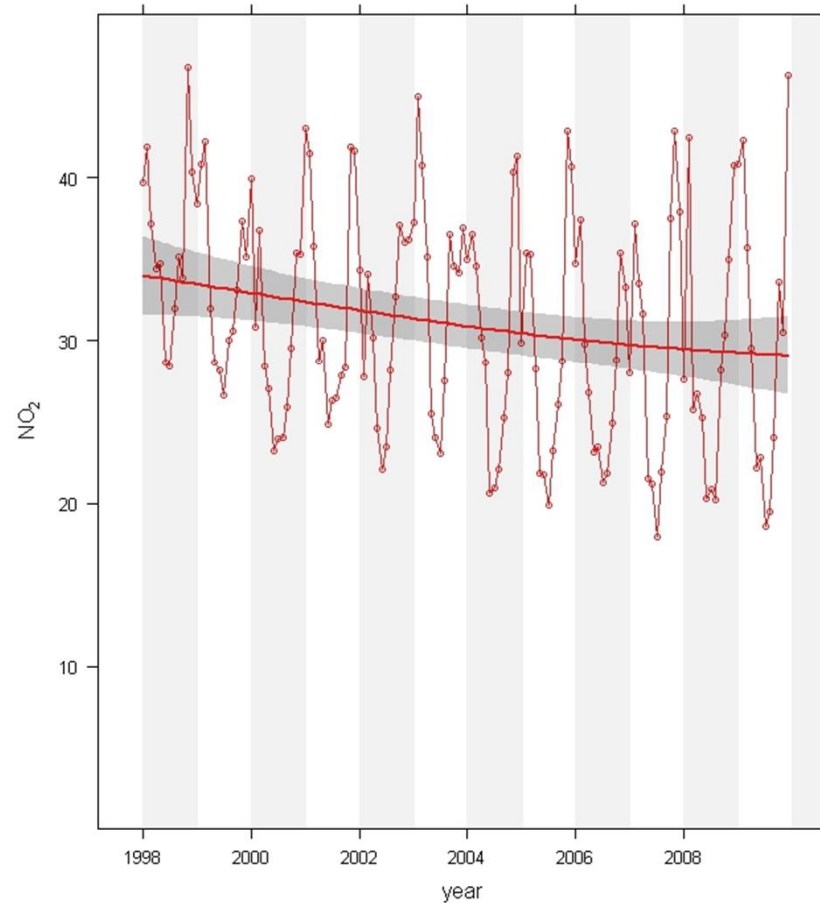


Trends at Medium NO_x Sites

NO_x

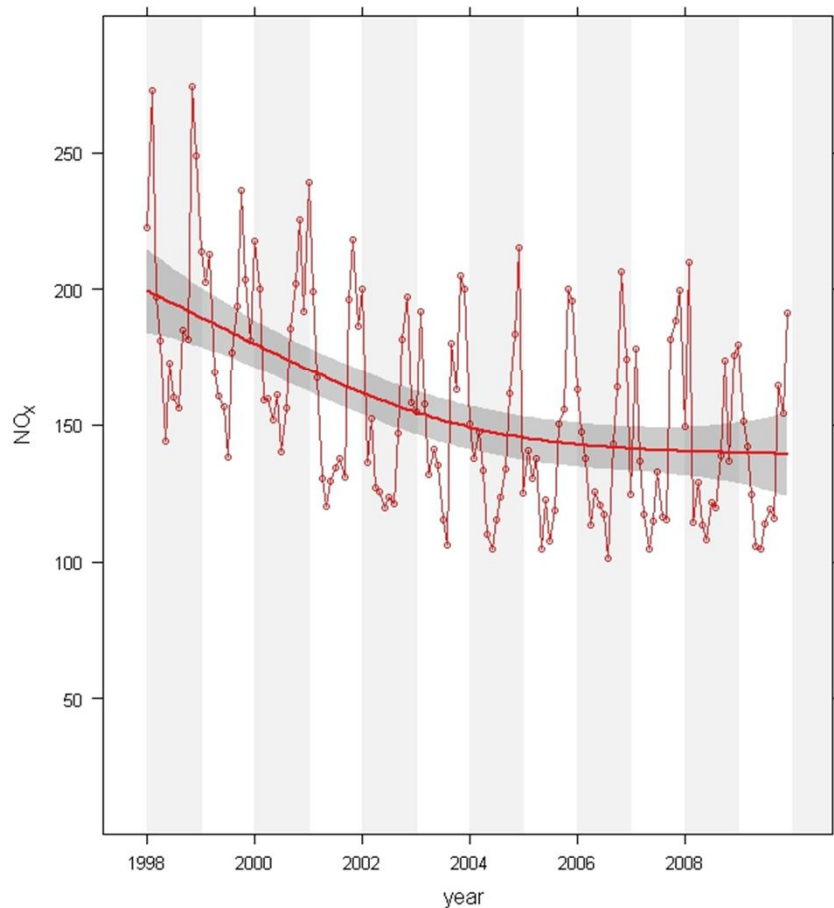


NO₂

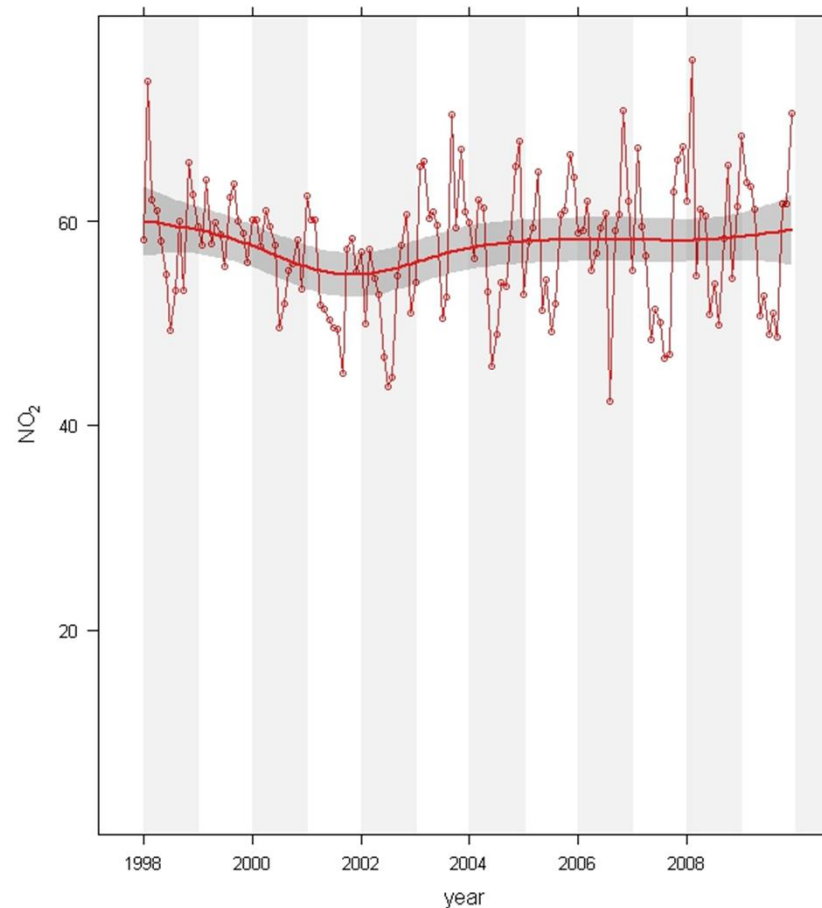


Trends at High NO_x Sites

NO_x

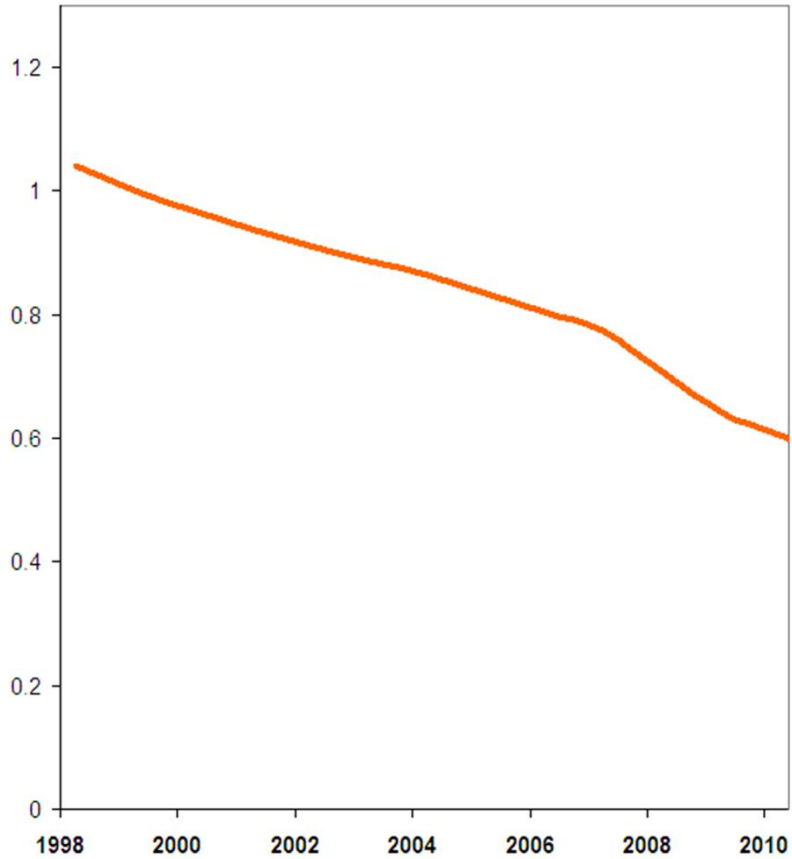


NO_2

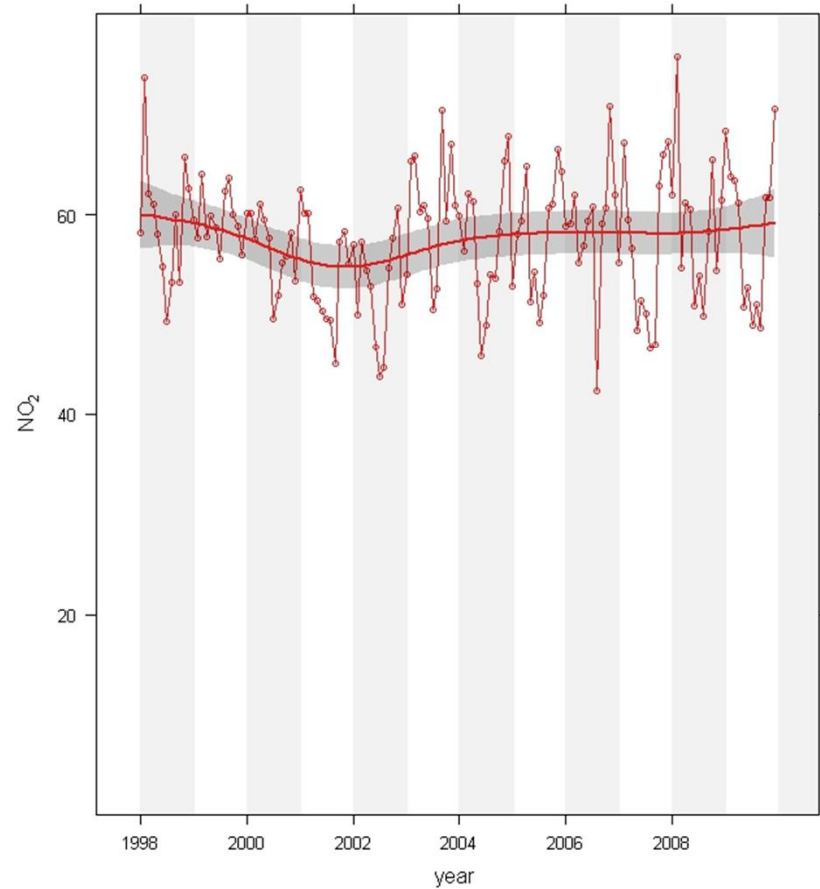


Traffic Dominated Sites NO₂

Official



Actual



Realisation

- Around 2005 realised that trend of NO₂ was not down as expected, especially at roadside locations
- After various studies it was recognised that this was largely due to higher emissions of primary NO₂, as set out in:
 - AQEG report *“Trends in Nitrogen Dioxide in the United Kingdom” December 2007*

Mismatch between official projections and evidence

- 2007 AQEG report said downward trend would be re-established as new controls on NO_x emissions come into play
- In practice this has not been the case
- Team led by KCL – ERG is undertaking a study for Defra. It is due to report soon

Reasons

- Appears to be principally due to Euro Standards not delivering the expected reductions for diesel vehicles, as set out recently by Defra:
 - Ø 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.
 - Ø NO_x emissions from HGV vehicles equipped with SCR reduction are much higher than expected when driving at low
- May also be an element of the stock mix on the road not being accurately understood

How does this affect future projections?

- There will be little change until after Euro 6 and Euro IV come into force in 2014 (assuming these deliver)
- Background concentrations will not decrease to the extent expected
- Road contribution to roadside concentrations will decrease even less, especially in urban areas

Defra Guidance (September 2010)

FAQ

Measured nitrogen oxides (NO_x) 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?

<http://laqm2.defra.gov.uk/FAQs/index.htm>

Defra Guidance

Answer

Sets out background then concludes:

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.

How does AQC take this on board?

- Assessments of new developments – ‘impact of’
 - Ø Where possible we now present at least 3-years of monitoring data, which will typically show no overall trend
 - Ø We model assuming the ‘still official’ reductions
 - Ø We have a section called ‘Uncertainties’ where we summarise the position. We make clear the modelled concentrations we present may be higher than set out. We also note that baseline concentrations should still be lower than in 2010
 - Ø We thus deal with this as a matter of uncertainty and rely on professional judgement to reach a conclusion on the significance of the overall air quality impacts

How does AQC take this on board?

- Assessments of new developments – ‘impact on’
 - Ø In this case we can present the impacts as a range, a) assuming the modelled reduction and b) assuming no reduction, i.e. current day concentrations
 - Ø For instance, we might say the first floor concentrations will range between 45.3 and 51.5 $\mu\text{g}/\text{m}^3$ and those on the second floor between 37.3 and 43.0 $\mu\text{g}/\text{m}^3$, while the background will lie between 29.5 and 33.9 $\mu\text{g}/\text{m}^3$
 - Ø This could lead to a recommendation to use forced ventilation for both first and second floors, but would need to take account of worst-case assumptions, year of scheme assessment and number of people affected



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