European air quality: changing priorities?

Some insights from the second European Auto/Oil Programme.

The second European Auto/Oil Programme (AO II) mentioned in the preceding articles has involved the European Commission, together with Member States, industry[1] and the NGO community, over the past three years. A major goal of this programme has been to assess the impact of already mandated emission control measures on air quality in the European Union. Where air quality targets are predicted not to be attained, the programme has also been designed to assess the efficacy of further transport fuel/local measures in making progress towards the target. As the technical phase of the programme draws to a close, what key policy-related messages are emerging? What important conclusions can be drawn in determining priorities as the Commission launches its follow-up initiative of **C**leaner **A**ir **F**or **E**urope (CAFE)? In this brief article we shall seek to answer these questions.

To begin we need to look at the anticipated trends in emissions. Figure 1 shows those for NO_x, VOCs, benzene and PM_{10} as developed by the Commission's consultant.[2] NO_x is the key target for NO_2 attainment and, together with VOCs, a key target for the attainment of ozone. Benzene and PM_{10} emissions are key targets for attaining the air quality objectives for these high concern pollutants.

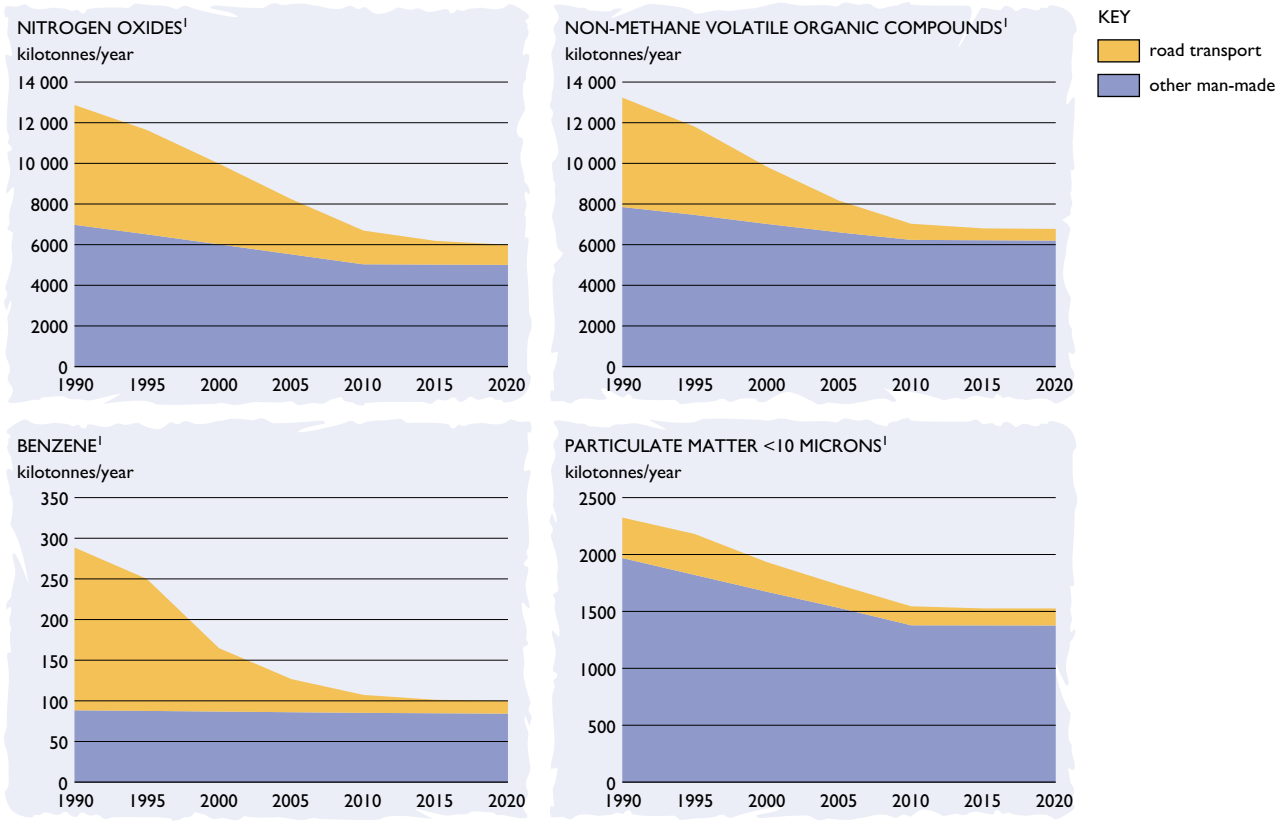

Figure 1
EU-15 emissions projections for NO_x, VOCs, benzene and PM_{10}.

1 *The auto and oil industry sectors*

2 *SENCO (Sustainable Environmental Consultants) and DRI (Data Resources Inc.)*

Correspondingly there are significant improvements in air quality for NO_2, VOCs, benzene and PM particularly between 1995 and 2010.

The trends are based on an assessment of the impact of already mandated control measures and account for the significant anticipated growth in transport over the period. The figures clearly illustrate why, over the past decade, there has been such a strong focus within the European Union on introducing road transport related measures as a means of improving air quality. They also clearly illustrate the efficacy of such a focus in dramatically reducing emissions from the road transport sector. The impact of this on air quality in our cities can be seen from the work undertaken by the European Environment Agency (EEA) in parallel to the Commission's programme. This 'top down' assessment[3] of the impact on 2010 urban air quality in some two hundred cities utilized the same detailed emission trends that underpin those given above. However, in this case individual sector/individual country level data for 1995 were used to properly account for national trends and the composition of emission inventories in each of the cities. For reasons of space we have only been able to include results for NO_2, benzene and PM_{10}.

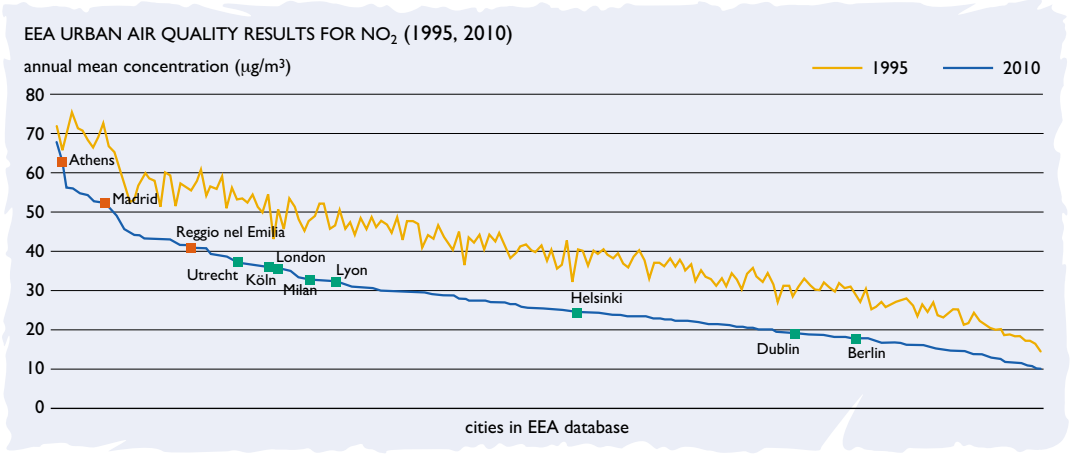

Figure 2
Auto/Oil II: plots of EEA urban air quality results, 1995/2010, for NO_2

For NO_2 the annual mean air quality target set in the air Quality Daughter Directive is 40 µg/m^3. This is recognized to be more difficult to achieve than the one-hour standard set in the same Directive. The EEA's assessment shows that already agreed measures will deliver the annual mean target in most cities by 2010. This is confirmed by the more detailed, but limited, individual city modelling carried out by the Commission.[4] In the Commission's view, the strategy for delivering the NO_2 target in the residual 'non-attainment' cities is likely to be best achieved through local targeted measures.

Since, in the case of benzene, long-term exposure is the concern, only an annual mean target is proposed by the Daughter Directive. As this draft Directive moves toward adoption, it appears that a target of 5 µg/m^3 will be mandated. The EEA's analysis together with the individual city analysis shows almost all cities will be brought into compliance with this target. Here, again, it is the Commission's view that further measures to achieve compliance in the few remaining 'non-attainment' cities is likely to be best achieved through local targeted measures.

In the case of PM_{10} it is also recognized that the annual mean target of 20 µg/m^3 is tougher than the 24-hour mean target set forth in the Daughter Directive. Both the EEA analysis and the

[3] *EEA 'top down' analysis using their c-Q model*
[4] *Joint Research Centre of the European Commission, Ispra*

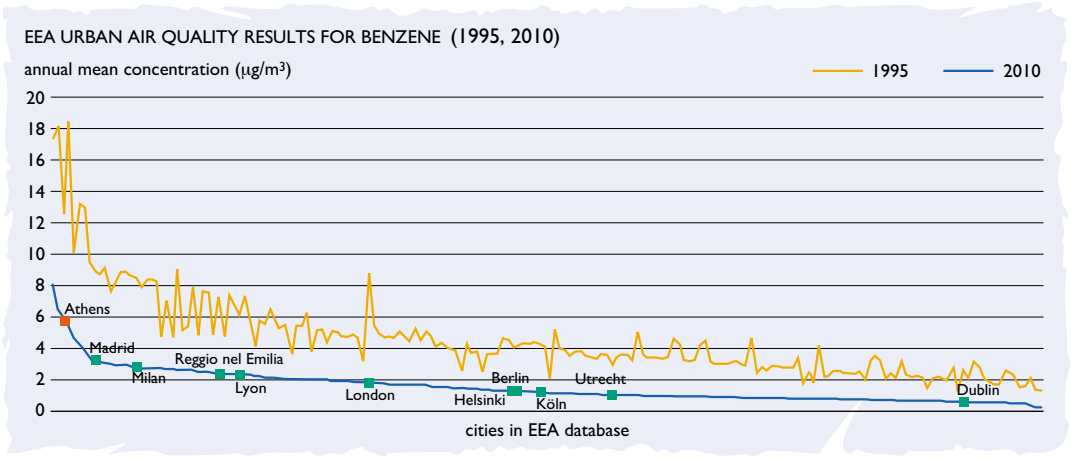

Figure 3
Auto/Oil II: plots of EEA urban air quality results, 1995/2010, for benzene

limited detailed city modelling confirm that a significant number of cities will not attain compliance with the annual mean target with already mandated control measures. In looking at the possible options for further measures aimed at moving towards a greater level of compliance, the emission trends given above provide a crucial perspective. While road transport related emissions are set to fall significantly, these reductions are not matched by any of the other major sectors. Indeed, by 2010, transport exhaust emissions are anticipated to make up only some 5–7 per cent of the total primary PM_{10} emissions. If secondary PM_{10} are included, this drops to less than 4 per cent! Given that PM_{10} is increasingly recognized as a long-range transportable pollutant, the need to address the non-road transport sector as 'the new priority' in future programmes like CAFE is obvious from this emission trend.

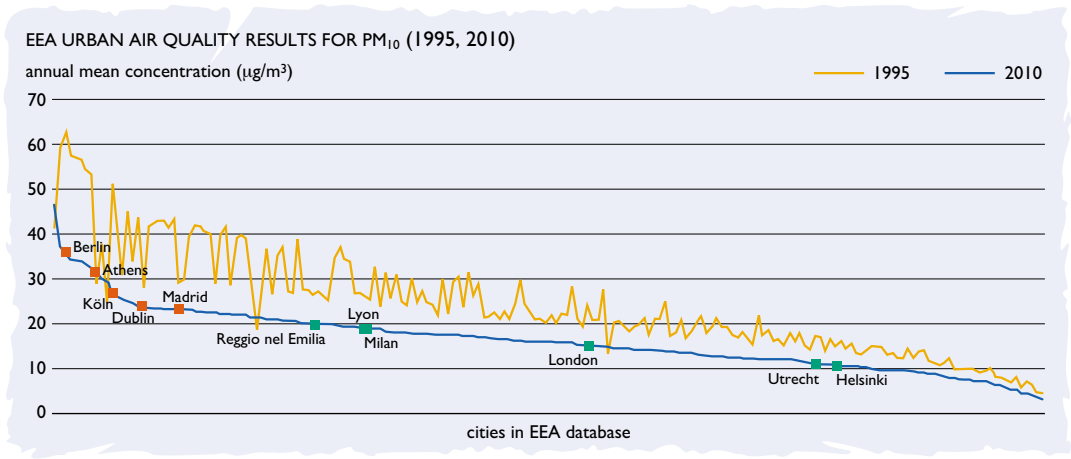

Figure 4
Auto/Oil II: plots of EEA urban air quality results, 1995/2010, for PM_{10}

If it be said that, in the future, the focus will move to $PM_{2.5}$ rather than PM_{10}, then again the emissions trend shown above suggests an urgent need for the research community to fill the enormous gap in understanding on the contribution of non-transport sectors to such emissions. Much research is under way to characterize the nature of road transport particulates; corresponding work on other sectors is conspicuous by its absence. If science is to inform wise policy, such gaps must surely be addressed urgently.

Finally a brief word about ozone. Whatever the outcome of the target-setting process for a new ozone target, it is again clear from the emission trends for NO_x and VOCs that, in a 'beyond 2010' Europe, road transport will have become a significantly reduced contributor. This too provides an important perspective for the setting of policy priorities for CAFE.