AIR QUALITY BULLETIN
November 2009 Issue 43

EXCEEDENCES

NO_2 getting worse

Official modelling of UK air quality in 2008 suggests that just three zones comply with the European NO_2 annual mean objective.

The submission, handed in last month, provides further ammunition for those that say NO_2 concentrations are not falling as the Government is predicting (*AQB October p7*).

2008 estimates of zones exceeding were compiled by AEA (see table) and reflect the latest release of emission factors. Emission factors have been blamed for the sustained failure of modelling to accurately predict NO_2 – modelling keeps predicting large falls, whereas many areas report static or even rising levels of NO_2.

The UK is split into 43 zones for the purposes of the EU directive reporting. Blackpool, Highland and Scottish Borders are the only three zones where no exceedences are reported. Data is contained in a simple excel file at the moment, it is currently being written up into report form. The data will put further pressure on Defra which is attempting to put together its application for a time extension for NO_2 deadlines.

Robert Vaughan, speaking at the recent UWE/Epuk conference held in Bristol as the figures were submitted, said that Defra was now reviewing local measures that can help to improve NO_2. Defra is to consult local authorities to confirm the national picture and include any local evidence for exceedences. Action plans will be reviewed and further measures outlined in a plan that will be circulated for consultation in February.

Defra will then submit a finalised plan to Europe "by summer 2010".

- 2008 data can be viewed on http://cdr.eionet.europa.eu/gb/eu/annualair

UK zones worsen

Number of zones meeting NO_2 objective

2003	8
2004	9
2005	8
2006	5
2007	4
2008	3

BIOMASS

Permit issued for Port Talbot wood burner

The Environment Agency has granted a permit for Europe's largest biomass plant to be built in Port Talbot – near the UK's worst industrially-prompted air quality management area.

The Agency says the new Prenergy virgin woodchip burning plant will not worsen air quality significantly nor impact on the AQMA called for PM_{10} around the Port Talbot Steelworks.

But it has dictated very tight PM_{10} emission limits – 6 mg/Nm^3 (dry, 0 deg C, 6% O^2). An expert told *AQB*: "This is tough. A 2005 Agency consultation draft for biomass boilers suggested 20 mg/Nm^3 for PM. Also the NO_x limit of 150 mg/Nm^3 is lower than the 200 mg/Nm^3 in its draft."

Protesters are not happy. Pete Wilson of Port Talbot Residents Against Power Stations accused the Agency of indifference: "We submitted four examples to show that the Agency was taking a very optimistic approach with regards to the accuracy of the dispersion modelling, particularly in hilly terrain scenarios such as Port Talbot. The Agency said our fears were unfounded. This is quite apart from the sustainability of importing this quantity of woodchip from Canada."

The agency says: "The plant will produce electricity with 50-80% less CO_2 emissions than gas or coal fired power stations. We have insisted that all wood used at the plant is from sustainable sources, the first time this clause has been included in an environmental permit. We have sought the advice of the local health board and set strict emission limits to protect human health which is important considering the proximity of the AQMA."

"Our policy, in line with Government guidance, allows for the permitting of new sites in areas of failing air quality providing the new sites' additional impact is negligible. Any other approach would prevent any development, however small, in some areas.

"We have put emission limits in the permit to make sure the contribution of Prenergy to the ambient air quality will be insignificant."

INSIDE THIS ISSUE ...

IN BRIEF

Inquiry launched

The Commons Environmental Audit Committee is launching a new inquiry into air quality.

It will "assess whether the Government is developing an effective strategy for meeting its obligations under the EU air quality directives". The committee will also examine whether the strategy is enough to ensure that air pollution is reduced to acceptable levels.

In preparation for its inquiry, the committee has commissioned a briefing by the National Audit Office (*AQB October p2*). The committee is interested in receiving written evidence that looks at:

- The monitoring and modelling systems used by the Government and whether these provide an adequate measure of air quality;
- The extent to which the Government fully understands and has identified the health and environmental risks caused by poor air quality;
- The extent to which the delivery chain for air quality is coherent, integrated, coordinated and effective and whether the bodies with responsibility for managing air quality have appropriate incentives, understand their role and responsibilities, and are adequately resourced;
- The steps that need to be taken to ensure that targets will be met in the future.

"Responses dealing with the issues above are welcome as are more wide-ranging responses. Those responding to this call for evidence need not confine themselves to the particular issues identified above.

Simon Birkett of the Campaign for Clean Air in London said: "This inquiry is long overdue. Let's hope it gets to the heart of the problem and results in urgent, radical action to prevent thousands of premature deaths each year."

- www.parliament.uk/parliamentary_committees/environmental_audit_committee/ea

IN BRIEF

Pollutants down

The 2007 update to the UK pollutant inventory has been released. It shows emissions of all main pollutants dropped between 2007 and the previous year.

● *Air quality pollutant inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2007* can be viewed on www.naei.org.uk

London in Europe

Measurements from the London Air Quality Network are now appearing on the EU-sponsored *Air Quality in Europe* web site established as part of the CITEAIR project.

● www.airqualitynow.eu

Black smoke compared

NPL has released results from black smoke monitoring in 2008.

During the year, old-fashioned black smoke monitors were replaced by 22 Magee aethalometers.

Conclusions include:

● Measured annual average black smoke index ranged from 3.5µg/m^3 in Woolwich to 39.9µg/m^3 at Marylebone Road. In general the average black smoke index measured in 2008 was lower than 2007, with network means of 8.6µg/m^3 and 9.9µg/m^3 respectively.

● Black smoke concentrations measured by the network were compared with Teom PM_{10}, total NO_x (expressed as NO_2) and particle number concentrations, for those sites where these measurements were colocated. Correlation was generally best between black smoke index and NO_x concentration. The data capture for black carbon measurements using the aethalometer was 91.8%.

● Measured average black carbon concentrations ranged from 1.3µg/m^3 in Folkestone to 13.0µg/m^3 at Marylebone Road. The network mean concentration was 3.1µg/m^3.

● *2008 annual report for the UK black smoke network* can be viewed on www.airquality.co.uk/archive/reports

BEST PRACTICE

Hunt for regional supergroups ...

The Low Emission Strategies Partnership, formed from the ashes of the Beacon initiative, is launching a Regional Groups Initiative. This will provide funding and support for participating organisations to develop and implement low emission strategies (*AQB October p4*).

Applications are invited from groups of local authorities and other organisations located broadly within the same geographical area. The LES Partnership will then select three groups to work with throughout 2010. LES says the groups will benefit through:

● Involvement in a national level initiative to implement low emission strategies, contributing to performance indicators and targets for climate change and air quality;

● Resourcing of £20,000 towards a regional low emission champion to coordinate and drive-through projects at a regional level; and

● Provision of technical and strategic advice from an experienced practitioner.

Andrew Whittles of Cenex will provide the technical and strategic support. He said: "I can't wait to get involved with this new initiative, building on the work that we've done so far as part of the LES programme. I know there are some really exciting ideas out there. It will be great to be able to support organisations in making real progress towards reducing emissions."

Application packs, containing further information and an application form are available to download from the LES website at: www.lowemissionstrategies.org/application_pack.html. The closing date for applications is Friday 11th December 2009.

The LES Partnership Board will then shortlist groups for interview early in January 2010, with the initiative running from February 2010 to February 2011.

● For further information, contact Andrew Whittles at: andrew.whittles@cenex.co.uk

GUIDANCE

... and for developer of low emission toolkit

The LES Partnership is inviting tenders to develop a Low Emission Toolkit to assist local authorities in identifying the range of low emission strategies available and in assessing the costs and benefits of pursuing them (*AQB October p4*).

The toolkit will include three applications:

● Technology guidance: to compare the emissions, performance, costs and logistics of low emission vehicle technologies (available in the 2010-2015 market) at an individual vehicle level;

● Fleet management tool: to appraise the costs and benefits of low emission options for local authority fleets and activities; and

● Development tool: to appraise the costs and benefits of low emission strategies when assessing development applications, including site-based measures (eg. a residents' electric car club) as well as financial contributions to wider schemes (eg. financial contributions towards a low emission bus fleet).

John Paterson, London Borough of Greenwich and acting chair of the LES Partnership Board, sees a big role for the toolkit in demonstrating the potential benefits of implementing low emission strategies: "With robust, quantitative data on costs and benefits, the toolkit will put local authorities in a much better position to develop and implement low emission strategies."

The invitation to tender for this contract was published last month and the contract will be led by the London Borough of Greenwich on behalf of the LES Partnership. Tenders for the work are expected to be in the region of £65,000 to £90,000. The closing date for tenders is Friday 20th November.

● Contact John Paterson via email on John.Paterson@greenwich.gov.uk

EMISSION INVENTORIES

EU set to miss 2010 air pollutant limits

Updated emission estimates for 2010 show just 14 member states expect to meet their respective 2010 air pollutant limits set under the EU National Emission Ceilings Directive (NEC Directive).

The NEC Directive status report from the European Environment Agency progress on the four pollutants covered by the directive: sulphur dioxide, NO_X, VOCs and ammonia.

Only Spain anticipates missing three emission ceilings — those for NO_X, NMVOC and NH_3. France, Germany and the Netherlands each anticipate missing two of their four emission ceilings. NO_x remains by far the most difficult – 12 member states – including the UK – now estimate they will miss the ceiling for this pollutant.

NO_X emissions for the EU-27 as a whole are now projected to be 6% above the aggregated member state ceilings (known as the Annex I ceiling) and 16% above the stricter ceiling for the European Community as a whole (the Annex II ceiling) set for 2010.

Pressure group T&E commented: "Pollution readings from vehicle test cycles were known to be unreliable eight years ago, yet governments still pinned their hopes on them."

● *NEC Directive Status Report* can be viewed on www.eea.europa.eu/highlights/europe-set-to-miss-2010-air-pollutant-limits

REVIEWS AND ASSESSMENTS

Defra reviews LAQM process

Local authorities are being polled for their views on the local air quality management process.

The scrutiny has raised fears among some that the LAQM process – which includes annual progress reports – could be watered down as part of the cross-Government drive to reduce burdens.

A team of former DETR civil servants are leading the review and already over 250 councils from across the UK have responded to the 'hour long' questionnaire. Responses are being sifted by UWE.

Defra says: "There will be a workshop of stakeholders including a cross section of local authorities, contractors, Government departments, Environment Agency, and others including Epuk. All these are either involved in LAQM delivery or influence its delivery (eg DH, CLG, DfT) The purpose of the workshop is to inform the preparation of the report and recommendations being prepared for Defra." The workshop is separate to the air quality 'summit' being organised on behalf of Defra by Lacors on 30th November.

The consultants have been given a brief to review the operation of LAQM in the UK, and to make recommendations with a view to improving air quality outcomes and making better use of available LAQM resources. It adds that proposals for legislative change are 'within scope'. A final report is due to be completed by the end of the year.

Air Quality Consultants' Duncan Laxen expressed concern that the review could lead to air quality being sidelined.

Speaking at the recent UWE/Epuk SW division conference held in Bristol, Laxen said: "This could end up a bit like what happened with the local transport plan process where air quality was downgraded as a priority.

"The desire to reduce burdens on local authorities could lead to Defra dropping the requirement for local authorities to carry out frequent reviews and assessments. If we go down that route, if it isn't mandatory, it may not get done at all."

Five key topic areas for the LAQM review

The evidence:
- Do the monitoring arrangements and modelling techniques used by authorities provide them with a good overview of air quality?
- Have authorities been able to detect change over time, and relate changes to action plan activities?
- Should more be done to integrate central government and local government air quality monitoring?

LAQM processes:
- Does the requirement for three-yearly updating and screening assessments continue to be justified in all areas?
- Is there a continuing justification for the requirement that all local authorities should produce annual progress reports?
- Is there scope for streamlining the procedures for detailed assessments, for declaring air quality management areas, for further assessments, and for the drawing up and agreement of air quality action plans?
- Current processes are built around the concept of local action to tackle 'hotspots' through the establishment of air quality management areas. Does this concept remain valid?

The inter-relationship with other policy areas:
- Is there scope, centrally, at local level, or both, for capitalising more effectively on the synergies between the objectives and instruments of LAQM and of transport, planning, and climate change policy?
- …and for managing better any conflicts between these?
- Consistently with the current framework of policy on central/local relations, what means are available for securing a greater focus on local air quality improvement in sustainable community strategies and local area agreements?

Aligning powers and responsibilities:
- Do local authorities have adequate powers to make an impact on air pollution through local action?
- Should local authorities be given formal duties to deliver statutory standards?
- Should national government do more to dictate local action? What form should their intervention take?

Differences across the UK:
The review team will explore experience across the UK, and highlight any important differences of experience and approach as between England and each of the DAs.

INDUSTRIAL REGULATION

Consultation on permit charge increases

Proposed charges for permits are being consulted on.

The proposed Environment Agency charges for 2010/11 will rise by a "baseline 1%" and there will be a series of technical changes.

Meanwhile Defra is consulting on LAPC rises of 1.15%. From 2008/9 full reviews are every two years, with an interim review.

- Agency charges: www.environment-agency.gov.uk/research/library/consultations/111170.aspx
- The Defra charges consultation can be found on www.defra.gov.uk/corporate/consult/localauth-plantfees10-11/index.htm

IN BRIEF

Renewed call for Olympics trap fitment

The Environmental Industries Commission has renewed its call for Olympics construction work to follow the *Best practice guidance on the control of dust and emissions from construction and demolition*.

EIC says that three years after construction started, the Olympic Delivery Authority "hasn't retrofitted any plant on site". Instead, the ODA recently made a "decision to undertake a pilot study on a live site with a range of machines and plant hire contractors".

"We believe that starting a pilot study now is unacceptable, particularly as there has been a commitment from day one to comply with all aspects of the London Best Practice Guidance – and that the necessary technologies are proven environmentally, cost effective and fully accredited – we have cooperated with the ODA on their proposals."

- www.eic-uk.co.uk

H1 revision

The Environment Agency is consulting on revisions to the March 2008 version of the H1 guidance to include activities being brought in under the Environmental Permitting Regulations in 2010.

The Agency says: "Our existing H1 guidance brought together the methodology for waste operators and installations. The changes in this consultation reflect proposals to widen the H1 environmental risk assessment to include water discharge consents and groundwater authorisations.

"Operators applying for a bespoke permit under the Environmental Permitting Regulations need to show that they will use appropriate measures to manage health and environmental risks. H1 Environmental Risk Assessment guidance helps them do this."

- www.environment-agency.gov.uk/research/library/consultations/111412.aspx

IN BRIEF

Smells 'nauseating'

Operators of Caythorpe composting centre in Lincolnshire have been fined £2,000 and ordered to pay full Environment Agency costs of £2,965 for breaching odour conditions.

Site operators Mid UK Recycling Ltd admitted breaching their environmental permit by allowing odours to escape.

The agency said there was a lack of active management at the site, waste acceptance procedures not being followed, a failure to incorporate larger woody materials into very wet grass-based waste and too much waste on site.

Officers investigating the smells were told that the windrows (long rows of composting material) had been turned on the day of the complaints and there had also been screening and shredding of green waste despite the excess smell.

The following day they described seeing two large piles of soggy grass material that had not been incorporated into the windrows and although the piles were not there two days later, more green waste was delivered that was wet and spilling leachate. Mangled wheelie bins were seen in the waste.

VOC agreement

The European Council has adopted the directive clamping down on petrol vapour emissions from service stations.

The new act obliges most filling stations to install equipment recovering VOCs released when refuelling cars and other vehicles.

- www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/envir/110297.pdf

Bias adjusted

The NO_2 diffusion tube bias adjustment factor spreadsheet has just been updated from the 05/09 version. The new spreadsheet (v. 09/09) may be downloaded from the Review and Assessment website.

- www.uwe.ac.uk/aqm/review

DATA ANALYSIS

The future is polar

Polar plots are likely to grow in popularity. This was the message of a recent academic workshop held in London.

Two NERC-funded research projects – *Openair* and *Airtrack* – shared a platform for a day in a bid disseminate new ways of manipulating and presenting air quality monitoring data.

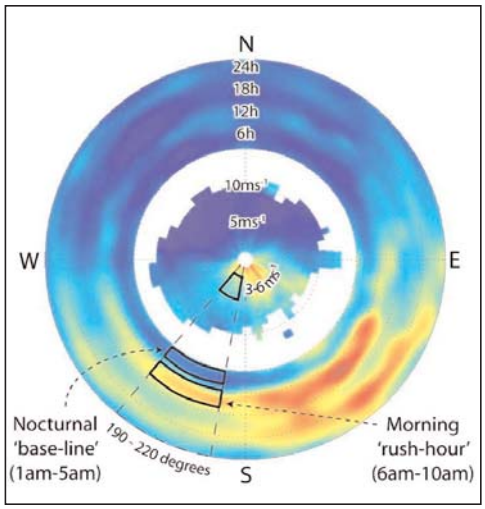
Leeds University's David Carslaw said: "The Openair project has been running for one year and we have many goals we wish to achieve, including ensuring that excellent documentation is available and developing case studies that show how the tools can be used to learn more about pollution."

Openair includes extensive use of polar plots which are devices to combine standard air quality parameters along with time of day and wind speed and direction. Carslaw says: "Analysis of air quality data can provide important insights into air pollution. Huge amounts of data is available but under-used. Insightful analysis provides evidence and can reveal unexpected behaviours. However there is no consistent set of tools available to carry out analysis, and there is a lack of time, money or ideas about what can be done."

Gary Fuller from ERG warned about getting overenthusiastic: "There are strengths and dangers with this approach. It will be very easy to produce graphs that depend very much on what you have or haven't put in as inputs. There is much scope for people to manipulate the data to get the plots they want. This could be quite an issue."

ERG's Ben Barratt added: "We may be at a stage where we can put the programme on the website – but do we want to?"

Lancaster City Council's Nick Howard suggested that users of the routine need some degree of competence in order to ensure good results.



Polar plots can uncover complicated trends

- Openair: http://airtrack.lancs.ac.uk
- Airtrack: "www.openair-project.org/examples.php

EQUITY

Crime is in the air, say lawyers

A new report – part of a *What is crime?* series – analyses air pollution in the UK.

King's College London's Centre for Crime and Justice Studies' *Crime is in the air* report says: "Air pollution control in the UK remains a model based on trust, partnership and operator self-regulation. The involvement of operator-appointed scientific expertise to assess and process permits raises serious questions that challenge the regime's ability to make impartial judgments. The existing regime regulating air pollution in the UK lacks neutrality. It is a process that remains biased towards the economic imperatives of free trade over and above the centrality of environmental protection. The penalties imposed for operators' breaching permits are minor in comparison to corporate profits

"When air pollution offences are viewed as eco-crimes, the severity of such acts becomes subject to great public, political and subsequently prosecutorial scrutiny.

"While such life-threatening offences are portrayed as mere exceedences by government, within an industry/ polluter dominated partnership built on trust and trade, it is difficult to envisage a decline in the harm caused by air pollution. It is argued that this model fails to capture the deleterious and dangerous effects that air pollution has on human and non-human health and, as such, we should begin to move beyond the rhetoric of exceedence to eco-crime."

- *Crime is in the air: air pollution and regulation in the UK* can be viewed on www.crimeandjustice.org.uk/crimeisintheair.html

BUSINESS

Consultant Enviros sold to SKM for £27m

Consultant Enviros has been sold to Australian consultant Sinclair Knight Merz.

The firm has been passed from pillar to post in recent years, it was originally bought by contractor Alfred MacAlpine, which was then bought by Carillion and now been sold to SKM for about £27 million.

In *AQB*'s mini-survey of consultants (*AQB August p4*), Enviros had seven air quality consultants – half way up our league table.

Editor's comment: Enviros (rather like Casella and Stanger) were a bit lost having parents who were contractors. Official statements reveal the delight in going to a consultant that has a good chance of understanding the business.

MONITORING

Air Monitors mulls Thermo deal

Last month as *AQB* went to press, Teom-maker Thermo announced that it was pulling out of UK direct sales of ambient air quality monitors.

The move reflects the shrinking UK market for air quality, and paves the way for even more jostling between the likes of Air Monitors, Enviro Technology, Casella and SupportingU.

Air Monitors' Jim Mills told *AQB*: "Air Monitors have been selling Thermo particle monitoring products continuously since 2002 before Thermo bought R&P. We added Thermo gas monitors to our range since the R&P acquisition. We are no longer 'competing' with Thermo's direct sales team in the UK. I do not believe that the previous dual outlet situation delivered cost benefits to the consumer, it may actually have had the opposite effect due to the increased overall costs of running direct and distributed channels simultaneously.

"We now seek to offer the Thermo products at an even more competitive price, despite the current weak pound/dollar position." Mills adds that more consumables and spares will be stocked to further shorten lead times, and improve reliability and data capture.

In addition to the traditional ambient products, Air Monitors will also distribute and support Thermo's line of occupational monitors including the DataRAM (Personal Dust Monitor).

Meanwhile Rae Systems, a supplier of toxic gas and vapour detection products, has appointed Air Monitors as an approved distributor. Rae products are used to detect a wide range of gases such as CO, CO_2, H_2S, and hundreds of organic gases and vapours such as benzene and many hundreds of others.

Air Monitors has recently added three new members to its field service team. Graham Barns and Chris Clooney, both formerly with Supporting U have recently joined the team led by Nigel Grey. Also joining is Ben Freebrey.

Mel Hadfield, co-founder of the company and its former service director retired in June, but still works part-time for the company and assists in the provision of service to the Defra heavy metals and speciation sampler network.

● www.airmonitors.co.uk

ALTERNATIVE FUELS

Camden polls the public on vehicles

Camden has commissioned a public attitudes study to gauge reactions to alternative fuelled vehicles.

Consultant Ecolane conducted a series of focus groups and telephone surveys from May through to July. One finding was that: "Air quality is of more concern than climate change".

The report notes: "As previous studies have found, air quality is conceptualised (and experienced) by the majority of survey participants as being a more immediate concern than climate change. Air quality is seen by Camden residents very much as a daily concern, whereas climate change is perceived as a more distant problem, one that is beyond individuals' control.

"While organisations also see air quality as an immediate issue, there appears to be a greater acceptance by organisations of the longer term challenge posed by climate change. The survey reveals that the particular concern about vehicle emissions in Camden is slightly higher than the level of concern expressed for air quality or climate change.

"Many individual participants give reasons for their high awareness of air quality issues, a common theme being the visible nature of 'black fumes' (from diesel vehicles) and the experience of inhaling fumes while walking and cycling. One key finding is that particular types of travel events (such as cycling behind a large vehicle in a bus lane) appears to repeatedly bring the issue of poor air quality to peoples' attention."

The report makes ten recommendations, including: "Given the public's high level of immediate concern for air quality, alternatively fuelled vehicles should be promoted on the basis of their air quality benefits, in addition to the potential carbon benefits which are more usually publicised."

The report adds that although a large number of substances are mentioned, the survey finds that participants are generally unsure which emissions really are present in vehicle exhaust fumes, and whether each substance has an air quality or climate change impact.

"Surprisingly, even though many of the representatives interviewed hold positions with environmental responsibilities, the same can be said about the responses from the organisations surveyed."

● *Camden AFV Survey 2009 consumer attitudes towards alternatively fuelled vehicles* is available through Gloria. Esposito@camden.gov.uk

IN BRIEF: PROSECUTIONS

Parliament has been told how many organisations have been taken to court for air pollution offences in England:

Year	Prosecuted	Convicted	Fined	Total fines (£)
2005	42	42	41	418,650
2006	62	59	57	475,240
2007	37	34	32	561,796
2008	44	40	38	339,200
2009	23	22	21	509,850

IN BRIEF

Craggs off

The decision by Thermo to pull out of direct UK sales will lead to the departure of Colin Craggs.

He told *AQB*: "After 27 years in scientific sales, and 19 in air quality, I feel a few weeks off is probably in order. I don't have to dive headlong into anything – it's a bit corny to say "looking for a new challenge", but if there is something out there I would be interested.

● Colin Craggs email cc41env@aol.com

Gases compared

The London Borough of Camden has compared the real life performance of two vans, one running on natural gas and the other on biomethane.

Two similar Iveco Daily vans working on street cleansing were compared. The newer model Daily, running on biomethane displayed a 6% fuel economy improvement, and a 56% reduction in well-to-wheel CO_2 emissions when compared with the natural gas vehicle. Analysis showed the biomethane fuel to be higher quality than the natural gas used in the trial.

No reliability issues were evident from either vehicle during the six month period.

● More details email Gloria. Esposito@camden.gov.uk

Greenery in London

Planting trees in a 10km by 10km area in East London might save two premature deaths a year and two hospital admissions due to reduced PM_{10} levels.

A research team, including the Forestry Commission, were keen to model (with ADMS-Urban) the benefits of urban green space and its ability to intercept particles. Planting was assumed to be 75% grassland, 20% Sycamore Maple and 5% Douglas Fir. This captured 90 tonnes of PM_{10} – equivalent to 9kg per hectare per year.

An integrated tool to assess the role of new planting in PM_{10} capture and the human health benefits, Abhishek Tiwary et al, *Environmental Pollution*, Vol. 157 (2009), pp2645-2653.

Milking the planning system

With funding tighter than ever, will recent changes in the planning system – especially the Community Infrastructure Levy – provide a way forward for funding air quality action?

Funding is tight – and its going to get even tighter. The main political parties are outdoing themselves with pledges to cut public spending. If there were problems in financing air quality action before, it's going to get worse.

No wonder many are looking to developers to fund air quality measures. Perhaps the most successful has been Greenwich. It has played host to a frenzy of development and has shamelessly shaken section 106 money from developers to fund air quality monitoring and air quality action.

More recently Mid Devon hit the headlines with its tough stance with developers in and around its market towns. The district council wanted all developers to pay towards measures that would improve air quality (*AQB September p1*).

Section 106 planning agreements are also being used towards air quality goals in places such as Bristol, but there is a new mechanism on the horizon – Community Infrastructure Levy (CIL). Planning expert (formerly with Greenwich) Steve Merrifield explained the importance of the levy to delegates at the recent Care4Air conference in Sheffield: "CIL is one of the proposals in the 2008 Planning Act. CIL's are essentially a capital cost payment by a developer towards the cost of local and subregional infrastructure to support development (the definition of infrastructure to include, transport, social and environmental infrastructure, schools and parks)."

Merrifield added that local authorities can choose whether they levy a charge – it is not mandatory. However many observers believe that other sources of public money will dry up to the extent that councils will effectively be forced to introduce the levy. Councils can still use section 106s alongside CILs.

He urged councils to get involved early with CILs on the basis that levies can only be charged for what is agreed by the council. Air quality action plan measures – for instance rerouting a road – could be included in the overall plan.

But there is much uncertainty about CIL and how it will affect councils, the uncertainty focussed on the exact definition of the term 'infrastructure'.

Consultation has recently ended on proposals on how the levy will be set and implemented. What is proposed is that planning authorities will agree a shopping list of infrastructure requirements, and then charge developers based on a formula (per square metre of development).

The consultation said: "The Government favours a wide definition of infrastructure. The Planning Act lists examples of infrastructure to which CIL could be applied. The things usually thought of as infrastructure – such as transport and flood defences – are expressly covered by the definition. Other items expressly covered include schools, sporting and recreational facilities and open spaces.

"But local government in general, and the planning system in particular, is charged with the delivery of sustainable development in the widest sense, and therefore with ensuring that the very things that make the quality of life good are provided for (or are not lost or weakened but are maintained or improved) when an existing community grows. This means adequate local facilities such as play areas, parks and green spaces, health and social care facilities, and police stations and other community safety facilities."

"Pressures placed on natural resources through water consumption, waste and car use mean that authorities will need to think innovatively in the future about how they plan for and meet their infrastructure requirements. An increasingly important component of infrastructure planning is the area of demand management – that is, measures which prevent a need for new or more costly infrastructure from arising.

"Demand management measures can sometimes be the best and most cost effective solutions to delivering sustainable communities. By their nature demand management measures – frequently used to address transport infrastructure needs – enable authorities to make the most effective use of existing infrastructure.

"To the extent that demand management measures can be defined as infrastructure, the Government is keen that CIL is used to fund them."

If this loose definition of infrastructure is allowed, this would open up the possibility that CIL could be used to cover many air quality action plan measures.

Another pointer towards the ability of CIL to be directed towards 'soft' measures is the suggestion that CIL payments can be counted towards zero carbon development criteria. Spending on zero carbon policies – electric cars, walking, cycling and other initiatives cut carbon and air pollution.

It does seem that Government will take kindly to CIL being used creatively – rather as it has done with section 106s which were never envisaged for use on air quality monitoring kit.

The consultation notes that there is an obvious overlap with section 106 agreements originally destined to fund infrastructure. Government does not want CIL to duplicate the purpose of s106s, so given the current obsession with cutting 'burdens', two policy areas that apparently duplicate the ability of councils to extract money from developers is always going to look vulnerable. but for now at least, it looks like S106s are remaining.

Mid Devon is perhaps a good example of an authority that has used the planning process to fund an air quality action plan – albeit one dependent on a new road to reduce emissions in a hotspot.

Mid Devon has developed a Supplementary Planning Document specifically on what it wants from developers on air quality (see panel, right). The council totted up what it needs to improve air quality, costed it, then created a tariff for anyone developing in or near Crediton. This is effectively how a CIL will work.

Steve Merriman told *AQB*: "The Government's consultation on CIL has moved the goal posts from how I read the original consultation and proposals. It is correct in that CIL is all about infrastructure and mitigation measures do not appear under the definition of 'infrastructure' in the 2008 Planning Act or the draft regulations relating to CIL.

"But the devil is in the detail, which despite a 163 page consultation document, remains unclear and lacking. S106s are meant to continue to operate alongside CIL. CIL will not be compulsory but as it will not involve time-consuming legal agreements, many authorities may choose take it up in preference to S106s."

Merriman pointed out that CILs were voluntary, as were S106s: "Many authorities have chosen not to use S106s while others have failed miserably to apply them appropriately much to the cost of the environment and (in my view) we have ended up with some poor quality schemes. It does require much work and dedication, but in the end you only get out what you put in."

He believes there may well be a scaling back of the scope of S106s, which the Low Emission Strategies (LES) Partnership, on which Merriman serves, does not support: "The danger is that air quality and other mitigation measures may well fall in the crack between CIL and the proposed

Making use of supplementary planning documents

Mid Devon's Simon Newcombe is the most recent evangelist keen to spread the word that the planning system can be used to aid air quality.

In the past the likes of Andrew Whittles from Greenwich have toured the UK telling any and everyone of how much he has wangled from developers using section 106 grants.

Now Mid Devon has decided to include air quality within a special Supplementary Planning Document. It has two market towns (Cullompton and Crediton) with street canyons causing air quality problems subsequently declared as AQMAs and it decided that new development should pay a share of the costs of the air quality management plan. The resulting Supplementary Planning Document was agreed – and indeed tested in court (*AQB October p1*).

Both towns have congested streets where pollution is caused as much by badly parked vehicles or delivery vans as heavy traffic. Very few options are available to reduce residential exposure, however road improvements could reduce traffic in streets that are pollution hotspots.

The SPD, adopted in May 2008, states that air quality assessments will be required for commercial (eg food retail above 1,000 sq m) and residential (eg more than 75 units) developments. It states: "All development over the next 10 years will be expected to contribute to funding of measures set out in the air quality action plan." The action plan promotes the removal of through traffic from the town centre, improves local air by enhancing walking and cycling opportunities around the town, and reduces town centre pollution by completing a relief road system.

The SPD costs the action plan for Crediton, then estimates the amount of development likely to take place over the coming decade. Half of the cost of the action plan is then shared out (via developers contributions) according to a tariff (see box, right).

MID DEVON'S SPD TARIFF

Market housing	£2,800-5,509/dwelling
Affordable housing	zero rated
Employment	£1,000-3,000 per sq m
Retail – food	£55,500-£108,449/per 100 sq m
Retail – non food	£9,000-£17,616 per 100 sq m

This tariff is applied within the vicinity of Crediton on the basis that a development near the market town will lead to increased traffic in the town itself. It was this linkage that was tested in court – developers of a small warehousing unit felt that there was insufficient connection between their development and the town's air quality problem. The appeal inspector agreed, but this was turned down following Mid Devon's legal challenge in the High Court.

The SPD itself contains strong words on air quality, also found in the council's core strategy: "Our vision is to conserve and enhance clean air and in Cullompton to promote the removal of through traffic by completing a relief road system and implementing air quality action plan initiatives; and in Crediton to promote a reduction of traffic on congested streets and improve local air quality by enhancing walking and cycling opportunities around the town, implementing air quality action plan initiatives, promoting improved public transport links and providing a link road between the A377 and Lords Meadow industrial area."

When introducing the SPD, the council rebutted criticism, from bodies such as CPRE, that the charge would allow development that was detrimental to air quality. Mid Devon responded: "The refusal of applications due to air quality would conflict with guidance in PPS 23. This states 'It is not the case that all planning applications for developments inside or adjacent to AQMAs should be refused if the developments would result in a deterioration of local air quality'.

"Such an approach could sterilise development, particularly where authorities have designated their entire areas as AQMAs. Planning authorities, transport authorities and pollution control authorities should work together to ensure development has a beneficial impact on the environment, for example by exploring the possibility of securing mitigation measures that would allow the proposal to proceed."

Mid Devon's Simon Newcombe added: "A decision was made in 2005 to develop a robust policy on air quality and development control. We identified the need for a consistent criteria for judging air quality constraints/impacts in relation to new development and a transparent, effective mechanism to secure mitigation measures and funding.

"When we came to develop the SPD funding formula, it had to be a unique formula devised in-house (due to lack of national guidance and other examples). The focus was on delivery of the Crediton AQMA action plan measures but should also provide an approach which can be applied in other circumstances eg. major developments outside of an AQMA and the emerging Cullompton air quality action plan."

He said the formula needed to:

- Provide a simple, fixed contribution rate per development unit (i.e. per residential property or 100 sq m of commercial development) over a ten-year period where development rates could reasonably be predicted;
- Be transparent and proportionate (higher polluting developments would pay more on the basis of higher traffic trip generation rates);
- Provide 50% of known action plan costs;
- Not be a 'licence to pollute' (larger developments still required to complete air quality impact assessments and specify mitigation measures where required);
- Would apply to all relevant development types within Crediton and its catchment (as defined by existing planning documents) via s106 or other planning obligation.

Peter Brett's Claire Holman, who has worked closely with Mid Devon on planning and air quality issues, says the air quality SPD has advantages: "Developers want certainty and no last minute surprises about when an air quality assessment will be required and what should be in it."

So far the SPD has been successful in obtaining £1.2-2m contributions from Tesco and almost £100,000 in other contributions since 2008.

- The Low Emission Strategies Partnership has prepared an SPD template, (in addition to the Low Emission Strategies guidance) which is to be made available to help authorities drawing up their own supplementary planning documents.

- Related planning documents including the planning inspectors core strategy examination report, SPD adoption statement etc available at: www.middevon.gov.uk/index.cfm?articleid=1885

changes to S106s, which would be a disaster."

"There is likely to be a transition period (two years has been mentioned) but in my view (shared by the Low Emission Strategy Group), S106s should remain until either CIL is allowed to cover mitigation or CIL and S106s are combined into something not yet on the table. It is true the electric vehicle points and the like could be regarded as infrastructure but I do fear that as things stand there are real concerns about securing mitigation under CIL," added Merrifield.

Whether or not local authorities copy authorities that have successfully used the planning process to garner air quality cash – as have Greenwich and Mid Devon – is a moot point. Sadly it is likely to be taken up only where there are particularly enthusiastic individuals willing to drive it forward.

London proposals fail to please

A draft air quality strategy released by the London Mayor looks impressive until you scratch the surface finds Jack Pease

London Mayor Boris Johnson has released his draft air quality strategy for London.

The draft has been keenly awaited given his track record in slashing environmental staff at GLA HQ – and watering down the low emission zone and congestion charging zone. If simply judged on the number of pages, such fears are justified – the new strategy has 88 compared to the 230 of the 2001 strategy it replaces.

Johnson was elected mayor in May 2008 – on an election pledge to remove the western extension of the congestion charging zone, with obvious air quality implications. But his unexpected postponement of phase three of the London low emission zone caused consternation.

Phase three would have seen emission controls extended downwards to light commercial vehicles. Johnson said the move would help small businesses hit by the credit crunch as they wouldn't need to buy new vans.

All this has implications far wider than London. The UK Government has applied for an extension for meeting the EU PM_{10} limit values based on a plan that had included the emission savings of the western extension and phase three LEZ plans. Without those policies, campaigners believe that the UK has no right to ask for an extension.

Certainly Defra appeared wrongfooted by the LEZ decision. Some believe that Johnson was crudely blackmailing Defra, was he posturing that he would take more interest in air quality if central funding was available?

This theme does emerge in the current draft strategy where attempts at setting out mitigation policies to compensate for the reduced emission savings are outlined. Right up front, the Mayor calls on the Government to "to fully back the plan with adequate policy and financial support".

So what else does the new draft say? Well first of all it is worth noting that the draft is effectively a 'pre draft' aimed at top-level decision makers. The big-wigs get an early chance to comment before a full public consultation early in 2010.

The strategy starts with the fairly standard introduction of which pollutants are of concern (NO_2 and PM_{10} – no surprises there). It is quick to point out that a lot of pollution comes from elsewhere, and trumpets existing policies such as hybrid buses, investment in cycling and support for electric vehicles. With these, and measures in the draft strategy, the Mayor appears to believe he can make impressive emission savings and meet legal targets for PM_{10}:

"The Mayor will be working with the Government to develop broader measures to seek to meet NO_2 targets for 2015. The strategy projects a 20-25% reduction in PM_{10} in central London by 2012 and between a 35-40% reduction in NO_2 by 2015."

He adds: "We are taking robust steps to tackle emissions but we cannot shoulder this burden alone. The additional measures I am proposing will deliver improvements in air quality, but they need financial and policy support from others especially the Government. Poor air quality desperately requires national policy solutions with adequate funding to support them.

"Whilst we undertake bold programmes to become a cleaner, healthier city, it is my duty as Mayor to balance both the city's environmental and economic needs. The low emission zone is currently being effective in deterring the dirtiest and older heavy goods lorries, buses and coaches from driving on our streets.

"Larger vans and minibuses will also have to meet emissions standards to avoid charges when driving in the zone but this will not be implemented until 2012 (two years later than planned) giving a reprieve to smaller businesses, charities and the self-employed who would most be affected, and giving them extra time in tough economic conditions to get cleaner vehicles and avoid charges. I am confident this decision will ensure greater compliance at the time we press ahead with these tougher measures."

Other measures include:

- **Taxis:** The Mayor proposes to introduce an age limit for taxis and minicabs starting with a 15 year age limit in 2012, tightened to a 10 year age limit in 2015. He will also require that all taxis and minicabs being licensed for the first time from 2012 are Euro 4 compliant;
- **LEZ phase four:** The Mayor will introduce phase four of the scheme in January 2012 to require Euro IV standards for HGVs, buses and coaches;
- **LEZ phase five:** From 2015, a phase five of the low emission zone will be introduced for NO_x covering HGVs, buses and coaches – this will need support from central government in establishing a suitable certification and testing regime for the required retrofitting equipment;
- **Buses:** The Mayor will ensure that all of London's buses meet at least Euro IV standards for both PM_{10} and NO_2 by 2015 – this will involve retrofitting around 2,800 buses;
- **Hotspots**: Tailored action plans for air quality hotspots to implement a package of intensive measures to tackle pollution – this could include directing the cleanest buses (currently hybrid) into these areas; planting street vegetation, and encouraging better traffic management;
- **Special measures on the highest pollution days:** working with the boroughs, the Mayor will develop a package of special measures for implementation (eg: cycling days and more traffic management) on days of the highest concentrations to reduce people's exposure to emissions;
- **Action days:** campaigns to encourage people to take action to cut pollution on the days of highest pollution concentrations for example, cycling or walking on certain days and in certain areas;
- **Better public information:** especially for those most vulnerable to high pollution days; for example supporting the expansion of the *Airtext* scheme that sends information to people's phones; putting up to date, pollution information on the Greater London Authority website and TfL's journey planner;
- **Domestic heating:** A London-wide homes energy efficiency programme to cut domestic emissions and initiatives to do the same in office buildings;
- **Construction:** The introduction of tight standards for construction and demolition sites;
- **Driver training:** Eco-driving training for GLA group drivers;
- **Alternative fuel vehicles:** The Mayor is committed to procuring 1000 electric vehicles in the Greater London Authority Group public fleet by 2015. He is also investing in new infrastructure and standards to support his target of 100,000 electric vehicles on the streets as soon as possible.

The London Assembly Green Party spokesman Darren Johnson was critical of the Mayor's draft plan: "This strategy could be a decisive factor in whether the Government is fined an estimated £300m by the European Commission. The Government has made clear to the European Commission that if the Mayor decided to suspend phase three of the low emission zone, it would expect him to put in place other measures that would deliver equal, if not greater, improvements to air quality.

"Lawyers at City Hall have advised that the Government can overrule the Mayor and impose the higher standards on 90,000 vans in London if it is necessary to meet the legal limit for particulates (PM_{10})."

Darren Johnson added: "Londoners have been let down by a decade of inaction and delay over air pollution. I expect the Mayor's air quality strategy to recognise the backward steps he has taken in dropping the

Boris's new slimline air quality strategy for London

mid-year inspections for taxis and proposing to drop the western extension of the congestion charge. Above all, he has to account for his decision to let 90,000 polluting vans off the hook, whilst an estimated 3,000 Londoners are dying prematurely of air pollution every year. If the Mayor's plan falls short then the Government may either face unlimited fines, or resort to banning traffic on certain roads when pollution gets too high."

"The London Assembly has taken evidence to show that low emissions zones work, including smaller targeted zones. The Mayor's ideas have to be based on solid research. Talking in vague terms about smoothing traffic flow won't wash with the scientists at the European Commission."

Liberal Democrat Mike Tuffey is one of a number of politicians that have written to EU Commissioner Dimas objecting to the UK's application for a time extension for Greater London to comply with EU limit values for PM_{10}. He cites a number of issues with the Mayor's draft strategy criticising the delay to the low emission zone phase three, the lack of detail of measures and their potential emissions reduction and lack of funding: "The strategy states that special measures are likely to involve traffic management and potential diversions. These measures have no defined location, timescale or effect. Similarly the proposed planting of street trees and low-level hedges along major roads has undefined effects on emissions reduction."

The Environmental Industries Commission takes a more positive view: "Following his election, Boris Johnson stated that 'Londoners and visitors to our great city deserve to breathe air of the highest possible quality.' Yet over the last 12 months, first the Mayor announced his intention to suspend the low emission zone, and still the London Olympics falls foul of its commitment to improve air quality throughout its construction.

"Whilst welcoming the draft air quality strategy in principle – and in particular the decision to reinstate phase three of the low emission zone, albeit two years late – we must be careful not to congratulate the Mayor too early. This much-delayed draft was originally due in July – if the same level of urgency is applied to implementation, we have many more years of poor air quality left in London."

Epuk added its voice: "The draft strategy in the large part fails to deliver. Whilst there is much of interest in the document, particularly around non-transport sources, it fails to get to grips with the transport emissions that cause the overwhelming majority of London's air quality problems. Crucially any commitment to compliance with European limit values, or ownership of the issue, is missing – many possible actions are pushed up to national Government or down to the London boroughs, rather than the Mayor taking a direct lead.

"There is an innovative suggestion for tackling NO_x emissions from boilers via scrappage scheme for older gas appliances. Policies are also put forward for biomass burning, which is one the first times that sub-national policy has been formalised on this contentious issue. These include a moratorium on small (< 500 kWth) biomass boilers in air quality management areas unless it can be demonstrated that their effect on local air quality would be no worse than an equivalent gas boiler."

But really the heavyweight analysis of the plans inevitably comes from the Campaign for Clean Air in London's Simon Birkett.

He told *AQB*: "Even with the LEZ and western congestion charge extension – on which the Government's application for an extension to the PM_{10} directive was based – it was clear that more needed to be done to reduce pollution. Now the western extension has been scrapped, and the phase three of the LEZ has been postponed, we have gone one step forward and two steps back. We think the LEZ and western extension together open up a 20% gap that now needs to be filled."

Birkett is not confident what is being proposed will make significant improvements to air quality – he says it is "papering over the gap". He doesn't think hedges are practical along busy traffic corridors "laughable even if it worked", nor does he believe trees will significantly improve pollution.

Ad hoc road closures risk pushing pollution elsewhere, and are simply not practicable for the major road hotspots and given that pollution events rarely last a single day. "You cannot just-rifle shoot the hotspots, you need a broader systemic approach," he says.

Birkett and others believe that the strategy makes it clear that the UK cannot fulfil the requirements of the EU directive, and he is one of many that have written to the EU Commissioner to request that he reject the UK's request for an extension to deadlines.

In his submission, Birkett cites three main arguments:

- The Mayor's decision to delay phase three of the London low emission zone from October 2010 to 2012 will impact over 15% of those worst affected by poor air quality. It is sure also to torpedo the government's application to the European Commission for a time extension until June 2011 to comply with legal standards for PM_{10} (since you cannot substitute uncertain measures for certain ones);
- Many of the proposals' included in the strategy are unfunded so are aspirational; and
- There is still no credible plan for London to comply with legal standards for PM_{10} by the June 2011 deadline since most measures (even if funded) would not be implemented until 2012. Ad hoc and minor measures and 'pre-compliance' (i.e. the early purchase of LEZ-compliant vehicles for phase three, in contrast to the experience of earlier phases) would be relied upon as London 'seeks to meet' these legal standards in 2011.

"The AQS says NO_x emissions need to be over 80% lower in 2015 than current projections in order for the EU limit value to be met everywhere in London. It then goes on to show that the current (mainly unfunded) proposals would achieve reductions of only 34 to 40% by 2015."

Birkett added: "Boris Johnson has lobbed the air quality ball into the government's court. He says 'The GLA's modelling shows that even with strong action by the Mayor, London cannot clean up its air on its own'".

"So we are asking:

- Will the government finally disclose the contents of its discussions with the Mayor on air quality? *(AQB October p1)*;
- How will the government close the gaping hole between the (latest) plans for London and the legal standards to be met by specific deadlines?;
- Will it offer the Mayor all the financial support he has called for and/or issue him with legal directions?;
- Can it somehow salvage, within weeks, its time extension application for PM_{10}?; and
- What will the government do to fix the shambles it has created nationally on NO_2?"

- *Cleaning the air, the Mayor's draft air quality strategy* can be seen at: www.london.gov.uk/mayor/environment/air_quality/

GLA WEB-GRILLED

The Mayor's environment advisor, Isabel Dedring faced questions on the strategy from Birkett and the London Assembly.

The meeting can be viewed via a webcast at: www.london.gov.uk/assembly/webcasts.jsp

SCIENCE SHORTS

Genetic link

Italian researchers say that ozone could cause genetic damage.

Blood samples were taken from 71 adults and checked for oxidative DNA damage in lymphocytes (white blood cells). Ozone exposures were established for ten different time windows before the blood was taken.

Researchers said: "Overall, statistically significant positive correlations between average ozone concentrations and DNA damage emerged in almost all time-windows considered, correlations were more evident among males, non smokers and traffic-exposed workers.

"Our results suggest that ozone concentrations at ground level modulate oxidative DNA damage in circulating lymphocytes of residents of polluted areas."

Environmental ozone exposure and oxidative DNA damage in adult residents of Florence, Italy, Domenico Palli et al, *Environmental Pollution* Vol. 157 (2009) pp 1521-1525.

Short-term exposure leads to changes

Short term changes in urban pollution can lead to changes in blood leukocyte methylation, a possible mechanism for ill health effects.

Rapid DNA methylation changes after exposure to traffic particles, Andrew Baccarelli et al, *American Journal of Respiratory and Critical Care Medicine*, Vol. 179, pp 572-578.

Database compared

Birmingham researchers have concluded that measurements and estimations of emission factors based on the PARTICULATES database are in good agreement.

Comparison of average particle number emission factors for heavy and light vehicles derived from rolling chassis dynamometer and field studies, David Beddows et al, *Atmospheric Environment* Vol. 42 (2008) pp7954-7966.

INDUSTRY

Steel closure aids PM analysis

Closure of a steel smelter in Italy allowed researchers to analyse the impact of steelworks emissions on the Genoa urban area.

Particles were analysed before and after the closure, concentrations were logged and samples analysed using X-ray fluorescence.

Researchers said: "The PM_{10} average concentration turned out to be surprisingly similar before and after closing of the smelter. Nevertheless, the comparison among data collected in the two periods (plants operating and closed) even with the limited information provided by the x-ray fluorescence, allowed us to single out two sources of PM related to smelter activities, to extract their profile and quantify the impact of the plant on PM_{10} levels."

The impact of the plant, based on measured zinc to lead x-ray measurements, was between 25-30%.

Coarse particulate matter apportionment around a steel smelter plant, Federico Mazzei, *Journal of the Air & Waste Management Associatn*, Vol. 59, May 2009 p514-519.

DISPERSION

Street scale deposition studied

Danish researchers have attempted to assess particle deposition according to where people stand in the street.

The size-dependent deposition of 12-580nm particles was measured with a novel setup in nine healthy subjects breathing on the windward side of a busy street in Copenhagen. Concentrations were measured both at the kerbside and at rooftop level to get the background concentration. Particle hygroscopicity, a key parameter affecting respiratory tract deposition, was also measured at the same time of exposure.

The total deposition fraction of the kerbside particles in the range 12-580nm was 0.60 by number, 0.29 by surface area, and 0.23 by mass. The deposition fractions of the "traffic exhaust" contribution, calculated as the hydrophobic fraction of the kerbside particles, was 0.68, 0.35, and 0.28 by number, surface area, and mass, respectively.

The deposited amount of exhaust particles was 16 times higher by number and three times higher by surface area compared to the deposition of residential biofuel combustion particles investigated previously.

Researchers said: "This was because the traffic exhaust particles had both a higher deposition probability and a higher number and surface area concentration per unit mass."

Results were validated through modelling.

Experimentally determined human respiratory tract deposition of airborne particles at a busy street, Jakob Londahl et al, *Environmental Science and Technology*, 2009, Vol. 43, pp4659-4664.

PARTICLE MECHANISMS

How particles affect health

North American researchers have tried to study how pollutants affect health.

In order to find out how fine particles and ozone restricts blood flow and raises blood pressure, they set up two trials on subjects measuring heart rate variability, blood pressure, biomarkers and blood flow.

In tests at Ann Arbor, fifty 18-50 year-old healthy non smokers were exposed to 150µg/m³ of $PM_{2.5}$ and 120ppb of ozone for two hours on three occasions. In Toronto, 31 subjects were exposed to four different combinations of ozone, particles ozone and filtered air.

Researchers found: "In Toronto, diastolic blood pressure significantly increased (2.9 and 3.6 mm Hg) only during particle-containing exposures in association with particulate matter concentration and reductions in heart rate variability. Flow-mediated dilatation significantly decreased (2.0% and 2.9%) only 24 hours after particle-containing exposures in association with particulate matter concentration and increases in blood tumour necrosis factor.

"In Ann Arbor, diastolic blood pressure significantly similarly increased during all of the exposures (2.5 to 4.0 mm Hg), a response not mitigated by pretreatments. Flow-mediated dilatation remained unaltered. Particulate matter, not ozone, was responsible for increasing diastolic blood pressure during air pollution inhalation, most plausibly by instigating acute autonomic imbalance.

"The findings confirm that even transient contact with relevant concentrations of $PM_{2.5}$ can rapidly instigate physiological responses potentially capable of triggering acute CV events in susceptible individuals. These findings agree with observations that $PM_{2.5}$ poses much greater acute risks to vulnerable individuals with pre-existing heart disease."

They added: "Together with our present results, the evidence supports that even shorter term $PM_{2.5}$ averages (eg, hourly) than are currently regulated may need to be minimised to optimally protect vulnerable individuals from an acute CV event."

Insights into the mechanisms and mediators of the effects of air pollution exposure on blood pressure and vascular function in healthy humans, Robert D. Brook, *Hypertension*. 2009;54:659-667.

WIND GENERATION

Turbines push up emissions

Wind and solar power may fail to yield expected emission reductions – or at worst, increase NO_x emissions.

US researchers, with funding from the electricity industry, studied the impact of various levels of penetration of alternative energy (wind and solar). Significant take-up of wind and solar power requires conventional fossil fuel plants to stand by in case there is no wind or sun to generate power.

Researchers say that current assumed benefits of alternative energy are based on assumptions of average fossil fuel plant performance. In fact because these plants will be on standby, and cycling up and down to meet demand, actual performance will be far worse than when in steady load conditions.

NO_x emissions from a power system based on wind and solar with natural gas powered back up is considered – NO_x reduction depends strongly on the type of NO_x control used, say researchers. "For the best system, NO_x reductions with 20% wind or solar penetration are 30-50% of those expected. For the worst, emissions are increased by two to four times the expected reductions.

"The results shown here indicate that at large scale, variable renewable generators may require that careful attention be paid to the emissions of compensating generators to minimise additional pollution."

The researchers add that carbon dioxide emission reductions from a wind or solar plant plus natural gas system back up are likely to be 75-80% of those presently assumed by policy makers (ie there is a benefit, but not as much as assumed).

Air emissions due to wind and solar power, Warren Katzenstein et al, *Environmental Science and Technology*, 2009, pp253-258.

EMISSION TECHNOLOGY

Do traps cut oxidative potential?

Californian researchers have studied diesel exhaust from a range of vehicles with different clean-up technologies.

They have found that heavy duty vehicles with traps and other devices dramatically cut PM_{10} mass – but oxidative potential of PM is not cut as much.

Oxidative potential is blamed by some for health effects of diesel. Oxidation can cause the break up of the lung, and diesel exhaust after-treatment is known to be more effective at cutting 'refractory' ('hard') particulate fractions, and less successful at cutting semi volatiles in particles which can be more dangerous.

Oxidative potential was measured using dithiothretiol which is acts as an indicator. Researchers commented that collecting sufficient mass of particulate from modern engines was problematic as so little was emitted.

They conclude: "This study demonstrates that while reducing a vehicle's overall oxidative burden, the oxidative potential of particles emitted by diesel vehicles may vary drastically with retrofit types. However particles downstream of a trap possess the highest oxidative potential on a per particle mass basis.

"Our study has shown that size distributions of particulate from most of the newer fleet with control technologies exhibited an increase in nucleation mode particles. In addition to higher oxidative potential, these particles have greater deposition efficiently in the human respiratory system due to their smaller sizes, compared to accumulation mode particles emitted in mostly by the baseline vehicle.

"The most important observation of this study is the remarkable reduction in oxidative potential as the aerosols are denuded of their semi volatiles. This suggests that particle oxidative potential generally stems from the semi volatile particulate fractions."

Oxidative potential of semi volatile and non volatile particulate matter from heavy duty vehicles retrofitted with emission control technologies, Subhasis Biswas et al, *Environmental Science and Technology*, 2009, Vol. 43, pp3905-3912.

BIOMASS

Wood smoke is a problem in Canada

Canadian researchers have studied wood smoke and its effect on populations.

They used the concept of intake fraction to assess exposure and prioritise sources for action. Intake fraction was assessed using two methods – winter wood smoke fine particulate matter ($PM_{2.5}$) emissions, and concentrations of levoglucosan, a marker of wood combustion. Models were compared with measured data from Vancouver.

Intake fraction was found to be comparable or higher than urban vehicle emission factors, and higher income areas tended to have lower exposures than poorer areas.

There is much wood burning in Canadian cities for 'aesthetic' purposes (ie fashionable) and researchers concluded: "Our results emphasise the importance of urban wood smoke as a source of $PM_{2.5}$ exposure and highlight the comparatively large population exposure and potential environmental justice benefits from reducing wood smoke emissions."

Intake fraction of urban wood smoke, Francis Ries et al, *Environmental Science and Technology*, 2009, Vol. 43, pp4701-4706.

SCIENCE SHORTS

Real world compared

Various ways of testing vehicle emissions have been compared by Leeds researchers.

Historically rolling road (dynamometer) testing has been used to assess vehicle emissions but even with representative drive cycles, these tests can sometimes underestimate emissions.

Other methods including tunnel studies, inverse dispersion and chaser studies are compared and contrasted.

Real world vehicle exhaust emissions monitoring: review and critical dispersion, Karl Ropkins et al, *Critical Reviews in Environmental Science and Technology*, Vol. 39, 2009, pp79-152.

Roadside air studied

German researchers have used a mobile laboratory to study air pollution near the city of Aachen.

It was found that particle loadings on traffic-influenced sites can vary to a high degree by mass and number concentration and chemical composition. It is therefore very important to study the individual compounds, both mass and number based.

In situ measurements of particle number concentration, chemically resolved size distributions and black carbon content of traffic related emissions on German motorways, rural roads and in city traffic, J Schneider et al, *Atmospheric Environment*, Vol. 42 pp4257-4268.

Diesel damage

Swiss researchers have studied the impact of diesel exhaust and other particles on rat cells.

Results suggest that diesel exhaust as well as titanium dioxide particles and to a lesser extent also single walled carbon nanotubes can directly induce cardiac cell damage and can affect the function of the cells.

Effects of combustion-derived ultrafine particles and manufactured nanoparticles on heart cells in vitro, Maria Helfenstein et al, *Toxicology*, Vol. 253 pp70-78.

HOT AIR

Greenwich's John Paterson should consider a career in after-dinner speaking.

At a low point after lunch at September's *Care4Air* conference, Paterson burst into action to wake up the audience with a talk on assessment of benefits. He wasn't given much time to talk about that, but did manage quite a few jokes on the dilemmas faced by air quality professionals.

"Expect to find quite a few monitors ending up on Ebay," he quipped, noting that Greenwich's huge s106 funded air quality monitoring programme was nearing its end.

He noted that air quality was a good reason to get money out of developers – but once the council got the money, he likened it to 'pigs in the trough' with other departments wanting their slice of the pie. "Sadly it often feels like air quality is the runt in the litter."

And referring to supermarkets' apparent unwillingness to accept that it is worth taking actions to achieve small improvements in air quality – he ribbed: "Every little helps (except when it comes to air quality)".

Nice one.

We're often having a go at the Highways Agency for refusing to do anything about air quality (well, apart from expanding its network to reduce pollution by 'solving' congestion).

So it comes as some surprise to hear it saying all the right things about someone else's road plans.

Mid Devon has an innovative Supplementary Planning Document to help improve air quality. When it consulted on the SPD, which includes a relief road, the Highways Agency "welcomed the council's commitment to monitoring and improving air quality". It added: "Sustainable travel options should be optimised. The Agency is concerned that a relief road will not give a long term solution to air quality problems and considers a modal shift towards sustainable transport options is more appropriate."

Pot. Kettle. Black.

Boris Johnson appears obsessed with trees – perhaps the London mayor thinks big green things tick all the boxes in terms of public acceptability while giving the appearance of doing something.

He's decided to postpone the third phase of the low emission zone, increase road capacity by cutting pedestrian crossing times at traffic lights and junk the western extension of the London congestion charge.

The emissions savings lost through these measures will be soaked up by tree leaves, he claims in his new draft London strategy: "Vegetation can reduce PM_{10} concentrations locally by around 20%. We will work with boroughs to investigate the planting of low-level hedges along major roads where air quality is poor, to act as a barrier between emissions from road transport and pedestrians on pavements."

Vegetation reduce PM_{10} by 20%???? Hedges acting as an emissions barrier? This is total and utter nonsense. Hedges will be planted where? In the bus lane? In boxes hung off pedestrian railings?

Campaigner Simon Birkett points to recent Forestry Commission research that says if you plant up a 100 square km chunk of London you may cut PM_{10} enough to save two deaths a year (there are 5,000 premature deaths a year in London due to pollution).

Surprised Boris hasn't jumped on to the NO_x eating coatings bandwagon.

AIR QUALITY EVENTS 2009/2010

12th November

AIR QUALITY UPDATE. NO_2: TIME FOR COMPLIANCE

Epuk conference to be held in Birmingham,
Carry Keay 01273 878776 www.environmental-protection.org.uk

13th November

INFLAMMATORY RESPONSES TO AIR POLLUTION:

Molecular Epidemiology Group meeting to be held at the London Scl of Hygiene and Tropical Medicine. Website www.meguk.org

24th November

DMUG: PARTICLES AND PERSONAL EXPOSURE

How can we assess personal exposure to particles at the local, urban and national scales? Dispersion Model Users Group meeting to be held at the CIEH, London
Carry Keay 01273 878776 www.environmental-protection.org.uk

2nd December

INVESTIGATION OF AIR POLLUTION STANDING CONFERENCE

Iapsc's second conference of the year to be held at the Council House, Birmingham. Website www.iapsc.org.uk

9-10th December

MONITORING AMBIENT AIR 2009 AIR QUALITY – THE MAJOR

Challenges, AAMG conference to be held in London website http://rsc-aamg.org/Pages/Meetings/MAA2009.html

2010

21st-22nd April

AIR QUALITY SPRING WORKSHOP

Epuk air quality spring workshop to be held in the Midlands.
www.environmental-protection.org.uk Carry Key 01273 878776

13th-14th April

2010 INDOOR AND OUTDOOR AIR POLLUTION RESEARCH

Meeting to be held at Cranfield, website www.cranfield.ac.uk/health/researchareas/environmenthealth/ieh/page19562.jsp

18th-19th May

18TH INTERNATIONAL SYMPOSIUM TRANSPORT AND AIR

Pollution Conference to be held in Zurich
www.empa.ch/plugin/template/empa/*/86139/---/l=2

12-16th September

15TH WORLD CLEAN AIR & ENVIRONMENTAL PROTECTION

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AIR QUALITY BULLETIN

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