AIR QUALITY BULLETIN
May 2010 Issue 49

ACTION PLANNING

Benefits underestimated

Conventional cost benefit analysis may underestimate the benefits of action on air quality, York University's Mike Ashmore told last month's *2010 annual UK review meeting on air pollution research* held at Cranfield.

He explained that current methods, as used by Comeap and the Interdepartmental Group on Costs and Benefits (IGCB), are based on modelled outdoor concentrations in 1km grid squares and resident populations in each square.

"They do not consider the variation in outdoor concentrations due to proximity to roads, indoor exposure at home or exposure in non residential locations. These limitations could lead to inaccurate estimates of the benefits of policy interventions to reduce exposure to traffic related air pollutants."

Ashmore used the concept of population exposure frequency distribution (PEFD) and health benefit estimates. Results from this technique were directly compared with those obtained from Comeap and the IGCB.

The study was based on Leicester, a GIS database was created and the Indair model used with location profiles to model actual exposure. Health benefits were calculated for children, the elderly and all ages taking account of work and living patterns and the amount of time spent indoors or outdoors.

Researchers found that their estimate of the overall health burden associated with current levels of PM_{10} was the same as existing methods, but the estimate started to differ when looking at policy interventions which affect personal exposure and background concentrations differently.

Modelling a 1µg/m^3 reduction in roadside concentration, the new PEFD method was found to give twice the benefits of the official IGCB method – or three times as high if more road links were modelled. The modelled reduction in mean personal exposure was greater for children than adults – suggesting that PEFD can lead not just to different estimates of benefits, but also different benefits to different groups.

Researchers concluded: "The results of this study suggest that the health benefits of the modelled reduction in roadside PM_{10} concentrations in Leicester are greater using the PEFD approach than using the IGCB approach.

"This has implications for national policy, as it suggests that current IGCB methods may lead to national estimates of health benefits that significantly underestimate the benefits of policy interventions to reduce PM_{10} levels. For instance for a low emission zone, we assume uniform decreases in pollution, but in fact there is a particular impact on the roadside.

"We need a wider suite of tools to assess the effects of policy interventions. We also believe that PEFD has benefits for local air quality management as well as national assessment."

● More from Cranfield: p3

LOCAL PROTESTS

Air cited in store protest

Air quality was a central plank in protesters' successful campaign against an extension to an Asda store in Handsworth, Sheffield, South Yorkshire. Handsworth is in the area covered by the East End Quality of Life Initiative which focuses on air quality www.sheffieldeastend.org.uk

IN BRIEF

Epuk mulls party political promises

Epuk boss Phil Mulligan reviewed election promises in advance of the General Election (which had yet to be decided as *AQB* went to press).

Speaking to the Epuk Spring workshop held in Rugby last month, he said Labour has been in power since 1997: "Will we see more of the same – we have a track record against which to judge them?"

He said of the Tories that they have a new green image "but the London experience suggests they are not fans of major policy interventions such as low emission zones and congestion charging". "They are also vaguely Eurosceptic so may not be too concerned about EU fines."

The LibDems are the only party to have a specific air quality commitment: "They would ensure the UK complies fully with air quality laws for PM_{10} and NO_2 by the time of the 2012 Olympics. They may well hold the balance of power in the event of a hung parliament."

Early ozone alert

Kings College London ERG noted an ozone air pollution incident on 10th & 11th April, the first in the year.

12 sites recorded moderate ozone as defined by the hourly average being greater or equal to 50 ppb. Two of these sites reached moderate as defined as an 8 hour rolling average being greater or equal to 50 ppb, this is the first occurrence of this longer averaging period exceedence this year.

These 12 sites were scattered across London, Herts, Beds and Sussex.

ERG has also been monitoring the effects of the volcano (see page 8).

● www.londonair.org.uk

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IN BRIEF

Heathrow runway doesn't stack up

The New Economics Foundation think tank says that a third runway at Heathrow would not be worthwhile if wider costs such as pollution were included.

It says the runway would cost £5bn in contrast to the £5.5bn of benefits claimed by industry.

Researchers at the Foundation claim to have used the same economic modelling program as the DfT, but updated the input data on economic growth rates, exchange rates, carbon prices, fuel prices and other variables. They also estimated the costs of a new runway to the local community using DfT's estimates for noise and air pollution, and for the first time, calculating the cost of additional surface congestion and community blight.

In addition, the report suggests that new thinking is required on appraising infrastructure projects more generally. It recommends that greater account is taken of their impact on inequality, as the costs and benefits are often unevenly distributed.

● *Grounded: A new approach to evaluating Runway 3* can be viewed on www.neweconomics.org

UWE courses

The University of the West of England is running several training courses on air quality and carbon management.

The courses, to be held over the next 12 months, are entitled:

● Introduction to air pollution;
● Introduction to carbon management;
● Introduction local air quality management;
● LAQM: monitoring and modelling;
● LAQM: review and assessment;
● LAQM: action planning; and
● LAQM for planners.

Course fees are £285 per attendee. Contact Jo Barnes aqmrc@uwe.ac.uk.

ACTION PLANNING

Geordies launch Be Air Aware

Five Tyne & Wear local authorities have joined together to launch the *Be Air Aware* publicity campaign.

With echoes of the successful South Yorkshire *Care4Air* and Liverpool *Liveair* campaign, a team including Newcastle's Ed Foster is using comedy and social media to tackle the issue of poor air quality in urban areas, targeting in particular unnecessary private vehicle journeys. At the heart of the new campaign is a new website aimed to promote issues around air quality and how people can make simple changes to improve things.

Foster said the aim was to move away from a top-down communications approach in favour of one designed to engage the public pointing out that dealing with modern air quality is more about tackling community and individual behaviour rather than hitting industry which has already been required to clean up.

"It's a real challenge encouraging individuals to make changes – but we're really hopeful that bringing the issue to life on platforms like our website, which is integrated with Facebook and Twitter profiles, we can engage the public and bring about the crucial changes we need to protect and improve health."

Ed Foster helps launch the new website www.beairaware.co.uk

To encourage web hits, the *Be Air Aware* team also asked a local improvising comedy group, The Suggestibles, to record podcasts to be downloaded from the website.

Foster added: "The Suggestibles are extremely popular in the North East and they've been a great addition to the initiative. They allow us to offer the public something they want, rather than just another public health message and so far the feedback has been phenomenal."

To coincide with the launch of the website, the initiative also engaged an editorial radio campaign in which one of the station's presenters spent a week camping and travelling around the region to air quality enhancement activities on public transport.

Be Air Aware is funded by Defra, and the Local Travel Plan (LTP) Partners comprising: Gateshead; Newcastle; North Tyneside; South Tyneside; and Sunderland local authorities, and Nexus. The campaign will support the work of travel planners in local schools and businesses and link to community activities, to encourage and recognise steps being taken to improve air quality.

● www.beairaware.co.uk

ROAD DUST

Corby settles over clean up dust action

Corby Borough Council settled the huge court case centred on toxic dust from the clean up of the former steelworks.

Local families blamed birth defects on the clean up of the former steelworks. Clearing up the contaminated land kicked up dust, claims residents (*AQB August 2009 p1*).

Last year, the High Court found the council breached its duty of care to 19 claimants in its "negligent" reclamation of former British Steel plant in Corby in the 1980s and 1990s. It found that there was a plausible link between the defects and the reclamation, for example one pathway was contaminated material being deposited from the back of unsheeted trucks onto roads running through the town and then being resuspended into the atmosphere by traffic.

As a result of the latest "final" agreement, the council has agreed to drop its challenge against the High Court ruling and instead will immediately pay compensation to each of the children, without accepting liability in this case. The financial terms of settlement remain confidential and in the case of the younger children will require approval by the court.

Des Collins, solicitor for the Corby families, said: "My clients live with the daily reminder of the sub-standard clean-up of the former British Steel plant in Corby. We hope that our experience in this case will also benefit others in the future who have to consider environmental and public health risks from the reclamation of hazardous sites."

Epuk comments: "As this case will now not go to appeal, the original High Court decision still stands meaning a judge has ruled that it is possible to prove a link between remediation that was not carried out to an adequate standard and personal injury."

NEWS FROM THE IEH MEETING HELD LAST MONTH AT CRANFIELD

Micromodel gives true exposure

A micro environmental exposure model can prove accurate in estimating true exposure to pollutants, the Cranfield air pollution and research meeting was told.

It is well known that fixed site monitors or larger scale modelling can fail to estimate true personal exposure. Manchester researchers wanted to prove that a micro environmental model was accurate using volunteer children with personal monitors collecting NO_2 data.

The exposure model was used to calculate the personal exposure of the child by splitting their time into being at home, at school and travelling, with account taken for indoor and outdoor exposure. Pollutant levels were derived from annual average concentrations fed into a land use regression model and monthly and diurnal adjustments.

Anna Molter told the Cranfield audience: "The mean result from the exposure model was very close to the mean measured personal exposure of the children. There were some individuals for whom there were large differences but these may be due to unusual circumstances in the child's home.

"The technique performed much better than the nearest urban monitor or outdoor model. The nearest urban monitor is a very poor predictor of personal exposure and it would provide very little variation in the exposure estimates. The outdoor model consistently over predicted personal exposure as the children spent 90% of their time indoors."

Cyclists can cut their exposure

Leeds University researchers estimate that cyclists can cut their exposure by keeping away from main roads.

Speaking at the recent air pollution research meeting held at Cranfield, Alison Tomlin explained how a cyclist researcher was equipped with a real time particle number counter. The cyclist was equipped with a helmet-mounted video camera and the one second resolution particle number count was compared.

Three routes were compared – a direct route into Leeds City Centre down the busy arterial road, down residential roads or down a mostly off-road route along public bridleways. The direct route took 15 minutes, the off-road route nearly doubled the journey time.

Particle number count peaks could be seen to take place on the approach to junctions where there was queuing traffic – or when being passed by a bus or truck. Particle number count was significantly lower on the off-road route – even taking into account the extra journey time. Perhaps surprisingly, taking the very heavily trafficked arterial road led to less exposure than using residential roads where rat running traffic and the longer journey length added to the exposure.

Tomlin said: "With cycling becoming an ever more popular form of commuting and exercise, it is important to understand the exposure of cyclists to airborne pollutants. Developing low exposure routes may encourage people to commute by bicycle instead of using a motor vehicle thus reducing overall emissions."

She added that the work showed greater benefits from using low exposure routes than has been shown by modelling, increasing the benefits of using such routes.

Munich cuts

German particle expert Erich Wichmann told the conference about monitoring of the Munich low emission zone.

He reported that there were six monitoring stations – three within the zone, two on the edge and a control outside. By using the control to see what the local contribution was, researchers were able to show that the low emission zone led to a 9% reduction in PM_{10} inside the zone.

PEOPLE

Obituary: Dr Nurul Leksmono

Dr Nurul Leksmono, formerly with the University of the West of England has died in a diving accident in her home country of Indonesia.

UWE said: "We are very sad to announce the sudden and tragic death of Dr Nurul Leksmono who drowned in a diving accident in Indonesia on Saturday 10th April.

"Nurul studied and worked in the Air Quality Management Resource Centre at UWE from 2001-2009 before returning to work in her home city of Jakarta last year. Nurul was the most likeable, warm-hearted and generous of people. Her kind, patient, happy nature, which touched so many, will be missed by all who knew her.

"Our thoughts and sympathy are with her family and friends."

● www.uwe.ac.uk/aqm/latestnews.html

IN BRIEF

Zero air gen

Casella Monitor has introduced a cartridge-based, ZeroGen zero air generator. It removes the need for zero calibration gas cylinders when performing calibration checks on ambient air gas analyser systems.

The cartridges are designed to be easily replaced each year, saving considerable time and expense compared to the use of traditional zero calibration cylinders.

Gary Noakes of Casella Monitor, said: "Operators of air quality monitoring stations will benefit from reduced operating costs, and achieve a higher accuracy of data with the installation of the ZeroGen. The ZeroGen scrubs the incoming ambient air and produces a purer true zero gas for calibration without all the complications and mechanics of transporting and installing zero calibration gas cylinders."

● website www.casella measurement.com

New boss for Environ

Niall Smiddy has become Environ's new UK boss.

Lynemouth challenge

A European Court has found that the UK has failed to properly enforce emissions legislation on the Lynemouth smelter.

The court declared that "by failing to apply Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants to the power plant operated by Rio Tinto Alcan Smelting and Power in Lynemouth, in north-east England, the UK failed to fulfil its obligations under that directive".

● *Commission v United Kingdom (Environment and consumers) [2010]* EUECJ C-346/08 (22 April 2010) can be viewed on www.bailii.org/eu/cases/EUECJ/2010/C34608.html

IN BRIEF

Fines 'a driver for change'

Epuk boss Phil Mulligan told the recent spring workshop that the possible EU fines for breaching air quality objectives are a "massive" driver for change.

Mulligan was reviewing the implications of the Environmental Audit Committee's report on air quality (*AQB April p8*). It concluded that the UK "should be ashamed or its poor air quality".

Mulligan said: "Many of the recommendations within the report are nothing new – we've been saying the same thing for years. However it is refreshing to hear someone with a bit more clout saying these things, the MPs' report hugely raises the importance of the recommendations and the Government will need to formally respond. There is a therefore a consequence to this report – the new Government must reply to it."

He said that the prospect of a £300m fine from Brussels for failing to properly meet air quality objectives was very welcome: "A few years ago Defra was hit by fines for agricultural failings – it was told that it had to find the money out of it's existing budget. This is a massive driver for change."

"Together with the local air quality management review and air pollution and climate change report we have a rough blueprint for what needs to be done but there will be no new policy announcements until the new Government is settled in."

Epuk planning guidance re-released

Environmental Protection UK has launched its updated guidance *Development Control: Planning for Air Quality* at the recent spring air quality workshop.

There have been few changes since the guide was launched in draft from earlier this year (*AQB March p5*).

● It can be downloaded from www.environmental-protection.org.uk/aqplanning

NEWS FROM EPUK'S AIR QUALITY WORKSHOP IN RUGBY LAST MONTH

Galey: Retrofit better than new

The Environmental Industries Commission's Mike Galey claims that retrofit vehicle equipment cleans older vehicles to above modern vehicles standards.

Galey told the Epuk air quality spring workshop held in Rugby of the various options for emission controls such as fuel catalysts, particle filters and selective catalytic reduction. Vehicle manufacturers have by and large managed to meet recent Euro standards by tweaking engine designs avoiding the cost of additional clean up equipment. However as standards get tougher, use of the extra equipment becomes inevitable.

Galey said that retrofitting a Euro III heavy duty vehicle with a CRT filter system would reduce ultrafine particle number by more than 99.9% – 100 times less than those from new Euro IV and Euro V standard vehicles.

However Galey did admit that there have been some unexpected downsides to counter the successes with particles.

He reported a Dutch study which showed that NO_X emissions from Euro V trucks fitted with Urea-SCR systems were only marginally better than emissions from Euro III trucks even though the Euro V NOx standard is 60% lower than Euro III standard.

He added: "Real world NO_X emissions from Euro V trucks during the urban driving were found to be about three times higher than regulatory levels – and only approached regulated levels when driving at speeds of about 50mph and above. Real life NO_X emission factors were previously believed to be about 1-15% above the regulatory levels." (more details next month).

Galey claims that retrofit can do better as bespoke systems can be designed for particular trucks and tuned for particular work cycles. He called for the Government to put in place national certification schemes for retrofit emission technologies for both on road and off road applications.

Also he wants a national framework for low emission zones based on emission criteria to allow coordinated action – and national adoption of London best practice guidance for construction which encourages the clean up of construction plant.

VEHICLE EMISSIONS

....but Fuller raises issue of trust

EIC retrofit expert Mike Galey was challenged on the issue that retrofit technologies have failed to deliver the benefits that might be expected.

ERG's Gary Fuller questioned him at the Epuk conference: "There is an issue of trust here. We are not sure that you are providing evidence that we can trust. We are playing catch up with what the industry probably has known for some time." He was referring to the unexpected side effect of using clean up equipment after which direct NO_2 emissions rose dramatically. Galey replied that this was because engine cycles are couched in terms of NO_X rather than NO_2.

But Fuller continued: "We have to be cautious because we are being asked to adopt technology after technology and we're being asked to trust your industry."

Galey responded that there was a big difference between new vehicle performance and retrofit in that retrofit involves making technology suitable for the environment it is designed for.

ERG's Ben Barratt added his concerns: "There are two sides to the story – technology on the one side, and the real world on the other."

Barratt continued: "We have had ten years of emission controls in London which appear not to have made the slightest difference to NO_2. The same is true of PM_{10}. And we have had some unexpected effects, such as the increase in concentrations of NO_2 at the kerbside." (see news, p7)

"We pointed this out in September 2003 and no one believed us then, while we are now working closely with Eminox, something unexpected is going on when at the kerbside to streets where all buses are fitted with traps, there has been no change to PM_{10} concentrations.

"We do need to face up to the implications of current policy of sitting back and waiting for inventories to catch up with emission standards. It's obvious from London and other cities such as Paris that PM_{10} concentrations are not tumbling down.

"This doesn't just affect the UK and Europe, a lot of the world (for instance China and South America) are following the same emission standards as we have and risk the same problems. If technology is not providing the benefits expected then we need to look at more meaningful policies to reduce concentrations."

Barratt made a plea that monitoring should not just cover PM_{10}, but include other metrics. For instance monitoring next to the North Circular Road found that interventions had not affected PM_{10} concentrations at all. However polar plots (which include wind speed and direction) showed that black carbon was reduced as was locally-derived $PM_{2.5}$.

"Thus in terms of policy (to reduce PM_{10}), this intervention may be judged to be ineffective. But in terms of health, which is more dependent on black carbon and $PM_{2.5}$ than PM_{10}, these policies may well be judged to be effective."

NEWS FROM EPUK'S AIR QUALITY WORKSHOP IN RUGBY LAST MONTH

But does it work? asks Barratt

Kings College ERG's Ben Barratt urged delegates at the Epuk air quality conference to show whether air quality actions are achieving anything.

He told the conference: "We currently have very little proof how effective actions are in the real world – we need accountability. The local air quality management process is now at the action stage, if we don't take this seriously we may all bark up the wrong tree."

He said that the following questions needed to be asked given there was very little proof of how effective air quality management actions are:

- Was the policy successful in reducing concentrations?;
- What area was affected?;
- Were there unexpected effects?;
- Was it financially/socially/politically worthwhile?;
- How could it be improved/evolved?

Such answers could be used to build up a body of evidence.

He cited four examples of air quality interventions which could be analysed in this way. In terms of national policy, the Irish coal ban gave an opportunity to see whether air quality improved – it did, but not just as a result of the ban but also because of the increasing availability of natural gas.

More locally, he described monitoring of a waste site with measurements compared with various different interventions such as road sweeping and dampening down, which had an effect.

In Atlanta during the Olympic games, traffic was banned as a means of improving air quality. At first sight there was a dramatic reduction in ozone and consequent health improvement, but subsequent reanalysis suggests that ozone levels have dropped in subsequent years without the intervention, suggesting the health effect was overstated.

King's is now involved in a large accountability study for the London low emission zone. Considerable care has been taken to collect data before the intervention took effect, modelling, monitoring and health response studies are underway to establish whether or not the LEZ is making any difference.

Barratt added that the accountability issue is likely to grow with the increasing need to do something about climate change. He said that in order to assess the impact of climate change policies in London, there needs to be an urban CO_2 monitoring network in the city to assess the impact of vehicle-related CO_2 reduction initiatives.

He added: "There also needs to be validation of the CO_2 emissions inventory with separation of local sources from global and regional sources and sinks." ERG has itself introduced four CO_2 monitors: "We will keep funding that until people treat it with the importance it deserves."

On being asked whether in the current financial climate it was realistic to require accountability studies, he said that such studies should only cost a few percent of the total project cost. "And once there is an adequate body of evidence about the effectiveness of air quality action, there will be less need for such accountability studies."

More details emerge of Reading LEZ

Plans for a low emission zone in Reading were explained to the Epuk spring workshop audience last month.

The LEZ applied to heavy goods vehicles (*AQB April p2*) but its fate is now uncertain with the demise of the Transport Innovation Fund and its replacement by the Urban Challenge Fund. TIF was a scheme aimed at forcing local authorities, rather than central Government, to take responsibility for introducing road pricing, but local authorities such as Manchester failed to persuade voters that the scheme was in their interest.

The Urban Challenge Fund "aims to deliver economic, health and environmental' improvements: Then transport minister Sadiq Khan said: "The Fund will support wider packages of measures that not only tackles congestion but offers greater choice for transport users, improve safety, reduce air pollutants and carbon emissions and improve the living environment."

At last month's Epuk conference transport consultant Tony Pettitt explained how Reading's bid would have operated (and may still be taken forward depending on the outcome of the election): "Source apportionment suggest HGVs create 60% of NO_X pollution. Background NO_2 levels are no longer falling, and many roadside locations see NO_2 steady or rising. Without intervention, EU NO_2 limit values will be exceeded at numerous locations in 2015 and beyond."

Reading spent £3m on working up its bid which featured a low emission zone for buses and trucks covering the central area. It would affect any non-Euro V vehicle over 3.5t which would have to pay (£50 for trucks over 3.5t, £5 for buses) 24 hours a day, seven days a week (if their destination was not the central area itself).

Modelling suggested that this would push half of HGV traffic out of the central area (2,234 vehicles per day) while 563 (12% would pay charge or upgrade).

Pettitt suggested there would be significant financial health benefits using the IGCB damage cost calculator, and these are likely to be very conservative given recently published thinking on air quality costs. There are also accident, noise and crime benefits.

The total phase one capital cost would be £52m (the low emission zone costing £1m). Benefit to cost ratio is 6.7 to one – very high.

IN BRIEF

£20,000 odour fine

Preston based TEG Group has been fined £20,000 for failing to comply with an enforcement notice served to cut bad odours.

TEG Group Plc pleaded guilty to the offence, which required the amount of waste on the site to be reduced to the volumes laid down in their environmental permit. During inspections by the Environment Agency in 2007, officers found more than three times the permitted levels of waste being treated on site, breaching their permit conditions. The Environment Agency had also received complaints from members of the public regarding odours in the vicinity of the site. The site had not complied with the enforcement notice, and this resulted in the legal action.

Greener transport

Greener vehicles emit less – but the rise in traffic is counteracting any benefits, the European Environment Agency claims in its latest Transport and Environment Reporting Mechanism (TERM) report.

The annual publication monitors the progress and effectiveness of efforts to integrate transport and environment strategies. EEA says that extensive investment in transport infrastructure has enabled increased travel "but no decrease in the amount of time that we are exposed to noise, congestion and air pollution".

Conclusions include:

- The economic slowdown has reduced transport volumes but growth is expected to resume as soon as the economy starts to grow again;
- Despite recent reductions in air pollutant emissions, road transport was the largest emitter of NO_x and the second largest contributor of pollutants forming particulate matter in 2007.
- *Towards a resource-efficient transport system* www.eea.europa.eu

IN BRIEF

Car production up

Motor traders body SMMT says car production has risen (albeit from a low base last year).

March figures suggest year-on-year car production increased 90.2%, which marks the fifth successive month of growth. Commercial vehicle output rose 61.6% in March and UK engine production was up 43.6%.

The scrappage scheme ended in March and saw 400,000 older vehicles being replaced by new ones with the help of a £1000 government grant.

Clean ships for US

The International Maritime Organisation has agreed to set up a North American emission control area for ships.

The MARPOL Convention will formally establish a North American Emission Control Area, in which emissions of NO_x, NO_x and particulate matter from ships will be subject to more stringent controls than the limits that apply globally from August 2011.

It means ships visiting American and Canadian ports will have to use fuels with a sulphur content of no more than 1000ppm from 2012, and be fitted with advanced emissions control technologies starting in 2016. If properly enforced, the new rules are expected to reduce sulphur content in fuel by 98%, which in turn will reduce PM emissions by 85% and NO_x by 80%.

The US EPA estimates that the benefits will avoid 8,300 premature deaths a year.

European pressure group T&E says: 'This is one of the most significant decisions to come out of the IMO's Marine Environment Protection Committee (MEPC). It clears the way for the EU to move ahead on other emission control areas, in particular introducing limits on NO_x emissions in the Baltic and North Seas and sulphur and NO_x limits around European coastlines."

- www.imo.org

PUBLIC INFORMATION

Freedom request revisited

The Campaign for Clean Air in London (CCAL) is jointly arguing against the Government's appeal against an order to release details including ministerial briefings on air quality relating to its January 2009 meeting with London Mayor Boris Johnson.

The Campaign's Simon Birkett says the Government has released information – but in three stages and with key elements still 'redacted' (blanked out). CCAL is keen to find out if the Government has acted responsibly in: seeking a time extension to comply with EU limit values for PM_{10} (and/or NO_2); and defending the UK from infraction proceedings in relation to breaches since 2005 of EU limit values for PM_{10}.

On 1 April 2009, the Government rejected CCAL's initial freedom of information request, CCAL's appeal against this refusal was also rejected. The Information Commissioner then told Defra to release the information but Defra rejected this request and appealed against the order, the hearing for this is imminent.

Subsequently Defra released some papers, which have now been published by CCAL.

A particular focus of the information released so far relates to the Government's approach to: the Mayor's proposed removal of the western extension of the congestion charging zone (WEZ); the Mayor's suspension of Phase 3 of the London low emission zone; the process to seek time extensions to comply with EU limit values for PM_{10} and NO_2; and a 'defensive' briefing for ministers on the Government's proposed expansion of Heathrow.

Birkett says: "CCAL is determined to find out about ministers' understanding of and approach to the impact on public health of poor air quality in London. The third tranche of information just released by the Government suggests the Government has not grasped adequately the scale or urgency of the public health threat posed by poor air quality by 2009 (or later) and may have mislead the European Commission when it submitted its time extension notification seeking a delay until 11 June 2011 to comply with EU limit values for PM_{10} and/or in defending the UK from infraction proceedings.

"A picture is emerging of a Government which has failed to communicate the dangers of poor air quality internally within Government, never mind to the general public; is more concerned with delaying compliance with air quality laws than achieving it; and seems to want to avoid a row with the Mayor even when he is taking one or more backwards steps on key air quality measures and threatens to jeopardise the UK's legal case for a time extension on PM_{10}. Is there any 'political will' in Government to achieve full compliance with air quality laws?

"It is time the Government accepted the overwhelming public interest in favour of it releasing immediately the remaining information. It is long past time we were told the truth."

- www.cleanairinlondon.org

INDICATORS

Finalised indicator reveals further jump

The official air quality indicator has improved even further.

In February the draft indicator for 2009 revealed a dramatic cut in polluted days, especially in urban areas (*AQB February p1*). The indicator has now been finalised and there has been an even larger cut – urban days are now down to 10 – half the next lowest figure seen in the last ten years (see table). The improvements will feed into the air quality indicator, one of 68 used by the Government to monitor performance. The air quality indicator has been one of the few showing worsening rather than improvement.

Other data released in final form include:

- Urban background particulate levels averaged 19µg/m³ in 2009, unchanged from 2008.

FINAL INDICATOR

	Urban	Rural
2000	20	28
2001	23	34
2002	19	32
2003	48	64
2004	22	45
2005	21	40
2006	38	55
2007	23	30
2008	26	45
2009	**10**	**32**

(Days moderate or higher)

These levels have fluctuated, but there has been an overall decreasing trend since 1993, the first year for which data were available;

- Roadside particulate levels averaged 22µg/m³ in 2009, compared to 26µg/m³ in 2008. Again, there has been a general downward trend since the series began in 1997;
- Urban background ozone levels averaged 55µg/m³ in 2009 compared to 59µg/m³ in 2008 and 44µg/m³ in 1992, the first available data. These levels had shown an overall increasing trend since 1992, but this has shown signs of levelling out in recent years;
- Rural ozone levels averaged 68µg/m³ in 2009, compared to 71µg/m³ in 2008 and 59µg/m³ in 1987, the first available data. There is no clear long term trend.
- *Air quality indicator for sustainable development: 2009 final results* www.defra.gov.uk/evidence/statistics/environment/index.htm

EMISSIONS

London worsening described

Kings College London ERG has released a report showing evidence of increasing pollutant levels in London.

ERG has been vocal in warning Government that some pollutants are rising in London, bucking the expected downward trend that might be expected from modelling and improving emission factors.

The new report explains that use of hourly traffic data (collected from registration plate cameras) can be used to compare actual traffic flows with concentration data. This allows more robust adjustment for weather conditions.

ERG says: "The use of both traffic and emissions data as hourly values has proved to be invaluable in helping interpret the air pollution measurement trends.

"We find there is evidence that NO_X concentrations have not decreased over the period 2003-2008. In fact, in central/inner London the mean of 10 roadside sites suggests that concentrations have increased by around 7% from 2003-2008. In outer London, concentrations of NO_X have decreased by about 8-9%. The corresponding changes in emissions are reductions of 20% and 29% respectively. These results therefore show there seems to be a considerable disparity between the expected change in emissions and the actual change in concentrations. The results also suggest that there is a difference in how central/inner London sites have responded compared with outer London sites.

"For PM_{10} the average of seven central/inner London sites shows that concentrations have decreased by 4-5% compared with an estimated 25% from detailed emission calculations (2003-2008). Similarly, in outer London the analysis of PM_{10} concentrations indicates a reduction of 13-14% compared with a 25% reduction estimated for the emissions. There does seem to be a consistent difference in the way that central/inner London sites respond compared with outer London site, which is similar to the findings for NO_X.

"The overriding conclusion of this work is, however, the clear disparity between the estimated trends in emissions and the observed trends in concentrations. This disparity has important implications for the management of air pollution and raises question about the adequacy of emission factors and projected concentrations of NO_X (and NO_2), and PM.

"In this study use was made of the currently available UK emissions factors. These have since been superseded via a consultation process undertaken by DfT during 2009. Initial results show that differences between the two emission factor datasets can be substantial for specific vehicles types. It would therefore be worth undertaking a recalculation of emissions using the new factors."

● *Air pollution and emissions trends in London*, Sean Beevers et al can be viewed on www.airquality.co.uk/reports

INDUSTRY

EU in Industrial Emissions Directive tussle

Europe is being pulled both ways over the Industrial Emissions Directive.

Environmental pressure groups fear it will be weakened while industry bodies such as the CBI say that it is too tough.

The Industrial Emissions Directive (IED), which is about to undergo a second reading in the European Parliament, stems from the 2001 Large Combustion Plant Directive (LCPD). This set gradually tightening emission limits for coal fire power stations. Pressure groups say that industry has had ample time to comply and that there is no justification for further derogations for dirty plants.

The CBI is warning that the directive could lead to closure of 14 power plants leading to power shortages. It is calling for power plants to be given until 2021 to prepare for the proposed changes, which will allow other low-carbon forms of energy to be built to replace the lost capacity and ensure a smooth transition.

The CBI is also highlighting another aspect of the Directive: "The current system of monitoring industrial emissions with the UK's Environment Agency and individual plants works well, and should remain the basis for complying with the Directive. We need a system that retains flexibility and is risk-based to take account of local environmental conditions and individual business investment cycles."

NECD will be missed

In 2010, around half of the European Union's member states expect to miss one or more of the legal limits set by the National Emission Ceilings Directive.

The European Environment Agency (EEA) believes 11 countries expect to exceed their ceilings by significant amounts – some missing NO_X targets by more than 40%. The UK will miss its NO_X ceiling by 5%. In contrast, France and Spain expect to exceed by 32% and 28%.

Only 16 expect to achieve their respective NO_X ceilings, with road transport bearing most of the blame. The road transport sector contributed around 40% of total EU-27 NO_X emissions in 2008 and although its overall emissions have decreased since 1990, the reduction has not always been as large as originally anticipated. This is partly because the sector has grown more than expected and partly because vehicle emission standards have not always delivered the foreseen level of NO_X reductions.

● *Overview of 'with measure' projections as reported by the EU-27 Member States in December 2009* can be viewed on www.eea.europa.eu

IN BRIEF

LES seeks help

The Low Emission Strategies Partnership has £5000 funding for LES-related projects/activities in 2010.

It is seeking proposals for work on topics such as:

● Development of a case study;
● Drafting of a policy position paper or review (eg. on the implications of the community infrastructure levy, or integration with LTP3);
● Conduct modelling or evaluation;
● Develop funding formulae for offsetting through planning obligations;
● Life cycle analysis of low emission technologies;
● Assist with technology trial or implementation; or
● To fill any data gaps.

LES is also looking at seeking to develop best/good practice guidance on buying cleaner vehicles to assist in influencing cost effective emissions reductions, with the aim of maximising collective approaches and encouraging market transformation.

Guidance will be guided by a procurement guidance workshop later this year.

● More details on www.lowemissionstrategies.org

Hydrogen plan set

London is set to create a 'Hydrogen network' by 2012 with the London Hydrogen Partnership (LHP) working with London boroughs and private landowners to deliver at least six refuelling sites to run hydrogen-powered vehicles in the capital over the next two years.

An action plan aims to encourage a minimum of 150 hydrogen-powered vehicles on the road in London by 2012. These could include cars, vans, taxis, motorbikes, and lorries. Fifty of the vehicles are expected to be operated by the Greater London Authority's functional bodies such as Transport for London, the fire brigade and the police.

● www.london.gov.uk /lhp

Ash cloud hits the UK

Ash is not a respiratory air quality problem – but it's left plenty to talk about finds Jack Pease

Air quality was thrown centre stage last month with the Icelandic volcano. An invisible plume of particles paralysed Europe– deadly to aero engines, but kind to the human lung.

The ash is generally larger than coarse PM_{10} so not strictly an air quality problem, the public were reassured that ash is not a direct human health issue despite copious deposits on their cars. But that didn't stop a massive focus (once again) on Met Office air quality modelling – as well as allowing a unique no flying period during which air quality could be studied near deserted airports.

Once the ash started billowing into the atmosphere, it was relatively easy for atmospheric modellers to plot the course of the plume. The Met Office use the Name model, a model derived from early military use as a means of tracking nuclear fall out – an event not dissimilar to the volcano.

Name has been in the air quality news before. Modelling is well known as a black art and subject to errors, Name was used to plot the Buncefield fallout (*AQB July 2006 p3*) and failed to predict plume grounding (which was eventually picked up by monitoring).

If Buncefield stretched Name, then the Icelandic Volcano was likely to stretch it even more, with stratified layers of ash apparently scattering across most of Europe. Airlines must heed the advice of aviation authorities, with aviation authorities being told by aero engine manufacturers that there was no safe level of ash, most of Europe was pronounced a no-fly zone.

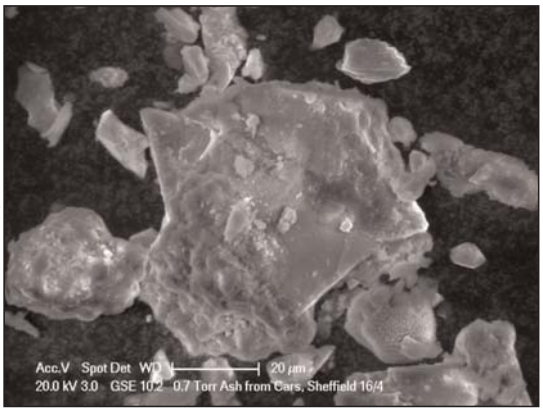
A few days of that started to make already cash-poor airlines squeal – and there was greater scrutiny of the advice from engine manufacturers. Airlines such as BA sent up their own planes into the plume and these arrived back safely, prompting engine manufacturers to agree a threshold of ash concentrations which should not cause a problem.

Modellers were then asked by governments and airlines what concentrations of ash there would be. This is really stretching Name to the limit – but even so the model was run with airspace being opened where concentrations were deemed to be low.

In the inevitable post mortem, the Met Office and its Name model have been criticised for being overcautious. But to be fair to the Met Office, it was asked 'where is the ash' and the Name model delivered its broadbrush prediction.

One expert told *AQB*: "Name has two jobs to do. The first is to predict the 3-D tracks of the ash. This does not require much understanding of the source, except for its position. Name will do this very well and as well as many other models because all you need are the basic
3-D wind fields.

"The second job for Name to do is to predict the concentrations along the path. This is where the difficulties really come in. You need to know a lot about the source, its magnitude, height and you need to know a lot about the nature of the ash, its particle size distribution and removal en route. Garbage in, garbage out. So as soon as the regime shifted from ash/no ash to how much ash? then all the models start to show their weaknesses. Name is no different in this regard."



Sheffield Hallam University analysed ash deposited on cars: it was volcanic

As *AQB* went to press, ash problems have re-emerged, and may do so over coming months. It is now inevitable that the Met Office will be asked to deliver concentration predictions – and atmospheric modelling may find itself once again in the spotlight.

As with Buncefield, modelling of the early volcanic plume spread was backed up with reports coming in from monitoring stations across the UK. As most ash is larger than 10 microns, there was little effect, although plenty of anecdotal reports of widespread and persistent dust appearing on cars.

Sheffield Hallam University was one of the earliest to report the analysis of deposited ash. Scientists from the University's Materials and Engineering Research Institute (MERI) collected samples of the ash and examined them in their laboratory.

Dr Hywel Jones said: "It was a curiosity factor for me to see if this dust was volcanic ash. We analysed the samples and found they contained silicon and oxygen, calcium, aluminium and sodium, which make up volcanic matter. It is essentially volcanic rock that has been melted and frozen in the atmosphere."

Kings College London ERG was characteristically also quick off the mark. Gary Fuller said: "Initially our analysis focused on looking for co-incident elevations of SO_2 and PM_{10} reflecting the likely composition in the volcanic plume.

"A series of SO_2 peaks have been measured in the areas covered by our networks. These have affected sites in east London at Greenwich and Bexley on Friday and sites in south Essex, at Castle Point and Thurrock on Saturday and Sunday. Elevated concentrations of NO_X have been associated with the SO_2 peaks (indicating a combustion source) and each of these events has shown an easterly progression with local wind direction. This is consistent with the normal pattern of plume grounding from industrial sources in the east Thames area.

"On Friday afternoon (16th April) a veering of wind direction from northeast towards southeast was linked to a sharp increase in PM_{10} concentrations at certain background sites. This increase of around 20µg/m³ appears to be mainly coarse PM (ie. $PM_{10-2.5}$) particles, with coarse PM comprising around 50% of background concentrations of total PM_{10} during Friday afternoon. Although this is a change in the nature of PM concentrations that prevailed earlier in the week, similar patterns of concentration changes have been measured before, for instance during a secondary PM_{10} episode in May 2009.

"Since Friday afternoon concentrations of volatile PM have been increasing steadily across south east England, consistent with increasing concentrations of secondary particulate. In addition, widespread moderate ozone was measured throughout south east England over the weekend with the greatest concentrations being measured on Sunday afternoon in Sussex, east Surrey and west Kent where concentrations of over 120µg/m³ were attained.

On Sunday afternoon, elevated concentrations of PM_{10} were measured at sites to the south of London, across Sussex, east Surrey and west Kent. PM_{10} concentrations of over 80µg/m³ were measured at roadside sites in Horsham, Chichester and Sevenoaks and at background sites in Sevenoaks, Eastbourne, Reigate and Banstead and Mole Valley. During Sunday afternoon PM_{10} concentrations at these sites exceeded those in London."

ERG said that the key to understanding the pollution events is to use back trajectory analysis to look at where air has travelled over before it reached the UK. Although the air present over the Sussex, east Surrey and

west Kent area on Sunday afternoon was over Iceland four days previously, this air also passed over parts of Germany, Belgium, the Netherlands and north France during the preceding 36 hours.

"The possibility of a minor contribution cannot be ruled out. Detection of PM from this source would require mineralogical analysis of collected PM samples. Such analysis is not routinely undertaken in the UK networks."

As is usual, AEA is less forthcoming. While it is the guardian of the national monitoring network, it is also under contract to to Defra and the regions and is thus muzzled by officialdom at the best of times. Being in the middle of election purdah made it even worse, but it did publish back trajectories that suggested air streams across the UK were coming via Iceland, but that there was no appreciable impact on network PM_{10} readings.

While the ash is generally in the coarser fraction above PM_{10}, there was still a need to reassure the public that there was little health risk.

Health Protection Scotland said: "No evidence has been identified from routine health surveillance resources which suggest any detectable impacts on public health in Scotland. Similarly routine air quality monitoring has not identified any significant increases in levels of pollutants such as particulates or gases such as sulphur dioxide potentially associated with the ash plume from the volcano.

"It is likely that there will be rain in various parts of the UK which might cause low concentrations of ash to be deposited. In wet weather the particles cannot be inhaled under these conditions, only very low concentrations of volcanic ash would be deposited in fields and towns. However, because small quantities of volcanic ash could float back up into the air in windy conditions, it would be sensible for people with existing respiratory conditions such as chronic bronchitis, emphysema and asthma to ensure they keep their inhalers or other medications with them."

AEA reported on it's Scottish air quality website some grounding of ash in Lerwick: "This was analysed by SEPA and verified to be from volcanic origin."

The particulate matter measured by SEPA was found to be between 15-85microns in diameter, far larger than the 10 micron cut off of PM_{10} analysers used in the networks.

The European Environment Agency (EEA) also followed the impacts of recent volcanic eruptions in Iceland, in particular assessing changes in ground-level air pollution. "According to preliminary monitoring data, ground-level air quality across Europe has not deteriorated significantly as a result of the volcanic activity. So far, monitoring stations in Europe have only detected a few episodes of ambient air concentrations of particulate matter and sulphur dioxide of volcanic origin, in particular at elevated mountainous locations, for example at Zugspitze in Germany (2659 m). The threat to public health in the European Union is therefore considered minimal."

AIRPORTS: A CLEAR MEASURABLE EFFECT

Closure of UK airspace for six days provided respite for those who suffer noise near airports – and an opportunity to see if there were any air quality improvements.

There are very few airports where air quality is a problem, Heathrow and Gatwick are the worst and have plenty of monitors dotted around the airport perimeter.

Kings College ERG said: "We have made an initial analysis of NO_x and NO_2 concentrations surrounding Gatwick and Heathrow airports during the first three days of closure – Thursday 15th to Saturday 17th April 2010. This period was chosen due to the stable weather conditions with light north easterly winds, allowing a cross-sectional analysis upwind and downwind of the airports.

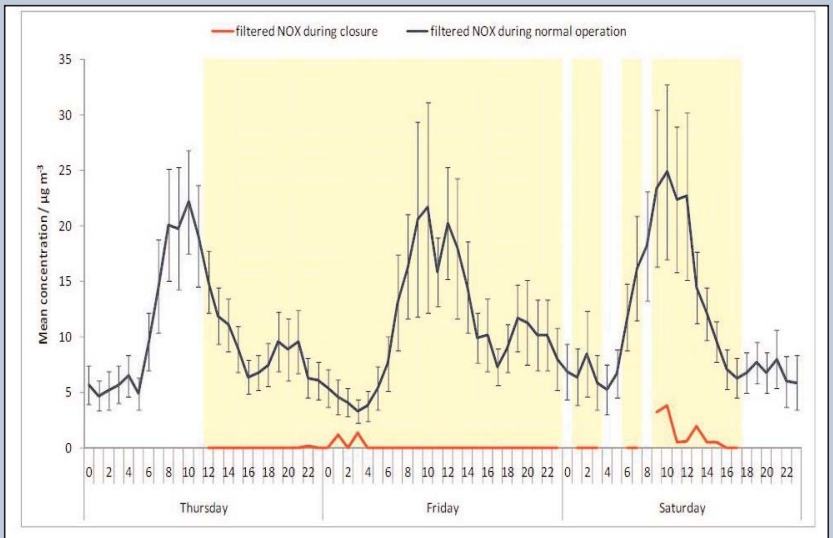
"This period of unprecedented closure during unexceptional weather conditions has allowed us to demonstrate that the airports have a clear measurable effect on NO_2 concentrations and that this effect disappeared entirely during the period of closure, leading to a temporary but significant fall in pollutant concentrations adjacent to the airport perimeters.

"Pairs of monitoring sites were used located either side of each airport with the upwind monitors provided the control data. By subtracting hourly mean concentrations recorded by the upwind site from those recorded by the downwind site, an estimation of emissions from the airport could be made.

NO_x was found to drop dramatically (see box right), and the analysis was repeated for NO_2, with similar results. The annual mean NO_2 concentration measured to the south west Gatwick, during 2009 decreased from 18µg/m³ to approximately 16µg/m³ in the absence of airport emissions. The impact of the airport is likely to be greater in the populated areas to the north east of the airport (Horley) due to prevailing winds from the south west.

A similar analysis was carried out using a pair of monitoring sites surrounding Heathrow airport. 'Airport' NO_2 concentrations were higher than those at Gatwick and dropped from 27µg/m³ to 8µg/m³ during the closure period.

"This exceptional closure has allowed us to demonstrate the impacts of airport emissions on their immediate neighbourhood. This preliminary study did not consider the impact of decreased traffic flows on airport feeder roads. Decreased flows are likely to have a significant effect on concentrations of vehicle-related pollutants close to such roads."



The figure above shows daily diurnal mean 'airport' NOx concentrations for the 'open' and 'closed' periods at a monitoring site close to the perimeter of Gatwick airport.

The yellow shaded areas indicate hours where winds were from the north or north east during the closure period, i.e., the site was downwind of the airport runway. The chart shows that during normal operating conditions 'airport' NOx concentrations increase during the day peaking at around 22 to 25 µg/m³ on average. During the period of closure (15th to 17th April 2010) mean 'airport' NOx concentrations were zero most of the time.

All concentrations were well below the lower 95% confidence interval indicating that the difference from 'normal' operation was statistically significant.

London: a closer look

Last month a lot of policies were published as part of the pre-election clear-out and we were unable to do justice to the London strategy. Now we take a closer look...

The London Mayor is required to have an air quality strategy – and update it regularly.

Last year (*AQB November p8*) he released a 'sawn off' version of the draft update for limited consultation. It had 88 pages (as compared to the 230 of the 2001 strategy that it replaced), now it is ready for formal public consultation, it has grown to 155 pages with annexes on top of that.

GLA would never admit it but the first draft was rushed out at a time that it had lost most of its air quality stalwarts. Incoming air quality specialist Rachel Conti had just weeks in the job before the draft was released, now there is a strategy that is a bit more credible.

There is certainly some politics around all this – London will have to work hard to claw back it's reputation for being at the forefront of air quality having dismantled it's world renowned environmental team, delayed phase three of the low emission zone, consulted on removing the western extension of the congestion charge, retimed traffic lights to let more traffic through and watered down proposals to clean up taxis.

Despite his actions, Mayor Boris Johnson is bullish: "This strategy outlines steps to position London at the forefront of new and innovative technologies to combat dirty air, so that one day, London can be a zero emissions city. We are targeting the most polluted areas with a package of clean-up measures including cleaning persistent pollution from the road, focusing the cleanest buses in these areas, better enforcement of no idling rules and new green infrastructure to absorb pollution and protect pedestrians from fumes."

The strategy starts with much discussion about health effects, picking up on what MPs said recently on health (*AQB April p8*). The Mayor's strategy says it has commissioned its own work suggesting there are some 4,300 deaths per year in London caused by long term exposure to $PM_{2.5}$. This amounts to a £2bn yearly health cost in London alone: "The GLA will shortly be publishing its study into the impacts of poor air quality in London. This will provide estimates for the number of deaths in London in a year which are partly attributable to poor air quality, as well as providing figures for associated years of life lost. The study will present some of the results at a borough level or smaller geographic area."

As *AQB* went to press GLA had still not released this report despite the Campaign for Clean Air in London using Freedom of Information legislation to extract the data.

GLA has done an assessment of PM_{10} exceedences and finds the picture relatively rosy: "Updated modelling has been undertaken based on 2008 emissions and monitoring from across London. The modelling shows that the vast majority of London already meets the EU limit value for annual mean PM_{10}, the highest concentrations are close to and restricted to major roads and it is important to note that elevated pollution concentrations tend to remain within the road carriageway and do not spread to the pavement where pedestrians are likely to be exposed. Circumstances such as these do not constitute a breach of the EU directive as there is no relevant public exposure."

Most of London also meets the EU limit value for daily mean PM_{10} concentrations except at the kerbside of some of London's busiest roads.

Monitoring also shows that $PM_{2.5}$ exposure reduction targets are likely to be met in London. The same monitoring shows a less-rosy picture for NO_2 for which there are many exceedences of the annual mean objective – sometimes by a factor of two, with levels rising.

The strategy contains projections forward based on the base case (ie excluding initiatives within the strategy). PM_{10} annual limit values will be met, but there will be sites where concentrations will be close. These are: Marylebone Road, Euston Road, Marble Arch, Hyde Park Corner, Victoria Embankment, Upper Thames Street and Tower Hill.

The report states: "The high concentrations at these locations are caused by a number of factors including the make up of the vehicle fleet going through the location, traffic speed and local road geography. In order to address these priority locations the strategy focuses on three interconnected corridors that include the specific locations at risk of not meeting the extended 2011 deadline for daily PM_{10}. These are Marylebone Road and Euston Road, Marble Arch and Hyde Park Corner and Embankment to Tower Gateway."

Action to reduce pollution includes power washing roads, applying dust suppressants, using the cleanest buses on these routes, enforcing no idling and no stopping rules. It has chosen thee measures based on a "detailed" TfL study that for instance suggests that power washing and dust suppressants can cut PM_{10} concentrations by 20% or more, however other studies suggest this may be optimistic.

The list will be kept under review and other locations may be added. It tells boroughs to undertake action at sites they identify through local monitoring.

The strategy is at pains to point out that action in Greater London alone will not be sufficient to meet the limit values by the extended target date of 2015: "NO_2 pollution is not just a problem in London but is a problem in other urban environments within the UK and Europe. Serious action to reduce NO_2 concentrations needs to be taken at national and European level if London is to meet the EU limit values for NO_2."

The strategy contains exhaustive emissions apportionment graphs that explain how transport is the main culprit and then lists existing and proposed actions to improve air quality (see box, facing page). There is a very clear threat that the GLA will not take action without central Government help: "The ultimate scale and scope of action will inevitably be dependent on the resources available. In developing his strategy the Mayor has taken account of TfL's business plan, which is already

Vegetation

The Mayor will ensure that the *Better Streets* programme includes measures that will improve air quality in London. This could include the planting of street vegetation which helps to trap particles or which can act as a barrier between pedestrians and road vehicles.

The Mayor has pledged that overall 10,000 trees will be planted on streets in 40 priority areas. Poor air quality has been one of the criteria used to determine these locations. Some research has shown that at a local level, trees can reduce concentrations of PM_{10}, as the leaves and branches act as a filter to trap toxic particles. Care will be taken to ensure that trees are not planted so that they form a canopy that traps pollutants causing local concentrations to increase, using the 'right tree, right place' principle.

The GLA will seek to remain informed of the latest research into which types of tree are most effective at trapping particles, to ensure that the benefits of tree-planting are maximised.

allocated to 2017/18. While the Mayor is fully committed to improving London's air quality through the transport measures set out in this chapter, these can only be delivered in full if central Government support is forthcoming."

Policies include the usual suspects such as promotion of smarter choices, ecodriving and a move towards low emission vehicles. TfL is in the process of identifying suitable locations to trial green walls, green screens and low barriers. It says that at a local level, these can reduce concentrations by around 10%. Trees will be planted (see box, below left).

More detail is given on action days: "The Mayor will work with boroughs to put in place a package of special measures for the highest air pollution days. Under extreme circumstances there may be a role for more stringent special measures used intensively for short periods of time which primarily affect how many and which kinds of vehicles can travel to and through the relevant area. These measures could include restricting vehicle access or movement into or within an area or diverting traffic away from that location.

"In the development of such measures, TfL will undertake a feasibility study into the potential for lane and road closures as emergency actions in response to particularly poor air quality. This will include developing a model to understand traffic impacts on air quality across the network. Depending on the outcome of this feasibility study, TfL may consider using powers available under the Road Traffic Regulation Act 1984 to close lanes or whole roads or otherwise restrict certain types of vehicles at certain times.

"The Mayor appreciates that the impact of special measures could be particularly high for boroughs and businesses in central London in terms of congestion. It should also be noted that these are only expected to be used in the most extreme circumstances.

"As a preference, and in order to promote more lasting change, a wider package of measures focused on planned "action days" will be developed. These measures, such as cycling days or zones would be focused on broader behavioural benefits – encouraging Londoners to use cleaner transport modes and demonstrating potential wider benefits, for example in terms of public realm and amenity, that longer term and wider change could bring. This may include a number of "action days" in central London during the year or more regular (e.g. weekly or monthly) events in certain areas. These could also be linked to major events such as the Olympics and other initiatives.

Transport is not the only culprit in terms of emissions, and the Mayor lists actions in other areas that will be contemplated:

- Reducing emissions from construction and demolition – through the review and full implementation of the Best Practice Guidance for construction and demolition sites across London (but it stops short of a pledge to implement it);
- Energy efficiency schemes – implementing programmes that will make London's buildings more energy efficient and lobbying central Government to provide additional funding for these programmes to increase their scale;
- Encouraging innovation – by making London a centre for new ideas that will improve air quality;
- Raising awareness – by highlighting the impact of poor air quality on health to encourage Londoners to take action to reduce emissions and by making them aware of any potential personal health risks.

On planning he suggests:

- Making new developments 'air quality neutral or better' – by making better use of the planning system to ensure no new development has a negative impact on air quality in London;
- Require new biomass boilers in AQMAs for PM_{10} to be fitted with suitable PM emission reduction technology. For planning applications within an AQMA that include proposals for the use of biomass boilers, the Mayor will require that an assessment of its emissions is undertaken;
- Apply emissions limits for both PM and NO_x for new biomass boilers across the whole of London;
- Develop a checklist to guide boroughs and developers in the assessment of the potential emissions from new developments;
- Ensure air quality benefits are realised through the promotion of low emissions strategies in section 106 agreements;
- Prepare template Supplementary Planning Guidance on air quality for boroughs to assist them in determining planning applications.

The Mayor concludes: "The transport measures outlined in this strategy will reduce emissions and concentrations across London, including at priority locations. The proposed local measures will deliver important reductions in emissions at the locations where levels of exposure are particularly high.

"Based on evidence from other cities, a reduction of up to 2.5µg/m^3 at the priority locations can be reasonably expected – equivalent to reductions of between 10 and 20%. Nevertheless, in order that a cautious and realistic assessment is given, it has been assumed that only half of the exceedence days that modelling suggests could be achieved by these measures will actually be avoided. This would translate into a reduction in daily exceedences at the priority locations of around six days. This is significant in the context of meeting the EU limit values, where in 2009 only a small number of days needed to be removed for the Marylebone Road priority location to meet the EU limit values for PM."

- www.london.gov.uk/airquality

London: Key policies

"Bold" action already in the pipeline

- Promoting mode shift to cleaner forms of transport, including ongoing investment in public transport through schemes including Crossrail and the tube upgrades and significant increases in cycling and walking infrastructure;
- Bus emissions programme – from 2012 every new bus will be diesel-electric hybrid and the New Bus for London is expected to be hybrid;
- Encouraging and funding car clubs, especially those which provide plug-in hybrid and electric cars;
- Improving road maintenance to reduce the contribution of particulate matter to emissions from road surface wear;
- Smoothing traffic through better traffic management and street works coordination;
- The continuation of the central London congestion charging scheme;
- Operation of the London low emission zone;
- Procurement and promotion of electric vehicles – target 100,000 electric vehicles;
- 'Greening' of transport fleets;
- Freight delivery and service plans to increase freight efficiency.

Further measures "designed to deliver value for money"

Policy 1: Encouraging smarter choices and sustainable travel behaviour): broad measures that are relatively easy to implement that will have positive air quality impacts across London;
Policy 2: Promoting technological change and cleaner vehicles;
Policy 3: Identifying priority locations and improving air quality through a package of local measures: these will focus on particular areas at most risk of not meeting EU limit values as well as promoting action by boroughs and others across a range of locations with particular air quality challenges;
Policy 4: Reducing emissions from particular sources in the public transport and public sector vehicle fleets;
Policy 5: Emissions control schemes (such as changes to the low emission zone);
Policy 6: Action days and special measures: these measures will provide for additional action on high pollution days, as well as seeking to promote more lasting behavioural change.

SCIENCE SHORTS

Long term exposure

A London study has looked at the impact of chronic long term exposure to outdoor air pollutants and adult lung function.

St George's researchers studied data from over 10,000 subjects for which lung function data was available.

They found that greater exposure to PM_{10} led to reduced adult lung function (FEV). A 10µg/m³ rise in PM_{10} reduced FEV by 3% for PM_{10}, and 0.7% for NO_2 and SO_2. The effects were most marked in men, older adults and ex smokers.

FEV was not found to be related to ozone exposure. "While magnitude of the effect may not be important for an individual, pollution could cause significant changes in the prevalence of low FEV and therefore of associated symptoms, prognosis and health service utilisation."

Chronic exposure to outdoor air pollution and lung function in adults, L Forbes et al, *Thorax* Vol. 64 pp657-663.

Heart effects studied

Canadian researchers have carried out a chamber study to study the impact of pollution on cardiovascular diseases.

45 non-smoking adults were exposed to various pollutants which revealed that interleukin 6 (a marker of heart disease) levels rose with exposure to ozone and sulphur dioxide. Responses varied by season and tended to be higher in the summer, especially for ozone and fine particles.

No association was found with fibrinogen, another marker of cardiovascular damage.

Baseline repeated measures from controlled human exposure studies: associations between ambient air pollution exposure and the systemic inflammatory biomarkers IL-6 and fibrinogen, Aaron Thompson et al, *Environmental Health Perspectives,* Jan 2010 Vol. 118 pp120-124.

ASTHMA

Study suggests asthma link

Canadian researchers have found evidence that pollution may cause, as well as exacerbate asthma.

The common wisdom is that pollution only worsens asthma, although studies continue to challenge this.

37,000 children born in 1999 in British Colombia were assessed for asthma incidence up the age of four. Their pollution exposure during pregnancy and the first year of their life was assessed using a mixture of fixed monitoring and land use regression modelling.

Out of the 37,000 children, a total of 3,482 (9%) were classified as asthma cases. "We observed a statistically significant rise of asthma diagnosis with increased early life exposure to carbon monoxide, NO, NO_2, PM_{10}, SO_2, black carbon and proximity to point sources. Traffic pollutants were associated with the highest risks with an 8% increase in likelihood for a 10µg/m³ rise in NO, 12% for a similar rise in NO_2, and 10% for a 100µg/m³ rise in carbon monoxide. Risks were higher for girls, although they had a lower incidence of asthma.

"To our knowledge this was the largest study and one of the few to examine the effects of in utero air pollution exposure on paediatric asthma risk. The data supports the hypothesis that early childhood exposure to air pollutants plays a role in the development of asthma.

"The risk increase is small at an individual level but presents a significant increase in burden of disease on population level because in most urban and suburban settings, traffic derived air pollution exposure is ubiquitous."

Effect of early life exposure to air pollution on development of childhood asthma, Nina Clark et al, *Environmental Health Perspectives* Vol. 118 no 2 Feb 2010 pp284-290.

TRAFFIC POLLUTION

Heavy metals estimated near busy traffic

Swedish researchers have studied roadside and background pollution levels in a bid to estimate emissions and concentrations of heavy metals.

Concentrations of particulate heavy metals were measured simultaneously over a year at a densely trafficked street and at an urban background site in Stockholm.

Researchers said: "This is the first study using simultaneous measurements of heavy metals at street and roof level enabling calculations of emission factors sing a tracer technique. Even on one of the most densely trafficked streets in Stockholm the levels of arsenic, cadmium and nickel were several times lower than the EU directive. Concentrations at a street canyon site were to two to four times higher than at an urban background site, excepted for copper and antimony for which the levels were seven times higher.

"Using NO_X as a tracer, emission factors have been estimated and compared with estimated emissions from brakes and vehicle exhaust. For copper and zinc, brake wear is likely to be very important for the emissions as indicated by comparing with estimates based on brake wear analysis and verified very high correlations between these metals and with antimony.

"The emission factors estimated for the street canyon site are higher than estimates based on road tunnel sites, this is likely due to different driving conditions (more stop and go at the street canyon site)."

Road traffic emission factors for heavy metals, Christer Johansson et al, *Atmospheric Environment* Vol. 43 pp4681-4688.

PUBLIC HEALTH

Particles affect overweight people

A random sample of 348 adults in Detroit has been used to show that obesity worsens the impact of fine particles.

Researchers measured body mass index, blood pressure and other variables and compared these measurements to $PM_{2.5}$ exposure.

They found that fine particles ($PM_{2.5}$) led to higher pulse pressures for those with a BMI over 30.

The effects were more marked for those closer to local emissions. Researchers add that the results can be used to better target community interventions to reduce the population burden of air pollution and high blood pressure: "It appears that rates of obesity are higher in communities with reduced economic resources, and that poor communities and communities of colour also experience increased exposure to particles.

"Thus residents of older urban neighbourhoods encounter multiple conditions that exacerbate the risk of cardiovascular disease, and that those risks may have not additive, but multiplicative effects on health."

Exposure to fine particulate matter and acute effects on blood pressure: effect modification by measures of obesity and location, S Kannan et al, *Journal of Epidemiology and Community Health*, 2010, Vol. 64, pp68-74.

INDUSTRY

Steelworks doesn't impact town

A steelworks in Germany has been found to have little impact on residential pollution levels.

The complex in Duisburg was monitored in a bid to see what impact it had on the surrounding area. PM_{10} was measured at four points close to the steelworks consisting of blast furnaces, a sinter plant, oxygen steelworks and a coke oven for a nine month period of monitoring.

The results of the measurement programme showed very high PM_{10} concentrations close to the burden preparation and stockpiling areas decreasing very rapidly the greater the distances from the area. Directly at the edge of the area, for instance, PM_{10} levels were 40µg/m^3, but at monitoring stations 600m – 1000m from the area, PM_{10} dropped to 1.5µg/m^3.

Researchers remark that the monitoring results are markedly different to modelling estimates which suggest high concentrations for several hundred metres downwind of the stockpiles.

They conclude: "These estimations are useful as they clearly show that facilities like the coke oven plant and processes like the burden preparation and stockpiling are relatively small sources of PM_{10} in the residential areas near Duisburg.

Estimating the contribution of industrial facilities to annual PM_{10} concentrations at industrially influenced sites, Dieter Gladtke et al, *Atmospheric Environment* Vol. 43 pp4655-4665.

TRAFFIC POLLUTION

Traffic pollution worsens asthma

A Californian study of 1,500 residents in San Yoaquin Valley suggests pollution can worsen asthma symptoms.

San Yoaquin Valley has amongst the worst air quality in the USA and some of the highest rates of asthma symptoms. Air quality exposure was inferred from fixed site monitoring stations in the one year period prior to assessing symptoms. A 10ppb rise in ozone increased daily and weekly asthma symptoms by 23%, a 10µg/m^3 rise in PM_{10} increased odds by 29% and a 10µg/m^3 rise in $PM_{2.5}$ increased odds by 82%. High increases in risks were also found for casualty visit or hospitalisation outcomes.

Researchers concluded: "Both ozone and particulate matter are associated with frequent asthma symptoms and asthma related emergency department visits or hospitalisations in San Yoaquin Valley. This area is interesting because it has urban areas surrounded by agricultural operations creating a unique mix of pollutants. Effects are found in both in children and adults with asthma."

Outdoor air pollution and uncontrolled asthma in the San Joaquin Valley, California, Ying-Ying Meng et al, *Journal of Epidemiology and Community Health*, 2010, Vol. 64, pp142-147 pp142-146.

BIOMASS BURNING

Wood burning features in Paris air

Paris pollution has been studied in a bid to see how much comes from domestic wood burning.

Researchers say that relatively little is known about wood smoke so they analysed the chemical and optical properties of fine carbonaceous particles in a winter season to track the presence of wood burning particles.

They found a clear diurnal pattern when looking at light absorbance with a peak taking place at night clearly attributable to wood burning.

"If considering only filters collected during the weekends, when traffic is limited and residential wood burning is more prevalent, the contribution was found to be 64% – in other words carbonaceous aerosol from wood burning made up 20% of the $PM_{2.5}$ in Paris.

"Wood burning aerosols should not be neglected in Paris at Wintertime," the researchers concluded.

Evidence for a significant contribution of wood burning aerosols to $PM_{2.5}$ during a winter season in Paris, France, Olivier Favez et al, *Atmospheric Environment* Vol. 43 pp3640-3644.

LUNG EFFECTS

Diabetic sufferers more susceptible

137 non smoking adults with diabetes were studied in a bid to see the impact of air pollution.

Belgian outpatients' exposure was assessed before their hospital visit, and a measure taken of the carbon in their airways. Diabetic patients showed evidence of a proinflammatory response to both recent and chronic exposure to particle air pollution.

Researchers commented: "This study is novel in that it suggests persons with diabetes, a condition associated with chronic inflammation, may have a short term inflammatory response to recent particle air pollution in addition to the effect of chronic exposure as assessed by the carbon load of airway macrophages."

Air pollution-related prothrombotic changes in persons with diabetes, Lotte Jacobs et al, *Environmental Health Perspectives*, Vol. 118, Feb 2010, pp191-196.

SCIENCE SHORTS

Oxidative stress

German researchers have used mice to study the effect of inhaled elemental carbon ultrafine particles.

They found that allergic individuals are more susceptible to the adverse health effects of elemental carbon ultrafines.

Role of oxidative stress in ultrafine particle induced exacerbation of allergic lung inflammation, Francesca Alessandrini et al, *American Journal of Respiratory and Critical Care Medicine*, Vol. 179 pp984-991.

Heart rate changes

Ultrafine particles have been found to affect the heart, US researchers suggest.

19 healthy non smoking male and female 18-35 year olds were exposed to concentrated particles. The exposure was found to affect heart rate variability and lead to inflammatory responses.

Concentrated ambient ultrafine particle exposure induces cardiac changes in young healthy volunteers, James Samet et al, *American Journal of Respiratory and Critical Care Medicine*, Vol. 179 pp1034-1042.

$PM_{2.5}$ admissions

In a bid to explain the geographical and seasonal differences in short term effects of fine particles, Yale researchers have compared fine particle concentrations to US hospital admissions among the elderly over a six year period.

They found communities with higher $PM_{2.5}$ content of nickel, vanadium and elemental carbon were found to have higher risk of hospitalisations associated with short term exposure to $PM_{2.5}$. They added: "A large fraction of the geographical and seasonal variation in the short term effects of particles on mortality and morbidity is explained by the differences in particle chemical composition."

Hospital admissions and chemical composition of fine particle air pollution, Michelle Bell et al, *American Journal of Respiratory and Critical Care Medicine*, Vol. 179 pp1115-1120.

HOT AIR

Air quality people are usually quite down to earth and suspicious of corporate gobbledegook.

During the recent Epuk air quality workshop held in Rugby, we spotted one city council EHO running a tally on how many 'going forwards' were uttered by speakers.

There were surprisingly few mentions of the hideously overused cliche, but runner up during the two day conference was King's College London ERG's Ben Barratt, a bit of a surprise as ERG doesn't really do corporate.

Epuk has recently had management consultants in (on a pro bono basis) – and we can see that's rubbed off on Ed Dearnley who used 'going forward' the most – a whopping seven times in 20 minutes.

We'll have to wean him off the phrase – maybe instead of a swear box, a 50p-a-time 'Bull Box' could be installed at Epuk's Brighton HQ?

ERG was quite noticeable at the conference with both Gary Fuller and the aforementioned Ben Barratt apparently spoiling for a fight with the particle trap industry.

One senses that there is a lot of unfinished business between those that promise great things for pollution, and those that spend their time looking for improvements that never come.

On a lighter note, Barratt said what most people may very well think: "If the Mayor of London decides to plant a hedge round Marble Arch, do we look at him like a hairy Labrador or take him seriously?"

The annual spring workshop did of course prompt the awarding of the *Jack Pease Bronze Bottom Award* for the person making a notable contribution to air quality.

As is usual, the award is hotly contested and the bum is engraved with past winners. The list is fast becoming an intriguing hall of fame – in the seven years of the award, there appears Andrew Whittles, Mark 'Twice' Daly, Ruth Calderwood, Simon Birkett, Duncan Laxen and Stephen Moorcroft.

Ian McCrae was of course unable to collect his well deserved award off *AQB* editor Jack Pease (pictured)

The award has no rules, no one is put forward for it and the judging criteria is ramshackle. Names mooted for winning this year included Mid Devon's Simon Newcombe for his planning successes, and Defra's Robert Vaughan who has settled in nicely (so will probably now move on). But this year's award was given to TRL's Ian McCrae who died earlier this year. Ian did a lot for air quality and as is often the case, it took his untimely death and overflowing condolence book for us to realise how much he contributed. A well deserved win.

AQB is being put to bed just as votes are being cast in the election.

It is a depressing time. All the talk of is of cuts, especially to the public sector and 'red tape'. Is the well regarded LAQM process about to get dismantled? You wouldn't mind so much if bankers, car makers and aviation interests didn't have the first call on Government billions.

AIR QUALITY EVENTS 2010

2010

3rd-7th May

AIR QUALITY AWARENESS WEEK

More details see www.epa.gov/airnow/airaware

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

1st-4th June

HARMO13

13th International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes to be held in Paris, website www.aria.fr/harmo

8th-10th June

METROLOGY OF AIRBORNE NANOPARTICLES, STANDARDISATION AND APPLICATIONS (MANSA)

to be held at NPL Teddington website www.npl.co.uk/events/mansa

20-23rd June,

URBAN ENVIRONMENTAL POLLUTION

to be held in Boston, Massachusetts, USA. For more information, visit www.uep2010.com/index.asp

21st-23rd June

AIR POLLUTION 2010

18th International Conference on Modelling, Monitoring and Management of Air Pollution to be held in Kos, Greece. For more information, see www.wessex.ac.uk/air2010cfp.html.

22nd June

INVESTIGATION OF AIR POLLUTION STANDING CONFERENCE

Iapsc meeting to be held at the Brunei Gallery, School of Oriental and African Studies, London, www.iapsc.org.uk

12-16th September

15TH WORLD CLEAN AIR & ENVIRONMENTAL PROTECTION

Congress to be held in Vancouver, http://iuappa.com/index.htm.

10-13th October,

FOURTH CENTRAL AND EASTERN EUROPEAN CONFERENCE ON

Health and the Environment to be held in Prague, For more information, website www.ceeche.org

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By popular demand, we are trialling a supplement covering carbon and how to cut it. *Carbon Reduction Bulletin* is aimed at people who need to know how others are tackling carbon reduction.

For now it is being enclosed in our existing newsletters, to ensure you get your own copy, tell us you want it sent to you direct!

Jack Pease

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ISSN 1751-150X
Printed and published by Environmental Management Publishing Ltd
AIR QUALITY BULLETIN