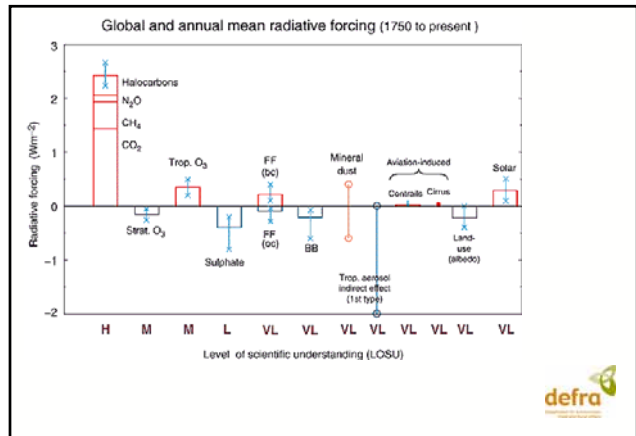
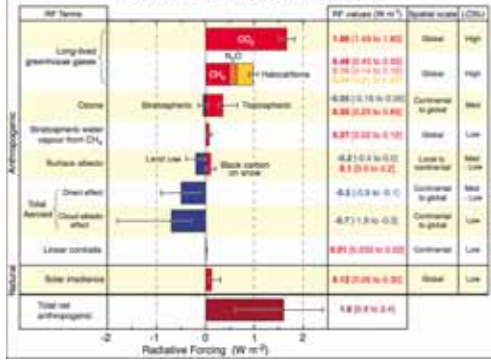


## AIR POLLUTION, CLIMATE AND HEALTH REGULATION: EUROPEAN EXPERIENCE

Martin Williams  
Defra, UK  
HEI Annual Conference  
Chicago, USA  
15-17 April 2007



### Radiative Forcing Components



- Air Quality and Climate Change comparisons and assessments are difficult because of the different lifetimes of the pollutants involved
- GHGs are long-lived whereas Air Pollutants have relatively short lifetimes
- GWPs can be calculated for air pollutants but not helpful for comparing GHGs and Air Pollutants
- Shine (2006) defined a Global Temperature Potential (GTP) which may be of more use



## THERE ARE WIN/WINS AND THERE ARE TRADE OFFS BETWEEN AIR QUALITY AND CLIMATE CHANGE POLICIES



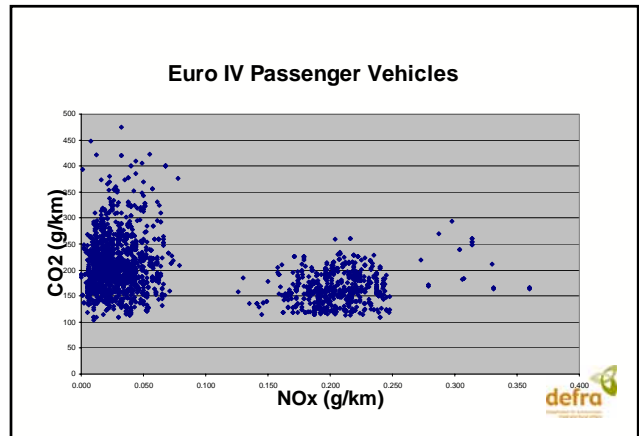
### WIN/WIN POLICIES

- Measures which reduce fuel use – energy efficiency, less transport activity
- Lower carbon intensity energy generation – ‘pure’ renewables, nuclear,
- Hybrid vehicles and electric (if electricity is low carbon)
- Hydrogen economy if generation of hydrogen is low carbon
- Reducing aviation and shipping NO<sub>x</sub>
- Reducing global ozone



### TRADE OFFS AND CONFLICTS-DIESELS

- Diesel vehicles – lower CO<sub>2</sub> vs higher Particulate and higher NO<sub>x</sub>
- But note the warming effect of Black Carbon-quantifying this is at the forefront of science at present
- Some estimates suggest GWP is ~650
- But BC is short lived so GTP may be a better metric, then the effect is smaller (Boucher et al), but still a warming, so good climate reasons to remove particles from diesel exhausts
- So 'civilising' the diesel with control technologies for PM and NO<sub>x</sub> will reduce the conflicts between air quality and climate change goals



### TRADE OFFS AND CONFLICTS-SULPHUR REMOVAL FROM STACK EMISSIONS AND FUELS

- Europe and North America have reduced sulphur emissions by large amounts since the 1970s
- This has greatly reduced the acidification problem and reduced harmful exposures to people
- But sulphate aerosol exerts a cooling influence on the earth's climate
- But no-one seriously considers reversing the improvements in sulphur emissions (Not at ground level anyway!!)
- S removal from fuels comes with a fuel consumption penalty at the refinery



### POTENTIAL TRADE OFFS STILL TO BE QUANTIFIED AND MANAGED - CHP

- CHP – Combined Heat and Power
- Significant energy savings are feasible
- But we will be reversing the trend we began in the 1960s of moving energy generation out of urban centres and bringing the generation back into cities
- So the air quality impacts will need to be quantified and managed



### POTENTIAL TRADE OFFS – BIOMASS

- While the use of biomass (wood) is *potentially* a low carbon form of energy there are problems:
- The carbon savings may not be as large as expected and vehicle pollution may not improve
- There are potentially biodiversity problems and related effects from wholesale cultivation practices, second generation biofuels more attractive?
- Wood burning is a potential air quality problem especially in smaller scale/domestic use
- Even if air quality does not deteriorate, the large potential improvements in air quality may not be realised



### What Action is being taken?

- Analysis
- Implementation

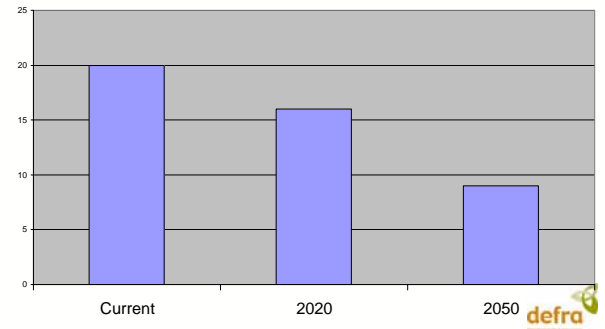


### UK Air Quality in 2050

- With win-win measures on climate change and air quality, it is possible to achieve improvements in air quality significantly greater than incremental measures on each
- With optimal win-win policies for climate change and air quality, PM<sub>2.5</sub> and NO<sub>2</sub> urban background levels in London could decrease by ~55% compared to current levels (Williams, 2006)



Potential Future PM<sub>2.5</sub> in London(ug/m<sup>3</sup>)

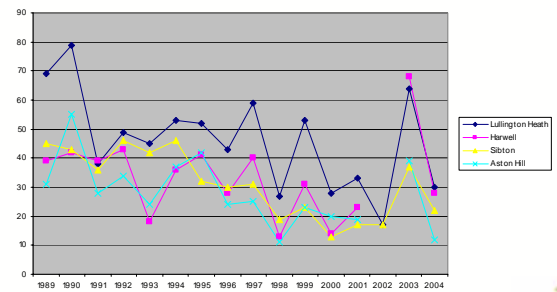


### UK Air Quality in 2050

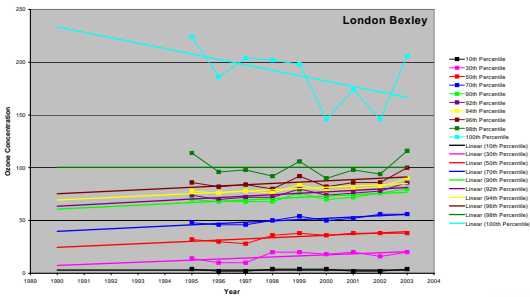
- Peak ozone levels may become more frequent, but urban **annual mean** levels will increase towards the tropospheric background – how significant is this for human health?



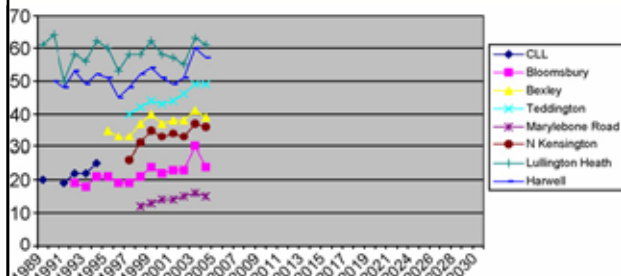
No. Days > 50ppb daily max running 8-hour mean



London Bexley



Annual Mean Ozone at Urban and Rural sites in London and SE England (µg/m<sup>3</sup>)



## THE STERN REPORT RECOGNISED THE WIN-WINS AND THE CONFLICTS

- Chapter 12
- 'Policies to meet air pollution and climate change goals are not always compatible. But if governments wish to meet both objectives together, there can be considerable cost savings compared to pursuing both separately'
- Cited studies: European Environment Agency (2006) which showed that the benefits of an emission scenario aimed at limiting global mean temperature increases to 2C would lead to savings on the implementation of existing air pollution control measures of €10 billion per year in Europe and additional avoided health costs of €16-46 billion per year.
- Similarly in China, a recent study (Aunan et al, 2006) showed that for carbon dioxide reductions of 10-20%, the air pollution and other benefits more than offset the costs of action.



## The UK Air Quality Expert Group (AQEG)

- Independent expert group, funded by UK Government
- Set up in 2001 to provide independent scientific advice on air quality
- Reports:
  - NO<sub>2</sub> in the UK (2004)
  - PM in the UK (2005)
  - **Air Quality and Climate Change (30 March 2007)**
  - Trends in Primary NO<sub>2</sub> in the UK (Summer 2007)
  - Ozone in the UK (draft summer 2007)



## Air Quality and Climate Change: A UK Perspective

AQEG asked to:

- Examine linkages between mitigation policies for AQ and CC
- Examine the scientific background to these interactions
- Identify:
  - **Synergies** – where measures to improve AQ can help ameliorate CC
  - **Trade-offs** – where policy measures in the two areas act in opposition

## Report published 30 March 2007

Available at:  
<http://www.defra.gov.uk/environment/airquality/aqeg>

## European Union Action

- The Council of the EU, including the UK, recently affirmed its commitment to a reduction of 20% in GHG emission reductions, and endorsed an EU objective of a 30% reduction, 'provided that other developed countries commit themselves to comparable reductions and economically more advanced developing countries to contributing adequately according to their responsibilities and respective capabilities'. (Council of the European Communities, 2007)



## European Union Action

- Measures on **vehicle emissions** from light duty vehicles are almost agreed
- Main message in context of air quality/climate change is the "civilising" of the diesel car
- Two stages: First requires DPFs, Second requires more stringent NO<sub>x</sub> control, possibly SCR or other technologies so implicit acceptance of the (small) increase in CO<sub>2</sub> for the large reductions in PM emissions
- EU **Biofuels Strategy** published 2006 ("...use should give rise to no environmental or technical problems..")
- Proposals on **fuel quality** (8 February 2007), reduces PAH content of diesel to 8%; enables a max oxygenate content in petrol of 10%



### European Union Action

- Proposal for revision of National Emission Ceilings Directive due later this year
- Will be followed by conclusions of Review and possible Revision of UNECE CLRTAP “Gothenburg” Protocol
- Setting national emission ceilings for SO<sub>2</sub>, NO<sub>x</sub>, VOC, NH<sub>3</sub> and possibly PM<sub>2.5</sub>
- Projections done in concert with Climate Change policies and GHG projections – more coherence between CC and AQ policies
- Introduction of novel urban area-wide “exposure reduction” target in new EU Air Quality Directive will make use of optimised policies easier



### UK Action

- Draft Climate Change Bill proposed in March 2007
- 60% Reduction in CO<sub>2</sub> by 2050 (on 1990 base)
- 26-32% Reduction by 2020
- 5-Year Carbon Budgets
- Annual report on progress by an independent Climate Change Committee
- Energy White Paper published shortly
- Biomass Strategy



THANK YOU

