Emissions policy and air pollution

*Blame every government since 1990 for ‘diesel’*

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Speaking to the Environmental Chemistry Group of the RSC
on 1 March 2017
Summary

1. Mission and opportunity
2. Jargon
3. Historical perspective
4. Prime Ministers...
5. Margaret Thatcher – This Common Inheritance
6. Myopic focus on CO$_2$
7. Policies, impacts including health
8. Solutions
Mission

“To achieve urgently and sustainably full compliance with World Health Organisation guidelines for air quality throughout London and elsewhere”
# The London Matrix – ‘One Atmosphere’

<table>
<thead>
<tr>
<th></th>
<th>Air pollution</th>
<th>Climate change</th>
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<tr>
<td><strong>London</strong></td>
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<td><strong>Rest of world</strong></td>
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#NO2Diesel | Thinking 'One Atmosphere'
Jargon

• Particles (PM$_{2.5}$ and PM$_{10}$) and gases (NO$_2$)
• Short (e.g. PM$_{10}$) and long-term (e.g. PM$_{2.5}$) health effects. Mortality and morbidity. Overlapping effects
• Emissions and concentrations. Health exposures, impacts and outcomes. Visible and invisible
• All affected. Many outcomes. Deaths mainly cardiovascular. 4,300 PM$_{2.5}$. 5,900 NO$_2$ in London versus 8,500 from smoking. Second biggest public health risk
• Local (NO$_2$), regional (PM$_{2.5}$) and transboundary pollution e.g. tropospheric ozone (O$_3$)
Building public understanding

Easier to warn the general public than...
AND THIS CLEARLY SHOWS AIR POLLUTION IS GOING DOWN
Historical perspective

- Great Smog 1952 and Clean Air Act 1956
- Scientific focus on short-term respiratory effects despite evidence of cardiovascular deaths in ‘time series’ studies
- ‘Cohort studies’ identified long-term effects of PM$_{2.5}$
- Myopic focus in UK since 1990 on CO$_2$ and fuel efficiency
- Many roads in Central London tend (today) to have the highest NO$_2$ concentrations in the world. Blame diesel
- Europe Union’s ‘Clean Air Policy Package’ in 2013
- 68$^{th}$ World Health Assembly. First debate on air pollution!
- Back where we thought we were 60 years ago
Prime Ministers

- 4 May 1979 – 28 November 1990  Margaret Thatcher
- 28 November 1990 – 2 May 1997  John Major
- 2 May 1997 – 27 June 2007  Tony Blair
- 11 May 2010 – 13 July 2016  David Cameron
- 13 July 2016 – To date  Theresa May
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>Mid-1980s</td>
<td>Unleaded petrol</td>
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<tr>
<td>8 November 1989</td>
<td>Speech to UN General Assembly on ‘our global environment’...‘alone’</td>
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<tr>
<td></td>
<td>subtitled ‘<em>Vast increase in carbon dioxide</em>’</td>
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<tr>
<td>27 June 1990</td>
<td>Speech to ‘Second Meeting of Parties to the Montreal Protocol on</td>
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<td></td>
<td>Substances that Deplete the Ozone Layer’</td>
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<tr>
<td>September 1990</td>
<td>‘This Common Inheritance’</td>
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<tr>
<td>28 November 1990</td>
<td>Gone but still here...</td>
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<td>---------------</td>
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<td>September 1990</td>
<td>This Common Inheritance: Britain’s Environmental Strategy</td>
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<tr>
<td>September 1991</td>
<td>This Common Inheritance: First year report</td>
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<tr>
<td>October 1992</td>
<td>This Common Inheritance: Second Year Report</td>
</tr>
<tr>
<td>January 2013</td>
<td>First report of the Quality of Urban Air Review Group</td>
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Examples from ‘This Common Inheritance’ including subsequent reports
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Examples from ‘This Common Inheritance’ including subsequent reports (Summary 1990)

Combined heat and power schemes provide useful heat as well as electricity, as here where waste heat from a power station is used in glasshouses.

Nuclear power
Nuclear power contributes about 20% of Britain’s electricity. It increases diversity of supply without adding to global warming or acid rain.

The Government believes it is right to maintain the nuclear option, but the industry must become more competitive with other fuels without compromising its high safety standards. In 1994 the Government will carry out a full scale review of the prospects for nuclear power into the 21st century. This review will take full account of environmental issues.

Transport
In the transport sector, the Government will:
- improve guidance to motorists on how to save fuel;
- consider whether further changes to fuel and vehicle taxes are needed to encourage motorists to seek greater fuel economy;
- improve enforcement of speed limits, and encourage less emphasis in car advertisements on speed and acceleration;
- work in the EC to improve the fuel consumption of vehicles;
- extend the MOT test to cover vehicle emissions and so improve the tuning of engines;
- where appropriate, encourage provision and use of public transport, and
- study how land use planning might help reduce demand for travel.

Forest
Trees, woods and forests can help because they absorb carbon dioxide and store it for a long time.

The Government will continue to encourage tree planting in Britain and the sustained management and regeneration of existing forests.

The Government’s tree planting programme helps lock up carbon which would otherwise contribute to global warming.

Action for All
We can help at work and at home. We can insulate our homes and hot water tanks, draughtproof doors and windows, buy more efficient appliances, and save energy in other ways. This not only reduces greenhouse gas emissions, but also saves money.

As travellers, we can help by driving less and saving fuel, buying more efficient cars, sharing journeys to work, or using the bus or train if possible.
Examples from ‘This Common Inheritance’ including subsequent reports (1990)
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Myopic focus on CO₂

A very senior civil servant, now retired, who worked in the [Department of Environment in the late 1990s] and has asked not to be named, said that cost-benefit studies of a switch to diesel were done, but climate change was “the new kid on the block” and long-term projections of comparative technologies were not perfect. “I recall all the discussions had the health issue as a significant factor,” he says. “We did not sleepwalk into this. To be totally reductionist, you are talking about killing people today rather than saving lives tomorrow. Occasionally, we had to say we were living in a different political world and everyone had to swallow hard.”

Myopic focus on CO$_2$

“The Chairman, summing up the discussion, concluded that the points could be put to Ministers in a general way. It was important, however, not to allow the question of fiscal incentives to encourage the purchase of cars meeting lower emission standards than the mandatory ones to obscure the long-term need to encourage people to use fuel efficient [diesel] vehicles.”

Department of Transport
Minute of meeting on 28 September 1990
Policies

• Promote diesel
• Emission standards were not technology neutral (unlike the US)
• Tackle particles (DPF in Euro 5) and then NOx in Euro 6 (but not NO$_2$)
• Ultra low sulphur fuels
Critical evaluation of the European diesel car boom 
(Cames and Helmers 2013)


Until the mid 1990s: Europe followed technology leaps initiated in US with a certain delay

That changed in the mid 1990s:

Diesel car penetration in world dominating markets.
All data are percentages, either annual new car registrations, or annual entire car fleet composition.
More questions

- Did petrochemical companies foresee spare capacity in late 1980s e.g. heating fuel in the dash for gas?
- Growth in market share of diesel cars since 1980
- Real world PM and NOx (and other) emissions for each Euro standard
- NO$_2$ as % of NOx
- Real world emission testing and maintenance costs for premium versus standard petrol and diesel
- Real world CO$_2$ emissions of vehicles since 1980
- Unpick the motives, methods and opportunities...
Health diesel

- Issues identified in ‘This Common Inheritance’
- Cross-departmental meetings
- QUARG 1993
- COMEAP
- June 2012  IARC classifies diesel exhaust as carcinogenic
- October 2013  IARC adds PM$_{2.5}$ and ambient air
- Inside versus outside vehicles
World Health Organisation declares...
London: 15 March 2012
Pollution Suppressor – 26 March 2012
London: 19 February 2013
Some consequences

• Diesel didn’t reduce CO₂ as expected
• Fuel additives? Subnano TiO₂ particles from catalysts?
• NO₂ increased as % of NOx
• Real world NOx much higher than Euro standards
• VW and #dieselgate
• Problems with DPFs including removal and ‘remapping’
• Beware particles from new petrol technologies
• Tyre and break wear largely unregulated
• We can’t wait until 2033+ e.g. diesel taxis
• It ain’t just diesel. CO₂ myopia is everywhere e.g. wood pellets, decentralised generation etc. etc. etc.
Lessons

• ‘One Atmosphere’: air pollution and greenhouse gases. Policy disasters promoting diesel and biomass burning
• Government departments are not/never ‘joined-up’. Must maintain and build scientific and official expertise
• Short and long-term effects e.g. offsetting. NOx/O₃. SOx cooling effects from shipping. Black carbon. CH₄. Hg. NH₃
• Solutions: Governance. Political leadership, lifestyle changes and technology. Not just ‘Best available technical solutions’. Offsetting is never the answer. Green walls cost 40x exhaust abatement per kg of pollutant removed
• Indoor air quality: ventilation, air conditioning and filtration
• Communicate health impacts. Warn, protect and reduce
• Expect new health and natural environment impacts
The London Principle – ‘One Atmosphere’

We must think in terms of ‘One Atmosphere’. All obligations to reduce air pollution must be met. Any trade-offs between climate change and air quality should be made in an explicit and transparent way e.g. through the application of the ‘London Principle’. This states that a 1% disbenefit in climate change terms (e.g. increased CO₂ emissions) should be accepted when there is an associated benefit of 10% in air quality terms (e.g. reduced emissions of particulate matter or oxides of nitrogen) (and vice versa) provided that legal breaches are not worsened
The London Circles
Transport measures address congestion and/or emissions

* ‘Clean Air Zones’
Zero tailpipe emissions by 2020
Source: Transport for London
Londoners and the Mayor ‘get it’

• ClientEarth surveys
• Mayor’s surveys
• Recommendations for Mayor’s direction of travel
  – T Charge from 23 October 2017 (pre-Euro 4 diesel and petrol)
  – Bring forward central ULEZ (to 2019)
  – Expand ULEZ to north/south circular (by 2019)
  – PHVs to pay the congestion charge
  – Simplify the above by introducing Emissions Based Road Charging (EBRC)
  – Vision of ending all fossil fuel burning in London by 2030
• Court, media and (some) politicians ‘get it’ too!
Ultra-low emission zone in 2020
Encourage active travel
Next steps

• Eliminate all fossil fuels in the most polluted places by 2030
• Start with diesel. Fiscal measures. Bans in Mexico City, Paris, Madrid and Athens by 2025. Point of sale information. Constant real world testing. MOT update
• Pedestrianisation is a strong ‘low emission zone’
• VED. Emissions based road charging
• Public is confused about ‘climate change’. Is it air pollution, greenhouse gases, emissions, causes, impacts, mitigation or adaptation? Clearer language would help
• ‘Climate change’ is an ‘impact’ not a ‘driver’. Emissions and sources are upstream. It is one of our greatest risks
• Think ‘One Atmosphere’
London and mega city solutions

- Build public understanding of air pollution. Smog warnings. Public health agencies must protect people.
- Act on illegal wood burning: 5-10% annual mean PM$_{10}$.
- Think ‘One Atmosphere’ on local energy generation e.g. stop standby diesel generators feeding into the ‘grid’.
- Ban diesel, diesel, diesel as we banned coal.
- Bus and taxi emissions (scrapping 25ft turning circle).
- Use ‘geo-fencing’ with care. Restrict road building.
- Promote positive measures e.g. active travel and car-free centres. Restrict polluting activities e.g. ultra low emission zones and/or emissions based road charging.
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