Scottish Air Quality

Royal College of Physicians of Edinburgh Respiratory Medicine Symposium

7th March 2018

Dr Iain McLellan
University of the West of Scotland
iain.mclellan@uws.ac.uk

DrIMcLellanUWS; Breath_COPD; #AirQuality
Topics

• Some facts and figures
• The atmosphere and pollution trapping
• Pollutants of concern
• UK smog
• Local air quality management
• Reducing emissions
  • Directives
  • Financial
  • Policy
  • Low Emission Zones
  • Public awareness
• BREATH
2.4m people die **each year** from air pollution. 200,000 of these deaths are associated with lung cancer (WHO).

500,000 Americans die annually from cardiopulmonary disease linked to ‘smog’. 400,000 people in the EU die prematurely from air pollution (EEA).

Estimated >2000 deaths in Scotland from anthropogenic PM$_{2.5}$ pollution.

Huge economic costs for society. Between €330Bn & €940Bn (3 – 9% of EU GDP).

£20bn annual costs to the UK alone (UK Govt).
2.9 million motor vehicles licensed in Scotland by the end of 2015

268,000 new vehicle registrations in 2015

70% of households have at least one car available for private use

27% of households have two or more cars available for private use

1.7% = Electric Vehicle

45.4 billion vehicle km travelled on Scotland’s roads in 2015

1.2% increase in vehicle km on Scottish roads from 2014 to 2015 compared with 1.6% increase across GB

<table>
<thead>
<tr>
<th>Mode</th>
<th>2010-11</th>
<th>2015-16</th>
<th>Change: 1 year</th>
<th>Change: 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car Traffic (m/veh km) on all roads</td>
<td>33,591</td>
<td>34,669</td>
<td>0.7%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Pedal Cycles (m/veh km) on all roads</td>
<td>298</td>
<td>342</td>
<td>-7.3%</td>
<td>14.8%</td>
</tr>
<tr>
<td>ScotRail Passengers (millions)</td>
<td>78.3</td>
<td>93.2</td>
<td>0.5%</td>
<td>19.0%</td>
</tr>
<tr>
<td>Bus Passengers (millions)</td>
<td>430</td>
<td>409</td>
<td>-1.7%</td>
<td>-4.9%</td>
</tr>
<tr>
<td>Air Passengers (millions)</td>
<td>20.9</td>
<td>25.5</td>
<td>5.9%</td>
<td>22.0%</td>
</tr>
<tr>
<td>Ferry Passengers (millions)</td>
<td>10.0</td>
<td>9.5</td>
<td>-1.4%</td>
<td>-4.4%</td>
</tr>
</tbody>
</table>

Transport Scotland (2016) "Scottish Transport Statistics".
Ranges
Nissan Leaf: 172km
BMW i3: 183km
Ford Focus: 185km
Hyundai Ionic: 199km
Tesla S: 350km

Deaths attributable to air pollution, 2010

- **25,002** England
- **1,320** Wales
- **2,094** Scotland
- **553** N. Ireland

Source: Public Health England

5.3% of deaths in the UK in 2010 were attributable to long-term exposure to pollution

Loss of statistical life expectancy (months) that can be attributed to anthropogenic contributions to \( \text{PM}_{2.5} \) for the emission levels in 2000 (left), and projected emission levels of the Thematic Strategy on Air Pollution for 2020 (right).

Loss in statistical life expectancy that can be attributed to man-made emissions of \( \text{PM}_{2.5} \) for the emission levels in the year 2000 (left), and projected emission levels of the Thematic Strategy for 2020 (right).

| Months | 0–1 | 1–2 | 2–4 | 4–6 | 6–9 | 9–12 | 12–36 | Outside report coverage |

Topics

- Some facts and figures
- The atmosphere and pollution trapping
  - Pollutants of concern
  - UK smog
- Local air quality management
- Reducing emissions
  - Directives
  - Financial
  - Policy
  - Low Emission Zones
  - Public awareness
- BREATH
Introduction

Not a new thing...

TO THE MOST SACRED MAJESTY, THE KING

Sir,

One day, while I was walking in your Majesty’s palace, where I sometimes come to enjoy the sight of your magnificent presence, I saw a ghastly billow of smoke coming from one or two tunnels between Northumberland House and Scotland Yard. It was so thick that the rooms, galleries and palaces were completely filled with it and people could hardly see each other for the cloud. Indeed, they struggled to even stand up.

J Evelyn, 1661, Fumifugium
The atmosphere – trapping pollution

Topics

• Some facts and figures
• The atmosphere and pollution trapping
• Pollutants of concern
• UK smog
• Local air quality management
• Reducing emissions
  • Directives
  • Financial
  • Policy
  • Low Emission Zones
  • Public awareness
• BREATH
Pollutants of concern – national / local

- **Particulate Matter (PM)**
  - Exacerbates heart & lung diseases
  - Road traffic, soils & dusts, sea salt, biological particles

- **Nitrogen oxides (NO\textsubscript{x})**
  - NO and NO\textsubscript{2}
  - NO from traffic emissions – harmless
  - NO\textsubscript{2} – lowers resistance to respiratory infections

- **Sulphur oxides (SO\textsubscript{x})**
  - Coal and oil power stations

- **Carbon Monoxide (CO)**
  - Incomplete/inefficient fuel combustion
  - Predominately petrol engines
  - Interferes with oxygen transport in blood

- **VOCs: 1,3 butadiene and benzene**
  - Petrol car emissions.

- **Lead (Pb)**
Air pollution – a simple conceptual model

Primary pollutants
- Carbon monoxide (CO)
- Sulphur dioxide (SO₂)
- Nitric oxide (NO)
- Nitrogen dioxide (NO₂)
- Ammonia (NH₃)
- Volatile organic compounds (VOCs)
- Particulates (PM)

Secondary pollutants
- Sulphur trioxide (SO₃)
- Nitric acid (HNO₃)
- Sulphuric acid (H₂SO₄)
- Hydrogen peroxide (H₂O₂)
- Ammonium (NH₄⁺)
- Ozone (O₃)
- Particulates (PM)

Wind

Aeroplanes
Volcanoes
Wildfires
Factories
Towns and homes
Agriculture
Shipping
Vehicle exhausts

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Air pollution – photochemical smog

• More important in cities with a high population & vehicle intensity
• NO released by vehicles, however readily oxidised to NO₂
Air pollution – photochemical smog

- NO levels can build up during morning rush hour, which is then oxidised to NO₂ by reacting with ozone: \( O_3 + NO \rightarrow O_2 + NO_2 \).

- Ozone concentrations start to build up as it is no longer destroyed by the NO – NO₂ reaction. Reactive hydrocarbons start to oxidise and build up.

- NO₂ reacts with free hydroxyl (OH) radicals to form HNO₃ which is one of the end products of smog.
Topics

- Some facts and figures
- The atmosphere and pollution trapping
- Pollutants of concern
- **UK smog**
- **Local air quality management**
- Reducing emissions
  - Directives
  - Financial
  - Policy
  - Low Emission Zones
  - Public awareness
- BREATH
Air pollution – UK Clean Air Act

• London Smog; 5th – 8th December 1952
• 4000 deaths were attributed to the episode
• Committee was set up Chaired by Sir Hugh Beaver
  • “to examine the nature, causes and effects of air pollution and the efficacy of present preventive measures; to consider what further measures are practicable; and to make recommendations”
• Reported in 1953 and 1954
• Gaseous and particulate emissions
• Immediate legislation to reduce smoke, grit and dust.
Air pollution – UK Clean Air Act

- Clean Air Acts 1956 and 1968
- Clean Air Act 1993
  - Part 1: “Black” or “Dark” Smoke (as defined on the Ringelmann Chart)
  - Part 2: Smoke, Grit, Dust and Fumes (domestic and industrial furnaces)
    - Grit >76µm; Dust 1 - 75µm; Fumes: any solid matter smaller than dust
  - Height of chimneys
- Part 3: Smoke Control
  - Smoke Control Area – “authorised fuels” and “exempted fireplaces”
- Remains in force although some discussion by Scottish Government to update but as this is a UK wide Act, this has to be done at Westminster and there are currently no plans to do so in this current parliament.
Scotland – Local Air Quality Management

- **Environment Act 1995: Section 82 – 88**
  - LAs have a duty to review air quality in their area
  - Pollutants: CO, NO$_x$, SO$_x$, O$_3$, Pb, Benzene, 1,3-Butadiene, PAHs, Particulate Matter: PM$_{10}$ & PM$_{2.5}$

- LAs must designate an **Air Quality Management Area**
  - Where objectives are not met
  - Where objectives are unlikely to be met

- LAs are required to develop an Air Quality Action Plan

- SEPA have special powers to review AQ within a LA boundary to assess AQ objectives and standards. Never been used in Scotland

- Associated Technical Guidance and Policy Guidance
  - Updated April 2016

- Clean Air for Scotland:
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Scottish AQ Objective</th>
<th>Measured as</th>
<th>Date to be achieved by</th>
<th>AQ Objective *</th>
<th>EU limit value §</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzene</td>
<td>16.25µg/m³</td>
<td>Running annual mean</td>
<td>31/12/2003</td>
<td>n/a</td>
<td>3.25µg/m³</td>
</tr>
<tr>
<td></td>
<td>3.25µg/m³ (Eng &amp; Wales 5µg/m³)</td>
<td>Running annual mean</td>
<td>31/12/2010</td>
<td>01/01/2010</td>
<td></td>
</tr>
<tr>
<td>1,3-butadiene</td>
<td>2.25µg/m³</td>
<td>Running annual mean</td>
<td>31/12/2003</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>10.0µg/m³</td>
<td>Running 8 hour mean</td>
<td>31/12/2003</td>
<td>01/01/2005</td>
<td></td>
</tr>
<tr>
<td>Pb</td>
<td>0.5µg/m³</td>
<td>Annual mean</td>
<td>31/12/2004</td>
<td>01/01/2005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.25µg/m³</td>
<td>Annual mean</td>
<td>31/12/2008</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>NO₂</td>
<td>200µg/m³ (not to be exceed &gt;18 times pa)</td>
<td>1 hour mean</td>
<td>31/12/2005</td>
<td>01/01/2010</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40µg/m³</td>
<td>Annual mean</td>
<td>31/12/2005</td>
<td>01/01/2010</td>
<td></td>
</tr>
<tr>
<td>PM₁₀</td>
<td>50µg/m³ (not to exceed &gt;35 times pa)</td>
<td>24 hour mean</td>
<td>31/12/2004</td>
<td>01/01/2005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50µg/m³ (not to exceed &gt;7 times pa)</td>
<td>24 hour mean</td>
<td>31/12/2010</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40µg/m³</td>
<td>Annual mean</td>
<td>31/12/2004</td>
<td>01/01/2005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18µg/m³ Not adopted in rUK</td>
<td>Annual mean</td>
<td>31/12/2010</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>SO₂</td>
<td>350µg/m³ (not to exceed &gt;24 times pa)</td>
<td>1 hour mean</td>
<td>31/12/2004</td>
<td>01/01/2005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>125µg/m³ (not to exceed &gt;3 times pa)</td>
<td>24 hour mean</td>
<td>31/12/2004</td>
<td>01/01/2005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>266µg/m³ (not to exceed &gt;35 times pa)</td>
<td>15 minute mean</td>
<td>31/12/2005</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>PAHs</td>
<td>0.25ng/m³</td>
<td>Annual average</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ozone</td>
<td>100µg/m³ (not to exceed &gt;10 times pa)</td>
<td>8 hour mean</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM₂.₅</td>
<td>10µg/m³ (also 15% reduction in annual mean conc. 2010/2020)</td>
<td>Annual mean</td>
<td>2020</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The Air Quality Standards (Scotland) Regulations 2010 SSI 2010/204
§ EU Air Quality Limit Values, Directive 2008/50/EC
Scotland – Local Air Quality Management

- 39 AQMAs (as at Jan 2018): NO$_2$, PM$_{10}$, SO$_2$
- 4 have been revoked:
  - Falkirk: modelling suggested problem, monitoring showed no problem
  - North Lanarkshire: Moodiesburn (PM$_{10}$ – M80 extension) and Harthill (PM$_{10}$ – quarry shut)
  - Midlothian
- SO$_2$ – Grangemouth. Petroineos introduced a tail gas unit which has led to a SO$_2$ concentrations and exceedances. Other – First Bus introduced new Euro 6 buses. May see revocation of these 2 AQMAs

![Falkirk SO$_2$ levels](image-url)
Scotland – Local Air Quality Management

- PM$_{10}$ annual mean has been decreasing across Scotland

**PM$_{10}$ levels in selected cities**

<table>
<thead>
<tr>
<th>City</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aberdeen</td>
<td>-60%</td>
</tr>
<tr>
<td>Dundee</td>
<td>-19%</td>
</tr>
<tr>
<td>Edinburgh</td>
<td>-26%</td>
</tr>
<tr>
<td>Glasgow</td>
<td>-38%</td>
</tr>
<tr>
<td>Auchencroth Moss</td>
<td></td>
</tr>
</tbody>
</table>

**Date:** 07/03/2018
Scotland – Local Air Quality Management

• NO$_2$ annual mean has been decreasing across Scotland
A comparison: PM$_{10}$ annual mean, 2013

Source: WHO Global Ambient Air Pollution Database (2016)
Global – Transboundary air pollution

- Case study: Particulate Matter
- 18th March 2015
Scotland – Local Air Quality Management

- PM$_{2.5}$ annual mean has been decreasing across Scotland

[Graph showing PM$_{2.5}$ in selected cities]
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• Reducing emissions
  • Directives
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  • Low Emission Zones
  • Public awareness

• BREATH
Reducing emissions: Euro standards

  - Introduces Euro Standards for all types of vehicles.
  - Limits exhaust emissions of
    - CO, THCs, NMHCs, NOx, PM (passenger & light commercial)
    - CO, HCs, NOx, PM and Smoke (heavy duty diesel engines)

<table>
<thead>
<tr>
<th>Class</th>
<th>Date</th>
<th>Diesel (passenger) (g/km)</th>
<th>Petrol (passenger) (g/km)</th>
<th>Heavy duty diesel engines (trucks &amp; buses)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>NOx</td>
<td>PM</td>
</tr>
<tr>
<td>1</td>
<td>1993</td>
<td>0.14</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>2</td>
<td>1996</td>
<td>0.08</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>3</td>
<td>2000</td>
<td>0.05</td>
<td>0.50</td>
<td>/</td>
</tr>
<tr>
<td>4</td>
<td>2005</td>
<td>0.025</td>
<td>0.25</td>
<td>/</td>
</tr>
<tr>
<td>5</td>
<td>2008/9</td>
<td>0.005</td>
<td>0.18</td>
<td>0.005</td>
</tr>
<tr>
<td>6</td>
<td>2014</td>
<td>0.005</td>
<td>0.08</td>
<td>0.005</td>
</tr>
</tbody>
</table>

Reducing emissions: finance

- Financial incentives: Vehicle Excise Duty (cars registered before 1st April 2017)

<table>
<thead>
<tr>
<th>Band</th>
<th>CO₂ emission (g/km)</th>
<th>Petrol &amp; Diesel</th>
<th>Alternative fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Up to 100</td>
<td>£0</td>
<td>£0</td>
</tr>
<tr>
<td>B</td>
<td>101-110</td>
<td>£20</td>
<td>£10</td>
</tr>
<tr>
<td>C</td>
<td>111-120</td>
<td>£30</td>
<td>£20</td>
</tr>
<tr>
<td>D</td>
<td>121-130</td>
<td>£110</td>
<td>£100</td>
</tr>
<tr>
<td>E</td>
<td>131-140</td>
<td>£130</td>
<td>£130</td>
</tr>
<tr>
<td>F</td>
<td>141-150</td>
<td>£145</td>
<td>£135</td>
</tr>
<tr>
<td>G</td>
<td>151-165</td>
<td>£180</td>
<td>£175</td>
</tr>
<tr>
<td>H</td>
<td>166-175</td>
<td>£205</td>
<td>£200</td>
</tr>
<tr>
<td>I</td>
<td>176-185</td>
<td>£225</td>
<td>£220</td>
</tr>
<tr>
<td>J</td>
<td>186-200</td>
<td>£265</td>
<td>£260</td>
</tr>
<tr>
<td>K</td>
<td>201-225</td>
<td>£290</td>
<td>£285</td>
</tr>
<tr>
<td>L</td>
<td>226-255</td>
<td>£490</td>
<td>£490</td>
</tr>
<tr>
<td>M</td>
<td>Over 255</td>
<td>£505</td>
<td>£505</td>
</tr>
</tbody>
</table>

https://www.gov.uk/vehicle-tax-rate-tables
# Reducing emissions: finance

- Financial incentives: Vehicle Excise Duty (cars registered after 1st April 2017)

<table>
<thead>
<tr>
<th>Band</th>
<th>CO₂ emission (g/km)</th>
<th>Petrol &amp; Diesel</th>
<th>Alternative fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>£0</td>
<td>£0</td>
<td></td>
</tr>
<tr>
<td>1 – 50</td>
<td>£10</td>
<td>£0</td>
<td></td>
</tr>
<tr>
<td>51 – 75</td>
<td>£25</td>
<td>£15</td>
<td></td>
</tr>
<tr>
<td>76 – 90</td>
<td>£100</td>
<td>£90</td>
<td></td>
</tr>
<tr>
<td>91 – 100</td>
<td>£120</td>
<td>£110</td>
<td></td>
</tr>
<tr>
<td>101 – 110</td>
<td>£140</td>
<td>£130</td>
<td></td>
</tr>
<tr>
<td>131 – 150</td>
<td>£160</td>
<td>£150</td>
<td></td>
</tr>
<tr>
<td>151 – 170</td>
<td>£200</td>
<td>£190</td>
<td></td>
</tr>
<tr>
<td>171 – 190</td>
<td>£800</td>
<td>£790</td>
<td></td>
</tr>
<tr>
<td>191 – 225</td>
<td>£1,200</td>
<td>£1,190</td>
<td></td>
</tr>
<tr>
<td>226–255</td>
<td>£1,700</td>
<td>£1,690</td>
<td></td>
</tr>
<tr>
<td>Over 255</td>
<td>£2,000</td>
<td>£1,990</td>
<td></td>
</tr>
</tbody>
</table>

- 1st year only based on CO₂ emissions
- Each year after that:

<table>
<thead>
<tr>
<th>Fuel type</th>
<th>Standard annual rate</th>
<th>Additional rate</th>
<th>Total annual payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>£0</td>
<td>£310</td>
<td>£310</td>
</tr>
<tr>
<td>Alternative</td>
<td>£130</td>
<td>£310</td>
<td>£440</td>
</tr>
<tr>
<td>Petrol or diesel</td>
<td>£140</td>
<td>£310</td>
<td>£450</td>
</tr>
</tbody>
</table>

- Can afford a car > £40,000?
- 1st year only based on CO₂ emissions
- Then, for next 5 years:

https://www.gov.uk/vehicle-tax-rate-tables
Reducing emissions: Cleaner Air for Scotland
## Reducing emissions: Cleaner Air for Scotland

### TRANSPORT

<table>
<thead>
<tr>
<th>WELLBEING</th>
<th>HEALTH</th>
<th>FINANCE</th>
<th>SAFETY</th>
<th>ENVIRONMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoiding travel, such as homeworking when required</td>
<td>Improves mental wellbeing</td>
<td>Increased staff productivity and concentration</td>
<td>Reduced workplace hazards</td>
<td>Produces no emissions from travelling and contributes to reduction in number of vehicles on road if traveller previously used a vehicle</td>
</tr>
<tr>
<td>Active travel</td>
<td>Reduces stress during journey travel</td>
<td>Saves money in comparison to driving</td>
<td>Safest form of travel</td>
<td>Will improve local air quality producing less CO₂, NOx and PM</td>
</tr>
<tr>
<td>Use public transport</td>
<td>Experiences of new, alternative, low or zero carbon technologies for travel</td>
<td>Means you will pay less for road tax</td>
<td>Safest form of motorised transport</td>
<td>Absorbs pollutants from the air</td>
</tr>
<tr>
<td>Decarbonising transport + use of low emission vehicles</td>
<td>Connected journeys provide travellers with confidence of movements</td>
<td>Inclusion at design is more cost effective than retrofitting</td>
<td>Quieter vehicles reduce noise annoyance</td>
<td>Paths connect active travel to integrated transport hubs</td>
</tr>
<tr>
<td></td>
<td>Provides more pleasant environments for people to live, work and relax in</td>
<td>Attracting employers to vibrant urban spaces</td>
<td></td>
<td>Creates safer, pleasant environments for active travel</td>
</tr>
</tbody>
</table>

### PLACEMAKING

<table>
<thead>
<tr>
<th>General public</th>
<th>Government</th>
<th>Business</th>
</tr>
</thead>
</table>

Reducing emissions: Cleaner Air for Scotland

HEALTH

A Scotland which protects its citizens from the harmful effects of air pollution, reducing health inequalities.

WE WILL:

- Include in legislation as Scottish objectives World Health Organisation guideline values for PM\(_{10}\) and PM\(_{2.5}\)
- Require NHS boards and their local authority partners to include reference to air quality and health in the next revision of their Joint Health Protection Plans, which should identify and address specific local priority issues
Reducing emissions: LEZs

- Low Emission Zones
- Approximately 200 across the EU
- Financial penalties – London up to £1000 HGV/day
- Reducing PM and NOx

<table>
<thead>
<tr>
<th>Country</th>
<th>LEZs</th>
<th>Vehicles</th>
<th>National Framework / legislation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>3</td>
<td>HGVs</td>
<td>Yes</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>1</td>
<td>HGVs</td>
<td>No</td>
</tr>
<tr>
<td>Denmark</td>
<td>6</td>
<td>HGVs</td>
<td>Yes</td>
</tr>
<tr>
<td>France</td>
<td>1</td>
<td>HGVs</td>
<td>No</td>
</tr>
<tr>
<td>Germany</td>
<td>≈70</td>
<td>Not motorcycles</td>
<td>Yes</td>
</tr>
<tr>
<td>Hungary</td>
<td>1</td>
<td>HGVs</td>
<td>No</td>
</tr>
<tr>
<td>Italy</td>
<td>≈92</td>
<td>Various</td>
<td>No</td>
</tr>
<tr>
<td>Netherlands</td>
<td>14</td>
<td>HGVs</td>
<td>Yes</td>
</tr>
<tr>
<td>Portugal</td>
<td>1</td>
<td>Cars &amp; HGVs</td>
<td>No</td>
</tr>
<tr>
<td>Sweden</td>
<td>8</td>
<td>All vehicles &gt;3.5t</td>
<td>Yes</td>
</tr>
<tr>
<td>UK</td>
<td>5</td>
<td>Various</td>
<td>No</td>
</tr>
</tbody>
</table>

Life AIRUSE (2014) "Draft Report on Low Emissions Zones in Central and Northern Europe"
Reducing emissions: LEZs

• 6 in UK (all in England)
  • Nottingham, Norwich, Oxford, Brighton, Durham and London (world’s largest = 1,580km²)
  • Glasgow, Edinburgh & Aberdeen – no

• Different cities have different requirements:
  • Norwich: Allowed cars, taxis, private hire vehicles. Not allowed: Buses older than Euro III
  • London: Buses, coaches and HGVs: Euro III. Dec 2015 TfL buses Euro IV. By 2020 the scheme will be extended to all vehicles and be Euro 6/VI (still in development)
  • Scottish Government, through CAfS, want a nationwide framework for equity amongst bus companies, haulage companies etc. Should be in place by end of year.
Reducing emissions: LEZs

• Effective? Yes and No.
  • What is the contribution from traffic on the PM levels at a particular site?
  • How does the weather at a site affect the pollution levels?
  • How is the air quality affected immediately outside a LEZ? Does it get worse as the more polluting vehicles use the area more?
  • Also it takes a while to implement a LEZ therefore there will be a natural turnaround of vehicles, i.e. buses / trucks, to the most recent Euro Standard therefore there is an argument that air quality would improve through that
Reducing emissions: LEZs

- Glasgow LEZ by end of year.
- In 2016: PM$_{10}$ objectives not exceeded, NO$_2$ 1 hour not exceeded; NO$_2$ annual in some parts
- Euro VI / 6 for diesel; Euro IV / 4 for petrol. Needed for NO$_2$
- 1$^{st}$ phase: buses with incremental compliance over 5 years
  - 100% funding for retrofitting buses :: little chance of displacement i.e. different routes
- 2$^{nd}$ phase: HGVs
- 3$^{rd}$ phase: LGVs and hackney cabs
- 4$^{th}$ phase: private cars
Reducing emissions: Public awareness

Air pollution levels across Scotland updated hourly

Summary from 96 monitoring sites.
View a map of monitoring sites across Scotland »
Last updated at 13:00 Tuesday 6th March 2018.

Click on image to go to website
Reducing emissions: Public awareness

Know & Respond - Scotland, the free air pollution alert messaging system

Know & Respond - Scotland is a free service to subscribers in Scotland that sends registered users an alert message if air pollution in their area is forecast to be moderate, high or very high. The description of the level of pollution is based upon the Air Quality Banding System.

The alert service is provided for anyone wishing to know about the quality of the air they breathe. It will be of particular benefit to people with medical conditions that may be affected by pollution, such as asthma, bronchitis and emphysema. It may also benefit people whose breathing gets worse when air pollution increases. This early warning service allows you to make informed decisions and take action if necessary to minimise the effects of pollution episodes.

The Know and Respond System is not designed to report on levels of pollen. For further information on levels of pollen please visit the [pollen forecast](#).
Topics

• Some facts and figures
• The atmosphere and pollution trapping
• Pollutants of concern
• UK smog
• Local air quality management
• Reducing emissions
  • Directives
  • Financial
  • Policy
  • Low Emission Zones
  • Public awareness

• BREATH
BREATH: Interreg-funded COPD research

• Border and REgions Airways Training Hub
• €7.7 million award; 1 clinical fellow; 5 PDRAs; 16 PhDs
BREATHE: Interreg-funded COPD research
BREATH: Interreg-funded COPD research

- PAR2
- Inflammatory disease
- Immunology
- Tissue remodelling

- Smooth muscle biology
- Ion channel blockers
- Drug design

- Clinical COPD research
- Lung disease mechanisms
- Biomarkers (proteases)
- Epithelial biology

Date: 07/03/2018
Thank you

Royal College of Physicians of Edinburgh
Respiratory Medicine Symposium

7th March 2018

Dr Iain McLellan
University of the West of Scotland
iain.mclellan@uws.ac.uk

DrIMcLellanUWS; Breath_COPD; #AirQuality