Air quality at London primary schools

18th February 2021
Introduction

New data from the Breathe London pilot project has allowed us to look at the estimated level of NOx pollution, and the sources which created it, at every London state primary school in 2019.

This analysis was provided to the London Assembly for its February 2021 report.
Local source contribution to annual average NOx concentrations at London primary schools (2019)

- Road Transport: 54%
- Commercial and Domestic Heat and Power: 31%
- Industrial, and Non-Road Mobile Machinery: 10%
- Aviation, Rail and River: 4%
- Other: 1%
Helping to understand the problem (2)

Source contribution to annual average NOx concentrations at London primary schools (2019)

- Road Transport: 40%
- Commercial and Domestic Heat and Power: 22%
- Background: 27%
- Industrial, and Non-Road Mobile Machinery: 8%
- Aviation, Rail and River: 3%
- Other < 1%
Helping to understand the problem (3)

- We can work to splice the data geographically to give an idea of different priorities.

- Although relatively similar across boroughs.

- Diesel cars are a larger contributor in Outer London areas.
Helping to understand the problem (4)

NOx local source annual average concentration percentage at London primary schools according to location

- **Outer London**:
  - Road Transport (excl. diesel cars): 32%
  - Diesel cars: 25%
  - Non-Road Mobile Machinery: 19%
  - Commercial Gas and Other: 8%
  - Industry: 7%
  - Aviation, Rail and River: 5%

- **Inner London**:
  - Road Transport (excl. diesel cars): 32%
  - Diesel cars: 19%
  - Non-Road Mobile Machinery: 20%
  - Commercial Gas and Other: 13%
  - Industry: 8%
  - Aviation, Rail and River: 6%
Looking at road transport in detail

• The total NOx concentrations from road transport varies greatly across the 1,795 primary schools
Priority action for schools by TfL roads (1)

On average 25% higher at schools within 100m of a TfL road

Average NOx concentrations by source
At London primary schools

Data source: Breathe London
## Priority action for schools by TfL roads (2)

### Proportion of primary schools near red routes by borough

<table>
<thead>
<tr>
<th>Borough</th>
<th>Within 100m of red route</th>
<th>Away from red route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lambeth (59)</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>Southwark (75)</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td>Wandsworth (61)</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Tower Hamlets (89)</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>Westminster (39)</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Camden (41)</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Sutton (37)</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>Richmond upon Thames (45)</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Kensington and Chelsea (27)</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Hammersmith and Fulham (36)</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Lewisham (65)</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Merton (44)</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Islington (48)</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Hackney (58)</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Haringey (83)</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>Hounslow (52)</td>
<td>8%</td>
<td></td>
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<tr>
<td>Croydon (81)</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Barnet (89)</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Enfield (68)</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Greenwich (83)</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Kingston upon Thames (32)</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Ealing (68)</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Redbridge (52)</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Bexley (59)</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Newham (67)</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Waltham Forest (50)</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Hillingdon (67)</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Havering (60)</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Harrow (41)</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>City of London (1)</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Bromley (70)</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Brent (61)</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Barking and Dagenham (43)</td>
<td>1%</td>
<td></td>
</tr>
</tbody>
</table>

Note: The graph shows the proportion of primary schools within 100m of a red route and those away from red routes. The data is presented by borough, with the highest proportion in Lambeth at 22%.
The GLA’s modelled 2019 NO$_2$ levels, there are 11 primary schools in the capital still exceeding legal limits.

All of these schools are within the Expanded ULEZ zone (5 in central ULEZ, 6 in expanded).

9 of the 11 schools (82%) are within 100m of a red route. This is compared to just 7% of all London’s primary schools being within 100m of a red route.
Trends at GLA NO2 exceeding schools (2)
Trends at GLA NO2 exceeding schools (3)

This is burning of gas, liquid and solid fuels to heat and power commercial buildings.
The school run

Median hourly NO2 concentration is 17% higher between 07:00 – 09:00 than the average across all hours of day.

We have not included legal limit here because the hourly legal limit is 200ug/m3. The annual average limit is 40ug/m3.

This is more about showing when pollution levels are generally higher.
Between 07:00 – 09:00 road transport is responsible for over 50% of all NOx pollution.

Road transport NOx twice as high between 07:00 – 09:00 than it is on average throughout the day.
Looking at local sources only we see road transport dominates concentrations, largely driven by tyre and brake wear and drives two peaks in the day: at 6AM and at 5PM.
Deprivation

The median NOx is 27% higher at primary schools with pupils from the most deprived areas than at primary schools with pupils from the least deprived areas.
Ethnicity

Average NOx concentration at London primary schools
According to the proportion of BAME population where pupils reside

Schools which have pupils from areas with the highest % of BAME population (65-93%) have average NOx concentrations 28% higher than schools which have pupils from areas with the lowest % of BAME population (3-16%).

Data sources: Breathe London; Office for National Statistics.
Helping to understand the problem (PM2.5)

Source contribution to annual average PM2.5 concentrations at London primary schools (2019)

- Non-local: 85%
- Local: 15%
- Road Transport - brake, tyre & road wear: 8%
- Commercial and Domestic Heat and Power: 2%
- Industrial, and Non-Road Mobile Machinery: 2%
- Other: < 1%
- Road Transport - exhaust: 1%
- Residual: 2%
Helping to understand the problem (PM2.5)

Local source contribution to annual average PM2.5 concentrations at London primary schools (2019)

- Road Transport - brake, tyre & road wear: 52%
- Industrial, and Non-Road Mobile Machinery: 15%
- Residual: 12%
- Commercial and Domestic Heat and Power: 10%
- Other: 2%
- Road Transport - exhaust: 9%
Modelling methodology

• This analysis was carried out using data produced by the Breathe London pilot project. The data was created by the ADMS-Urban model, based on emissions of NOx taken from the London Atmospheric Emissions Inventory (LAEI) published by the GLA.

• This work used ‘LAEI 2013’, which was published in 2016, has a base year of 2013 and includes projections for 2020. It used annual average values for 2019, obtained by interpolating between the base year values and the projections for 2020.

• Modelled annual concentrations (µg/m3) at state-funded primary schools across Greater London for 27 different pollution sources.

• Sensitive receptors were modelled at 1 metre above ground.

• Rather than modelling pollution directly on or above buildings, new locations were created by selecting the nearest road section within 100m of the original location to give a better representative of children’s exposure.

• In this deck the average refers to the median; this was used to reduce model uncertainty at high levels of NOx concentration.