Supplementary information (SI)

**Fig. S1**

The extent of the clean air zone (CAZ), as well as a topographical presentation of the elevations surrounding Bradford. Green represents low heights above sea level, increasing up to red. The CAZ boundary (shown as a red outline) is flanked by areas of higher ground, increasing up to the Pennine hills in West Bradford.

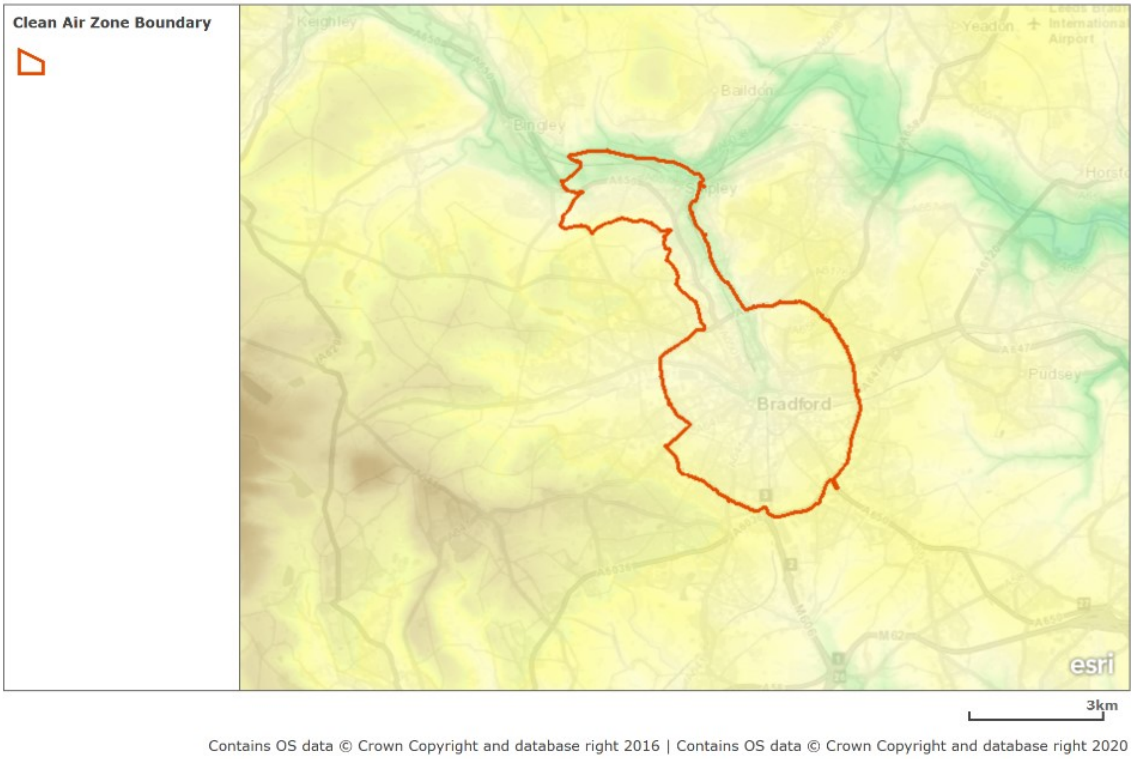



**Table S1**

A table of the 30 VOCs contained within the 30-component NPL30 calibration standard used in this study.

| | | |
|---|---|---|
| 1,2,3-trimethylbenzene | ethane | n-heptane |
| 1,2,4-trimethylbenzene | ethene | n-octane |
| 1,3,5-trimethylbenzene | ethylbenzene | n-pentane |
| 1,3-butadiene | hexane | o-xylene |
| 1-butene | isobutane | propane |
| 2-methylpentane | isooctane | propene |
| acetylene | iso-pentane | p-xylene |
| benzene | isoprene | toluene |
| cis-2-butene | m-xylene | trans-2-butene |
| cis-2-pentene | n-butane | trans-2-pentene |

**Table S2**

Limits of detection (LOQ) and quantification (LOQ) for VOCs resolved by the GC analysis. LODs were calculated by a signal-to-noise (SNR) ratio of 3:1, and LOQ using an SNR of 10:1.

| voc_name | LOD_µgm3 | LOQ_µgm3 | voc_name | LOD_µgm3 | LOQ_µgm3 |
|---|---|---|---|---|---|
| 123-TMB | 0.0217 | 0.0724 | gamma-terpinene | 0.0227 | 0.0755 |
| 124-TMB | 0.0222 | 0.0741 | hexane | 0.0239 | 0.0796 |
| 135-TMB | 0.0222 | 0.0741 | isobutane | 0.0242 | 0.0806 |
| 2-carene | 0.0227 | 0.0755 | isoprene | 0.0227 | 0.0755 |
| 2-chloropropane | 0.0436 | 0.145 | isopropanol | 0.0444 | 0.148 |
| 3-carene | 0.0227 | 0.0755 | levomenthol | 0.0281 | 0.0937 |
| 4-carene | 0.0227 | 0.0755 | limonene | 0.0227 | 0.0755 |
| acetaldehyde | 0.0733 | 0.244 | methanol | 0.0711 | 0.237 |
| acetone | 0.0483 | 0.161 | methylenechloride | 0.141 | 0.471 |
| acetonitrile | 0.0455 | 0.152 | n-butane | 0.0242 | 0.0806 |
| alpha-phellandrene | 0.0227 | 0.0755 | n-pentane | 0.024 | 0.08 |
| alpha-pinene | 0.0227 | 0.0755 | o-cymene | 0.0223 | 0.0744 |
| alpha-terpinene | 0.0227 | 0.0755 | p-cymene | 0.0223 | 0.0744 |
| beta-myrcene | 0.0227 | 0.0755 | propan-1-ol | 0.04 | 0.133 |
| beta-phellandrene | 0.0227 | 0.0755 | propanal | 0.0483 | 0.161 |
| beta-terpinene | 0.0227 | 0.0755 | propane | 0.0245 | 0.0815 |
| beta-thujene | 0.0227 | 0.0755 | styrene | 0.0217 | 0.0722 |
| camphene | 0.0227 | 0.0755 | tert-butyl-benzene | 0.0223 | 0.0744 |
| camphor | 0.0281 | 0.0938 | 11-dichloroethene | 0.101 | 0.336 |
| carbondisulfide | 0.127 | 0.422 | cyanogenchloride | 0.128 | 0.426 |
| delta-terpinene | 0.0227 | 0.0755 | carbontetrachloride | 1.02 | 3.41 |
| ethanol | 0.0511 | 0.17 | chloroform | 0.496 | 1.65 |
| ethylbenzene | 0.0221 | 0.0736 | benzene | 0.0217 | 0.0722 |
| toluene | 0.0219 | 0.073 | xylene | 0.0221 | 0.0736 |

**Supplementary method 1 – emission rate sensitivity analysis**

Emission rate in this paper was calculated as in eqn SE1:

$$q = (C_{in} - C_{out}) \times V \times ACR$$

SE1

Where q is the calculated emission rate (g $hr^{-1}$), $C_{in}$ and $C_{out}$ are the indoor and outdoor concentration of a VOC (µg $m^{-3}$), V is the available diluent volume ($m^3$) and ACR is the air change rate ($hr^{-1}$). To assess the impact of compounding errors on the emission rate, the propagation of errors formula can be used:

$$\sigma_q^2 = \left(\frac{\partial q}{\partial C_{in}}\sigma_b\right)^2 + \left(\frac{\partial q}{\partial C_{out}}\sigma_c\right)^2 + \left(\frac{\partial q}{\partial V}\sigma_d\right)^2 + \left(\frac{\partial q}{\partial ACR}\sigma_e\right)^2$$

SE2

Where $\frac{\partial q}{\partial x}$ is the partial derivative of the emission rate $q$ with respect to variable $x$, and $\sigma_x$ is the absolute error of variable $x$. The partial derivatives can be calculated using the product rule as such:

$$\frac{\partial q}{\partial C_{in}} = V \times ACR$$

$$\frac{\partial q}{\partial C_{out}} = -V \times ACR$$

$$\frac{\partial q}{\partial V} = (C_{in} - C_{out}) \times ACR$$

$$\frac{\partial q}{\partial ACR} = (C_{in} - C_{out}) \times V$$

This then gives the final equation in SE3:

$$\sigma_q = \sqrt{\left(V \times ACR \times \sigma_{C_{in}}\right)^2 + \left(-V \times ACR \times \sigma_{C_{out}}\right)^2 + \left((C_{in} - C_{out}) \times ACR \times \sigma_V\right)^2 + \left((C_{in} - C_{out}) \times V \times \sigma_{ACR}\right)^2}$$

SE3

The errors of $C_{in}$ and $C_{out}$ are 0.1%, which itself was determined through constructing calibration curves of a target gas of increasing concentration. As conservative estimates, errors in $V$ and $ACR$ were assigned as 10% and 20%, respectively. This resulted in an average 22% uncertainty in the calculated emission rate. However, this likely represents a 'worst case' scenario as the volume and air change rate uncertainties are likely upper-bound estimates of the actual uncertainties. Assigning errors in $V$ and $ACR$ of 10% for both gives as average 14% uncertainty in the calculated emission rate.

**Supplementary method 2 – Lifetime cancer risk calculation**

Lifetime cancer risk (LCR) can be calculated according to eqn SE4:

$$LCR = C_{A,C} \times IUR$$

SE4

Where $C_{A,C}$ is the exposure factor-adjusted indoor concentration (μg m$^{-3}$), $T_Y$ is the residential time per lifetime (years), and $T_L$ is the life expectancy (years), and $IUR$ is the

inhalation unit risk [(μg $m^{-3}$)$^{-1}$]. Cancer IURs were identified for 6 VOCs in this study, and were obtained from the Integrated Risk Information System (IRIS) database, shown in Table S4, hosted by the United States Environmental Protection Agency (US EPA).[1] The EPA defines the IUR as 'the upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 μg $m^{-3}$ in air for a lifetime'. [2]

The exposure factor-adjusted indoor concentration was calculated using eqn SE5:

$$C_{A,C} = C_I \times E_{f,C}$$

SE5

Where $C_I$ is the measured indoor concentration obtained from whole air samples (μg $m^{-3}$), and $E_{f,C}$ is the atmospheric exposure factor for the LCR calculation (dimensionless). The atmospheric exposure factor serves to adjust the measured indoor concentrations into an 'effective' concentration to account for time not spent within the setting $C_I$ was measured in.

$E_{f,C}$ was calculated according to eqn SE6:

$$E_{f,C} = \frac{T_R \times 7\frac{days}{week} \times 52.14\frac{weeks}{year} \times T_Y}{24\frac{hours}{day} \times 7\frac{days}{week} \times 52.14\frac{weeks}{year} \times T_L}$$

SE6

Where $T_R$ is the residential time per day (hours), $T_Y$ is the residential time per lifetime (years), and $T_L$ is the life expectancy (years). Average UK work hours (obtained from the Office for National Statistics [3]) were subtracted from 24 to give $T_R = 16.72.$ Values of

$T_Y = 33$ and $T_L = 78$ were obtained from available guidance provided by the Agency for Toxic Substances and Disease Registry (ATSDR). [4] This gave a calculated $E_{f,C}$ of 0.30, reflecting that for this calculation it is assumed that 30% of an individual's lifetime is spent in the residential environment studied here,

**Supplementary method 3 - Hazard quotient calculation**

The calculation of a hazard quotient (HQ) for a VOC concentration starts similarly to the estimation of LCR in the calculation of an exposure factor, shown in eqn SE7:

$$E_{f,NC} = \frac{T_R \times 7\frac{days}{week} \times 52.14\frac{weeks}{year}}{24\frac{hours}{day} \times 7\frac{days}{week} \times 52.14\frac{weeks}{year}}$$

SE7

Where $E_{f,NC}$ is the atmospheric exposure factor for non-cancer hazard quotient calculation (dimensionless). $E_{f,NC}$ in this study was calculated to be 0.70. The exposure factor-adjusted concentration of VOCs for non-cancer hazard quotient calculation, $C_{A,NC}$ was calculated as in eqn SE5. Finally, hazard quotients were calculated as in eqn SE8:

$$HQ = \frac{C_{A,NC}}{R_fC}$$

SE8

Where $HQ$ is the hazard quotient for non-cancer related risk (dimensionless), and $R_fC$ is the reference concentration for each VOC (μg $m^{-3}$). $R_fC$ values were gathered from the IRIS database, and are shown in Table S5. [1] The preceding equations follow guidance from the EPA and the ATSDR. Cancer IURs were calculated using specific exposure

pathways, as inhalation risks increase through defined routes. In contrast, $^{R_f C}$ values consider total indoor time, reflecting broader exposure patterns in the calculation of exposure factors.

**Table S3**

Measured VOCs used for LCR analysis using inhalation unit risk data available from IRIS.

| **Species name** | **Inhalation unit risk (per µg m$^{-3}$)** |
|---|---|
| 1,3-butadiene | 0.00003 |
| Chloroform | 0.000023 |
| Carbon tetrachloride | 0.000006 |
| Acetaldehyde | 0.0000022 |
| Benzene | 0.0000022 |
| Methylene chloride | 0.00000008 |

**Table S4**

Measured VOCs used for HQ analysis using reference concentration data available from IRIS.

| **Species name** | **Reference concentration (µg m$^{-3}$)** |
|---|---|
| 1,3-butadiene | 2 |
| Propanal | 8 |
| Acetaldehyde | 9 |
| Benzene | 30 |
| 1,2,3-trimethylbenzene | 60 |
| 1,2,4-trimethylbenzene | 60 |
| 1,3,5-trimethylbenzene | 60 |
| Acetonitrile | 60 |
| m-xylene | 100 |
| o-xylene | 100 |
| p-xylene | 100 |
| Methylenechloride | 600 |
| Carbondisulfide | 700 |
| Hexane | 700 |
| 1,3-dichlorobenzene | 800 |
| Ethylbenzene | 1000 |

| | |
|---|---|
| Styrene | 1000 |
| t-butyl-benzene | 5000 |
| Toluene | 5000 |
| Methanol | 20000 |
| Carbon tetrachloride | 100 |
| Cyclohexane | 6000 |
| Naphthalene | 3 |
| t-butyl-alcohol | 5000 |

**Table S5**

Raw sampled VOC concentration data. All values are given in units of μg $m^{-3}$.

| Species | Mean | 5th percentile | 25th percentile | Median | 75th percentile | 95th percentile | Standard deviation |
|---|---|---|---|---|---|---|---|
| propane | 131.4718 | 6.42451 | 18.22264 | 49.01542 | 113.2612 | 620.9195 | 216.4602 |
| isobutane | 128.7174 | 2.869592 | 12.18533 | 37.30631 | 117.3661 | 678.1206 | 236.4613 |
| n-butane | 219.6981 | 6.66134 | 25.96672 | 76.44349 | 250.0136 | 1101.071 | 317.5535 |
| n-pentane | 4.286987 | 0.487911 | 1.189555 | 1.932624 | 3.791783 | 11.53045 | 10.04894 |
| hexane | 0.770075 | 0.117996 | 0.230816 | 0.322301 | 0.52026 | 2.557107 | 1.70827 |
| isoprene | 2.113299 | 0.3898 | 0.769828 | 1.541363 | 2.807606 | 5.192791 | 2.090033 |
| carbondisulfide | 1.862036 | 0.451615 | 0.637903 | 1.072044 | 1.99231 | 6.308651 | 2.15951 |
| acetaldehyde | 22.41466 | 1.549082 | 12.3473 | 18.10759 | 26.00685 | 49.93836 | 19.36909 |
| propanal | 4.247747 | 0.466236 | 1.99725 | 2.795617 | 4.234733 | 8.406247 | 7.263306 |
| acetone | 53.50257 | 10.58774 | 25.38392 | 32.89584 | 54.54952 | 200.9483 | 70.68356 |
| methanol | 69.86539 | 3.161335 | 38.55206 | 57.75694 | 89.92292 | 144.7383 | 50.60594 |
| methylenechloride | 5.384164 | 0.507537 | 0.784996 | 1.272674 | 2.361142 | 21.32572 | 16.8556 |
| propan-1-ol | 0.554775 | 0.1396 | 0.189485 | 0.257577 | 0.493002 | 1.134415 | 0.993939 |
| isopropanol | 72.65894 | 1.53941 | 12.4102 | 27.6249 | 49.88171 | 316.2054 | 156.09 |
| ethanol | 558.9503 | 68.56741 | 191.8341 | 332.4858 | 591.9274 | 1942.875 | 708.2073 |
| 4-carene | 2.879976 | 0.146486 | 0.804301 | 2.224512 | 4.935448 | 6.773487 | 2.521787 |
| acetonitrile | 1.14215 | 0.180395 | 0.319073 | 0.675818 | 1.294433 | 3.441378 | 1.417328 |
| alpha-pinene | 6.75427 | 0.33136 | 1.350052 | 2.923961 | 5.795429 | 13.24767 | 20.76261 |
| beta-myrcene | 1.246831 | 0.085531 | 0.172666 | 0.450656 | 1.173801 | 4.84582 | 2.571431 |
| alpha-terpinene | 0.858637 | 0.08269 | 0.145405 | 0.227314 | 0.420593 | 1.789995 | 3.413624 |
| tert-butyl-benzene | 1.773789 | 0.095468 | 0.136105 | 0.448511 | 1.15561 | 1.538526 | 6.106573 |
| 135-TMB | 6.874903 | 0.116183 | 0.294255 | 0.578319 | 1.237453 | 15.39759 | 38.66844 |
| 124-TMB | 7.385853 | 0.152064 | 0.960881 | 2.278751 | 3.712229 | 22.76234 | 21.02322 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 123-TMB | 3.489957 | 0.093109 | 0.172943 | 0.463392 | 0.980196 | 12.66378 | 13.44574 |
| styrene | 0.342512 | 0.076227 | 0.115811 | 0.158484 | 0.198685 | 1.114931 | 0.429401 |
| camphene | 0.183171 | 0.079062 | 0.09358 | 0.136743 | 0.203193 | 0.509951 | 0.138601 |
| beta-thujene | 1.021399 | 0.105891 | 0.178882 | 0.379276 | 1.188809 | 3.149632 | 1.615707 |
| beta-terpinene | 1.383296 | 0.137074 | 0.635795 | 1.360244 | 2.132334 | 2.662272 | 0.989501 |
| 3-carene | 0.874588 | 0.088192 | 0.177476 | 0.410748 | 0.861806 | 2.541324 | 1.657697 |
| alpha-phellandrene | 0.144441 | 0.099342 | 0.106019 | 0.140034 | 0.178455 | 0.195707 | 0.049214 |
| limonene | 2.050206 | 0.113666 | 0.314121 | 0.58791 | 1.774617 | 9.888409 | 3.874785 |
| beta-phellandrene | 1.228936 | 0.08996 | 0.120912 | 0.193715 | 1.130563 | 3.222927 | 2.483957 |
| gamma-terpinene | 0.31083 | 0.085268 | 0.126395 | 0.183131 | 0.398071 | 0.871774 | 0.296988 |
| delta-terpinene | 0.612528 | 0.078937 | 0.109944 | 0.119627 | 0.280612 | 2.176802 | 1.671658 |
| 2-carene | 2.989718 | 0.22764 | 0.577392 | 1.18232 | 1.400473 | 11.44858 | 5.610187 |
| levomenthol | 0.549449 | 0.111394 | 0.175855 | 0.337634 | 0.41317 | 1.927401 | 0.699965 |
| camphor | 0.558731 | 0.200694 | 0.21291 | 0.437213 | 0.666318 | 1.311859 | 0.480022 |
| o-cymene | 0.608298 | 0.085367 | 0.092742 | 0.11699 | 0.185033 | 1.835551 | 1.953696 |
| p-cymene | 0.704738 | 0.103167 | 0.200084 | 0.408544 | 0.893663 | 2.162917 | 0.723335 |
| ethylbenzene | 6.679928 | 0.25514 | 0.546938 | 0.923522 | 1.859595 | 12.98793 | 32.88894 |
| carbontetrachloride | 21.0364 | 5.168289 | 10.85679 | 15.46533 | 31.3838 | 39.76674 | 16.63856 |
| chloroform | 8.761406 | 1.731696 | 1.857239 | 2.456674 | 3.816694 | 16.05265 | 23.87512 |

**Table S6**

Calculated emission rate data in units of g $hr^{-1}$.

| Species | Mean | 5th percentile | 25th percentile | Median | 75th percentile | 95th percentile | Standard deviation |
|---|---|---|---|---|---|---|---|
| propane | 0.00525 | 6.93E-05 | 0.000408 | 0.00168 | 0.003809 | 0.023865 | 0.009542 |
| isobutane | 0.004476 | 2.85E-05 | 0.000299 | 0.000855 | 0.003463 | 0.021851 | 0.008269 |
| n.butane | 0.009971 | 9.20E-05 | 0.000792 | 0.001937 | 0.008838 | 0.043268 | 0.018425 |
| n.pentane | 9.47E-05 | 2.75E-06 | 1.43E-05 | 4.01E-05 | 9.02E-05 | 0.000432 | 0.000165 |
| isoprene | 8.12E-05 | 8.84E-06 | 2.56E-05 | 5.73E-05 | 9.40E-05 | 0.000249 | 8.97E-05 |
| acetone | 0.001725 | 0.000214 | 0.00055 | 0.000927 | 0.001479 | 0.005462 | 0.002365 |
| methanol | 0.002165 | 0.000285 | 0.000768 | 0.001486 | 0.002752 | 0.00541 | 0.00247 |
| methylenechloride | 8.94E-05 | 3.65E-06 | 1.13E-05 | 3.01E-05 | 5.71E-05 | 0.000437 | 0.000199 |
| propan.1.ol | 1.12E-05 | 9.17E-07 | 2.30E-06 | 5.70E-06 | 1.04E-05 | 4.01E-05 | 1.85E-05 |
| isopropanol | 0.00263 | 0.000245 | 0.000553 | 0.001158 | 0.002354 | 0.011096 | 0.004334 |
| ethanol | 0.014077 | 0.001371 | 0.004283 | 0.008894 | 0.018304 | 0.037413 | 0.015768 |
| 4.carene | 7.73E-05 | 8.46E-09 | 8.86E-08 | 3.48E-05 | 0.000137 | 0.000216 | 0.000106 |
| alpha.pinene | 0.000166 | 7.90E-06 | 3.81E-05 | 9.30E-05 | 0.000232 | 0.0005 | 0.000182 |
| beta.myrcene | 1.57E-05 | 7.32E-07 | 2.26E-06 | 5.81E-06 | 1.03E-05 | 2.48E-05 | 5.08E-05 |
| alpha.terpinene | 1.41E-05 | 2.19E-06 | 3.98E-06 | 7.30E-06 | 1.27E-05 | 4.28E-05 | 2.22E-05 |
| 135.TMB | 3.55E-05 | 2.50E-06 | 7.42E-06 | 1.82E-05 | 2.98E-05 | 7.95E-05 | 8.98E-05 |
| 124.TMB | 0.000163 | 4.97E-06 | 2.37E-05 | 6.24E-05 | 0.0001 | 0.000817 | 0.000375 |
| 123.TMB | 2.68E-05 | 1.95E-06 | 4.18E-06 | 8.51E-06 | 2.06E-05 | 6.00E-05 | 9.98E-05 |
| camphene | 3.19E-06 | 4.34E-09 | 2.49E-07 | 1.44E-06 | 3.31E-06 | 9.27E-06 | 6.19E-06 |
| beta.thujene | 3.72E-06 | 1.03E-08 | 2.27E-07 | 1.29E-06 | 5.23E-06 | 1.08E-05 | 6.27E-06 |
| beta.terpinene | 1.41E-06 | 1.99E-08 | 9.79E-08 | 2.38E-07 | 3.79E-07 | 5.37E-06 | 4.58E-06 |
| 3.carene | 4.67E-05 | 4.47E-07 | 6.01E-06 | 1.74E-05 | 4.20E-05 | 0.000222 | 8.58E-05 |
| alpha.phellandrene | 1.23E-06 | 2.12E-08 | 1.52E-07 | 6.87E-07 | 1.50E-06 | 3.92E-06 | 1.86E-06 |
| limonene | 9.37E-05 | 9.45E-07 | 8.29E-06 | 2.70E-05 | 0.000114 | 0.000392 | 0.000147 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| beta.phellandrene | 4.47E-06 | 7.34E-09 | 7.99E-08 | 1.29E-06 | 4.74E-06 | 2.38E-05 | 7.68E-06 |
| alpha.terpinene | 1.29E-06 | 9.83E-08 | 2.47E-07 | 3.65E-07 | 5.97E-07 | 3.27E-06 | 3.38E-06 |
| gamma.terpinene | 8.00E-06 | 1.11E-07 | 6.81E-07 | 3.57E-06 | 1.04E-05 | 2.10E-05 | 1.75E-05 |
| delta.terpinene | 1.27E-05 | 6.98E-09 | 1.94E-07 | 9.96E-07 | 2.54E-06 | 1.08E-05 | 7.83E-05 |
| 2.carene | 1.36E-06 | 2.29E-08 | 1.18E-07 | 2.47E-07 | 5.95E-07 | 6.38E-06 | 3.35E-06 |
| levomenthol | 1.72E-06 | 1.42E-07 | 2.56E-07 | 4.11E-07 | 2.55E-06 | 4.97E-06 | 2.42E-06 |
| o.cymene | 2.66E-06 | 2.90E-07 | 5.44E-07 | 1.39E-06 | 4.66E-06 | 7.41E-06 | 2.70E-06 |
| p.cymene | 3.39E-05 | 8.73E-07 | 4.39E-06 | 1.87E-05 | 3.87E-05 | 0.000102 | 5.33E-05 |
| 2.chloropropane | 4.40E-06 | 8.71E-08 | 1.63E-07 | 2.37E-07 | 4.33E-06 | 1.64E-05 | 7.96E-06 |
| ethylbenzene | 0.000124 | 3.23E-06 | 1.06E-05 | 2.73E-05 | 5.72E-05 | 0.000162 | 0.000625 |
| ethylbenzene | 0.00015 | 6.59E-06 | 8.56E-06 | 1.48E-05 | 2.61E-05 | 0.000161 | 0.000588 |
| carbontetrachloride | 1.52E-05 | 5.52E-07 | 1.28E-06 | 3.70E-06 | 1.44E-05 | 7.40E-05 | 2.65E-05 |
| chloroform | 2.22E-05 | 2.97E-06 | 4.79E-06 | 1.39E-05 | 3.44E-05 | 5.91E-05 | 1.99E-05 |

**Fig. S2**

Boxplots indoor/outdoor ratios of aromatic VOCs, separated by rural or urban status. Indoor/outdoor ratios were split into Boxplots show values in the order of (from bottom-to-top): lower outliers, 5$^{th}$ percentile, 25$^{th}$ percentile, median value, 75$^{th}$ percentile, 95$^{th}$ percentile, and upper outliers. TMB = trimethylbenzene. Here, individual xylene isomers have been grouped for consistency with the main text.

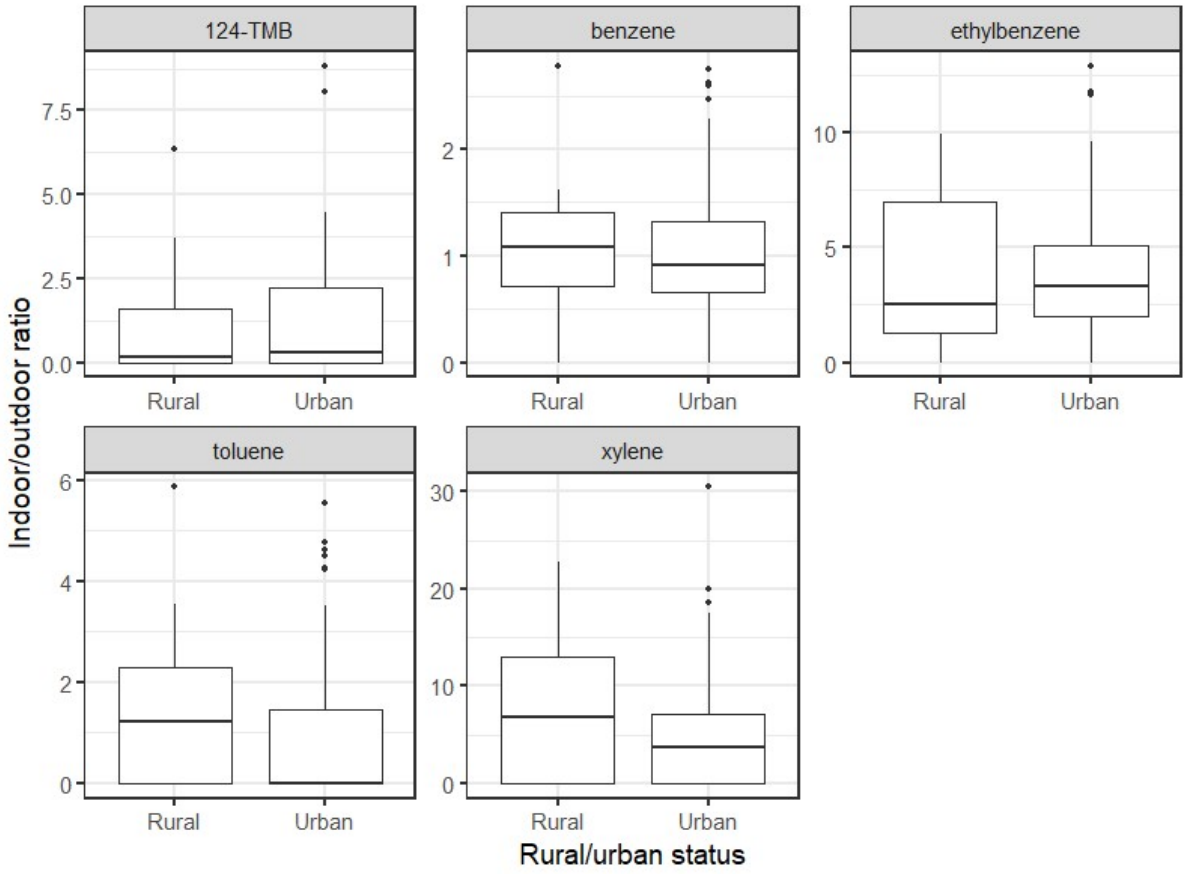



**Fig. S3(a)**

Meteorological data gathered from UK Met Office for Bradford over 2023 and 2024, taken from a weather station at 53°48'46.8"N 1°46'19.2"W. Values were taken for each month. Data was collected for maximum and minimum mean temperature ($^{O}$C), ground

frost days per month, total rainfall (mm)  and total sunshine hours per month.

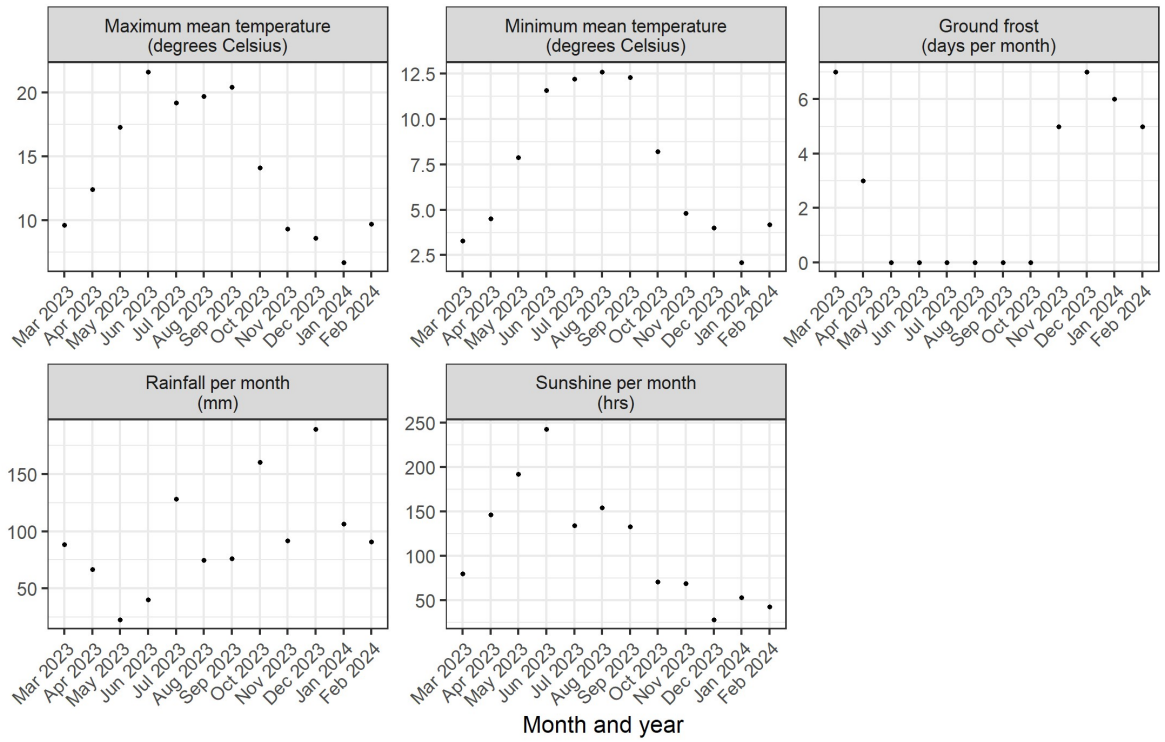



**Fig. S3(b)**

Meteorological data gathered from UK Met Office for Bradford over 2023 and 2024, taken from a weather station at 53°48'46.8"N 1°46'19.2"W. Data was collected for maximum and minimum mean temperature ($^{O}$C), ground frost days per month, total rainfall (mm)  and total sunshine hours per month. Values were taken for each month, with each month then being grouped into four seasons: winter (December, January, February), spring (March, April, May), summer (June, July, August), and autumn (September, October, November), and mean values for each meteorological measurement taken for each season.

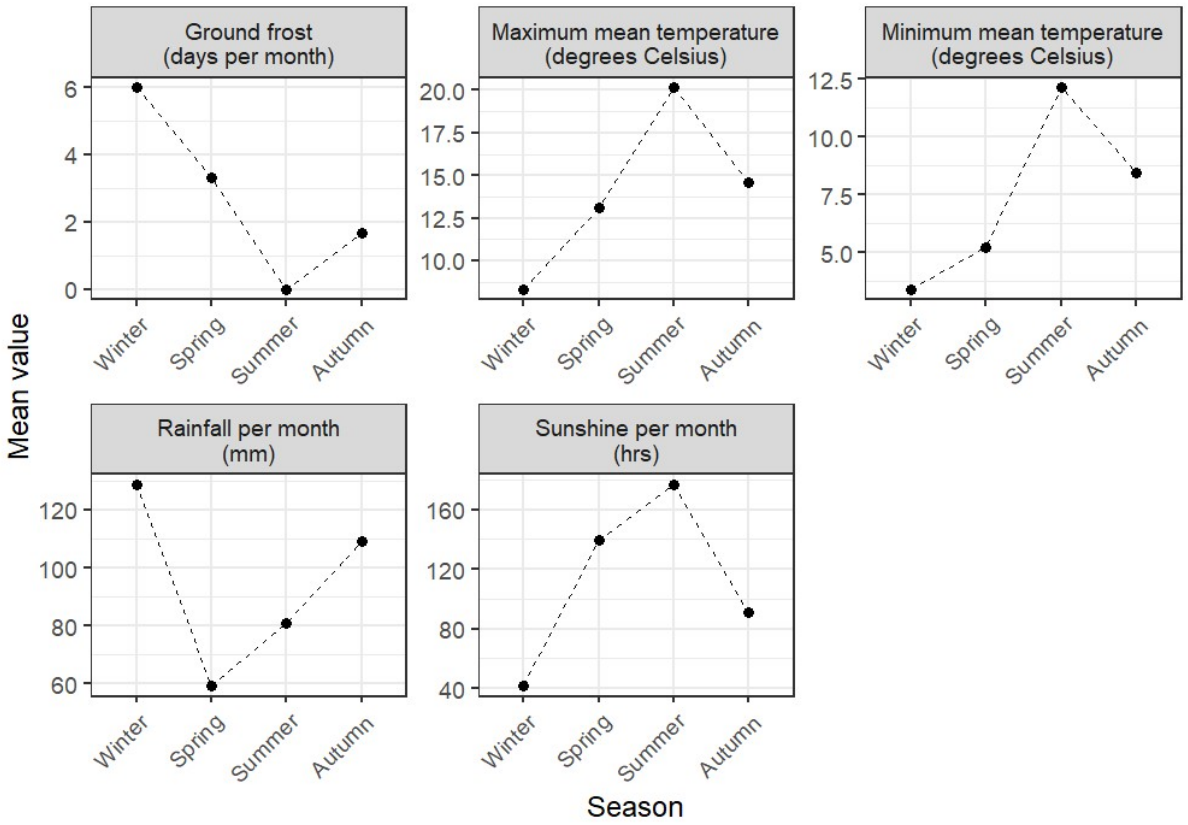

Ground frost
(days per month)
Maximum mean temperature
(degrees Celsius)
Minimum mean temperature
(degrees Celsius)
Rainfall per month
(mm)
Sunshine per month
(hrs)
Mean value
Season
Winter
Spring
Summer
Autumn

**Fig. S4**

Calculated individual VOC emission rates over the seasons. Outliers above 10 mg $hr^{-1}$ were removed from ethane and sum BTEX plots, and outliers above 1 mg $hr^{-1}$ were removed from 1,3-butadiene and sum TMB plots to aid presentation, but did not affect the calculation of quartiles for boxplots. Boxplots show values in the order of (from bottom-to-top): lower outliers, 5$^{th}$ percentile, 25$^{th}$ percentile, median value, 75$^{th}$ percentile, 95$^{th}$ percentile, and upper outliers. The y-axis has been logarithmically transformed to aid presentation. TMB = trimethylbenzene, BTEX = benzene, toluene, ethylbenzene and xylene.

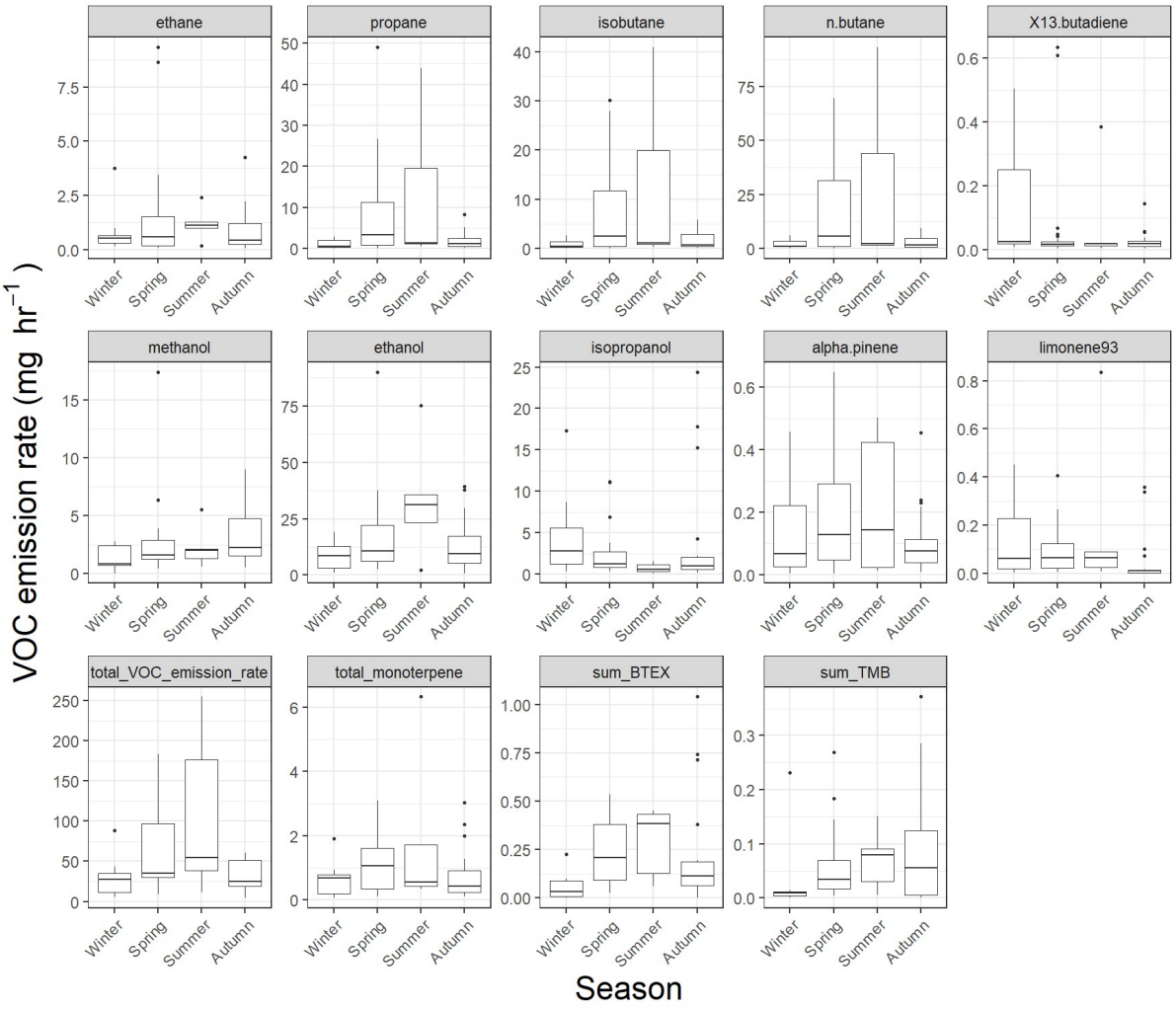



**Fig. S5**

(a) Total fragrance product use, (b) total aerosol product use and (c) the sum of fragrance and aerosol product use. Statistics were gathered daily and then added together over the 72-hour sampling period. Boxplots show values in the order of (from bottom-to-top): lower outliers, 5$^{th}$ percentile, 25$^{th}$ percentile, median value, 75$^{th}$ percentile, 95$^{th}$ percentile, and upper outliers.

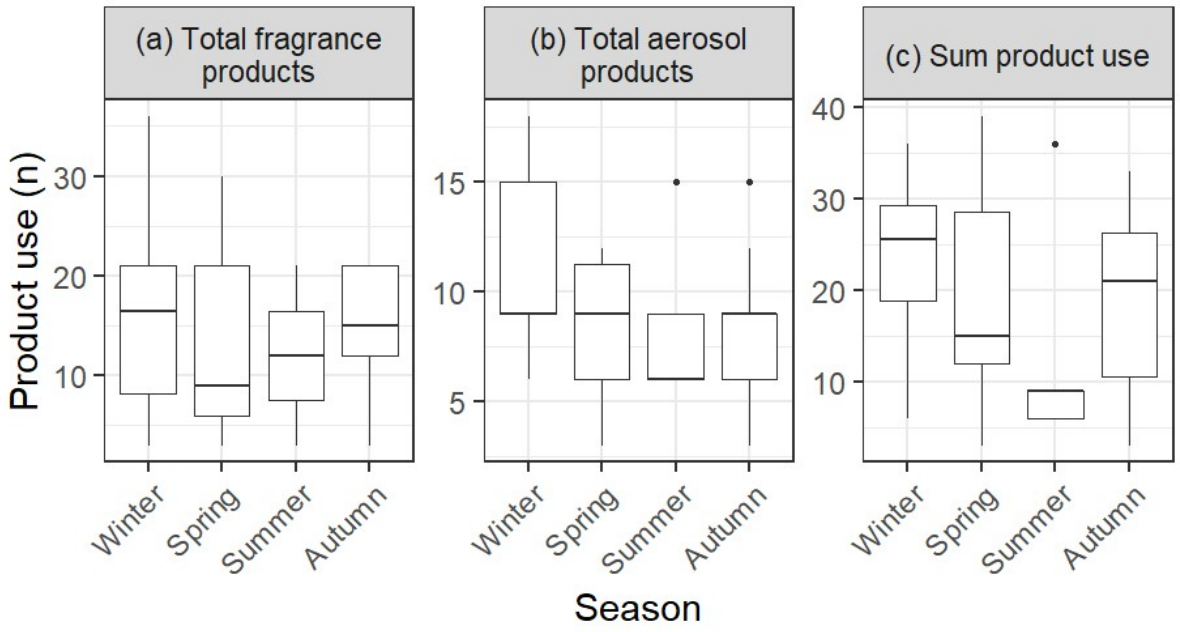
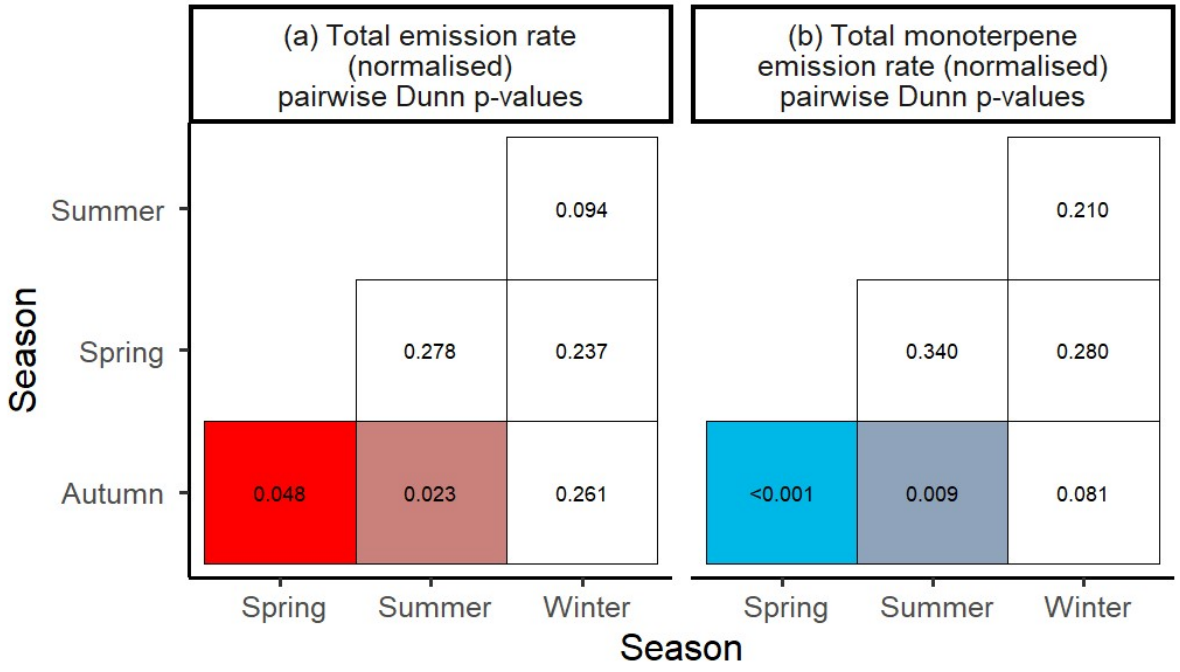



**Fig. S6**

Matrices of *p*-values following *post hoc* Dunn tests for seasonality in (a) summed normalised VOC emission rates and (b) summed normalised monoterpene emission rates. A white coloured matrix cell indicates the *p*-value for the pairwise comparison was not of significance. Significant values (*p*-value ≤0.05) graduate from red (*p*-value = 0.05) to blue (*p*-value -> 0)



**References**


1. Agency, U.S.E.P. *IRIS Assessments*. 2024 [cited 2024 October 26]; Available from: https://iris.epa.gov/AtoZ/?list_type=alpha.
2. United States Environmental Protection Agency. *Basic Information about the Integrated Risk Information System* 2023 June 28, 2024]; Available from: https://www.epa.gov/iris/basic-information-about-integrated-risk-information-system.
3. Office for National Statistics. *Average hours worked and economic growth, UK: 1998 to 2022* 2024 June 28, 2024]; Available from: https://www.ons.gov.uk/economy/grossdomesticproductgdp/articles/averagehoursworkedandeconomicgrowth/2024-01-22.
4. Agency for Toxic Substances and Disease Registry. *Guidance for Inhalation Exposures*. 2021 June 28, 2024]; Available from: https://www.atsdr.cdc.gov/pha-guidance/resources/ATSDR-EDG-Inhalation-508.pdf.