Supplementary Information: Carslaw et al. (2024)

Table S1*: Summary of chemical instrumentation used for WPs1-3*

Pollutant	**Instrument**	**Offline/ online**	**WP**
Alkenes inc. total terpenes, aromatics, HCHO & other OVOC	SIFT-MS, *Syft Technologies VOICE Ultra*	On	1,3
Speciated terpenes	GC-MS (6850/5975C quadrupole, Agilent Technologies)	Off	1
Alkanes, alkenes (inc. speciated terpenes), aromatics, OVOC	GC-TOF-MS, *Agilent 6890N/Almsco*	Off	1,3
Alkanes, alkenes, speciated monoterpenes/monoterpenoids, aromatics, OVOCs, chlorinated hydrocarbons, cyclosiloxanes	GC-FID-QMS (7890A, 5977A, Agilent Technologies)	Off	2
O_3, CO (Zephyr only), CO_2 (AQMesh only) NO, NO_2, PM_1, $PM_{2.5}$, PM_{10}	Low-cost sensor network (Zephyr and AQMesh)	On	1,2
Chemically speciated PM	UHPLC-Orbitrap-MS; Aerodyne HR-AMS and FIGAERO-I^--CIMS	Off	1,2
Semi-volatile organics	2D-GC-TOF-MS	Off	1,2
NO, NO_2, CO_2	AirXY ICAD NOx & in-built CO_2 sensor	On	1,3
SIFT=selective ionisation flow-tube; MS=mass spectrometry; GC=Gas Chromatography; TOF=time of flight; FID= flame ionisation detection; QMS=quadrupole mass spectrometry; OVOC=oxygenated VOC; UHPLC=Ultra-high pressure liquid chromatography; HR-AMS=High Resolution Aerosol MS; FIGAERO-I^--CIMS=Filter Inlet for Gases and Aerosols, coupled to Chemical Ionisation MS (with iodide ions); ICAD=iterative cavity enhanced DOAS (differential optical absorption spectroscopy).			

AirGradient Sensors

The AirGradient (AirGradient, n.d.) integrates a series of sensors: a SenseAir S8 using non-dispersive infrared technology to measure CO_2 concentration (parts per million by volume (ppm)); a Plantower PMS5003 sensor with laser scattering technology to measure three size fractions of PM concentration (PM_1, $PM_{2.5}$, PM_{10} in □g/m^3); and a Sensirion SHT3x/4x sensor to measure temperature and relative humidity. The platforms also integrate a Sensirion SGP41 sensor to measure total volatile organic compounds (TVOCs) concentrations (parts per billion by volume (ppb)); however, due to the complexity of quantifying TVOCs with metal oxide sensors, these measurements were only used as a qualitative indicator of indoor emissions.

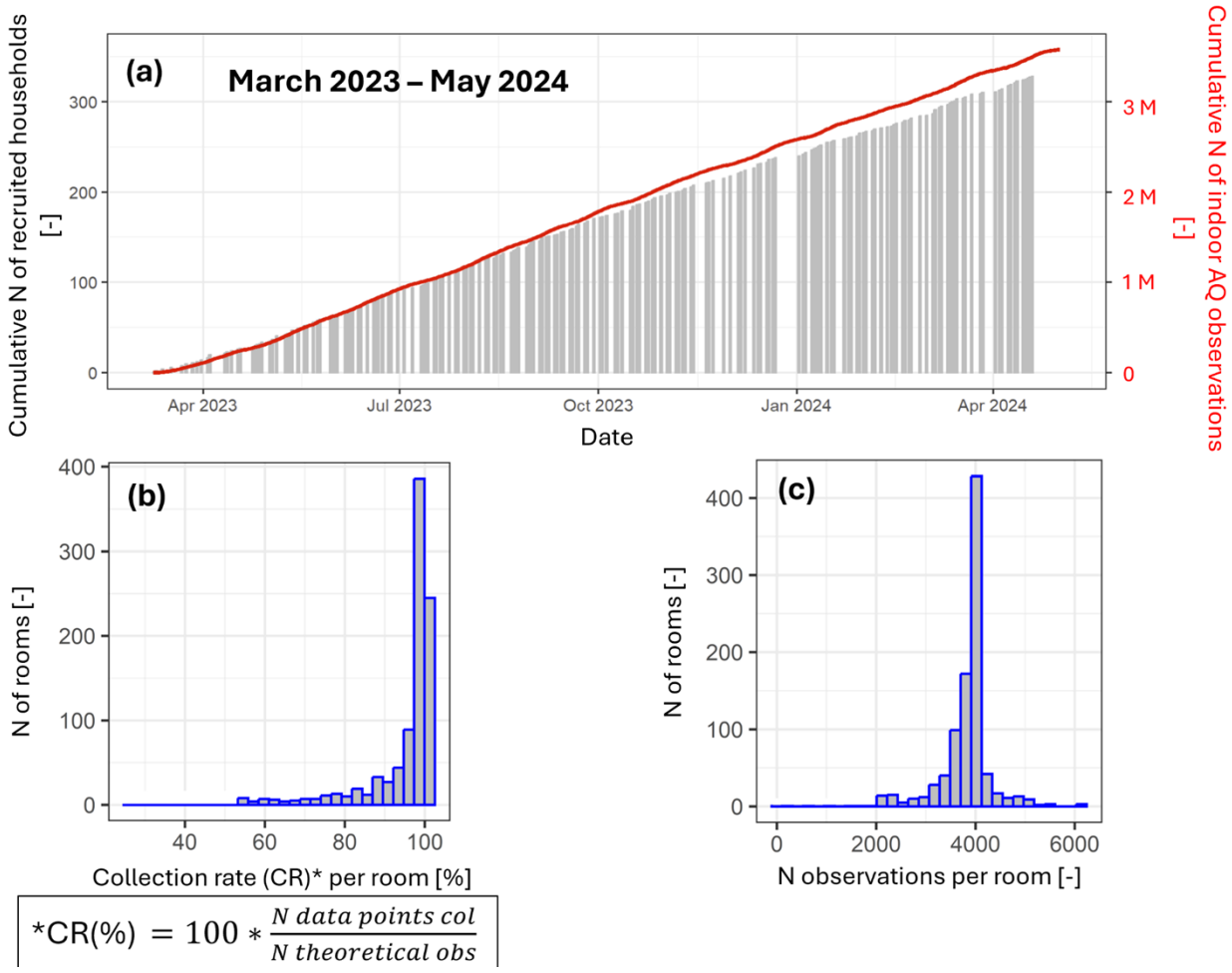

Figure S1: **(a)** Recruitment overview during the INGENIOUS sampling period (March 2023-May 2024) and for 315 households. A total of ~3.5 million indoor air quality measurements were collected. **(b)** The mean collection rate of indoor AQ observations was 93% with a median of 98%. Lower collection rates occurred in some households due to poor cellular connectivity. **(c)** Observations were collected for an average of 14 days per household at a 5-min interval, resulting in an average of ~4000 timestamped points per sampled room (3 rooms in each house).

Note that we measured in 3 rooms in each household (kitchen, living room, child's bedroom). For each room the collection rate (CR) was estimated as:

CR = 100* (number of collected observations /number of theoretically possible observations).

For example, the number of theoretical observations that could be collected in a 14-day period at a 5-min interval in one room would be 12 (observations in an hour) * 24 h *14 days = 4032. If we collected 3,630 observations over this period, then the CR for this room would be 90%.

To ensure that the measurements were representative of the indoor environmental conditions, rooms in households were retained for further analysis if they fulfilled the following criteria:

- There were at least 7 valid days in the 14-day period (=>50% collection rate).
- A day was considered valid if there were at least 12 valid hours collected (=>50% collection rate).
- An hour was considered valid if there were at least 6 observations of the possible maximum of 12 maximum (=>50% collection rate).

Table S2: Input parameters for the INCHEM-Py model used in the simulation of Figure 5. Details of these model parameters can be found in Shaw et al., (2023).

Settings parameter	**Value**
Temperature (K)	293
Relative humidity (%)	50
Air change rate (h^{-1})	0.72
Outdoor concentration profile	Bergen urban
Date	21-07-2020
Latitude (^{o}N)	53.79
Indoor lighting profile	LED, set to come on at 7am and off at 7pm
Glass attenuation profile for sunlight	Sacht glass C
Room volume (cm^3)	2.176×10^7
Surface areas (cm^2)	Painted surfaces 3.936×10^5 Linoleum 9.46×10^4
O_3 and H_2O_2 surface deposition	False

Note that the species concentrations/mixing ratios used to constrain the model simulations shown in Figure 5 are a low-pass filter of the combined measurements from the multiple meal experiments.

Additional References for SI

1. Air Gradient website (nd). https://www.airgradient.com last accessed October 17th, 2024.