Clean Air IN LONDON

The Rt. Hon. Michael Gove MP
Secretary of State for Levelling Up, Housing and Communities
Department for Levelling Up, Housing and Communities
2 Marsham Street
London
SW1P 4DF

14 February 2023

Dear Secretary of State

Clean air: 'Awaab's Law', improving indoor air and reducing building emissions

I am writing on behalf of Clean Air in London ("CAL") to thank you for tabling amendments[1] to the Social Housing (Regulation) Bill[2] to introduce 'Awaab's Law', which will require landlords to fix reported health hazards within specified timeframes[3].

I am also writing to encourage you to take a lead in improving indoor air quality and reducing building emissions in your work investing in local areas, delivering homes, supporting groups and overseeing local government, planning and building safety.

As you may know, Defra admitted today that the UK breached the single annual emission ceiling applicable to the National Emission Ceilings Regulations 2018 ("NECR") and the Gothenburg Protocol to the UNECE Convention on Long-range Transboundary Air Pollution ("CLRTAP") for total UK primary emissions of fine particulate matter ($PM_{2.5}$)[4] in 2021. Domestic wood burning was the largest source at 21% followed by emissions from industrial sites, road transport and construction[5]. Please note the difference between primary emissions and total concentrations which include 'secondary $PM_{2.5}$' from ammonia (NH_3) i.e. agriculture. CAL will write to Defra separately on the legal issues.

'Awaab's Law' shows what can be done to address these problems. In your current role, you have an opportunity over the next two years to protect health, the environment and the climate through the levers of objective setting, policy, primary and secondary legislation, guidance and influence.

Indoor air

COVID-19, the tragic death of Awaab Ishak aged two (21 December 2020), the publication of the World Health Organisation's ("WHO's") new air quality guidelines (published on 22 September 2021) and the Chief Medical Officer's annual report on air pollution (published on 8 December 2022) have highlighted the importance of indoor air quality.

[1] https://publications.parliament.uk/pa/bills/cbill/58-03/0206/amend/socialhousing_rep_rm_0210.pdf
[2] https://bills.parliament.uk/bills/3177
[3] https://www.gov.uk/government/news/government-to-deliver-awaabs-law
[4] https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-background
[5] https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-particulate-matter-pm10-and-pm25

CAL points you to several lessons:

- ***COVID-19***: An excellent study by Andrew Conway Morris and others at Addenbrooke's Hospital (published 1 July 2022)[6] found the airborne COVID-19 virus (i.e. SARS-COV-2 RNA) only on particles with a diameter greater than 1 micron (μm) and almost none when a portable HEPA air filtration device was switched on (to achieve five to 10 room-volume filtrations per hour). Bioaerosol was also effectively filtered. N.B. viruses usually die once captured in an air filter.

- ***Awaab Ishak's*** tragic death and inquest reminded us that the World Health Organisation's 'Housing and health guidelines' (published on 23 November 2018)[7] stated that "*Instead, it is recommended that dampness and mould-related problems be prevented*" [page 91] and *"Dampness and mould may be particularly prevalent in poorly maintained housing for low-income people. Remediation of the conditions that lead to adverse exposure should be given priority to prevent an additional contribution to poor health in populations who are already living with an increased burden of disease*" [page 92].

  Your announcement on 9 February 2023 and letters to all providers of social housing[8] and local authorities[9] (19 December 2022) demonstrated the vital role that Government can play in tackling these problems.

- ***World Health Organization's ("WHO's")*** new air quality guidelines (published 22 September 2021)[10] halved their guideline for $PM_{2.5}$ and slashed another for nitrogen dioxide (NO_2) by 75%. Importantly, the WHO stated "*The present guidelines are applicable to both outdoor and indoor environments globally*" [page roman xx][11]. 'Occupational settings' are excluded e.g. industrial welding where Health and Safety Executive (H.S.E.) and other standards apply.

- ***Chief Medical Officer's Annual Report 2022 on air pollution***[12] (published 8 December 2022) included five recommendations on indoor air. Recommendation 12 says "*Effective ventilation, while minimising energy use and heat loss, is a priority for reducing air pollution, respiratory infections and achieving net zero. This is a major engineering challenge which needs solving."*

  At last, there is official recognition that the long-standing advice to rely on 'fresh air'[13] – which is going to result in large energy costs to warm incoming air in winter and cool it in summer – is not the answer. In any event, many busy locations do not have clean outdoor air. Please bear in mind also that the desired outputs are clean indoor air (not ventilation *per se)* and low energy use.

[6] https://www.cam.ac.uk/research/news/air-filter-significantly-reduces-presence-of-airborne-sars-cov-2-in-covid-19-wards
[7] https://cleanair.london/app/uploads/WHO-Housing-and-Health-guidelines_28-November-2018_Para-8-2-2-pages-94-to-95.pdf
[8] https://cleanair.london/app/uploads/SoS_letter_to_all_providers_of_social_housing-191122.pdf
[9] https://cleanair.london/app/uploads/SoS_letter_to_local_authority_chief_executive_and_council_leaders-191122.pdf
[10] https://cleanair.london/hot-topics/new-who-air-quality-guidelines/
[11] https://cleanair.london/app/uploads/CAL-423-New-WHO-AQGs-220921.pdf
[12] https://www.gov.uk/government/publications/chief-medical-officers-annual-report-2022-air-pollution
[13] https://www.hse.gov.uk/ventilation/overview.htm

The '*major engineering challenge*' that the Chief Medical Officer ("CMO") foresees does not exist because 'heating, ventilation and air conditioning' ("HVAC") engineers and facilities managers have spent decades perfecting solutions to achieve clean air and low energy use in buildings.

For example, a normal HVAC system in a building can remove well over 90% of PM_1 particles in a single circulation simply by using two ePM_1 70% low energy bag air filters complying with standard BS EN ISO 16890:2016 for supply air and one for recirculation air. HVAC systems typically combine 20% outdoor air with 80% recirculation air and achieve five to 10 air changes per hour (i.e. one every 12 or six minutes) to reduce energy use for heating or cooling in similar proportions. HEPA air filters and positive air pressure are the gold standard e.g. in healthcare and biosecurity facilities. Portable air cleaners with HEPA air filters can also be used in hard-to-reach ventilation 'not spots' and in buildings not served by ducted mechanical ventilation.

Clean indoor air is likely to further reduce energy use by preventing the accumulation of dust and fluff on heating and cooling coils (which adversely impacts heat transfer, air flow and pressure drop through heat exchangers). Indeed, this was the original purpose of some old systems.

Regular maintenance is important for all HVAC systems, including ducting, with appropriate degrees of personal protective equipment for the technicians servicing them. Please bear in mind that CAL has seen an open cement bag dumped in ducting on the downstream (i.e. people) side of a sophisticated HVAC system, perhaps by a lazy builder.

Monitoring of energy use and indoor air quality should take place in a building or premises to ensure that positive outcomes are achieved. Where possible, CAL recommends regular monitoring where people live, work or visit to ensure compliance with the WHO's latest air quality guidelines for particulate matter ($PM_{2.5}$ and PM_{10}), nitrogen dioxide (NO_2), carbon monoxide (CO), formaldehyde, volatile organic compounds and carbon dioxide (CO_2). Humidity is also important to monitor.

- ***Cleaner indoor air across the [USA]*** (published 8 December 2022): The CMO's excellent report coincided with further major commitments from the White House (President Biden) to prioritise cleaner indoor air across the United States as an effective tool for reducing the spread of COVID-19 and other airborne diseases[14].

Here's a link to a presentation on indoor air that I gave at a conference for HVAC professionals a few months before the new WHO air quality guidelines were published[15].

Recommendations

CAL asks you please to apply your responsibilities and influence to improve the nation's indoor air and offers five recommendations:

1. focus on the outputs of 'clean air' and 'low energy use' and differentiate between buildings with mechanical HVAC systems and those without (where portable standalone air filters can be used).
2. use the WHO's new air quality guidelines and good practice statements (e.g. for ultrafine particles) to define indoor air quality as 'acceptable', 'clean' or 'good'. New standards or testing protocols

[14] https://www.whitehouse.gov/ostp/news-updates/2022/12/08/fact-sheet-departments-and-agencies-commit-to-cleaner-indoor-air-across-the-nation/
[15] https://cleanair.london/app/uploads/HVN-230321_Final.pdf

are not needed. Regrettably, most current guidelines still refer to the WHO's 2005 air quality guidelines (published in 2006).

3. make the most of existing mechanical HVAC systems. This can be done by using three ePM$_1$ 70% efficiency bag filters in a typical HVAC system filter configuration i.e. as described above. Carbon air filters can be added to eliminate gases such as NO_2 where there is an outdoor air pollution problem e.g. beside busy roads. Good bag air filters should each last 18 months to two years with the second one on the supply air side replacing the upstream one and a new one replacing the second one every nine to 12 months.
4. update all regulations and guidance for indoor air for the new WHO standards and the latest internationally recognised standards. Relevant regulations and guidance include: BB 101[16] (schools); building regulations (e.g. Ventilation, Part F)[17]; HTM-03[18] (healthcare); and forthcoming BSI 40102[19]. Relevant standards include: BS EN 16798-3:2017 (which replaced EN 13779:2007 many years ago)[20]; BS EN ISO 16890:2016 (air filter performance standards for particle removal); BS EN ISO 10121-2:2014 (air filter performance standards for gas removal); and Eurovent 4-23 (updated January 2022) (which has recommendations for air filter applications). BS EN ISO 10121-3:2022 is the recognised standard for the classification of molecular gas filtration e.g. NO_2. It is important that internationally recognised test standards are used for testing and validation e.g. BSI ISO 15714:2019 for the use of UV-C technology. UV-C has many uses but does not remove particles or gases and creates ozone (O_3) when it reacts with oxygen in the air.
5. bear in mind, when you set timeframes for landlords to fix reported health hazards, that Awaab Ishak died aged two i.e. three or four months is more appropriate for action than six.

I would be pleased to explain the technical aspects of the above to your officials.

Building emissions

There is a major opportunity for DLUHC to reduce harmful emissions from buildings using your many levels of influence e.g. the planning system (including the NPPF) and standard setting.

Public and policy attention has been focused, for far too long, on traffic emissions alone (due mainly to the legal limits for NO_2, a toxic gas, matching the WHO's 2005 air quality guideline i.e. they were ambitious in health terms). This is in stark contrast to $PM_{2.5}$ where the legal limit for annual mean concentrations has been two to 2.5 times the WHO air quality guideline since 2008[21]. I mentioned the separate annual emission ceilings for $PM_{2.5}$ at the start of this letter.

Legal action over NO_2 breaches and a tendency by Defra to blame other departments for air pollution problems (e.g. transport) has exacerbated the situation. Action is long overdue by Defra on wood burning (which the Climate Change Committee says should be phased out)[22] and ammonia (NH_3).

CAL points you to several lessons:

- Buildings are directly or indirectly responsible for a large proportion of primary $PM_{2.5}$ and NOx emissions. They are also responsible for the vast majority of greenhouse gas emissions generated

[16] https://www.gov.uk/government/publications/building-bulletin-101-ventilation-for-school-buildings#history
[17] https://www.gov.uk/government/publications/ventilation-approved-document-f
[18] https://www.england.nhs.uk/estates/health-technical-memoranda/
[19] https://standardsdevelopment.bsigroup.com/projects/2021-02350#/section
[20] https://cleanair.london/app/uploads/HVN-230321_Final.pdf
[21] https://environment.ec.europa.eu/topics/air/air-quality/eu-air-quality-standards_en
[22] https://cleanair.london/health/ban-domestic-wood-burning-in-urban-areas/

within a city like London. The London Plan 2021 states that "*London's homes and workplaces are responsible for producing approximately 78 per cent of its greenhouse gas emissions*" [paragraph 9.2.1 on page 343].

- ***Environment Act 2021.*** Unfortunately, the Environment Act 2021 ("EA 2021") was a missed opportunity. In essence, it:

  1. **set weak air quality targets:** the EA 2021 set two targets for the UK to reduce $PM_{2.5}$. One of those is to achieve the WHO's 2005 air quality guideline for annual mean concentrations of $PM_{2.5}$ of 10 micrograms per cubic metre ($\mu g/m^3$) by 2040 where monitors exist. Oddly, section 4(2)[23] of the Environment Act 2021 seems to have been interpreted too 'literally' and far too 'cautiously'.

     Modelling undertaken for the revision of the Gothenburg Protocol, obtained by CAL after the European Commission published a map[24] showing that most of the UK would comply with an annual mean of 5 ($\mu g/m^3$) by 2030, shows that only 8,197 people would be exposed to an annual mean for $PM_{2.5}$ of more than 7 $\mu g/m^3$ by 2030 – as a baseline case.
  2. **imposed new duties on local authorities under 'Local air quality management'**: the EA 2021 increased obligations on local authorities without giving them matching new powers (Section 72 and Schedule 11[25]):

     - *(3) An action plan is a written plan that sets out how the local authority will exercise its functions in order to secure that air quality standards and objectives are achieved in the area to which the plan relates.*

     This is much stricter than the previous requirement under the Environment Act 1995:

     - *(Section 84(2)(b) …to prepare…a written plan (in this Part referred to as an "action plan") for the exercise by the authority, in pursuit of the achievement of air quality standards and objectives in the designated area, of any powers exercisable by the authority.*[26]

     Lord Tope (with Baroness Jones, Lord Randall and Lord Whitty) proposed an amendment to the Environment Bill (amendment 55 in marshalled list 6 September 2021[27]) which would have made a good start in giving local authorities the powers that they need to control emissions from plant and machinery in areas of poor air quality.
  3. **amended the rules for Smoke Control Areas under the Clean Air Act 1993**: Section 73[28] and Schedule 12 of the EA 2021 tightened the penalties for the emission of smoke (to little or no effect) and the rules around the sale and purchase of solid fuel.

- ***Wood burning***. Defra's new national statistics for 'Emissions of air pollutants in the UK 2021' (published on 14 February 2023)[29] identified domestic wood burning as the largest source of total

[23] https://www.legislation.gov.uk/ukpga/2021/30/section/4/enacted
[24] https://cleanair.london/app/uploads/A_Press-release_European_Green_Deal__Commission_proposes_rules_for_cleaner_air_and_water.pdf
[25] https://www.legislation.gov.uk/ukpga/2021/30/schedule/11/enacted
[26] https://www.legislation.gov.uk/ukpga/1995/25/section/84/enacted
[27] https://bills.parliament.uk/publications/42415/documents/613
[28] https://www.legislation.gov.uk/ukpga/2021/30/section/73/enacted
[29] https://www.gov.uk/government/statistics/emissions-of-air-pollutants

UK primary emissions of $PM_{2.5}$ in 2021 at 21% (up from 17% in 2020 and up by 124% between 2011 and 2021). It also admitted breaching the legal limit for total UK annual emission ceilings under the National Emissions Ceiling Regulations 2018 ("NECR") and the Gothenburg Protocol to the UNECE Convention on Long-range Transboundary Air Pollution ("CLRTAP").

You may be interested to know that the Greater London Authority has used its existing powers under the planning system to introduce new guidance on 'Air Quality Neutral'[30] and 'Air Quality Positive'[31] (8 February 2023) that will reduce wood burning and other emissions in new or substantially refurbished properties. CAL would like Metro Mayors to have greater powers and duties to take stronger action sooner to reduce building and other non-transport emissions.

- ***Commercial cooking*** is an important source of $PM_{2.5}$ emissions in cities and towns. Defra's recent analysis and modelling and publications around its air quality targets (9 February 2023) and National Air Pollution Control Programme (10 February 2023) highlighted 'great concern' over the omission of commercial cooking in restaurants and food outlets from their data (page 122[32]).

  Estimates from the London Atmospheric Emissions Inventory 2019 (which is due to be updated shortly) showed that commercial cooking was responsible for 98.25 tonnes/annum of $PM_{2.5}$ out of a total of 184.49 tonnes/annum in the City of Westminster i.e. 53.3%[33] in 2019. This dwarfs emissions from other sectors including road transport (31.53 tonnes/annum i.e. 17.1%).

  A package of measures is needed therefore to address local emissions from commercial cooking including: rapidly phasing out or banning the most-polluting fuels and appliances (e.g. charcoal used for commercial cooking in cities); robust enforcement under the current rules; stricter application of planning and licensing conditions; new rules and regulations; and the promotion of induction and other electric stoves.

Recommendations

CAL asks you please to reduce harmful emissions from the nation's buildings and offers five recommendations:

1. give local authorities and Metro Mayors new powers to control emissions from non-transport sources of pollution so that they can fulfil their new duties under the Environment Act 2021.

2. give local authorities and Metro Mayors powers to require zero or ultra-low emission plant, machinery and appliances in areas of poor air quality e.g. Local Air Quality Management Areas and Smoke Control Areas. This includes:

   - boilers fired by gaseous fuels which have a rated heat power output of less than 1 MW.
   - combined heat and power plant.
   - cooking appliances used in restaurants and food outlets.

[30] https://www.london.gov.uk/programmes-strategies/planning/implementing-london-plan/london-plan-guidance/air-quality-neutral-aqn-guidance
[31] https://www.london.gov.uk/programmes-strategies/planning/implementing-london-plan/london-plan-guidance/air-quality-positive-aqp-guidance
[32] https://cleanair.london/app/uploads/CAL-502-Defra-PM2-point-5-modelling-090223_2302091626_Analysis_of_abatement_options_to_reduce_PM2.5.pdf
[33] https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2019

- domestic cooking appliances.
- fireplaces and wood burning stoves.
- non-road mobile machinery i.e. construction equipment or so called 'yellow plant'.
- solid fuel boilers with a rated heat power of less than 1 MW.
- stationary generators with a rated thermal power output of less than 1MW.

The current controls for Smoke Control Areas were designed to deal with smoke and sulphur dioxide not NOx and PM and those for wood burning are no longer fit for purpose.

Even the City of London (Various Powers) Act 1954[34] said "No smoke should be emitted from premises…". On the spot fines for visible smoke should be a minimum step forward in 2023.

3. specify maximum emission limits (which could be zero) for oxides of nitrogen (NOx) and particle mass and number concentrations for the above with limited exceptions during genuine emergencies.

   This approach would have similarities with the 'exempt appliances' and 'approved fuel' framework already applied by local authorities. The limits should also be technology neutral i.e. a single emission limit should be set for each type of plant, equipment and appliance not looser emission limits for more polluting appliances. Two stage deadlines might be used e.g. 1 January 2028 and 1 January 2030.

   Please also signal ending the sale of most new combustion plant, equipment and appliances by 2030 i.e. following the approach adopted with diesel and petrol cars.

4. update relevant regulatory standards and close lacunas by:

   - introducing zero emission limits for small boilers under the Ecodesign Regulations.
   - closing the regulatory gap between the current Ecodesign and medium combustion plant regulations to tackle emissions in the 500kW to 1MW thermal input range.
   - introducing tighter emission standards for medium combustion plant and generators.
   - scrapping 'empty permits' so that local authorities and Metro Mayors can play a role with the Environment Agency now in reducing emissions from some of the most polluting sources.

5. support energy efficiency (with respect to regulated and non-regulated energy use in buildings) and the development and use of zero air emission technologies.

There is an opportunity for DLUHC to deliver these changes quickly through the planning system, building regulations and other levers. The proposals are not onerous and would provide a clear framework for ensuring that zero and ultra low emission plant and equipment is used and installed in areas of poor air quality.

I would be pleased to discuss this letter with your officials.

Yours sincerely

Simon Birkett
Founder and Director

[34] https://cleanair.london/app/uploads/City-of-London_VP_Act-1954-2.pdf