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‘IAQ lessons for a healthy indoor environment’
CIBSE TM61 (2020). *Operational performance of buildings*
Reducing PM2.5 and NOx levels could save 36,000 lives per year in the UK based on COMEAP estimates.

Estimated cost of air pollution is £20,000,000,000 (COMEAP) annually in the UK alone.

COMEAP (2018). Associations of long-term average concentrations of nitrogen dioxide with mortality

RCPCH (2016). Every Breath We Take. The Lifelong Impact of Air Pollution

Holgate, S. (2018). How important is indoor air pollution in indoor homes?
Research how the pollutant you’re measuring, or monitoring, behaves in the indoor environment; Think about how occupants use the space; Calibrate sensors !!!
Concentration of TDCPP (flame retardant) in cars was found to be 14-2,280 times higher than the concentration in buildings.

Data from 502 buildings from 7 countries shows the mean concentration of a flame retardant in dust (ng/g) is 40-320 times higher than the mean concentration in air (ng/m3).
Benzene has a sweet, aromatic, gasoline-like odour (NIOSH). The AIHA odour threshold is 0.5-313ppm (AIHA, 2013). There are no safe levels for benzene (PHE, 2019).

HFC-245fa is a VOC with a faint sweet odour. There are limited health impacts reported in literature at high concentrations.
Some products, such as carpets, adsorb/retain heavier pollutants (PMs, SVOCs) so cleaning is also an important factor for IAQ (Hyytiäinen et al, 2018).

We found a carcinogenic VOC during spraying of DIY cans of spray foam that wasn’t listed on the safety data sheets (Naldzhiev, 2019).

Hyytiäinen et al. (2018). Crawling-induced floor dust resuspension affects the microbiota of the infant breathing zone.
Houseplants alone – very unlikely to clean air, unrealistic densities are required and ‘real life’ experiments have not worked
Green walls – more likely to clean air, especially active walls for certain VOCs (Gubb, 2019)

So even this set-up would clean the air negligibly … (Waring, 2014)
The optimal air quality strategy is source control.


PHE (2019). Indoor Air Quality Guidelines for selected Volatile Organic Compounds (VOCs) in the UK

CIBSE TM61 (2020). Operational performance of buildings
We need more data to develop robust and holistic IAQ and IEQ metrics. Our design solutions should be based on empirical, scientifically robust, data and not marketing.

Although we are making progress, there are new challenges for designing and building spaces that make people healthier and more productive. We must face these collaboratively and rise to the challenge of delivering a zero carbon built environment that enhances our quality of life.

Salthammer et. al (2010). *Formaldehyde in the Indoor Environment*
Thank you for listening.

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10. Naldzhev et. al (2018). An experimental study of spray foam insulation products-evidence of 1,2-dichloropropane and 1,4-dioxane emissions
11. Hyytäinen et al. (2018). Crawling-induced floor dust resuspension affects the microbiota of the infant breathing zone
15. PHE (2019). Indoor Air Quality Guidelines for selected Volatile Organic Compounds (VOCs) in the UK