Breathing City

Future Urban Ventilation Network

Theme 2 Health-centred ventilation design

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Health-centred ventilation design

- Health can mean different things in different contexts…
  - e.g. WHO: “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”
  - Health often in the context of well-being

- Within FUVN ‘health’ is in the context of ventilation
  - Primary focus is on respiratory health, i.e. minimising the contribution of our indoor spaces to respiratory disease but…
  - Ventilation design should be holistic to ensure:
    - Broad contribution to individuals’ well-being,
    - Contribute to societal well-being via appropriate energy usage

Health-centred ventilation design

- Theme 2 Aim: To stimulate innovations required to deliver good ventilation for occupant health
  - Most our time is spent indoors => indoor exposures matter
  - Occupant health affected by both acute exposures and chronic exposures
    - Acute (short-term) exposures, e.g. Airborne infections arise due to acute exposures
      - We want to help deal with COVID-19 but not entirely focus on COVID-19
    - Chronic (long-term) exposures, e.g. Chronic exposures to PMs linked to poor health like cardiopulmonary disease (CPD)
      - Just as important to FUVN Theme 2

What changes can FUVN expedite in light of the pandemic?

- Educate and engender behavioural changes in ventilation
  - National, to building, to individual level
- Evidence and highlight co-benefits
  - Reduction in the wider burden of airborne disease
  - Impact on other diseases, e.g. asthma, etc…
- Highlight ‘value added’ of good ventilation – cognitive, well-being
- Motivate and guide retro-fit of ventilation provision
- Help engender change in priority of ventilation within building design and construction

What can manage/determine exposures?

- Occupants
  - Activities/their health/behaviours
  - Interventions in ventilation intended/unintended
- Building design, fabric and furniture
- Room level solutions and building system level solutions
- Outdoor air supply
  - Mechanical contributions and/or natural
  - Pollutant source?
- Heating and cooling
  - How/where our indoor spaces are heated/cooled affects airflow patterns within
  - Thermal comfort and energy
- Air cleaners
  - Filters (particle/activated carbon)
  - Ionisers
  - UV

Fluid dynamics links between all these aspects (and more) – **Understanding is critical!**

Plans for Theme 2 within FUVN

- Develop an evidence base for key health and exposure parameters
- Review occupant exposure in the context of health and interactions with both ventilation and occupant behaviour
- Consider how the fluid dynamics of airflows can relate to uncertainty in occupant exposure, and the implications for ventilation design – *call for small scale research projects*
- Co-create research projects for holistic health-centred ventilation design focused on indoor environment quality at a range of technology readiness levels

In the immediate…

- We've formed a working group and meet monthly
  - If you have an interest in health-centred ventilation design then please:
    - Join the FUVN mailing list
    - Email h.burridge@imperial.ac.uk if you'd like contribute to the theme 2 working group
    - Participate in our chat on Xleap today…

Theme 2 Health-centred ventilation design

Challenges and questions…

- How can we evidence the links between indoor exposures and health outcomes?
- Can buildings be monitored to determine both acute and chronic exposures of occupants or is this the wrong approach?
- How do we strike the balance between removing pollutants from indoor sources and increasing exposure to urban pollutants and/or energy consumption?
- Where, when and by which methods can air cleaning be an ‘efficient’ thing to do?