Draft for a Health-related Performance Assessment Framework for Smart Ventilation

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How to assess, score and check the performance?

Which pollutants?
Which sources?

Design phase development
Simulation
• High resolution
• Assumptions

In-situ performance
Measurements
• Low resolution
• Actual values

Metrics
Key principles

Occupant-centric
  • Exposure concentration (not room concentration)

Double check
  1. Pass or fail: absolute limits
     • Maximum exposure concentration
     • Maximum (yearly) intake
     • Life-time average daily dose (HQ, LCR)
     • Better than reference systems
  2. Scoring
     • Metrics that allow relative rating
     • Energy-use
     • Disability adjusted life-years (DALY)

Applicable at different data resolutions

Which pollutants?
Which sources?

Proposed method

1. Measurement campaign
2. Identify pollutants of interest
   • Filter based on occurrence, concentration level and health impact
3. Identify sources
   • Occupants
   • Occupant activities
   • Building - furniture
1. Measurements
2. Identify pollutants
3. Identify sources

Add pollutants/sources to simulation framework

Design simulation framework

Evaluate pollutants for scoring

Identify other pollutants

Feedback:
New emerging pollutants?
Rising concentration levels?
New sources?

Case Belgium
Minimum performance metrics

Minimum performance metrics: occupant specific
Relative performance metric

Disability Adjusted Life Year (DALY)
- Metric of harm
- Sum-able
- Based on Logue et al. (2011)
- ID & IND method

2.

Formaldehyde
Benzene
Limonene
Naphtaliene
Toluene
PM2.5
NO2
Ozone
3.

Formaldehyde
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Limonene
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Occupant
Activities
Construction materials
Furniture
Outdoors

Formaldehyde exposure concentration (µg/m³)

Time (days)

Dref  Dsmart
Dsmart and Dref. The text mentions DALYs due to formaldehyde exposure, with a note of +4.6 DALYs.

The diagrams show the comparison between Dsmart and Dref over time (days) with a focus on formaldehyde exposure. The table notes HQ and LCR with corresponding checkmarks.
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