

Theme 1 Coupled indoor-outdoor environments

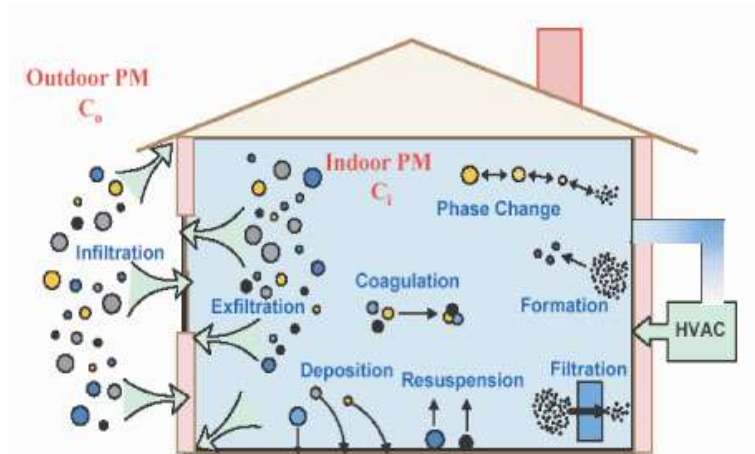
Theme Leads: Malcolm Cook and Maarten van Reeuwijk

Aims

To identify all mechanisms for ingress and egress of pollutants in buildings

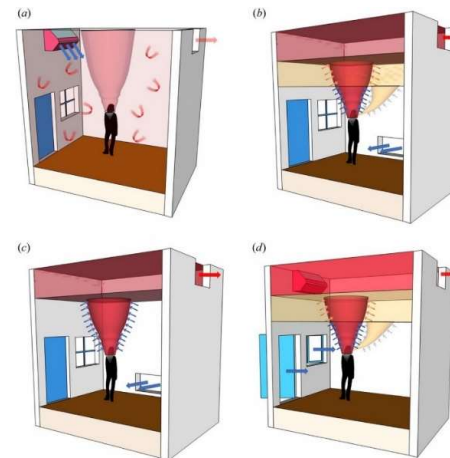
To assess the tools and techniques for quantifying this air exchange





<https://www.netl.doe.gov/node/3142>

Emission sources, conversion, deposition



[Bhagat et al., Journal of Fluid Mechanics 2020](#)

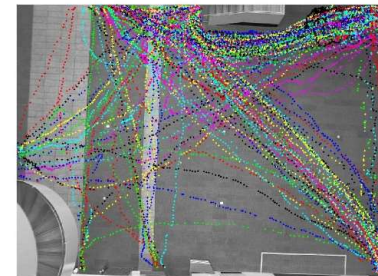
Indoor flow and stratification



Human interventions



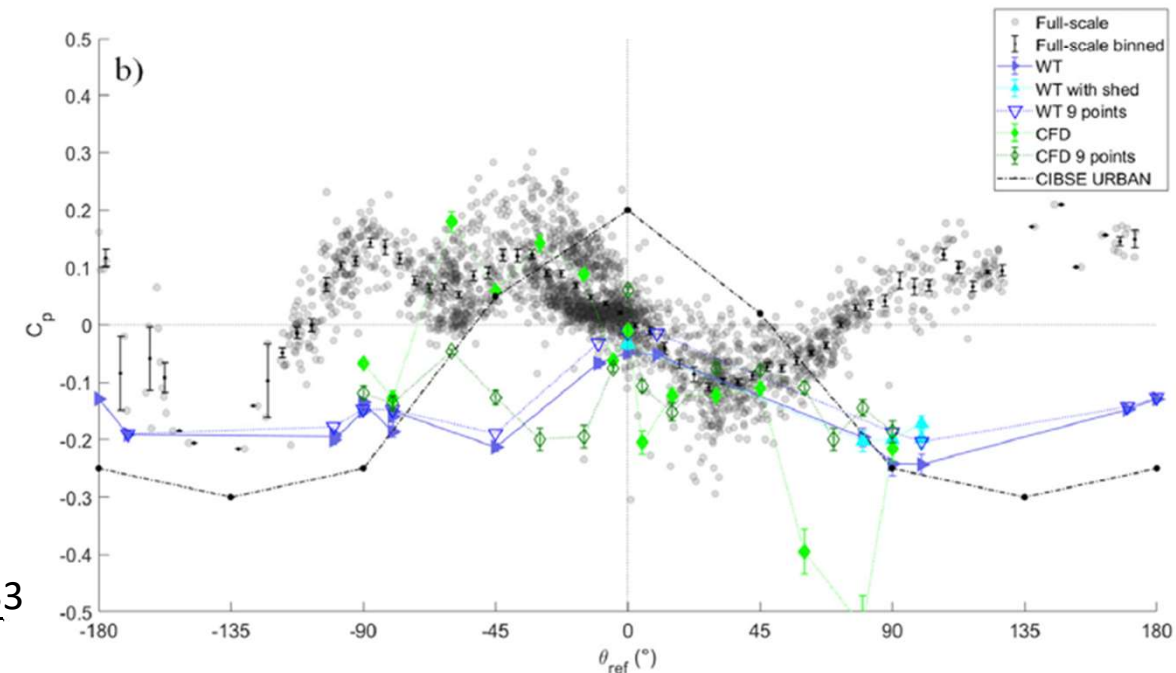
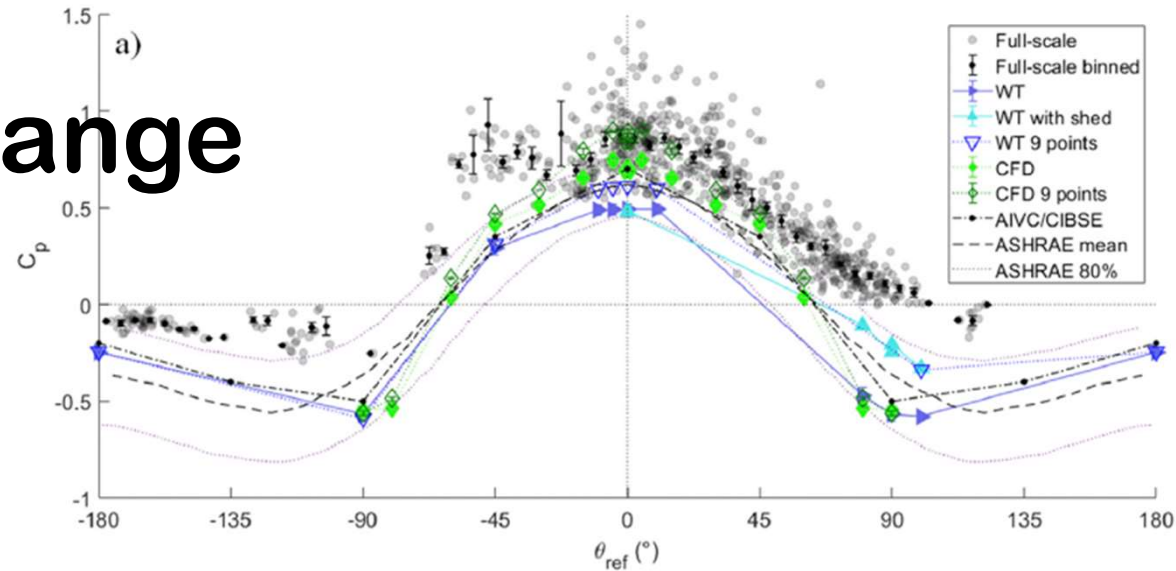
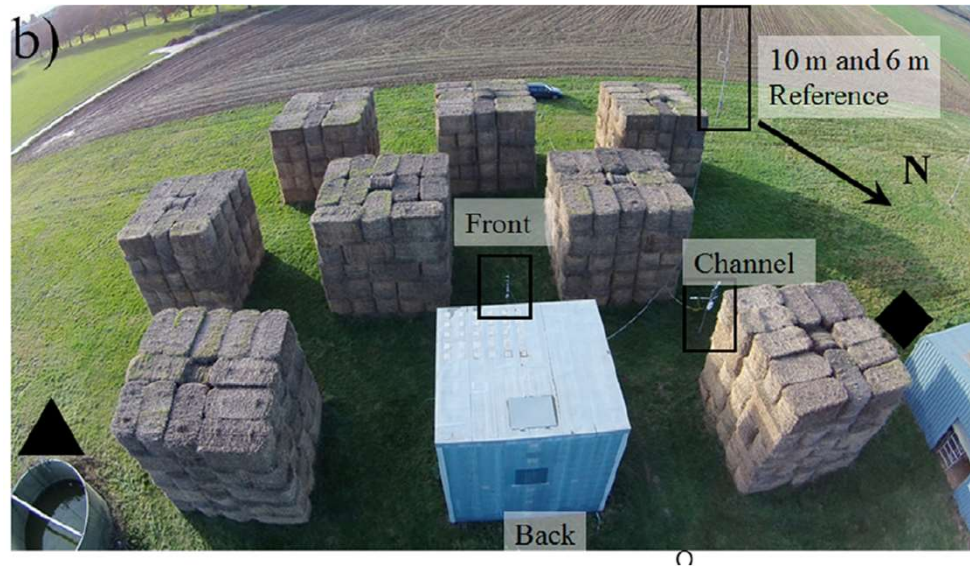
Health implications



Personal exposure



Indoor-outdoor exchange



Gough *et al.* (2019). J. Wind Eng. Ind. Aero. 189 (2019) 22–33

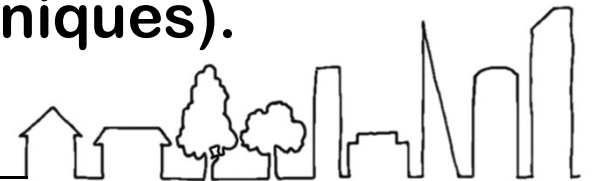
How?

- Through three **co-creation workshops**, involving practitioners, policy makers, regulators and researchers
- By drafting a **position paper** which presents the issues of concern, current state-of-the-art, and opportunities in simulating coupled indoor-outdoor environments
- Development of a **roadmap** (icw other themes)
- Via **funding** of small-scale research activities



Indoor-outdoor exchange questions

- (i) the **technical requirements** for models from a health, ventilation, design and regulatory perspective;
- (ii) Collate **available models and data sets** and their strength/weaknesses;
- (iii) approaches to characterise **human behaviour** within flow models (control, intervention);
- (iv) systematic differences in indoor-outdoor exchange for **building types** for specific vulnerable groups (e.g. hospitals, schools, homes, community centres);
- (v) **Trade-offs** with other requirements (energy, comfort, noise...)
- (vi) opportunities arising from **technology advances** (wearable sensors, digital twins, machine learning techniques).



Get involved

- We plan to set up a working group which meets regularly
- If you are interested in joining, please contact mvr@ic.ac.uk (Maarten) or malcolm.cook@lboro.ac.uk (Malcolm).

