HESTIA Network Launch Event

Home **E**nvironment **S**olutions through **T**echnology and **I**nnovation for **A**ll: **HESTIA**

15th January 2026

Welcome and opening remarks

Chair: Douglas Booker

- Welcome from the University of Leeds – Cath Noakes

- Welcome from the Project Lead – Douglas Booker

Welcome from the University of Leeds

Welcome from the Project Lead

- Bring together investigators, project partners, interested researchers, and stakeholders to scope out the key elements of our three scientific themes
- Co-create and co-produce the research priorities of the sandpit

Overview of the day

HYBRID SESSION

9:30 – 10:00 Registration + tea/coffee/pastries

10:00 – 10:10 Welcome and Opening remarks

10:10 – 11:10 Keynote Speakers

11:10 – 11:30 Mid-morning refreshment

11:45 – 12:00 EPSRC Micro Network presentations

12:00 – 1:00 HESTIA Network Overview

AFTERNOON IN-PERSON SESSION

1:00 – 2:00 Lunch + networking

2:00 – 3:30 World Café activity

3:30 - 3:50 Tea, coffee + cake

3:50 - 4:50 Scoping HESTIA's activities

4:50 - 5:00 Closing remarks

Keynote Speakers

Chair: Amber Yeoman

- Rosamund Adoo-Kissi-Debrah, The Ella Roberta Foundation: “Clean Air for All"

- Brian Horne, Energy Saving Trust: “Beyond Whole House Retrofit: what we have learnt so far from the development of home retrofit thinking”

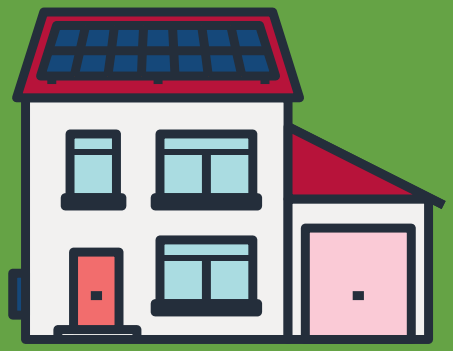
- Marcella Ucci, UKIEG/UCL: "Health, equity and housing: engineering indoor environments via a socio-technical lens"


CLEAN AIR
FOR ALL
The
Ella Roberta
Foundation

energy saving trust

Beyond Whole House Retrofit

What we have learnt so far from the development of home retrofit thinking



Brian Horne

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Contents

Introduction

Energy Saving Trust is an independent organisation working to address the climate emergency by empowering millions of householders every year to make better energy choices.

Reducing carbon emissions from home energy use is our primary aim, but....

I am Technical Knowledge Lead and I'm responsible for ensuring our advice is accurate, appropriate and consistent. I've been working at Energy Saving Trust for 16 years, and in energy advice for 36 years.

Fabric First

"We should prioritise improvements to the fabric of the building before spending money on expensive low carbon heating systems and generation."

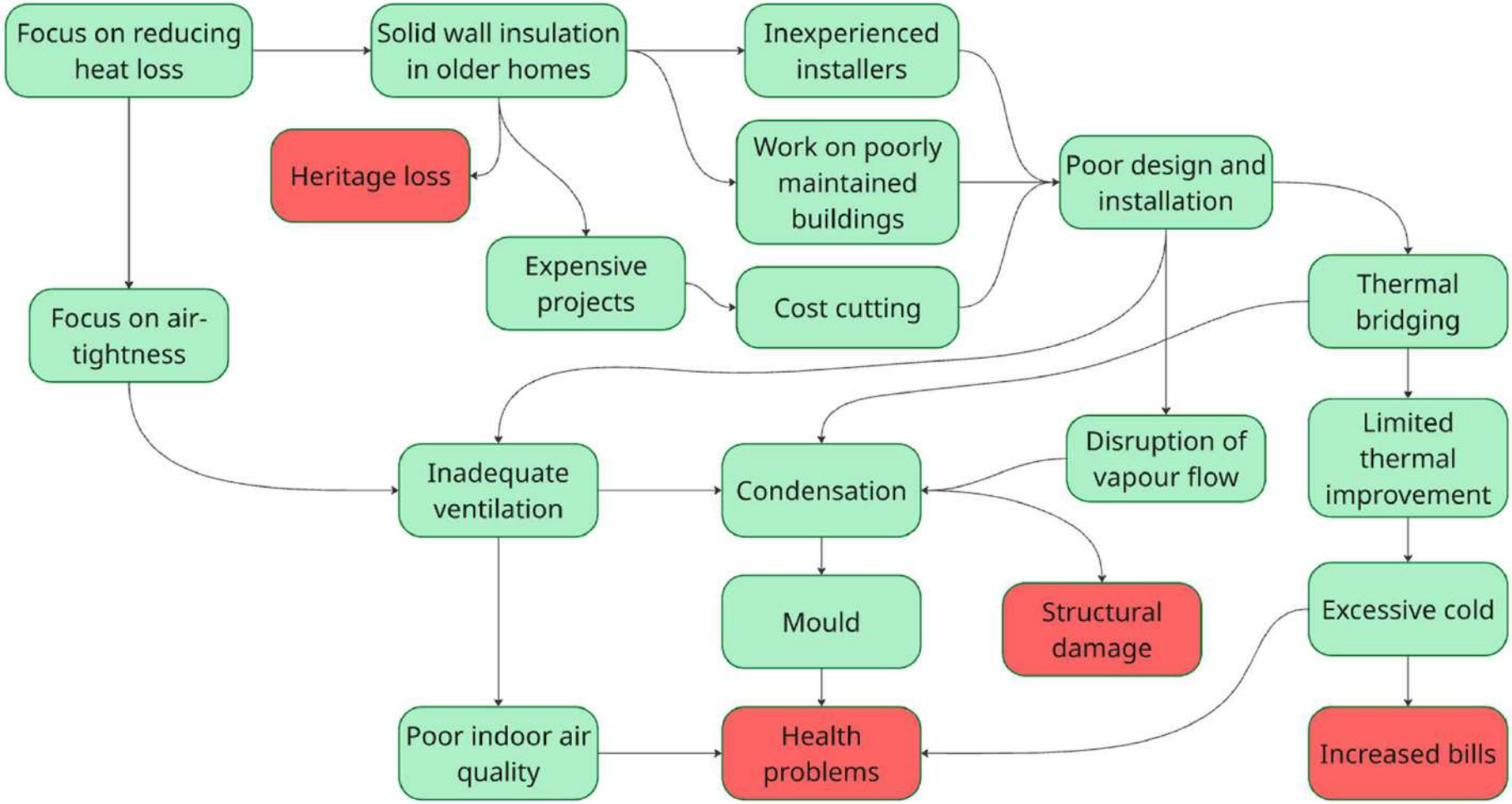
A rule of thumb developed when most homes could benefit from cheap and low risk fabric improvements, and when low carbon technologies were very expensive and difficult to fit.

Intended to maximise financial and carbon savings per pound spent.

Fabric First - issues

- Has become viewed as an immutable law, rather than a rule of thumb
- Has become less and less appropriate as a rule of thumb as:
  - the number of easy win measures has decreased
  - the cost of low carbon heating and generation has decreased
- Has focused attention on fabric improvements that are expensive, difficult and risky, leading to…..

Unintended consequences



Whole House Approach

"We should look at the whole building when planning and implementing retrofit, to ensure that all the improvements we make work together successfully to achieve the desired result."

A guiding principle, intended to encourage more holistic thinking and greater planning in home retrofit, and so minimise the risk of unintended consequences.

PAS 2030 and 2035 are standards that were developed to encourage and enable this approach.

Whole House Approach - issues

Multiple definitions and interpretations:

- Some include Fabric First as a fundamental principle in Whole House Approach, without clarifying how it should be applied
- Some interpret it as needing to do a full deep retrofit in one go
- Some highlight the multiple impacts of retrofit and the need to balance these, while others simply focus on the interaction between elements as part of an energy system
    - This can enable focusing on one outcome e.g. carbon reduction, while still claiming to take a whole house approach

Whole House Approach - issues

Additional cost limiting uptake:

- PAS 2035 in particular prescribes a process with multiple qualified and certified personnel involved
- WHA is not a legal requirement for any retrofit project
- PAS 2035 is a requirement for many funding schemes, encouraging tick box compliance

Beyond Whole House

"We should look at the whole building, and at **all** the potential impacts on occupants, society and the environment, when planning and implementing retrofit, to ensure that all the improvements we make work together successfully to achieve the desired results for **everyone**."

Some definitions of Whole House are this comprehensive, but some are not, so the term Whole House Approach is inadequate to describe it.

Beyond Whole House – impacts to consider

Energy bills
Carbon emissions
Moisture risk to the building
Mould risk
Internal air quality
Local air quality
Comfort

Aesthetics
Heritage
Excess cold
Property value
Homeliness
Functionality
Ease of use

Beyond Whole House - barriers

- What do we call it?
- How do we avoid dilution?
- How do we encourage it?

Beyond Whole House - names

Whole household approach
Whole home retrofit
Whole planet retrofit
Broad context retrofit
Whole community
Whole society approach
Whole system approach
Wholehearted retrofit
Whole scope renovation
Broad scope renovation
Broad perspective
Full perspective
Combined consequence
Impact based approach

360 degree retrofit
Comprehensive retrofit
Integrated retrofit
Holistic retrofit
House-as-a-system retrofit
Systems-based retrofit
Integrated building retrofit
Coordinated retrofit approach
Outcome-oriented retrofit
Future-proof retrofit
Resilient retrofit
Package retrofit
Retrofit package approach
Bundled retrofit measures

Coordinated retrofit pathway
Whole-journey retrofit
Whole-house decarbonisation
Integrated refurbishment
Building performance retrofit
Comprehensive energy refurbishment
Whole-home upgrade
Full home makeover
Complete home upgrade
Entire house renovation
Big-picture retrofit
Joined-up home improvements
Full-scale home improvement
Health-equity-centred engineering approach

energy saving trust

Thank you

Health, equity and housing: engineering indoor environments via a socio-technical lens

Hestia Network Launch, Leeds, 15 Jan 2026

Prof Marcella Ucci, Professor of Healthy and Sustainable Buildings

UCL
THE BARTLETT
INSTITUTE FOR
ENVIRONMENTAL DESIGN
AND ENGINEERING

Introductions: Hello!

- Professor in Healthy and Sustainable Buildings, UCL
- Director, UCL Institute for Environmental Design and Engineering (Nov 2025-now).
- Vice-Chair, UKIEG (previously Chair, 2012-2017 – Committee member since 2005)
- Co-Chair, CIBSE's Health and Wellbeing Working Group
- Architecture Degree (Italy), MSc EDE (2003), PhD Bartlett (2007).
- Research focus: how buildings should be designed, upgraded and managed in order to support health and wellbeing, tackle inequalities and reduce environmental impacts

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UK Indoor Environments Group

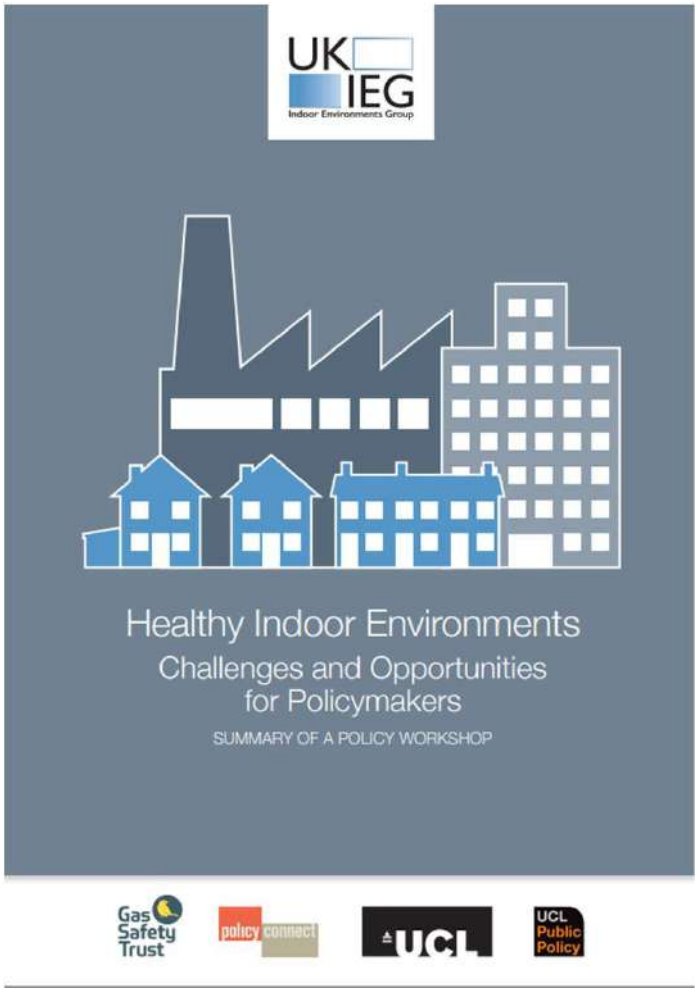
- Set up in 2003, to co-ordinate and provide a focus for UK activity concerned with improving indoor environments for people.
- We are a unique, independent and impartial multidisciplinary network of professionals working in the indoor environment field.
- We are committed to promoting the development, synthesis, dissemination and application of evidence relating to policy and practice in the UK indoor built environment, with the ultimate aim of improving health and wellbeing.

UK Indoor Environments Group

- Network overseen by UKIEG Committee
- Currently approx. 300 members (membership is free!)
- Annual Scientific Conference (2025's was in Leeds)
- Newsletter
- Partnerships -e.g. events or activities
- Working groups
- http://www.ukieg.org/

Policy Workshop: Reflection on Recommendations

- A **lead Government Department** should be designated to head up development of national strategy and policy, and co-ordinate cross-government department work on the issue of health and wellbeing in the indoor environment.
- The **UK Research Councils should recognise that the cross disciplinary nature** of this issue does not readily fit into Research Council funding briefs. Therefore, there is a need to establish a framework for calls for research in this area.



March 2017

https://ukieg431081511.wordpress.com/wp-content/uploads/2022/02/ukieg-summary-report-low-res-pdf.pdf

UKIEG Conference 2021

Indoor Environmental Quality for Healthy Buildings: the Indoor / Outdoor Interface

JUNE 24th 2021 Online Conference

10:00	**WELCOME**	
10:00	Welcome (Dr Monica Mateo-Garcia, BCU)	
10:05	Welcome & Chair introduction (UKIEG)	
Session 1. SPF CLEAN AIR NETWORKS		**Chair: Dr Marcella Ucci**
10:10	**UKRI SPF Clean Air Networks**	BioAirNet, CleanAir4V, Breathing City, TAPAS, HEICCAM and TRANSITION
	BioAirNet Dr Zaheer Nasar CleanAir4V Dr Christian Pfrang Breathing City Prof Catherine Noakes TAPAS Prof Paul Linden HEICCAM Prof Ruth Doherty TRANSITION Dr James Levine	
11:10	Panel debate	

HBN LEEDS **UKIEG 2025** About | Healthy Buildings Network | Keynotes | Program | Venue | Registration

UK IEG Indoor Environments Group

12:30 - 13:00 | Networks and Research Funding Session

Chair: Dr. Issie Myers - Independent Consultant - Health, Policy and the Environment

Brief presentations from representatives of new research networks (5 minutes each):

- HESTIA Network – Doug Booker
- CHILI Hub – Niloofar Shoari
- INHABIT Hub – Ruth Doherty
- HEARTH Research Hub - Rajat Gutpta
- Indoor PM network – Sierra Clark and Abigail Hathway
- Breathe In – Bruno Fraga

Recent News: UKIEG is proud to partner with new EPSRC micro-networks to organise and host a monthly seminar series on Healthy Indoor Environments.

COMEAP's statement (Dec 2025) – summary of recommendations

- […] there is a need for more comprehensive information on the types and concentrations of pollutants in indoor environments in the UK, and the risks that they pose to health. **A coordinated programme of measurements could make an important contribution to this knowledge; this could be achieved by establishing an Indoor Air Quality Observatory to undertake this role**. Nonetheless, **a complementary national programme of research funding** is also likely to be needed. We recommend **a focus on pollutants which are known to be hazardous to heath**, in order to facilitate an assessment of the level of risk and to allow interventions to be prioritised appropriately.

- An **integrated approach should be used to assess policies and interventions intended to mitigate climate change or to improve indoor or outdoor air quality**, in order to avoid unintended consequences and to maximise co-benefits to health. **The reactivation of a cross-Whitehall working group on indoor air quality** could play an important role in this, and in co-ordinating efforts to address health effects attributable to indoor air pollutants. We think **that applying the interventions hierarchy – prioritising prevention of emissions** – would be most effective in improving indoor air quality.

https://www.gov.uk/government/publications/comeap-response-to-aqeg-report-on-indoor-air-quality

Hitting the target: engineering approaches and health based metrics

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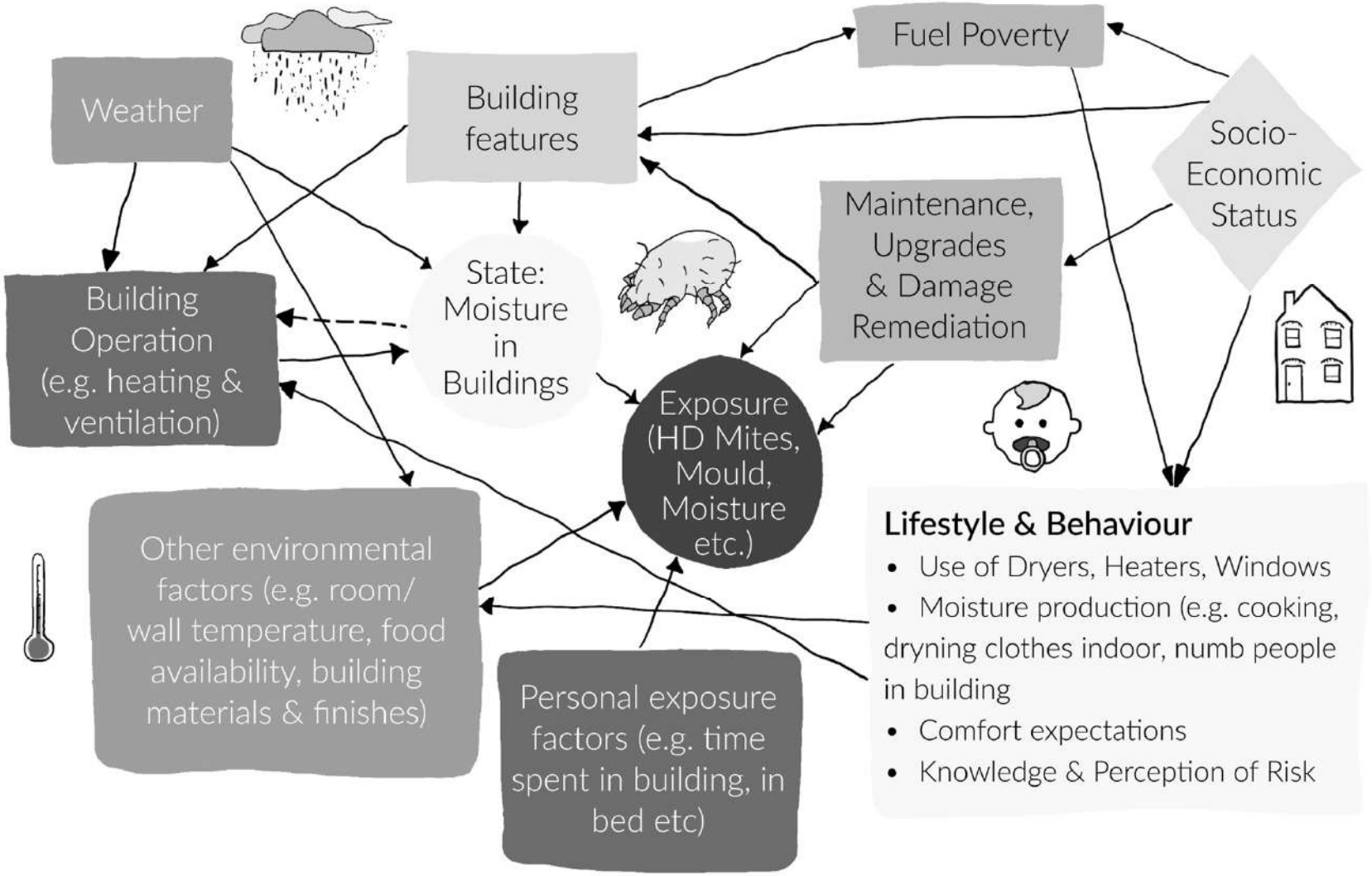
ENERGY AND RESOURCES

Socio-technical problems – damp/mould as example



Ucci, M., 2020, **Future-proofing residential environments for children's wellbeing:** A review of evidence and design implications, in: Boyko, Cooper and Dunn, *Designing future cities for wellbeing,* Abingdon; New York: Routledge.

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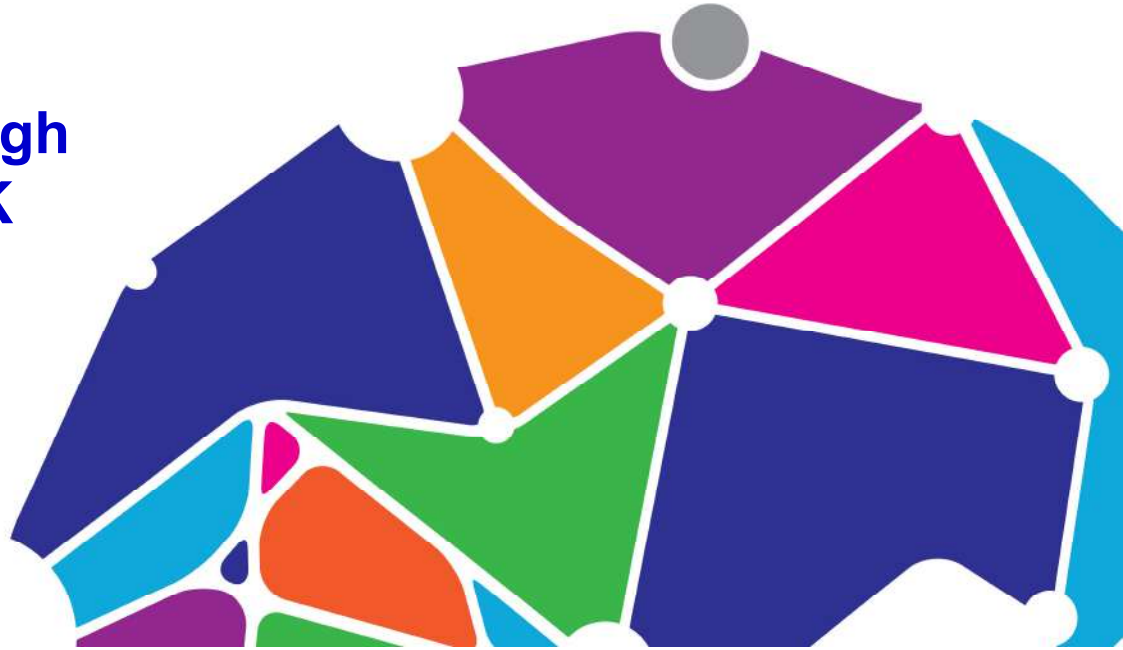
ActEarly: a whole system, City Collaboratory approach to early promotion of good health and wellbeing

"Test beds": Tower Hamlets and Bradford

Five year project on reducing upstream determinants of childhood health inequalities, funded by the UK Prevention Research Partnership

Exploring the Interactions between Housing and Neighbourhood Environments for Enhanced Child Wellbeing

The Lived Experience of Parents Living in Areas of High Child Poverty in England, UK



Ucci, M. et al. *Int. J. Environ. Res. Public Health* **2022**, *19*, 12563. https://doi.org/10.3390/ijerph191912563

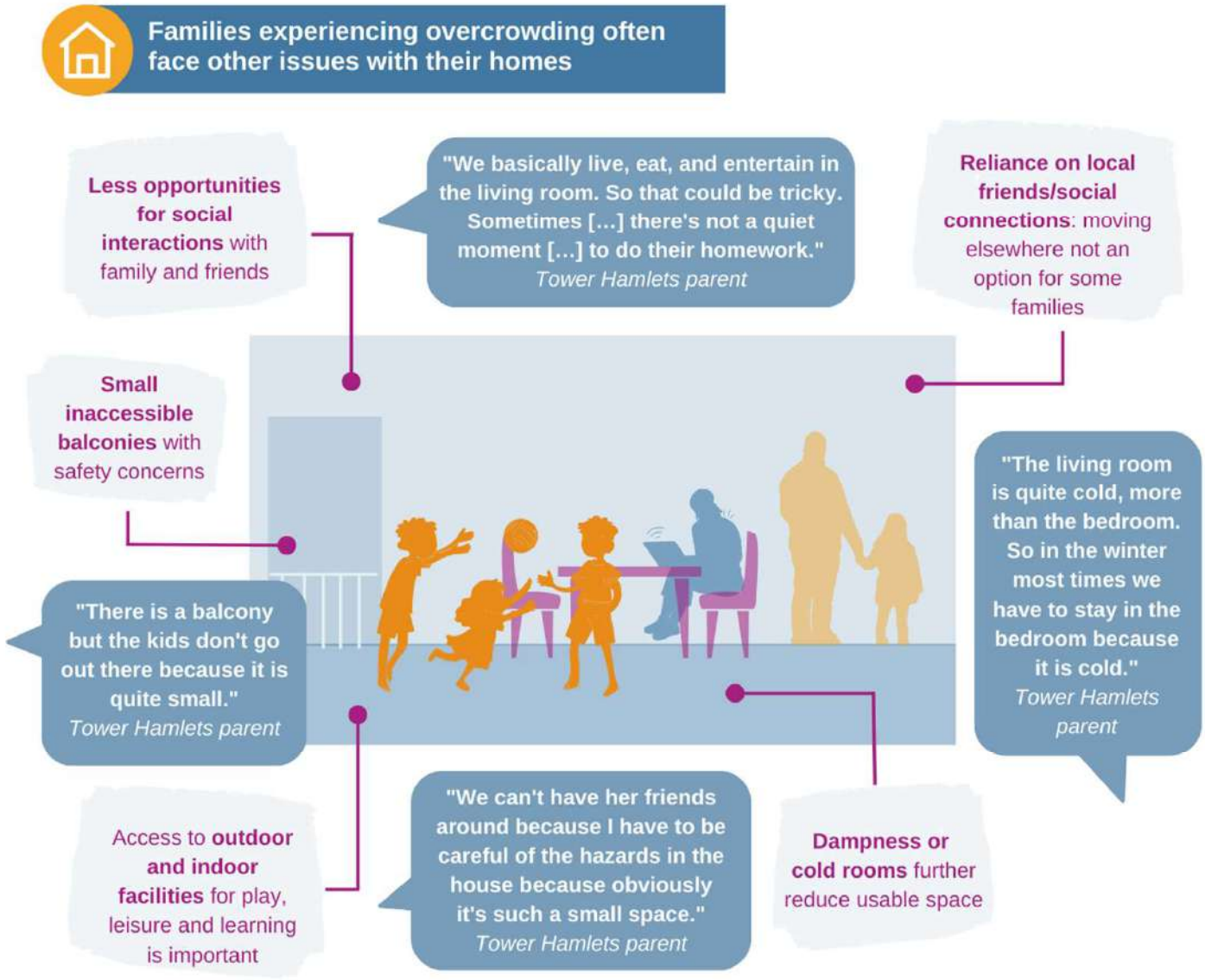
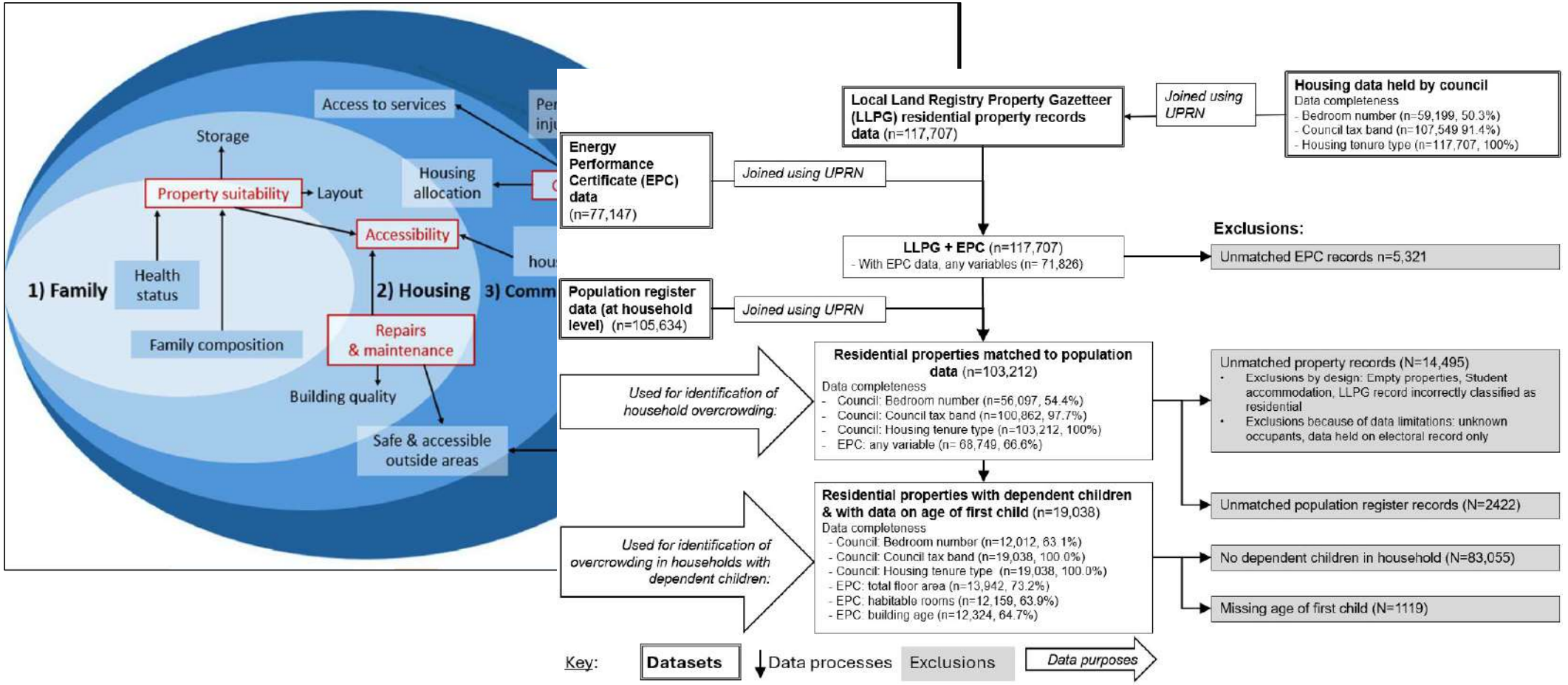


Figure 4: Overcrowding issues reported by parents

Combining data to identify families at risk of the harmful health effects of overcrowded housing – a feasibility study (NIHR)



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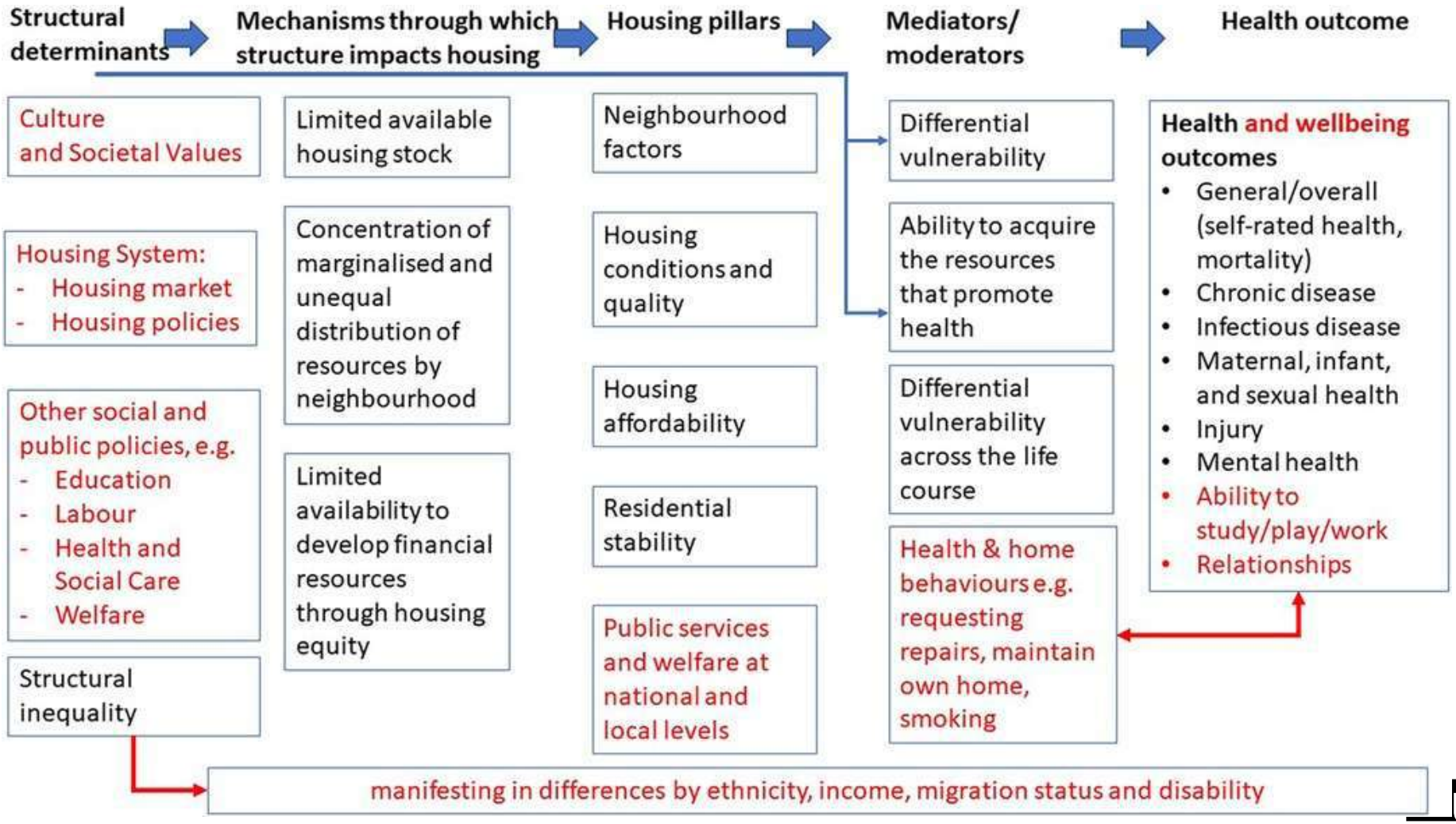
Adaptation of Conceptual Model: Housing as a determinant of health equity



Adaptation from Swope and Hernandez (2019), Conceptual model of the impact of housing on health inequalities, for a UK urban context. In: **Understanding placed-based pathways by which housing is related to health inequalities: a qualitative interview study in London, 2024**

Other Ongoing work

- NIHR-funded project on evaluating net-zero retrofit and health, led by Born in Bradford (started July 2025)
- Lancet Series on Health Equity in Cities
- Book on Retrofit and Health? TBC!
- Co-Charing the CIBSE Health and Wellbeing Working Group: Guidance on health/wellbeing and net-zero

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Health and Wellbeing Guide for Net Zero, TM Guidance - scope

This Technical Memorandum (TM) provides guidance on considering and addressing the impacts on health and wellbeing of a focus on Net Zero in buildings.

Whist detailed technical guidance on specific aspects of health, wellbeing and Net-Zero in buildings exists and is cited in this document, this TM aims to identify:

- potential synergies and conflicts between health/wellbeing and Net-Zero approaches,
- benefits of considering synergies/conflicts throughout the design and operational stages, so to avoid unintended consequences of single-focus approaches;
- design and operational recommendations;
- current guidance and technical standards in relevant area.

Principal Authors:
- Milena Stojkovic (AtkinsRealis)
- Jiannan Luo (Foster+ Partners)
- Marcella Ucci (UCL)
- Anna Mavrogianni (UCL)
- Emma Gibbons (UCL)

Structure of the Document (Section 2-4)

Environmental Factors

- Indoor Air quality
- Moisture and Mould
- Thermal comfort
- Construction material selection
- Light and lighting
- Noise and sound
- Water

Wider Societal & Environmental Considerations

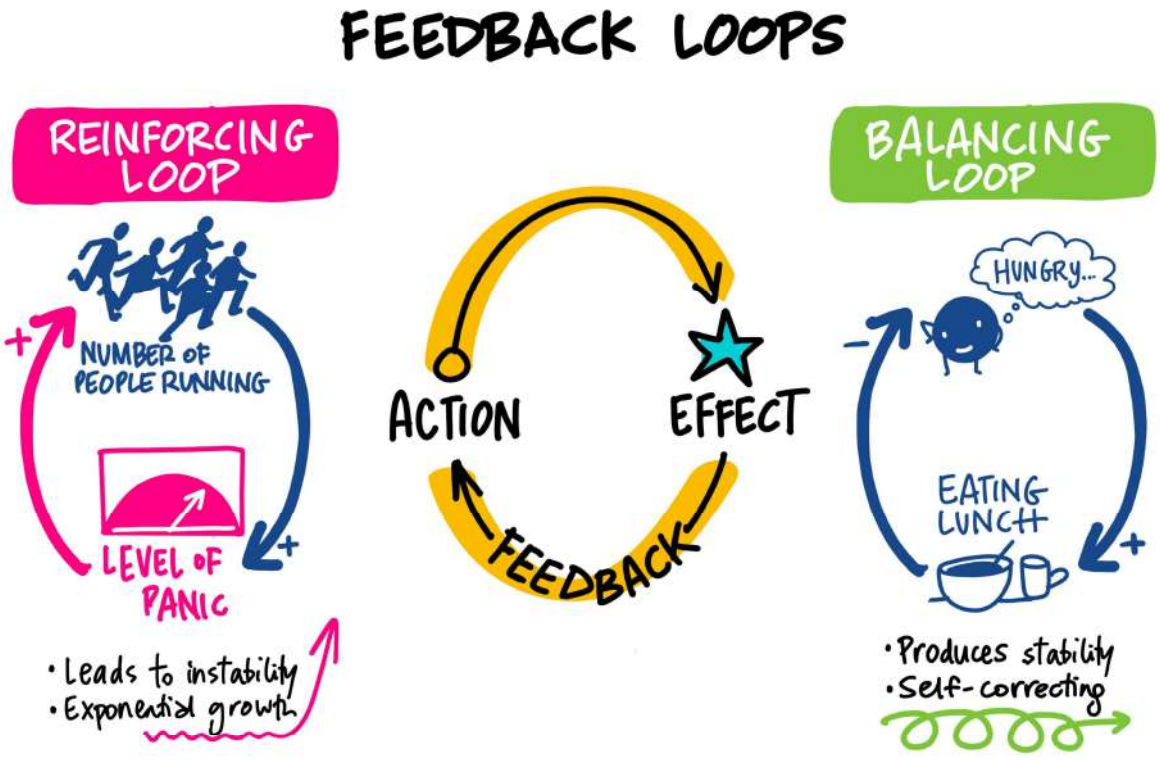
- Resilience to climate change
- Inclusive design
- Flourishing: biophilia, active design etc.
- Social value
- Outdoor Environmental Quality
- Building Certifications
- Equity
- Density, crowding and space use

Summary of Design and Operational Recommendations

- Design ‘checklist’
- Operational ‘checklist’

NB: whenever possible we consider a whole life, systems approach, including importance of performance evaluation/monitoring, commissioning etc.

Systems questions - Feedback Loops?



Reflections…

- We need more data – some already available but needs to be “linked”. Assessing existing data and its quality?
- Co-production of commonly agreed metrics – building/exposure/health
- Engineering approaches need to be ‘scaffolded’ by socio-technical lens
- Interdisciplinary and transdisciplinarity – co-production with stakeholders
- Size matter(s), and silver bullets

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Concluding Remarks

- Current engineering approaches to defining IEQ are not always underpinned by "health"-relevant indicators (and equity is also not directly embedded)…
- We need more evidence of what happens when things go well? How can measure/demonstrate the wellbeing and equity gains that might be achieved with optimal housing design and operation.
- Applied research is mostly focusing on "minimum level of environmental conditions" to reduce hazard exposure, instead of striving for wellbeing.

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Extracts from WHO's Constitution

•Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

•The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.

https://iris.who.int/bitstream/handle/10665/350123/9789240039384-eng.pdf?sequence=1

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Thank you for listening

m.ucci@ucl.ac.uk

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EPSRC Micro Networks

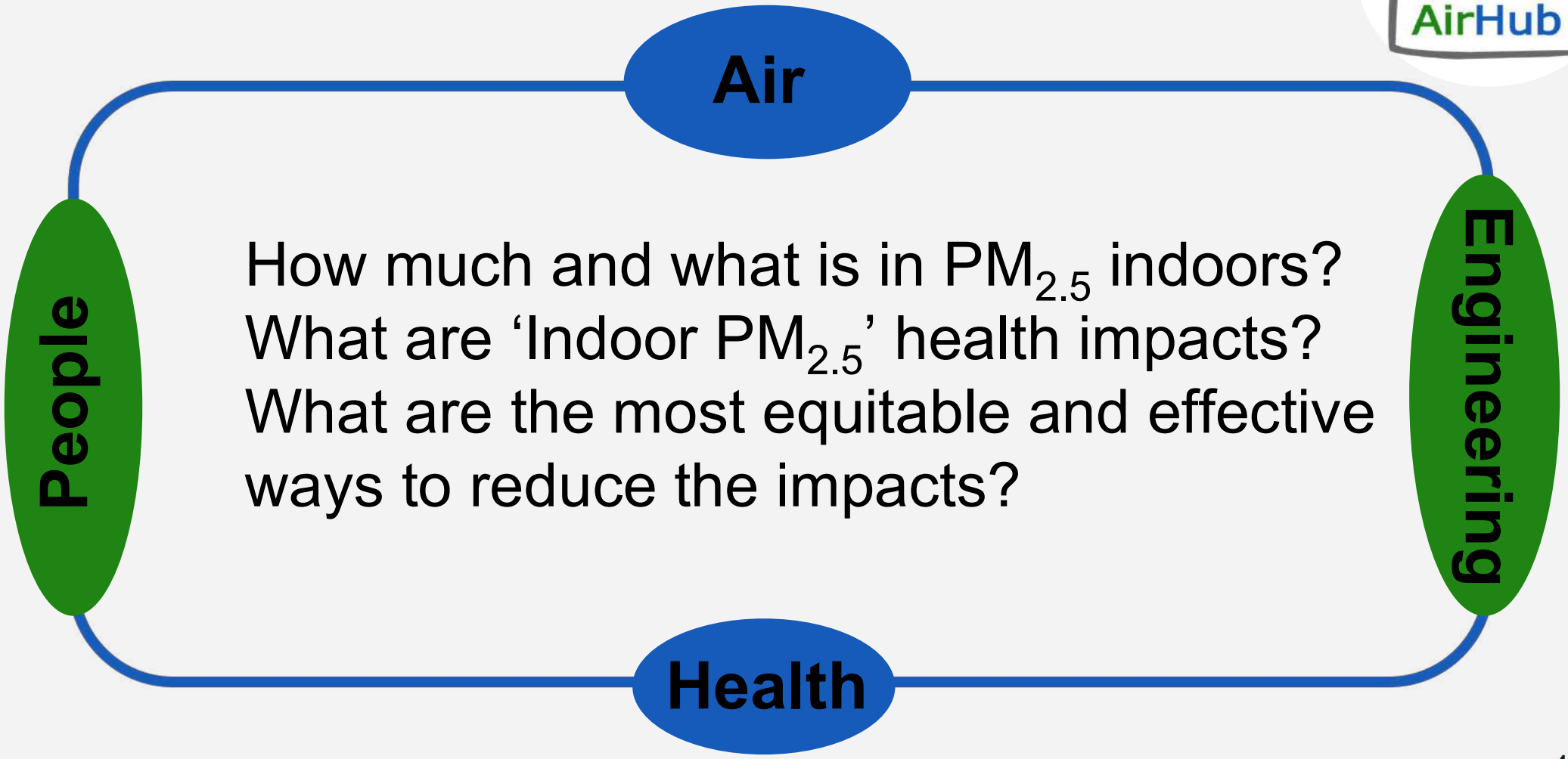
Chair: Suzanne Bartington

- AirHub – Abigail Hathway
- BreatHE IN – Suzanne Bartington
- GREEN IN – Prashant Kumar

Air Hub: Engineering healthy indoor environments

Dr Abigail Hathway

Our Focus - $PM_{2.5}$ Indoors



How much and what is in $PM_{2.5}$ indoors?
What are 'Indoor $PM_{2.5}$' health impacts?
What are the most equitable and effective ways to reduce the impacts?

Impact Panel

Co-creation workshops

Webinars

Health impacts of indoor particulate matter
Online
5th Feb

Workshops including:

What do we know about indoor Particles

How can you link with cohort studies

Best practice in ethics of indoor air research

Designing technology for peoplee

ECR – online coffee – Training - Networking

Sand-pit
Attendance by application
8-9th July

Conference

Research Road Map

The team

Leadership and Researchers


Abigail Hathway


Sierra Clark


Jonny Higham


Chantelle Wood


Sarah West


Gergo Baryani


Heather Elphick


Simon Johnston


Ellie Haimes


Ciara Higham


Rhys Archer

Partners

Swansea University Prifysgol Abertawe

UCL

NHS Sheffield Teaching Hospitals NHS Foundation Trust

Newham London

UK IEG

NIHR | Health Determinants Research Collaboration Doncaster

Sheffield Children's NHS Foundation Trust

Doncaster Council

Sheffield City Council

BARNSLEY Metropolitan Borough Council

University of York

University of Sheffield

University of Liverpool

University of Leeds

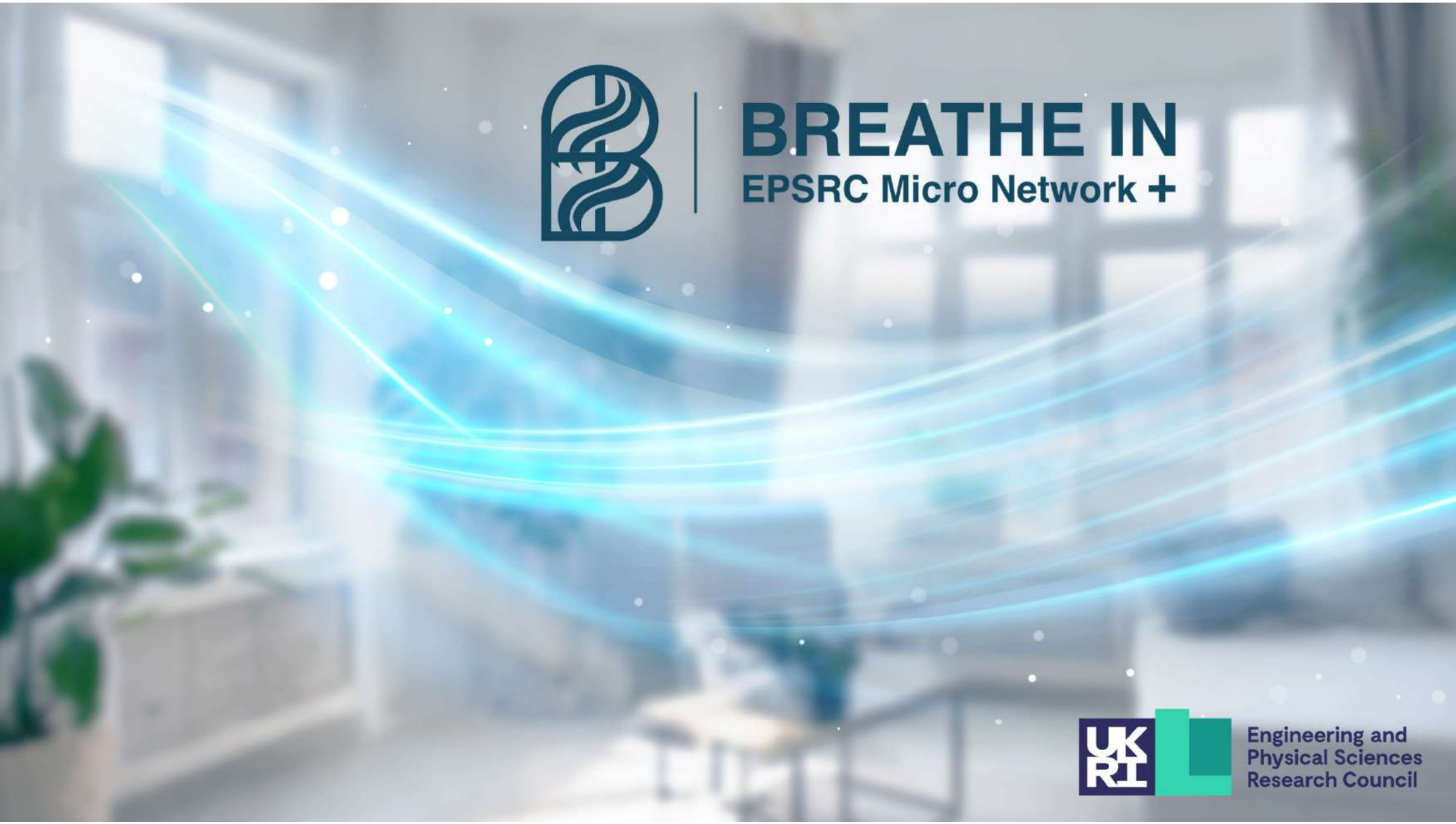
City St George's University of London

Join us…..

air-hub.org.uk

Linked-in

Blue Sky


BREATHE IN
EPSRC Micro Network +
UKRI
Engineering and
Physical Sciences
Research Council

BreatHE IN Team

Dr Bruño Fraga

Prof Sonia Antoranz Contera

Prof Christian Pfrang

Prof Zhiwen Luo

Dr Suzanne Bartington

Partners and Advisory Board:

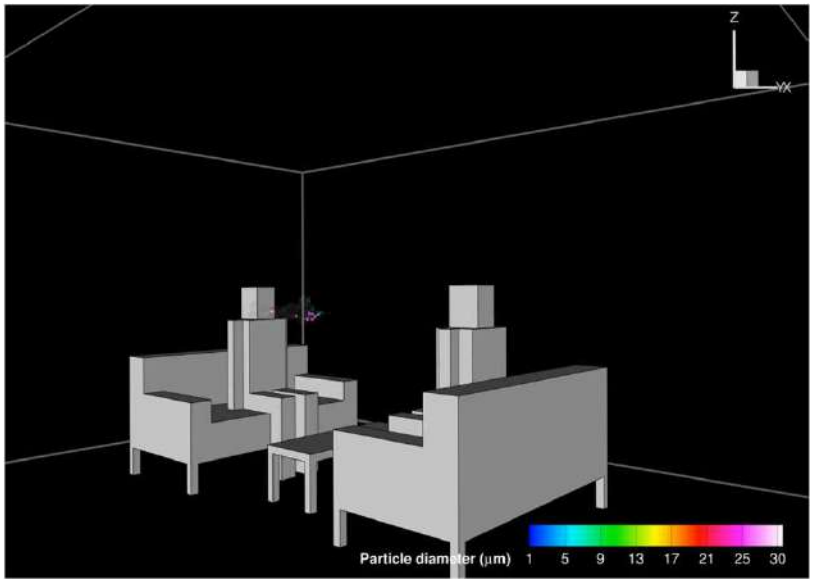
- Prof Christina Pagel (UCL)
- Dr Adam Squires (Bath)
- Anne Canning (Nottingham)
- Katerina Kaouri (Cardiff)

Motivation

I. Indoor health is an often-overlooked, complex and broad topic with many ramifications
II. Need for a cross-disciplinary and cross-sector strategy
III. Bottleneck in knowledge transfer to wider society
IV. Social context: housing crisis, climate change and ecosystemic disruption, energy crisis (net zero) and health inequity

Aims

1) UK-wide cross-disciplinary network to champion healthy indoor environments and knowledge transfer.
2) To advance knowledge and awareness on healthier indoor environments.
3) To promote holistic solutions with the built environment at the core.
4) To make health and wellbeing transversal themes at the heart of building design, intervention and monitoring.
5) To generate a legacy of long-term collaborations and funding.

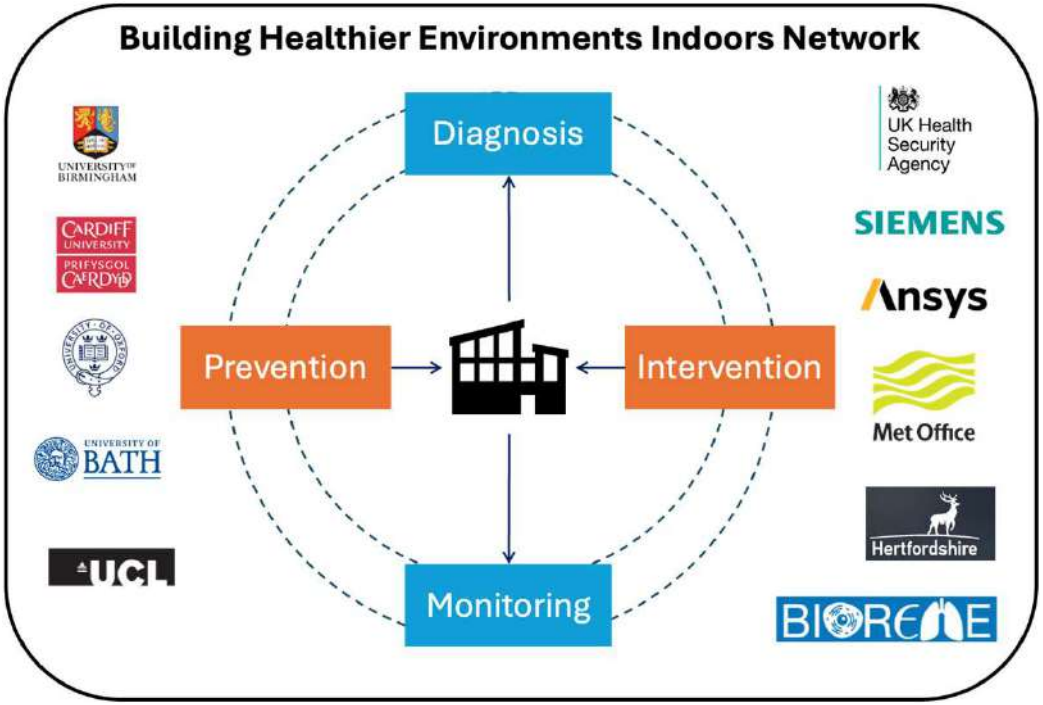


Activities

1) Roundtables
2) Roadmap
3) ECR support: bursary and mentorship scheme
4) Online presence:
    1) Membership
    2) Website and repository
    3) Social media: https://www.linkedin.com/company/breathe-in-plus/
    4) Mailing list
5) Sandpits

Sandpit Format

I. In-person events in Birmingham
II. We will host **two** of them: one on Diagnosis and Monitoring, one on Prevention and Interventions.
III. Participation in the event is necessary to apply for subsequent funding.
IV. Event: keynote speaker + pitch of initial project ideas + collaborative workshop.
V. Then teams can apply for feasibility study funding (£260k to be allocated in sandpits).



Sandpit Funding Priorities

I. Open to new, disruptive ideas;

II. We value interdisciplinary and cross-sectorial collaborations;

III. Sandpit 1: focus on technologies on **modelling** + **monitoring + design** and **interface indoor/outdoor → April/May 2026**;

IV. Sandpit 2: focus on **retrofitting**, **net zero compatibility** and considerations on **mental health → Spring 2027**;

V. Two-tiered approach: ‘small’ studies (up to £36k FEC) and ’large’ studies (up to £72k FEC);

VI. We encourage ECR participation.

Review panel of 4 members (sandpit leads + 2 specialists)

Priorisation panel (AB and PL)

Coordination with other networks

- Monthly meetings
- Monthly webinar series
- Sandpit coordination
- Presence in Indoor Air 2026

HESTIA

AirHub

GREENIN
GREENING THE INDOORS:

Noise Network+


BREATHE IN
EPSRC Micro Network +

GREENIN Micro Network Plus

GLOBAL CENTRE FOR CLEAN AIR RESEARCH
UNIVERSITY OF SURREY

UNIVERSITY OF SURREY

UK Research and Innovation

UK Centre for Ecology & Hydrology

Engineering and Physical Sciences Research Council

UNIVERSITY OF OXFORD

UNIVERSITY OF BATH

Cranfield University

UNIVERSITY of York

www.linkedin.com/company/greenin-micro-network-plus/ @greenin.bsky.social @greenin_mnp

GREENIN

GREENIN Micro Network Plus Partners

EPSRC-funded Micro Network Plus grant, led by the University of Surrey's Global Centre for Clean Air Research (GCARE) in collaboration with:

Growing fast! From 27 partners to current 38 partners!

UK Universities:

- University of Surrey
- UKCEH
- University of Bath
- Cranfield University
- University of Birmingham
- Imperial College London
- University of Hertfordshire
- University of Oxford
- University of Warwick
- University of York

International Universities:

- Chongqing University, China
- Southeast University, China
- Universidade Federal do Espírito Santo, Brazil
- Queensland University of Technology, Australia
- Universidade de São Paulo
- ARC Training Centre for Advanced Building Systems
- Against Airborne Infection Transmission (Thrive)

Businesses:

- Scotscape
- Intelligent Building Group
- PASSIVHVAC
- UKUAT
- GrowSpec
- Lazyscrog Technologies
- Society for Indoor Environment
- Nevegy Environmental S.L.
- Safe Air Schools UK
- Healthy Air Technology
- UK Indoor Environments Group

Charities:

- Farm Urban
- NHS Forest
- RHS Garden Wisley
- Trees for Cities
- Zero Carbon Guildford

Local Governments:

- Oxfordshire County Council
- Portsmouth City Council
- Surrey County Council
- Merton City Council
- Hertfordshire City Council

Citizen Science / Art:

- Guildford Living Lab

www.linkedin.com/company/greenin-micro-network-plus/ @greenin.bsky.social @greenin_mnp

GREENIN

Introducing GREENIN Micro Network Plus Core Management Team

Professor Prashant Kumar

Project Lead, University of Surrey

Professor Sukumar Natarajan

Project co-lead, University of Bath

Professor Nicola Carslaw

Project co-lead, University of York

Professor Laurence Jones

Project co-lead, UK Centre for Ecology & Hydrology (UKCEH)

Professor Kamaldeep Bhui

Project co-lead, University of Oxford

Professor Katherine Denby

Project co-lead, University of York

Dr Zaheer Nasar

Project co-lead, Cranfield University

Dr Jannis Wenk

Project co-lead, University of Bath/Federal Institute of Hydrology, Germany

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GREENIN

Vision

- **Reimagine indoor spaces for health and wellbeing in a changing climate.**
- **Unlock the untapped potential of indoor nature-based solutions**
- **Build healthier, more resilient spaces through interdisciplinary greening research**

Four Interlinked Themes

Our work is structured around four interlinked themes exploring how indoor greening can improve environmental quality and human health

- **Engagement & Knowledge Exchange**
- **Understanding Indoor Environmental Challenges**
- **Integrating Greening into Buildings**
- **Evaluating the Potential of Indoor Greening**

Objectives

Build a network of multidisciplinary specialists

Conduct collaborative studies to expand our knowledge of indoor greening

Create practical guidelines for building design and management professionals

Promote wider use of greening to enhance building environments and public health

How can you get involved?

- 4 Funded Fellowships
- 4 Funded Sandpit Projects
- 4 Rapid Reviews
- 24 Monthly Webinars
- 4 Funded Workshops
- A growing network with 38 Partners

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GREENIN

GREENIN Micro Network Plus

Mini-fellowships

Application Deadline 31 January 2026

The objectives of the GREENIN Micro Network Plus project are:

- **Build a network of multidisciplinary specialists**
- **Conduct collaborative studies to expand our knowledge of indoor greening**
- **Create practical guidelines for building design and management professionals**
- **Promote wider use of greening to enhance building environments and public health**

www.linkedin.com/company/greenin-micro-network-plus/ **@greenin.bsky.social** **@greenin_mnp**

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Upcoming Sandpit Projects

The GREENIN workshop aims to bring together experts from academia, industry, policy, and communities to co-create feasibility study ideas on indoor greening.

Selected teams can apply for £30-40k feasibility study funding (3-4 projects, 6-9 months), open to UK-based GREENIN members who attend the workshop.

Expression of interest deadline will be published soon followed by sandpit workshops. Funded projects take place from June 2026 to March 2027.

Expected dates:

- Expression of interest announcement date: late January 2026
- Workshop: Early March 2026

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Achievements to date

'Ten Questions' manuscript on sustainable indoor environnements

Advisory board formed and first meeting planned for March 2026

Sandpit workshop and studies initiated…

9 Presentations and 9 journal publications…

5 Webinars held to date and more to come….

Social Media Followers:
LinkedIn: 244
X: 10
BlueSky: 21

Receiving plenty of interest and applications for the Mini-fellowship opportunity

126 Members and growing….

3 monthly newsletters sent out…

Four rapid reviews underway…..

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www.greenin.uk

THANK YOU!

Become a member today! https://www.greenin.uk/join-greenin

GREENIN Micro Network Plus team

greeninmnp@surrey.ac.uk

Professor Prashant Kumar (Lead PI)

p.kumar@surrey.ac.uk

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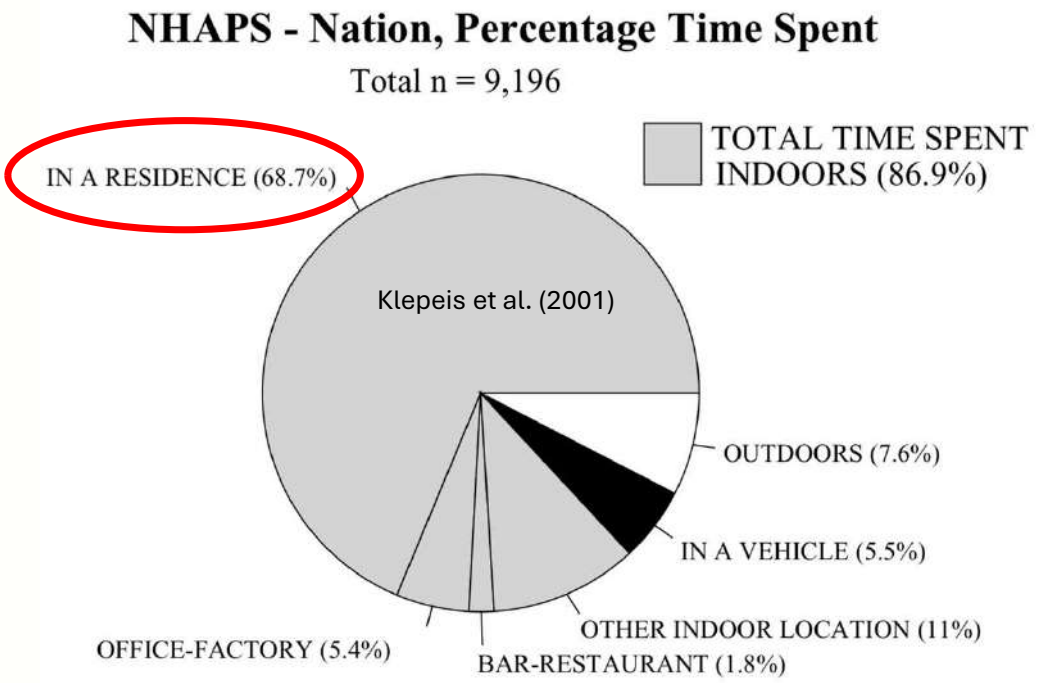
HESTIA Network Overview

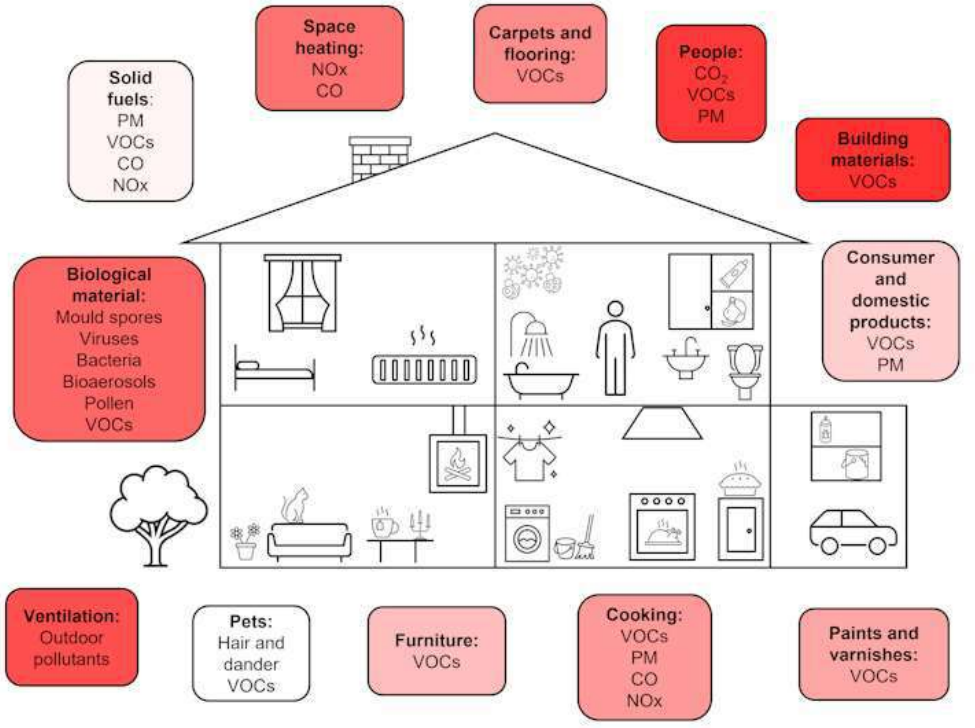
Home **E**nvironment **S**olutions through **T**echnology and **I**nnovation for **A**ll: **HESTIA**

Housing transitions

- Decarbonising the UK housing stock is essential to meet climate mitigation targets: housing is responsible for ~20% of total UK GHG emissions (DESNZ, 2022)
- UK building stock is among the oldest in Europe: 26.4 million dwellings (ONS, 2023)
- A huge campaign of energy retrofitting is already underway

The ‘indoor generation’



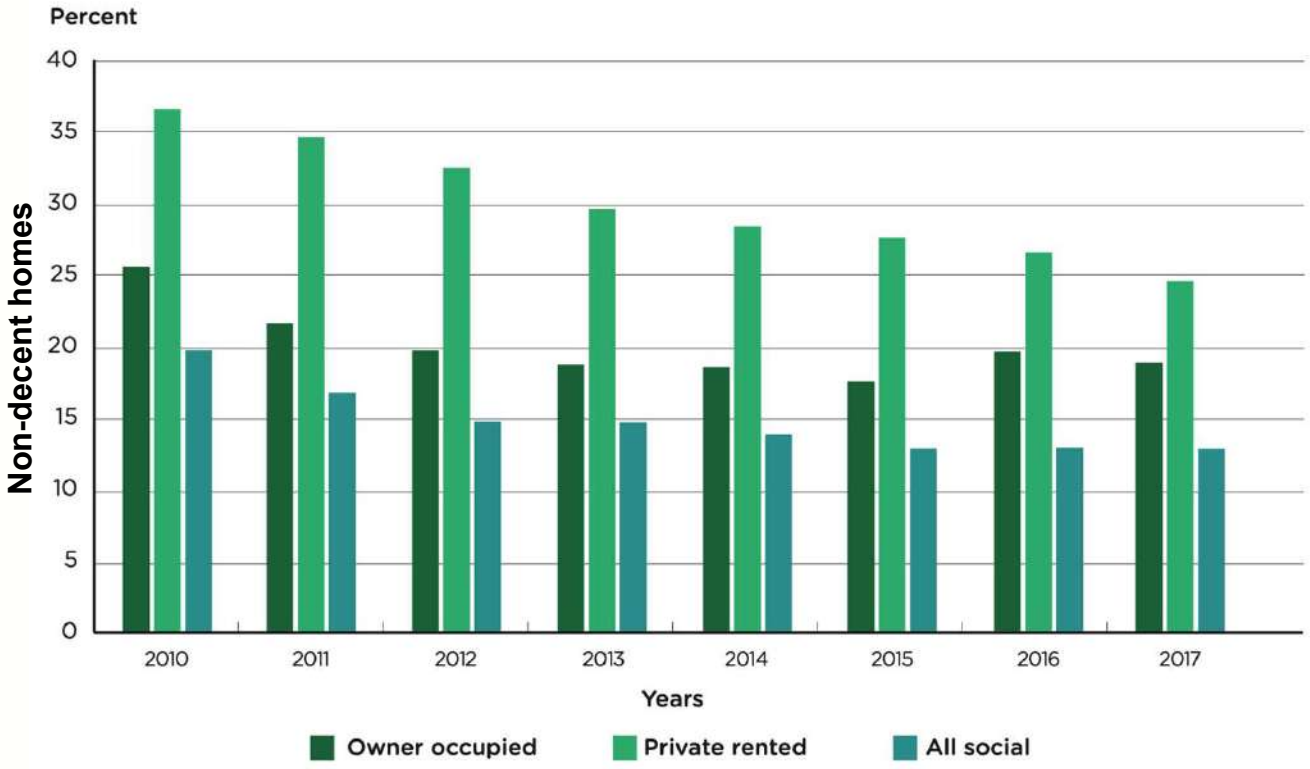


Source: https://doi.org/10.64628/AB.4vwpygj69

Health starts at home

- The impacts of these changes on Indoor Environmental Quality (IEQ), physical and mental health and wellbeing, and equity are less well known
- Housing quality is a significant determinant of mental and physical health
- Estimated to cost the NHS ~£1.4 billion per year (BRE, 2021)

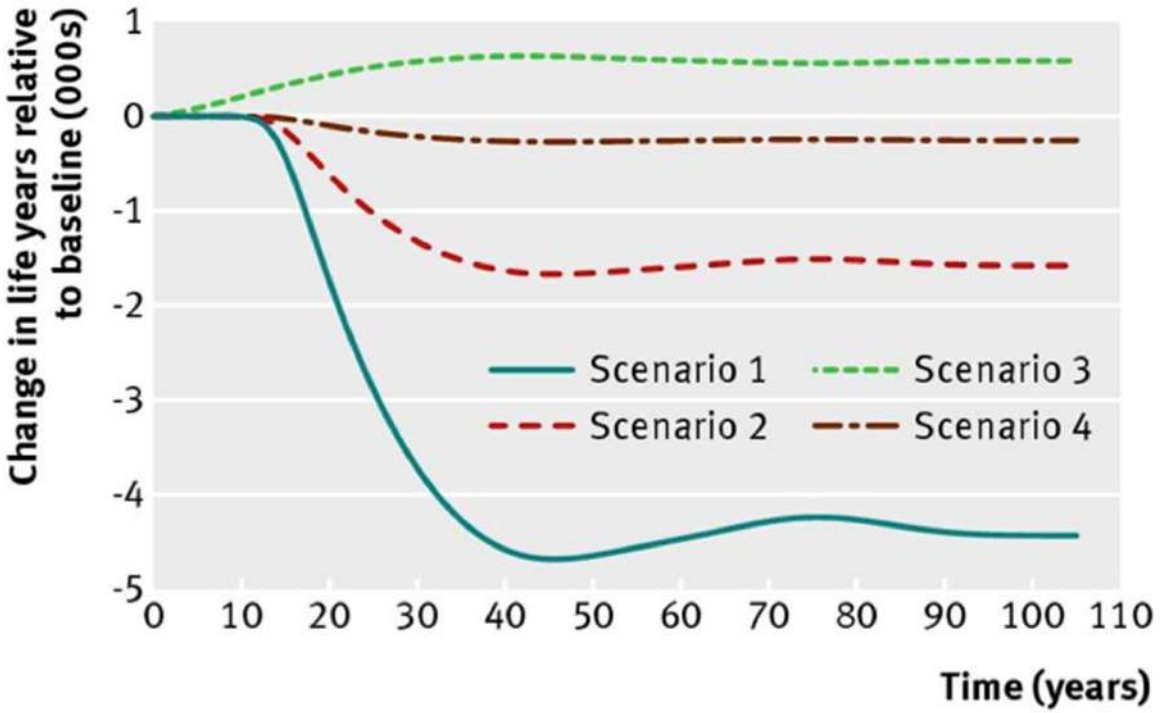
Percentage of non-decent homes by tenure



Health Equity in England: The Marmot Review 10 Years On

Aligning health and environmental co-benefits

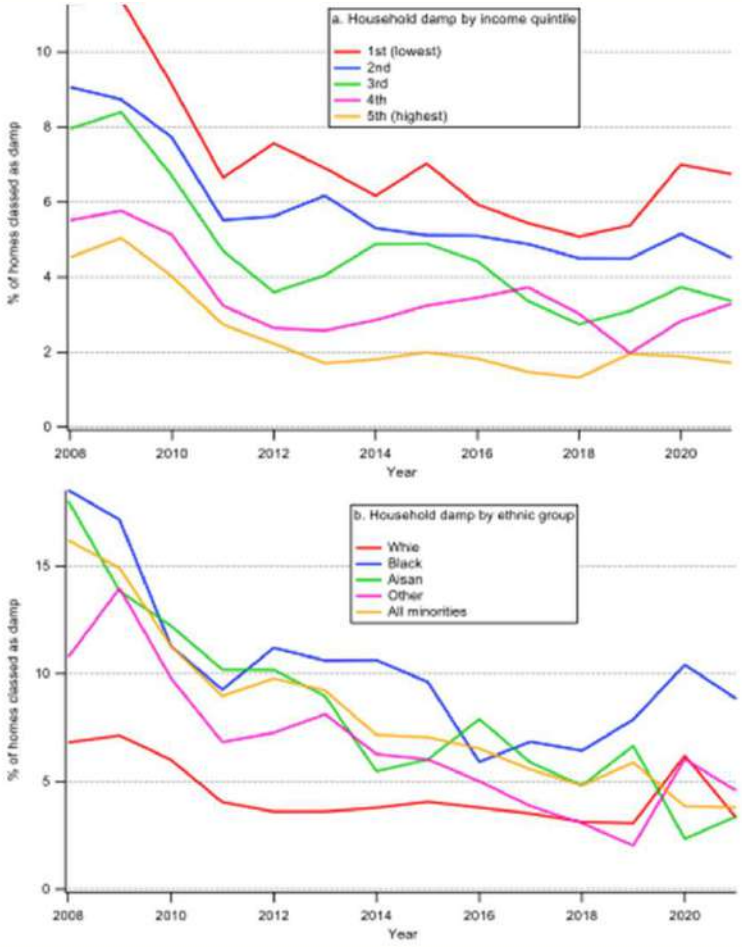
- More energy efficient homes require higher levels of air tightness to prevent heat loss
- High levels of air tightness without adequate ventilation can result in a significant unintended consequence: poor indoor air quality (IAQ)
- “Air tight, ventilate right”
- Homes should be healthy for people and the planet



Milner et al. (2014) https://doi.org/10.1136/bmj.f7493

Inequalities in damp in English housing

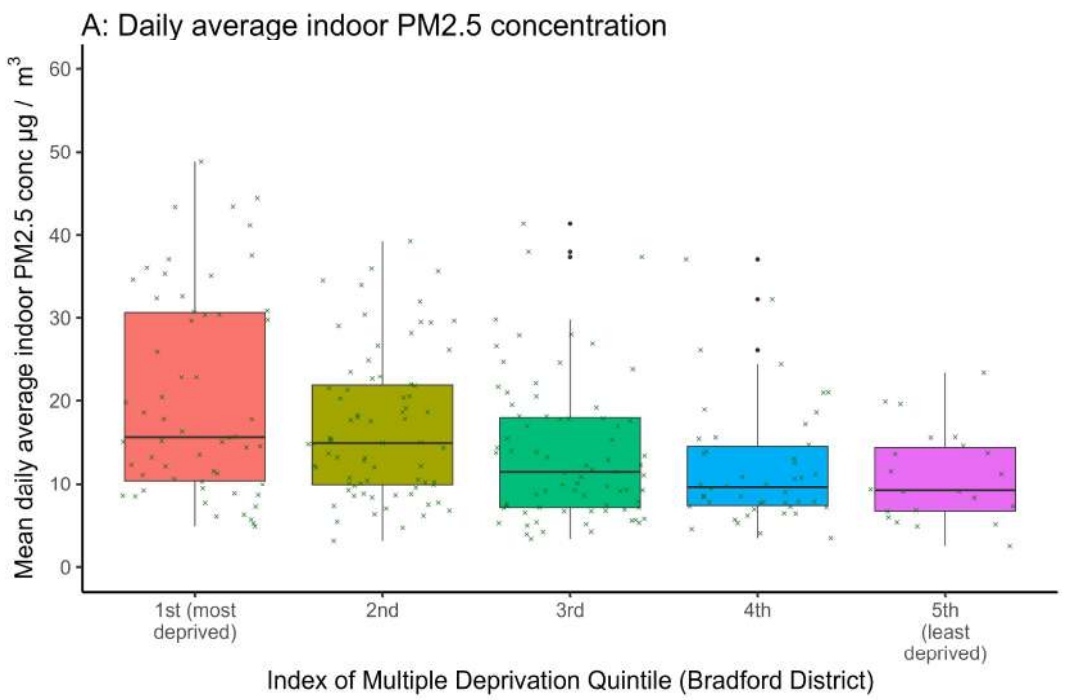
- English Housing Survey data
- Homes with damp problems decreasing, but not equally
- Strong association between household income and damp
- Clear trends also with different ethnicities



Air Quality Expert Group. "Differentials in air pollutant exposure across communities and regions in the UK." (2025).

Indoor air (ine)quality

- Higher $PM_{2.5}$ levels were seen in:
  - Rented vs. owned homes
  - Smoking vs. non-smoking households,
  - Terraced and semi-detached vs. detached homes
  - Gas vs. electric cooking appliances
- Intersectionality with areas of deprivation, and South Asian homes



Mean = 23.8 µg/m³ **Mean = 12.8 µg/m³**

p = .003

Cheung, Rachael W., et al. "Inequalities and indoor air pollution: a prospective observational study of particulate matter (PM2. 5) levels in 309 UK homes from the Born in Bradford cohort study." *BMC Public Health* 25.1 (2025): 3876

(Just) transitions?

- Aligning, health, environmental, and justice co-benefits
- “Improving housing is about fairness and equity. The greater the deprivation of an area, the less likely are people to have good homes” (IHE, 2025)
- Providing a ‘just transition’ in UK housing

Table 2: Different scales of just transitions

LARGEST SCALE	
International	“Common but differentiated responsibilities” between richer vs poorer nations, or compensation to undertake climate adaptation[60–63]
National	Inequalities between a country’s regions, how a country’s Nationally Determined Contribution (NDC) to reducing carbon emissions may affect some parts of the country more than others[64,65]
Regions & Cities	Exacerbation of inequalities within areas, phasing away from major regional industries or consequences of major changes for rural and urban areas (such as heavy industry or agriculture)[14,64]
Communities	Consideration of whether transitions increase deprivation, or how communities, or socio-economic groups, can benefit[66]
Individuals & Households	Job security, household income and household dependents, value for consumers or human rights
SMALLEST SCALE	

POST (2023) What is a just transition for environmental targets?

The HESTIA Team

- Led by a team spanning engineering, the built and environmental sciences, health (physical and mental), and social sciences
- Involves leads of three of the Clean Air Networks (FUVN, HEICCAM and TRANSITION)
- Strong early career researcher (ECR) contingent


Dr Douglas Booker


Dr Suzanne Bartington


Prof Ruth Doherty


Prof Helen Fisher


Prof Rajat Gupta


Prof Anna Mavrogianni


Dr Alejandro Moreno-Rangel


Prof Cath Noakes


Dr Amber Yeoman


Mrs Denise Groves

UNIVERSITY OF LEEDS
UNIVERSITY OF BIRMINGHAM
THE UNIVERSITY of EDINBURGH
KING'S College LONDON
OXFORD BROOKES UNIVERSITY
UCL
University of Strathclyde Glasgow
UNIVERSITY of York

Projects that helped shape HESTIA

- HESTIA builds on co-creation through three networks in the SPF Clean Air Programme
- An IAQ observatory workshop, and a local government workshop identified housing as a critically important environment for health

HESTIA

Clean Air Programme

TRANSITION CLEAN AIR NETWORK

Breathing City
Future Urban Ventilation Network

HEICCAM

Who we are working with

Project partners

Waltham Forest

EDINBVRGH THE CITY OF EDINBURGH COUNCIL

energy saving trust

Sustainable Development Foundation

Wheatley Group

bib We are family BORNINBRADFORD

Public Health Scotland

ASBP The Alliance for Sustainable Building Products

BESA BUILDING ENGINEERING SERVICES ASSOCIATION

OXFORDSHIRE COUNTY COUNCIL

CERC

Healthy Homes Hub

UK IEG Indoor Environments Group

Advisory Board

Dr Rebecca Rhead

Prof Tim Sharpe

Fiona Reynolds

Emma Gibbons

Prof Sani Dimitroulopoulou

Prof Pawel Misztal

Dr Olivia Swann

Prof Maria Kolokotroni

Who we are working alongside

Hubs

Extreme weather

HEARTH
National Hub on Net Zero, Health and Extreme Heat

Indoor environments in a net zero world

IN-HABIT
Indoor HABItability during the Transition to Net Zero Housing Hub

Projects

In2Air
The air we breathe

HEALTHY HOMES
A BORN IN BRADFORD STUDY

Bradford Teaching Hospitals NHS Foundation Trust

Micro Networks

HESTIA

GREENIN
GREENING THE INDOORS:

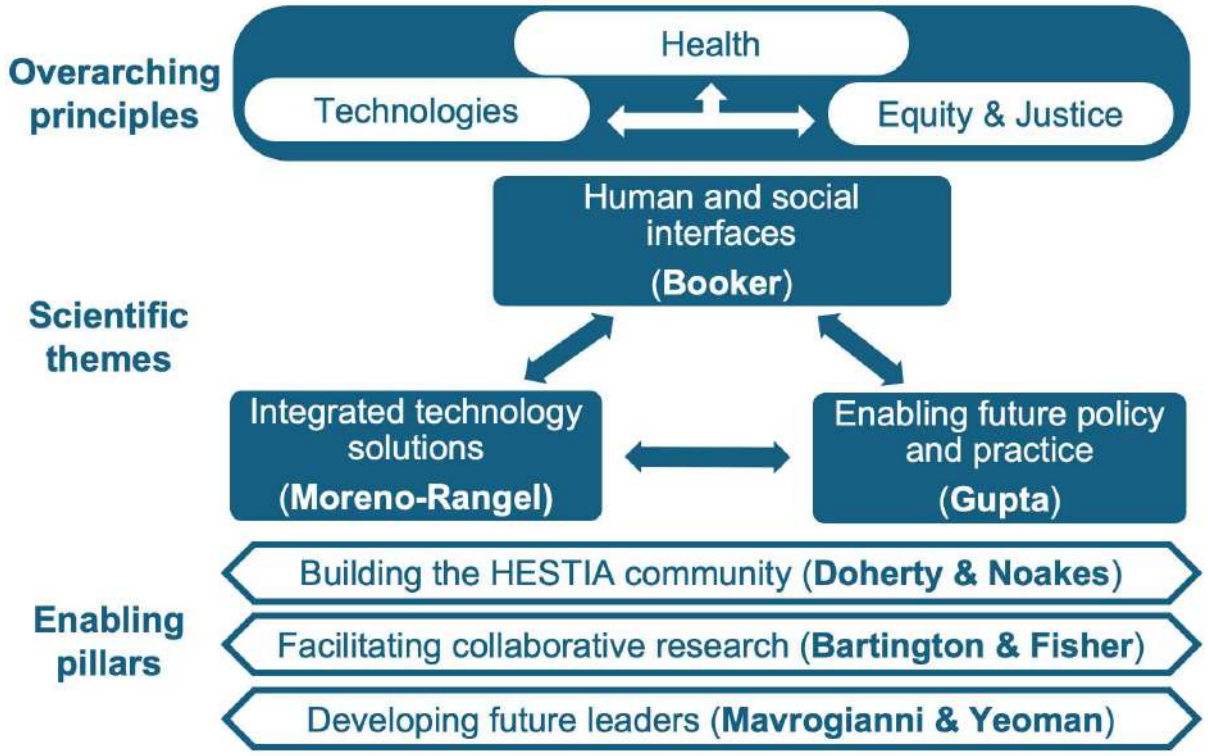
AirHub

UK Research and Innovation

NIHR
National Institute for Health and Care Research

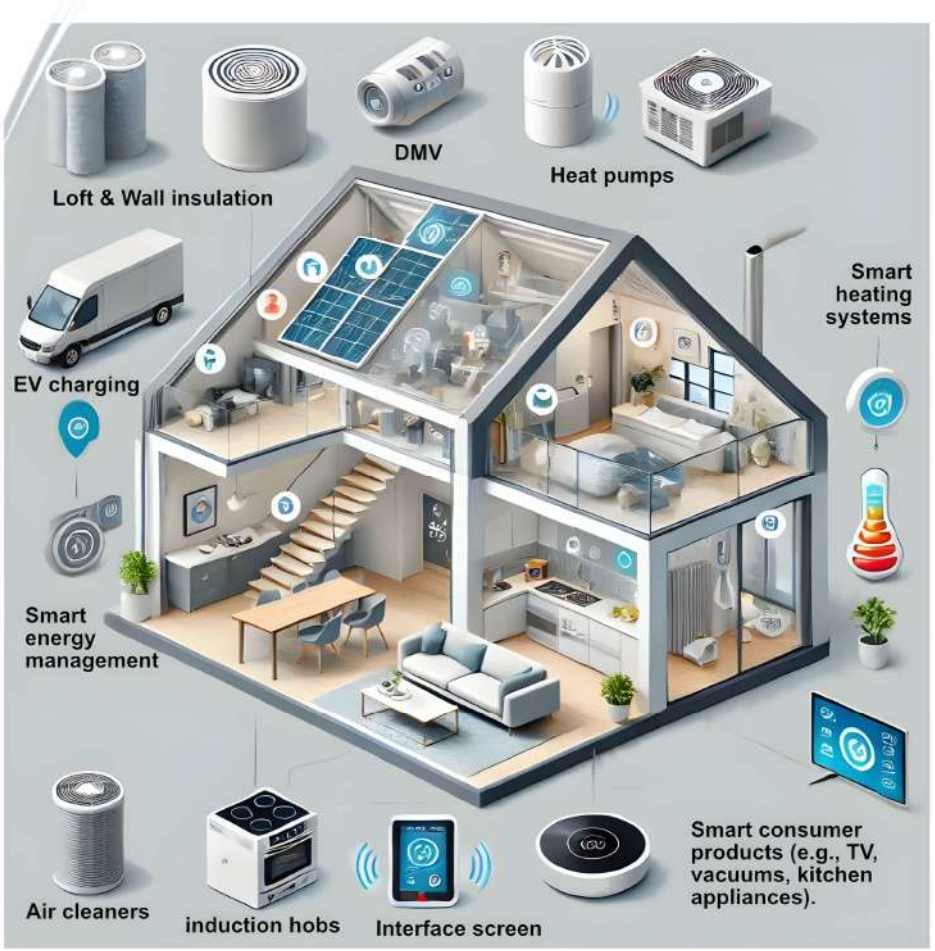
Our aims

- **HESTIA** will co-develop a new health-equity-centred engineering approach to home design and retrofit, integrating existing and emerging building technologies to maximise human and environmental health co-benefits, and minimise health inequalities



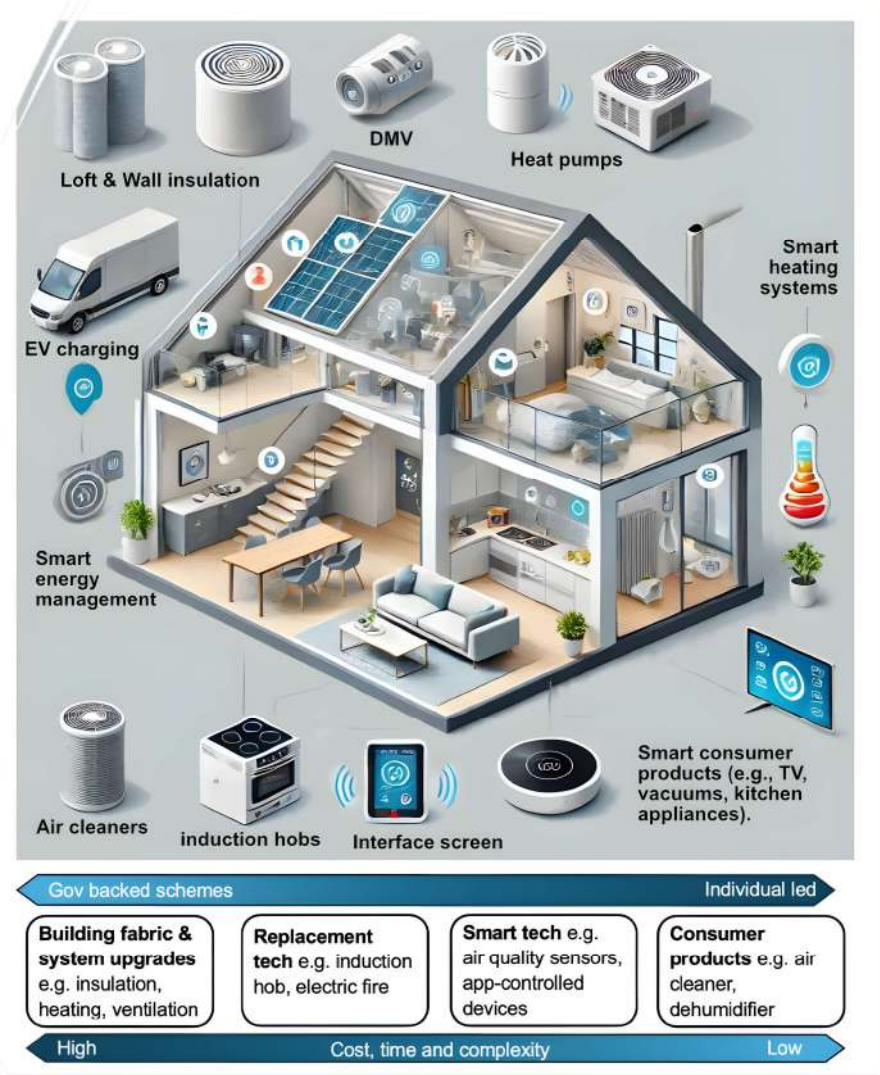
Human and social interfaces

- Studies have demonstrated the importance of the interactions between technologies and users on IEQ
- Pressing need to understand acceptability, uptake, and real-world user interactions with technologies, as this will ultimately determine the success or failure of engineering interventions.
- How do people use home technologies in their daily lives, and how well do these technologies match their needs, habits, and capabilities?



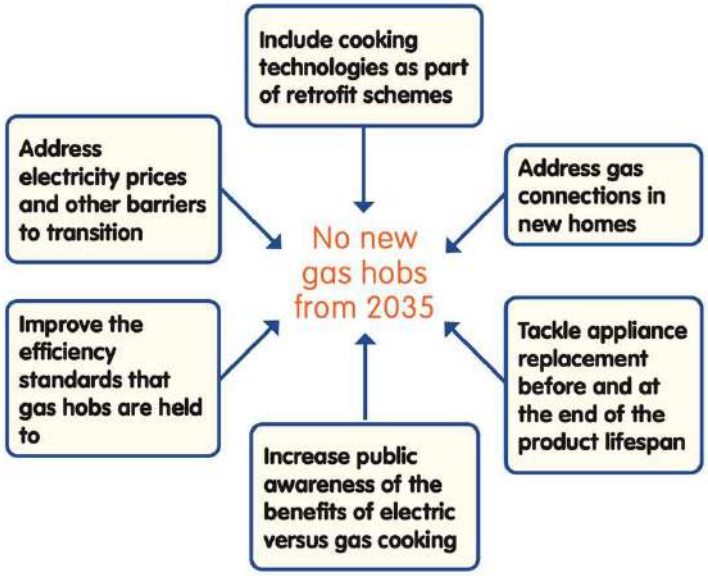
Integrated technology solutions

- Delivering low-carbon, healthy, and equitable homes through design and retrofit will need multiple different technologies
- Current efforts focus primarily on building fabric or system upgrades, yet there are significant opportunities through replacement technologies, smart devices, and consumer products
- How might different technologies in our homes affect our health, and the environment? Where do they support each other, and where might they be in conflict?



Transitioning to electric cooking

- Gas cooking is a significant source of poor indoor air quality, and is linked to serious health effects
- Gas is a fossil fuel, and gas hobs are less efficient than electric alternatives, contributing to increased household energy consumption.
- Around half of all homes in the UK still use gas hobs for cooking
- An opportunity to align the health equity and environmental co-benefits of retrofitting UK buildings?



HESTIA

Enabling future policy and practice

- Policy, regulatory, and practice failures can combine and lead to disastrous consequences
- What current policies help or hinder the creation of healthier, fairer, and more environmentally sustainable homes, and what changes could better support this in the future?

Policy workshops

- Dedicated workshops informed by network activities and results from the sandpit feasibility studies
- Workshops to hone the research and policy outcomes of the network
- Initiate roadmap development and identify guidance directions

Policy and Impact training

- Signpost and hold events on impactful research for policy
- Write briefing notes, and scope out the feasibility of short two-way secondments between academic and project partner institutions
- Equip ECRs with the networks and skills to undertake policy-facing research.

Building the HESTIA community

- Building an **inclusive, interdisciplinary & inter-sectoral community** at the interface of engineering technologies and practical implementation with human health and real-world experiences

Building the HESTIA community

- Creating a community of researchers from multiple universities, our project partners, advisory board, sister networks + recruiting a group of public members to **co-create research priorities, activities and outputs**
- Webinars, in-person assemblies, workshops, sandpit, website, newsletters, social media

Facilitating collaborative research

- **Accelerating research on healthier home indoor environments** through interdisciplinary & inter-sector collaboration via stakeholder, research & policy workshops, public member & advisory board meetings, and thematic working groups

The ‘sandpit’

- **Sandpit in May/June 2026** with researchers & non-academic organisations to develop feasibility studies at the interface of health, technology, and equity & justice
- ~£200k of funding available for **collaborative grant applications** (2 large awards ≤9 months & 2 small awards ≤6 months)

Developing future leaders

- Small network of ECRs (PhD and PDRA)
- ECRs led and supported by the HESTIA team
- Build interdisciplinary partnerships
- Potential activities – grant writing workshops, fellowships support, collaborative paper writing
- Involved with coordinating HESTIA's sandpits

ELSEVIER

Building and Environment

Volume 278, 15 June 2025, 112957

Ten questions concerning the future of residential indoor air quality and its environmental justice implications

D. Booker [a], G. Petrou [b], L. Chatzidiakou [c], D. Das [d], F. Farooq [e], L. Ferguson [f], OE.I. Jutila [g], K. Milczewska [h], M. Modlich [i], A. Moreno-Rangel [j], S.K. Thakrar [i], A.M. Yeoman [k], M. Davies [b], M.I. Mead [l], M.R. Miller [m], O. Wild [n], Z. Shi [o], A. Mavrogianni [b], R.M. Doherty [i]

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Developing future leaders

- 11 ECRs from 4 institutions
- 3 PhD, 8 PDRA

Tom Warburton
Lucy Webster
Lia Chatzidiakou
Darpan Das

Becky Sale
Kylie Kay

Cheng Cui
Amr Hamada
Giorgos Petrou

Zaeem Farooq
Carolina Recart

Closing remarks

- Sandpit: May / June 2026 with researchers & non-academic organisations to develop feasibility studies at the interface of health, technology, and equity & justice
- Accelerating the creation of indoor home environments that meet Net Zero targets while promoting physical and mental health and wellbeing for all, considering the interface of technologies and social factors

Join the HESTIA Network

www.HESTIA-Network.org

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