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TE KUNENGA KI PŪREHUROA MASSEY UNIVERSITY

Inaugural award recipient | 2026

CIB Makarand Hastak Visiting Scholar Award 2026

From Award to Action

Australia–New Zealand collaboration on occupant behaviour and building energy efficiency

Dr Lei Liu

Postdoctoral Research Fellow | Western Sydney University

Host research partner: Professor Monty Sutrisna, Massey University



Presentation Outline

01 Research background

02 Massey collaboration focus

03 **Visit activities and research progress**

04 Next stages of collaboration

05 Future opportunities and closing

About Me & Research Background

Dr Lei Liu

Postdoctoral Research Fellow

School of Built Environment and Design | Western Sydney University



Academic background

PhD in Construction Management, Western Sydney University (2025)

Research expertise

- Life-cycle energy assessment and predictive modelling
- Occupant behaviour and building energy performance
- Sustainable construction and low-carbon technologies

CIB engagement

Communications Coordinator, CIB W116 – Smart and Sustainable Built Environments

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Research Collaboration with Massey University

Australia–New Zealand collaboration on occupant behaviour and building energy efficiency

The shared challenge: Occupant actions affect energy use, comfort and building performance — yet are difficult to assess consistently

01

Integrated assessment

Connect behavioural context, influencing factors, data collection, modelling and energy-performance outcomes.

02

Emerging digital tools

Explore smart-meter data, digital twins and AI-assisted modelling while considering privacy and interpretability.

03

Joint research roadmap

Develop Australia–New Zealand comparative research and pathways to joint publications, pilot studies and future funding.

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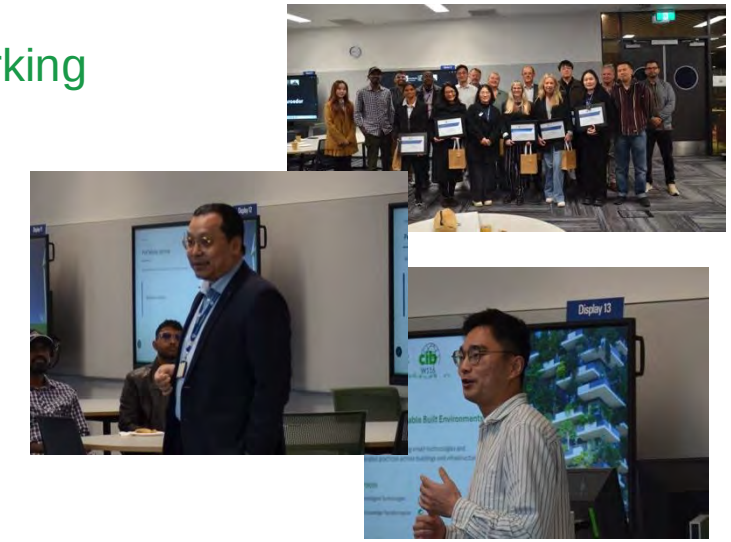
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First Visit to Massey University

25–28 August 2026 | Research exchange, facilities and international networking







Research Discussion

I shared my review paper in progress, and our discussions helped strengthen its content.

Laboratory Visit

We visited Massey's advanced laboratories and explored how our facilities could complement each other.

Workshop Presentation

I gave a workshop presentation, shared my research ideas and exchanged views with other researchers.

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Research Progress & Publications

Accepted | NZBERS2026

Research Trends and Scope Definition of Occupant Behaviour Impact Assessment in Building Energy Efficiency

9TH NEW ZEALAND BUILT ENVIRONMENT RESEARCH SYMPOSIUM
People and the Built Environment

Research Trends and Scope Definition of Occupant Behaviour Impact Assessment in Building Energy Efficiency

Lei Liu[1] and Vivian Tam[2*]

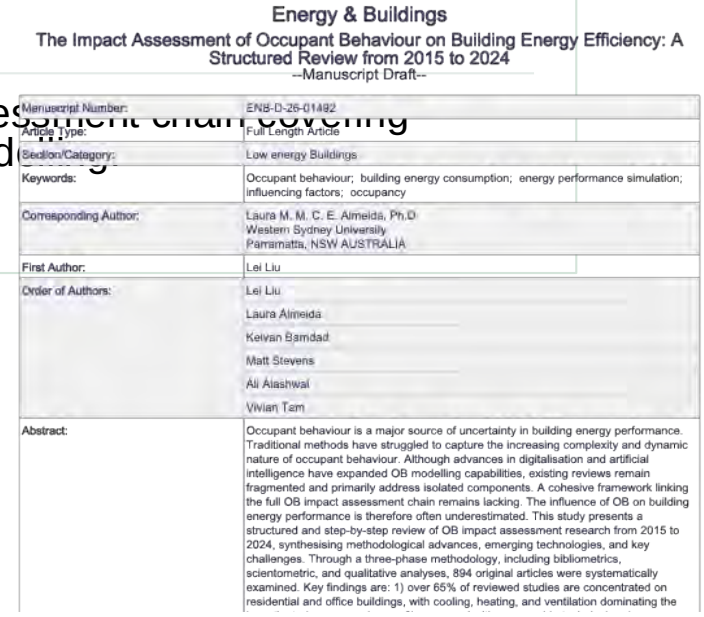
[1] *Western Sydney University, Lei.liu@westernsydney.edu.au*
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**Corresponding author*

Abstract
Occupant behaviour (OB) is a major source of uncertainty in building energy performance and

Submitted | Energy & Buildings

The Impact Assessment of Occupant Behaviour on Building Energy Efficiency: A Structured Review from 2015 to 2025

Developed a four-stage assessment chain covering scope, factors, data and mod



Energy & Buildings
The Impact Assessment of Occupant Behaviour on Building Energy Efficiency: A Structured Review from 2015 to 2024
--Manuscript Draft--

Manuscript Number:	ENB-D-26-01492
Article Type:	Full Length Article
Section/Category:	Low energy Buildings
Keywords:	Occupant behaviour; building energy consumption; energy performance simulation; influencing factors; occupancy
Corresponding Author:	Laura M. M. C. E. Almeida, Ph.D Western Sydney University Parramatta, NSW AUSTRALIA
First Author:	Lei Liu
Order of Authors:	Lei Liu Laura Almeida Kelvan Bamdad Matt Stevens Ali Alashwal Vivian Tam
Abstract:	Occupant behaviour is a major source of uncertainty in building energy performance. Traditional methods have struggled to capture the increasing complexity and dynamic nature of occupant behaviour. Although advances in digitalisation and artificial intelligence have expanded OB modelling capabilities, existing reviews remain fragmented and primarily address isolated components. A cohesive framework linking the full OB impact assessment chain remains lacking. The influence of OB on building energy performance is therefore often underestimated. This study presents a structured and step-by-step review of OB impact assessment research from 2015 to 2024, synthesising methodological advances, emerging technologies, and key challenges. Through a three-phase methodology, including bibliometrics, scientometric, and qualitative analyses, 894 original articles were systematically examined. Key findings are: 1) over 65% of reviewed studies are concentrated on residential and office buildings, with cooling, heating, and ventilation dominating the

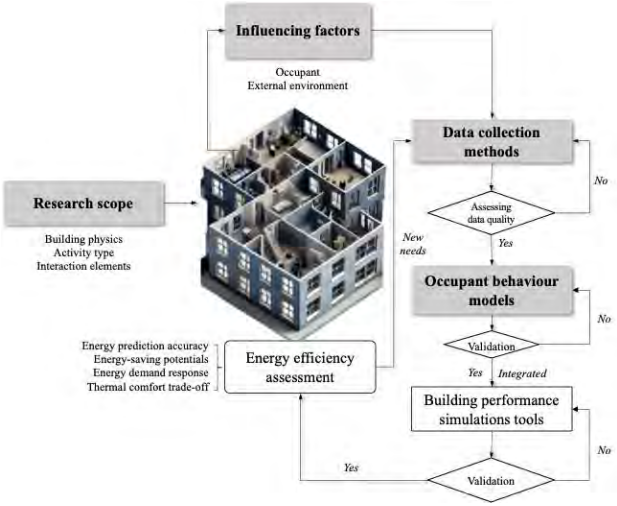
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Journal Review: Occupant Behaviour & Building Energy

01 Integrated assessment chain



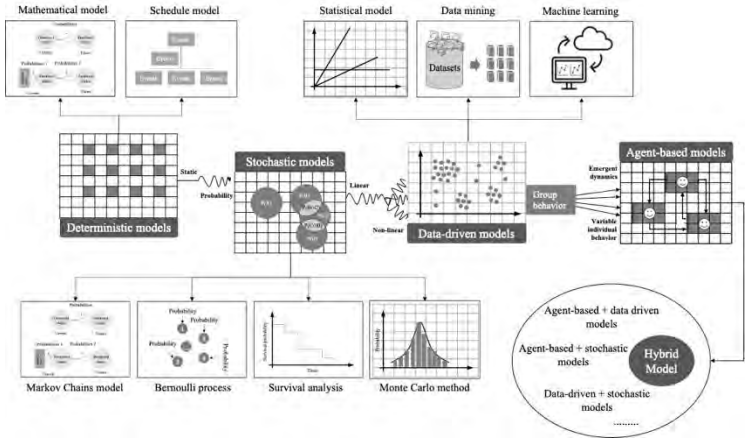
Research scope → influencing factors → data → behaviour models → energy assessment

02 Behavioural influencing factors



Technical, occupancy-related and social-psychological drivers

03 Modelling approaches



From fixed rules to dynamic data-driven, agent-based and hybrid models

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Next Stages of Collaboration

VISIT 1 · AUGUST 2026

Completed

Research discussions on the review paper

Laboratory visits and workshop exchange

DEC 2026

Online follow-up

Review research progress and discuss next steps, including possible funding.

VISIT 2 · 13–16 APRIL 2027

Planed

Deepen research and publication plans

Explore pilot data, case studies and partners

Intended next steps Joint publication plan · Pilot and data scoping · Funding and partner roadmap

Future Joint Funding Opportunities

Early-stage partnership

NZ Catalyst: Seeding

Potential Massey-led international collaboration

- Exchange ideas and scope joint research
- Explore datasets and pilot feasibility
- Build a basis for future applications

Longer-term applied research

ARC Linkage Projects

Potential WSU-led project with eligible end users

- Engage suitable industry and end-user partners
- Test occupant-behaviour assessment in buildings
- Develop practical energy-efficiency approaches

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Expected Impact & Acknowledgements

International collaboration

Build lasting research links between Western Sydney and Massey University.

Knowledge exchange

Support joint research, publications, teaching and academic exchange.

Sustainable buildings

Work towards more practical, occupant-centred energy-efficiency research.



WITH SINCERE THANKS TO

CIB & Professor Makarand Hastak

Massey University & Professor Monty Sutrisna

Western Sydney University & Professor Vivian Tam

