

EXPERTISE DESCRIPTION

INFORMATION ABOUT THE EXPERT

ORGANISATION	LUCID - ULIEGE
ADDRESS	Allée de la Découverte, 13A B52/3 - Local -1/544 Quartier Polytech 1 4000 LIEGE 1 (Sart-Tilman)
TYPE OF PARTNER	University
WEBSITE	https://www.lucid.uliege.be
CONTACT PERSON	Pierre Leclercq
EMAIL	pierre.leclercq@uliege.be
TELEPHONE	0032 4 366 94 16
POSITION	Professor
DATE OF PUBLICATION	11.06.2026

EXPERTISE OVERVIEW

TOPIC(S) OF INTEREST:

HORIZON-NEB-2026-01-REGEN-01

Sustainable, inclusive, affordable and beautiful solutions for thermal comfort in buildings

HEADLINE:

Our laboratory develops integrated human-centred design approaches (Human Centered Design / Construction 5.0) to improve thermal comfort in existing buildings by combining energy performance, sustainability, aesthetics and social inclusion.

Main areas of expertise:

- Human Centered Design & Construction 5.0: co-design with building users.
- Generative bioclimatic architectural design: computational approach (including parametric), for solutions integrating energy, sunlight, wind, comfort, sustainability and aesthetics.
- Human Building Interaction: adaptive comfort, indoor air quality, personalised thermal regulation
- Simulation and energy performance analysis: dynamic thermal modelling, passive systems, natural ventilation strategies
- UX Design & Human-Machine Interface: comfort management dashboards, interface accessibility for all audiences
- Building technologies: heating/cooling systems, heat pumps, bio-based and insulating materials
- Multi-criteria analysis: optimisation of solutions integrating energy, economic, social and aesthetic criteria

POTENTIAL CONTRIBUTION:

Our team is particularly well-positioned to contribute to the human and technical dimension of this NEB call, which requires articulating technological innovation, design and social inclusion:

1. Generative bioclimatic architectural design of thermal comfort solutions adapted to varied socio-economic contexts (social housing, public buildings, schools), involving building users from the design phase onwards.

2. Development and evaluation of passive and active thermal regulation solutions integrating sustainability criteria (materials LCA), accessibility (total cost of works – OPEX and CAPEX) and aesthetic and usage acceptability.

3. Digital tools for simulation and monitoring of thermal comfort, coupled with feedback interfaces accessible to all building user profiles.

4. Multi-criteria evaluation methodologies for comparing and selecting solutions in renovation projects, integrating the sociotechnical, economic and New European Bauhaus dimensions (sustainability, inclusion and aesthetics).

References :

Projet 1 : (Bioclimatic architecture and thermal comfort, Green building, North-South partnership) : COMBOdIA, 2021-2026 - Budget : 450k€ - LUCID-ULiège coordinator.

This development cooperation project is conducted in partnership with ITC Phnom Penh (Cambodia) and focuses on training architectural engineers to educate future professionals in mastering the sustainable development of the built environment. It is structured around 4 key pillars : architectural project methodology, bioclimatic design, environmental quality of buildings and Building Information Modeling (BIM).

The project adopts a multidisciplinary approach (engineering, architecture, ICT) and operates at multiple academic levels (master's, doctoral, and post-doctoral) to provide advanced higher education support for Cambodia's development.

Projet 2 : (Bioclimatic architecture and thermal comfort, expertise-based services) : UdEX

UdEX is the operational unit responsible for implementing the methods and tools derived from the laboratory's applied research in bioclimatic design. The unit offers public and private decision-makers its expertise-based services in the following areas:

- The energy and environmental analysis and assessment services include evaluating direct and diffuse solar irradiance on the ground and facades, comfort in public spaces and solar potential of buildings. They cover analysis of solar resources, heating needs, solar sensor placement, and environmental impact studies, including summer/winter solar gains and the thermal performance of housing.
- The bioclimatic and urban design and optimization services focus on sizing solar shading systems, urban design methodologies, and the development of renovation real estate projects. They include analysis of master plans and the quality of public spaces (wind, sunlight, microclimate, influence of vegetation and urban form), as well as studies of climatic performance (free-cooling/free-heating) of built forms.
- The technical expertise and guidance services include expertise in building pathology, hygrothermal studies, and the selection of renovation methods. They cover guidance for architectural and technical design offices, the use of urban space analysis tools to assess private areas, and support in selecting from proposed master plans.

Representative Projects :

- renovation of residential/social housing : "Maison des Hommes" in Flemalle, Belgium (7,000 m², 99 housing units); "Droixhe Park" in Liège; Pécs, Hungary (150,000 m², 160 housing units); social housing "Les Trixhes" in Flémalle, Belgium (5,000 m², 60 housing units); development of collective housing "Verberie", France (4,400 m², 64 housing units); creation of a bioclimatic housing development "Béthencourt", France (1,900 m², 19 housing units).
- urban developments and master plans : Harbin neighborhood, China (244.000m², 3.950 dwellings); EXPO'98 international exhibition in Lisbon; environmental impact assessment for the Palais de Justice project, Place St-Lambert, Liège, Belgium; Resilience analysis of railway stations by 2050 : enhancing passenger thermal comfort through a bioclimatic approach. Case study: Paris-Gare de Lyon.

Selected publications :

- Taing, K., Reiter, S., Han, V., & Leclercq, P. (2025). Bioclimatic design guidelines for design decision support to enhance residential building thermal performance in tropical regions. *Sustainability*, 17(4), 1591. <https://doi.org/10.3390/su17041591>
- Nassimos, M., & Attia, S. (2023). An expert decision support tool for office buildings facades during early design stages: A parametric approach. In D. Yan (Ed.), *Proceedings of the 18th IBPSA Conference — Building Simulation 2023* (pp. 0192). IBPSA. <https://doi.org/10.26868/25222708.2023.1260>
- Taing, K., Andre, P., & Leclercq, P. (2023). Analysis of thermal performance of naturally ventilated residential building in tropical climate: Case study of Phnom Penh, Cambodia. *IOP Conference Series: Earth and Environmental Science*, 1199, 012038. <https://doi.org/10.1088/1755-1315/1199/1/012038>
- Taing, K. (2024). Architectural design process for a bioclimatic building: Study of methods and design strategies for building comfort in the tropical climate [Doctoral thesis, Université de Liège]. ORBi. <https://hdl.handle.net/2268/324002>
- Baudoux, G. (2023). De l'idéation en conception architecturale à l'instrumentation numérique de l'information bâtiment : Étude des conversations réflexives multi-instrumentées [From ideation in architectural design to digital instrumentation of building information: Study of multi-instrumented reflexive conversations] [Doctoral thesis, Université de Liège]. ORBi. <https://hdl.handle.net/2268/305350>
- Soriot, M. (2025). Bioclimatic strategies and thermal performance in hot and humid climates: Application case in Vietnam — Dreamplex Flexi Office Ngo Quang Huy [Master's thesis, Université de Liège]. MatheO. <http://hdl.handle.net/2268.2/24911>