



Improving Sustainability for Climate Resilience in Urban Housing by Combining Biophilic Design and Net-Zero Energy Building Strategies

ARCHITECTURE (Darq)

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01 | WHY DOES THIS RESEARCH MATTER?

How can urban housing respond to climate change while supporting energy performance, occupant well-being, and connection with nature?

Urban housing in a changing climate.

Rising temperatures and increasing overheating risks intensify the need to rethink residential building design. Achieving energy efficiency and thermal comfort must go hand in hand with promoting human well-being, strengthening connections with nature, and supporting biodiversity.

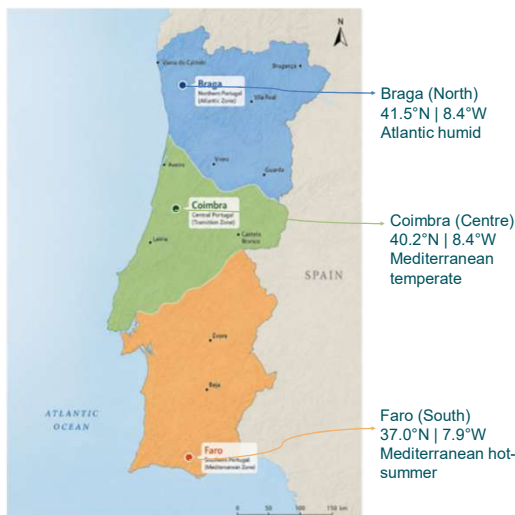


Figure: Location Map of the case study areas in Mainland Portugal

05 | RESEARCH PROGRESS

COMPLETED

Climate analysis of present and future conditions across three Portuguese regions: Braga, Coimbra, and Faro.

IN PROGRESS

Literature evidence synthesis and development of the integrated conceptual framework.

NEXT PHASE

Case-study application, assessment, and framework refinement.

06 | EXPECTED CONTRIBUTION

An evidence-informed conceptual framework to support the integrated consideration of Biophilic Design and NZEB strategies in the design of sustainable and climate-resilient urban housing.

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02 | THE RESEARCH GAP

Two approaches. One shared housing challenge.

BIOPHILIC DESIGN (BD)

Strengthens connections between people, buildings, and nature.

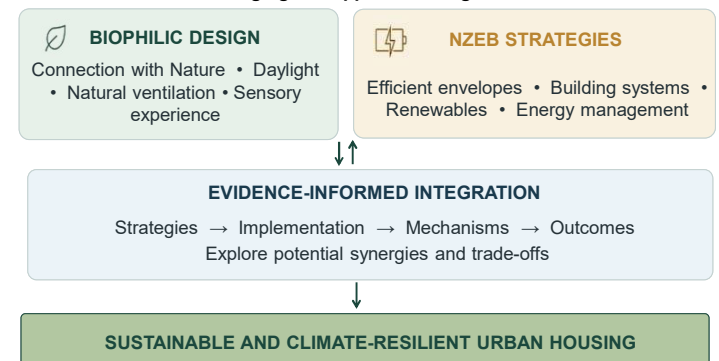
NET-ZERO ENERGY BUILDING (NZEB) STRATEGIES

Reduce building energy demand and support the balance between energy use and renewable energy generation.

How can Biophilic Design and NZEB strategies be integrated to support sustainability and climate resilience in urban housing?

03 | THE RESEARCH IDEA

Bringing two approaches together



The framework explores potential relationships; combined benefits have not yet been assumed or validated.

04 | THE RESEARCH APPROACH

From evidence to an integrated conceptual framework

1. Climate Analysis	Map present & future climatic conditions across three case study areas in Portugal. Establish climatic design contexts.
2. Literature Evidence Synthesis	PRISMA-guided systematic literature review. Review strategies for Biophilic Design and NZEB for urban residential buildings.
3. Framework Development	Synthesize reported strategies, implementation approaches, and outcomes. Identify potential synergies, trade-offs, and relationships.
4. Case-study Application And Refinement	Apply and simulate the framework in a digital prototype of a mid-rise, multi-family housing. Refine the framework based on data analysis.