

# ThermoBuild Brief

A Newsletter Featuring Leading Voices in Thermoelectrics and Building Energy Technology

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## Research Highlights

In recent months, our research has had its greatest milestone with the presentation of [Zhineng He](#)'s doctoral thesis, entitled "[System modeling and control strategy of thermoelectric window frames](#)", in which applications of thermoelectric systems for regulating indoor temperature in buildings are developed.

The study explores the main factors of thermoelectric systems that affect thermal performances, analyses their effects on thermal performances, and finally proposes an optimization strategy and a potential control system.

## Expert Spotlight



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## Technical Insight

- We firmly believe in the potential of thermoelectricity to eliminate bulky indoor HVAC building services in certain architectural typologies.
- We aim to improve the control systems of various climate-controlled spaces using thermoelectric systems by leveraging the stimergy concept.



## Data Snapshot

### Performance Analysis of Model-Based Control for Thermoelectric Window Frames Buildings 2025, 15, 1364 – Z. He, C. Martín-Gómez, A. Zuazua-Ros

<https://doi.org/10.3390/buildings15081364>

Keeping indoor temperatures stable is a persistent challenge in buildings, where external conditions constantly interfere with climate control systems. This paper proposes a model-based control method for thermoelectric window frames that adjusts operating current in real time to compensate for indoor and outdoor disturbances — bringing room temperature reliably to the desired set point.

## Up Next

*"We are creating a workflow for the integration of thermoelectric systems in buildings, so that all those involved (e.g. architects, materials engineers, electrical engineers or maintenance managers) have a common framework on which to make their contributions."*