SBD Lab

(Liege University - (ULiege / ULg))



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# Development of Thermal Building Model for a Nearly Zero-Energy Timber House with Integrated Phase Change Materials

Draft Unpublished

Galeone, Dania; Attia, Shady, 2025, "Development of Thermal Building Model for a Nearly Zero-Energy Timber House with Integrated Phase Change Materials", https://doi.org/10.7910/DVN/NCX4IN, Harvard Dataverse, DRAFT VERSION

This study presents the development of an EnergyPlus thermal building model for a nearly zero-energy timber house located in Aalter, Belgium, supported by on-site thermal comfort monitoring. The lightweight wooden envelope makes the building particularly sensitive to indoor temperature fluctuations and overheating. To enhance passive thermal energy storage, bio-based phase change materials (PCMs) were integrated into the ceilings and selected wall assemblies. Indoor thermal comfort was monitored through measurements of air temperature and relative humidity in representative zones, and the measured data were used to inform and calibrate the EnergyPlus model. The model incorporates detailed building geometry, construction stratigraphy, PCM thermophysical properties, and the main heating and ventilation systems. The combined monitoring and EnergyPlus modeling framework enables the assessment of indoor thermal comfort and the effectiveness of phase change materials in reducing temperature variations, providing a robust basis for evaluating passive overheating mitigation strategies in nearly zero-energy timber buildings. (2025-12-15)

Collapse Description [-]

**Subject**

Engineering

**Keyword**

Nearly zero-energy building, timber construction, phase change materials

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