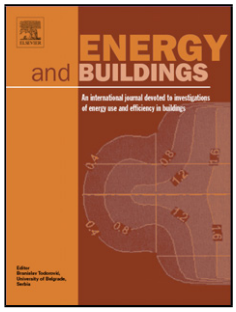

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Improved prediction of deep retrofit strategies for low income housing in Ireland using a more accurate thermal bridging heat loss coefficient

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Abstract

In order to improve the energy efficiency of buildings, thermal insulation plays a pivotal role, however increasing external wall thermal insulation without also addressing construction details can lead to increased thermal bridging and increased mould growth. Detailed knowledge of a buildings thermal envelope is paramount to correctly analysing existing problems that promote cold bridging and low surface temperatures. No detailed database exists for housing in Ireland which describes the geometrical configuration of the existing stock. This paper presents findings from an investigation into the prediction of heating energy consumption performance for external envelope retrofit measures when adopting default standardised coefficients for thermal bridging as opposed to simulated values based on accurate geometrical information. Using a remote extraction methodology to obtain geometrical information on house typologies, this paper presents a study that produced a detailed building component database premised on stock aggregation theory using Cork City's local authority housing as a case study. Three construction types; block on flat, cavity and composite cavity are identified with representative construction details for housing typologies modelled in Psi-Therm 2d enterprise. Linear thermal transmittance and minimal surface temperatures are evaluated and an energy efficient external retrofit for each construction detail is proposed. Thermal characteristics for each house archetype are developed using information extracted from 1551 asset rating surveys. Three case study terraced house typologies are then modelled using Ireland's national asset rating software to demonstrate the importance of obtaining more accurate information regarding the building stock. The results highlighted up to 21.5% variation in energy performance when substituting default thermal bridging coefficient for calculated values.

Keywords: Stock aggregation; Retrofit; Thermal bridging; Local Authority Housing