

Energy Certification Labels and Comfort Assessment for Dwellings Located in a Mild Climate

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Abstract : Most of the European literature concerning energy efficiency and thermal comfort of dwellings assumes permanent heating and focuses on energy-saving measures. European National regulations are designed for those permanent comfort conditions. On the other hand, very few studies focus on the effect of the improvement measures in comfort reduction, for free-floating conditions or intermittent heating, in fuel poverty vulnerable countries. In Portugal, only 21% of the household energy consumptions (and 10% of the cost) are spent in space heating, while, on average European bills, this value rises to 67%. The mild climate, but mainly fuel poverty and cultural background, justifies these low heating practices. This study proposes a “passive discomfort” index definition, considering free-floating temperatures or with intermittent heating profiles (more realistic conditions), putting the focus on comfort rather than energy consumption (which is low for these countries). The aim is to compare both energy (regarding the legal framework of national regulation) and comfort (considering realistic conditions of use) to identify some correlation. It was developed an experimental campaign of indoor thermal conditions in a 19th building located in Porto with several apartments. One dwelling was chosen as a case study to carry out a sensitivity analysis. The results are discussed comparing both theoretical energy consumption (energy rates from national regulation) and discomfort (new index defined), for different insulation thicknesses, orientations, and intermittent heating profiles. The results show that the different passive options (walls insulation and glazing options) have a small impact on winter discomfort, which is always high for low heating profiles. Moreover, it was shown that the insulation thickness on walls has no influence, and the minimum insulation thickness considered is enough to achieve the same impact on discomfort reduction. Plus, for these low heating profiles, other conditions are critical, as the orientation. Finally, there isn't an unequivocal relation between the energy label and the discomfort index. These and other results are surprising when compared with the most usual approaches, which assume permanent heating.

Keywords : dwellings in historical buildings, low-heating countries, mild climates, thermal comfort

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