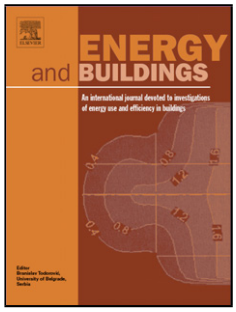

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Methodological proposal for monitoring energy refurbishment. Indoor environmental quality in two case studies of social housing in Madrid, Spain

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Highlights:

- Analysis of energy performance in two social dwellings and their refurbishment needs
- Over one year of monitoring data
- Comparison of user habits and indoor environmental quality to regulatory standards

ABSTRACT

Energy performance analysis of two dwellings is discussed with a view to energy refurbishment. Both form part of State-developed multi-family social housing in Madrid. Their non-insulated double wall façades are typical of the buildings erected in Spain between 1940 and 1980, i.e., from the end of the Spanish Civil War to the entry into effect of code NBE-CT-79 on thermal conditions in buildings.

A methodology is proposed to characterise existing conditions in this type of housing and identify the main factors for proposing improvement measures. Data were gathered on design, user behaviour, indoor environmental quality, construction systems and energy consumption. The analysis focused on user well-being, including factors such as usage and indoor environmental quality to tailor the approach adopted to actual performance.

The results of applying the methodology to two standard dwellings to determine actual energy performance revealed significant differences from the standards set out in the legislation, as well as shortcomings in indoor environmental quality, inaccuracies in assumptions about user behaviour and flaws in construction system quality.

KW: energy efficiency, social housing refurbishment, user behaviour, building energy performance, indoor environmental quality, occupant well-being

1. INTRODUCTION

The aim pursued with building energy refurbishment is to lower the greenhouse gas emissions associated with energy consumption [1]. This can be attained by reducing demand, raising system efficiency and using renewables [2].

The high cost of energy often induces restrained consumption in social housing, to the detriment of habitability. As early as 2007, the Intergovernmental Panel on Climate Change [3], analysing experiences on the effectiveness of emissions abatement policies from a cost-benefit perspective, noted