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Addressing the challenges of public housing retrofits

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Abstract

European directives are pushing EU member states to promote energy retrofits of their building stocks. Nevertheless, building renovation stagnates due to many issues, including financial, informational, behavioral, educational and other challenges. All of these increase for the public housing sector, where specific problems such as fuel poverty and social exclusion sum up to common problems such as the tenant-landlord dilemma. On the other hand, public housing represents an important asset for local governments, both in terms of economic and social value. By improving the quality of life and the economic resilience of inhabitant of public housing, local authorities may obtain long-term returns for social inclusion, and citizens' wellbeing. Following this perspective, the municipalities of Milan and Lisbon committed, within the larger framework of the EU funded Sharing Cities project, to promote the renovation of some pilot public housing estates. The design process, the objectives, the expected outcomes and the monitoring and assessment process are described in the paper, trying to highlight the potential benefit for tenants, local governments and, in the long run, for the whole society.

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1. Introduction

The residential sector is one of the largest consumers of energy, accounting for around 25 % of the yearly final energy consumption in the European Union (EU) [1]. To reduce energy consumption in this sector, and the consequent

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environmental impacts that derive from it, the EU has designed and implemented the Energy Efficiency Directive [2] and the Energy Performance of Buildings Directive [3].

Several studies have identified that there is a significant potential to increase the energy efficiency of the residential sector through the investment in more efficient appliances, the retrofitting and construction of high performance buildings' envelopes and technical systems and also through changes in occupants' behavior [4-7]. In the particular case of building retrofits, the potential is justified by the aged building stock of the EU, with two-thirds of the existing buildings having been built before there were any energy performance standards [8,9]. As such, many residential buildings have low efficiencies, resulting in high energy demands to fulfill the occupants' needs, especially those that date between 1945 and 1980. However, despite the identified potential, energy reduction in the residential sector has only been decreasing slightly, with the renovation rate of buildings being only about 1 % per year [10]. To address this issue, the European Commission has identified that its member states need to further promote building retrofits by providing more information to consumers about energy efficiency options and to improve the investment conditions for private consumers. In addition, recognizing that some of its citizens still face fuel poverty and low living standards, the European Commission also urges member states to implement measures such as interest-free loans and to tackle the tenant-landlord dilemma, which are particularly relevant in social and public housing [11].

The aim of this work is to provide a better understanding of the challenges faced by local and national governments to promote building retrofits in public housing estates, by presenting how Milan and Lisbon are addressing the issue within the Sharing Cities project. In the paper we will refer to the distinction provided by the Oxford Dictionaries for public housing, i.e. housing provided for people on low incomes, subsidized by public funds; and for social housing, i.e. housing provided for people on low incomes or with particular needs by government agencies or non-profit organizations.

2. Challenges and barriers of retrofitting

Building renovation faces several barriers that have hindered the investment in energy efficiency improvement. Financial barriers originate from the high upfront costs that are inherent to building retrofits and lead to long payback periods [12]. Information barriers may affect all the stakeholders involved in the value chain of building retrofit, as they may have a lack of information regarding the regulatory framework, the most suitable measures, the available technologies, the installation, operation, and maintenance of efficient equipment and the quantification of future energy savings [13]. Behavioral barriers are also very relevant, as they derive from the willingness of the consumer to invest in energy efficiency improvements. Examples of behavioral barriers are the possible unavailability of individuals to leave their houses or endure the annoyance when works are required, the high discount rates that individuals have when assessing an investment, and the split-incentives issue that arises if the house is rented, with the tenant having immediate benefits and the property owner obtaining benefits in the long-run [14]. The split-incentives problem is very relevant in the EU as around 30 % the population lives in rented houses [15].

Another challenge is the quantification of non-monetary benefits that may be obtained through building retrofit. These include improved indoor air quality (IAQ), better thermal comfort and lower noise levels, i.e. a higher indoor environmental quality (IEQ). The inclusion of these factors in a building retrofit analysis could help convincing household owners to undertake renovations.

Between the behavioral and information barriers and the challenge of non-monetary benefits lays the so-called rebound effect [16], i.e. the reduction in expected energy savings, because of unfavorable occupants' behavior. The rebound effect can be better defined as the increase on energy consumption in services for which improvements in energy efficiency reduce the costs [7]. A typical example is occupants choosing to invest part of the economic operational saving obtained as consequence of the energy efficiency measures, in a not necessary energy service. Literature studies report that, although energy consumption is lower in energy efficient dwellings, their occupants tend to prefer higher indoor temperatures [7]. It is therefore plausible that lower energy costs for heating are offset by a demand for more heating-related benefits [7].

In order to surpass these barriers and increase renovation rates, governments have been pushing for more clear regulation, to drive investment and reduce uncertainty, and establishing energy performance certificates to bring attention to energy efficiency and provide more information concerning the benefits of building retrofits [17].

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