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A management perspective on energy efficient renovations in Swedish multi-family buildings

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Abstract

Sweden has around 2.5 million dwellings in multi-family buildings, which constitute about 55% of the total dwelling units. The multi-family building ownership in Sweden can be categorized into municipal, private and co-operative ownership. Approximately 40% of apartments in multi-family buildings belong to municipal housing companies, while the rest is equally shared by private companies and co-operative housing associations. These organizations have different priorities, limitations and concerns related to energy renovations. Accordingly, in this sector the decisions to invest in energy efficiency improvement depends to a large extent on the type of ownership.

In this study we analyzed the perspectives of different types of building ownership on energy efficient renovation. The analysis is based on detailed interviews of 4 senior managers representing the multi-family buildings under different ownership categories. Along with this we also interviewed a municipality energy adviser. All the interviewees are based in in North Sweden. The drivers to facilitate the rate of adoption of energy renovation in such buildings are discussed.

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1. Introduction

Energy efficiency improvements constitute an important strategy for reducing global carbon dioxide (CO₂) emissions [1]. Building sector offer a large potential for reducing such emissions through energy efficiency improvements [2]. Moreover, a significant number of mature energy efficiency measures in buildings could result in CO₂ emissions reductions that have net benefits [2]. To improve energy efficiency in the building sector, it is important to target both new and existing buildings. Many countries have introduced building codes with energy efficiency

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requirements for new buildings. However, addition of new buildings to the existing stock happens slowly, especially in developed countries. For example, in Sweden, the number of residential units increased by approximately 10% from 1991 to 2008, which corresponds to an average increase of roughly 0.5% of new housing units per year [3]. Hence to significantly reduce energy use in the building sector, it is important to improve the energy efficiency of existing buildings.

The multi-family buildings' ownership in Sweden can be categorized into three: tenant-ownership (henceforth co-operative housing association), private and municipality owned buildings. Approximately 40% of apartments in multi-family buildings belong to municipal housing companies, while the rest is equally shared by private companies and co-operative housing associations. The municipal housing and private companies give their apartments for rent, while the co-operative sector resembles a condominium [4]. In Swedish co-operative housing associations the decisions pertaining to the buildings are usually made by the executive board which is headed by a chairperson who is selected from the apartment owners. These housing associations collect a monthly fee from apartment owners as a payment for heating, facility electricity, interests for loans and for services such as garbage removal. The associations usually allocate a part of this fee for maintenance activities.

The type of ownership may influence the perspectives and approaches of multi-family buildings towards energy efficient renovation. In this study we investigated the perspectives of “decision makers” in three categories of housing of organizations. The aim of the study is to understand the barriers to adopt energy efficiency measures in different categories of housing organization and also to learn from the organizations' experiences in dealing with energy efficient renovations.

2. Energy efficiency improvements in multi-family buildings

Energy efficient buildings may provide significant energy cost savings to building owners. However, several barriers limit the widespread adoption of energy efficiency measures in the buildings. The building owners' uncertainties on the costs and payback period of energy efficiency measures is an important barrier for the adoption of such measures [5]. The fiscal incentives, providing accurate information of available financial support and building regulations are all important drivers to promote energy efficient renovation and sustainable construction [5, 6]. According to Hydes and Creech [7] the misconception that the energy efficiency measures are not cost effective could be an important barrier for the diffusion of such measures. Unlike the public perception of high costs for wide range of energy efficient renovation measures, several such measures in reality are economically viable [8]. Moreover, improved indoor air quality and occupants' satisfaction due to energy efficient renovations are some of the additional benefits. The building owners can market these aspects to either attract new tenants or to retain existing ones [9].

Mosgaard et al [10] highlighted that extensive energy renovations should not be seen as adoption of individual technologies but as a complex innovation processes encompassing interactions between technologies and actors. The building sector involves co-operation of several actors and many times they co-operate only for specific projects. Palm et al [11] found that building professionals were involved only in the decisions related to their own specialized areas. Palm et al [11] suggests that it is a cumbersome to coordinate various actors, which makes it challenging to incorporate energy efficiency measures that requires close co-operation. According to Beillan et al [6] the stakeholders such as project managers or architects, whom the building owners trust, could influence the choice of specific measures. They suggest to improve the awareness of stakeholders, such as installers and builders, by training them on the specific aspects of energy efficient renovation.

A difference of upto 50% between predicted and actual energy savings were reported in energy efficient renovations [12]. Such discrepancies may lead to negative perception towards energy saving possibilities of energy efficient renovation. Moreover, the lending agencies may perceive higher risk for energy renovation due to the bad reputation of some previous projects that failed to deliver the promised energy cost savings renovation due to the bad reputation of some previous projects that failed to deliver the promised energy cost savings [10].

3. Methodology

Interviews were used for data collection as detailed information on the topic were required from the housing organizations. Representatives from three different categories of multi-family buildings who wield influence in decisions were contacted for an interview. The interviewees included (i) the chief operating officer (CEO) of a

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