



# Are we moving fast enough? The energy renovation rate of the Dutch non-profit housing using the national energy labelling database



Faidra Filippidou\*, Nico Nieboer, Henk Visscher

*Delft University of Technology, Faculty of Architecture and the Built Environment, OTB, Julianalaan 134, 2628 BL, Delft, The Netherlands*

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## ABSTRACT

The existing housing stock plays a major role in meeting the energy saving targets set in the Netherlands as well as in the EU. Existing buildings account for 38% of the final energy consumption in the European Union (EU), and they are responsible for 36% of the CO<sub>2</sub> emissions. Energy renovations in dwellings offer unique opportunities to reduce both energy consumption and greenhouse gas emissions. In this article, the renovation rates for the non-profit housing stock of the Netherlands are presented, based on the changes in the energy performance of 856,252 dwellings for the period of 2010–2014. The data necessary are drawn from a monitoring system that contains information about the energy performance of approximately 60% of all dwellings in the sector. The method used follows the changes of the dwellings' physical properties and reported energy performance. The results show that although many energy improvements have been realized, they result in small changes of the energy efficiency of the dwellings. Deep energy renovation rates are very low. If this pace continues, the progress is too little to reach national and international policy targets. The renovation rates are not high enough and the trends seem difficult to reach.

## 1. Introduction

The energy performance of buildings is generally so inadequate that the levels of energy consumed in them place the sector among the most significant CO<sub>2</sub> emission sources in Europe (BPIE, 2011). Existing buildings are responsible for 36% of the CO<sub>2</sub> emissions in the European Union (EU) (European Commission, 2008, 2014). In the context of all the end-use sectors, buildings represent the largest sector with 38% of the total final energy consumption, followed by transport (European Commission, 2016a). A considerable percentage of this energy consumption is attributed to the residential sector, as on average dwellings consume 24.8% of the total energy consumption in the EU (Eurostat, 2016). The building sector plays a major role in order to meet the energy saving targets set in the Netherlands and in the EU (SER, 2013; Ürge-Vorsatz et al., 2007). This is particularly true for existing buildings, because they will constitute the major part of the housing stock over several decades. The renovation activity will be greater than the construction and demolition activity in the future.

Policy targets and regulations are in force, at an EU level, to ensure the energy efficiency improvement of the building stock. The Energy Performance of Buildings Directive ([EPBD] 2002, recast 2010) is the main legislative and policy tool in EU and focuses on both new and existing buildings. At the same time, the building sector plays a

prominent role in the Energy Efficiency Directive ([EED] 2012). Relatedly, in the Netherlands, the foundation of energy efficiency policy has been a number of national cross-cutting measures and EU derived policies that play a large role; like the strengthening of standards for new buildings or dwellings and energy labels for existing ones (EPBD) (ECN 2015). Additional measures target split incentives. In 2013, a revolving fund for savings in buildings was created – 150 million euros from the government and 450 million from market parties (ECN, 2015).

The energy savings potential of the existing dwellings is large. In the Netherlands, policy measures have been employed since the last quarter of the 20th century, mainly through building decrees. The energy consumption of new buildings has been regulated since 1975 consisting of limits on transmission losses based on insulation values (Boot, 2009). In 1995 these limits were expanded to include the national “EPC” (Energy Performance Coefficient) which is a figure expressing the energy performance of a building depending on the energy consumed for space heating, hot water, lighting, ventilation, humidification and cooling. The energy performance of the existing housing stock is being regulated through energy labels (A to G – most efficient to least efficient), since 2008, when the EPBD was implemented in the Netherlands. The average energy label in 2015 was C (RVO, 2015). As the years pass, more dwellings adopt an energy label and

\* Corresponding author.

E-mail addresses: [f.filippidou@tudelft.nl](mailto:f.filippidou@tudelft.nl) (F. Filippidou), [n.e.t.nieboer@tudelft.nl](mailto:n.e.t.nieboer@tudelft.nl) (N. Nieboer), [h.j.visscher@tudelft.nl](mailto:h.j.visscher@tudelft.nl) (H. Visscher).

thus far 2.9 million have one. The majority of these dwellings belong to the rental sector.

Despite the regulations and directives, there is a greater focus on newly built dwellings, achieving nearly zero energy standards, than on energy renovations of the building stocks. Nonetheless, energy renovations of dwellings are considered to be more sustainable and cost-effective than demolition and rebuilding (Itard and Klunder, 2007), and should be given priority and incentives, especially taking into account the low and declining construction rates in the EU (Pombo et al., 2016; Thomsen & Van der Flier, 2002). Energy renovations offer unique opportunities for reducing the energy consumption and greenhouse gas emissions. Energy renovation is instrumental for reaching the EU 2020 goals (Saheb et al., 2015). Moreover, renovations of the existing building stock have implications for growth and jobs, energy and climate, and cohesion policies (European Commission, 2014; Saheb et al., 2015). Renovating existing buildings is seen as a 'win-win' option for the EU economy (Saheb et al., 2015). However, there are challenges mainly relating to the financing, market uptake and occupant awareness of energy renovations. Further, although there have been various energy renovation actions of dwellings in Europe (see Section 2), the assessment and monitoring of the pace of these renovations is lacking.

The tenure mix of dwellings bears a significant relevance to the ability to renovate regarding both the energy performance and the impact on the pace of energy renovations. The total amount of dwellings in the Netherlands is 7.5 million. The owner occupied sector comprises 55.8% of the total, whereas the rental sector amounts to 43.5% (BZK, 2016b). The ownership type is unknown for the remaining 0.7% (BZK, 2016b). The vast majority of the rental sector belongs to housing associations forming the non-profit housing sector. In this paper, we focus on the Dutch non-profit housing because the sector comprises approximately 2.3 million homes, which adds up to 30% of the total housing market (BZK, 2016a). This is a unique situation as the Netherlands have the highest percentage of non-profit housing in the EU. The non-profit housing sector can be expected to be a leading example when it comes to energy efficiency goals due to its intrinsic social values.

Although no common definition for the non-profit housing sector is used, three elements are shared across the European non-profit social housing sectors: a mission of general interest, affordable housing for the low-income population and realization of specific targets, defined in terms of socio-economic status or the presence of vulnerabilities (Braga and Palvarini, 2013). Non-profit housing is typically owned by the public sector; however, there is an increasing trend towards non-public involvement or the privatization of the non-profit housing sector in Europe, as is the case in Ireland, UK, Austria, France, and Denmark. Since the beginning of the 1990s the Dutch non-profit housing sector deviated from government control and public financing and became an independent sector. In the Netherlands, non-profit housing is almost entirely in the hands of private organisations (Elsinga and Wassenberg, 2014; Priemus, 2013; BPIE, 2011; Kemeny, 2002). These organizations can be better described as "hybrid" – they act between government, market and community (Nieboer and Gruis, 2016). They have to manage the different and frequently competing interests from each of these three entities (Nieboer and Gruis, 2016). The housing organizations have to fulfil several mandatory goals regarding the provision and allocation of homes.

Energy savings and sustainability are high on the agenda of the non-profit housing sector, especially since 2008 (Aedes, 2013). The main energy efficiency policy for the sector is described in the Energy Saving Covenant for the Rental Sector ("Covenant Energiebesparing Huursector", 2012). The current aim of the non-profit housing sector is to achieve an average energy performance indicator, called Energy Index (EI), of 1.25, corresponding to an energy label B, by the end of 2020 (BZK, 2014). The Covenant is a voluntary agreement between Aedes – the umbrella organisation of housing associations – the

national tenants union, and the national government. The goal of the agreement means a reduction by 33% in energy consumption compared to the 2008 levels (BZK, 2014; CECODHAS Housing Europe, 2012). This voluntary agreement is a prominent example of policy implementation in organized housing. Agreements like this one could be enforced in communities and other public or private bodies to ensure energy efficiency of housing stocks. However, the application of such agreements is difficult in the owner-occupied housing sector where the owner bears the energy efficiency investment weight alone and is difficult to motivate.

The main aim of the article is to determine the actual renovation rate of the non-profit housing stock in order to conclude if the targets set are reachable and if not, what are the policy instruments needed to increase this rate. The energy renovation rate for the non-profit housing stock of the Netherlands is presented based on the changes in the energy performance of about 856,252 dwellings for the period of end 2010 to the end of 2014. We aim to identify the amount of dwellings in the non-profit housing sector of the Netherlands that showed an improved energy performance during this period. Moreover, we also analyse the energy improvements of the stock per year to get a more detailed view of the trend of the energy renovation rate. Through this study we highlight the importance of monitoring the energy renovations in the housing stock.

A common definition of an energy renovation is lacking. In 2014, the European Commission published the guidelines to finance the energy renovation of buildings. According to these guidelines, there are three types of energy renovations: the implementation of single measures (including the low-hanging fruit), the combination of single measures (which can be termed "standard renovation") and the deep or major energy renovation – referring to renovations that capture the full economic energy efficiency potential of improvements (European Commission, 2014). We define the energy improvement rate as the amount of dwellings that were improved by at least one label step in a specific amount of time (e.g., one year). In addition we also refer to the dwellings that improved towards the highest energy performance (labels A or B). We define the deep renovation pace as the amount of dwellings that improved by at least 3 label categories. We have chosen this minimum of three 'steps', because this improvement in energy efficiency involves the application of a serious package of measures and is in line with several subsidy schemes.

This paper is structured as follows. The second section presents an overview of energy efficiency goals and improvements in several European countries. The third section describes the data and methods of our research. The fourth section presents the results. The fifth section deals with our experiences concerning the database and the longitudinal data analysis. Finally, the sixth section elaborates on policy implications and draws conclusions.

## 2. Energy efficiency regulations, goals and insights in progress

The European Environmental Agency (EEA) reports that the EU is going to achieve its 20-20-20 climate, renewable energy and energy efficiency targets (EEA, 2015). The climate targets refer to the Greenhouse Gas (GHG) emissions projected to be 27% lower in 2030 compared to the 1990 levels (based on 2014 data); moreover, the goal for a 20% reduction in 2020 will be met (EEA, 2015). The renewable energy targets refer to 20% share of Renewable Energy Sources (RES) in energy consumption. The energy efficiency targets refer to the level of primary and final energy consumption. The energy efficiency target for 2020 is defined as an absolute target. It is set 20% below the level in primary energy consumption of 2005 (EEA, 2015). Apart from the prevailing "20-20-20" goals, when it comes to reducing the primary energy consumption at the EU level, the Energy Efficiency Directive 2012/27/EU (EED) is in place. All Member States have their own national plans to achieve the targets as required by the EED. Since

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