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Are Dutch residents ready for a more stringent policy to enhance the energy performance of their homes?

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ABSTRACT

Investments in the energy performance of houses offer good prospects for reducing energy consumption and CO_2 emissions. However, people are not easily convinced of the need to take measures to improve the energy performance of their houses, even when financial benefits outweigh the costs. This article analyses the factors that influence the decision for improving the energy performance of existing homes, including policy instruments. Subsequently, the article provides policy suggestions on how to stimulate energy performance improvements. Both owners and tenants (50–70%) support government policy on energy performance improvements to existing homes. Nevertheless, people also have strong feelings of autonomy regarding their homes. Our results underline the importance of well-informed and competent decision-makers. Introducing the use of Energy Performance Certificates (EPCs) into the tax system for energy and residential buildings might therefore be an effective way to increase the interest of owners in the EPC, improve the use and effect of this informative instrument, and make the first step towards bridging the tension between autonomy and more stringent instruments.

1. Introduction

In the Netherlands, residential buildings are responsible for about 9% of CO_2 emissions (Schoots et al., 2016) ,[1] the main greenhouse gas causing climate change. The Dutch Government has a long history in encouraging energy conservation in the built environment. Today, this policy is also propelled by European regulation, in particular by the Energy Performance of Buildings Directive (EPBD). Energy conservation is predominantly driven by the benefits to stakeholders. These benefits include having control over heating costs, a comfortable and healthy indoor environment and an increase in property value (e.g. see Brounen and Kok, 2011; Hu et al., 2014; Ryan and Campbell, 2012). Saving energy is not easy, however, even when the benefits outweigh the investment costs. The Dutch Ministry of the Interior and Kingdom Relations (BZK, 2011) stimulates energy saving behaviour in the built environment. Apart from reducing CO_2 emissions, this policy is also driven by the aspiration to control energy costs for end-users and to stimulate the Dutch construction and installation sector.

Energy saving behaviour in the built environment concerns two types of conduct: 'daily' heating behaviour and the investment decisions that affect the energy performance of buildings (Mills and Schleich, 2012). Daily heating behaviour is recognised as an important factor by scientists (Gram-Hanssen, 2011; Greening et al., 2000; Guerra Santin et al., 2009; Guerra Santin and Itard, 2010) and the Ministry (BZK, 2011; Tigchelaar and Leidelmeijer, 2013). However, most policy instruments in the Netherlands are intended to influence investment decisions and persuade owners to invest in the energy performance of their homes (BZK, 2011; Murphy and Meijer, 2011; Murphy et al., 2012; Noailly and Batrakova, 2010; Vringer et al., 2016).

In 2013, PBL Netherlands Environmental Assessment Agency was asked to assess the national Energy Saving policy for the Built Environment (Vringer et al., 2014, 2016). This assessment was conducted to establish how governments can stimulate investments in the energy performance of the built environment more effectively and efficiently. The assessment was partly based on a decision model for the required investments and a survey among owner-occupiers and tenants. In this article, we aim to contribute to the understanding of the factors that influence the decision to improve the energy performance of existing homes by reporting on the approach, the results and the related policy recommendations. Several models reported in the literature search for relationships between socio-economic household characteristics, attitudes, knowledge, building characteristics and the

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[1] According to this source, national CO_2 emissions totaled 187 Mt CO_2 eq in 2014 (not adjusted for temperature), where 17 Mt CO_2 eq (temperature adjusted) is attributed to residential buildings.

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adoption of measures to improve the energy performance (e.g. see Ameli and Brandt, 2015; Mills and Schleich, 2012). Our analyses and model also try to address the questions of how policy influences investment decisions. To our knowledge, only Murphy (2012) has made a somewhat similar attempt to understand the impact of policy instruments. In addition to Murphy, this article also explores the support for policy instruments.

The Section 2 of this article introduces the model. Section 3 discusses data and methods, followed by the dependent and independent variables in Section 4. Section 5 discusses multiple regression results, where the effects of policy instruments have been controlled for other variables influencing the decision to adopt measures. Finally, in Section 6, policy implications are elaborated.

2. A decision model for energy saving behaviour

We arrived at a relatively simple model for the decision-making process, including the effects of policy instruments. The latter is relatively new to (quantitative) studies on investment decision with regard to the energy performance of dwellings. Our model bears resemblance to the qualitative model developed by the Council for the Environment and Infrastructure (Rli, 2014). This section introduces the model theoretically, supported by references to relevant literature.

In our model (Fig. 1), the physical context shapes the environment within which households decide whether or not to improve the energy performance of their homes. It includes the dwelling itself, household characteristics (including financial possibilities) and housing tenure (Murphy, 2012; Tigchelaar and Leidelmeijer, 2013). Within the physical context, housing tenure is important as this determines who is in charge of the property: owner-occupiers have legal control over their home, while tenants depend on their landlords for substantial investments. Split incentives are common barriers between building owners and tenants (Ameli and Brandt, 2015; Economidou, 2014).

Second, people can be strongly influenced by 'social standards' and the actions of other people (BIT, 2011; Bouma and Dietz, 2013). The influence of social peers refers to the opinions and behaviour of family, friends and enterprises that are important to (potential) investors.

Third, we acknowledge that decisions are taken with a bounded rationality because people do not have unlimited amounts of time, skills or information. Besides the bounded rationality also behavioural processes as described by behavioural economists play a role (see e.g. DellaVigna, 2009; Kahneman, 2011; Thaler and Sunstein, 2008). This is also the case for energy behaviour which leads to the so-called 'energy efficiency gap', caused by not taking profitable investments in energy efficiency (Gillingham and Palmer, 2014; Allcott and Greenstone, 2012). People do less than they would like, are afraid of loss, reluctant out of fear of the hassle involved in renovation, or they underestimate the future financial benefits of energy saving measures. Although understanding of the relevant processes is growing, behavioural processes are complex and very difficult to predict or measure (Frederiks et al., 2015; Antonides and Handgraaf, 2013).

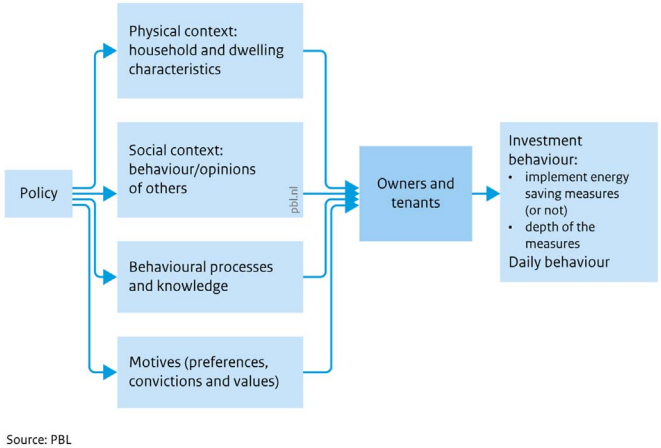

Fig. 1. Behavioural model for tenants and owners.

Fourth, owners and tenants have several motives for taking measures that may influence their decision making. Mills and Schleich (2012) found younger and higher educated households more likely to adopt energy-efficient technologies and energy conservation practices based on environmental motives, while elderly households or households with lower educated members appeared to place more importance on financial savings. Motives can also include other issues, such as comfort, financial considerations, safety and the environment.

Finally, the influence of policy instruments is included. As in most neighbouring countries (OECD, 2007), also in the Netherlands, the government applies a mix of policy instruments, described in the Plan of Action for Energy Saving in the Built Environment (BZK, 2011). Direct policy instruments include subsidies and tax reductions to lower investment costs, energy taxes to reduce the recovery time of investments, cheap loans for financing investments, tailor-made energy advice, Energy Performance Certificates (EPC-labels), and smart meters to stimulate awareness. In the Netherlands, there are no direct legal obligations for existing homes to take certain measures.

Indirect policy instruments are aimed at other, mediating parties. Examples for the Netherlands comprise innovation and stimulation programmes to improve the number of investment options available (from both technological and process-related perspectives; Van Renssen, 2014), higher standards for the energy performance of new buildings, covenants and the adjustment to the Dutch property valuation system (WWS) for the rental sector to allow landlords to recover investment costs by raising the rent.

3. Data and methods

To better understand the decision-making process described in Section 2, we conducted a survey amongst tenants, and homeowners.

3.1. Representativeness and preparation of the survey data

Respondents to the '2012 WoON Energy Module' of the triennial Dutch Housing Survey – a dataset representative of private households in the Netherlands (Tigchelaar and Leidelmeijer, 2013) – were approached a second time. Using the same respondents allowed us to reduce the number of questions and provided very detailed information on households and their homes, including, the EPC-label and recent investments.

In January 2014, the questionnaire was send to 4733 of the original 4790 respondents ,[2] either online or by post. The response amounted to 53% percent, or 2522 respondents .[3] There was no difference between the online and written response rate (Veldkamp, 2014). However, data was lacking from the paper versions as respondents were able to skip questions, either intentionally or by accident. Eighty-six respondents were excluded from the analysis because they had moved house between 2012 and the re-approach in 2014. Another 89 were excluded as they already had implemented all 9 examined measures (see Section 4.1). Finally, respondents with 16 or more

[2] No address information was available for the remaining 57 respondents

[3] These figures relate to the unweighted number of respondents. When using the 2012 WoON Energy Module weight variable to reweight the sample to the Dutch population of private households (i.e. excluding people living in institutions, housing units, houseboats, etc.), the response was just under half the (weighted) population: 3.5 of 7.1 million households. This implies that, on average, respondents that represent household types that were underrepresented in the original sample again were underrepresented in the response. In the remainder of this article, the terms 'respondents' and 'households' will be used interchangeably as the (reweighted) respondent analyses represent households.