



# Energy efficiency services for residential buildings: market situation and existing potentials in the European Union



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## ABSTRACT

Although a substantial economic energy saving potential exists in the residential sector of the European Union, the energy efficiency service (EES) market is much less developed in this market segment than in other demand sectors (e.g. the industry or the public/service sector).

This paper presents an analysis of the current situation and existing potentials for future expansion. A specific analysis methodology has been developed and applied by a research consortium in 18 EU countries. This methodology has mostly built upon an extensive review of the existing literature and on interviews of a large number of acknowledged experts. Its application has allowed identifying encouraging development trends in specific market segments where the possibility of aggregating the EES demand or of exploiting good relationships with customers have created interesting investment opportunities. These trends have been observed in particular in Germany, Denmark, France, Flanders (BE), Hungary, Romania and UK. The assessment performed has also allowed discussing a series of strategies and policy measures that can be adopted to overcome existing barriers to market development. The general conclusion drawn in the paper is that energy efficiency policies supporting EES markets in the residential sector are highly needed. Although EU policies have typically a limited direct impact, they can increase trust into EESs and EES providers. At the national level, a stronger collaboration of governments or local administrations with banks to finance EESs is still very necessary in many EU countries.

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## 1. Introduction

Comprehensive overviews of the development status of the Energy Efficiency Service (EES) market for the residential sector in the EU Member States are still missing in the literature. The main references for an analysis of the EU EES market are the reports prepared by Bertoldi and Rezessy (2005), Bertoldi et al. (2006b, 2007, 2014) and Marino et al. (2010). A specific overview of the development status and existing potential for an EES market in the

residential sector in European countries is however still missing. Despite its relevant economic energy saving potential (FhG-ISI et al., 2010), the EES market in the residential sector is much less developed than in the industry, tertiary and public sectors of the European Union. Given the existing market conditions and barriers, market experts generally appear quite sceptic about the possibility of a real and significant development in the EU countries (Ürge-Vorsatz et al., 2007). Besides sectors cross-cutting barriers (e.g. low level of energy prices in some countries, long investment

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payback periods, lack of information and awareness, lack of appropriate forms of finance), there are specific barriers which make a large scale application of the EES concept to residential buildings particularly difficult. These barriers typically are<sup>1,2</sup>:

1. The particularly high transaction costs (Dahlman, 1979) for EES providers compared to the small amount of energy costs and the potential cost savings per single EES supplied.
2. The high fragmentation of the mass-market and the need to individually look at every building or building block. This makes the supply of standardised EESs difficult (Labanca, 2010).
3. The so-called landlord/tenant dilemma due to the fact that, although the tenant basically has an interest to reach energy savings through energy efficiency improvement (EEI) actions, the landlord typically receives no benefits from these investments or can hardly pass on investment costs to the tenant (Economidou, 2014; IEA, 2008).
4. The legal requirement existing in some countries that the landlord of a multifamily building is allowed to pass on EEI action investment costs to tenants only if all tenants agree on this investment (Rezessy and Bertoldi, 2010).
5. The privatisation process in multi-apartment buildings (which usually represent the most interesting investments for EES suppliers and financiers) in many Eastern European municipalities. This process has led in many cases to property situations where every flat in a building has a different owner, which makes decisions on the building shell and building technology more difficult. Decision rules are different in different countries. Typically, at least one half or even all apartment owners need to agree to a refurbishment<sup>3</sup> (Tigheelaar et al., 2011; Grim, 2005).
6. The fact that the energy consumption in the residential sector is much more correlated to individual needs and behaviours than in other sectors (EEA, 2013). This can make it particularly difficult to define a consumption baseline and induces high risks when setting energy saving guarantees. Moreover, individual energy consumption meters for heat and hot water are sometimes lacking in multi apartment buildings impeding energy efficiency investment decisions by single households.
7. Difficulty for potential customers to get oriented among existing EES offers due to a lack of information on the available offers and services and the difficulty in understanding the EES concept, financing and contract. Moreover, terms like energy services and EES are sometimes used for services without the clear aim of improving energy efficiency (Economidou, 2011).
8. The lack of credibility on EES providers due to the often lacking legal framework for their accreditation and bad experiences of some household (Bertoldi et al., 2007).
9. The fear to become too much dependent on the EES contractor (Bertoldi et al., 2006a) and that the service offered would be more expensive compared e.g. to the case when the supplier is not (partly) paid by the energy savings.

<sup>1</sup> Most of these barriers do exist also in countries outside Europe since many years. See e.g. McKinsey (2009) and Lang (2004) for an overview of these barriers in U.S. and China.

<sup>2</sup> Although important, this paper will not discuss existing obstacles and opportunities for EESs focused on the utilization of low waste technologies and materials in the construction of residential buildings. A proper market of these EESs is far from being existent. For information on the current situation concerning the utilization of low waste materials for residential buildings in European and non-European countries see e.g. COM (2014) and Zhang et al. (2012).

<sup>3</sup> However the situation is different where the privatisation process has resulted into a common ownership of a multi-apartment building or building bloc (where e.g. a co-operative, with the general assembly of the owners or the CEO on behalf of the assembly of owners decides on a refurbishment).

10. The present economic crisis and related economic and political uncertainties.
11. The scarce or difficult accessibility of public subsidies and financing capital for EES implementation (Rezessy and Bertoldi, 2010; Economidou and Bertoldi, 2014).

The presence of the above barriers and the existing literature pointing to very scarce possibilities for an actual market development have so far discouraged the accomplishment of thorough analyses concerning the actual advancement status of the market and existing potentials in the EU countries. This paper aims to contribute to fill the existing knowledge gap and to highlight possible future development trends.

After a brief description of the adopted analysis methodology, the paper presents analysis results concerning the development status of the European EES market in the residential sector and quantitative estimates performed in relation to existing potentials. Subsequent to that, analysis results concerning existing energy efficiency policies affecting the EES market are presented. Two possible development models – a so-called community model and a household model – for a future EES market in the residential sector are then illustrated. Moreover, a short discussion on strategies and energy policy measures that could be adopted to overcome the existing barriers to EES market growth and stimulate the diffusion of the development models identified is presented at the end of the paper. Finally, a series of promising case studies reflecting the models outlined are briefly illustrated. The salient points emerged from the study are summarised in the flow chart reported in Fig. 1 below.

The definition adopted in this paper for energy efficiency services is equivalent to that provided by the European standard on Energy Efficiency Services (CEN, 2010) defining an EES as an agreed task or tasks, designed to lead to an energy efficiency improvement and other agreed performance criteria. This standard also requires that EESs include an energy audit as well as identification, selection and implementation of actions and verification of energy efficiency improvements over a contractually defined period of time through contractually agreed methods.

In the analyses presented a distinction is made among the following EES activity types that are also referred to as EES value chain stages or partial services connected to EES: (1) awareness raising, (2) information and advice, (3) identification of measures, (4) technical planning, (5) financing and subsidies, (6) implementation (operation and or supervision), (7) optimization of technical operation, and (8) measurement and verification of savings.

An Energy Service Company (ESCO) is any company delivering EESs or partial services connected to EESs, accepting some degree of financial risk in doing so and being wholly or partially paid for EES delivery based on the achievement of energy efficiency improvements (EEIs) and/or on the meeting of other performance criteria. Moreover, an energy company is defined in this paper as any company whose core business is related to energy carriers, whether this company is an energy distributor, or a distribution system operator, or a retail energy sales company. Finally, an EES provider is defined as any entity that delivers EESs (including ESCOs and energy companies).

## 2. Methodology of analysis

The methodology adopted to analyse the development status of the EES market in the EU countries has consisted of a literature review and of interviews of 4–5 acknowledged EES experts in 18 EU countries<sup>4</sup> as performed by researchers participating in a European

<sup>4</sup> The 18 EU countries are AT, BE, BG, CZ, DE, DK, EL, EE, ES, FR, IT, LV, NL, PL, PT, SE, SK, SL.

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