How much Energy Efficiency can Energy Contracting deliver to the Residential Sector in Germany?

Subtitle: Transaction and Life Cycle Cost Analyses, Market Survey and Statistical Potential

Jan W. Bleyl-Androschin, IEA dsm Task XVI „Competitive Energy Services“ Operating Agent, c/o Graz Energy Agency Ltd, Kaiserfeldgasse 13/1, 8010 Graz, Austria, Bleyl@Grazer-EA.at and Energetic Solutions, Lendkai 29, 8020 Graz, Austria , EnergeticSolutions@email.de

Dr. Bernd Eikmeier, Project Manager, Bremer Energie Institut, College Ring 2 / Research V, D-28759 Bremen. Eikmeier@bremer-energie-institut.de

Friedrich Seefeldt, Prognos AG, Head of Department "Energy Efficiency. Renewable Energies & Climate Protection", Goethestr. 85, D-10623 Berlin, Friedrich.Seefeldt@prognos.com

Overview

21.1 Mio or 59.4 % of German apartments are in the residential sector. Energy use for space heating and warm water in residential buildings accounts for more than a quarter of the final energy consumed in Germany. Yet, energy efficiency (EE) is not a priority for most building owners. At the same time Energy Contracting (EC) as a market based instrument to access saving potentials has climbed high on political agendas and has even reached the headlines of EE-legislation [2006/32/EC]. But the realistic potential, the limits and obstacles of Energy Service Company (ESCo) products in the residential sector are not well enough understood yet, as the limited market success and repeatet statements by different stakeholders tell us.

Methods

Answers to these questions are thought in a recently completed research study for the German government. We have undertaken a conceptual analysis of Energy Supply Contracting (ESC) as the market prevailing product as well as an economic analysis of transaction cost and a life cycle cost comparison between in-house and ESCo implementation. The results are compared with the empirical data of a comprehensive market query, interviews and workshops with stakeholders and case studies. Last but not least, we studied statistical housing data to estimate suitable ESCo market potentials in the residential sector.

In this paper, we do not address legal obstacles and the split incentive dilemma, constituted by the lack of a reliable legal framework for the implementation of ESCo projects (for more details, please refer to [Eikmeier et al., 2009]).

Results

Over the range 30-1,000 kW_{th} installations, the life cycle cost comparison reveals no significant cost difference between ESCo compared to in-house projects. We found a cost effective minimum project size of about 100 kW_{therm} for ESC-projects, derived from transaction cost accrued to implement ESC projects. This figure is confirmed by the market query.

The market query has further revealed around 250 ESCos, whose dominant product in the residential sector is ESC. Based on their specialized know how, competent ESCos achieve an average efficiency gain of around 5 % compared to in-house implementation. They are more likely to implement innovative and renewable technologies. Although there is still a lack of market data, it can be implicitly derived from other market data and results of our query that the actual market coverage for ESC in the residential sector is between 10 and 20 %.

In the German residential sector, a market potential of 12.3 TWh/a is considered “preferentially suitable” for EC: This accounts for only 5.6 % of the total useful heat demand in this sector. An additional, “conditionally suitable” potential amounts to 102.0 TWh/a (46.6 %), mainly limited by small size of the buildings.

Conclusions and Outlook

We conclude that the Energy Contracting potential for the residential sector is confined by three major restrictions (in addition to the lack of a suitable legal framework):

1. Due to transaction costs the EC market potential is restricted to project exceeding about 100 kW_{th} in the residential sector.

2. Furthermore, with ESC as the prevailing ESCo product in the residential sector, efficiency gains are restricted to the boiler room. Thus savings are limited to around 20 % compared to existing (or 5 % compared to new in-house) installations, whereas the .energetic saving potential of the typical building is typically twofold.

3. The case for EC can not be built on cheaper cost primarily or other classical outsourcing arguments. Advantages of Energy Contracting can rather be found in the field of outsourcing of technical and commercial implementation and operating risks to the ESCo as well as takeover of function, performance and price guarantees by the ESCo. And if innovative technologies are on demand. Only if these features are perceived as added value by the customers, more EC-products will be able to penetrate the market.

We recommend EC product standardization to access the "conditionally suitable" market. Additional efficiency potentials of typically 20 - 50 % can only be tapped, if demand side building technologies, building envelope (e.g. building insulation, improved glazing) and targeting user behaviour are integrated into energy service schemes. This could be achieved either by in-house implementation and/or innovative energy service models such as the Integrated Energy Contracting model [Bleyl 2008]. And off course the legal barriers need to be adressed.

This development requires „educated" customers to demand qualified energy services in the market. Residential building owners or more likely independent facilitators need to learn how to procure ESCo services with guaranteed results. And there is a need to finance this project development process through public money or energy efficiency funds.

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