Energy efficiency and renewable energy: brothers in arms or blowing in the wind?

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Introduction

The energy policies in many European countries currently place much more focus on renewable energies (RE) than energy efficiency (EE). This is despite the energy hierarchy's focus on demand reduction or EE above any supply side measures, including RE and cogeneration (IET, 2007). Furthermore, there exist large cost-effective potentials for EE across large sectors of the economy and much of these potentials could be realized through relatively small behavioural, "no regrets" or indeed "business as usual" measures (McKinsey & Company, 2007). Hence this paper examines Germany as a case study, where recent decades have seen an extremely rapid expansion in RE capacities, for which all end consumers are obliged to pay through a surcharge on their electricity bill. On the other hand, it is not clear how the ambitious near-term targets for EE will be met or how much additional action is required, given the heterogeneous nature of the policy in this area.

Overview

After an overview of the current situation, RE and EE are compared in terms of their CO_2 abatement costs. It is argued that EE measures represent a more equitable apportionment of these costs, given that, generally, the investor himself benefits – apart from in the case of a split-incentive. Finally it is shown what an economically optimal basket of EE measures in the domestic sector might look like and as an outlook the barriers to both RE and EE (Sorrell et al., 2004) and ways to ameliorate or eliminate them are discussed.

Methods

By using the feed-in tariff as an indicator for the total investment in RE over the past years, the CO_2 abatement costs of these investments are derived for the main renewable technologies wind, PV and biomass. In a second step indirect effects, which tend to reduce the overall social cost associated with this investment, such as the stimulation of the local economy through employment (Slattery et al., 2011; Llera Sastresa et al., 2010) and the price-dampening Merit-Order Effect (EWEA & Pöyry, 2010) are at least qualitatively considered. A similar approach is then taken for EE, in which, firstly, the changes in energy service demands over the study period are decomposed into structural, output, and intensity effects, whereby the focus here is on the domestic sector. This intensity effect is then taken to be indicative of the "real" energy efficiency saving, which can be related to total investments in EE policies and measures, including the feed-in tariff for CHP, subsidies such as through the KfW programmes (Kuckshinrichs et al., 2012) and other indirect methods. In a final step, the determined overall CO_2 abatement costs for RE and EE are compared in order to illustrate the differences, as shown schematically in Figure 1.

Expected results

The results are expected to demonstrate and quantify the large disparity between funding for RE and EE in the German case. Hence then commonly-held public conception that RE has received too much subsidy in recent years will be illustrated with empirical data. The results will thereby enable concrete conclusions regarding the formulation of more optimal energy efficiency measures to be formulated.

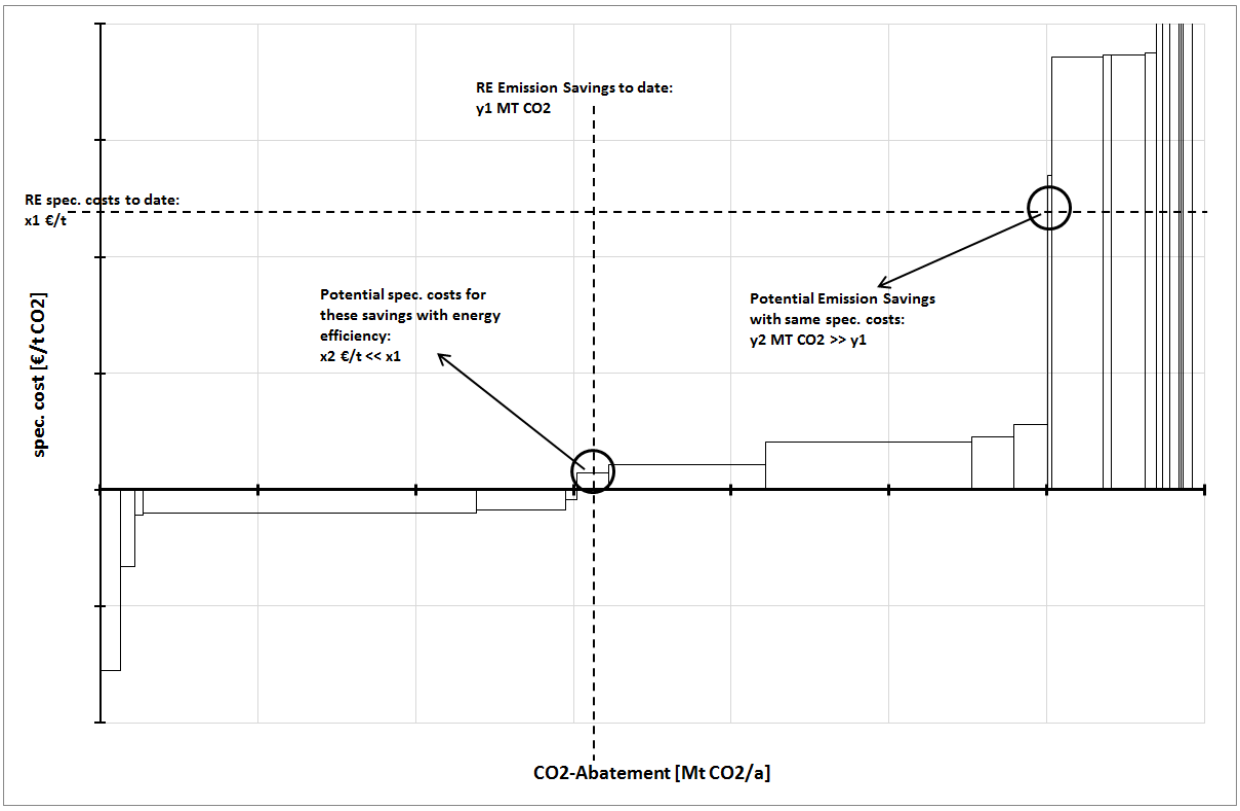

Figure 1 – Schematic illustration of the proposed methodology

References

EWEA & Pöyry 2010, "Wind Energy and Electricity Prices: Exploring the 'merit order effect'", EWEA, Brussels.

IET 2007, "The IET Energy Principles", The Institution of Engineering and Technology, London.

Kuckshinrichs, W., Kronenberg, T., & Hansen, P. 2012, "Wirkungen der Förderprogramme "Energieeffizientes Bauen", "Energieeffizient Sanieren" und "Energieeffiziente Infrastruktur" der KfW auf öffentliche Haushalte: Förderjahr 2011", IEK-STE, Jülich.

Llera Sastresa, E., Us+¦n, A. A., Bribi+ín, I. Z., & Scarpellini, S. 2010, "Local impact of renewables on employment: Assessment methodology and case study", *Renewable and Sustainable Energy Reviews*, vol. 14, no. 2, pp. 679-690.

McKinsey & Company, I. 2007, "Kosten und Potenziale der Vermeidung von Treibhausgasemissionen in Deutschland".

Slattery, M. C., Lantz, E., & Johnson, B. L. 2011, "State and local economic impacts from wind energy projects: Texas case study", *Energy Policy*, vol. 39, no. 12, pp. 7930-7940.

Sorrell, S., O'Malley, E., Scott, D. S., & Schleich, D. J. 2004, "The Economics of Energy Efficiency: Barriers to Cost Effective Investment", Edward Elgar, Cheltenham