

LESSONS LEARNT FROM THE UPTAKE OF ENERGY AUDITS AND ENERGY MANAGEMENT SYSTEMS IN GERMANY

Clemens Rohde, Fraunhofer Institute for Systems and Innovation Research ISI, Phone +49 721 6809442,
E-mail: clemens.rohde@isi.fraunhofer.de

Lisa Nabitz, Fraunhofer Institute for Systems and Innovation Research ISI, Phone +49 721 6809252,
E-mail: lisa.nabitz@isi.fraunhofer.de

Patrick Plötz, Fraunhofer Institute for Systems and Innovation Research ISI, Phone +49 721 6809289,
E-mail: patrick.ploetz@isi.fraunhofer.de

Nele Friedrichsen, Fraunhofer Institute for Systems and Innovation Research ISI, Phone +49 721 6809304,
E-mail: nele.friedrichsen@isi.fraunhofer.de

Overview

Promoting energy audits and energy management systems is a core part of the European Union's policy mix for industry. The EU's energy efficiency directive requires mandatory energy audits for all large enterprises and encourages the widespread use of energy audits among SME. In addition, Germany has promoted the uptake of certified energy management systems by two energy tax relief schemes as well as a funding scheme. As a result, the majority of ISO 50001 certified companies are from Germany. The impact of those policies on the energy efficiency progress as well as the uptake of energy efficient technologies has not been analyzed in detail yet. Within our paper we will present the current state of diffusion of energy audits and management systems in Germany. In a second step, we will empirically analyze the impacts of those instruments on the company's activities in the field of energy efficiency.

Data

To analyze the status of diffusion of the two instruments, energy audits and energy management, as well as to investigate their impact we use different data sets. These data sets were partly collected in the context of evaluations of funding programs as well as partly independently collected.

The first data set is based on the European Manufacturing Survey. This survey is carried out by Fraunhofer ISI every three years and consists of a representative sample of the manufacturing sector in terms of the distribution of company size and industry affiliation (Mattes et al. 2015). In terms of content, the use of technical and organizational innovations in production and the resulting improvements in the ability to perform in the manufacturing sector have been surveyed. Due to the time series data this sample is especially relevant for the status of diffusion of energy management systems. Fraunhofer ISI together with IREES collected the second data set, "Energy audits in SMEs", in the context of the evaluation of the funding program "Energy Consulting for SME" (Mai et al. 2014). As a result, a subsidized energy audit was carried out in all surveyed companies. Within the framework of the project "Evaluation of the Energy Efficiency Fund", the funding program "Promotion of energy management systems" was evaluated and a survey was carried out among the subsidized companies. In this third data set, the majority of companies has already installed an energy management system (Nabitz et al. 2016). Thus, this sample is particularly suitable to assess the impact of energy management systems. The fourth data set "Rational use of energy in industry" is a subsample of the European Manufacturing Survey and contains information on the rational use of energy, energy monitoring and the relevance of energy efficiency in industry (Mattes et al. 2016). In addition, the fifth data set "Rational use of energy in the trade, commerce and services sector" covers analogous data on the rational use of energy for these branches.

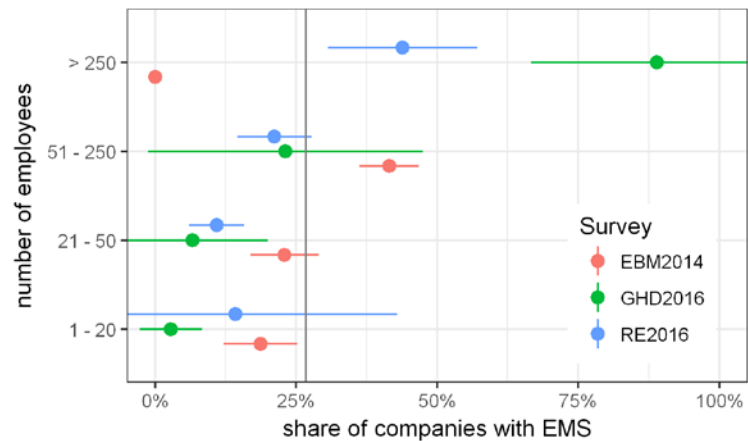
Results

We analyze the share of companies that have implemented energy audits. We use the RE2016 data set (from the "Rational use of energy in industry" survey – see data section) since it provides a representative sample of German companies. The overall share of companies with an audit is 58 ± 5 % (95% confidence interval). We observe an increase of the audit share with growing company size. We compare the share of companies with audit among the different data sets. The "Effizienzfonds 2016" has a similar sample and the resulting share of companies with audit in different company size groups are similar to the findings in figure with an overall share of 64 ± 7 % (95% confidence interval) fully consistent with the previous findings. Furthermore, the trade and services sector generally has a lower share of implemented energy audits than the industry sector.

The present state of EMS diffusion in the German industry can be further analyzed with the different surveys introduced in the data section. The figure below presents the share of companies in the German industrial sector that have an EMS according to three survey and differentiated by company size. The overall average share is 27

± 2.5 % (95% confidence interval). The different samples show slightly averages of 31 ± 3 % for the EBM2014 (N = 722), 20 ± 4 % for the RE2016 (N = 395) as well as of 18 ± 9 % for the GHD2016 (N = 73).

In a second step, we use average marginal effects of a logit regression to quantify the impact of the energy management measures. We ran a logit regression of the presence of an audit and energy management system on the implementation of at least half the suggested energy efficiency measures (“Effizienzfonds” data, N = 180). Further control variables are the use of energy saving targets and energy usage indicators within a company. Our results indicate that an audit increases the likelihood to implemented more the half the suggested energy efficiency measures by 17 percent points (marginally significant) and an EMS by 26% (highly significant). Furthermore, the included control variables have a significant impact on the likelihood of implementing energy efficiency measures. Overall, both audit and EMS increase the average share of implemented energy efficiency measure per company.



Conclusions

With our analysis we can show, that energy audits and energy management systems lead to a significantly increased uptake of energy efficiency measures in industry. Although being a no-brainer at first glance, this result is of uttermost importance for policy design. Although companies (and especially association) often claim, that they act strictly economically reasonable and implement all economically viable measures, there is obviously more untapped potential in the companies, which can be exploited by closing the informational gap and by changing the organizational culture.

References

Mai, M.; Gruber, E.; Holländer, E.; Roser, A.; Gerspacher, A.; Fleiter, T.; Hirzel, S.; Ostrander, B.; Schleich, J.; Schlomann, B. (2014): Evaluation des Förderprogramms „Energieberatung im Mittelstand“. Schlussbericht. Karlsruhe: IREES, Fraunhofer ISI.

Mattes, K.; Jäger, A.; Nabitz, L.; Hirzel, S.; Rohde, C.; Som, O. (2016): Benchmarking energy efficiency in the German non-energy intensive industries. Proceedings of the ECEEE Industrial Summer Study, September 2016, Berlin, p. 255-266.

Mattes, K.; Lerch, C.; Jäger, A. (2015): Ressourceneffiziente Produktion jenseits technischer Lösungen. Mitteilung aus der ISI-Erhebung Modernisierung der Produktion, Fraunhofer-Institut für System- und Innovationsforschung ISI, Ausgabe 69.

Nabitz, L.; Hirzel, S.; Schlomann, B. (2016): Evaluierung des Programms „Förderung von Energiemanagementsystemen“. Bericht im Rahmen des Projekts „Evaluierung und Weiterentwicklung des Energieeffizienzfonds (Projekt Nr. 63/15) im Auftrag des Bundesministeriums für Wirtschaft und Energie (BMWi), (not published).