

## **A STUDY OF THE KNOWLEDGE OF THE LEGAL OBLIGATION OF PUBLIC AUTHORITIES TO SERVE AS A MODEL IN THE FIELD OF ENERGY EFFICIENCY**

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### **Abstract**

The purpose of this study was to refute the hypothesis which states that companies in which public authorities are involved fulfil their legal obligation to conduct energy audits and act as role models.

For this study, only companies with headquarters in North Rhine-Westphalia and a municipal participation of more than 25 percent were interviewed. A total of 44 participation reports were analysed and 204 companies were surveyed.

Based on these results, it was found that the hypothesis could, at least, be partly refuted in light of the legal obligation.

### **Keywords**

public authorities, energy efficiency, energy audit, DIN EN 16247

### **JEL Classification**

K23, K32, L88, L97, L98, P18, Q01, Q04, Q48

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### **Introduction**

Although the public sector accounts for a relatively small proportion of total final energy consumption in Germany, there is considerable potential for saving energy, for example, in the areas of the energy-efficient renovation of public buildings or lighting.

Owing to federalism in Germany, 16 federal states and around 11,000 municipalities in Germany also play a major role in increasing energy efficiency. Thus, subnational units together account for about two-thirds of the total energy consumption of the public sector (BAFA, 2018).

In addition to its economic importance, the public sector also has a role model for society. Their energy efficiency measures add additional interest and persuasiveness to the desire to promote energy-efficient behaviour among private actors.

In recent years, a number of legislative acts have been adopted at the European Union level, with measures and arrangements for increasing energy efficiency. The new Energy Efficiency Directive (EED) was adopted in 2012 as an essential part of the European Union energy policy (European Parliament, 2012). The German act on Energy Services and Further Energy Efficiency Measures (EDL-G) was adapted in 2015 as part of the implementation of EED (Bundestag, 2015).

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The EDL G now obliges a large number of German companies to conduct an energy audit in accordance with DIN EN 16247 1. Not only are all the so-called non-SMEs affected but also the companies that actually fulfil the SME definition in terms of size and turnover if they have a municipal investment over 25 percent (BAFA, 2015).

These regulations, therefore, also particularly affect municipal companies as they too are included in the auditing obligation.

The question that arises with this implementation is whether or not the public authorities are aware of this legal obligation and fulfil their function as role models.

In addition to this legal obligation and under the aspect of the existing model role for the public sector to use energy services and to implement energy efficiency measures, the author would like to refute the hypothesis which suggests that companies with public participation fulfil their role model function.

The author assumes that the companies concerned are not fully aware of their legal obligation to implement energy audits and that they are not acting as role models.

The presumed effect is empirically demonstrated by this study and, in this way, the above formulated hypothesis is rebutted. In this manner, the author wants to provide important insights for the entire energy policy research field so that better legal decisions can be made in the future.

### **Methodology of Research**

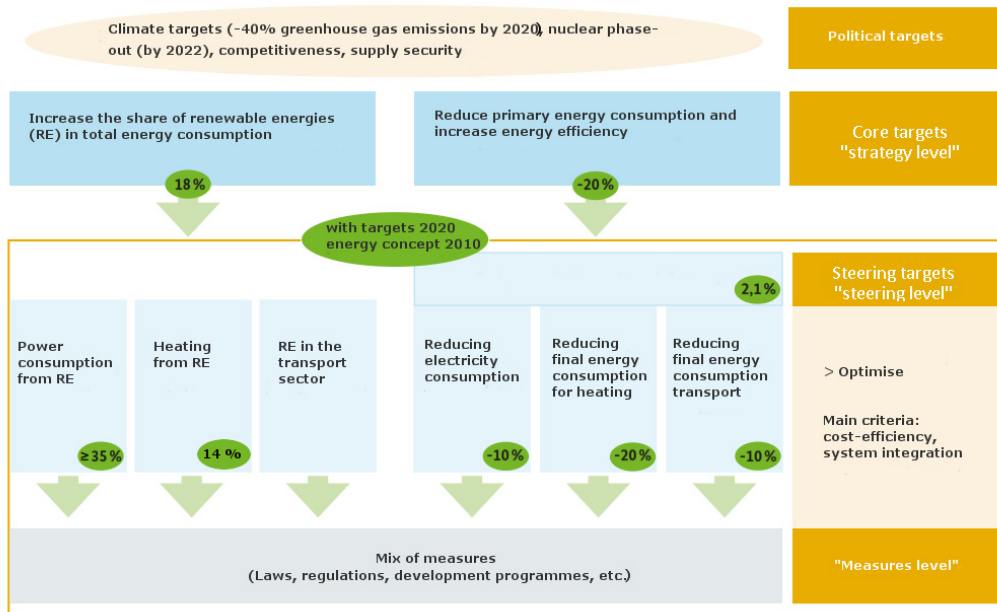
First, a literature search (Method 1) on the number of public sector enterprises was carried out. In a subsequent step, the companies concerned were questioned (Method 2) on whether they had carried out an energy audit (with expected responses of yes or no).

### **1. Literature Review**

Germany initiated a far-reaching transformation of its energy system, the so-called “Energiewende” meaning “energy transition” (BMW and BMU 2010). Alongside intensifying the use of renewable energies, reducing energy consumption by increasing energy efficiency is a key pillar of the Energiewende. The Energy Concept also includes ambitious energy efficiency targets for Germany (Schlomann, Rohde and Ringel, 2016). The structure of the Germany’s targets according federal authorities is illustrated in Energiewende Monitoring Report (2016) as in fig. no. 1.

With the National Action Plan on Energy Efficiency (NAPE), the Federal Government has launched a comprehensive strategy to deliver on the energy consumption goal, defining immediate actions and farther-reaching work processes in order to meet the national efficiency and climate goals. In order to achieve goals, the NAPE defined cross-cutting measures designed to reduce energy consumption on the demand side for the following important action areas of energy efficiency policy:

- Step up energy efficiency in the buildings sector
- Establish energy efficiency as a business model and a model for generating returns on investment. For example, in the field of renewable energy, the political statements in Germany and the macroeconomic perspective present a big trend in expansion of new renewable energy plant. For several reasons, like delayed taxation and supervisory regulations, the investments of the private sector in renewable energies are impeded. Nonetheless, beginning by end of 2014, investments have arisen. Especially institutional investors are looking for adequate returns of their investments to fulfill obligations in context with their statutes (Maftei, Stiegler and Ulrich, 2017).
- Increase personal responsibility for energy efficiency.



**Fig. no. 1 Structure of the goals of the Energy Concept**

Source: The Federal Ministry for Economic Affairs and Energy (BMWi), 2016. Fifth "Energy Transition" Monitoring Report. The Energy of the Future. 2015 Reporting Year, Publisher BMWi, Public Relations. Berlin [https://www.bmw.de/Redaktion/EN/Publikationen/monitoring-report-2016.pdf?\\_\\_blob=publicationFile&v=11](https://www.bmw.de/Redaktion/EN/Publikationen/monitoring-report-2016.pdf?__blob=publicationFile&v=11)

For the industry, the implementation of the European Energy Efficiency Directive (2012/27/EU) in Germany followed a two-step approach differentiating SMEs and non-SMEs (Weber, Mateescu, Lange and Rauch, 2016).

One of the central measures in the area of energy efficiency is mandatory energy audits for non-SMEs, in order to identify potential for energy savings in company energy supply systems and provide incentive for the introduction of an energy management system to ISO 50 001 (BMWi, 2016).

This measure is based on the Energy Services Act that requires large businesses (non-SMEs) to perform energy audits according to EN 16247-1 by December 2015, and every four years thereafter, or alternatively introduce an energy management system to ISO 50001 or an environmental management system to EMAS by 31 December 2016. Up to 50,000 businesses in Germany fall under the rules for mandatory energy audits. The energy management systems might experience a much higher rating going forward, as with the year change to 2015, several legal regulations became effective in Germany conditioning the implementation of energy management systems and for smaller enterprises (<250 employees) alternatively specific energy audits following defined requirements (Weber, Olaru and Surugiu, 2015). The Federal Office for Economic Affairs and Export Control is responsible for the enforcement of the law. In 2016, it conducted a representative number of spot checks to check compliance with the requirement for mandatory energy audits.

For this study, systematic business research based on municipal investment reports was conducted between February and June 2017. The study was mainly carried out online on the respective municipal websites and by means of telephone inspections on the participation reports of respective municipalities. In accordance with the legal requirements, an investment report must contain information about

- the fulfilment of the public purpose,
- the financial impact of the investments,

- participation ratios, and
- the composition of the organs of society.

The focus was on publications with regard to shareholdings from the calendar year 2014. The research area can be divided into the following three main parts:

- Federal state participations
- Circle participations
- Municipal investments

North Rhine-Westphalia consists of a total of 396 politically independent cities and municipalities. These are distributed over 271 cities and 125 other municipalities. In the context of this study, only participations at the municipal level in North Rhine-Westphalia were analysed.

The aim of this literature research is to identify companies with a municipal participation of more than 25 percent and to question them in the context of a downstream survey with regard to completed or unperformed energy audits.

### 1.1 Sample size of the Participation Reports to be Analysed

The following Formula (1) (Kauermann and Küchenhoff, 2011) was used to determine the minimum sample size of the participation reports to be analysed:

$$n = \frac{\frac{z^2 \cdot p(1-p)}{e^2}}{1 + \left(\frac{z^2 \cdot p(1-p)}{e^2 \cdot N}\right)} \quad (1)$$

, where

n = minimum sample size

N = population size

e = margin of error; is the percentage in decimal notation

z = confidence level (as z value)

p = proportion of the sample components that have the explored feature (when ‘p’ is unknown, it is considered equal to 0.5—the corresponding maximum dispersion)

To determine the minimum sample, the coefficients of the aforementioned formula have the following values:

N = 125

e = 0.1

z = 1.65 (corresponding to a confidence level of 90 percent)

p = 0.5 (corresponding to the maximum value of dispersion)

By entering the value quantities N, e, z, and p in Formula (2), a value of 44 participation reports for the minimum sample size resulted in the following equation:

$$n = \frac{\frac{1.65^2 \cdot 0.5(1-0.5)}{0.1^2}}{1 + \left(\frac{1.65^2 \cdot 0.5(1-0.5)}{0.1^2 \cdot 125}\right)} = 44 \text{ participation reports} \quad (2)$$

### 1.2 Sample Size of the Companies to be Questioned

The analysis of the 44 participation reports showed a result of 432 affected companies. The aforementioned Formula (1) was used to determine the minimum sample size of the companies to be questioned. To determine the minimum sample, the coefficients of the aforementioned formula have the following values:

$N = 432$   
 $e = 0.1$   
 $z = 1.65$  (corresponding to a confidence level of 90 percent)  
 $p = 0.5$  (corresponding to the maximum value of dispersion)

By entering the value quantities  $N$ ,  $e$ ,  $z$ , and  $p$  in Formula (2), a value of 59 companies for a minimum sample size resulted in the following equation:

$$n = \frac{\frac{1.65^2 \cdot 0.5(1-0.5)}{e^2}}{1 + \left(\frac{1.65^2 \cdot 0.5(1-0.5)}{0.1^2 \cdot 432}\right)} = 59 \text{ companies} \quad (3)$$

**Survey**

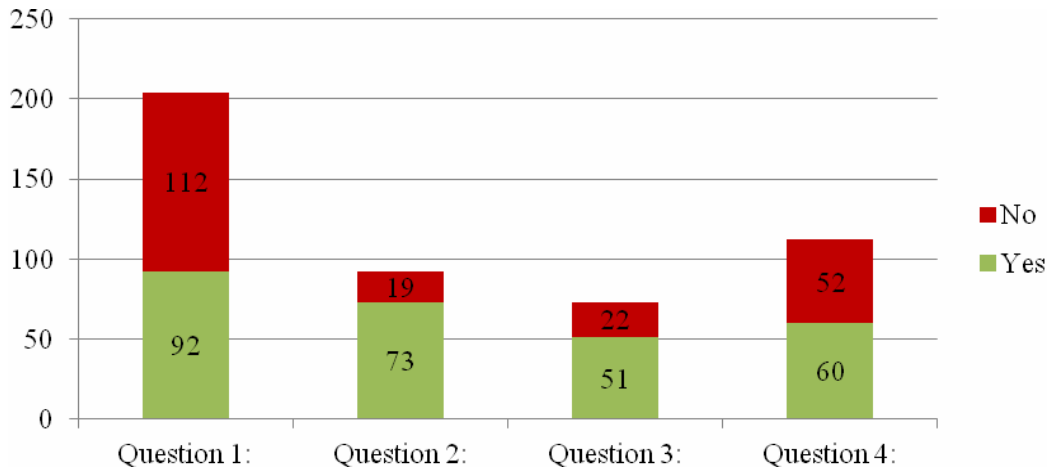
To conduct the study, organizations that perform sovereign tasks were excluded from this survey. For example, responsibilities in the areas of security, police, and justice as well as the responsibilities of publicly funded educational institutions and the management of state-controlled social security systems were excluded (BAFA, 2015).

To complete the research, 204 companies were consulted. The planned telephone interviews, among other things, dealt with the following main questions:

- Question 1: Are you aware of the legal obligation to conduct an energy audit?
- Question 2: Have you checked whether your business is affected?
- Question 3: Did you do an energy audit?
- Question 4: If not, now that you are aware, will you be doing an energy audit?

**Research Results**

The results of the evaluation criteria are shown in Figure no.2. The research findings for Question 1 show that more than half (55%) of the surveyed companies were unaware of the fact that there is a legal obligation to conduct energy audits.



**Fig. no. 2 Results of the survey**

*Source: author*

The research results for Question 2 show that of the remaining companies (45%), four-fifths have checked whether their organization is actually affected. Further action has not been taken by 19 companies.

The research results for Question 3 show that a quarter (25%) of all the companies surveyed conducted an energy audit. In terms of the companies that know the law, 55 percent have

carried out an energy audit. In terms of the group of companies that tested their organization positively, 70 percent performed an energy audit. Twenty-two companies did not carry out an energy audit, despite their knowledge and positive assessment.

The research results for Question 4 showed that more than half of the companies that answered 'No' in response to Question 1 will not conduct an energy audit in the future, even though they are now aware of the legal obligation.

### Conclusion

The research carried out exhibited that 75 percent of the companies surveyed did not carry out an energy audit and thus could not exercise their role model function; this large number could be due to a lack of knowledge.

Thus, as an initial idea, we can take into account that only companies that have legal knowledge can act as role models.

Above all, the special feature of size-independent classification as a non-SME has to be taken into account. A company is considered to be a non-SME even if 25 percent or more of its capital or voting rights are directly or indirectly controlled, individually or jointly, by one or more public bodies or public-law entities.

As a further idea, we can take into account that the assessment of whether a company is a so-called 'non-SME' and thus is obliged to carry out an energy audit, which is the responsibility of the company itself and can, therefore, lead to uncertainties.

The fact that companies alone are responsible for determining whether they fall within the scope can be identified as an essential criterion. The information gained from this research will be used at a later stage in order to develop recommendations for politics and enterprises. Detailed policies could help companies make lawful decisions.

### References

- Bundesministerium für Wirtschaft und Ausfuhrkontrolle BAFA, 2018. *Effizienzpolitik, Nationale Energieeffizienzpolitik, Vorbild Öffentlicher Sektor* [online]. Available at: <[http://www.bafa.de/BfEE/DE/Effizienzpolitik/NationaleEnergieeffizienzpolitik/VorbildOeffentlicherSektor/vorbildoeffentlichersektor\\_node.html](http://www.bafa.de/BfEE/DE/Effizienzpolitik/NationaleEnergieeffizienzpolitik/VorbildOeffentlicherSektor/vorbildoeffentlichersektor_node.html)> [Accessed 28 May 2018].
- Bundesministerium für Wirtschaft und Ausfuhrkontrolle BAFA, 2015. *Guidelines for Energy Audits in accordance with the provisions of §§ 8 ff.* [pdf] EDL-G, Department 526, Eschborn. Available at: <[http://www.bafa.de/SharedDocs/Downloads/EN/Energy/ea\\_guidelines.pdf?\\_\\_blob=publicationFile&v=2](http://www.bafa.de/SharedDocs/Downloads/EN/Energy/ea_guidelines.pdf?__blob=publicationFile&v=2)> [Accessed 19 September 2017].
- Bundestag, 2015. Gesetz zur Teilumsetzung der Energieeffizienzrichtlinie und zur Verschiebung des Außerkrafttretens des § 47g Absatz 2 des Gesetzes gegen Wettbewerbsbeschränkungen, *Bundesgesetzblatt* [online]. Available at: <[https://www.bgbl.de/xaver/bgbl/start.xav?start=%2F%2F\\*%5B%40attr\\_id%3D%27bgbl115s0603.pdf%27%5D#\\_bgbl\\_%2F%2F\\*%5B%40attr\\_id%3D%27bgbl115s0578.pdf%27%5D\\_1508665662884](https://www.bgbl.de/xaver/bgbl/start.xav?start=%2F%2F*%5B%40attr_id%3D%27bgbl115s0603.pdf%27%5D#_bgbl_%2F%2F*%5B%40attr_id%3D%27bgbl115s0578.pdf%27%5D_1508665662884)> [Accessed 19 September 2017].
- European Parliament, 2012. *DIRECTIVE 2012/27/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC* [online]. Available at: <<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32012L0027>> [Accessed 19 September 2017].
- Kauermann, G., and Küchenhoff, H., 2011. *Stichproben, Methoden und praktische Umsetzung mit R*. Berlin Heidelberg: Springer-Lehrbuch.

- Maftai, M., Stiegler, T., Ulrich, A. W., 2017. The current state of alternative investments in renewable energies for institutional investors in Germany, p. 349-361. In: M. Olaru, ed. 2017. *Businesses Walking the Tightrope*. Aachen: Shaker Verlag.
- Schlomann, B., Rohde, C. and Ringel, M., 2016. Energy Efficiency Policies in the German Energy Transition, ACEEE Summer Study on Energy Efficiency in Buildings. *From Components to Systems, From Buildings to Communities*, Asilomar Conference Grounds Pacific Grove, USA, 21-26 August 2016. [online]. Available at: [https://aceee.org/files/proceedings/2016/data/papers/9\\_158.pdf](https://aceee.org/files/proceedings/2016/data/papers/9_158.pdf) [Accessed 18 May 2018].
- The Federal Ministry for Economic Affairs and Energy (BMWi), 2016. *Fifth "Energy Transition" Monitoring Report. The Energy of the Future. 2015 Reporting Year*, Publisher The Federal Ministry for Economic Affairs and Energy (BMWi), Public Relations. Berlin [online]. Available at: [https://www.bmwi.de/Redaktion/EN/Publikationen/monitoring-report-2016.pdf?\\_\\_blob=publicationFile&v=11](https://www.bmwi.de/Redaktion/EN/Publikationen/monitoring-report-2016.pdf?__blob=publicationFile&v=11) [Accessed 18 May 2018].
- Weber, G., Mateescu, R.M., Lange, S. and Rauch, M., 2016. Knowledge Intensive Business Services (KIBS) in the Context of Changing Energy Economics in Germany. *Amfiteatru Economic*, 18(41), pp. 89-103
- Weber, G., Olaru, M. and Surugiu, I., 2015. Impacts of changing energy economics systems to the strategies of enterprises - a trend development case study. *Calitatea: Acces la succes*, 16(S1), pp.246-251.