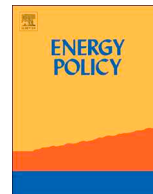




ELSEVIER

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

Transposing The Requirements of the Energy Efficiency Directive on Mandatory Energy Audits for Large Companies: A Policy-Cycle-based review of the National Implementation in the EU-28 Member States

Lisa Nabitz^{a,c,*}, Simon Hirzel^b

^a Karlsruhe Institute of Technology (KIT), Institute for Technology Assessment and Systems Analysis (ITAS), Karlstrasse 11, 76133 Karlsruhe, Germany

^b Fraunhofer Institute for Systems and Innovation Research ISI, Breslauer Strasse 48, 76139 Karlsruhe, Germany

^c formerly Fraunhofer Institute for Systems and Innovation Research ISI, Breslauer Strasse 48, 76139 Karlsruhe, Germany



ARTICLE INFO

Keywords:

Energy efficiency
Energy audit
Energy management
Article 8 EED
Energy Efficiency Directive
Policy cycle

ABSTRACT

Energy audits and energy management systems are recognized as important instruments to improve energy efficiency. By introducing Article 8 of its Energy Efficiency Directive (EED) the European Commission has made regular energy audits an obligation for large companies. Its transposition into national legislation by the EU-28 Member States (MS) results in different national implementations. The aim of this paper is to analyze differences and commonalities in the national requirements and to derive good practice for policy makers from these. We structure the implementation process according to the theoretical concept of Policy Cycle Analysis and apply it as a heuristics from a multi-level governance perspective. The empirical analysis is based on a review of national implementation documents and 30 semi-structured interviews with stakeholders involved in the process of Article 8 EED. The transposition was delayed in more than half of the 28-EU MS. Our findings suggest that the interlinkages of the policy cycles are particularly important for a smooth policy process as MS partly interpreted the requirements differently. Further research on an updated, in-depth analysis of the correctness of the transposition as well as research on the impact of energy audits and energy management systems induced by the regulation is needed.

1. Introduction

Energy efficiency is seen as a “first fuel” (IEA, 2014) and it is recognized as a cost-effective way to concurrently improve the security of supply, to enhance competitiveness and to contribute to the overall energy and climate goals (EC, 2010, 2014). Meeting these goals necessitates an efficient and effective transposition of European energy policies in the Member States (MS). Energy audits and energy management systems have been identified as helpful means to improve energy efficiency in companies (Schleich, 2004; Fleiter et al., 2012; Wohlfahrt et al., in press; Schulze et al., 2016; Kluczek and Olszewski, 2017). Recognizing their potential benefits, the European Commission (EC) has politically endorsed the implementation of energy audits since 2006 by requiring its Member States (MS) to implement “high quality energy audit schemes” according to the European Energy Service Directive (ESD, 2006/32/EC) (Art. 12 (1) ESD; EC 2006). Due to the sluggish progress towards meeting the 2020 energy efficiency target with the ESD, the EC decided to replace the ESD by the Energy Efficiency Directive (EED, 2012/27/EU) which entered into force on 4

December 2012 (EC 2012a). With this directive, the EC enforced the implementation among others by requiring all MS to oblige large companies to regularly conduct mandatory energy audits unless they implement an energy management system (Art. 8 (4, 6) EED).

The aim of this paper is to analyze commonalities and differences in the transposition of Article 8 for large companies drawing on the concept of Policy Cycle Analysis applied as a heuristics from a multi-level governance perspective. Thereby, we review the transposition of mandatory energy audits and management systems into the national legislation of EU-28 along different steps of the Cycle and we derive a set of hypotheses on challenges and good practice for policy making in conjunction with Article 8. As a first step, our research focuses on the policy instrument design resulting from Article 8 EED. The analysis should be supplemented by a comprehensive ex-post monitoring of the impact of Article 8 EED when corresponding data is available.

The implementation of Article 8 of the EED has been discussed in several works: Eurochambres (2015) analyze the status of transposition in the different MS based on assessments of its members, Brems and Chirez (2016) provide insights regarding the status of transposition for

* Corresponding author.

E-mail addresses: lisa.nabitz@kit.edu (L. Nabitz), simon.hirzel@isi.fraunhofer.de (S. Hirzel).

<https://doi.org/10.1016/j.enpol.2017.12.016>

Received 27 July 2017; Received in revised form 20 October 2017; Accepted 9 December 2017

Available online 04 July 2018

0301-4215/© 2018 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license

(<http://creativecommons.org/licenses/by/4.0/>).

Table 1
Requirements relevant for Article 8 in conjunction with Annex VI EED.

| Field of Analysis | Requirements from Article 8 EED for transposition of regulation |
|---|--|
| Scope (Article 8 (4) EED) | MS shall ensure that enterprises that are not SMEs are subject to an energy audit [...] by 5 December 2015 and at least every four years from the date of the previous energy audit. |
| Timeline (Article 28 EED) | EED was approved on 25 October 2012 and entered into force by 4 December 2012; MS expected to fully transpose its requirements into national legislation by 5 June 2014, i.e. within a period of roughly 18 months. |
| Delimitation of large company (Article 2 (26) EED, EC, 2003) | Three main criteria for determining whether a company is an SME: 1) One employee criterion = primary criterion (250 or more employees) 2) Two financial criteria (balance sheet and turnover) = secondary criteria |
| Multi-national and multi-site companies (EC, 2003, Art. 3 & 6) | Two cases relevant for multi-site and multi-national operating companies: 1) the assessment of SME status (level for calculation of thresholds) 2) the decision if the respective company part is obliged to conduct an energy audit at site level |
| Minimum coverage of the energy audits (Annex VI EED) | Need for representativeness of the energy audit: Energy audit shall be '[...] proportionate, and sufficiently representative to permit the drawing of a reliable picture of overall energy performance and the reliable identification of the most significant opportunities for improvement.' |
| Transport and Buildings (Annex VI EED) | Energy audit shall '[...] comprise a detailed review of the energy consumption profile of buildings or groups of buildings, industrial operations or installations, including transportation [...].' |
| Monitoring (Annex VI EED) | MS shall actively promote the implementation of recommendations of the energy audit; the data used in energy audits shall be storable for historical analysis and tracking performance. |
| Penalties for non-compliance (Article 13 EED, EC, 2013b) | MS are allowed to lay down rules on penalties applicable in case of non-compliance with the national provisions adopted pursuant to Article 8; penalties have to be 'effective, proportionate and dissuasive'. |

large enterprises by drawing on information in their company database, [Hirzel et al. \(2016\)](#) provide an in-depth analysis on the transposition in the EU-28 MS and instruments endorsing energy audits and energy management systems beyond the EU, [Nabitz et al. \(2016\)](#) review the implementation of Article 8 for SMEs and [Eichhammer & Rohde \(2015\)](#) suggest policy recommendations for a potential review of the Directive.

Our approach differs from previous studies by the following aspects: (1) So far no theory-based research on the European and national policy cycles aiming at the analysis of design and implementation of policy instruments enhancing the diffusion of energy audits and management systems has been done. (2) Rather than looking at a few countries as other theory-based comparative studies do, we conduct an empirically-based comprehensive overview and comparison of the different approaches resulting from Article 8 EED taken across the EU-28 MS. (3) We further delineate key challenges regarding the “top-down” and “bottom-up” transfer of requirements between the interlinked European and national policy cycle(s).

This paper is organized as follows: [Section 2](#) provides further information on the obligations of Article 8 EED, it reviews prior studies on multi-level policy implementation processes and it outlines the Concept of Policy Cycle Analysis. [Section 3](#) describes the data set and the methodology used for the analysis of the implementation process. The data collection process for this research took place between March and September 2015. In [Section 4](#), the main results at European as well as MS level are presented. This presentation of results is followed by a discussion of the main policy implications in [Section 5](#) and leads to our conclusions in [Section 6](#).

2. Background

2.1. Requirements of Article 8 of the EED

According to the legal nature of any European Directive, its transposition into national legislation is required (Art. 288, Treaty of the European Union, 2008/C 115/01). A Directive shall be binding and requires MS to achieve certain results in general without stipulating the means of how to achieve them. The MS thus have the opportunity to choose form and methods in consideration of the existing national policy mix to meet the requirements of the Directive (*ibid.*). For a

Directive to take effect at national level, MS adopt a law to transpose it and thereby must achieve the objectives set by the Directive ([EP, 2017](#)). Consequently, every individual country is free to decide about the ways and means how to achieve the Directive's goal and thus has room for maneuver in this transposition process ([Publications Office of the European Union, 2017](#)).

This certainly also applies to the regulatory approach of Article 8 of the EED and is the reason why the detailed design of the approaches taken by MS varies considerably across the EU-28 MS. From a political science perspective, a regulatory instrument is defined as organisational and/or technological requirements and standards with the aim of improving energy efficiency in entities (see e.g. [Gupta et al., 2007](#)). Regulation hereby is based on prescribed or prohibited activities while standards define a harmonized way of performing these activities.

In case of Article 8 of the EED in conjunction with Annex VI EED, the regulatory requirements concern implementing energy audits. According to the Directive, the MS have to ensure the availability of cost-effective high quality energy audits (Art. 8 (1)). The focus of this work is on the requirement that MS ensure that large companies (“not SMEs”) carry out energy audits until 5 December 2015 and at least every four years after the preceding audit (Art. 8 (4)). These audits have to fulfil certain minimum criteria further laid down in the EED (Art. 8 (5)). Large companies are exempted from the mandatory audits if they are implementing a certified energy or environmental management system which includes an energy audit according to the minimum criteria (Art. 8 (6)). The energy audits may also be part of a broader environmental audit (Art. 8 (7)). The EC as well as other institutions published Guidance Notes and guiding documents supporting MS regarding the interpretation for the national transposition ([EC, 2013a, 2013b; eceee, 2013](#)).

Within our analysis we focus on the following eight central aspects for a smooth operation of energy audits which have among others to be transposed into national legislation by MS (see [Table 1](#)).

2.2. Prior studies on multi-level implementation processes

Numerous studies on the transposition of directives on a meta-level as well as on individual directives in detail across all thematic fields of European policies have been conducted to gain insights into the multi-

Table 2
Overview of exemplary meta studies on the transposition of directives on an overarching level as well as on case studies particularly focusing on the transposition of energy-related directives.

| Source | Country scope | Topic(s) and directive(s) | Data set | Time frame analysed | Research focus | Main findings |
|------------------------------|---|--|--|---------------------|--|--|
| Berglund et al. (2006) | Netherlands, Germany, UK, Spain and Greece | various from the fields of utilities and food safety regulation | 250 Directives and 1088 MS transposition cases | 1986–1999 | Timeliness | 65% of the cases the transposition was delayed, average delay 7 months; learning processes at MS level as the development of administrative routines are crucial for an effective, efficient and fast transposition |
| Bertoldi et al. (2015) | UK, Italy, France, Denmark, Belgium, Poland, Ireland, Slovenia, Austria, Bulgaria, Spain, Lithuania, Malta, Latvia, Estonia, Hungary, Luxembourg, Croatia | Energy efficiency (Article 7 EED) | 18 transposition cases with EEOS | unknown | Instrument choice and its design (obligated parties, sectors, technology and measures) | Majority of MSs plans to continue to use or to introduce new EEOS, 10 MSs intend to meet their savings targets without EEOS; out of 18 MSs using EEOS to meet the Art. 7 obligations, only 4 MSs plan to use only the EEOS, remaining 14 MS will combine it with alternative measures |
| Haverland and Romeijn (2007) | Germany, Greece, Netherlands, Spain and UK | Social policy directives | 300 transposition cases | 1975–1999 | Timeliness | Transposition in 42.7% of the cases in time and in 57.4% delayed; 39.9% transposed within two years after the deadline and 17.5% exceeded the deadline by more than two years; need for inter-ministerial coordination and administrative inefficiency are strongly associated with transposition delays |
| Haverland et al. (2011) | Germany, Greece, Netherlands, Spain and UK | Telecom, Energy, Agriculture, Food, maritime shipping, transport, health and safety at work, Social policy | 1117 transposition cases | 1978–2002 | Timeliness, cross-sectoral differences | 40% delayed by less than two years, 10% delayed by more than two years; time frames for transposition are too short to do so in a timely manner; differences in timeliness of new and modified Directives; differences across sectors; need for guidelines and technical and administrative assistance |
| Käding (2006) | Germany, Spain, Netherlands, UK and Greece | Transport | 106 directives | 1957–2004 | Timeliness, goodness of fit | Transposition delay of more than six months was apparently more of a problem in the 1980s and 1990s than in recent transposition history; veto players involved and time set for transposition are important variables |
| König and Luetgert (2008) | EU – 15 MS | various thematic fields | 1592 directives | 1986–2002 | Timeliness | Notification failure is found to be more likely when there is conflict between MS during the EU legislative process, higher levels of complexity and increased use of parliamentary legislation, as well as more federalist and pluralist structures, contribute to delayed compliance |
| Mastenbroek (2003) | Netherlands | all EC and Euratom directives | 229 directives | 1995–1998 | Timeliness, implementation deficit | 60% of the directives are transposed late, i.e. after the deadline specified by the directive |
| Reiche and Bechberger (2004) | Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, UK | Renewable energies (RES) | 1 directive, 15 transposition cases | 2002 | Instrument choice, goodness of fit | Authors identify number of success conditions for an increased use of RES: long-term planning security for investors, technology-specific remuneration for green power, strong efforts in the field of the power supply systems (grid extension, fair access to the grid, etc.) and measures to reduce local resistance against RES projects |
| Rosenow et al. (2016) | EU28-MS | Energy efficiency (Article 7 EED) | 1 directive, 28 transposition cases | unknown | Instrument choice | Main challenges are a lack of additionality to the national policy mix, a lack of binding rules for monitoring and verification problems at the EU level |
| Schlomann et al. (2013) | EU28-MS | Energy efficiency (Article 7 EED) | 1 directive, 28 transposition cases | unknown | Instrument choice | Authors investigate the role of new market-oriented instruments at national level and show that none of the instruments alone can achieve the prescribed energy efficiency targets, but that a mix of instruments is necessary |
| Treutlein (2007) | EU15-MS | Agriculture, Energy, Industry, Finance, etc. | 1275 cases | 1986–2002 | Actual implementation patterns | Primary to total transposition ratios decrease with the strength of a government, both relative to opposition in parliament and within the government coalition, Governments further seem to opt less for primary transposition devices towards the end of an election period and if they are a 'net-recipient' of EU transfers |

level transposition process. Basically, two huge research strands could be distinguished in this context: (1) literature on Europeanization and (2) literature on compliance (see e.g. Käding, 2006; Treutlein, 2007). The former mainly consists of meta studies focusing on the timeliness of the directive's transposition whereas the latter investigates compliance in detail. We limit ourselves in this section to a discussion on both exemplary meta studies investigating the transposition of directives on an overarching level as well as on exemplary case studies particularly focusing on the transposition of energy-related directives. Energy-related directives imply the Energy Efficiency Directive (especially Article 7 EED) as well as the Directive on the promotion of electricity produced from renewable energy sources (RES) where MS also face the challenge of selecting a policy instrument design during the transposition process. Table 2 summarizes the design and main findings of these studies in a synopsis.

Europeanization studies on the transposition process of directives in general often focus on timeliness rather than on correctness of the transposition by MS and find that delays regularly occur. Berglund et al. (2006) e.g. compare 250 directives and 1,088 MS transposition cases in the fields of utilities and food safety regulation and show that in 65% of the cases the transposition was delayed. The average delay was seven months. Haverland and Romeijn (2007) focus on the implementation performance of social policy directives based on 300 observations across Germany, Greece, the Netherlands, Spain and United Kingdom and find similar results. The transposition by MS was in 42.7% of the cases in time whereas in 57.4% of the cases the transposition was delayed. 39.9% transposed within two years after the deadline and 17.5% exceeded the deadline by more than two years. A later study with a broader scope of 1,117 transposition cases by Haverland et al. (2011) also identifies a delay in half of the transposition cases. The study by Mastenbroek (2003) based on 229 directives even identifies a delay in 60% of the transposition cases. König and Luetgert (2008) analyze the transposition of directives from 1986 to 2002 across EU-15 MS and investigate a total of 1,592 directives from all thematic fields. The authors also do find significant variation in transposition across countries.

The reasons for the delays vary across MS. The findings from König and Luetgert (2008) suggest that complexity, as expressed by the number of national transposing measures, the number of bureaucrats involved, and the number of interest groups involved influences a transposition delay. The results from Haverland and Romeijn (2007) indicate that the need for inter-ministerial coordination and administrative inefficiency are strongly associated with transposition delays. Whether a directive is new or merely an amendment is unrelated to the transposition delay. The authors do not find a relation of the directive's complexity or parliamentary involvement to a transposition delay. In addition, Haverland et al. (2011) argue that time periods for the transposition are too short to handle issues in a timely manner. Berglund et al. (2006) find that learning processes at MS level as the development of administrative routines are crucial for an effective, efficient and fast transposition.

Another example for the transposition of EU energy policy besides the EED is the Directive on the promotion of electricity produced from renewable energy sources (RES) where MS both have a different understanding on which renewable energies shall be used as well as they use different approaches for funding. Reiche and Bechberger (2004) further investigate these approaches and figure out that success depends on the respective country-specific framework where the policy instrument is implemented. This includes not only economic and geographic conditions, but also depends on long-term planning security for investors and technology-specific remuneration for green power. Studies primarily focusing on Article 7 EED clearly show that MS make use

of their possibility to adjust aspects during the national transposition. Article 7 EED states that each MS shall set up an energy efficiency obligation scheme (EEOS) and thereby achieve new savings each year from 1 January 2014 to 31 December 2020 of 1.5% of the annual energy sales to final customers of all energy distributors. Besides an EEOS other market-oriented instruments such as financial subsidies or tax reductions or exemptions are allowed (Art. 7 (9) EED). Schlomann et al. (2013) investigate the role of new market-oriented instruments at national level and show that none of the instruments alone can achieve the prescribed energy efficiency targets, but that a mix of instruments is necessary. Bertoldi et al. (2015) and Rosenow et al. (2016) discuss several design aspects regarding the transposition of Article 7 EED, such as timescale, obligated parties, sectors, technologies, and measures. Out of 18 MS using EEOS to meet the Article 7 obligations, 4 MSs plan to use only the EEOS, while the remaining 14 MS will combine it with alternative measures without EEOS (Bertoldi et al., 2015). Rosenow et al. (2016) identify as main challenges a lack of additionality to the national policy mix, a lack of binding rules for monitoring and verification problems at the EU level. Thus, the diversity of approaches used to transpose Article 7 is an expression of the search of MS for the best fitting policy mix in their specific national context.

The review shows that during the transposition of a directive at national level, timeliness, policy instrument choice, correctness of transposition, interplay of the different institutions and the degree of national adjustments to the directive's requirements seem to be the most crucial aspects. We therefore put the emphasis among others on these aspects within our empirical investigation. Our analysis is mainly linked to the compliance literature strand, but also provides insights for the Europeanization studies.

2.3. Concept of Policy Cycle Analysis as a heuristics

The theory to our analysis is based on the concept of Policy Cycle Analysis which forms a heuristics for the examination of the negotiation process of Article 8 EED at EU level as well as for the transposition of policy instruments at national level. Initially suggested by Lasswell (1951) and adopted by many others (e.g. Jenkins, 1978, deLeon, 1999, Howlett and Ramesh, 2003, Jann and Wegrich, 2007, Howlett and Giest, 2015) this concept has been continuously developed to the most widely applied framework to systemize and structure research on the evolution of policy processes. The Concept of Policy Cycle Analysis mainly serves to analytically structure the governance process by reducing the complexity of the policy instrument setting and designing process which obviously in reality can be more complex and inter-related with different actors and institutions (Howlett and Giest, 2015).

The typical chronological and gradual order of the policy cycle with its different stages is visualized in Fig. 1 (for a detailed description see e.g. Jann and Wegrich, 2007). Usually, the policy cycle consists of one loop (see upper part of Fig. 1) and is divided into five main stages (1) Agenda Setting, (2) Policy Formulation, (3) Decision Making, (4) Policy Implementation Styles and (5) Policy Evaluation Styles (e.g. Howlett and Giest, 2015). For a more detailed analysis, we further disaggregate the steps into eight stages and extend the concept into a “double loop” policy cycle from a multi-level governance perspective (see Fig. 1) which sheds light on the direct interaction and reciprocal effects between European and national policy making (blue arrows). This extension enables us to derive promoting and inhibiting factors with regard to the transposition of Article 8 EED in both cycles of the loop. Particularly the interfaces in terms of both directions, “top-down” and “bottom-up”, are decisive for a smooth and compliant policy process. However, the first-time initiator as a starting point of the policy cycle is

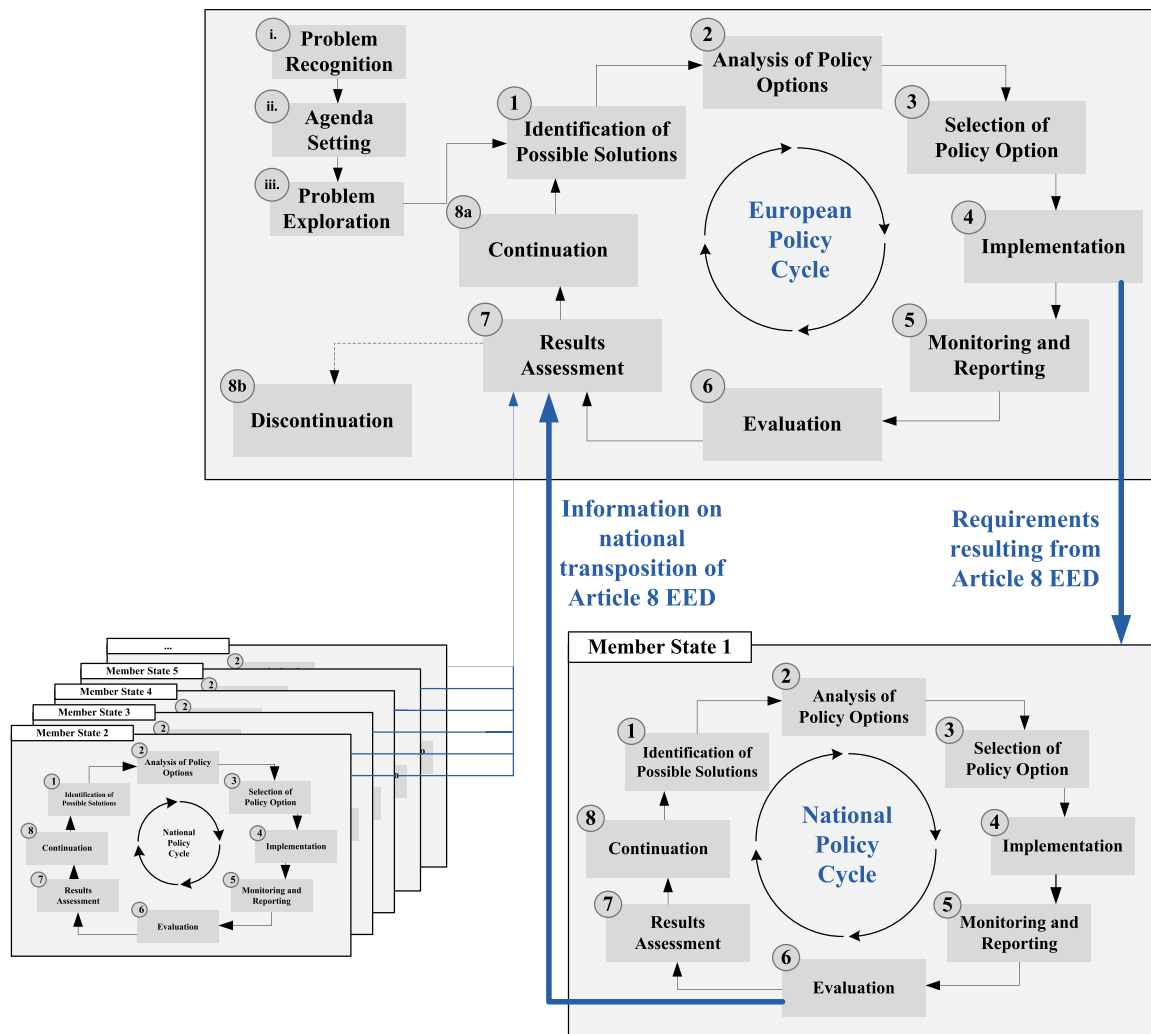


Fig. 1. Policy Cycle of Article 8 EED.

always the EC due to the nature of the European Union as a legal entity. Nevertheless, once actuated the policy cycle with its “double-loop” is triggered by both the European and the national level.

The starting point of the policy cycle is a process of (i) *Problem Recognition*, (ii) *Agenda-Setting* and (iii) *Problem Exploration* where a specific problem is recognized and put on the political agenda for an in-depth analysis and reflection. The result of this process is a description of the problem and its key aspects. These are also based on an interaction of different stakeholders’ corresponding demands and proposals are concretised. After identifying the main aspects, the stages (1) *Identification of Possible Solutions*, (2) *Analysis of Policy Options* and (3) *Selection of one Policy Option* follow where the outcome is synthesized and transposed into an adequate policy instrument option. This stage is sometimes also called *Policy Formulation*. Thereafter, decisions regarding the choice of the instrument as well as its design and a course of action have to be taken while considering the different alternatives to address the problem. In the *Implementation* stage the instrument is practically applied and executed by the responsible institutions. Following the successful implementation a continuous *Monitoring and*

Reporting is crucial in order to retrace the evolvement of the new policy instrument. This is also a precondition for an *Evaluation* which in turn is crucial to assess whether the intended outcomes are achieved. Finally a decision whether to adjust and continue or terminate the policy instrument has to be taken and the negotiation process possibly begins anew (Jann and Wegrich, 2007; Howlett and Giest, 2015). As we extend the concept, in our case national policy cycles follow to the European policy cycle as shown in Fig. 1 which run according to the same scheme as described above.

3. Data and methodology

To gain insights into the policy cycle of Article 8 EED and especially into the implementation phase (No. 4 in Fig. 1) of the policy cycle, the present research is based on both a comprehensive literature review regarding the national transposition as well as on interviews at MS level. The data collection process for this research took place between March and September 2015. This period has been chosen to also take those MS into account which carried out the national transposition of

Article 8 EED after June 2014. Therefore, the analysis in this paper outlines the circumstances as of late summer 2015. The timeframe of the study, shortly before the energy auditing obligation entered into force, was particularly appropriate as the majority of MS had to a great extent already concluded their deliberations, but crucial and not yet clarified aspects could be identified during the course of analysis.

The review process included a study of literature as well as a review of institutional websites, documents, databases and other material such as legal documents (e.g. EED, Guidance Notes addressing Article 8 EED, national laws transposing Article 8 EED, etc.) and other official documents (e.g. the National Energy Efficiency Action Plans (NEEAPs)). After having concluded the preliminary examination, research gaps in the analysis of each country were identified.

For a complementation of the analysis in a second stage 30 semi-structured interviews with stakeholders from different institutions such as national public bodies, and consulting or research institutions in each country were conducted. The interview partners were either familiar with the negotiation and implementation process of Article 8 EED or with the improvement of energy efficiency in large companies. Each interviewee completed a questionnaire consisting of a general set of research questions to allow for a structured discussion of the current policy instruments. The questionnaire was complemented by additional questions tailored to the specific situation in each country. This approach allows on the one hand comparability between the results in each country and on the other hand leaves flexibility to capture particularities and best practices in each MS. Furthermore, the interviews served to verify preliminary findings from the first stage.

4. Results

4.1. Policy Cycle at European level

In 2015, industry and services accounted for approximately 18 EJ (~430 Mtoe) final energy consumption (excl. non energetic uses) in the EU, of which approximately 11.5 EJ (~275 Mtoe) were used in the industry sector (Eurostat, 2017). This energy demand represents roughly 40% of the EU's total final energy consumption including buildings in those sectors (ibid.). To leverage untapped energy efficiency potentials in these sectors the EC launched the ESD and requested already in 2006 MS to implement "high quality energy audit schemes" (Art. 12 (1) ESD). To reinforce the diffusion of energy audits in a second step, Article 8 EED with its concretizations followed in 2012.

The framing of the problem as a starting point of the policy cycle for obligatory energy audits introduced by the ESD was mainly triggered by the impact assessment as early as 2010 (see upper part of Fig. 1). In this context the knowledge was gained that the energy efficiency target for 2020, an increase of energy efficiency by a 20% saving of the European Union's (EU) primary energy consumption (EC, 2007), will presumably not be achieved (EC, 2011). The slow progress was amongst a relatively low adoption level of energy efficiency measures by companies and was also caused by a lack in the political agenda and priority setting: Whilst the reduction of greenhouse gas emissions by 20% and an increase of the share of renewable energy by 20% by 2020 are legally binding, the energy efficiency target is only indicative and not legally binding (EC, 2007). The 2030 EU energy and climate policy framework, which was adopted in the fall of 2014 (EC, 2014), is likewise not ambitious enough, in that it mandates an indicative and - so far - non-binding goal of 27% reduction in primary energy consumption, with a 30% reduction target being suggested at present.

The agenda setting process was further accelerated by the fact that requirements of the ESD to conduct an energy audit were voluntary and consequently did not result in a broad diffusion of energy audits and energy management systems in the industrial sector. Thus, after a comprehensive negotiation process the EC finally decided to go beyond the voluntary approach and set up mandatory energy audits for large companies. Before this decision was taken a broad consultation process

drafting the EED took place, analyzing the problem structure and seeking to match this with an appropriate policy instrument design. A decisive factor for the decision to establish mandatory energy audits for large companies was the fact that industry is responsible for approximately 40% of the energy demand¹ and still economic energy saving potentials exist. In large enterprises these are concentrated on fewer companies compared to SMEs which represent 99% (in terms of the number of companies) of the EU's companies (Eichhammer and Rohde, 2016). This was emphasized in the preamble of the EED: "Energy audits should be mandatory and regular for large enterprises, as energy savings can be significant." (Paragraph 24, preamble of the EED). Furthermore, the EC expects a substantial increase in energy savings estimated at 26.5 Mtoe with its mandatory approach in Article 8 EED (EC, 2012b). When publishing the EED as well as the corresponding Guidance Notes, the implementation process was concluded on the part of the EC and this was the starting point of the national policy cycles (see blue arrow in Fig. 1). At a later stage the upper policy again becomes relevant when the monitoring and reporting process (see No. 5 in Fig. 1) of Article 8 EED takes places. This is a necessary precondition for the revision of the requirements as well as for a potential review of the EED. However, at the time of the research this process was still ongoing. Activities are among others mainly triggered by the EC itself as well as by the Concerted Action Group (Concerted Action, 2016).

4.2. Policy cycle at Member State level

The formal starting point of the policy cycle at national level (see lower part of Fig. 1) was on 25 October 2012 when the EED was approved. This was followed by the final entry into force on 4 December 2012. The text of the directive as well as the different guidance notes by the EC (EC, 2013a, 2013b) gave MS a certain degree of orientation for the transposition of the energy audit obligation. Nevertheless, for the identification of possible solutions regarding the transposition of Article 8 (see No. 1 in lower part of Fig. 1) MS continuously fostered an exchange of best practices by means of their own platform, the EED Concerted Action is financed by the European Commission (Concerted Action, 2016). For an analysis and discussion of several policy options, the majority of MS sought further exchanges with national stakeholders such as national public bodies, business associations, and consulting or research institutions. A final decision on transposition aspects was primarily made by the responsible national ministry for the transposition of Article 8 EED. The responsible ministry depended on the national departmental structure and split of topics between the departments. In some MS, the ministry mainly focused on economic issues (e.g. Estonia, Italy, Netherlands, Poland, Slovakia), in others it was solely in charge for energy-related questions (e.g. Cyprus, Malta) and in others again, it was mainly responsible for ecology and sustainable development (e.g. France). Before this final decision was taken a lot of outstanding issues and challenges regarding the national policy formulation arose which will be discussed in the following (for an overview at country level see Table 3).

4.3. Timing of national transposition

The majority of MS took time to identify and analyze possible policy options for the transposition as well as discussed these in a consultation process with national stakeholders before a decision on the transposition was made. While political feasibility and the question how the new policy instrument fits into the national policy mix are relevant issues for the decision on policy characteristics, MS had initially to orientate themselves on the requirements of the EED. However, this process led in some countries to comparatively long timeframes between the entry

¹ Assuming the specific energy demand per employee is independent of the company size.

Table 3

Overview about transposition of Art. 8 across the EU28 MS. (If cell is empty, at the time of the study no decision had been taken, law not yet passed by the national parliament or no information was available).

| Country | Delimitation of large companies | Additional requirements | Exemptions |
|-------------------|--|---|---|
| Austria | EU definition | – | Some facilities subject to public right |
| Belgium: Brussels | – | – | – |
| Belgium: Flanders | Either financial criterion and other threshold | – | – |
| Belgium: Wallonia | – | – | – |
| Bulgaria | EU definition | Energy threshold | – |
| Croatia | Two criteria and lower financial thresholds | Lower financial ceiling thresholds which also cover companies that are SMEs | – |
| Cyprus | – | – | Companies with an energy consumption below 100,000 kWh/year |
| Czech Republic | EU definition | Energy threshold | – |
| Denmark | Employees plus financial criteria | – | Companies participating in voluntary energy efficiency agreement (includes energy audits) |
| Estonia | EU definition | – | – |
| Finland | EU definition | – | Some facilities subject to public right |
| France | Either financial criterion and other threshold | – | – |
| Germany | EU definition | – | Municipalities and institutions with predominantly statutory activities |
| Greece | – | – | – |
| Hungary | EU definition | – | – |
| Ireland | EU definition | Energy threshold | – |
| Italy | EU definition | Energy threshold | Public administration offices |
| Latvia | EU definition | – | – |
| Lithuania | – | – | – |
| Luxembourg | – | – | – |
| Malta | EU definition | – | Companies with an energy consumption below 50,000 kWh/year |
| Netherlands | EU definition | – | If organisation is part of the LTA3 or MEE voluntary programmes then it is not required to comply with the Regulation |
| Poland | EU definition | – | – |
| Portugal | EU definition | Energy threshold | In case the periodic energy audits are not profitable, they have to be carried out only every eight years |
| Romania | EU definition | Energy threshold | Companies with an energy consumption of less than 1000 toe |
| Slovakia | Exact employee threshold not included | – | – |
| Slovenia | Lower financial thresholds | Lower financial ceiling thresholds which also cover companies that are SMEs | – |
| Spain | Extended employees plus financial criteria | – | – |
| Sweden | Employees plus financial criteria | – | – |
| United Kingdom | EU definition | – | Publicly funded bodies |

| Country | Multi-national and multi site companies | Minimum coverage of energy audit | Penalties in case of non-compliance |
|-------------------|---|---|--|
| Austria | Parent company (limited to parts located nationally) obliged | Minimum share: 10%; (buildings, processes and transportation) | Company: up to EUR 10,000 |
| Belgium: Brussels | – | – | – |
| Belgium: Flanders | – | – | – |
| Belgium: Wallonia | – | – | – |
| Bulgaria | – | Minimum share: 100% | Company: up to EUR 50,000 |
| Croatia | – | – | Company: up to EUR 66,000, Management: Up to EUR 2000 |
| Cyprus | – | – | Up to EUR 30,000 (unclear if per company) |
| Czech Republic | – | – | Up to EUR 180,000 (unclear if per company) |
| Denmark | Thresholds calculated at group level | Minimum share: 90% (10% could be excluded) | Not specified (case-by-case decision) |
| Estonia | – | – | – |
| Finland | Enterprises registered in Finland and subsidiaries of overseas enterprises operating in Finland obliged | Minimum share: 95% | Case-by-case basis |
| France | Operations based in France (SIREN code) obliged | Minimum share: 65% (2015), 80% (as of 2016), sampling approach allowed | Case-by-case basis (shall not exceed 2% of company's revenues (or 4% of revenues in case of repeated non-compliance) |
| Germany | Thresholds calculated at group level, national sites obliged | Minimum share: 90%, Sampling approach allowed | Company: up to EUR 50,000 |
| Greece | National operations in Greece | – | Company: Up to EUR 50,000 |
| Hungary | Companies nationally registered obliged | – | Company: Up to EUR 48,000 |
| Ireland | Legal entity registered in Ireland obliged | Energy use covered by a GHG Emissions Permit (under EU ETS) exempt from the regulations | Auditor: Up to EUR 320 Management: EUR 5000 (from 2016 onwards) |

(continued on next page)

Table 3 (continued)

| Country | Multi-national and multi site companies | Minimum coverage of energy audit | Penalties in case of non-compliance |
|----------------|---|--|---|
| Italy | Thresholds calculated at group level | proportionate and sufficiently representative, Sampling approach allowed | Companies: Up to EUR 40,000 |
| Latvia | – | – | – |
| Lithuania | – | – | – |
| Luxembourg | – | – | – |
| Malta | Enterprises registered in Malta obliged | representative | Company: Up to roughly EUR 70,000 or up to EUR 1400 per day of non-compliance |
| Netherlands | Enterprises registered in the Netherlands obliged | – | Case-by-case basis |
| Poland | – | – | Legislation under preparation |
| Portugal | – | – | Up to EUR 44,800 (unclear if per person or company) |
| Romania | – | – | Up to EUR 200,000 |
| Slovakia | – | – | Companies: Up to EUR 30,000 |
| Slovenia | – | – | Company: Up to EUR 125,000, Management: Up to EUR 10,000 |
| Spain | – | – | Company: Up to EUR 60,000 (but not more than 10% of annual turnover) |
| Sweden | Enterprises registered in Sweden obliged | Representative, sampling approach allowed | Not specified (case-by-case decision) |
| United Kingdom | Enterprises registered in United Kingdom obliged | Minimum share: 90% | Company: Up to EUR 55,000 |

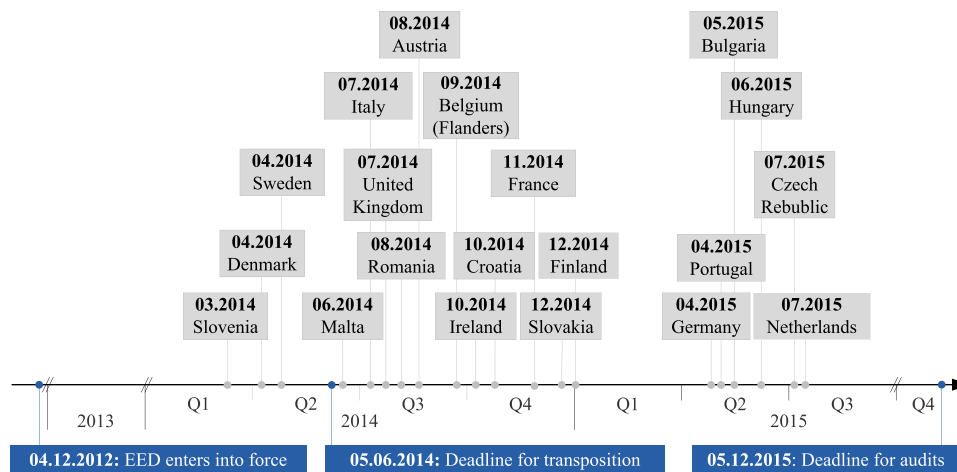


Fig. 2. Overview about timing of national transposition until Q3/2015.
Source: own compilation based on transposition documents

into force of the EED and the passage of the national bill (see Fig. 2). More than half of the 28-EU MS actually finalized the transposition after 5 June 2014. Given the 5 December 2015-deadline for implementation, this left little room for obliged companies to actually conduct their mandatory energy audit.

This phenomenon of delay is not only unique to Article 8 EED. Research of the past two decades suggests that delayed transposition of EU Directives by MS is a common problem (e.g. Berglund et al., 2006, Steunenberg, 2006, König and Luetgert, 2008). Some authors (e.g. Héritier, 1996, Risse et al., 2001) argue that the delay is a result of a ‘misfit’ between EU and domestic policy while others see opposing preferences of relevant actors as a main factor for delays (e.g. Steunenberg, 2006). Our findings suggest that diverging interests as well as the transposition of the entire EED with its 30 articles is a capacity- and resource-demanding process for national institutions, especially in smaller MS.

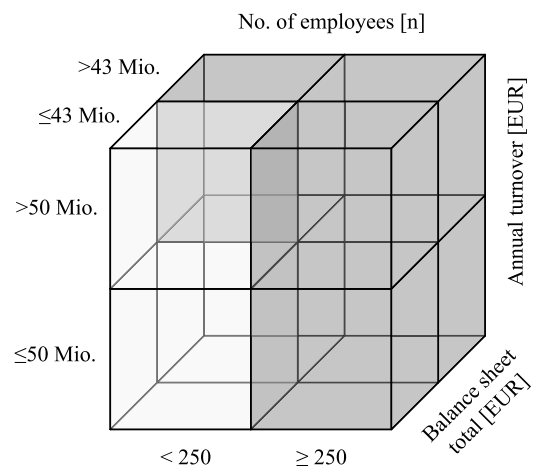
4.4. Definition of the obliged target group

One of the major challenges for MS during the transposition was to

define the target group. The delimitation of SMEs and large companies is based on three criteria: (1) number of employees, (2) turnover and (3) balance sheet total. For each of these criteria, there is a threshold value. The employee criterion is considered as the primary criterion and exceeding it means that a company is definitively a non-SME, i.e. a large company. The two financial criteria are considered as secondary criteria. To meet the definition of an SME, at least one of these criteria must also not exceed the threshold value. In Article 2(26) of the EED with reference to the Commission Recommendation 2003/361/EC of 6 May 2003 SMEs are defined as “[...] enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million.”² Article 8 EED, on the contrary, is relevant to large enterprises. This target group is only implicitly defined by referencing to SMEs and delimiting large enterprises as “enterprises that are not SMEs” (Article 8 (4) EED). Yet in the MS, different

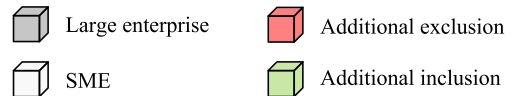
² These criteria apply directly to the accounts of ‘autonomous enterprises’, whereas for ‘linked’ or ‘partner’ enterprises they apply to consolidated accounts as specified in the Commission Recommendation 2003/361/EC of 6 May 2003 (Annex Title I - Article 3 and 6) which is especially relevant for multi-site and multi-national companies.

EU Definition Austria, Bulgaria, Czech Republic, Estonia*, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia*, Malta, Netherlands, Poland*, Portugal, Romania, United Kingdom

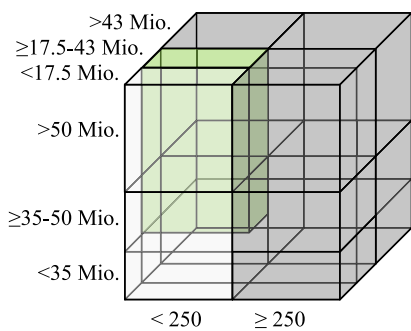


„[...] the category of micro, small and medium-sized enterprises is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million“
Art. 2 (26), EED

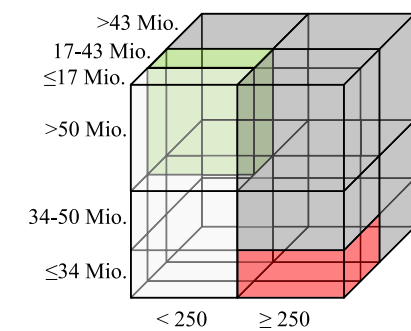
* According to draft definition
** Interpretation of Denmark includes exact financial thresholds



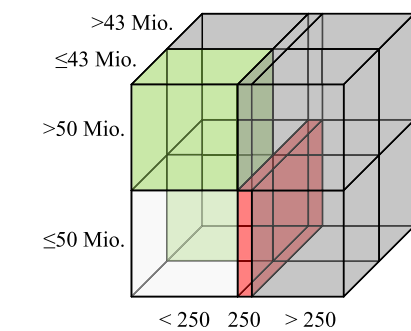
Slovenia



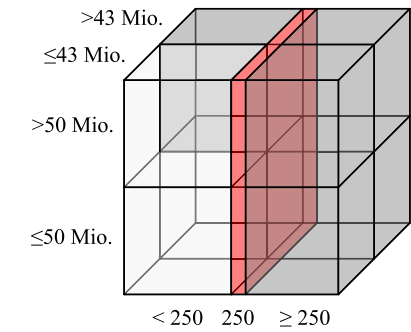
Croatia



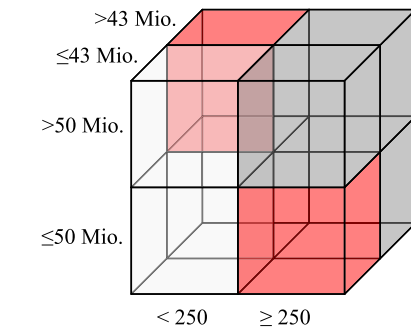
Belgium (Flanders); France



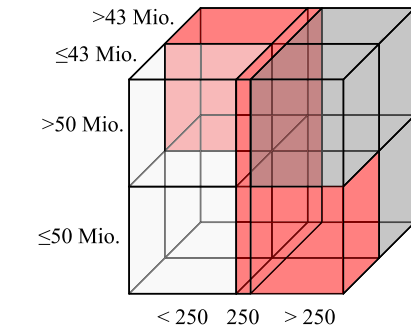
Slovakia



Sweden, Denmark**



Spain*



No information Belgium (Brussels; Wallonia), Cyprus, Lithuania, Luxembourg

Fig. 3. Definition of large companies across EU-28 MS as of late summer 2015³. Source: own compilation based on transposition documents

national approaches to translating the target group can be found (Fig. 3 and Table 3). Some MS decided to explicitly define large enterprises in their legal documents, others followed the approach of the EED and only defined SMEs and outlining large companies as any others.

Denmark, France, Spain and Sweden used the same employee and

financial thresholds as given by the EU definition,⁴ but linked the criteria differently than implied by the non-SME definition in the EED. In some MS further criteria for a delimitation of large companies were applied which resulted either in an extended or reduced target group regarding the obligation. An additional inclusion of companies and

³Note that additional criteria apply in some MS to make companies subject to mandatory energy audits.

⁴Denmark, France and Spain have slightly modified the exact threshold values, e.g. by still considering companies with 250 as SME like France or Spain (see Table 3).

therefore an extension of the target group were realized by Bulgaria, Croatia, Ireland, Italy, Romania and Slovenia. While Croatia and Slovenia adjusted and reduced the financial thresholds for the definition of SMEs, Bulgaria and Romania extended the target group based on energy-related criteria (see Table 3). In any case, it should be noted that the illustration in Fig. 3 only shows some of the differences among the Member States. There may be other differences, e.g. in the counting of employees (head count, full-time equivalents), with regard to multi-site and multi-national companies or with regard to the duration until a company changes its classification. Furthermore, some MS made exemptions, e.g. for facilities subject to public right (e.g. Finland, Germany, Italy and United Kingdom) or for companies below a certain energy threshold (e.g. Cyprus, Malta and Romania) (see Table 3).

4.5. Implications for multi-national and multi-site companies

For multi-site and multi-national operating companies the obligation to conduct an energy audit led to particular challenges due to the fact that national requirements resulting from the national transposition of Article 8 EED of each individual country of the EU28 MS apply (where the company is legally operating). Thus, an appropriate inter-linkage (with a tendency to harmonization) of the European and national policy cycles is crucial for these companies (see Fig. 1 and Table 3). Especially the assessment of whether a company is obliged to conduct an energy audit led to two main challenges: 1) the assessment of the SME status in general and 2) the decision if the respective company part is obliged to conduct an energy audit at site level. Regarding the calculation of the thresholds several cases arise which in general could be summarized to two procedures. Some MS including Denmark, Finland, Germany, the United Kingdom decided to calculate the thresholds for the assessment of the SME status at group level including all company parts located inside and outside the national territory which belong to the parent company. In the other case the thresholds are calculated at national level, such as for example in Italy and in Greece. In this case company parts which are located outside the national territory are not considered within the calculation. Once the respective company has been assessed as a non-SME company, the decision if each company site has to conduct an energy audit is crucial for both multi-site and multi-national operating companies. The majority of MS limited the scope to company parts located in the national country.

4.6. Minimum coverage of the energy audits

Taking into consideration the need for representativeness required from Annex VI EED, some MS defined different minimum percentage rates of the total energy consumption of the company which have to be covered as a minimum share by the energy audit (see Table 3). However, the majority of MS did not decide on the conditions relating to the minimum of coverage of energy consumption by the mandatory audit. Some countries such as Bulgaria or Malta did not allow to exclude a certain amount of the energy consumption from the energy audit. Others such as Finland (95%), France (65 or 80%), Germany (90%) and the United Kingdom (90%) explicitly defined minimum percentage rates which have to be covered by the audit and therefore allowed a certain exclusion of the energy consumption. Some other MS again (such as Austria, Italy or Malta) directly followed the general wording in Annex VI EED and basically defined in their national legislation that the energy audit has to cover all essential areas of energy consumption and at the same time has to be sufficiently proportionate and representative. Thus, this still leaves room for interpretation for both the energy auditor and the respective company.

4.7. Monitoring and implementation of recommendations

To check whether the companies have actually carried out the

energy audit, continuous monitoring is crucial. In this context the question arises if MS have to proactively submit information on their energy audit to an authority or if only spot checks are carried out. Some MS such as Germany, Spain, Sweden and the United Kingdom have decided to carry out only spot checks where companies are required to provide the relevant documents on request. At the time of the data collection process, the majority of MS was still in the discussion process on how to structure and organize the compliance monitoring. Regarding the level of detail of the information, some MS only request proof that the energy audit has been completed whereas other MS request a detailed report of the energy audit. To structure and summarise the information collected during the energy audits, some MS (among others Austria, Croatia, Italy, Malta and Poland) decided to establish a database to collate information from energy audit reports. This database including data regarding the characteristics of companies, the identified measures, and potential savings resulting from the energy audits assists MS to evaluate the progress and decide on further steps encouraging companies to implement the identified measures. To ensure an efficient instrumental design, it is important to use the collected data as well as the lessons learnt in the ongoing process of the policy cycle(s).

Another requirement from Article 8 EED is that MS shall actively promote the implementation of recommendations resulting from energy audits. Therefore, the monitoring process plays a crucial role as the collection of data allows MS to gain more transparency about energy-related characteristics of the companies and also about typical recommendations resulting from an energy audit. However, the requested documents, the level of detail and the timeframe within documents have to be submitted vary considerably between the EU-28 MS.

In addition, the estimated number of companies in the target group varies considerably across MS, ranging from approximately 50,000 companies in Germany to approximately 80 companies in Malta. As a consequence, the administrative follow-up process with regard to the implementation and monitoring is quite different across the MS. In the majority of MS, such as Austria, Denmark, Finland, France, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Spain, Sweden and the United Kingdom, large companies are obliged to ensure compliance with Article 8 EED by proactively submitting information about the energy audit.

4.8. Penalties for non-compliance

The MS were allowed to lay down rules on penalties in their national transposition to guarantee compliance with the requirements. It is up to each MS which person or institution to affect by a penalty. Some MS imposed it on the non-compliant company while others decided to impose personal penalties on the energy auditor or the company's management (see Table 3). Fig. 4 gives an overview about the upper ceiling of penalties in case of non-compliance across MS. Obviously, the overall amount differs considerably.

The majority of MS imposed the penalty on the company level; some other MS, namely Ireland (EUR 5000), Croatia (EUR 2000) and Slovenia (EUR 10,000) decided to impose the penalty on the management level (director of the company). Hungary in turn took another approach and decided to impose a penalty of EUR 320 on the energy auditor. Denmark, Finland, France, Netherlands and Sweden did not define any penalty and intend to decide on a case-by-case basis. Spain defined a penalty of EUR 60,000 and connects this value with a profitability criterion: The amount may not exceed 10% of the turnover of the company.

The following table systematically summarizes the previously discussed commonalities and differences regarding the national transposition of Article 8 EED (Table 3).

Although the *policy implementation* process is completed for almost all MS, the *interlinked policy cycles* are still ongoing. Next steps include a continuous *monitoring and reporting process* regarding the impact of the

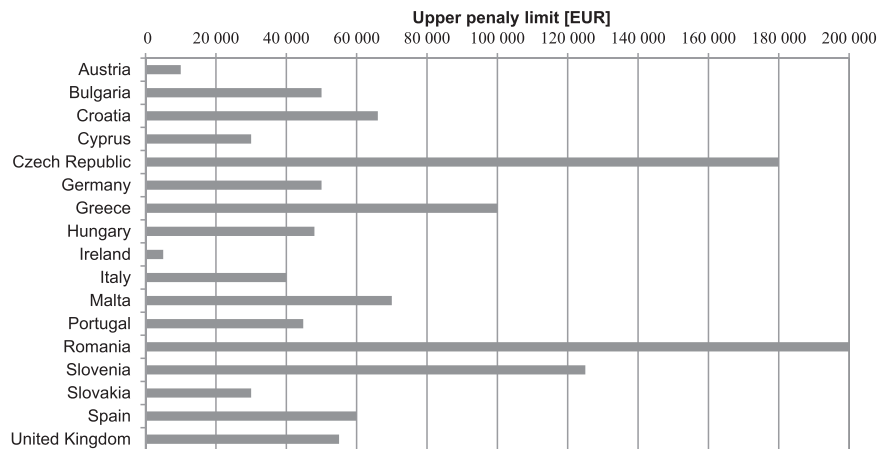


Fig. 4. Upper limit of penalties for companies in case of non-compliance (values include fines for repeated non-compliance)⁵. Source: own compilation based on transposition documents and interviews

energy audit obligation including insights into achieved energy savings, distributional aspects as well as impacts on the energy auditor market before a final decision on possible adjustments concerning the national requirements could be taken. At this point both policy cycles are intertwined as the EC may also revise Article 8 EED in future which could be the beginning of a second policy cycle (see Fig. 1). However, at the time of writing this paper, there are no signs of a revision of Article 8 EED by the EC.

5. Discussion

5.1. Methodological discussion

The “double-loop” policy cycle framework as used for structuration purposes in our analysis is evidently subject to the same limitations as the concept of Policy Cycle Analysis in general (see e.g. Jann and Wegrich, 2007). First, it is based on a simplified model of reality which highlights selected aspects while disregarding others. Second, the idealized stages of the cycle are not clearly separable in reality and overlap with each other (ibid.). When considering the “double-loop” Policy Cycle Approach, the interaction process between the European and national level is assumed to be linear, i.e. the process is first carried out on the ‘upper’ level and is then triggering the process on the ‘lower’ level. In reality processes on both levels are yet not following each other, they are not strictly hierarchical as ‘feedback’ from the ‘lower’ level (national policy cycle) may affect the ‘upper level’ (European policy cycle). Furthermore, the policy cycles of several implementers on the ‘lower level’ are not independent from each other. Third, in our case the “double-loop” policy cycle assumes a ‘top-down’ approach where the EC functions as law maker and ‘idea provider’ and the MS as ‘implementers’. However, the main goal of this approach is to systemize processes and to derive lessons learnt from this. It allows researchers to make the policy process more comprehensible and to delineate each phase separately. Thereby results are comparable across countries.

5.2. Lessons learnt and policy implications

The results of our analysis show that the design of European policies as well as the subsequent national transposition by the MS within the

⁵ Note: All values shown are rounded and partly from national currency converted to euro. Thus, slight differences may arise. All figures are shown at company level, except Ireland at management level (for 2016). Denmark, Finland, France, Netherlands and Sweden did not define any penalty either, because they intend to decide on a case-by-case basis. Estonia, Latvia, Lithuania, Luxemburg and Poland did not define any penalties at the time of the study. For Belgium no information could be identified.

policy cycle involve considerable challenges, among others capacity requirements or the timely transposition into a national act. This process also involves negotiations with stakeholders. Thus, for policy makers the main goal is to find a consensus between the diverging interests both at European and national level.

Even if the EED leaves room for interpretation in some aspects, our findings clearly show that there are numerous similarities regarding the implementation decisions taken by MS related to aspects such as (1) What proportion of the energy consumption should be covered by the audit (incl. transport, building)? or (2) Are exceptions permitted? This is obviously also caused by the clear formulations and recommendations in the Guidance Notes as well as by the exchange of information between the MS at the Concerted Action Platform. However, there are several differences as well, which may result in a (unintended and deliberate) non-compliance by MS.

Evidently, the new instrument to be introduced at national level always has to fit into the existing policy mix as “policy instruments do not evolve in a vacuum” (Cunningham et al., 2016). This implies that MS occasionally have to adjust the existing policy mix while introducing the new policy instrument. In our case this meant e.g. excluding companies which are affected by the energy audit obligation from existing national funding programmes for energy audits (and/or energy management systems). This decision about an adjustment is of course a matter for each individual country. Furthermore, the concrete decisions regarding policy design aspects of a new instrument are also influenced by the country specific policy context. In addition, further challenges arise which may be addressed by policy makers which are discussed in the following.

5.3. Comprehensible description of requirements in the Directive and its guidance documents are essential

European legislation via directives is certainly associated with a precise definition of the requirements for the MS by the EC. However, our findings suggest that the complexity and also the amount of information is challenging for some countries. One example we have picked amongst many others is the definition of the obliged target group in the EED. Due to the implicit (and inverse) delimitation of large companies, the definition in law as well as the real identification of obliged companies is challenging for MS. Our findings illustrate that this further complexity is added by adding further (e.g. energy-related) criteria in some MS. Due to a lack of adequate data it is challenging for national institutions to clearly identify the obliged companies. Thus, to maintain requirements at a comprehensible and clear level for national capacities is crucial for an adequate transposition. Furthermore, English guidance documents in each country (which are lacking in almost every

country except Malta and Denmark) explaining the framework conditions for internally operating companies allow them to set up a standardized and compliant process for all subsidiaries.

5.4. Institutional capacity for the transposition of the entire EED varies across countries

The transposition of the entire EED with its 30 Articles is a capacity and resource demanding process for national institutions, especially for smaller MS with less institutional capacity and in view of numerous other energy-related Directives published in recent years. Even if the size of the industrial sector varies across countries, the fixed effort for the basic transposition remains similar. Thus, for the timely execution of the entire policy cycle including transposition and monitoring, some MS might need more guidance and time than others.

5.5. Timing of national policy cycle and definition of requirements facilitate the implementation of energy audits on time

As indicated by the results, MS spent some time on discussing, evaluating and deciding on their options for the national transposition. As this delayed the policy cycle in the MS, companies came under time pressure to conduct an energy audit on time. Missing details in some MS also made it difficult for internationally operating companies which seek a harmonized fulfilment of the obligation by setting up a standardized process for all subsidiaries. Thus, it seems advisable to ensure that companies have adequate timeframes for the implementation. Furthermore, companies which intend to implement an energy or environmental management system should be granted a sufficiently long period to properly set up such a system.

5.6. Account should be taken of the interplay of the 28 MS' policy cycles at EU-level

Concrete requirements how to conduct an energy audit (such as minimum coverage of share of energy consumption, sampling approaches, etc.) significantly differ across MS. In the long term, the aim should be to achieve an alignment of the requirements and thereby stepwise harmonization in order to facilitate companies to be compliant in each country. This would also assist the EC to monitor MS' compliance at a general level.

5.7. Evaluation and monitoring process offers window of opportunity

To ensure a close interconnection of the two interlinked policy cycles, findings and insights of the national policy cycles should be fed into the revision process of Article 8 EED in the beginning of a new “loop” (see Fig. 1). For this purpose transparent, detailed and continuous monitoring of the conducted energy audits by the MS seems helpful to better understand its impact. This collection of data at company level (including recommendations of energy efficient measures) is a good starting point and window of opportunity for the countries to establish further support (e.g. in the form of policy instruments) seeking to enhance the adoption of these measures. However, our findings show that in the majority of countries the selection and discussion of possible monitoring and evaluation processes is still ongoing. In some cases, countries even try to lower the administrative expenditure for companies in order not to burden them too much. It is important to show the benefits of such monitoring to companies, for example by developing benchmarks based on the energy audits or by information campaigns which built on the monitoring information and provide additional insights for companies.

5.8. Penalty levels should encourage compliance

Irrespective of the affected person or institutions, penalties should

exceed the average costs for compliance, i.e. carrying out an energy audit in this case, and also consider the probability to be checked by a public authority. Failing to do so might make companies decide not to conduct an energy audit.

Given the above mentioned challenges, our findings suggest that a more effective transposition and implementation can be achieved by MS with an intense and cooperative exchange of experiences between countries. This is underlined by the fact that the MS have become aware of the difficulties regarding the transposition within the negotiation process. At this stage, an exchange between countries is particularly valuable because the process is still ongoing and approaches or ideas could still be changed. An exchange for the MS could also be further enhanced in shorter intervals by an EU-wide platform.

6. Conclusions

The aim of this paper was to analyze commonalities and differences in the transposition of Article 8 on energy audits for large companies and to derive a set of hypotheses on challenges and good practice for policy making in conjunction with Article 8. For this purpose, we applied the concept of Policy Cycle Analysis as a heuristics from a multi-level governance perspective to structure our research process.

By means of a directive, the EC provides a coherent framework for the MS to transpose the energy audit obligation. Our analysis shows that at a first glance there are numerous commonalities in the national transpositions of Article 8 EED. This is obviously due to the concrete requirements in the directive as well as in the guidance notes which gave MS a certain degree of orientation for the transposition. Our findings show that the interlinkages of the “double-loop” policy cycle are of particular relevance for a smooth policy process as MS partly interpreted the requirements differently as the approach of a directive offers MS the advantage to make national adjustments. This also leads to the fact that some MS exceeded the minimum requirements (e.g. by an extension of the target group based on modified thresholds). When assessing the differences one has to note that due to the institutional and industrial heterogeneity of the MS, there seems to be no general or “one-fits-all” solution in the sense that the EC prescribes every single detail regarding the national energy audit obligation. Our findings rather suggest that a continuous exchange of experiences between the MS is crucial to achieve an adequate national solution. In doing so, countries may learn from each other's experiences in terms of the transposition and try to adopt what they perceive as ‘best practices’ or avoid ‘bad practices’. In addition, a timely national transposition facilitates the implementation of energy audits on time, both for obliged companies as well as for energy auditors. However, the transposition of Article 8 EED was delayed in more than half of the 28-EU MS. Finally, the European as well as national evaluation and monitoring process of Article 8 EED offers a window of opportunity both for checking compliance as well as for data collection purposes for the future design of policy instruments. This also offers a further perspective to develop useful instruments for companies such as benchmarking of energy performance in companies or opens the door for networking activities among companies to learn from each other.

The analysis in this article can only provide a partial snapshot of the transposition at a certain point in time as the whole implementation process is dynamic and subject to constant changes and minor adjustments. At the time of writing this paper there are no foreseeable signs of an overarching revision of Article 8 EED by the EC. In the case of a new policy “loop” minor adjustments of Article 8 EED, also inspired by the results of this paper, both at EU as well as at national level may lead to a broader effect and thereby to increased energy savings induced by the energy audits in the European industry.

Further research on an updated, in-depth analysis of the correctness of the transposition of Article 8 as well as research on the impact of energy audits and energy management systems induced by the regulation is needed. For this purpose, however, other, especially

statistical, methods are necessary for the analysis of the impact of these instruments.

Acknowledgements

This manuscript on the implementation of Article 8 EED in the MS, though carried out independently, partially draws on research within ‘A Study on Energy Efficiency in Enterprises: Energy Audits and Energy Management Systems’ prepared for the European Commission (EC). The responsibility for this paper solely lies with the authors. We would like to thank all supporters of the study. In addition, we are grateful to Wolfgang Eichhammer and two anonymous reviewers for their valuable comments on a former version of this manuscript.

Lisa Nabitz would especially like to thank the „Energy Efficiency“ group within the Competence Center of Energy Technologies and Energy Systems at the Fraunhofer Institute for Systems and Innovation Research ISI where she worked for the last four years and had the great possibility to conduct this research before she moved to ITAS.

References

- Berglund, S., Gange, I., van Waarden, F., 2006. Mass production of law: routinization in the transposition of European directives: a sociological institutionalist account. *J. Eur. Public Policy* 13, 692–716.
- Bertoldi, P., Castellazzi, L., Fawcett, T., Oikonomou, V., Spyridaki, N.-A., Renders, N., Moorkens, I., 2015. How is article 7 of the Energy Efficiency Directive being implemented? An analysis of national energy efficiency obligation schemes. In: Proceedings of the eceee Summer Study, Presqu'île de Giens, Toulon/Hyères, France, p. 455–465.
- Brems, A., Chirez, S., 2016. International Experience with Energy Efficiency Policy: Implementation of Article 8 of the EU Energy Efficiency Directive. 2016 International Energy Policies & Programmes Evaluation Conference, Amsterdam. URL: <<http://www.iepppec.org/wp-content/uploads/2016/05/Paper-Chirez.pdf>>. (accessed 19 June 2017).
- Concerted Action, 2016. Results of the energy audit obligation. Executive Summary 5.8. Online: <<http://www.esd-ca.eu/themes/articles-of-the-eed/energy-audits-and-management/executive-summary-5.8-results-of-energy-audit-obligation>>. (accessed 19 January 2017).
- Cunningham, P., Edler, J., Flanagan, K., Larédo, P., 2016. The innovation policy mix. In: Edler, J., Cunningham, P., Gök, A., Shapirap, P. (Eds.), *Handbook of Innovation Policy Impact*. Edward Elgar, Cheltenham, pp. 505–542.
- deLeon, P., 1999. The stages approach to the policy process. In: Sabatier, P.A., Weible, C.M. (Eds.), *Theories of the Policy Process*. Westview Press, Boulder, CO, pp. 19–32.
- eceee, 2013. Understanding the Energy Efficiency Directive. Steering through the maze #6: A guide from eceee. Online: <<http://www.eceee.org/policy-areas/EE-directive/maze-6>>. (accessed 17 January 2017).
- EC (European Commission), 2014. (ed.): Communication From the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A policy framework for climate and energy in the period from 2020 to 2030.
- EC (European Commission), 2013a. Implementing the Energy Efficiency Directive – Commission Guidance. COM(2013) 762 final, Brussels, 6.11.2013.
- EC (European Commission), 2013b. Guidance note on Directive 2012/27/EU on energy efficiency, amending Directives 2009/125/EC and 2010/30/EC, and repealing Directives 2004/8/EC and 2006/32/EC. Article 8: Energy audits and energy management systems. Communication from the Commission to the European Parliament and the Council. Implementing the Energy Efficiency Directive – Commission Guidance. SWD(2013) 447 final, Brussels, 6.11.2013.
- EC (European Commission), 2012a. 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 2012/30/EU and repealing Directives 2004/8/EC and 2006/32/EC.
- EC (European Commission), 2012b. Non-paper of the services of the European Commission on Energy Efficiency Directive. Informal Energy Council. 19–20 April 2012. URL: <https://ec.europa.eu/energy/sites/ener/files/documents/20120424_energy_council_non_paper_efficiency_en.pdf>. (accessed 17 June 2017).
- EC (European Commission), 2011. Impact Assessment. Accompanying document to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Commission Staff Working Document. Energy Efficiency Plan 2011. URL: <www.cep.eu/Analysen_KOM/KOM_2011_109_Energieeffizienzplan/SEC_2011-277_Impact_Assessment.pdf>. (accessed 9 November 2015).
- EC (European Commission), 2010. (ed.): Communication From the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions. Energy 2020 – A strategy for competitive, sustainable and secure energy. SEC (2010) 1326. COM (2010) 639 final.
- EC (European Commission), 2007. EUROPEAN COUNCIL ACTION PLAN (2007 – 2009). ENERGY POLICY FOR EUROPE (EPE). 7224/1/07 REV 1: Presidency Conclusions of the European Council of 8/9 March 2007. Online: <<http://arc.eppgroup.eu/Press/pfocus/docs/March07.pdf>>. (accessed 9 November 2015).
- EC (European Commission), 2006. Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC.
- EC (European Commission), 2003. Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises (notified under document number C(2003) 1422), OJ L 124, 20.5.2003 (2003/361/EC). Online: <<http://eur-lex.europa.eu/legal-content/en/ALL/?Uri=celex:32003H0361>>. (accessed 9 November 2015).
- Eichhammer, W., Rohde, C., 2016. Enhancing the impact of energy audits and energy management in the European Union. A review of Article 8 of the Energy Efficiency Directive. Prepared for eceee with financial support from ROCKWOOL International. URL: <<http://publica.fraunhofer.de/documents/N-378907.html>>. (accessed 19 June 2017).
- EP (European Parliament), 2017. Sources and Scope of European Union Law. URL: <http://www.europarl.europa.eu/ftu/pdf/en/FTU_1.2.1.pdf>. (accessed 23 June 2017).
- Eurostat, 2017. Final energy consumption by sector. Online: <<http://ec.europa.eu/eurostat/tgm/refreshTableAction.do?Tab=table&plugin=1&pcode=tsdpc320&language=en>>. (accessed 29 June 2017).
- Eurochambres, 2015. Transposition Study. Energy Audits for Europe Assessment of the transposition of Article 8 of the Energy Efficiency Directive (2012/27/EU) into Member State legislation. Online: <http://www.eurochambres.eu/custom/Transposition_Paper_Art_8_EED_22062015-2015-00266-01.pdf>. (accessed 29 June 2017).
- Fleiter, T., Schleich, J., Ravivanpong, P., 2012. Adoption of energy-efficiency measures in SMEs—An empirical analysis based on energy audit data from Germany. *Energy Policy* 51, 863–875.
- Gupta, S., Tirpak, D.A., Burger, N., Gupta, J., Höhne, N., Boncheva, A.I., Kanoan, G.M., Kolstad, C., Kruger, J.A., Michaelowa, A., Murase, S., Pershing, J., Saijo, T., Sari, A., 2007. Policies, instruments and co-operative arrangements. In: Metz, B., Davidson, O.R., Bosch, P.R., Dave, R., Meyer, L.A. (Eds.), *Climate Change Mitigation - Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. University Press, Cambridge, United Kingdom and New York, NY, USA.
- Haverland, M., Steunenberg, B., van Waarden, F., 2011. Sectors at different speeds: analysing transposition deficits in the European Union. *J. Common Mark. Stud.* 49, 265–291.
- Haverland, M., Romeijn, M.H., 2007. Do Member States make European policies work? Analysing the EU transposition deficit. *Public Adm.* 85 (3), 757–778.
- Héritier, A., 1996. The accommodation of diversity in European policy-making and its outcomes: regulatory policy as a patchwork. *J. Eur. Public Policy* 3, 149–176.
- Howlett, M., Giest, S., 2015. Policy cycle. *Int. Encyclopedia Social. Behav. Sci.* 2, 288–292.
- Howlett, M., Ramesh, M., 2003. *Studying Public Policy. Policy Cycles and Policy Subsystems*, Second edition. Oxford University Press, Oxford.
- Hirzel, S., Nabitz, L., Wohlfarth, K., Rohde, C., Behling, I., Clarke, D., Perera, N., Turner, R., 2016. A Study on Energy Efficiency in Enterprises: Energy Audits and Energy Management Systems. Report on the fulfilment of obligations upon large enterprises, the encouragement of small- and medium-sized companies and on good-practice. Online: <http://www.isi.fraunhofer.de/isi-wAssets/docs/e/shi/Task1-2_Report_FINAL.pdf>. (accessed 10 June 2016).
- IEA (International Energy Agency), 2014. Energy Efficiency Market Report 2014. Market Trends and Medium-Term Prospects. Paris: IEA (International Energy Agency).
- Jann, W., Wegrich, K., 2007. Theories of the policy cycle. In: Fischer, F., Miller, G.J., Sidney, M.S. (Eds.), *Handbook of Public Policy Analysis. Theory, Politics, and Methods*, pp. 43–62.
- Jenkins, W.I., 1978. *Policy-Analysis. A Political and Organisational Perspective*. London: Martin Robertsen.
- Käding, M., 2006. Determinants of transposition delay in the European Union. *J. Public Policy* 26, 229–253.
- König, T., Luetger, B., 2008. Troubles with transposition? Explaining trends in Member-State notification and the delayed transposition of EU directives. *Br. J. Political Sci.* 39, 163–194.
- Kluczek, A., Olszewski, P., 2017. Energy audits in industrial processes. *J. Clean. Prod.* 142 (4), 3437–3453.
- Lasswell, H.D., 1951. The policy orientation. In: Lerner, D., Lasswell, H.D. (Eds.), *The Policy Sciences*. Stanford University Press, Stanford, pp. 85–104.
- Mastenbroek, E., 2003. Surviving the deadline. The transposition of EU directives in the Netherlands. *Eur. Union Polit.* 4, 371–395.
- Nabitz, L., Hirzel, S., Rohde, C., Wohlfarth, W., Behling, I., Turner, R., 2016. How can energy audits and energy management be promoted amongst SMEs? A review of policy instruments in the EU-28 and beyond. In: Proceedings of the ECEEE Industrial Summer Study, September 2016, Berlin, pp. 401–415.
- Publications Office of the European Union, 2017. EUR-LexDatabase – European Union directives. URL: <http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?Uri=LEGISSUM:l14527&from=DE>. (accessed 19 June 2017).
- Reiche, D., Bechberger, M., 2004. Policy differences in the promotion of renewable energies in the EU member states. *Energy Policy* 32, 843–849.
- Risse, T., M.G. Cowles, M.G., Caporaso, J., 2001. Europeanization and domestic change: introduction. In: Cowles, M.G., Caporaso, J., Risse, T. (Eds.), *Transforming Europe: Europeanization and Domestic Change*. Cornell University Press, Ithaca, NY, pp. 1–20.
- Rosenow, J., Fawcett, T., Leguijt, C., Pató, Z., 2016. Evaluating the Implementation of Article 7 of the Energy Efficiency Directive. In: Proceedings of International Energy Policies & Programmes Evaluation Conference, Amsterdam. URL: <<http://www>>.

- ieepcc.org/wp-content/uploads/2016/05/Paper-Rosenow-3.pdf. (accessed 20 June 2017).
- Schleich, J., 2004. Do energy audits help reduce barriers to energy efficiency? An empirical analysis for Germany. *Int. J. Energy Technol. Policy* 2, 226–239.
- Schlomann, B., Rohde, C., Eichhammer, W., Bürger, V., Becker, D., 2013. Which role for market-oriented instruments for achieving energy efficiency targets in Germany? *Energy Environ.* 24 (1 & 2), 27–55.
- Schulze, M., Nehler, H., Ottosson, M., Thollander, P., 2016. Energy management in industry: a systematic review of previous findings and an integrative conceptual framework. *J. Clean. Prod.* 112, 3692–3708.
- Steunenberg, B., 2006. Turning swift policy-making into deadlock and delay. *Eur. Union Polit.* 7 (3), 293–319.
- Treutlein, D., 2007. What actually happens to EU directives in the member states? A cross-country cross-sector view on national transposition instruments, CESifo working paper, No. 2098.
- Wohlfahrt, K., Eichhammer, W., Schlomann, B., Mielicke, U., 2017. Learning networks as an enabler for informed decisions to target energy-efficiency potentials in companies. *J. Clean. Prod.* 163, 118–127.