NEW STRATEGY TO SUPPORT COMPANIES IN THE UPTAKE OF AUDIT MEASURES: THE AUDIT2MEASURE PROJECT

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ABSTRACT

Industry is a key player in energy consumption and economic impact in the European Union and energy audits represent an important tool to improve energy efficiency in the sector; despite both the spread of energy audits and the knowledge of their benefits, the actual implementation rate of the Energy Savings Measures proposed by energy audits is relatively low. The main aim of the AUDIT2MEASURE (leading business towards climate neutrality by speeding up the uptake of energy efficiency measures from the energy audits) project is to support companies in the uptake of audit measures necessary to reduce the energy consumption supporting their energy transition. AUDIT2MEASURE will develop and implement a new engagement strategy (called 'Audit2Action') to put into action the opportunities emerging from energy audits. To this aim, in the first part of the project, barriers to the adoption of energy saving measures will be identified and subsequently solutions to overcome such barriers will be developed by understanding decision-making processes in companies and the position of energy efficiency in them; after that, the project will develop a capacity building program to motivate the professionals of the involved companies to increase their capacity to implement the energy audit outcomes. Finally, the project will assist a series of engaged companies to implement selected measures in the field to test the results of the 'Audit2Action' strategy. A knowledge exchange space will be created to ensure sustainability, replication and exploitation of results also after the end of the project. AUDIT2MEASURE is characterised by its approach to result in action, thereby both developing a new methodology for adoption of energy audits and applying this to improve energy efficiency in the European industrial sector. This paper will describe the 'Audit2Action' strategy and present the first result of stakeholder engagement using such a methodology.

Keywords: energy efficiency, energy audit, energy saving measures.

1 INTRODUCTION

In the recent years, thanks to the Energy Efficiency Directive (2012/27/EU) (EED) and its update in 2018 (2018/2002/EU), large companies have been gradually undertaking energy audits. Depending on how the system boundaries are defined, energy audits provide essential information about the status of energy consumption and its management in a company. Results from audits have highlighted that considerable opportunities exist to improve energy efficiency in companies.

The development and integration of new measures and technologies, with improved energy performance require a certain period of learning, and, therefore, the opportunities they offer may not be immediately appreciated. For this reason, in 2011, a worldwide recognized Energy Management System was proposed under ISO 50001:2011 and its update (ISO 50001:2018 [1]), which supports organizations in all sectors to use energy more efficiently through a Plan–Do–Check–Act (PDCA) continual improvement framework. The purpose of this international standard is to specify 'requirements for establishing, implementing, maintaining and improving an Energy Management System (EnMS), whose purpose is to enable an organization to follow a systematic approach in achieving continual improvement of energy performance, including energy efficiency, energy use and consumption'. Despite the large potential of improving energy efficiency in companies, the actual implementation

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rate of energy saving measures (ESM) is often not higher than 50% of the potential proposed by the energy audits [2]. The main barriers that hinder the adoption of energy efficiency measures can be divided into three groups [3], [4]:

- informational barriers, such as lack of awareness of the energy use in the company, lack of information on costs and benefits, information issues on energy contracts, low status of energy efficiency in the decision-making chain, lack of time and lack of culture about energy efficiency;
- behavioural and organizational barriers, such as lack of interest in energy efficiency, other priorities, imperfect evaluation criteria, inertia and lack of sharing the objectives;
- economic barriers, such as low capital availability, hidden costs, intervention-related risks, interventions not being sufficiently profitable and split incentives.

It is therefore important to take a holistic approach to tackle the above-mentioned barriers by engaging all the stakeholders operating in the field with a tailored approach towards the common objective of improving energy efficiency.

2 THE AUDIT2MEASURE PROJECT

The AUDIT2MEASURE (leading business towards climate neutrality by speeding up the uptake of energy efficiency measures from energy audits, https://ieecp.org/projects/audit-to-measure/) (A2M) was co-funded by the European Union under the LIFE funding program (project ID 101075785).

The main aim of the project is to enhance the uptake of ESM proposed in energy audit outcomes in manufacturing companies. In particular, companies of the chemical-pharmaceutical (NACE C20 and C21) and machinery (NACE C25 to C28) sectors will be addressed in five different member states (MS) (IT, NL, CZ, ES and EL); also, other sectors such as ceramic (NACE C23.3 and C23.4), iron and steel (NACE C24.1) or plastic (NACE C22) will be explored in some of the mentioned MS.

A2M will enable the adoption of energy audit outcomes through a strategy to engage companies and motivate them towards improving energy efficiency. In addition, barriers to the adoption of ESM will be identified and subsequently solutions to overcome these barriers will be developed. A2M is characterized by its approach to result in action, thereby both developing a new methodology for adoption of energy audits and applying this to improve energy efficiency. To this end, AUDIT2MEASURE has the following two main objectives:

1) Develop an engagement strategy to put into action the opportunities that emerge from energy audits. This strategy (called ‘Audit2Action’) will combine technical/engineering tools and capacity building programmes to overcome barriers in investing in energy efficiency and enable the industrial sector to utilize the opportunities identified through energy audits. The strategy will build on an analysis of the current ESM penetration levels in the selected sectors and an assessment of barriers and potential solutions. In this perspective, the impacts of using EnMS in the industrial sector will be quantified and presented to companies’ decision makers in terms of energy savings, avoided CO_2 emissions, investment needs and related cost savings.

2) Increase the capacity of high, intermediate and low-level professionals of the companies to accelerate the uptake of the energy audit outcomes, by putting in place the ‘Audit2Action’ strategy which will set up and launch a capacity building programme to simplify the process for application of ESM, identified as result of energy audits, on site, with the goal to engage all management levels, professionals and industry associations. Facilitating the participation of company professionals will be key in the capacity

building programme since it can contribute to accelerating the uptake of ESM, by removing potential barriers and by increasing the ranking of ESM in the decision-making priorities of the companies. The capacity building programme will be structured and tailored to three target groups:

a. Company managers and decision makers (high-level managerial staff – at least 100 professionals (unique participants) in five countries);

b. Operational staff (at least 400 professionals (unique participants) in five countries), such as company intermediate and low-level managers, energy auditors, investors, energy experts and energy managers, energy related experts, staff of industry associations, consultants, economists, business/commercial experts and other professionals working in their own companies or providing external support to the uptake of the ESM in companies.

A wider audience, at national and EU level, through conferences, webinars, dialogue events and masterclasses aiming at increasing the critical mass of professionals working with the industry sector supporting the uptake of the ESM but also increasing the network and the impact of the capacity building outcomes.

3 THE AUDIT2ACTION STRATEGY

The main goal of the 'Audit2Action' strategy is to provide a practical framework to support industrial companies in the uptake of energy saving measures (ESM) identified through energy audits, aiming primarily at reducing their energy consumption and thus supporting their energy transition. Moreover, the strategy includes also support activities for the identification of the expected non-energy benefits (NEB) associated with the implementation of the ESM. This latter aspect related to NEB deserves particular attention, since it can provide an additional driver for the incentivizing process of ESM uptake.

The 'Audit2Action' strategy is centred on the set-up and launch of a capacity building program for high, intermediate and low-level managers within the companies, in order to accelerate the uptake of the energy audit outcomes. To establish this program, a stakeholder analysis and engagement plan (SAEP), which is addressed not exclusively to companies, rather to professionals and industry associations as well, has been launched to enhance cross-fertilization among different stakeholders in and outside the companies.

The mentioned coordinated involvement of companies' management and of engaged energy professionals (energy staff, energy auditors, energy consultants, etc.) at the various levels of the energy management process represents a key element for the 'Audit2Action' strategy. In this context, the strategy aims at empowering target companies, by helping them:

- in acquiring a concrete grasp on the identification of the barriers, which hinder the implementation of ESM;
- in leveraging knowledge, know-how and tools to develop skills aiming at overcoming and at managing the barriers-related risks;
- in increasing the ESM ranking in the investment priorities of the decision makers.

In this regard, the strategy provides a structured capacity building program that will enable companies and their associations to develop an energy management culture and gradually adopt behavioural and organizational changes needed to promote energy saving and energy efficiency.

Given the previously mentioned motivational elements, the 'Audit2Action' strategy is structured into four steps combining a series of theoretical and practical tools:

- In the first step, the state of art of energy efficiency implementations in companies and related policies on national level will be framed, through both desk research and a feedback questionnaire from the involved stakeholders. The rationale of this very first task is to extrapolate an analysis of the role of energy audits and the penetration level of ESM within industrial sectors. In order to complete the picture, the barriers faced by firms in adopting ESM will be further examined. Finally, the internal dynamics of companies and their approach to energy efficiency will be further explored by the examination of the decision-making process in industry for ESM implementation. Finally, to complete the picture, the dominant support schemes for the ESM implementation process adopted by European companies will be analysed, to bridge the information gap between audit results and implementation of recommended/identified ESM.
- In the second step, a benchmarking system for the assessment of ESM, based on a series of Key Performance Indicators (KPIs), including non-energy and of non-financial benefits, will be developed. To this latter extent, an extended database of ESM will be built, in which each ESM will be classified according to the KPIs previously defined. Additionally, based on the inputs coming from the first level, a Maturity Management Model will be developed in order to investigate and assess the mindset of decision markers in companies towards energy efficiency issues and Energy Management systems as established in ISO 50001 (in particular its standard-based energy management maturity model). All the carried-out activities belonging in this level are preliminary for the capacity building programme which will take place in the next level (which constitutes the project core).
- In the third step, a capacity building program, built on two pillars, for involved stakeholders will be launched. In detail, the first pillar includes three different types of activities, addressing the interests of different target groups:
    - Laboratories of ideas with company managers and other decision makers, aimed at gaining commitment of high-level management.
    - Training courses and workshops for operational staff (e.g., intermediate and low-level managers, energy auditors, energy experts and energy managers), as the closest professionals directly involved in the uptake of the ESMs resulting from the energy audits.
    - Training workshops with industrial associations involving energy related experts, staff of industry associations, consultants, economists, business/commercial experts and other professionals, aimed at extending the capacity building program to professionals and associations external to companies but who operate in satellite contexts, in order to increase the outreach of the project results.

  The above-mentioned activities will lay the foundation for the second pillar, which includes the in-field activities in which the partners will provide practical support to a group of engaged companies and related stakeholders for ESMs implementation;
- In the fourth step, a knowledge exchange space (KES) including the main project outputs in a user-friendly structure with both an internal part for A2M consortium partners and a public part with the relevant information resulting from the project. A specific business model will be developed to assure that the activities will last after the project will be over, to enable the stakeholders to fully exploit the project-deriving knowledge. This latter stage will guarantee the sustainability, replicability and long-term exploitation of project results.

Finally, throughout the project, the 'Audit2Action' strategy will be continuously monitored by partners, in close cooperation with relevant stakeholders, through the critical evaluation and validation of its performance, of its results, as well as of its achievements, in particular the lessons learnt emerging from the in-field activities with the engaged companies. This constantly revision-based process will lead to the production of guidelines for companies and energy auditors, together with recommendations for policy makers.

4 THE 'AUDIT2ACTION' STRATEGY: PRELIMINARY RESULTS OF THE FIRST STEP

This section will present the preliminary results of the first step of the 'Audit2Action' strategy, which has allowed project partners to have a comprehensive overview and comparison of national audit systems and the related legislative framework of the six countries involved in the A2M project: the Czech Republic, Greece, Germany, Italy, the Netherlands and Spain. This was possible thanks to desk research and input evaluations from A2M partners.

The comparative analysis has identified key differences among the involved countries in the implementation of the Article 8 of European EED, in terms of ambitions, requirements, guidelines and verification measures. They are listed below:

- Audit obligations according to EED Article 8: all surveyed countries have implemented the audit obligation in their policy frameworks in accordance with the EED. However, the target groups vary significantly among surveyed countries. Although EED currently targets large enterprises, most countries have progressively introduced energy-intensiveness thresholds for the application of the audit obligation. These criteria vary significantly among countries, sometimes including SMEs with high energy consumptions as well. In all countries, ISO certified EMS are exempt from audit obligation. Germany is the only remaining country where EMAS certification is also exempt from the audit obligation. Each country appointed a ministry or a national agency to oversee the audit systems and apply financial penalties in case of non-compliance. However, enforcement is lagging as verification is only carried out through sampling in most countries. Only the Netherlands currently have the capacity to control all audits carried out annually.
- ESM implementation obligations: half of the countries surveyed (Germany, Italy and the Netherlands) have set ESM implementation obligations in addition to audit obligations for energy-intensive enterprises. Germany and the Netherlands have set economic viability criteria for the mandatory energy saving measures, while Italy only requires the implementation of one measure. Monitoring and enforcement of this obligation is limited as, apart from self-regulation, national institutions lack the capacity to verify implementation and apply adequate sanctions.
- Audit process and reporting methodologies do not vary significantly among surveyed countries, as they mostly rely on the guidelines of EN 16247. Most countries provide additional guidance documents and templates for reporting and data submission to the relevant entities, except in Spain where regional governments are in charge of providing guidance to enterprises. Most countries, namely Greece, Germany, Italy and the Netherlands, have provisions that allow clustering and sampling approaches to assess the energy performance of large groups or multi-site enterprises. However, the parameters for defining the clusters and determining the representativeness and proportionality of the samples vary between the countries surveyed.

- Requirements for ESM recommendations: national requirements and guidelines for the assessment and prioritisation of ESM vary significantly among surveyed countries. In most countries, the assessment mainly relies on economic viability criteria, although the Czech Republic, Germany, the Netherlands and Spain also expect greenhouse gas emissions accounting as part of ESM assessments. In Czech Republic, notably, recommended ESM must minimally achieve 10% of savings either in terms of energy consumption or CO_2 emissions. In the Netherlands, return on investment calculations must factor in the national carbon tax rates.
- National audit system evaluations: the European EED sets reporting requirements for Member States on the implementation of their national energy efficiency and climate targets. To date however, only Germany and Italy have carried out national evaluations. Italy carries out a statistic evaluation every year, while the only comprehensive evaluation in Germany dates back to 2017. Spain is currently carrying it out its first national evaluation.

5 CONCLUSIONS AND NEXT STEPS

This paper has described the 'Audit2Action' strategy and presented the preliminary results of the first step of such a strategy, which have allowed A2M project partners to have a comprehensive overview and comparison of national audit systems, policies and guidelines of the six countries involved in the project. The comparison of the national audit system is particularly relevant in the light of the European Commission's proposal for a recast of the energy efficiency directive that is currently being negotiated among European institutions and the recent update of the European energy audit norm EN 16247-1. National policies appear to precede certain updates proposed by the Commission such as the introduction of energy-intensiveness thresholds for the application of the audit obligation; while some national initiatives such as the introduction of ESM obligations will likely not be included in the EED recast. The new chapter on clustering and sampling of the EN 16247-1:2022 will help harmonise multi-site audit methodologies among Member States once translated into national standards.

National evaluations and publicly available data on the impact of the audit policies are largely missing, are carried irregularly or differ too much in their scope to enable a meaningful comparative analysis among the surveyed countries. Especially sector-specific data on recommended and implemented ESM is lacking. Comprehensive data on compliance to the obligation and prevalence of energy audits by sectors is not uniformly available in surveyed countries. A cross-country assessment of the enterprises' readiness and the identification of implementation gaps in the manufacturing industries is currently not possible with secondary research.

In the next stages of the first step of the 'Audit2Action' strategy, reports will follow aiming to complement the analysis shown in this paper by providing further insight into the actual implementation of audits and ESM in the selected industries across five countries. The analysis will be based on information gathered from questionnaires filled in by enterprise decision makers, management, operational staff and auditors. The reports will analyse enterprise strategies and top management decision-making processes as well as the informational, behavioural, organizational and economic barriers affecting the uptake of energy saving measures in the manufacturing industry.

These activities will lay down the foundation for the actual stakeholder engagement in companies which will occur in the following steps of the 'Audit2Action' strategy.

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REFERENCES

[1] ISO 50001:2018(en) Energy management systems: Requirements with guidance for use. https://www.iso.org/obp/ui/#iso:std:iso:50001:ed-2:v1:en. Accessed on: 4 May 2023.
[2] Deloitte, Energy efficiency in Europe: The levers to deliver the potential, 2016. https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Energy-and-Resources/energy-efficiency-in-europe.pdf. Accessed on: 6 Jun. 2023.
[3] Thollander, P. & Palm, J., *Improving Energy Efficiency in Industrial Systems*, Springer-Verlag: London, 2013.
[4] Cagno, E., Worrel, E., Trianni, A. & Pugliese, G., A novel approach for barriers to industrial energy efficiency. *Renewable and Sustainable Energy Reviews*, **19**, pp. 290–308, 2013.