

IMPLEMENTATION OF THE ENERGY MANAGEMENT SYSTEM ISO 50 001 IN BOSNIA AND HERZEGOVINA

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ABSTRACT

In the modern world, energy management is becoming an increasingly important topic for both industry and other sectors due to rising energy costs, price fluctuations, and increased sensitivity to environmental impacts. Recognizing the importance of energy for the long-term sustainability of business, organizations can use the ISO 50 001 standard to practically manage and control their energy consumption and costs. This paper will focus on the implementation of an energy management system based on the ISO 50 001 standard in Bosnia and Herzegovina. The goal of this paper is to analyze the current state of energy management in Bosnia and Herzegovina, identify barriers to implementing energy management systems, and provide guidance for the successful implementation of energy management systems for organizations in accordance with the ISO 50 001 standard. The paper also covers the theoretical basis of energy management system, as well as example of organization that has successfully implemented this standard.

Keywords: ISO 50 001, energy management system, implementation

1. INTRODUCTION

Energy efficiency refers to the optimal use of energy with the aim of reducing consumption, while energy management refers to an organized approach to planning, implementation, monitoring, and improving the energy performance of organizations. Accordingly, an increasing number of organizations worldwide, including Bosnia and Herzegovina (B&H), recognize the importance of implementing an energy management system according to the ISO 50001 standard. There is evidence that much greater energy savings can be achieved through effective "energy management" rather than the implementation of expensive technical and technological solutions. This is precisely the hypothesis on which the ISO 50001 standard is based [1]. ISO 50001 is an international standard that defines the requirements for energy management in organizations, with the goal of improving energy efficiency, reducing greenhouse gas emissions, and optimizing energy consumption. Implementing an energy management system (EnMS) according to ISO 50001 provides organizations with a structured approach to achieving energy objectives, reducing energy consumption, identifying and managing energy risks, and improving their competitive position in the market [2]. In B&H,

as a country with diverse industrial sectors and energy resources, the implementation of an energy management system according to ISO 50001 can be of great significance in achieving sustainable development, reducing energy consumption, optimizing processes, and improving the competitive position of organizations in the market, since the most industrial plants, production is based on several decades old technologies [3]. However, despite its potential, the implementation of energy management systems in B&H is still in its early stages and faces numerous challenges and obstacles.

2. FUNDAMENTAL CHARACTERISTICS OF ISO 50 001 STANDARD

The history of the ISO 50 001 system dates back to the 2008, when the need for more efficient energy management became increasingly pronounced. Initially, ISO 50 001 was developed based on the European standard EN 16 001, which was published in 2009. However, as interest in this standard rapidly grew worldwide, it was decided to develop an international standard, which resulted in the publication of the ISO 50 001 standard. ISO 50 001 was created in response to the need for organizations to systematically manage energy, identify energy losses, optimize energy consumption, and reduce greenhouse gas emissions [4]. Recognizing the significance of energy efficiency for sustainability, competitiveness, and environmental protection, the International Organization for Standardization (ISO) developed the ISO 50 001 standard, which was published in June 2011. This standard is based on the Plan-Do-Check-Act (PDCA) cycle and is aligned with other ISO standards, such as ISO 9001 for quality management and ISO 14 001 for environmental management. The PDCA cycle continuously rotates and repeats to achieve continuous improvement in the performance of processes or systems, as can be seen in the Figure 1 [6]. ISO 50 001 has gained significant support from organizations around the world, resulting in its widespread acceptance and implementation in various sectors, including industry, services, transportation, public sector, and others. Its implementation enables organizations to reduce energy consumption, optimize their energy processes, improve their market competitiveness, and reduce negative impacts on the environment. Over the years, ISO 50001 has undergone revisions and updates to better adapt to changes in market requirements, technologies, and regulations. The latest revision of the standard was conducted in 2019, with the aim of enhancing its implementation and effectiveness in achieving organizations' energy goals.



Figure 1. Plan-Do-Check-Act Cycle of ISO 50 001 implementation [5]

3. GUIDELINES FOR IMPLEMENTING ISO 50 001 IN ORGANIZATIONS

Implementation of the ISO 50001 standard requires certain steps that should be carefully planned and executed. These are the basic steps that should be followed for implementing ISO 50001 in a company [7]:

1. Establishment of an energy team: for a successful implementation of ISO 50001, it is necessary to have an expert team that will be responsible for this process. The team should include representatives from all relevant departments and functions, as well as energy efficiency experts who will ensure that the EnMS is established, applied, maintained, and continuously improved in accordance with the standard.
2. Assessment of energy performance - energy profile: the first step in implementing the ISO 50001 standard is to assess the current energy performance of the company. This includes evaluating previous and existing energy consumption, as well as expected future energy consumption.
3. Defining energy objectives and policies: after assessing energy performance, the company needs to define its energy objectives and policies. Objectives and policies should be aligned with the company's business objectives and customer needs, as well as with legal regulations and other relevant standards.
4. Planning measures for improving energy efficiency: based on the assessment of energy performance, defined objectives and policies, the team should plan measures for improving energy efficiency that must be consistent with the energy policy. Measures can include the application of new technologies, process changes, optimization of facilities, etc.
5. Implementation of measures for improving energy efficiency: after planning measures, the team should implement measures for improving energy efficiency. Implementation should be carefully planned and executed, with progress monitoring and plan correction if necessary. The organization must ensure that any persons working for or on behalf of the organization are aware of the requirements for compliance with the energy policy, EnMS procedures, and requirements, and the benefits of improved energy performance.
6. Internal audit and certification: after implementing measures, the company should conduct an internal audit to verify that all implemented measures are being implemented in accordance with the plan and ISO 50001 standard. The organization must define and periodically verify its measurement needs and ensure that the equipment used for monitoring and measuring key elements provides accurate and repeatable data. After that, the company can seek certification from an independent certification body.
7. Continuous monitoring and improvement: finally, the implementation of the ISO 50001 standard is not a one-time process. The company should continuously monitor its energy performance and improve it through periodic planning of measures and audits, and establish a document management system to demonstrate compliance with EnMS requirements.

4. IMPLEMENTATION OF THE ENERGY MANAGEMENT SYSTEM ISO 50 001 IN BOSNIA AND HERZEGOVINA

According to statistical data from the International Organization for Standardization (ISO), the implementation of the ISO 50 001 standard in Europe has been steadily increasing year by year. As of the end of 2021, a total of 13118 organizations in Europe had successfully implemented the ISO 50 001 standard. These organizations were primarily from the

manufacturing sector, such as the automotive, metal, and chemical industries. However, the number of organizations implementing the ISO 50 001 standard in the service sector is also growing, as awareness of the importance of energy efficiency in this sector increases. The implementation of the ISO 50 001 standard in Europe has also become part of national sustainability and energy efficiency policies, further promoting its application. The European Union (EU) has its own program to support the implementation of ISO 50001, called the "European Energy Efficiency Directive." This program provides support to organizations that want to implement ISO 50001, including financial incentives and technical assistance. The implementation of the ISO 50001 standard in Bosnia and Herzegovina is increasing in last few years, as shown in Figure 2. According to ISO data in 2021, ISO 50001 has been implemented in 20 companies. The organizations that have implemented this standard are mostly from the industrial sector, such as food production, pharmaceuticals, textiles, and related industries. According to the same report, the service sector in Bosnia and Herzegovina still needs to be more engaged in implementing this standard. Although this number is currently relatively small, the implementation of the ISO 50001 standard in Bosnia and Herzegovina continues to expand as organizations increasingly recognize the benefits that this standard can provide [8].

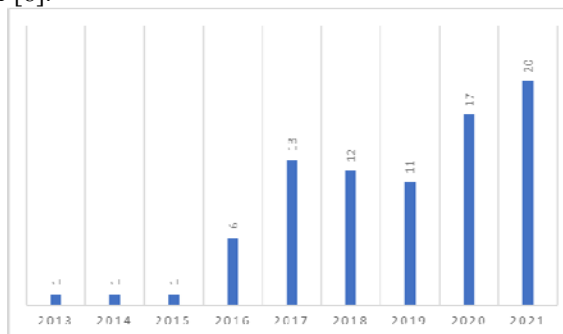


Figure 2. Number of certified companies in Bosnia and Herzegovina [8]

However, there are several barriers to the implementation of the ISO 50 001 standard in B&H, which are similar to those in other countries such as [9]:

- ... lack of awareness of EnMS benefits,
- ... financial costs such as training, certification and improving energy infrastructure,
- ... lack of experts trained in the implementation of the ISO 50 001 standard and energy efficiency management because very often one employee performs multiple functions, which results in superficial work to meet the form, without significant improvements,
- ... the representative of the quality and energy management team lacks sufficient support and real authorization from the management, as well as lack of motivational factors for employees who apply, maintain and improve the system.

5. IMPLEMENTATION OF ISO 50 001 IN COMPANY „ALFE-MI“ I.l.c. – CASE STUDY

The core business of ALFE-MI LLC is the production of metal structures, residential and sanitary containers. In addition to its core business, the company's activities include the production and installation of aluminum and PVC profile metalwork, the production of sheet metal products, industrial roller shutters of all types and dimensions, as well as other activities. Since 2012, the company has been certified according to the requirements of the BAS ISO 50001:2011 standard. The management of the company aimed to ensure continuous improvement and effectiveness of the quality and energy management system through

measures related to technology and the human factor by integrating QMS (ISO 9001) and EnMS (ISO 50001) as can be seen in Figure 3. For example this is expected to increase competitiveness in accordance with market demands and ensure constant product quality while using all forms of energy rationally.

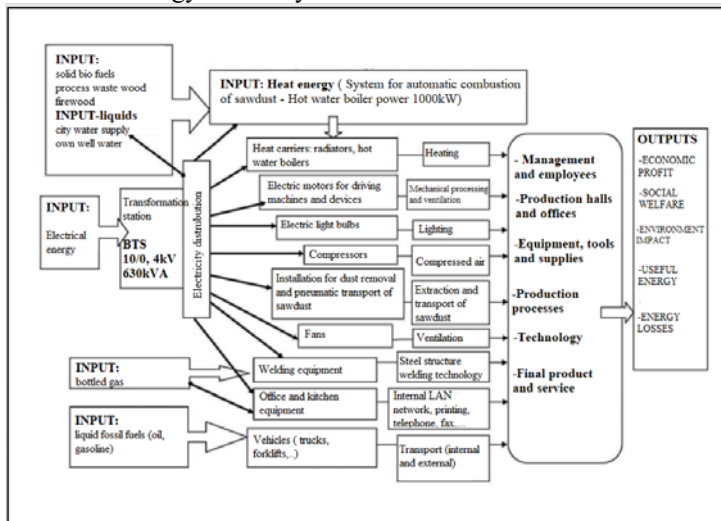


Figure 3. Scheme of energy flow and usage in ALFE-MI l.l.c. [10]

In order to develop an energy audit, the company analyzed the use and consumption of energy based on measurements and other data. Based on the analysis of energy use and consumption, areas of significant energy consumption were identified, namely plants, equipment, systems, processes, etc., which significantly affect energy use and consumption. Current energy performance of plants, equipment, systems, and processes related to identified significant energy uses and estimated energy consumption in the future period were determined. Priorities were identified and opportunities for improving energy performance were noted. Examples of measures for preventive action to reduce energy consumption within the implementation of the ISO 50 001 standard include [10]:

- ... measures to reduce energy consumption in equipment handling and maintenance (regularly maintaining all machines and equipment, turning off equipment and transportation vehicles when not needed, using equipment with optimal sizes and capacities)
- ... measures to reduce fuel consumption in shipping, distribution, and internal transport (planning services and regular preventive maintenance to ensure vehicle technical fitness, turning off the vehicle engine during loading, unloading, or waiting, paying attention to truck capacity and optimal speeds, etc.).

The management of ALFA-MI l.l.c. reviews the quality management system EnMS at least once a year to ensure their compliance, adequacy, and effectiveness. This review includes an assessment of the suitability for improvement and the need for changes to the quality and energy management system, including the quality and energy management policy and annual quality and energy objectives.

The application of ISO 50001 standard in ALFA-MI l.l.c. has many benefits, including [10]:

- ... Systematic monitoring and supervision of energy consumption,
- ... Energy costs are no longer viewed as fixed costs, as systematic action is taken to reduce costs and promote rational use and consumption of energy by changing

equipment and systems. For example, the replacement of light bulbs has resulted in improved lighting levels and as well reducing energy consumption leading to a decrease in greenhouse gas emissions, which has a positive impact on the environment. Additionally, reducing energy consumption results in lower operating costs.

- ... Awareness of the importance of energy has increased among employees through the identification and communication of all employees who can contribute to improving energy performance,
- ... The reputation of the company is enhanced, as the system leads to the systematic reduction of harmful gas emissions, environmental protection, and the use of renewable energy sources in compliance with applicable legal obligations.

6. CONCLUSION

The implementation of ISO 50 001 system in Bosnia and Herzegovina still faces challenges due to a lack of energy awareness in all sectors, financial constraints for certification and energy infrastructure improvements, shortage of skilled workforce, and insufficient motivation for employees to implement energy management systems. However, as of 2021, 20 companies have successfully implemented ISO 50 001 in Bosnia and Herzegovina. It is crucial to increase energy efficiency awareness and promote the use of renewable energy sources in the wider public and encourage the application of energy-efficient technologies in all sectors. The implementation of ISO 50001 in Bosnia and Herzegovina can bring significant economic and environmental benefits but requires coordinated efforts and a team process approach from all relevant stakeholders

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