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Application of the Energy Management System in Russia

Kristina Januario Shirrime and Pavel Alekseevich Trubaev
Belgorod State Technological University Named after V.G. Shukhov,
Kostyukova Street 46, 308012 Belgorod, Russia

Abstract: This study presents a methodology of application an energy management system in accordance with the ISO50001 (International Standard Organization) requirements in Russian Federation. The energy management system helps to increase energy efficiency, organize management structure and discipline to implement technical and management strategies that significantly reduce energy costs and green house gas emissions and also sustain those savings over time. But when it comes to applying this already widely applicable in Europe and USA approach in Russian budget institutions and organizations these international requirements have a lot of difficulties. That is why, it is necessary to adopt international experience but with the corrections that will simplify the process of the energy management system integration in Russia. These modifications are presented in this study.

Key words: Energy management, energy efficiency, energy savings, standardization, certification

INTRODUCTION

Today, an important task for any organization is saving energy resources and energy efficiency because a significant share of their costs is the payment for the Fuel and Energy Resources (FER). World practice shows that energy efficiency can be achieved not by the technical measures but also due to organizational changes in the management system of institutions and organizations. Energy management system allows controlling the use of energy resources, identifying the most effective ways to reduce their consumption, thus allowing reducing expenses on electric and energy and water resources.

Energy management according to the definition of GOST R 50001-2012 (Gost, 2012) is the complex of interrelated and interacting elements, aimed at formation of energy policy, objectives and measures development to achieve these goals. This standard is applicable for all types of organizations and implementation of the system is very effectivenot only in industry but also in budget organizations at the municipal and regional levels. The main goal of energy management from the point of view of the researchers is not the development of measures of energy efficiency improvement but the creation of a mechanism that gives reliable information about the current consumption, dynamics of its changes and a creation of a initiative system for energy efficiency at all levels that will generate incentives for all employees who participated in saving energy resources (Troitskiy, 2005).

MATERIALS AND METHODS

The presented methodology helps to apply internationally successful experience to the national budget organizations and institutions by its concentration not on the procedures for the final performers, regulating their main activities, from the point of view improving its energy efficiency but to documenting the process of obtaining analysis of energy consumption.

Basic part: Energy Management Systems (EnMS) allows controlling the use of energy resources, identifying the most effective ways to reduce their consumption, thus allowing to reduce the institutions and organizations costs for electric, thermal energy and water resources (Kurbatov *et al*., 2013).

After the introduction of EnMS at metallurgical plant combine Zapovednik-rostal (Ukraine) they have managed to reduce the consumption of natural gas by 3% in the first half of the year and about 5% for the 2nd year. Introduction of energy management system in budget organizations of the city Kamensk-Uralsky resulted to the 5% of energy savings per year. These results are not isolated and can be achieved in all enterprises and organizations.

Now a days it is >400 organizations in the world that have implemented energy management system and already certified under the international standard ISO 50001.

Corresponding Author: Kristina Januario Shirrime, Belgorod State Technological University Named after V.G. Shukhov, Kostyukova Street 46, 308012 Belgorod, Russia

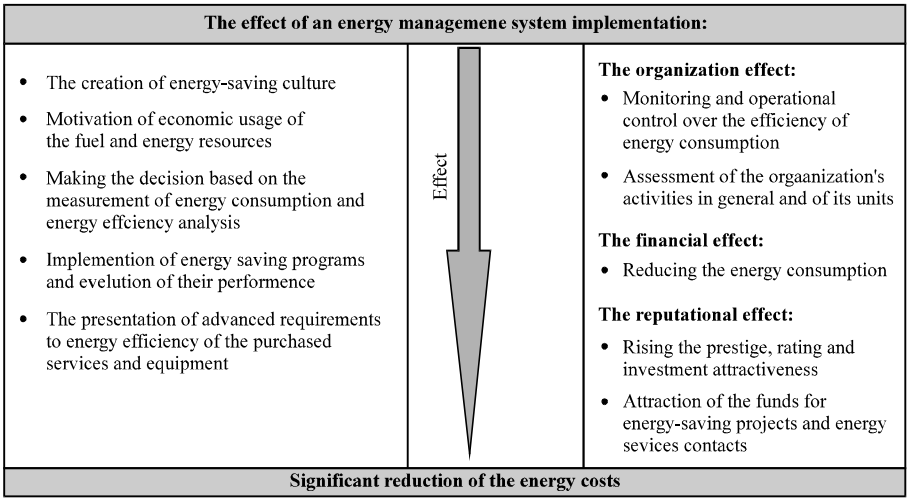

Fig. 1: Energy management system implementation effect

By itself, ISO 50001 means continuous improvement. Its cycle consists of the following phases:

- Planning
- Implementation
- Inspection
- Development

Due to this, the company will receive a structured guide of the energy consumption optimization and a management system of this process.

The process of energy management system implementation lastsat least 9 months in general (Shchelokov, 2011). At the expiration of this time, the analysis of energy management system functioning is carried out by the internal audit. And then if the company or organization wants to get the certificate the pre-certification and certification audits are being realized. After receiving the certificate, consulting audit for the following 3 years may be conducted and later the recertification audit in order to confirm the proper functioning of the system may be held.

It is important to note that the potential of the energy management system is very high and certification under the international standard allows having a successful partnership. Already at the initial phase with zero investment implementation of EnMS allows to achieve significant savings because of the energy consumption that takes on average about 25% of the total budget organizations.

The final task for EnMS is reducing the energy costs, means systematically minimization and optimization of the financial and resources costs and therefore the target is to accomplish the investments in the most efficient measures to achieve benefits and returning of invested funds, as much as it possible (Fig. 1).

ISO 50001:2011 does not contain pre-established indicators of energy efficiency and the energy management towards primarily to the significant energy consumers that is those that consume significant amounts of energy or have the possibility of increasing energy efficiency.

The stages of the system implementation: Implementation includes the following stages:

- The diagnostic audit which is related to the requirements of international standard ISO 50001. Auditing consists of the documents analysis, verification of its compliance with the necessary requirements and practical procedures standard rather than just a technical surveys of equipment and facilities
- Training of the institutions employees
- Development and implementation of individual energy management system
- Confirmation of tasks execution by internal and pre-certification audit
- The certification audit by international certification company

The issued certificate is valid for 3 years. For its confirmation, it is necessary to precede the supervisory audit after 11 and 24 months. At the end of the certificate (Fig. 2) validity period it can be prolonged after a recertification audit.


CERTIFICATE

certife that Energy Management System Inmplemented

Name of the organzation

Fig. 2: Certificate of the ISO 50001:2011 implementation

RESULTS AND DISCUSSION

Comparison of Russian and International standards for implementation of energy management systems: Energy management systemis based on the national and international standards. The development of international standards as a rule based on the national projects that already managed to prove its effectiveness in the issue of energy saving. Predecessors of ISO 50001:2011. Energy management systems. Requirements with guidance for use had become standards of the several countries: The USA (ANSI/MSE 2000:2008), South Korea (KSA 4000:2007), China (GB/T 23331:2009) and the pan-European energy management standard EN 16001:2009. Implementation of energy management system based on requirements of ISO 50001 had already obtained the national status in sixteen European countries.

Russia applies the domestic standardization system, so it was decided to create a technical committee that will develop a national standard to adopt internationally well-known approach. Representatives of the country were not involved in the international organization standardization during the discussion process of ISO 50001, therefore, the situation with creating a national approach became significantly complicated from the position of borrowing and developing the best suitable practices for national organizations and institutions.

Further there are considered the peculiarities of the national standard GOST R ISO 50001:2012 that are causing difficulties during application the methodology in the field of energy management system which proposed by the international organization, in accordance with normative statements of the Federal legislation.

In fact GOST R 50001 is a translation of the main theses of ISO 50001; the problem is the correct translation of someterms into Russian language and disagreements with applicable laws and regulations. According to GOST R 53905-2010 Energy savings. Terms and definitions where are fixed and determined 108 of terms, some of the definitions are beingdifferentiated from those that indicated in GOST R 50001.

Further there are examples of discrepancy the translated terminology from international energy management system standard and definitions from normative documents of the Russian Federation.

Differences in the definition of energy management system: The term GOST R 50001-2012: energy management system is a set of interconnected with each other and interacting elements, based on the energy policy, goals, processes and procedures which allows achieving these goals.

The term GOST R53905-2010: Energy management system is a complex of measures aimed at the automation of energy accounting, identification and elimination of irrational consumption of energy resources and to maintain energy technologically reasonable level.

The definition in GOST R 50001-2012 is not specified, focusing only on targeted of the energy saving measures, thus forming a simplified view on the essence and character of EnMS and its constituent elements.

The definition of the energy efficiency:

- The term ISO 50001:2011: energy performance
- The term GOST R 50001-2012: energy efficiency

As the translation of the word performance it is impossible to use the word effectiveness because English-Russian dictionaries do not provide such option but the literal translation of this term is efficiency or productivity. The Federal law No. 261-FL and GOST R 54195-2010, GOST R 54196-2010, GOST R 54197-2010 uses a standardized term level of energy efficiency. The application of the proposed above translated phrase energy efficiency allows completely harmonize the GOST R 50001-2012 approach with the Russian standards.

Table 1: Comparison of ISO 50001 provisions with the Federal law No. 261 provisions in the area of energy management

The energy analysis and energy survey goals	
The provisions of ISO 50001:2011	**The provisions of the Federal law No. 261**
For the development of the energy review, the organization should: analyze the use and energy consumption, based on the measurements data, i.e., to identify available sources of energy; conduct an assessment of the use and consumption energy in the present moment and for past periods time; based on an analysis of the use and energy consumption to identify areas of significant energy use, i.e., to identify other variables that affect a significant energy use; to determine the current energy performance of buildings, equipment, systems and processes related to the significant energy use; to assess the future use and energy consumption; to identify, prioritize and register opportunities to improve energy outputs	The main objectives of energy audits are: obtaining objective data on the amount of used energy resources and other determination of energy efficiency; determination of the potential for energy saving and energy efficiency; development of the measurementset of on energy saving and increasing energy efficiency and the estimation of their cost (The Law of Russian Federation of 2009)
Periodicity	
Through the planned intervals, the organization shall evaluate compliance of its activity with legal and other requirements; it has committed to do that are related to the use and energy consumption	The obligatory power inspection is conducted not less than once every 5 years; the frequency at voluntary screening is not set

The differences in the terminology of the standard and law: The definition of GOST R 50001:2012: energy efficiency: ratio or other quantitative relationship between the efforts, services and produced goods or energy and consumed energy that were input.

Definition according to 261 FL: Energy efficiency is a description reflecting the ratio of the useful effect from the use of energy resources to the cost of energy resources produced in order to obtain this effect, applied to products, technological process, legal entity, individual entrepreneur.

The definition by the Federal law is more accurate and can refer both to the process or product and type of activity.

Getting information about the current state of energy consumption in ISO is carried out using energy analysis and in Russian regulatory documents using energy survey.

The definition of GOST R 50001:2012 (energy analysis): A determination of the energy performance of the organization that is based on data and other information which allows identifying opportunities for improvement activities.

The definition in 261-FL (energy survey): The collection and processing of information about the use of energy resources in order to obtain reliable information about the amount of used energy resources, energy efficiency, identify opportunities for energy saving and energy efficiency with the reflection of the received results in the energy passport.

In the Federal law No. 261-FL in comparison with GOST 50001:2011 requirements for the survey are described more precisely and detail. Table 1 shows the provisions examples comparison of ISO 50001:2011 with the provisions of Federal law No. 261-FL. Note that the energy management system works continuously and energy audit is carried out every 5 years.

The comparison of the quality management system and energy management systems: The Quality Management System (QMS) is a management approach that relies on the participation of all employees (staff in all divisions and at all levels of the organizational structure).

The standard GOST R ISO 50001:2012 sets out the requirements applicable to the use and consumption of energy, including measurement, documentation and reporting, planning and practices relating to the organization with the necessary equipment, systems, processes and personnel in the field of energy. Therefore, the approach of developing EnMS should be different than for the QMS. In EnMS the main thing is not a regulation of technological and business processes but monitoring and analysis of energy consumption.

CONCLUSION

We should say that this scientific work describes a method of application an energy management system with the accordance ISO 50001 to the national facilities, organizations and budget institutions. It contains a number of differentiations between the existed international worldwide approach and the Russian one.

As we can see in the adopted Russian standard GOST R 50001:2011 there are a number of differences in terms and definitions in comparison with other Russian laws and regulations. This complicates the implementation of the energy management system at Russian enterprises and organizations. Therefore, during the certification process it should be considered all the above-listed discrepancies and coordinated with the national legal system, also it should be proper understanding of all

provisions and requirements meaning that ware usedall that will significantly simplify the process of implementing GOST R 50001:2011.

IMPLEMENTAIONS

The study presents the energy management technique within the Russian management system and gradual way of introduction of energy management system in accordance with ISO 50001 for Russian organizations. Its distinctive features are:

- Implementation of the system is carried out not on the basis of the new division and responsibilities are distributed among the existing personnel
- The terminology that is being adopted in developed countries should be replaced with the terms and definitions that are common for the country
- In the proposed system the main attention is focused not on the procedures for the final performers, regulating their main activities, from the point of view of improving its energy efficiency but to documenting of the energy consumption obtaining analysis process
- Defined the structure of the duties for the responsible persons for each site that gives a more streamlined and structured process of obtaining information specifically for each sector and thus allows to make more clear, well organized, effective and targeted methods of regulation.

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