STANDARD ISO 50001:2011 - BENEFITS FOR LEADERS IN THE FIELD OF ENERGY EFFICIENCY

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SUMMARY

Common social awareness campaigns, in the field of ecology, typically run those individuals and sections of society who already feel importance of environment, but without the power to do something significant. On the other hand, there is a kind of new experience of managers who appear as the bearers of uncontrolled own development. They think that development can be faster and more profitable if the ecology is not taken into account. In the regulation of these opposites is the irreplaceable role of the state as a regulator of development and protection of current and prospective interests of society, that the state realized through the implementation of stimulus measures and restrictive legislation. The quality and effectiveness of these measures can be best evaluated if they have cleverly integrated features and economic incentives. Most managers speak the universal "language of money". Managers and owners are interested in cost savings and increased profits. One of the good examples of merger savings and environmental effects is the international standard ISO 50001:2011, which will be discussed in this paper. This paper will also show the similarities, differences and recommendations for the joint implementation of standards ISO 50001:2011 and the Law on the rational use of energy (draft).

KEYWORDS: *energy efficiency, ISO standard 50001:2011, Law on the rational use of energy*

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1. INTRODUCTION

With increasing and constant environmental pollution, people awareness that something must be done to reduce the pollution of the Earth grows, unfortunately often only in face with consequences. With eco-unfriendly behavior of population and with work of a large manufacturing plants, the planet is polluted and destroyed. One of the factors that significantly affect the parameters of the environment is energy, its use, consumption and conservation.

It is well known that the only environmental awareness campaign and encourage people are not enough to achieve the effect of those actions that will reduce environmental pollution. However, there is a "universal driver" on the implementation of proper measures and proper treatment of energy and environment in general, and that is money. Most managers speak the "language of money". From the management in organization and their commitment to improvements in energy efficiency, success of any project in energy efficiency the most depends. Managers and owners are interested in cost savings and increased profits. If the "language of money" is used in

environmental campaigns, there may be significant developments in this area. One of the good examples of merger savings and environmental effects is the international standard ISO 50001:2011, which will be discussed in this paper.

Previous standard SRPS EN 16001: 2010[1] which was equal with EN 16001:2009[2], is the European forerunner of ISO 50001:2011, which will come out as the Serbian version by the end of 2012. The international standard ISO 50001:2011, compared to the European standard, is a broader approach that also specifically address the issue of implementation.

In the Republic of Serbia is expected publishing of the Law on the rational use of energy, which is currently in draft form. This, as other laws, give the minimum requirements that a business entity must meet to avoid coming to the violation of the provisions of Law and paying the high fines. Law on the rational use of energy is primarily intended to apply to large consumers and producers of energy. They are the target group and they have a legal obligation to maintain an energy management system.

The Law is an obligation for target groups, but standard has a voluntary implementation. Standard is upgrade of the basic global settings prescribed by Law. Standard allows companies to apply it in order to achieve leadership in the field of energy efficiency. In other words, the Law establishes a framework for the implementation of an energy management system at the global level - at the level of the state. Standard helps in implementation of an energy management system at the micro level - at the level of the enterprise. Because of the growing importance of energy efficiency and popularizing it, will not take much time before the standard ISO 50001:2011 becomes the indispensable requirements in tenders, as they are now the standards ISO 9001[3], ISO 14001[4] and OHSAS 18001[5].

An energy management system, that requires Law, mainly applies to regular monitoring and reporting of energy performance. The goal of the monitoring of energy performance in the Republic of Serbia, in order to fulfill the strategy that is set at the state level, is related to certain environmental parameters, including the energy efficiency. The Law establishes the legal framework and details the roles and responsibilities of the energy management system, but guidelines for practical application are omitted. The Law does not elaborate what organizational measures have to be done to ensure adequate and timely reporting about energy performance. With increased energy performance, energy efficiency brings saves the owner, and consequently potentially increase profits.

Report on energy performance should be just a result of the overall organization and savings measures implemented in the organization. There is evidence that the much larger energy savings can be achieved with good management of energy, rather than using expensive technical and technological solutions. This is just a hypothesis on which the whole standard ISO 50001:2011 is structured. Standard ISO 50001:2011 provides guidance on the procedures which need to be met

[1] SRPS EN 16001:2010 Sistemi menadžmenta energijom - Zahtevi sa uputstvom za upotrebu (Energy management systems - Requirements with guidance for use)

[2] EN 16001:2009 Energy management systems - Requirements with guidance for use

[3] SRPS ISO 9001:2008 Sistemi menadžmenta kvalitetom – Zahtevi (Quality management systems - Requirements)

[4] SRPS ISO 14001:2005 Sistemi upravljanja zaštitom životne sredine - Zahtevi sa uputstvom za primenu (Environmental management systems - Requirements with guidance for use)

[5] SRPS OHSAS 18001:2008 Sistem upravljanja zaštitom zdravlja i bezbednošću na radu – Zahtevi (Occupational health and safety management system - Requirements)

in organization. In case of implementation of mentioned procedures, energy efficiency would not be the only phrase and would not be implemented the only for compliance with the Law. Energy efficiency becomes a motive for the reorganization of the company, the means to achieve cost savings and a system that allows involvement of all employees in energy efficiency measures, on relatively reasonable and understandable way.

The method applied in the paper is analysis, both individually and comparative, of ISO 50001:2011 and domestic Law on the rational use of energy (draft). Tables show together requirements of these two documents and points out the differences in the requirements of these documents. In addition to tabular display, graphical displays of the results obtained by the analysis were used.

2. BASIC FEATURES OF STANDARD ISO 50001:2011

Standard ISO 50001:2011 specifies requirements for an energy management system (EnMS[6]), through which the organization shall establish energy policy and energy objectives, targets and action plans for its implementation. Standard takes into account legal requirements and other requirements (recommendations, national strategies) concerning energy consumption and energy efficiency. The main objectives to be achieved by this standard are reducing greenhouse gas emissions and reducing energy costs. The ultimate goal should be achieved is to improve energy performance. The purpose of the standard is to enable organizations to establish systems and processes to improve energy performance (energy efficiency, energy consumption and use of energy).

Standard ISO 50001:2011 can be implemented independently or integrated with some of the management system, such as the quality management system (ISO 9001), environmental management system (ISO 14001), occupational health and safety management system (OHSAS 18001) and many others. Standard is widely applicable, in production, in the commercial, institutional, or services sector. Standard is applicable to organizations of all types and sizes, regardless of geographic, cultural and social conditions.

Standard ISO 50001:2011 enables organizations to expand environmental responsibility in the management of energy resources and management of energy consumption. As such, it represents a major component of organizational accountability, providing an internationally recognized position for both technical and strategic aspects of energy management and consumption, which respects all the legislation in this area. In addition, costs for energy are reduced and organization is focused on reducing CO_2 emissions.

ISO 50001:2011 standard provides organizations and companies with technical and management strategies to increase energy efficiency, reduce costs and minimize negative environmental impact. Based on the wide applicability in most economic sectors, it is expected that this standard will affect more than 60% of energy demand worldwide[7]. Although primarily intended for the industry, the standard is applicable to any type of organization that wants to effectively manage its energy use and efficiency.

Standard provides a framework for organizations to integrate energy management into their management practices.

[6] EnMS - energy management system

[7] http://www.kvalitet.org.rs, Quality portal

Companies that have established, implemented and maintained an energy management system, thus achieving these effects:

- Make a basis for comparison of energy use within certain time periods, between sectors, but also within the industry and competing organizations (*benchmarking*).
- Actively manage the energy use, rationalization and cost savings, generated by recording, as a result of improvements in energy management.
- Reduce emissions into the environment by reducing the use or application of renewable energy sources, with no negative effect on the performance and activities of the organization.
- Continuously improve the relationship between energy consumption parameters and achieved results of work activities.
- Record and document savings that can later be used for internal use (for example, comparison of energy consumption in different departments), and for external use (for example, comparison between organizations or marketing effects).

Standard ISO 50001:2011 is not published to be similar with standards in series ISO 14000 environmental management systems, but as a useful and practical guidelines in the one field of environment - energy management. As a result, organizations that have already implemented (and certified) system in accordance ISO 14001 can easily integrate ISO 50001:2011 in the existing management structure. As with ISO 9001 and ISO 14001, there is a certification process for ISO 50001:2011 standard.

ISO 50001:2011 standard is a useful tool in the integration of performance measurement and data with framework of management system. Implementation of this stanadard does not only lead to an effective management process, it also increases energy efficiency and contribute to the wise use of energy. Implementation of standard ISO 50001:2011 ensures that the organization has an effective management process in order to achieve its energy objectives and targets.

Standard ISO 50001:2011 provides a systematic setting of targets related to energy and provides assistance in achieving them, which can result in significant energy savings. This is the reason that many states offer a variety of stimulants and tax incentives for organizations that have implemented the energy management system, which is internationally accepted.

ISO 50001:2011 standard is intended for certification. Standard is based on the concept of Deming PDCA cycle, like other standards for management systems, and hence the compatibility between the standards. An illustration of the PDCA cycle in ISO 50001:2011 is shown below (Fig. 1).

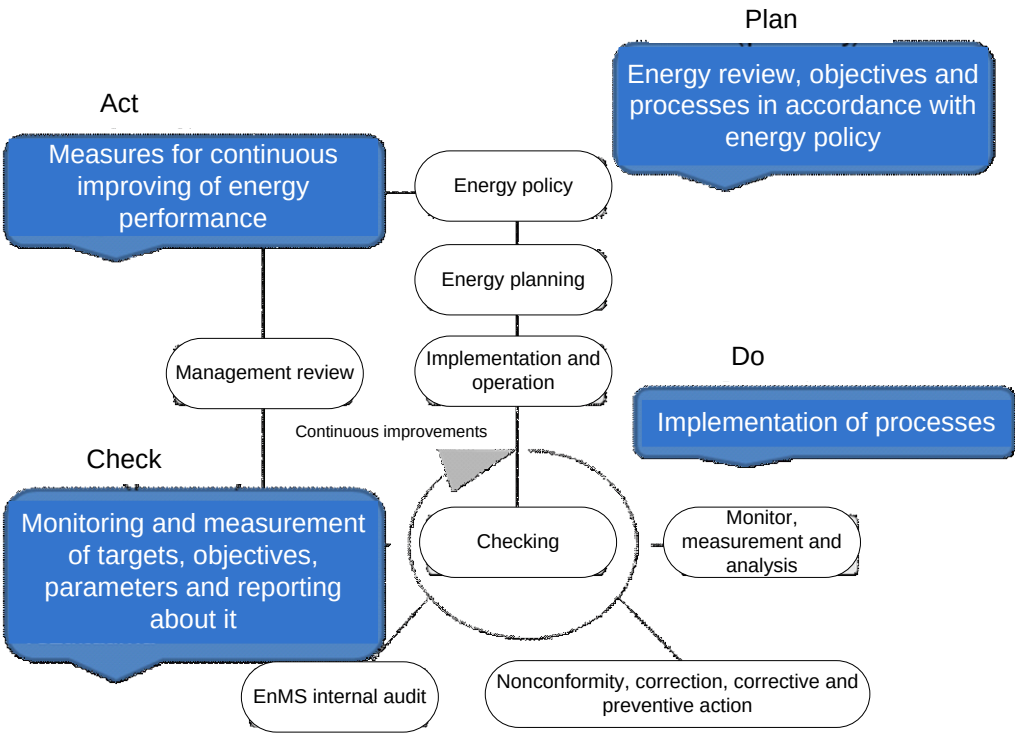

Figure 1. PDCA cycle in standard ISO 50001:2011

Some of benefits of developement and implementation of energy management system in accordance ISO 50001:2011 standard are:

- Reduced use of energy,
- Controling and reducing costs of energy,
- Reducing the negative environmental impact,
- Preparation for the monitoring and reporting of greenhouse gas emissions,
- Credibility about energy awareness in public[8].

3. IMPLEMENTATION FLOW OF STANDARD ISO 50001:2011

Some of the major obstacles encountered in the implementation of energy management systems are not, as most expect, inaccessible or expensive technology. Practice shows that organizations have enough technology, even some of the organizations very high sums of money invested in the purchase of technology and modern machines, however, machines are not used in the right way, in terms of energy efficiency and the environment.

Generally, a large number of organizations where the authors worked as consultants for implementation of different management systems, the biggest problem were the people, their habits, and existing inadequate organization. Employees often lack technical knowledge, no systematic approach to work and the breadth and completeness in problem solving. In addition, energy efficiency is often a low priority in relation to other activities that directly bring a profit to organization, and is often set aside. The biggest problems arise when you do not have the

[8] http://www.kvalitet.org.rs, Quality portal

support of top management, or when they do not want to get too involved, because they do not see a result of savings in the short term. Energy management system does not come easy to show cost savings and generated profits for organization.

The following illustration shows the flow of improvements that can be achieved by applying the standard for energy management systems.

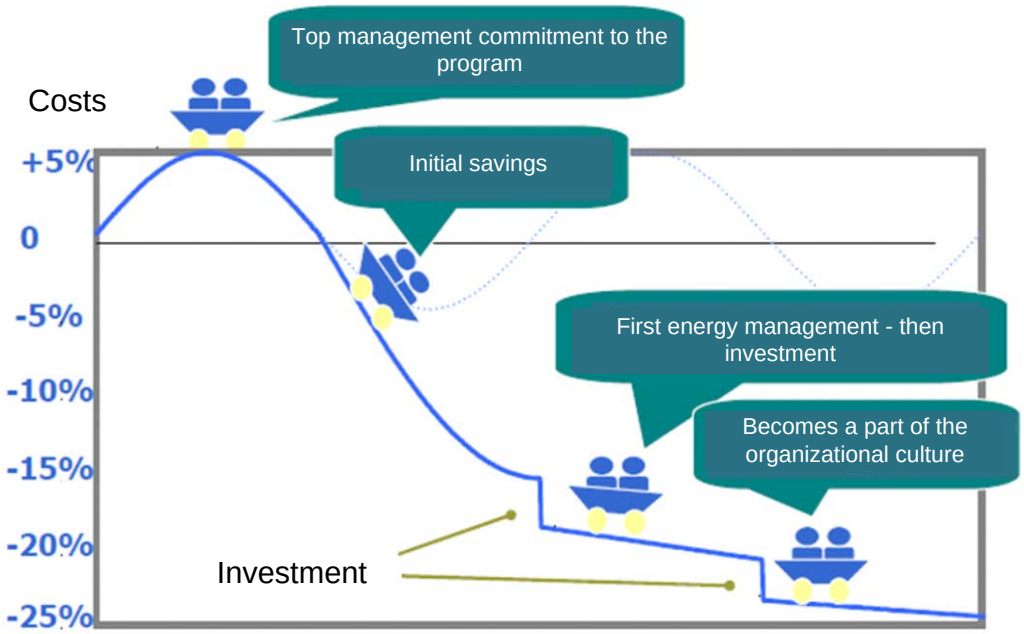

Figure 2. Flow of improvements in the implementation of an energy management system

4. MAIN FEATURES OF THE LAW ON RATIONAL USE OF ENERGY (DRAFT)

The European Union accepted the obligation to reduce emissions of greenhouse gases, including carbon dioxide, by 20% compared to 1990., to increase the share of renewable energy to 20% and to improve energy efficiency and achieve savings of 20% to 2020.

Ratification of the Contract of establishment of the Energy Community in 2006., Serbia has obligation for implementation of European energy directive to increase the share of renewable energy sources and energy efficiency.

The adoption of the Law on the rational use of energy was stopped by a negative opinion of the Ministry of Finance in conjunction with the introduction of Energy Efficiency Fund. Serbia has an obligation under the Energy Community of Southeast Europe and the EU to increase its energy efficiency by 9% from 2011. to 2020. Although consumption per capita is lower in Serbia than in some developed countries, per unit of product is consumed three to four times more energy than in Europe.

Law on the rational use of energy (draft) predicts the implementation of the energy management system for all big energy consumers and local governments. This include 120 companies that are large consumers of energy, 30 companies that have a large number of facilities and 100

municipalities with more than 20,000 inhabitants. They will report about spendings and plans how to save energy to the Ministry[9].

The adoption of the Law on rational use of energy, open access to European funds, which the EU has already set for assistance to Serbia in the energy and environmental protection. The Law, which is by the European Union rated as the most progressive, envisages a series of measures to increase control of energy use in Serbia. Their adoption and implementation is significant in order to save funds that would be used for new investments in the energy sector, economy, infrastructure and the implementation of measures to protect the environment.

Law on the rational use of energy (draft) regulates the area of rational and efficient use of energy. The Law provides establishment of the policy of rational use of energy, the establishment, implementation and monitoring of the operation of energy management systems, energy class product labeling and energy performance of buildings (specific administrative tools, such as: energy passports mandatory for new buildings on 30 September 2012., classes A-H, required class C, without passports can not be issued use permit nor can register an object), the requirements of energy efficiency in the energy delivery, financial incentives for efficient energy use and so on. The Law provides establishment of the Energy Efficiency Fund, whose role is in the financial and administrative assistance in the implementation of energy efficiency projects.

The main objectives are to increase the security of energy supply, efficient use of energy, the competitiveness of the economy, to reduce negative impact of the energy sector on the environment, to encourage responsible behavior towards energy and so on[10].

5. COMPARISON BETWEEN STANDARD ISO 50001:2011 AND THE LAW ON RATIONAL USE OF ENERGY (DRAFT) - SIMILARITIES, DIFFERENCES AND JOINT IMPLEMENTATION

The purpose of this paper is to analyze the similarities, differences, options and recommendations for the joint implementation of standard ISO 50001:2011 and regulations laid down by the Law on the rational use of energy (draft). The following table (Table 1.) gives a comparative view articles of standard ISO 50001:2011 and the articles of the Law on the rational use of energy (draft), which would come into force in the Republic of Serbia. Law will be applied to a large number of organizations, which simultaneous use of standard ISO 50001:2011 can provide valuable assistance in achieving compliance with the Law. Some of the articles in Law are very similar to the articles in standard. In Table 1. are given explanations, similarity and difference, especially for, at first glance, very similar provisions.

[9] http://www.euractiv.rs, Euractiv Serbia

[10] Law on the rational use of energy - Draft, Ministry of Infrastructure and Energy, Belgrade, September 2011

Standard ISO 50001:2011		Law on the rational use of energy - Draft	
MICRO LEVEL		MACRO LEVEL	
Article	Content of article	Article	Content of article
Article 1	Scope Standard scope includes the organization or some of its departments, plants or sectors.	Article 1, 2	Scope and objectives of the Law Goals are established by the state authorities and related to the global issues of energy efficiency and values of energy parameters that need to be achieved at the national level.
Article 2	Normative refrence Refers to the standards and other laws with which is related the mentioned standard.		On the last page of the Law draft are given lists of European directives on which it which is related to Law on the rational use of energy.
	The application of standard is voluntary. Responsibility for implementation exists only when the organization commits to the implementation , through certification of EnMS.	Article 3, 4	Responsibility for Law enforcement Responsibility for the implementation of the Law is on the state agencies. Implementation of the Law is mandatory for all target organizations, from the date of application.
	The standard does not explicitly define the target group, because the standard is applicable to all organizations, but puts great emphasis on large consumers and producers of energy.	Article 5	Target groups The target groups of the Law are organizations where the application of Law is mandatory.
Article 3	Terms and definitions	Article 6	Terms and definitions
Article 4.3	Energy policy Energy policy of organization is about implemented EnMS, explains how the organization intends to treat the energy.	Article 7, 8, 9, 10	Policyof rational and efficient use of energy Policy is adopted by state and includes strategies, policies and plans for achieving the policy.
Article 4, 4.1	The requirements for EnMS - general requirements Provides detailed information on the concept and structure of EnMS.	Article 11	Energy management system (EnMS) It does not explain how the system should look like, but it only gives the information that it needs to be, without details.
	Standard is voluntary. There is no obligation to implement EnMS.	Article 12, 16	Target groups Organization in which is the mandatory application of EnMS.
Article 4.2, 4.2.1, 4.2.2	Responsibility of top management The top management Management representative Responsibility for monitoring the operation of the system at the level of the organization is concentrated in the management of the organization. Supervision of the implementation is done by the certification body which certified EnMS.	Article 13, 14, 15	Jurisdiction of the Ministry, the Government and the Agency for the application of EnMS Responsibility for monitoring the operation of the system at the state level. A representative of management shall be energy manager, and his team need to be consist of energy associates.

Standard ISO 50001:2011		Law on the rational use of energy - Draft	
MICRO LEVEL		MACRO LEVEL	
Article	Content of article	Article	Content of article
Article 4.4, 4.4.1, 4.4.2, 4.4.4, 4.4.5, 4.4.6	Energy planning General requirements Legal and other requirements Energy baseline Energy performance indicators Energy planning at the level of the organization, an overview of the current situation in the energy and determination of future desired state and ways to achieve them.	Article 17, 18	Plan for the rational use of energy The Plan is adopted at the state level and includes the energy objectives which have to be met at the global level, where each organization participating eith achieved energy performance, which can be measured in the EnMS.
Article 4.5, 4.5.1, 4.5.3, 4.5.4, 4.5.5	Implementation and operations General requirements Communication Documentation - requirements and Document management Operations management Detailed view of the functioning of the EnMS.		The Law does not display the mode of operation of the system. Does not deal with methods of communication within the system (requiring only regular external reporting to government agencies), or the method of documenting EnMS.
Article 4.4.6	Energy targets, objectives and action plans (programs) The program set out to achieve energy performance at the organizational level.	Article 19	Annual program of rational use of energy The program is made at the state level.
Article 4.6, 4.6.1, 4.6.2, 4.6.3, 4.6.4, 4.6.5.	Checking Monitoring, measurement and analysis Compliance with legal and other requirements EnMS internal audits Nonconformities, corrective and preventive actions Records management Detailed procedures for monitoring, measuring, solving nonconformities and checking the energy performance parameters in the organization.		The Law does not have detailed instructions on techniques for monitoring, measuring and resolving energy nonconformities in organizations.
Article 4.7	Management review - general requirements, input and output elements		There are no provisions on the role of management of organization in the implementation of EnMS.
Article 4.5.2	Competence, training and awareness There are no explicit requirements for professional licensing exams to perform tasks related to the EnMS.	Article 20, 21, 22, 23, 29, 31, 32, 34, 35, 36, 37, 38	Energy manager Energy associate Certified energy advisors Licences and certificates
Article 4.4.3	Energy review There are no explicit requirements that must be implemented by a person with a license, but have to be realized.	Article 24, 25, 26, 27, 28, 30	Energy audit and energy audit reports Conducted with the license (certified energy advisors).

Standard ISO 50001:2011		Law on the rational use of energy - Draft	
MICRO LEVEL		MACRO LEVEL	
Article	Content of article	Article	Content of article
Article 4.5.6, 4.5.7.	Designing Procurement of energy services, products, equipment and energy Requires the consideration of energy performance in the design of products and the procurement of components and equipment.	Article 39, 40, 41, 42, 43, 44, 45	Energy products and energy efficiency labeling The product should be designed in accordance with the principles of energy efficiency. Energy efficiency class must be marked.
Article 4.4.3, 4.5.6, 4.5.7.	Energy review Designing Procurement of energy services, products, equipment and energy Requires the consideration of energy performance in the design of facilities and the procurement of components and energy.	Article 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58	Energy performance of buildings and certificates and reports on the energy performance of buildings
Article 4.5.6, 4.5.7.	Designing Procurement of energy services, products, equipment and energy Requires the consideration of energy performance in the design of power plants and the procurement of equipment and energy.	Article 59, 60, 61	Energy efficiency in the production, transmission and distribution of electricity and heat
Article 4.5.7	Procurement of energy services, products, equipment and energy Requires the consideration of the energy performance in energy supply.	Article 62, 63, 64, 65, 66, 67	Measurement and calculation of energy consumption
Article 4.5.7	Procurement of energy services, products, equipment and energy Requires the consideration of the energy performance in energy supply.	Article 68	Supply of natural gas
Article 4.4.3, 4.5.6.	Energy review Designing Requires the consideration of energy performance in the design of the heating system and the procurement of components and equipment.	Article 69	An energy review of the heating systems and boilers
Article 4.4.3, 4.5.6.	Energy review Designing Requires the consideration of energy performance in the design of air conditioning systems and the procurement of components, equipment, energy services and energy.	Article 70	Energy review of air conditioning systems

Standard ISO 50001:2011		Law on the rational use of energy - Draft	
MICRO LEVEL		MACRO LEVEL	
Article	Content of article	Article	Content of article
	There are not explicitly listed funds to assist in the implementation of standard, but the funds can be obtained indirectly through the SIEPA, CEDEF, and various European projects.	Article 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92	The Energy Efficiency Fund Incentives for energy efficiency
Article 4.5.7	Procurement of energy services, products, equipment and energy With the procurement, organization must consider the energy performance of suppliers.	Article 93, 94, 95	Duties of the public sector and public procurement Atthe state level, considering energy performance of suppliers in public procurements.
	There is no such provision.	Article 96	Tax, customs and other benefits
	Renewable energy sources are mentioned only as a way od increasing energy efficiency. There are no special requirements.	Article 97	Renewable energy sources
Article 4.5.7	Procurement of energy services, products, equipment and energy Requires the consideration of energy performance in the design and procurement of energy services	Article 98, 99	Energy services
Article 4.4.3, 4.5.6, 4.5.7.	Energy review Designing Procurement of energy services, products, equipment and energy Consideration of energy performance in transport activities.	Article 100, 101, 102, 103	Energy efficiency in transport
	Monitoring of the implementation and operation of EnMS conducts certification body that issued the certificate ISO 50001. Monitoring is done through certification, the first annual surveillance, second annual surveillance and recertification after three years.	Article 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114	Inspection control
	There is no such provision.	Article 115, 116, 117, 118, 119, 120, 121, 122, 123, 124	Penalty provisions and offenses
	There is no such provision.	Article 125, 126, 127, 128, 129, 130, 131, 132	Transitional and final provisions

Table 1. Comparative analysis between standard ISO 50001:2011 and the Law on the rational use of energy (draft)

This comparative analysis was performed to show that there are elements of energy management systems that are not fully and precisely defined by Law, but the Law also has good elements, such as the introduction of licensing and professional examinations in this area. Specifically,

paper shows a practical way of combining requirements of the Law on the rational use of energy (draft) and standard ISO 50001:2011, in order to achieve outstanding energy performance. The Law sets out a global framework for energy efficiency, and standard ISO 5001:2011 develops specific elements of the energy management system at the level of a particular organization. On the other hand, standard ISO 50001:2011 has a voluntary application, and its parts, which relate to organizational and human resources, can significantly help in the co-implementation of the Law. As we have shown, as standard, and the Law has good and bad sides.

We recommend starting with the application of the Law, and parallel the company should introduce the management system standard ISO 50001:2011, and thus organization will have good organizational and documentation support, in order to achieve timely and adequate implementation of the Law.

6. SUMMARIZED REVIEW OF COMPARATIVE ANALYSIS

To analyze the congruence requirements of the Law on the rational use of energy (draft) and ISO 50001:2011 standard requirements for energy management system, adopted the following marks:

- An exact (fully) match between requirements of standard ISO 50001:2011 and Law on the rational use of energy (draft), will be marked as - **congruence 100%.**
- Partial match between requirements of standard ISO 50001:2011 and Law on the rational use of energy (draft) (partial matching usually refers to the requirements that are applicable to the company level and the Law on the state level, or relating to articles which match in some parts only), will be marked as – **congruence 50%.**
- A mismatch between the requirements of the standard and requirements of Law has a dual mark:
    - **Congruence 0z%** - indicates that there is a requirement in the Law, but not in the standard.
    - **Congruence 0s%** - indicates that there is a requirement in the standard, but there is no in Law.

The following table (Table 2.) shows the analysis of the congruence requirements of standard ISO 50001:2011 and the Law on the rational use of energy (draft), quantified through the above mentioned adopted marks.

	TITLE OF REQUIREMENT OF STANDARD ISO 50001:2011 AND THE LAW ON THE RATIONAL USE OF ENERGY (DRAFT)	CONGRUENCE MARK
1.	Scope and objectives	**100%**
2.	Normative references	**100%**
3.	Legal obligation	**0z%**
4.	Target groups	**100%**
5.	Terms and definitions	**100%**
6.	Energy policy	**50%**
7.	General requirements for an energy management system	**50%**
8.	Obligation for implementation of energy management system	**0z%**
9.	Responsibilities in the energy management system	**50%**

10.	Planning, legal requirements, energy performance indicators	**50%**
11.	Operations management, communication, documentation	**50%**
12.	Energy objectives and action plans	**50%**
13.	Checking, monitoring and measurement, internal audits, corrective action, preventative action and nonconformities in EnMS	**0s%**
14.	Management review	**0s%**
15.	Competence of staff - energy managers, energy associates, certified energy advisors	**100%**
16.	Energy review	**100%**
17.	Energy products and their labeling	**50%**
18.	Energy performance of buildings and studies	**50%**
19.	Energy efficiency in energy transmission and distribution	**50%**
20.	Measurement and calculation of energy consumption	**50%**
21.	Supply of natural gas	**50%**
22.	Energy review of the heating systems and boilers	**50%**
23.	Energy review of air conditioning systems	**50%**
24.	Energy Efficiency Fund and incentives	**0z%**
25.	Public procurements	**100%**
26.	Tax and duty exemptions	**0z%**
27.	Renewable energy sources	**50%**
28.	Energy services	**100%**
29.	Energy efficiency in transport	**50%**
30.	Inspection control	**50%**
31.	Penalty provisions	**0z%**
32.	Transitional and final provisions	**0z%**

Table 2. Quantified match between articles of standards ISO 50001 and the draft Law on the rational use of energy

The following table (Table 3.) shows the summarized number of matches of specific requirements of ISO 50001:2011 and the Law on the rational use of energy (draft).

	CONGRUENCE MARK	NUMBER OF REQUIREMENTS WITH CONGRUENCE MARK	PERCENTAGE
1.	100%	**8**	**25%**
2.	50%	**16**	**50%**
3.	0z%	**6**	**18.75%**
4.	0s%	**2**	**6.25%**

Table 3. Number of requirements of ISO 5000:20111 standard and the Law on the rational use of energy (draft) in various categories of congruence marks

In above table, it can be seen that there are a large number of requirements in which the standard ISO 50001:2011 and Law are in the matching (*25% of total requirements*). The largest number of requirements has partial matching, which precisely the analysis presented (*50% of total requirements*). The requirements of the standard ISO 50001:2011 relates to the level of organization and requirements of the Law relates to the state level, and therefore it can be

expected that the requirements of the Law are general and the requirements of ISO 50001:2011 standard is only one part of the Law requirements. There are a number of requirements contained in the Law, but not the standard (*18.75% of total requirements*). These requirements are mainly related to legal obligations, penalties, incentives. There are two requirements that exist in the standard ISO 5001:2011, but not in the Law on the rational use of energy (draft) (*6.25% of total requirements*). These requirements are related to organizational procedures and documentation required for the implementation and operation of energy management at the organizational level.

In the following part of paper is presented a graphical view of the results obtained by analyzing.

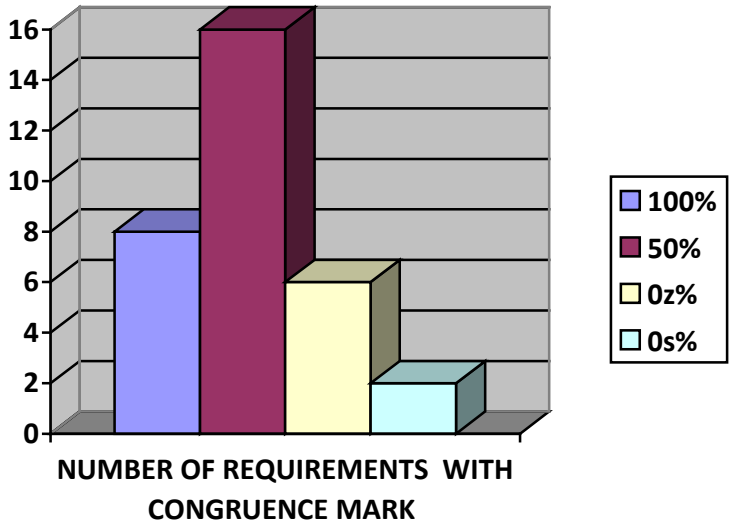

Figure 3. Graphical representation of analysis

7. CONCLUSIONS

Law on the rational use of energy (draft) establishes a global framework for the implementation of energy management systems and monitoring performance in the field of energy. The Law provides implementation of energy management systems in individual enterprises, and there is a detailed elaboration of an energy management system at the micro level ended. The importance of ISO 50001:2011 is that it helps the individual organizations to implement an energy management system, not just to meet the minimum required by Law, but to solve specific problems in addition to achieve a specific benefits for themselves and for society. We hope that at the state level will be recognized the importance of this standard, and that organizations which have applied and certified energy management system, in accordance ISO 50001:2011, will have market and administrative benefits, so that organizations can see the effects of their efforts to become leaders in the implementation of energy management systems.

There is a large number of requirements in which the standard ISO 50001:2011 and Law coincide. The largest number of requirements has partial matching, which the analysis precisely shows. The requirements of standard are applicable at the organization level, and requirements of the Law at the state level (general requirements), and therefore it can be expected that the requirements of ISO 50001:2011 are only one part of the requirements of the Law. There are a number of requirements contained in the Law, but not the standard. These requirements are

mainly related to legal obligations, penalties, incentives. There are two requirements that exist in ISO 50001:2011, but not in the Law on the rational use of energy (draft). These requirements are related to organizational arrangements and documentation required for the establishment and operation of energy management at the organizational level.

As can be seen from the results obtained in the analysis, it is not possible to apply only one of these documents (ISO 50001:2011 or the Law on the rational use of energy). Their requirements are not the same, but largely overlap or complement. The only valid use is exactly the use of both documents. In this way, organization avoids paying high penalties prescribed by the Law on the rational use of energy (draft) in the event of failure to comply. At the same time, the aim of implementation of ISO 50001:2011 is to properly establish an energy management system and get all individual and general social benefits in terms of rational use of energy. Mutual combining these two documents in the application, leads to advanced energy performance, which help organizations to improve business image, prestige and achieve better relationships with customers and suppliers.

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ACKNOWLEDGEMENT

This paper is part of the project III 43008, which is supported by the Ministry of education, science and technological development of the Republic of Serbia.