

Energy Management Systems: from EN 16001 to ISO 50001

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Abstract

In July 2009, The European Standard EN 16001 on the Energy Management Systems was issued. However, different authors have pointed out certain differences between the European Standard EN 16001 and ISO 50001.

The article presents the main differences between the old EN 16001 Standard and the new ISO 50001. It also provides important information on the adoption of ISO 50001 at world level.

Keywords: Energy management systems, standards, ISO

JEL: P 28, Q4

Preamble

The European Standard EN 16001 on the Energy Management Systems was issued two years ago, in July 2009.

It is widely welcomed with interest the adoption of a voluntary Standard created to help the organizations on one of the most debated issue at the international level.

"Energy", in fact, has assumed a central role in European Union policies that have been substantiated with the climate-energy package known as "20-20-20"¹ issued in April 2009. Then, the Treaty Lisbon (December 2009) has enshrined that the European Union may legislate in the field of energy; so, energy becomes a "matter of competition" between the European Union and the member States (M. Boccacci Mariani, G.M. Piana, 2011)

Already in 2009, compared to other international Standards governing the management systems like ISO 14001:2004 Standard on the Environmental Management System, some authors noted that *"a difference, not to be underestimated, is that the 14001 is an ISO Standard, i.e International Organization for Standardization, and has international significance, while the 16001 is a Standard issued by EN, and is a European Standard"* (R. Beltramo, S. Duglio, 2010). So, there are *"(...) essentially two unknowns in its application, or rather, in the real flow rate that can have on organizations. The first concerns the fact that in ISO there is a work table that has as its ultimate goal the establishment of a governing ISO Energy Management Systems. This should be public in 2010 (with the acronym of ISO 50001). (...)"* (R. Beltramo, S. Duglio, 2010).

In fact, it was so. Last June (a year later on the roadmap) the ISO 50001:2011 Standard - *"Energy Management Systems - Requirements with guidance for use"* was issued.

¹ The European package known as "20-20-20" predicts that by 2020:

1. consumption of primary sources must be reduced by 20%;
2. gas emissions causing climate change must be reduced by 20%;
3. there is an increase to 20% of renewable energy sources of the final consumption..

But maybe for this reason, at the end of June 2011 (after two years of entry into force of EN 16001), in Italy only seven organizations have certified their Energy Management System (FIRE, 2011).

What will happen now to companies wishing to be certified and those who already are?

ISO 50001:2011 international Standard will replace the EN 16001:2009, that has been issued by CEN/CENELEC, and it's valid only in the European Union.

The EN 16001 will be withdrawn (it is assumed at the beginning of 2012). At the publication of this paper ISO 50001 Standard will probably have already been implemented in Europe and will be doing all the steps for national transpositions (thus for Italy, it will be implemented by UNI - Italian Organization for Standardization).

In Italy, ACCREDIA - Italian Institute for Accreditation of certification bodies - has published its own provision in which indicates that from 1 August 2011 any new application for accreditation on the Energy Management System must be made in relation to the new Standard specifies the methods for the transfer of credits from the UNI CEI EN 16001 to ISO 50001 (ACCREDIA, 2011).

As regards organizations already certified EN 16001, it is likely a transition to the new Standard and, given the similarities between the two instruments, these will probably be painless.

EN 16001 and ISO 50001: a comparison

The two Standards have a similar structure to facilitate the passage from the EN 16001 to the new ISO 50001. The structure is also able to guarantee the integration with other management tools, in particular with the ISO 14001 Standard on the Environmental Management System.

In fact, the "politics" of the new voluntary tools, as well as the revision of existing Standards, is to facilitate the integration of systems. There's about an intense international literature on the Integrated Management Systems (Quality, Environment, Safety and Ethics) or their different combinations, which should be consulted.

So, also the Energy Management System has the optic of the Deming Cycle, which subdivides the composition of macro-management system in four steps Plan - Do - Check - Act.

It follows that the two Standards are similar, as can be seen from Table 1 that compares the indexes. The concepts included in ISO 50001 and not in EN 16001 are highlighted in bold. These concepts are, therefore, the discontinuity between the two tools, which by contrast have a "mirror" structure.

The attention will be focused on these differences, rather than a reading of "vertical" indexes of the two Standards.

Table 1. Correspondence between EN 16001 and ISO 50001

Index	EN 16001	Index	ISO 50001
1	Scope	1	Scope
		2	Normative references
2	Terms and definitions	3	Terms and definitions
3	Energy management system requirements	4	Energy management system requirements
3.1	General requirements	4.1	General requirements
		4.2	Management responsibility
		4.2.1	Top management
		4.2.2	Management representative

Index	EN 16001	Index	ISO 50001
3.2	Energy policy	4.3	Energy policy
3.3	Planning	4.4	Energy planning
3.3.1	Identification and review of energy aspects	4.4.1	General
3.3.2	Legal obligations and other requirements	4.4.2	Legal and other requirements
3.3.3	Energy objectives, targets and programme(s)	4.4.3	Energy review
		4.4.4	Energy baseline
		4.4.5	Energy performance indicators
		4.4.6	Energy objectives, energy targets and energy management action plans
3.4	Implementation and operation	4.5	Implementation and operation
3.4.1	Resources, roles, responsibility and authority	4.5.1	General
3.4.2	Awareness, training and competence	4.5.2	Competence, training and awareness
3.4.3	Communication	4.5.3	Communication
3.4.4	Energy management system documentation	4.5.4	Documentation
3.4.5	Control of documents	4.5.5	Operational control
3.4.6	Operational control	...4.5.6	Design
		...4.5.7	Procurement of energy services, products, equipment and energy
3.5	Checking	4.6	Checking
3.5.1	Monitoring and measurement	4.6.1	Monitoring, measurement and analysis
3.5.2	Evaluation of compliance	4.6.2	Evaluation of legal requirements and other requirements
3.5.3	Nonconformity, corrective action and preventive action	4.6.3	Internal audit of the EnMS
3.5.4	Control of records	4.6.4	Nonconformities, correction, corrective, and preventive action
3.5.5	Internal audit of the energy management system	4.6.5	Control of records
3.6	Review of the energy management system by top management	4.7	Management review
3.6.1	General	4.7.1	General
3.6.2	Inputs to management review	4.7.2	Input to management review
3.6.3	Outputs from management review	4.7.3	Output from management review

Source: elaboration from EN 16001 Standard and ISO 50001 Standard

Beyond some differences, which does not change substantially the contents, there are three steps of greater distinction.

The first step concerns the Management responsibility (in 4.2) and the subsequent subsections of the ISO 50001, absent in the European version.

The second aspect is present in the Plan phase where the ISO 50001 adds some concepts (in 4.4.3, 4.4.4 and 4.4.5). Finally, the Do phase of ISO 50001 system has been added two new paragraphs (4.5.6 and 4.5.7).

Regarding the first aspect, the ISO 50001 emphasizes the fundamental role of the so-called Top Management. It's a strategic actor which defines policy, objectives and, consequently, allocates resources and defines operational roles. This greater emphasis is embodied in the classic figure of the Representative of the Top Management, which, however, should identify "on paper" the task-force as support for the energy management: a team, therefore, with the Management Representative as a leader.

Coming to the second aspect, in the Plan phase it's interesting to analyze the concept of energy analysis (4.4.3 - Energy Review). A section is entirely dedicated to this concept because thank to it the organization should establish reference energy data (4.4.4 - Energy baseline). The span of time is decided by the organization itself (Locati, 2011a) and the

purpose is to be a basis for comparison of changes in the organization's energy performance, measured through appropriate indicators (4.4.5 - Energy Performance Indicators).

Regarding the latter ones, the methodologies aren't indicated for the selection of indicators, but the single organization can define method that will be assessed during the visit of the certification body. Also because these indicators have to be compared with the baseline energy data, that descending from the analysis.

In this regard, the use of energy indicators provided by the Global Reporting Initiative could be proposed. The Global Reporting Initiative is an international network which has issued guidelines for drafting the Sustainability Report (3.1 of its last update in 2011). This is considered a communication tool of the sustainability (R. Beltramo, S. Duglio, A. Bianco, 2011)². The report provides a set of indicators divided into core and additional (Add), divided into economic performance indicators (7 Core, 2 Add), environment (17 Core, 13 Add), work practices (10 Core, 5 Add), human rights (9 Core, 2 Add), companies (8 Core, 2 Add) and product liability (4 Core, 5 Add). On 30 environmental indicators, 5 investigate energy aspects and they are presented in Table 2 (GRI, 2011).

Table 2. Energy indicators in the Global Reporting Initiative (3.1 version)

Abbreviation	Indicator	Typology
EN3	Direct energy consumption by primary energy source	CORE
EN4	Indirect energy consumption by primary source	CORE
EN5	Energy saved due to conservation and efficiency improvements	ADD
EN6	Initiatives to provide energy-efficient or renewable energy based products and services, and reductions in energy requirements as a result of these initiatives	ADD
EN7	Initiatives to reduce indirect energy consumption and reductions achieved	ADD

Source: elaboration from Global Reporting Initiative

The Sustainability Report has the advantage of offering a powerful communication tool of sustainability. By contrast, it has been accused to find its full usefulness only by large organizations. So some authors have proposed a methodology for small enterprises (F. Borga, A. Citterio, G. Noci, E. Pizzurno, 2009).

Here we propose the use of its energy indicators, because, as we will see in continuation, it is likely adherence to formalized energy management mainly by large organizations.

On the other hand, there are some aspects of EN 16001 that don't seem to be considered in the ISO 50001. In particular (Locati, 2011b):

1. the scale of priority of energy aspects that need to be further explored;
2. the identification of all persons who work for the organization or on its behalf and whose activities may have impacts on energy consumption;
3. a forecast of costs for the upgrades and consumption reduction and re-entry of investments based on projections of consumption.

The third difference is in the DO phase of the energy system. The ISO 50001 adds two paragraphs "Design" and "Procurement of energy services, products, equipment and energy". The ISO 50001 asks attention for the design of processes, systems, equipment that may have significant consequences on the energy aspects. This focus dedicated on the design phase involves the use of dedicated tools, such as, for example, the Life Cycle Assessment (LCA).

² Actually, the Working Groups are working on the G4 version.

The second point specifies a concept that would normally already be included in operational systems: the purchases and, in this case, the necessity to insert "energy policy" in the contract and its communication to potential suppliers.

Discussion

In the previous section the attention was focused on the differences between the old EN 16001 Standard and the new ISO 50001 one.

If it is true that between the two Standards there are some important differences, it's also possible to affirm that the two have a similar index. So, if some doubts could be raised on the real membership of the organizations at the first Energy Management System, they still remain.

Crucial matter concerns the real impact that the Standard may have in relation to the average enterprises size. In Italy, for example, the economic structure is permeated by Small-Medium Enterprises. This fact could not argue for the adherence to an energy Standard. Bear in mind, in fact, that the energetic issue might already be well framed in other (more general) management systems, especially with reference to ISO 14001:2004 on the environment. In Italy there are many certified organizations: according to the latest available data (ACCREDIA, 2011) there are more than 15,500 environmental certificates. In addition there are also 1,360. EMAS registrations (ISPRA, 2011), which provide an additional step as well known as Environmental Statement.

About this last aspect, also the ISO seems to be aware. In fact, if it focuses on the tasks of the Management Representative, including the preparation of a Management Team, indirectly recognizes a medium-big energy size to manage, typical of big business.

In conclusion, while it's impossible to exclude that small and medium enterprises (or third sector organizations) will adopt a formalized Energy Management System, the risk is that this Standard applies only in the following categories of actors:

1. Big companies or organizations in the service sector, which must provide (by law) the figure of the Energy Manager³. In this case the Energy Manager and the Representative for the Energy Management System may be the same figure.
2. Energy companies that produce or market power.
3. Organizations that offer energy services, the ESCo.
4. Large service sector organizations.
5. Public Administration (Municipalities etc).

But also these categories may decide not to implement the energy system. Especially in this economic period, they "could be satisfied" to implement ISO 14001 Certification or EMAS Registration.

Clearly, they are very complex assessments. Today it isn't possible to predict the real potential of penetration of the ISO 50001, because, although in few numbers, the experience of EN 16001 doesn't have offered clear signs.

On the one hand, in fact, it is true that only seven organizations have certified their EN 16001 system. But it's equally true that it was known an international standard would have been issued. So, it's supposable that some companies have waited the new standard. It's also interesting to underline that five (on seven) organizations certified to EN 16001 have also an Environmental Management System in according to ISO 14001 (Duglio, 2010).

A few months after the publication of the ISO 50001 Standard some organizations are taking the path to certification. ISO hasn't presented official statistics, but it's interesting to note that the Eastern of the world is really dynamic on this issue.

³ Italian Legislation (10/1991) provides this professional figures when the consumption of energy resources are over than a definite threshold.

Worldwide, the first ISO 50001 certification absolute dates June 17th (two days after the publication) by an Indian organization, the Dahanu Thermal Power Station of Reliance Infrastructure Ltd.

In an article, available on the ISO internet site (Lambert, 2011), the author interviews the managers of the first certified organizations that, in order of the nation, are: two Chinese, one of Taiwan, India, France and Austria. The last is an interesting case because the energy system was adopted by the Municipality of Bad Elsenkappel. In addition, the article tells in advance about other organizations reporting that had started this path: three in the Far East and one in Europe (Porsche, that has then obtained the certificate in October 2011).

Even in Italy something is moving: on October, in fact, the first Italian car enterprise, Lamborghini, has obtained the ISO 5001 certification.

So, in the coming months an increase in this certification has been predicted, as soon as possible to clarify the timing for the transition of both EN 16001 certified organizations.

Conclusion

The issue of a voluntary international Standard concerning the energy management and addressed to all organizations marks a discontinuity in the world of the management tools.

For two reasons. The first one is related on the theme, energy, undoubtedly one of the deepest concerns of the scientific, industrial and public opinion, albeit with different points of approach: the study of environmental problems (greenhouse effect, in particular), the health and the cost of energy resources. On the other hand, ISO 50001 faces the energy issue as a primary aspect of organizational management, scoring in a sense a new frontier of management processes, which would seem to deal with specific issues.

The main international Standards of process have faced the issues with a broader focus: quality, environment, safety, ethics, information security. In this sense, the most popular (and used) Standards - ISO 9001 and 14001, OHSAS 18001, SA 8000 - are notoriously open to all organizations. This is possible because their flexibility encourages the adhesion regardless of the geographical area and/or the size of company.

The ISO 50001 was born with this aim. Effectively, many big enterprises and public institutions may be interested in the analysis of the energy aspect distinctly from other environmental ones. For example, a big company with an Energy Manager and with a certified environmental management system has in the energy consumption one of its significant impacts. In this sense, the implementation of ISO 50001 (at least partially integrated with ISO 14001) may have the goal of facing more specifically an issue on which there are consistent impacts (including economic).

But for small and medium enterprises, predominantly in Italy, and the third sector organizations in general, can be equally and cost-effectively useful implement the Environmental Management System and, if energy impacts are very significant, decide to define the energy-environmental objectives in the environmental management system.

The real extent of the Energy Management System will play on this aspect.

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