Transition to ISO 50001:2018

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1. Introduction

The Energy Management System Standard, ISO 50001:2011 published June 2011 has had a rapid take up in over 90 countries with over 22,800 certifications by December 2017. In August 2018, a revised version was published: ISO 50001:2018. This article highlights the main changes in ISO 50001:2018 and considers their implications for organisations, who hold ISO 50001 certification or are considering building an Energy Management System (EnMS) with accredited certification in mind.

My comments are entirely personal views based on my experience of building EnMS in manufacturing, local authorities, retail, legal and banking sectors. I have also worked as an ISO 50001 internal auditor for organisations. During 2018 I was building EnMSs for two clients simultaneously: one to ISO 50001:2011 and the other to ISO 50001:2018, based on a draft version before publication. This hands-on experience of applying the two Standards simultaneously gave me particular insights in comparing the requirements and evaluating the differences.

2. The Main Changes

The main changes in ISO 50001:2018 fall into four categories:

- changes to the structure of the Standard to the High Level Structure (HLS)
- general changes in ISO 50001:2018
- removal of requirements from ISO 50001:2011
- additions to the requirements in ISO 50001:2011

The rest of the article briefly describes some of the changes with reference to ISO 50001:2011 and comments on their merits and defects. Some readers will already be familiar with the HLS if they have used this structure in the transition to ISO 14001:2015. If this is the case Section 3 below can be skipped to the more energy specific elements in Section 4 onwards.

3. High Level Structure

Before looking at the High Level Structure, it is worth reviewing the structure of ISO 50001:2011 which has seven clauses:

4.1   General requirements
4.2   Management responsibility
4.3   Energy policy
4.4   Energy planning
4.5   Implementation and operation
4.6   Checking
4.7   Management review

Clauses 4.3 to 4.7 largely reflect the traditional 'Plan, Do, Check, Act' process as shown in Figure 1.

Figure 1   Energy Management System Model

A common structure of standards for management systems was drawn up in 2012 and applicable to the new ISO standards and future revisions of existing ISO standards. It was titled the High Level Structure (HLS).

HLS means:

- Terminology, text, definitions, titles and the common sequence of the same

- Greater importance given to the concept of risk/opportunities, context, interested parties and issues affecting organisations

In particular, all management system standards present:

- A structure made up of 10 principal points. Within each point there are some paragraphs and content, inclusion of which is obligatory in all standards.

- Where necessary, the individual standards may add specific requirements in relation to their fields of application.

The idea behind HLS is to harmonise or 'standardise' the structure of standards. This follows a logic common to all standards, enabling better integration which aims to ease management systems building and auditing. See Figure 2.

Clause No	Clause
1.	**Scope**
2.	**Normative references**
3.	**Terms and definitions**
4.	**Context of the organization** • *Understanding the organization and its context* • *Understanding the needs and expectations of interested parties* • *Determining the scope of the management system* • *Management system*
5.	**Leadership** • *Leadership and commitment* • *Policy* • *Organizational roles, responsibilities and authorities*
6.	**Planning** • *Actions to address risks and opportunities* • *Objectives and planning to achieve them*
7.	**Support** • *Resources* • *Competence* • *Awareness* • *Communication* • *Documented information*
8.	**Operation** • *Operational planning and control* • *Design* • *Procurement*
9.	**Performance evaluation** • *Monitoring, measurement, analysis and evaluation* • *Internal audit* • *Management Review*
10.	**Improvement** • *Nonconformity and corrective action* • *Continual improvement*

Figure 2   Main Clauses of ISO 50001:2018

The main principles of HLS are:

- **Risk-based thinking**: the risk analysis and opportunities go across all normative requirements. The specific requirement in ISO 50001:2011 dedicated to preventive actions disappears. However, although the term has gone the concept of identifying root causes remains in Clause 10.1(b).

- **Context of the organisation**: a knowledge of the internal and external context, as well as the needs and expectations of interested parties, leads up to a better application of the management system. It also makes it possible to analyse and provide for critical (internal and external) factors that can affect the organisation's capacity to attain the desired results in the EnMS.

- **Leadership**: top management must show leadership and commitment so that implementation of the management system is integrated in the organisation's strategic management processes.

- **Planning**: allows the organisation to realise the opportunities offered by the reference context, analyse related risks, and prevent negative impacts that could affect attainment of EnMS goals.

- **Documented information**: organisations can choose the most appropriate means of preparing and keeping documentation related to their operations.

- **Knowledge management**: people's knowledge and skills have greater emphasis, as they are considered a qualifying element to achieve the organisation's objectives.

The structure of ISO 50001:2011 and the HLS in ISO 50001:2018 are compared in Figure 3.

ISO 50001:2011	ISO 50001:2018
1. Scope	1 Scope
2. Normative references	2 Normative references
3. Terms and definitions	3. Terms and definitions
4. Energy management system	4. Context of the organisation
4.1 General requirements	5. Leadership
4.2 Management Responsibility	6. Energy planning
4.3 Energy policy	7. Support
4.4 Energy planning	8. Operation
4.5 Implementation and operation	9. Performance
4.6 Checking	10. Improvement
4.7 Management review	

Figure 3   Structures of ISO 50001:2011 and ISO 50001:2018

Clauses 4.1 to 4.7 of ISO 50001:2011 are now part of Clauses 4 to 10 of ISO 50001:2018. Was this change necessary? In a sense it is an irrelevant question as the change was going to occur, as part of 'standardising' the standards, whether it was needed or not.

In general the structure of ISO 50001:2011 was acceptable but there were some ill-fitting elements. For example, the structure of Clause 4.5 "Implementation and Operation" is:

4.5.1   General
4.5.2   Competence, training and awareness
4.5.3   Communication
4.5.4   Documentation
4.5.5   Operational control
4.5.6   Design
4.5.7   Procurement

Clause 4.5.4 on Documentation (highlighted) seems out of place, sandwiched between other key clauses. Also Sub-Clause 4.6.5 "Control of records" is seperated from Clause 4.5.4 on Documentation.

Similarly, 4.4.2 "Legal requirements and other requirements" is separated from 4.6.2 "Evaluation of compliance with legal requirements and other requirements". It could be argued that 4.6.2 and 4.6.5 were put in Clause 4.6 "Checking" because they were evelution elements, but it always felt awkward.

So the new HLS irons out some of these anomolies and is therefore welcomed. However, it does create extra work for those with an EnMS to ISO 50001:2011 if all the documentation and clause numbering will need changing. This will require some effort to transition from the existing structure to the new HLS. However, it is likely to be short term pain (and cost) for a longer term gain.

In this context it is worth mentioning that in Annexe A.3 it says:

The clause structure and some of the terminology of this document have been changed from the previous edition to improve alignment with other management system standards. There is, however, no requirement in this document for its clause structure or terminology to be applied to an organisation's EnMS documentation. There is no requirement to replace the terms used by an organisation with the terms used in this document. Organisations can choose to use terms that suit their business and needs, or to use those found in this document.

This says that the EnMS structure does not need to mimic the ISO 50001 structure, terminology and clause numbering. However, most organisations building an EnMS have elected to do so for simplicity's sake. This is because clarity is required for all stakeholders and particularly the Management Representative, EnMS team and the internal /external auditors. Somehow the EnMS has to relate to the Standard requirements if certification is required. Given that most organisations with ISO 50001:2011 certification have designed their EnMS to this standard, it follows that major changes to the EnMS will be required to reflect ISO 50001:2018 requirements, especially if they need to integrate with other HLS standards.

4. Changes in ISO 50001:2018

This section covers the changes which do not fit into removals and additions to requirements of ISO 50001:2011 which are described below in Section 6 and 7.

A glossary of terms and definitions may sound mundane to the uninitiated, however, they are of vital importance. Words and terms used in the Standard have specific meanings. It matters not what the reader of the Standard thinks a term means, but what the glossary actually says it means. Therefore the meaning of words is very important in interpreting the actual requirements of the Standard.

In ISO 50001:2011, Clause 3 has Terms and Definitions listed in alphabetical order and therefore easy to use. However, a backward step has been taken with the equivalent Clause 3 in ISO 50001:2018. For

some reason the authors have decided to group the glossary into 'helpful' topics and list terms and definitions within them. This includes terms related to 'energy' and terms related to 'performance'. This means the reader has a two stage mental process: firstly to guess what group the term is in and then look for it alphabetically in the group. Usually the first group guess is incorrect and therefore the eye roams across all terms until it is finally found. This is an example of a 'helpful' change which has proved to be unhelpful. However, as an afterthought an alphabetical glossary appears at the very end of the standard. This has probably been added as the result of negative feedback but is an end-of-pipe solution.

Many of the terms and definitions provide enlightenment but others are so opaque they have little actual meaning. For example, take the definitions of an Energy Management System in both versions of ISO 50001:

ISO 50001:2011:   *set of interrelated or interacting elements to establish an energy policy and energy objectives, and processes and procedures to achieve those objectives.*

ISO 50001:2018:   *management system to establish an energy policy, objectives, energy targets, action plans, and processes to achieve the objectives and energy targets.*

The ISO 50001:2018 definition is definitely an improvement but it focuses entirely on the **process** of an EnMS and does not mention its actual **purpose**. Here is my definition which I use when trying to put into terms senior management can understand:

An EnMS is a structured, defined and disciplined approach, applied to key aspects of energy management, to deliver continual improvement in effective energy use.

There is a tendency to include cross referenced terms (shown in blue text) in definitions in ISO 50001:2018 which renders some definitions difficult to understand. For example:

Energy Performance Improvement

improvement in measurable results of *energy efficiency* (3.5.3), or *energy consumption* (3.5.2) related to *energy use* (3.5.4), compared to the *energy baseline* (3.4.7)

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5. Removal of Requirements from ISO 50001:2011

Some requirements have been removed from ISO 50001:2011 and are deemed as not required in ISO 50001:2018. I feel ambivalent about some of these removals, others, I think, are a backward step. Before selecting a few, it is worth saying that it does not really matter. When organisations build an EnMS they usually produce an EnMS Manual which describes their Energy Management. This is not a specific documented requirement of either Standard, however, it helps the Energy Management Team, the internal auditor, external auditors and other stakeholders to understand the EnMS strategy and the key components and their inter-relationship. When the EnMS Manual is written it will describe how two types of requirement are met:

   a. A specific requirement of ISO 50001
   b. A requirement specified by the organisation and stated in their EnMS which is in **addition** to ISO 50001

When the internal auditor or external auditor is conducting an audit their scope covers both types of requirement. For example, if an organisation states in the Energy Policy they will buy 100% of imported grid electricity from renewable sources, this is a requirement of the organisation - not a requirement of ISO 50001. So if the organisation is audited and it is revealed that they no longer purchase electricity

from renewable sources, they are not complaint. Not because they failed a requirement of ISO 50001, but because they failed their own requirement. Possible corrective actions are to start purchasing electricity from renewable sources again or, easier, change the policy. However, if the new policy has to be re-signed by the CEO, in some organisations it might be easier to switch back to green electricity!

If there is a removal of a requirement in the change from ISO 50001:2011 to ISO 50001:2018 and an organisation and thinks this is a backward step, they can keep it, simply by making it an EnMS requirement. For example, in ISO 50001:2011 there is a specific requirement for a Management Representative (there can be more than one). It is also inferred that there is an Energy Management Team. However, in ISO 50001:2018 the requirement for a Management Representative has been removed and only an Energy Management Team is required. In the transition to ISO 50001:2018 an organisation that wishes to retain the role of the Management Representative simply needs to make it an EnMS requirement.

Another change concerns documentation. In ISO 50001:2011 there are two categories of documentation:

a. A specific document required by the Standard
b. Other documents determined by the organisation to be necessary (Sub Clause 4.5.4.1)

The list of documents, specifically required by ISO 50001:2011, is not very long. Among others, it includes the Energy Policy, the Energy Review, scope and boundaries of the EnMS, and energy objectives, targets and action plans.

This meant it was up to the organisation to decide what other documentation was necessary. For example, in Clause 4.5.2 it states:

The organisation shall identify training needs associated with the control of its significant energy uses and the operation of its EnMS. The organisation shall provide training or take other action to meet these needs.

There is no specific requirement in the standard to document the training needs analysis or any of the training materials although it says records should be kept. However, if this element was audited, internally or externally, how could an organisation prove it had indeed fulfilled requirements of 4.5.2 without appropriate documentation?

In ISO 50001:2018 the specific documentation requirement has been reduced even further so an even greater onus is placed on the organisation to determine what documentation is required. This gives more flexibility but it also requires more thought. A key way of approaching documentation is to list all the mandatory clause requirements within the standard (look for the word "shall"). Then against each requirement ask yourself: "What is the minimum documentation I need to show that my organisation has met this specific requirement?"

There is no longer a specific requirement for a document to be categorised as a document, method, procedure or record. However, if this categorisation has been useful it can be retained as an EnMS requirement.

Going back to the training needs requirement in ISO 50001:2011, this has been removed in ISO 50001:2018. Instead the goal of competency is stated but the means of achieving this is left to the organisation but must be recorded.

Also in ISO 50001 the competency clause was in relation to those who could significantly impact energy consumption. But in ISO 50001:2018 the word 'significantly' has been dropped. It is not clear why as

there is no logic in improving competency if the person's role has little or no effect on energy consumption.

6. Additions to Requirements in ISO 50001:2011

6.1 Context of Organisation (Clause 4.1)

Some additional requirements come with the HLS. Clause 4 of ISO 50001:2018 sensibly includes the organisational context (4.1) and understanding the needs and expectations of interested parties. Clause 4.3 addresses scope and boundaries where there is a requirement: "The organisation shall not exclude an energy source within the scope and boundaries". It is up to the organisation to set its scope and boundaries, yet this requirement appears to be instructing an organisation to include all energy sources, which appears contradictory. In Clause 3.1.4 under definition of "EnMS Scope" there is Note 1 which says: "The EnMS can include several boundaries and can include transport operations". Transport is an energy source but the note seems to suggest this is an option (use of the word 'can') rather than a requirement. Some may argue this is not contradictory as it all depends on how an organisation defines its scope and boundaries.

The definitions of "boundary" and "EnMS scope" do not add much light:

"boundary"   - *physical or organisatonal limits*

"EnMS Scope" - *set of activities, which an organisation addresses through an energy management system*

In Clause 3.1.4 relating to EnMS scope a footnote says:

The EnMS scope can include several boundaries (3.1.3) and can include transport operations.

Firstly any multi-site group certification has several boundaries (one per site) so this is self-evident. However, the mention of transport is relevant particularly in relation to UK ESOS requirements if ISO 50001 certification is used as a route for compliance. In ESOS transport energy use must be audited if it is not excluded under the 10% de minimis rule. Therefore if ISO 50001 certification is being used as a route for ESOS compliance then transport must be in the ISO 50001 scope. Otherwise compliance for the transport element must be met by another means, such as an ESOS transport energy audit.

However, for both ESOS and ISO 50001 scope, three questions are important:

- Is transport energy fuel directly purchased by the organisation?
- Is transport energy data recorded by the organisation?
- Does the organisation have direct control over the vehicles and drivers?

If the answer is 'no' to these questions then the transport energy use is not in ESOS scope. Also it is not advisable to include in ISO 50001 scope, as it would not be possible to quantify energy use or to calculate EnPIs, or set quantified targets or prove continual energy use.

These comments also apply to outsourced SEU, if the same criteria apply. So before including anything in the EnMS scope it is important to answer three questions:

- Do we purchase the energy used?
- Do we control the energy used?
- Can we quantify the energy used?

6.2 Leadership (Clause 5.0)

Sensibly the Energy Policy is now Clause 5.2 under Leadership. As mentioned earlier, the requirement of a Management Representative has been removed and only an EnMS Team is required. But every team needs a leader. The senior management role has been increased in ISO 50001:2018. My own feeling is that the management commitment requirement in ISO 50001:2011 was sufficient and, at times, hard to get in large organisations. By increasing this requirement even further then this difficulty will be increased but needs addressing.

6.3 Planning (Clause 6.0)

Clause 6.1 addresses risks and opportunities as a new addition. This is a sensible addition. The rest of Clause 6 is similar to the equivalent requirements of ISO 50001:2011.

6.4 Support (Clause 7.0)

Some minor changes have been made but nothing significant. The dropping of the requirement for a training needs analysis has been mentioned earlier. It is up to the participant to decide the best means of demonstrating competence of those who are deemed to need to be competent.

The grouping of documentation has largely been included in Clause 7.5 "Documented information". This is an improvement but the approach to documentation is now more flexible and the advantages/disadvantages of this have been described earlier.

6.5 Operation (Clause 8.0)

This is generally the same as the equivalent requirement in ISO 50001:2018. In Clause 8.3 under 'Procurement', there is a statement which states:

Where applicable, the organisation shall define and communicate specifications for:

a) ensuring the energy performance of procured equipment and services
b) the purchase of energy

Whilst point a) is likely to have significant impact on energy consumption and performance, it is not the case for point b). How can the specification for the purchase of energy itself impact energy performance? In the case of natural gas and grid electricity, a delivered kWh is a kWh. It has no relevance. In the case of other types of energy, the specification may make an impact on energy performance. Examples include moisture content of liquid and solid fuels, types of biomass, swell index on some solid fuels etc. I accept it does say "where applicable" but some clarification would have been useful in Annex A "Guidance for Use" to provide examples of when this is applicable and when not.

6.6. Performance evaluation (Clause 9.0)

This is now sensibly structured with the following clauses grouped together:

- monitoring energy performance (9.1)
- internal audit (9.2)
- management review (9.3)

There is a useful addition to 'Internal Audit' which says in Clause 9.2.2:

The organisation shall define the audit criteria and scope for each audit.

This is significant because in ISO 50001:2011 there is no reference to the scope requirement of each internal audit. In its absence, some certification bodies have incorrectly assumed it is a requirement

that an internal audit should cover every aspect of the EnMS in every internal audit. This is incorrect because there is no such specific requirement in ISO 50001:2011. Thus ISO 50001:2018 has addressed this incorrect interpretation: it is up to the organisation to define the scope of each internal audit.

The requirements of the Management Review have been expanded and clarified which is a welcome change.

6.7. Improvement (Clause 10)

Clause 10.1 covers "Nonconformity and corrective action". The need for 'preventive action' has been removed in favour of viewing corrective action in a broader context.

Clause 10.2 "Continual Improvement" is an addition. It only has two sentences. The second is controversial. It says:

The organisation shall demonstrate continual energy performance improvement.

In ISO 50001:2011 there are several references to 'continual improvement in energy performance', such as a commitment in the Energy Policy which is continued in ISO 50001:2018. But the controversy hinges in the word "demonstrate" which is new and has been highlighted by Vilnis Vesma. The argument is that if you cannot **demonstrate** continual improvement in energy performance year-on-year then an organisation is subject to a nonconformance which could affect certification. The argument is that for any organisation, a plateau will be reached, where future improvement in energy performance is impossible without either closing a facility or investing in energy efficiency measures that are not cost effective.

However, this argument is based on a static view of an organisation over time in which neither the organisation nor energy saving technology changes. My own view is that this requirement contradicts the setting of energy objections and targets which is to be done by the organisation. Sometimes just to maintain savings at their current level requires much effort. What matters here is how a certification body will interpret this requirement. A pragmatic approach is for an organisation itself to interpret Clause 10.2 and then find a certification body who agrees with them.

Also there are very few organisations who are so mature in energy management that energy opportunity has been identified and implemented with no room for improvement now or in the future.

7. Timings

ISO 50001:2018 was published in August 2018 but organisations could continue to be certified to ISO 50001:2011 for 18 months (up to February 2020). For organisations holding ISO 50001:2011 they have three years from publication to migrate to the new standard. So this transition must be completed by August 2021.

For those wishing to use ISO 50001 as a means of compliance with ESOS, they need to hold an accredited certificate on the ESOS Phase 3 compliance date of 5 December 2023. Also the scope of ISO 50001 certification must match the scope of ESOS liabilities. If not, then ISO 50001 will count as a means of partial compliance to ESOS and the shortfall must be made up by other means. For example, if an ESOS assessment requires transport energy to be included but this is not included in the scope of the EnMS then a separate ESOS Transport Energy Audit would be required to meet the shortfall.

Since February 2020 it has not been possible to get certification to ISO 50001:2011. Also any existing ISO 50001:2011 certifications automatically expire in August 2021. This means that only ISO 50001:2018 certification can be used as a means of ESOS compliance on the next compliance date of 5 December 2023.

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