INTERNATIONAL STANDARD

ISO 50004

Second edition
2020-06

Energy management systems — Guidance for the implementation, maintenance and improvement of an ISO 50001 energy management system

Systèmes de management de l'énergie — Lignes directrices pour la mise en oeuvre, la maintenance et l'amélioration d'un système de management de l'énergie de l'ISO 50001

Reference number
ISO 50004:2020(E)

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 301, *Energy management and energy savings*.

This second edition cancels and replaces the first edition (ISO 50004:2014), which has been technically revised. The main changes compared with the previous edition are as follows:

— the document has been restructured as per the high level structure (HLS) for management system standards (MSS), which helps to ensure a high level of compatibility with other MSS, including the addition of context of the organization and risk[12];

— stronger emphasis has been placed on the role of top management;

— exclusions of energy types have been clarified;

— the energy review has been clarified;

— details on the energy data collection plan and related requirements have been added (previously the energy measurement plan);

— the EnPI and EnB text has been clarified to provide a better understanding of these concepts;

— the examples based on the experience of implementation have been included;

— the format has been modified to remove the practical help boxes and integrate the information within the text;

— the annexes have been removed.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document provides practical guidance when implementing the requirements of an energy management system (EnMS) based on ISO 50001. It shows the organization how to take a systematic approach to achieve continual improvement in the EnMS and energy performance. This document is not prescriptive. Each organization can determine the best approach to adopt the requirements of ISO 50001. The user is advised to use this document with ISO 50001 and its annexes.

This document provides guidance to users with different levels of energy management, energy consumption and EnMS experience. Each clause explains how an organization can approach a part of an EnMS. Practical tools, methods, strategies and examples are provided to help organizations implement an EnMS and to continually improve energy performance. The examples and approaches presented in this document are for illustrative purposes only. They are not intended to represent the only possibilities, nor are they necessarily suitable for every organization. In implementing, maintaining or improving an EnMS, it is important that organizations select approaches appropriate to their needs.

Energy management is sustainable and most effective when it is integrated with an organization's overall business processes (e.g. operations, finance, quality, maintenance, human resources, procurement, health and safety, and environmental policy).

ISO 50001 can be integrated with other management system standards (MSS), such as ISO 9001, ISO 14001, ISO 45001 and ISO 55001. Integration can have a positive effect on business culture and business practice, embedding energy management into daily practice, improving operational efficiency and reducing the operational costs related to the management system. The common HLS of MSS supports this integration[12].

Ongoing commitment and engagement by top management is essential for the effective implementation, maintenance and improvement of the EnMS, and for achieving continual energy performance improvement. Top management ensures the EnMS is aligned with the strategic direction of the organization and demonstrates its commitment through leadership actions that ensure the ongoing allocation of resources, including the people to implement, maintain and improve the EnMS over time.

Energy management systems — Guidance for the implementation, maintenance and improvement of an ISO 50001 energy management system

1 Scope

This document gives practical guidelines and examples for establishing, implementing, maintaining and improving an energy management system (EnMS) in accordance with the systematic approach of ISO 50001:2018. The guidance in this document is applicable to any organization.

This document does not provide guidance on how to develop an integrated management system.

While the guidance in this document is consistent with the requirements of ISO 50001:2018, it does not provide interpretations of those requirements.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 50001:2018, *Energy management systems — Requirements with guidance for use*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 50001:2018 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.2 Abbreviated terms

EnB	energy baseline
EnMS	energy management system
EnPI	energy performance indicator
GHG	greenhouse gas
HLS	high level structure
HVAC	heating, ventilation and air conditioning
MSS	management system standard
PDCA	Plan-Do-Check-Act

PESTLE political, economic, social, technological, legal, environmental

SEU significant energy use

SWOT strengths, weaknesses, opportunities, threats

TDODAR time, diagnose, options, decide, act/assign, review

4 Context of the organization

4.1 Understanding the organization and its context

This subclause involves determining strategic issues, i.e. issues that can affect, either positively or negatively, the intended outcomes of the EnMS. Determining these issues (both internal and external) serves to connect the EnMS with the organization's strategic direction and goals.

EXAMPLE 1 Examples of internal issues include but are not limited to:

— strategic direction and organizational management;

— processes, systems and operational factors;

— the age and condition of equipment and systems;

— the organization's performance indicators;

— the organization's financial circumstances;

— organizational structure and hierarchy;

— employee knowledge and organization culture;

— mission and vision of the company.

EXAMPLE 2 Examples of external issues include but are not limited to:

— economic and financial;

— security of energy supply;

— technology;

— cultural, social and political;

— geographical;

— legal/other requirements;

— environmental;

— restrictions on energy consumption;

— natural and competitive circumstances.

When the context of an organization is well understood, it assists in establishing, implementing, maintaining and continually improving the organization's EnMS and energy performance. Understanding the context promotes discussion between top management and the relevant interested parties (see 4.2) and ensures that changing circumstances and other issues are addressed to benefit the EnMS. Integral to this process is understanding the aims and culture of the organization. This helps to align the EnMS with the preferred practices and approaches used by the organization to conduct its business operations. The outputs of context are used to plan, implement and operate the EnMS in ways that provide ongoing value to the organization. Top management is best placed to ensure the EnMS reflects the organizational context and that it continues to provide the expected benefits to the organization. Internal and external issues change over time. To ensure the context remains current,

the organization can conduct reviews of its context at planned intervals and through activities such as management review.

Organizations can approach this requirement through discussions and structured conversations, and by reviewing sources of information. At the strategic level, tools such as SWOT analysis, PESTLE analysis or TDODAR analysis may be used for the identification and evaluation of contextual issues. A simpler approach, such as brainstorming, can be useful for organizations, depending on the size and complexity of their operations. The processes and outputs of processes used for evaluating the organization's context can be considered necessary for the effectiveness of the EnMS, and may be maintained as documented information. The triggers and review frequency for conducting these processes should also be defined in documented information.

4.2 Understanding the needs and expectations of interested parties

This subclause is designed to ensure that the organization structures a formal framework to identify and respond to internal and external relevant parties' needs and expectations.

An organization determines the interested parties relevant for its energy performance or for its EnMS. The relevant parties can be internal (e.g. employees related to SEUs that affect energy performance, an energy management team that affects EnMS performance) or external (e.g. providers of equipment that could impact energy performance, clients that could be perceived as affected by the energy performance of the organization).

The organization is expected to gain sufficient understanding of the expressed needs and expectations of those internal and external interested parties that have been determined by the organization to be relevant. Understanding these needs and expectations should be sufficient to meet the requirements of the organization.

Legal requirements reflect needs and expectations that are mandatory because they have been incorporated into laws, regulations, permits and licences by governmental or court decisions. Legal requirements refer to applicable mandatory requirements related to an organization's energy use, energy consumption and energy efficiency.

EXAMPLE 1 Examples of legal requirements can include but are not limited to:

— local, state, provincial, national and international legal requirements;

— energy performance standards required by law for equipment;

— regulated energy assessment or energy audit requirements;

— energy-related building codes and construction requirements;

— energy storage, distribution and transportation codes;

— minimum energy efficiency standards;

— prohibition or limitation of application of a particular energy for a particular purpose;

— energy-type installation codes.

Other requirements can refer to voluntary agreements or initiatives, contractual arrangements or corporate requirements subscribed to by the organization related to energy efficiency, energy use and energy consumption. Other requirements only become requirements of the organization when the organization adopts them.

EXAMPLE 2 Examples of other requirements include but are not limited to:

— organizational guidelines or requirements;

— agreements with customers or suppliers;

— agreements with "central office";

— non-regulatory guidelines;

— voluntary principles or codes of practice;

— voluntary energy agreements;

— requirements of trade associations;

— agreements with community groups or non-governmental organizations;

— public commitment of the organization or its parent organization;

— voluntary minimum specifications for energy performance issued by government or private agencies;

— network limits on electricity or gas supply, or limitations on electricity exports to the network.

The organization can consult interested parties or use other methods to categorize their needs and requirements. One category can be information on legal requirements and other requirements, which can be obtained from a variety of sources, such as in-house legal departments, government or other official sources, consultants, professional bodies and various regulatory bodies. If the organization already has a process to determine legal requirements, that process may be used to identify and access energy-related legal requirements. The process used to identify legal requirements should be clear and include a description of how compliance is assessed and ensured. Guidance on evaluating compliance is given in 9.1.2.

Early consideration of legal requirements and other requirements can assist the organization in identifying the related data that are needed and addressed in the energy review. It may be useful to establish and maintain a list, database or system of recording legal requirements and other requirements so their implications can be considered for other parts of the EnMS, including SEUs, operational controls, records and communication.

A second category can arise from the organization voluntarily incorporating the needs and requirements of interested parties as its own. For example, an organization could see improved energy performance (as advocated by an external interested party) as providing the organization with business advantages and choose to adopt the recommendations from the external interested party.

As the needs and requirements of interested parties can change over time, the organization can include a process for a periodic review of their requirements that have been incorporated into the EnMS. This review can alert the organization to items such as:

a) changes in applicable legal requirements and other requirements;

b) changes in the operations of the organization that could affect applicable requirements;

c) changes in the needs and recommendations of external interested parties;

d) changes in equipment or technology that bring new operating and maintenance requirements.

4.3 Determining the scope of the energy management system

The intent of this subclause is to ensure that the organization defines the scope and boundaries of the EnMS, which allows the organization to focus its efforts and resources on energy management and energy performance improvement. Over time, the scope and boundaries can change due to energy performance improvement, organizational changes or other circumstances. The EnMS is reviewed and updated as needed to reflect the changes. Items to consider when defining the scope and boundaries are found in Table 1.

Table 1 — Scope and boundary considerations

Scope considerations	Boundary considerations
What operations and activities are included?	What parts of the site are included?
Is energy for transport included?	What facilities are included?
Are other media, e.g. water and gas flows such as hydrogen or nitrogen, included?	Which buildings, systems and processes are included?
Who is top management within the defined EnMS scope and boundaries?	Are other sites included?
How are outsourced processes considered?	What parts of the site or locations are not included?
Are all energy types purchased by the organization included?	Are measurements of energy data available for the chosen boundaries?
Can the authority of control be demonstrated for the selected scope?	

Typically, the energy management team develops the documented EnMS scope and boundaries based on input from top management regarding the activities and physical or organizational limits to be covered by the EnMS.

Documenting the scope and boundaries of the EnMS can be in any format. For example, they can be presented as a simple list, map, line drawing or as a written description indicating what is included within the EnMS.

4.4 Energy management system

The intent of this subclause is to ensure that the organization determines and implements the processes needed for continual improvement. This includes the processes that are needed for the effective implementation and continual improvement of the system, such as internal audit, management review and others. It also includes the processes needed for quantifying and analysing energy performance.

The level to which processes need to be determined and detailed can vary according to the context of the organization.

ISO 50001:2018 uses ISO's common approach to MSS, where the aim is to enhance the consistency and alignment of MSS by providing a unifying and agreed upon HLS, identical core text and common terms and core definitions. This is particularly useful for those organizations that choose to operate a single (sometimes called "integrated") management system that can meet the requirements of two or more MSS simultaneously. The HLS is not intended to provide a sequential order of activities to undertake when developing, implementing, maintaining and continually improving a MSS. The HLS as a whole is intended to enable an organization to achieve continual improvement and is based on the PDCA approach. The MSS elements are organized around functional activities in an organization as shown in Figure 1.

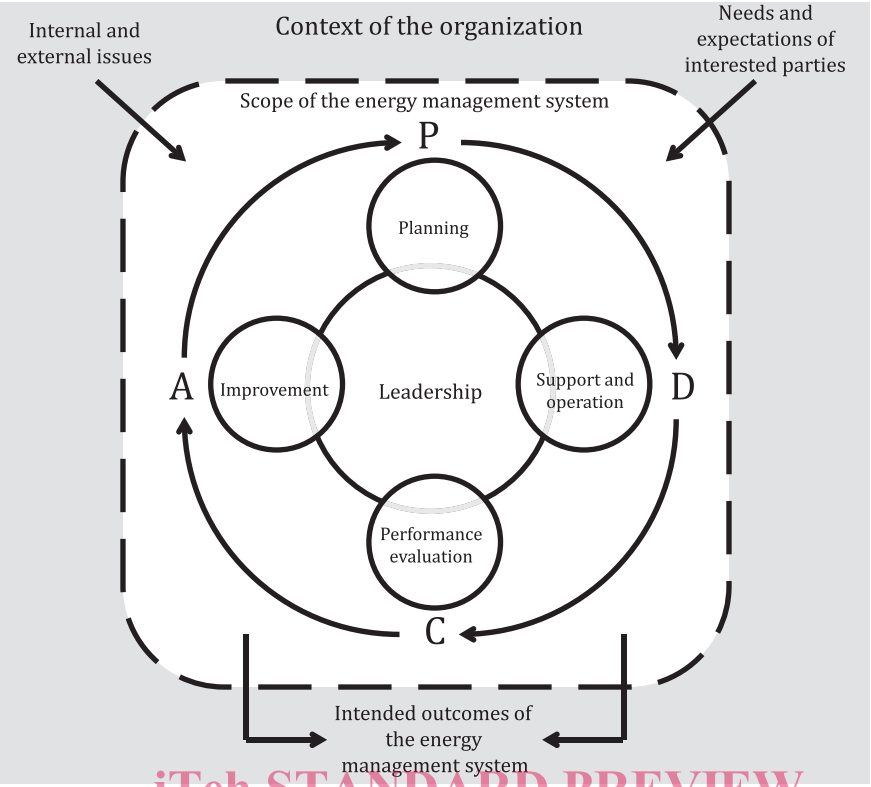

Figure 1 — Plan-Do-Check-Act cycle

It is good practice to keep the EnMS as simple and easy to understand as possible while still meeting the ISO 50001:2018 requirements. For example, organizational objectives for energy management and energy performance should be reasonable, achievable and aligned with current organizational or business priorities. Documentation should be straightforward and responsive to organizational needs, as well as easy to update and maintain. As the management system develops based on continual improvement, simplicity should be maintained. The EnMS for each organization should reflect and be as unique as that organization.

The processes of the EnMS for a complex organization may be more detailed in order to effectively manage energy efficiency, use and consumption. Lower complexity organizations could only require simple approaches and the minimum processes and documented information as defined in ISO 50001:2018 for an effective EnMS. For example, in a low complexity organization, collection of energy data can be as simple as logging utility meter readings for gas and electricity, manually, in a spreadsheet. For a complex organization to effectively manage energy, the data collection would likely need to include electronic gathering and transmitting of multiple data sources across the organization, including sub-meter data.

5 Leadership

5.1 Leadership and commitment

This subclause is intended to ensure that top management actively demonstrates leadership and commitment to continually improving energy management and energy performance. Ongoing top management commitment and engagement are critical factors in the continual improvement of the EnMS and energy performance.

Top management demonstrates its commitment through:

a) its leadership actions and active involvement in the EnMS;

b) understanding the ongoing allocation of the needed resources, which includes people to implement, maintain and improve the EnMS and energy performance over time, including the means of gathering and reporting data to support the ongoing maintenance and improvement of the EnMS and energy performance.

Energy management and energy performance improvement should align with the organization's business strategy, long-term planning and resource allocation processes.

Early in the EnMS implementation process, top management should initiate ongoing communications across the organization about the benefits and importance of energy performance and energy management. Initial communication typically includes the energy policy and announcing the energy management team.

Integration of energy management responsibilities with the organization's performance evaluation (appraisal) system for personnel can improve EnMS outcomes by institutionalizing responsibilities.

Good practice is to have a cross-functional energy management team of more than one person, which includes representatives from areas that can affect energy performance. This approach provides an effective mechanism to engage different parts of the organization in the planning, implementation and maintenance of the EnMS. The members of the energy management team can change over time and should be based on defined roles rather than named individuals. The energy management team size can vary with the size or complexity of the organization and their processes.

NOTE In the case of a small and medium-sized enterprise (SME), the roles and responsibilities of the team could be fulfilled by a single individual (see ISO 50001:2018, 3.2.5).

The personnel that make up the energy management team should be empowered by top management to communicate decisions to their respective areas and to ensure that changes to improve energy performance are implemented. The energy management team approach takes advantage of the diversity of skills and knowledge of individuals. The organization should consider building energy management and improvement capability and capacity throughout the organization. This can include additional training and rotation of the members of the energy management team.

When selecting the members of the energy management team (as appropriate to the organization's size and complexity), top management should consider the following:

— personnel representing a mix of skills and functions to address both the technical and organizational components of the EnMS;

— financial decision-makers or personnel with access to them;

— business development managers;

— representatives of other management systems;

— an environmental manager;

— procurement personnel or supply chain managers, as appropriate;

— operational personnel, particularly those performing tasks associated with SEUs;

— representatives of tenants or the building administrator in commercial buildings, where appropriate;

— individuals who can take responsibility for operational controls or other elements of the EnMS;

— maintenance and facility personnel;

— production or other personnel who could already be involved in improvement mechanisms, such as continuous improvement teams;

— individuals who will further the integration of the EnMS into the organization;