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Entwurf

Energiemanagementsysteme – Anforderungen mit Anleitung zur Anwendung (ISO/DIS 50001:2017); Deutsche und Englische Fassung prEN ISO 50001:2017

Energy management systems –
Requirements with guidance for use (ISO/DIS 50001:2017);
German and English version prEN ISO 50001:2017

Systèmes de management de l'énergie –
Exigences et recommandations de mise en oeuvre (ISO/DIS 50001:2017);
Version allemande et anglaise prEN ISO 50001:2017

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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 on 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 the following URL: 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 50001:2011), which has been technically revised.

The main changes compared to the previous edition are as follows:

- Adoption of the Annex SL Annex 2, High Level Structure (HLS) text to ensure a high level of compatibility with other management system standards;
- Clarify of language and organization;
- Definitions in Section 3 are in context order;
- Energy Review has been clarified;
- Normalization of EnPI(s) and associated EnB(s);
- Clarification on the energy data collection plan and related requirements (previously energy measurement plan);
- EnPI and EnB text has been clarified to provide a better understanding of these concepts.

Introduction

0.1 General

The aim of this document is to enable organizations to establish the systems and processes necessary to continually improve energy performance, including energy use, energy consumption, and energy efficiency. Successful implementation of an energy management system (EnMS) requires a culture of energy performance and in many instances this involves cultural change within an organization. It also depends upon commitment from all levels and functions of the organization, especially top management. This document applies to the activities under the control of the organization. Its application can be tailored to fit the specific requirements of the organization, including the complexity of its systems, degree of documented information and available resources. This document does not apply to product use by end-users outside of the scope and boundaries of the EnMS, nor does it apply to the product design outside of facilities, equipment, systems or energy-using processes. This document does apply to the design and procurement of facilities, equipment, systems or energy-using processes within the scope and boundaries of the EnMS.

This document specifies the EnMS requirements for an organization. These include development and implementation of an energy policy, objectives, energy targets, and action plans related to its energy use, energy consumption, and energy efficiency while meeting applicable legal and other requirements. An EnMS enables an organization to set and achieve objectives and energy targets, take action as needed to improve its energy performance and to demonstrate the conformity of the system to the requirements of this document.

0.2 Energy Performance approach

This document provides requirements for a systematic, data-driven process, focused on continually improving energy performance. Energy performance is a key element integrated within the concepts introduced in this document in order to ensure effective results based on comparable measurements across time. Energy performance is a broad concept which is related to energy consumption, energy use and energy efficiency. Energy performance indicators (EnPIs) and energy baselines (EnBs) are two interrelated elements addressed in this document means to enable organizations to demonstrate energy performance improvement.

0.3 Plan-Do-Check-Act cycle

Energy management described in this document is based on the Plan Do Check Act (PDCA) continual improvement framework and incorporates energy management into existing organizational practices, as illustrated in Figure 1.

In the context of energy management, the PDCA approach can be outlined asfollows:

– **Plan**: understand the context of the organization, establish an energy policy, an energy management team, consider actions to address risks and opportunities, conduct the energy review, establish the energy performance indicators (EnPIs), energy baseline(s) (EnBs), objectives and energy targets, and action plans necessary to deliver results that will improve energy performance in accordance with the organization's energy policy;
– **Do**: implement the action plans, operational and maintenance controls, and communication, ensure competence and consider energy performance in design and procurement;
– **Check**: monitor, measure, analyze, evaluate, audit and conduct management review(s) of energy performance and the EnMS;

– **Act**: take actions to address nonconformities and continually improve energy performance and the EnMS.

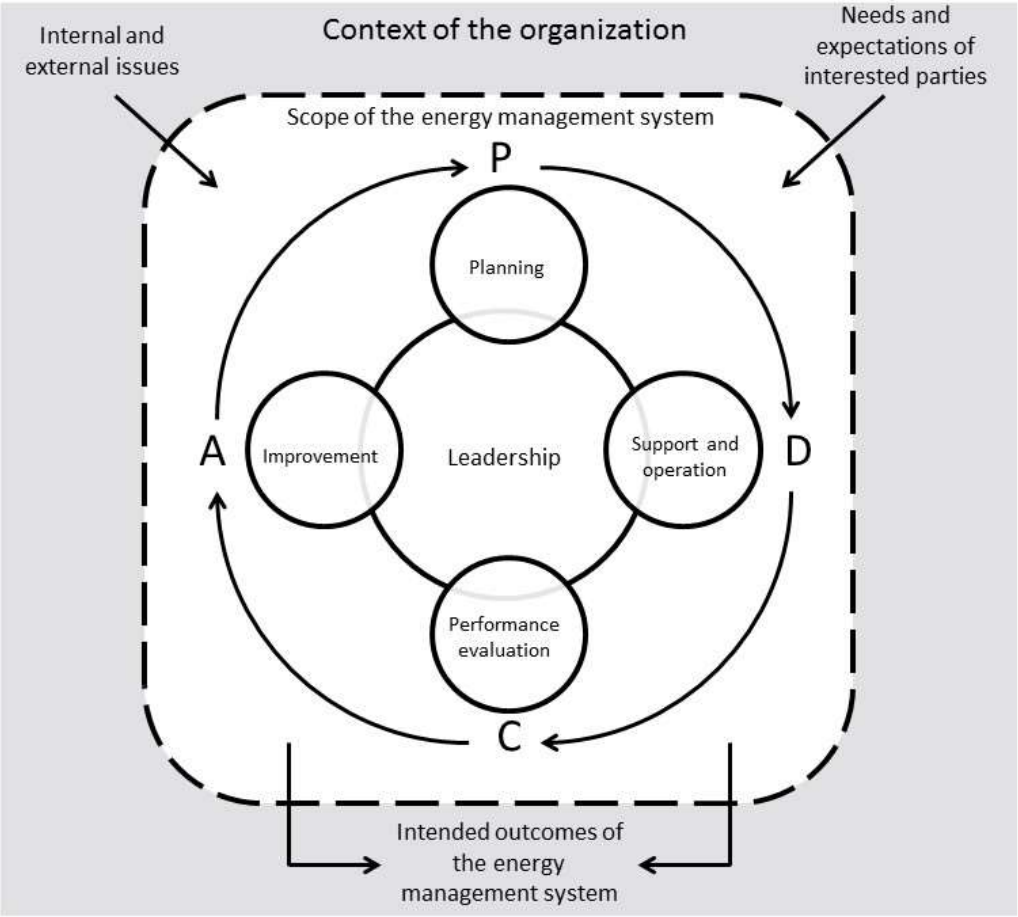

Figure 1 Plan Do Check Act Cycle

0.4 Compatibility with other management system standards

This document incorporates the common elements of ISO Directive 1 Annex SL High Level Structure, thereby ensuring a high level of compatibility with other management system standards. This document can be used independently, but an organization can also choose to combine its EnMS with other management systems, or integrate its EnMS in the achievement of other business, environmental or social objectives. Two organizations carrying out similar operations, but having different energy performance, can both conform to the requirements of ISO 50001. An organization can choose the order in which to implement and maintain the requirements.

This document contains the requirements used to assess conformity. An organization that wishes to demonstrate conformity with this document can do so by:

— making a self-determination and self-declaration, or

— seeking confirmation of its conformance or self-declaration by interested parties, such as customers, or
— seeking certification/registration of its energy management system by an external organization.

In this document, the following verbal forms are used:
— "shall" indicates a requirement;
— "should" indicates a recommendation;
— "may" indicates a permission;
— "can" indicates a possibility or a capability.

Information marked as "NOTE" is intended to assist the understanding or use of the document. "Notes to entry" used in Clause 3 provide additional information that supplements the terminological data and can contain requirements relating to the use of a term.

0.5 Benefits of ISO 50001

Effective implementation of ISO 50001 can transform the way organizations manage energy, offering a systematic approach to improvement of energy performance over time. The standard has value as a best practice model for strategic management of energy and associated costs.

ISO 50001 is:

- Business-friendly: energy and cost savings based on a proven management framework;
- Globally relevant: developed by over 50 countries, many of whom have implemented supporting policies and programs;
- Transformational: embeds energy best practices into any organization, allowing continual improvement in energy performance and therefore overall productivity.

Most importantly, by embedding energy management as an integral business practice, companies ensure that energy performance improvement opportunities are continually realized and energy performance improvements endure and grow over time.

Energy management systems have an important role in accelerating climate change actions in support of United Nations climate change agreements. Standards related to energy management have a critical role in helping meet climate goals by promoting energy performance improvements while providing transparency, reliability and accountability.

Broad implementation of the ISO 50001 standard across the commercial, industrial, and services sectors may achieve significant energy performance improvement for individual organizations while driving progress towards meeting climate actions globally.

BLUE text in this document is high-level structure ISO/IEC Directive 1 Annex SL Annex 2 text or template ISO text and justification is required for changes. The BLACK text is discipline specific text from ISO/TC 301. **Colour text will not be used after the Draft International Standard (DIS) stage, at that time all text will be black**. Items in the high-level structure that are to be deleted are shown in strikeout through the DIS stage. Drafting rules of ISO/IEC Directive 2 will be followed.

Energy management systems — Requirements with guidance for use

1 Scope

This document specifies requirements for establishing, implementing, maintaining and improving an energy management system, and its aim is to enable an organization to follow a systematic approach in achieving continual improvement of energy performance.

This document:

a) is applicable to any organization regardless of its type, size, complexity, geographical location, culture, or the products and services it provides;
b) is applicable to activities affecting energy performance that are managed and controlled by the organization;
c) is applicable irrespective of the types of energy and quantity of energy consumed;
d) does not define specific levels of required energy performance improvement, but requires demonstration of continual improvement by determination of energy performance;
e) can be used independently, or be aligned or integrated with other management systems.

Annex A provides informative guidance on this document. Annex B provides a comparison of this edition to the previous edition, ISO 50001:2011.

2 Normative references

There are no normative references cited for this document. This clause is included in order to retain clause numbering identical with other ISO management system standards.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

NOTE: For alphabetical order of terms see the Alphabetical List of terms.

3.1 Terms related to the organization

3.1.1 ~~3.1~~
organization
person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its *objectives* (3.4.13)

Note 1 to entry: The concept of organization includes, but is not limited to, sole-trader, company, corporation, firm, enterprise, authority, partnership, charity or institution, or part or combination thereof, whether incorporated or not, public or private.

3.1.2 ~~3.5~~
top management
person or group of people who directs and controls an *organization* (3.1.1) at the highest level

Note 1 to entry: Top management controls the *organization* (3.1.1) defined within the *EnMS scope* (3.1.4) and *boundaries* (3.1.3) of the *EnMS* (3.2.2)

Note ~~1~~2 to entry: Top management ~~has the power to~~ delegates authority and provides resources within the organization.

Note ~~2~~ 3 to entry: If the scope of the *management system* (3.2.1) covers only part of an organization, then top management refers to those who direct and control that part of the organization.

3.1.3
boundary
physical or organizational limits

EXAMPLES: A process; a group of processes; a site; an entire *organization* (3.1.1); multiple sites under the control of an organization.

Note 1 to entry: The organization defines its boundary.

3.1.4
EnMS scope
set of activities, which an *organization* (3.1.1) addresses through an *EnMS* (3.2.2)

Note 1 to entry: The EnMS scope can include several *boundaries* (3.1.3) and can include transport operations.

3.1.5 ~~3.2~~
interested party (preferred term)
stakeholder (admitted term)
person or *organization* (3.1.1) that can affect, be affected by, or perceive itself to be affected by a decision or activity related to the *EnMS* (3.2.2) or *energy performance* (3.4.3) of the *organization* (3.1.1)

3.2 Terms related to the management system

3.2.1 ~~3.4~~
management system
set of interrelated or interacting elements of an *organization* (3.1.1) to establish *policies* (3.2.3) and *objectives* (3.4.13) and *processes* (3.3.6) to achieve those objectives

Note 1 to entry: A management system can address a single discipline or several disciplines.

Note 2 to entry: The system elements include the organization's structure, roles and responsibilities, planning and operation.

~~Note 3 to entry: The *scope* (3.3) of a *management system* (3.6) may include the whole of the *organization* (3.1), specific and identified functions of the organization, specific and identified sections of the organization, or some or more functions across a group of organizations.~~

3.2.2
energy management system
EnMS
set of interrelated or interacting elements of an *organization* (3.1.1) to establish an *energy policy,* (3.2.4) *objectives* (3.4.13), *energy targets,* (3.5.15), action plans, and process(es) (3.3.6) to achieve the objectives and energy targets

3.2.3 ~~**3.7**~~
policy
intentions and direction of an *organization* (3.1.1), as formally expressed by its *top management* (3.1.2)

3.2.4
energy policy
statement by the *organization* (3.1.1) of its overall intention(s), direction(s), and commitment(s) related to its *energy performance* (3.4.3), as formally expressed by *top management* (3.1.2)

3.2.5
energy management team
person(s) with responsibility and authority for effective implementation of *energy management system* (3.2.2) activities and for delivering *energy performance improvement* (3.4.6)

Note 1 to entry: The size and nature of the *organization* (3.1.1), and available resources are taken into account when determining the size of an energy management team. A single person can perform the role of the team.

3.3 Terms related to requirement

3.3.1 ~~**3.3**~~
requirement
need or expectation that is stated, generally implied or obligatory

Note 1 to entry: "Generally implied" means that it is custom or common practice for the *organization* (3.1.1) and *interested parties* (3.1.5) that the need or expectation under consideration is implied.

Note 2 to entry: A specified requirement is one that is stated, for example in *documented information* (3.3.5)

3.3.2 ~~**3.18**~~
conformity
fulfilment of a *requirement* (3.3.1)

3.3.3 ~~**3.19**~~
nonconformity
non-fulfilment of a *requirement* (3.3.1)

3.3. 4 ~~**3.20**~~
corrective action
action to eliminate the cause(s) of a nonconformity (3.3.3) and to prevent recurrence

3.3.5 ~~**3.11**~~
documented information
information required to be controlled and maintained by an *organization* (3.1.1) and the medium on which it is contained

Note 1 to entry: Documented information can be in any format and media, and from any source.

Note 2 to entry: Documented information can refer to:

— the *management system* (3.2.1), including related *processes* (3.3.6);

— information created in order for the organization to operate (documentation);

— evidence of results achieved (records).

3.3. 6 ~~3.12~~
process
set of interrelated or interacting activities which transforms inputs into outputs

Note 1 to entry: A process related to an *organization's* (3.1.1) activities can be:

— physical (e.g. energy-using processes, such as combustion), or
— business or service (e.g. order fulfilment).

3.3.7 ~~3.15~~
monitoring
determining the status of a system, a *process* (3.3.6) or an activity

~~Note 1 to entry: To determine the status, there may be a need to check, supervise or critically observe.~~ .

3.3.8 ~~3.17~~
EnMS audit
systematic, independent and documented *process* (3.3.6) for obtaining EnMS audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled

Note 1 to entry: An EnMS audit can be an internal audit (first party) or an external audit (second party or third party), and it can be a combined audit (combining two or more disciplines).

Note 2 to entry: An internal EnMS audit is conducted by the *organization* (3.1.1) itself, or by an external party on its behalf.

Note 3 to entry: "Audit evidence" and "audit criteria" are defined in ISO 19011.

3.3.9~~3.14~~
outsource (verb)
make an arrangement where an external *organization* (3.1.1) performs part of an organization's function or *process* (3.3.6)

Note 1 to entry: While an external organization is outside the scope of the *management system* (3.2.1), ~~although~~ the outsourced function or process is within the scope.

3.4 Terms related to performance

3.4.1~~3.16~~
measurement
process (3.3.6) to determine a value

Note 1 to entry: See ISO/IEC Guide 99 for additional guidance on measurement related concepts.

3.4.2 ~~3.13~~
performance
measureable result

Note 1 to entry: Performance can relate either to quantitative or qualitative findings.

Note 2 to entry: Performance can relate to the management of activities, *processes* (3.3.6), products (including services), systems or *organizations* (3.1.1)

3.4.3
energy performance
measurable result(s) related to *energy use* (3.5.4), *energy consumption* (3.5.2), and *energy efficiency* (3.5.3)

Note 1 to entry: Energy performance can be measured against the *organization's* (3.1.1) *energy policy* (3.2.4), *objectives* (3.4.13), *energy targets* (3.4.15) and other energy performance requirements.

Note 2 to entry: Energy performance is one component of the *performance* (3.4.2) of the *EnMS* (3.2.2).

3.4.4
energy performance indicator
EnPI
measure or unit of *energy performance* (3.4.3), as defined by the *organization* (3.1.1)

Note 1 to entry: EnPI(s) can be expressed by using a simple metric, ratio, or a model,

Note 2 to entry: See ISO 50006 for additional guidance.

3.4.5
energy performance indicator value
EnPI value
quantification of the *EnPI* (3.4.4) at or over a specific period of time

3.4.6
energy performance improvement
improvement in measurable results related to *energy efficiency* (3.5.3), *energy use (3.5.4)*, or *energy consumption* (3.5.2)compared to the *energy baseline* (3.4.7)

[Source: ISO 50003, 3.5- modified removed reference to annex and Note 1 to entry deleted]

3.4.7
energy baseline
EnB
quantitative reference(s) providing a basis for comparison of *energy performance* (3.4.3)

Note 1 to entry: An energy baseline is based on data from a specified period of time and/or conditions, as defined by the *organization* (3.1.1).

Note 2 to entry: Energy baseline(s) is also used for determination of *energy performance improvement* (3.4.6), as a reference before and after, or with and without implementation of energy performance improvement actions.

Note 3 to entry: See ISO 50015 for additional information on measurement and verification of energy performance.

Note 4 to entry: See ISO 50006 for additional information on EnPIs and EnBs guidance.

3.4.8
static factor
identified factor that impacts *energy performance* (3.4.3) and does not routinely change

EXAMPLES: Facility size; design of installed equipment; number of weekly shifts; range of products.

[SOURCE: ISO 50015:2014, 3.22, modified — Example modified, Note 1 to entry deleted.]

3.4.9
relevant variable
quantifiable factor that impacts *energy performance* (3.4.3) and routinely changes

EXAMPLES: Weather conditions, operating conditions (indoor temperature, light level), working hours, production output, etc.

[Source: ISO 50015:2014, 3.18]

3.4.10
normalization
modification of energy data in order to account for changes to enable comparison of *energy performance* (3.4.3) under equivalent conditions

3.4.11~~3.9~~
risk
effect of uncertainty

Note 1 to entry: An effect is a deviation from the expected – positive or negative.

Note 2 to entry: Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of, an event, its consequence, or likelihood.

Note 3 to entry: Risk is often characterized by reference to potential "events" (as defined in ISO Guide 73 2009, 3.5.1.3) and "consequences" (as defined in ISO Guide 73:2009, 3.6.1.3), or a combination of these.

Note 4 to entry: Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated "likelihood" (as defined in ISO Guide 73:2009, 3.6.1.1) of occurrence.

3.4.12 ~~3.10~~
competence
ability to apply knowledge and skills to achieve intended results

3.4.13~~3.8~~
objective
results to be achieved

Note 1 to entry: An objective can be strategic, tactical, or operational.

Note 2 to entry: Objectives can relate to different disciplines (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product and *process* (3.3.6)).

~~Note 3 to entry: An objective can be expressed in other ways, e.g. as an intended outcome, a purpose, an operational criterion, as an energy objective, or by the use of other words with similar meaning (e.g. aim, goal, or target).~~

Note 3 4 to entry: In the context of *energy management systems* (3.2.2), objectives are set by the *organization* (3.1.1), consistent with the *energy policy* (3.2.4), to achieve specific results.

3.4.14~~3.6~~
effectiveness
extent to which planned activities are realized and planned results achieved

3.4.15
energy target
quantifiable *objective* (3.4.13) of *energy performance improvement* (3.4.6)

Note 1 to entry: An energy target can be included within an objective.

3.4.16~~3.21~~
continual improvement
recurring activity to enhance *performance* (3.4.2)

Note 1 to entry: Relates to the improvement of *energy performance* (3.4.3) and the *EnMS* (3.2.2).

3.5 Terms related to energy

3.5.1
energy
electricity, fuels, steam, heat, compressed air, and other like media

Note 1 to entry: For the purposes of this document, energy refers to the various types of energy, including renewable, which can be purchased, stored, treated, used in an equipment or in a process, or recovered.

3.5.2
energy consumption
quantity of *energy* (3.5.1) applied

3.5.3
energy efficiency
ratio or other quantitative relationship between an output of *performance* (3.4.2), service, goods, commodities, or *energy* (3.5.1), and an input of energy

EXAMPLES: Conversion efficiency; energy required/energy consumed

Note 1 to entry: Both input and output need to be clearly specified in terms of quantity and quality and be measureable.

3.5.4
energy use
application of *energy* (3.5.1)

EXAMPLES: ventilation; lighting; heating; cooling; transportation; data storage; production process.

Note 1 to entry: Energy use is sometimes referred to as 'energy end-use'**.**

3.5.6
energy review
analysis of *energy use* (3.5.4), *energy consumption* (3.5.2), and *energy efficiency* (3.5.3) based on data and other information, leading to identification of *SEUs* (3.5.7) and opportunities for *energy performance improvement* (3.4.6)

3.5.7
significant energy use
SEU
energy use (3.5.4) accounting for substantial *energy consumption* (3.5.2) and/or offering considerable potential for *energy performance improvement* (3.4.6)

Note 1 to entry: Significance criteria are determined by the *organization* (3.1.1).

4 Context of the organization

4.1 Understanding the organization and its context

The organization shall determine external and internal issues that are relevant to its purpose and that affect its ability to achieve the intended outcome(s) of its EnMS and to improve its energy performance.

When determining organizational context, the organization shall consider the information obtained from the energy review (see 6.3).

4.2 Understanding the needs and expectations of interested parties

The organization shall determine:

a) the interested parties that are relevant to energy performance and the EnMS ;

b) the risk and opportunities for deviating from energy performance;

c) the relevant requirements of these interested parties;

d) which of the identified needs and expectations the organization addresses through its EnMS.

The organization shall:

— ensure that it has access to the applicable legal and other requirements related to its energy use, energy consumption, and energy efficiency;
— determine how these requirements apply to its energy use, energy consumption, and energy efficiency;
— ensure that these requirements are taken into account;
— review at defined intervals its legal and other requirements.

NOTE: See ISO 19600 for additional guidance.

4.3 Determining the scope and boundaries of the energy management system

The organization shall determine the boundaries and applicability of the EnMS to establish its EnMS scope.

When determining ~~this~~ the EnMS scope, the organization shall consider:

a) the external and internal issues referred to in 4.1;

b) the requirements referred to in 4.2.

The organization shall ensure that it has the authority to control its energy use, energy consumption, and energy efficiency within the scope and boundaries. The EnMS scope and boundaries shall be ~~available~~ maintained as documented information (see 7.5).

4.~~4~~ Energy management system

The organization shall establish, implement, maintain and continually improve ~~an~~ the EnMS and its energy performance ~~an energy management system~~, including the processes needed and their interactions, in accordance with the requirements of this document.

NOTE: The processes required can differ from one organization to another due to:
—the size of organization and its type of activities, processes, products and services;
—the complexity of processes and their interactions;
—the competence of persons.

5 Leadership

5.1 Leadership and commitment

Top management shall demonstrate leadership and commitment with respect to continually improving energy performance and effectiveness of the EnMS, by:

a) ensuring that the EnMS scope and boundaries are established;

b) ensuring that the energy policy (see 5.2), objectives (see 6.6), and energy targets are established and are compatible with the strategic direction of the organization;

c) ensuring the integration of the EnMS requirements into the organization's business processes;

NOTE Reference to "business" in this document can be interpreted broadly to mean those activities that are core to the purposes of the organization's existence.

d) ensuring that action plans are approved and implemented;

e) ensuring that the resources needed for the EnMS are available;

f) communicating the importance of effective energy management and of conforming to the EnMS requirements;

g) ensuring that the EnMS achieves its intended outcome(s);

h) directing and supporting persons to contribute to the effectiveness of the EnMS and to energy performance improvement;

i) promoting continual improvement of energy performance and the EnMS;

j) supporting other relevant management roles to demonstrate their leadership as it applies to their areas of responsibility;

k) ensuring the formation of an energy management team;

l) ensuring that EnPIs are appropriate to the organization;

m) ensuring that processes are established and implemented to determine and address changes affecting the EnMS and energy performance.

5.2 Energy policy

Top management shall establish an energy policy that:

a) is appropriate to the purpose and context of the organization (see 4.1);

b) provides a framework for setting and reviewing objectives and energy targets (see 6.6);

c) includes a commitment to ensure the availability of information and needed resources to achieve objectives and energy targets;

d) includes a commitment to satisfy applicable legal and other requirements (see 4.2) related to energy use, energy consumption, and energy efficiency;

e) includes a commitment to continual improvement (see 10.2) of energy performance and the EnMS;

f) supports the procurement (see 8.3) of energy efficient products and services that impact energy performance and

g) supports design (see 8.2) activities that consider energy performance improvement.

The energy policy shall:

— be available as documented information;

— be communicated within the organization;

— be available to interested parties, as appropriate;

— be periodically reviewed and updated as necessary.

5.3 Organization roles, responsibilities and authorities

Top management shall ensure that the responsibilities and authorities for relevant roles are assigned and communicated within the organization.

Top management shall assign the responsibility and authority to the energy management team for:

a) ensuring the EnMS is established, implemented, maintained and continually improved;

b) ensuring that the EnMS conforms to the requirements of this document;

c) implementing action plans (see 6.6.3) to continually improve energy performance;

d) reporting on the performance of the EnMS and improvement of the energy performance to top management at determined intervals;

e) establishing criteria and methods needed to ensure that the operation and control of the EnMS are effective.

6 Planning

6.1 General

Planning shall consist of a review of the organization's activities and processes that can affect energy performance. Planning shall be consistent with the energy policy (see 5.2) and shall lead to actions that result in continual improvement of energy performance. The organization shall maintain documented information on the planning process.

NOTE 1 A concept diagram illustrating the energy planning process is shown in Figure A.1.

NOTE 2 The output of the energy review is used to identify risks and opportunities in the integrated management in the organization and input of subsequent energy planning process.

6.2 ~~6.1~~ Actions to address risks and opportunities

6.2.1 When planning for the EnMS, the organization shall consider the issues referred to in 4.1, 4.2, and outputs of energy review (see 6.3) and determine the risks and opportunities that need to be addressed to:

— give assurance that the EnMS can achieve its intended outcome(s) including energy performance improvement;

— prevent, or reduce, undesired effects;

— achieve continual improvement in the EnMS and energy performance.

6.2.2 The organization shall plan:

a) actions to address these risks and opportunities;

b) how to:

1. integrate and implement the actions into its ~~XXX management system~~ processes;
2. evaluate the effectiveness of these actions.

6.3 Energy review

The organization shall develop and conduct an energy review. Results of the energy review shall be retained as documented information. The methods and criteria used to develop the energy review shall be maintained as documented information. To develop the energy review, the organization shall:

a) analyse energy use and consumption based on measurement and other data, by:

1. identifying current types of energy;
2. evaluating past and current energy use and consumption.

b) based on the analysis of energy use and consumption, identify the areas of significant energy use (SEU), i.e.

– identify the facilities, equipment, systems, and processes that significantly affect energy use and consumption.

c) For each SEU:

1. determine relevant variables;

2. determine current energy performance;

3. identify the people that influence or affect the SEU(s).

d) determine and prioritise opportunities for improving energy performance.
e) estimate future energy use(s) and energy consumption.

The energy review shall be updated at defined intervals, as well as in response to major changes in facilities, equipment, systems or energy–using processes.

NOTE: The output of the energy review provides information for the context of the organization (see 4.1).

6.4 Energy performance indicators

The organization shall determine EnPIs that are appropriate for measuring and monitoring its energy performance and enable the organization to demonstrate energy performance improvement. The method for determining and updating the EnPIs shall be maintained as documented information. Where the organization has data indicating that relevant variables significantly affect energy performance, consideration of relevant variables and static factors is appropriate.

EnPI values shall be reviewed and compared to their respective energy baseline(s), as appropriate. EnPI value(s) shall be retained as documented information.

6.5 Energy baseline

The organization shall establish an EnB(s) using the information from the energy review(s) (see 6.3), taking into account a suitable period of time.

EnB(s) shall be modified to enable energy performance comparison under equivalent conditions or revised in case of one or more of the following:

a) EnPI(s) no longer reflect the organization's energy performance,

b) there have been major changes to the static factors, or

c) according to a pre-determined method.

Where the organization has data indicating that relevant variables significantly affect energy performance, the organization shall carry out normalization of the EnPI(s) and corresponding EnB(s) to compare energy performance changes.

The EnB(s), relevant variable data and modifications to EnB(s) shall be retained as documented information (see 7.5).

6.6 ~~6.2~~ Objectives, energy targets and planning to achieve them

6.6.1 The organization shall establish objectives at relevant functions and levels. The organization shall establish energy targets.

6.6.2 The objectives and energy targets shall:

a) be consistent with the energy policy (see 5.2);

b) be measureable (if practicable);

c) take into account applicable requirements;

d) consider SEUs (see 6.3);

e) take into account opportunities (see 6.3) to improve energy performance;

f) be monitored;

g) be communicated;

h) be updated as appropriate.

The organization shall retain documented information on the objectives and energy targets.

6.6.3 When planning how to achieve its objectives and energy targets, the organization shall ~~determine~~ establish and maintain action plans that include:

— what will be done;

— what resources will be required;

— who will be responsible;

— when it will be completed;

— how the results will be evaluated, including the method for verification of energy performance improvement (see 6.7).

The organization shall consider how the actions to achieve its objectives and energy targets can be integrated into the organization's business processes. The action plans shall be retained as documented information.

6.7 Planning for energy data collection

The organization shall ensure that key characteristics of its operations that determine energy performance are measured, monitored and analysed at planned intervals. The key characteristics to be monitored shall include:

a) the effectiveness of the action plans in achieving objectives and energy targets;
b) EnPI(s);
c) operation of SEUs;

d) actual versus expected energy consumption.

The organization shall define and implement an energy data collection plan appropriate to its size, complexity, resources and its measurement and monitoring equipment. The plan shall specify the data which is necessary to monitor the key characteristics and state how and at what frequency the data shall be collected and retained.

Data to be collected (or acquired by measurement as applicable) and retained as documented information shall include:

1) the relevant variables related to SEUs;

2) energy consumption related to SEUs and to the organization;

3) operational characteristics related to SEUs;

4) static factors, if applicable;

5) data specified in action plans.

The energy data collection plan shall be reviewed at defined intervals and updated as appropriate.

The organization shall ensure that the equipment used in measurement of key characteristics provides data which are accurate and repeatable. Documented information on measurement and monitoring and other means of establishing accuracy and repeatability shall be retained.

7 Support

7.1 Resources

The organization shall determine and provide the resources needed for the establishment, implementation, maintenance and continual improvement of:

a) the EnMS;

b) energy performance.

7.2 Competence

The organization shall:

a) determine the necessary competence of person(s) doing work under its control that affects its energy performance and EnMS;

b) ensure that these persons are competent on the basis of appropriate education, training, skills or experience;

c) where applicable, take actions to acquire the necessary competence, and evaluate the effectiveness of the actions taken;

d) retain appropriate documented information (see 7.5) as evidence of competence.

NOTE Applicable actions can include, for example, the provision of training to, the mentoring of, or the reassignment of currently employed persons; or the hiring or contracting of competent persons.

7.3 Awareness

Persons doing work under the organization's control shall be aware of:

a) the energy policy (see 5.2);

b) their contribution to the effectiveness of the EnMS, including achievement of objectives and energy targets (see 6.6) and the benefits of improved energy performance;

c) the impact of their activities or behaviour with respect to energy performance;

d) the implications of not conforming with the EnMS requirements.

7.4 Communication

The organization shall determine the internal and external communications relevant to the EnMS, including:

a) on what it will communicate;

b) when to communicate;

c) with whom to communicate;

d) how to communicate;

e) who communicates.

When establishing its communication process(es), the organization shall ensure that information communicated is consistent with information generated within the EnMS and is reliable.

The organization shall establish and implement a process by which any person working for, or on behalf of the organization can make comments or suggest improvements to the EnMS and to energy performance.

7.5 Documented information

7.5.1 General

The organization's EnMS shall include:

a) documented information required by this document;

b) documented information determined by the organization as being necessary for the effectiveness of the EnMS and to demonstrate energy performance improvement.

NOTE The extent of documented information for an EnMS can differ from one organization to another due to:

— the size of organization and its type of activities, processes, products and services;

— the complexity of processes and their interactions;

— the competence of persons.

7.5.2 Creating and updating

When creating and updating documented information, the organization shall ensure appropriate:

a) identification and description (e.g. a title, date, author or reference number);

b) format (e.g. language, software version, graphics) and media (e.g. paper, electronic);

c) review and approval for suitability and adequacy.

7.5.3 Control of documented information

Documented information required by the EnMS and by this document shall be controlled to ensure:

a) it is available and suitable for use, where and when it is needed;

b) it is adequately protected (e.g. from loss of confidentiality, improper use, loss of integrity).

For the control of documented information, the organization shall address the following activities, as applicable:

— distribution, access, retrieval and use;

— storage and preservation, including preservation of legibility;

— control of changes (e.g. version control);

— retention and disposition.

Documented information of external origin determined by the organization to be necessary for the planning and operation of the EnMS shall be identified, as appropriate, and controlled.

NOTE Access can imply a decision regarding the permission to view the documented information only, or the permission and authority to view and change the documented information.

8 Operation

8.1 Operational planning and control

The organization shall plan, implement and control the processes, including those related to its SEUs (see 6.3), needed to meet requirements, and to implement the actions determined in 6.2, by:

a) establishing criteria for the processes, including: the effective operation and maintenance of facilities, equipment, systems, and energy-using processes where their absence can lead to a significant deviation from intended energy performance;

NOTE: Significant deviation criteria are determined by the organization.

b) communicating (see 7.4) the criteria to relevant personnel working for, or on behalf of, the organization;

c) implementing control of the processes in accordance with the criteria; including operating and maintaining facilities, equipment, systems and energy-using processes in accordance with established criteria;

d) keeping documented information (see 7.5) to the extent necessary to have confidence that the processes have been carried out as planned.

The organization shall control planned changes and review the consequences of unintended changes, taking action to mitigate any adverse effects, as necessary.

The organization shall ensure that outsourced SEUs or processes related to its SEUs (see 6.3) are controlled (see 8.3), where the absence of control can negatively impact energy performance.

8.2 Design

The organization shall consider energy performance improvement opportunities and operational control in the design of new, modified and renovated facilities, equipment, systems and energy-using processes that can have a significant impact on its energy performance over the planned or expected operating lifetime.

Where appropriate, the results of the energy performance evaluation shall be incorporated into the specification, design and procurement activities.

The results of the design activities shall be retained as documented information (see 7.5).

8.3 Procurement

The organization shall establish and implement criteria for evaluating energy performance over the planned or expected operating lifetime when procuring energy using products, equipment and services which are expected to have a significant impact on the organization's energy performance.

When procuring products, equipment, and services that have, or can have, an impact on SEUs, the organization shall inform suppliers that energy performance is one of the evaluation criteria for procurement.

The organization shall define and communicate specifications for:

a) ensuring the energy performance of procured equipment and services, where applicable;
b) the purchase of energy, if applicable.

9. Performance evaluation

9.1 Monitoring, measurement, analysis and evaluation of energy performance and the EnMS

The organization shall determine for energy performance and the EnMS:

a) what needs to be monitored and measured;

b) the methods for monitoring, measurement, analysis and evaluation, as applicable, to ensure valid results;

c) when the monitoring and measuring shall be performed;

d) when the results from monitoring and measurement shall be analysed and evaluated.

The organization shall evaluate its energy performance and the effectiveness of the EnMS (see 6.7).

Improvement in energy performance shall be evaluated by comparing EnPI values (see 6.4) against the relevant EnB(s) (see 6.5).

The organization shall investigate and respond to significant deviations in energy performance. Information on the results of the investigation and response shall be retained as documented information.

The organization shall retain appropriate documented information as evidence of the results from monitoring and measurement.

NOTE 1: See ISO 50015 for additional information on measurement and verification of energy performance.

NOTE 2: See ISO 50006 for additional information on EnPIs and EnBs.

9.2 Evaluation of compliance with legal and other requirements

At planned intervals, the organization shall evaluate compliance with legal and other requirements (see 4.2) related to its energy use, energy consumption, energy efficiency, and the EnMS. The organization shall retain documented information (see 7.5) on the results of the evaluation of compliance and any actions taken.

9.3 ~~9.2~~ Internal EnMS audit

9.3.1 The organization shall conduct internal EnMS audits at planned intervals to provide information on whether the EnMS:

a) improves energy performance;

b) conforms to:

— the organization's own requirements for its EnMS;

— the energy policy (see 5.2), objectives and energy targets (see 6.6) established by the organization;

— the requirements of this document;

c) is effectively implemented and maintained.

9.3.2 The organization shall:

a) plan, establish, implement and maintain an audit programme(s) including the frequency, methods, responsibilities, planning requirements and reporting, which shall take into consideration the importance of the processes concerned and the results of previous audits;

b) define the audit criteria and scope for each audit;

c) select auditors and conduct audits to ensure objectivity and the impartiality of the audit process;

d) ensure that the results of the audits are reported to relevant management;

e) take appropriate actions in accordance with 10.1 and 10.2;

f) retain documented information (see 7.5) as evidence of the implementation of the audit programme and the audit results.

9.4 ~~9. 3~~ Management review

9.4.1 Top management shall review the organization's EnMS, at planned intervals, to ensure its continuing suitability, adequacy, effectiveness and alignment with the strategic direction of the organization.

9.4.2 The management review shall include consideration of:

a) the status of actions from previous management reviews;

b) changes in external and internal issues and associated risks and opportunities that are relevant to the EnMS;

c) information on the EnMS performance, including trends in:

1. nonconformities and corrective actions;
2. monitoring and measurement results;
3. audit results;
4. results of the evaluation of legal and other requirements;

d) opportunities for continual improvement, including those for competence;

e) energy policy.

9.4.3 The energy performance inputs to management review shall include:

— the extent to which energy targets have been met;

— energy performance and energy performance improvement based on monitoring and measurement results;

— EnPIs and EnBs;

— status of the action plans.

9.4.4 The outputs of the management review shall include decisions related to continual improvement opportunities and any need for changes to the EnMS, including:

a) opportunities to improve energy performance;

b) the energy policy;

c) the EnPIs or EnBs;

d) objectives, energy targets action plans or other elements of the EnMS and actions to be taken if objectives are not achieved;

e) opportunities to improve integration with business processes;

f) allocation of resources;

g) improvement of competence, awareness and communication.

The organization shall retain documented information as evidence of the results of management reviews.

10 Improvement

10.1 Nonconformity and corrective action

When a nonconformity is identified ~~occurs~~, the organization shall:

a) react to the nonconformity and, as applicable:

   1. take action to control and correct it;
   2. deal with the consequences;

b) evaluate the need for action to eliminate the cause(s) of the nonconformity, in order that it does not recur or occur elsewhere, by:

   1. reviewing the nonconformity;
   2. determining the causes of the nonconformity;
   3. determining if similar nonconformities exist, or ~~could~~ can potentially occur;

c) implement any action needed;

d) review the effectiveness of any corrective action taken;

e) make changes to the EnMS, if necessary.

Corrective actions shall be appropriate to the effects of the nonconformities encountered.

The organization shall retain documented information as evidence of:

— the nature of the nonconformities and any subsequent action taken;

— the results of any corrective action.

10.2 Continual improvement

The organization shall continually improve its energy performance. The organization shall continually improve the suitability, adequacy and effectiveness of the EnMS.

Annex A
(Informative)
Guidance for Use

A.1 General

The additional text given in this annex is strictly informative and is intended to prevent misinterpretation of the requirements in this document. While this information addresses and is consistent with the requirements, it is not intended to add to, subtract from, or in any way modify these requirements.

A.2 Relationship between energy performance and the EnMS

This document addresses both energy performance improvement and a management system approach to managing energy. Its key focus is on efficient use and consumption of energy by the organization. This systems approach and concept is designed to enable organizations to incorporate energy performance within the scope of the management system.

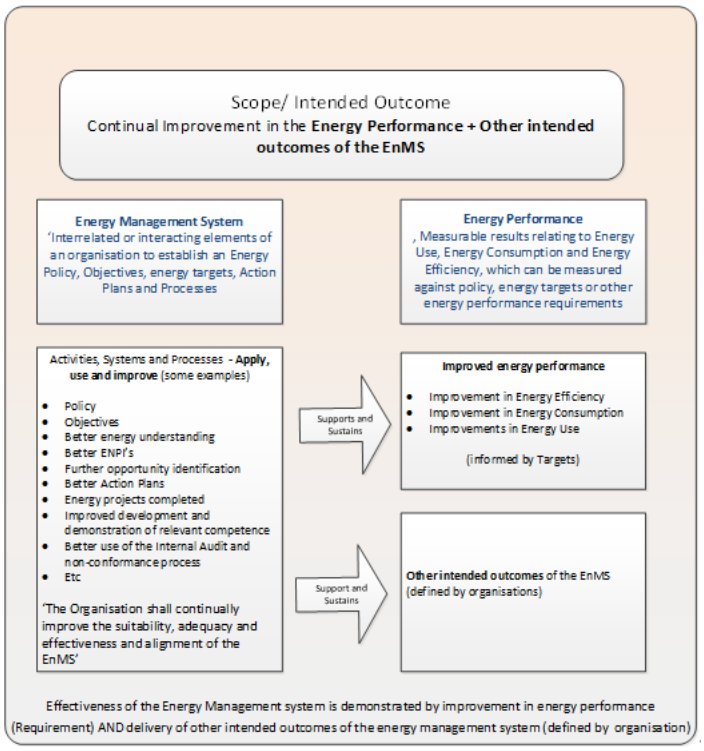

Figure A1 - Relationship between energy performance and EnMS

NOTE: Other intended outcomes of the management system may extend further than traditional energy targets such as delivering reduced costs of energy, improved reliability, increased use of renewables, etc. While the standard requires delivery of improved energy performance, it is the organization that determines the actual energy performance. For other intended outcomes of the management system, the organization determines these requirements.

A.3 Clarification of terminology

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

— In this document, the use of the word "any" implies selection or choice.

— The words "appropriate" and "applicable" are not interchangeable. "Appropriate" means suitable (for, to) and implies some degree of freedom, while "applicable" means relevant or possible to apply and implies that if it can be done, it needs to be done.

— The word "consider" means it is necessary to think about the topic but it can be excluded, whereas "take into account" means it is necessary to think about the topic but it cannot be excluded.

— The word "continual" indicates duration that occurs over a period of time, but with intervals of interruption.

— The word "ensure" means the responsibility can be delegated, but not the accountability.

— This document uses the term "interested party"; the term "stakeholder" is a synonym as it represents the same concept.

This document uses some new terminology. A brief explanation is given below.
As part of the alignment with other management system standards, a common clause on 'Documented Information' has been adopted without significant change or addition (see 7.5). Consequently, the terms "documented procedure" and "record" have both been replaced throughout the text by "documented information".
— "Documented information" replaces the nouns "documentation", "documents" and "records" used in previous editions of this document. To distinguish the intent of the generic term "documented information", this document now uses the phrase "retain documented information as evidence of...." to mean records, and "maintain documented information" to mean documentation other than records that is kept up to date. The phrase "as evidence of…." is not a requirement to meet legal evidentiary requirements; its intent is only to indicate objective evidence needs to be retained.

— The phrase "intended outcome" is what the organization intends to achieve by implementing its energy management system and working toward improved energy performance.

— The phrase "person(s) doing work under its control" includes persons working for the organization and those working on its behalf for which the organization has responsibility (e.g. contractors). It replaces the phrase "persons working for it or on its behalf" and "persons working for or on behalf of the organization" used in the previous edition of this document. The intent of this new phrase does not differ from that of the previous edition.

A.4 Context of the organization

The organizational context will provide a high-level conceptual understanding of the external and internal issues that may impact, either positively or negatively energy performance and the EnMS of the organization.

The result of examination of the organizational context will provide a high-level conceptual understanding of the external and internal issues that may affect, either positively or negatively, energy performance and the EnMS of the organization. Examples of external issues can include:

- issues relating to interested parties such as existing national or sector objectives, requirements or standards,
- any restrictions or limitations on energy supply, security and reliability,
- energy costs or the choice of types of energy,
- geo-political settings,
- effects of or effect on climate change.

Examples of internal issues can include:

— core business objectives and strategy,
— asset management plans,
— financial resource (labor, financial, etc.) constraints affecting the organization,
— energy management maturity and culture,
— sustainability considerations,
— existing technology maturity,
— operational risks and liability considerations

A.5 Leadership

A.5.1 Leadership and commitment

Top management has the overall responsibility for meeting the requirements of this document. Even if it delegates some responsibilities, the overall accountability still stays with it.

When communicating to those in the organization, top management can emphasize the importance of energy management through employee involvement activities such as empowerment, motivation, recognition, training, rewards and participation.

Top management should approve any changes to the boundaries.

A.5.2 Energy policy

Energy policy is the foundation for developing an organization's EnMS and the resultant energy performance within its scope and boundaries. The energy policy may be a brief statement that members of the organization can readily understand and apply to their work activities.

A.5.3 Organization roles, responsibilities and authorities

No additional guidance is given.

A.6 Planning

A.6.1 General

This clause focuses on the energy performance of the organization and activities to maintain and continually improve energy performance.

Figure A.2 provides a conceptual diagram to improve understanding of the energy planning process.

This diagram does not represent the details of a specific organization. The information in the energy planning diagram is not exhaustive and there may be other details specific to the organization or to particular circumstances.

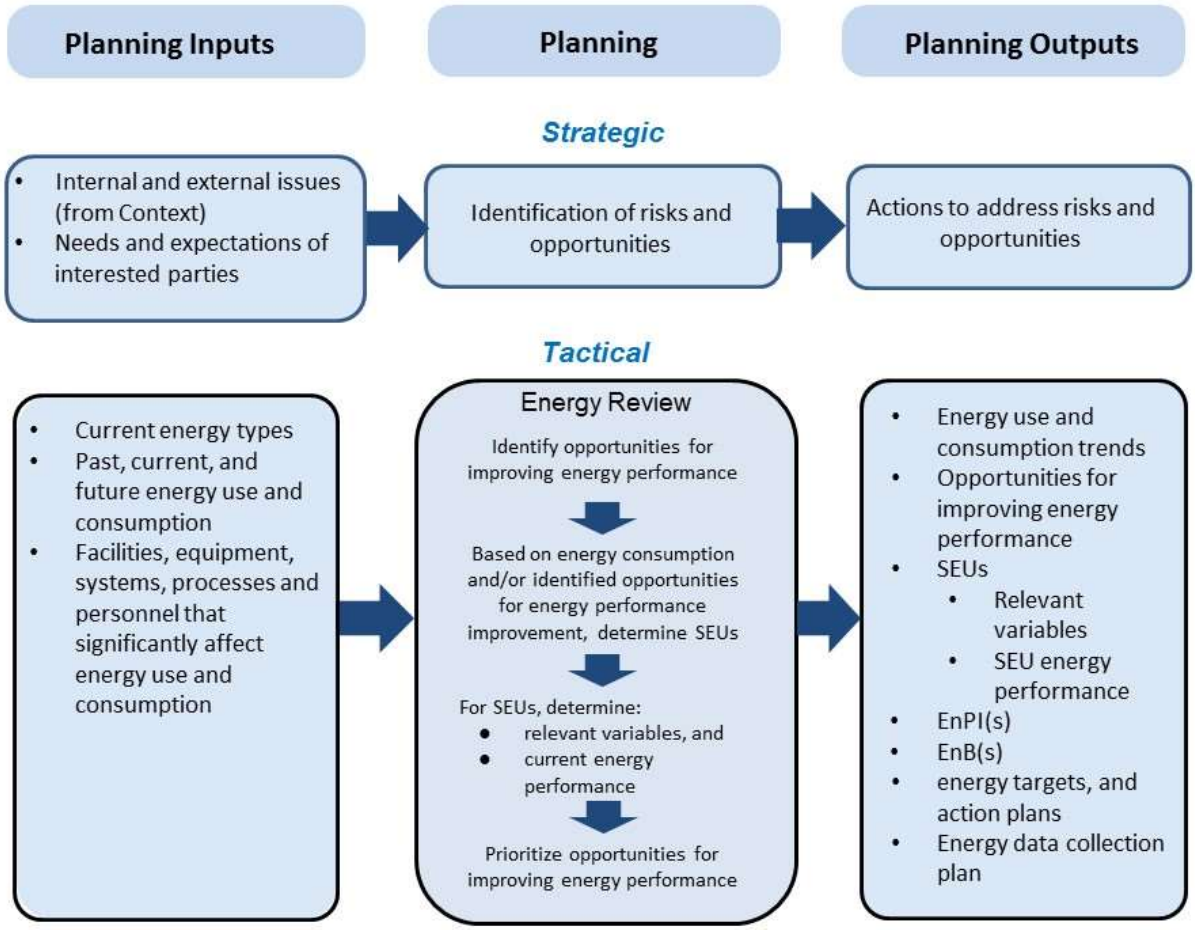

Figure A.2 - Energy Planning Process

A.6.2 Actions to address risks and opportunities

Considerations of risk and opportunities are part of the high-level strategic decision-making in an organization. By identifying risks and opportunities to the EnMS, an organization is able to anticipate potential scenarios and consequences so that undesired effects can be addressed before they occur. Similarly, favourable considerations or circumstances that could offer a potential advantage or beneficial outcomes can be identified and pursued.

A.6.3 Energy review

The process of identification and evaluation of energy use and energy consumption leads the organization to determine areas of significant energy use and identify opportunities for improving energy performance. The organization determines what makes an energy use significant. Once identified, the management and control of SEUs is an integral part of the EnMS.

People working on behalf of the organization can include service contractors, part-time personnel and temporary staff.

Updating the energy review means updating the data and information related to the analysis of energy use and energy consumption, determination of significant energy uses and identification of opportunities for improving energy performance. Not all of the parts of the energy review need to be updated at the same time. To evaluate opportunities for energy performance improvement in more detail a formal energy audit can be used; the energy audits can be of SEUs, systems, energy-using processes and/or equipment.

An energy audit can provide information on one or more parts of the energy review. Depending upon the scope, an energy audit can comprise a detailed review of the energy performance of an organization, of a process, or for another defined scope. It is typically based on appropriate measurement and observation of actual energy performance. Energy audit outputs typically include information on current energy consumption and energy performance, and they can be accompanied by a series of specific ranked recommendations for energy performance improvement or financial return on investment.

When reviewing energy performance, organizations should consider the extent to which energy is required for a particular process, or is recoverable. Even where a process such as a chemical reaction is physically limited, the auxiliary equipment may offer significant energy performance improvement potential, as can improved process control or equipment scheduling. Opportunities can also emerge over time due to changes in operating loads and parameters, equipment degradation and improvements in available technologies and techniques.

Renewable energy is an energy type (source), not an application of energy (use). While an increase in renewable energy does not represent an energy performance improvement, it may have a positive environmental impact and an organization can have an objective to increase its installation of renewable energy. In such cases, an organization needs to separately assessassess the renewable energy production.

A.6.4 Energy performance indicators

EnPIs can be a simple metric, ratio, or a model. An EnPI is not a quantitative value. It is a “ruler” that is used to compare energy performance before (reference EnPI value) and after (resultant or current EnPI value) implementation of action plans and other actions (see Figure A.3). The difference between the reference value and the resultant value is the energy performance change.

The organization can update the EnPIs when business activities or EnBs change that affect the relevance of the EnPI, as applicable. Generally, energy consumption is a measured result of energy, consumed over a specific period of time.

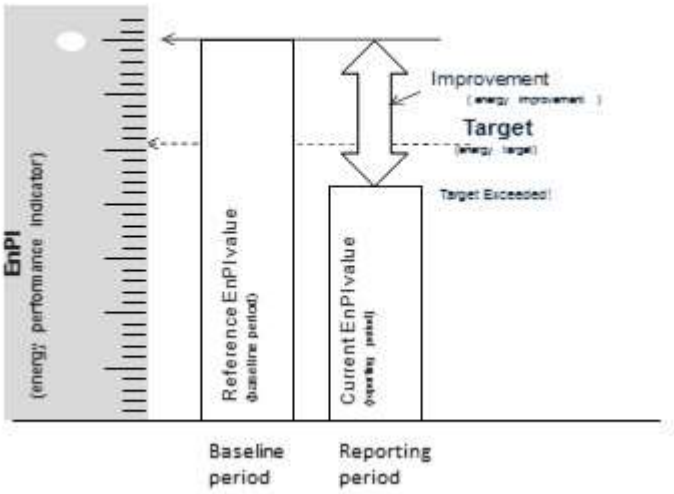

Figure A.3 - EnPI and EnPI Value

A.6.5 Energy baseline

A suitable data period means the organization accounts for operating cycles, regulatory requirements or variables that affect the energy use, energy consumption, and energy efficiency that adequately demonstrate a full range of performance.

Normalization of an EnPI for changes in relevant variables may provide a more accurate indication of energy performance. When an energy use that consumes a significant amount of energy is removed or introduced within the scope and boundaries of the EnMS, the EnB should also be modified accordingly.

A.6.6 Objectives, energy targets, and planning to achieve them

Objectives can include both overall improvements to an EnMS and specific, measurable energy performance improvement targets. While some objectives will have quantifiable targets for energy performance improvement (e.g. reduce electricity consumption 3% by the end of the year, 2% plant efficiency improvement by 4th Quarter), other objectives may be qualitative (e.g. relating to energy behaviour, cultural change).
In addition to the requirement for action plans associated with objective and energy targets, an organization may have action plans that are related to other organizational objectives related to the EnMS.

A.6.7 Planning for energy data

Data is critically important in demonstrating energy performance. Planning for which data to collect, how to collect it and how often helps ensure the availability of the data needed to maintain the energy review and the monitoring, measurement, analysis and evaluation processes.
Measurement can range from only utility meters for small organizations up to complete monitoring and measurement systems connected to a software application capable of consolidating data and delivering automatic analysis. It is up to the organization to determine the means and methods of measurement.

A.7 Support

A.7.1 Resources

Resources include human resources, specialized skills, technology, data collection infrastructure, and financial resources.

A.7.2 Competence

Competence requirements should be appropriate to the function and level of persons, including top management, doing work which affects energy performance in the organization and the EnMS. Competence is determined by the organization.

Training is one of the many methods for achieving competency. EnMS team members should be encouraged to demonstrate continual professional development to maintain and improve knowledge, technical skills and personal attributes. Where relevant national or local certification schemes, or equivalent, are available, certification can be considered.

A.7.3 Awareness

No additional guidance is given.

A.7.4 Communication

No additional guidance is given.

A.7.5 Documented information

This document provides details on what documented information is required to be maintained or retained. The organization may choose to develop additional documented information as it deems necessary to effectively demonstrate energy performance and support the EnMS. Documented information of external origin can include laws, regulations, standards, equipment manuals, weather data, and data in support of static factors and relevant variables.

A.8 Operation

A.8.1 Operational planning and control

No additional guidance is given.

A.8.2 Design

Considering lifetime in ISO 50001 means evaluating the value of energy performance and business benefits against total costs over the lifetime. However, it does not require a lifecycle analysis or lifecycle management.

A.8.3 Procurement

Procurement is an opportunity to improve energy performance through the use of more efficient products and services. It is also an opportunity to work with the supply chain and influence its energy behaviour.

The applicability of energy purchasing specifications may vary from market to market. Specifications for purchases of energy can include energy quality, quantity, reliability, availability, cost structure, environmental impact and alternative sources of energy.

For new facilities, improved technologies and techniques, alternative energy such as renewables or less polluting types of energy options, should be considered.

The organization may use the specification proposed by an energy supplier, as appropriate.

A.9 Performance evaluation

A.9.1 Monitoring, measurement, analysis and evaluation for energy performance and the EnMS

This section involves implementation of the data collection plan (see 6.7) and will evaluate if the organization can demonstrate both energy performance improvement and the effectiveness of the EnMS.

Effectiveness of the EnMS can be demonstrated by improvement in energy performance and other intended outcomes. Energy performance improvement, with EnPIs as defined by the organization, can be demonstrated by the improvements in EnPIs over time, relative to the relevant EnB.

When conducting analysis, ensure that the limitations of the data (accuracy, precision, uncertainty) are taken into account before reaching the final conclusions.

A.9.2 Evaluation of compliance with legal and other requirements

No additional guidance is given.

A.9.3 Internal EnMS audit

Internal audits of an energy management system can be performed by personnel from within the organization, or by external persons selected by the organization, working on its behalf. In smaller organizations, auditor independence can be demonstrated by an auditor being free from responsibility for the activity being audited.

An energy audit or energy assessment is not the same concept as an internal audit of an EnMS.

A.9.4 Management review

The management review covers the scope of the EnMS, although not all elements of the energy management system need to be reviewed at once. The review process may take place over a period of time.

A.10 Improvement

No additional guidance is given.

Annex B
(informative)

Correspondence of ISO 50001:2018 to ISO 50001:2011

Table B.1 - ISO 50001:2018 correspondence to ISO 50001:2011

ISO 50001:2018	ISO 50001:2011
Introduction	Introduction
1. Scope	1. Scope
2. Normative references	2. Normative references
3. Terms and definitions	3. Terms and definitions
4. Context of the organization	
4.1 Understanding the organization and its context	
4.2 Understanding the needs, and expectations of interested parties	4.4.6 Energy objectives, energy targets and energy management action plans
4.3 Determining the scope and boundaries of the energy management system	4.1 General requirements 4.4.2 Legal and other requirements
4.4 EnMS	4.1 General requirements
5. Leadership	4.2 Management responsibility
5.1 Leadership and commitment	4.2.1 Top management 4.2.2 Management representative
5.2 Energy policy	4.3 Energy policy
5.3 Organizational roles, responsibilities and authorities	4.2.1 Top management 4.2.2 Management representative
6. Planning	4.4 Energy planning
6.1 General	4.4.1 General
6.2 Energy review	4.4.3 Energy review
6.3 Actions to address risks and opportunities	
6.4 Energy performance indicators	4.4.5Energy performance indicators
6.5 Energy baseline	4.4.4Energy baseline
6.6 Objectives, energy targets and planning to achieve them	4.4.6 Energy objectives, energy targets and energy management action plans
6.7 Planning for energy data	4.6.1 Monitoring, measurement and analysis
7. Support	4.5 Implementation and operation
7.1 Resources	4.5 Implementation and operation 4.2.1 (energy team)
7.2 Competence	4.5.2 Competence, training and awareness

7.3 Awareness	4.5.2 Competence, training and awareness
7.4 Communication	4.5.3 Communication
7.5 Documented information	4.5.4 Documentation 4.6.5. Control of records
7.5.1 General	4.5.4 Documentation 4.6.5. Control of records
7.5.2 Creating and updating	4.5.4 Documentation 4.6.5. Control of records
7.5.3 Control of documented information	4.5.4 Documentation 4.6.5. Control of records
8. Operation	4.5 Implemenation and operation
8.1 Operations planning and control	4.5.5 Operatinal control
8.2 Design	4.5.6 Design
8.3 Procurement	4.5.7 Procurement of energy services, products, equipment and energy
9. Performance evaluation	4.6 Checking
9.1 Monitoring, measurement, analysis and evaluation for the EnMS	4.6.1 Monitoring, measurement and analysis
9.2 Evaluation of compliance with legal and other requirements	4.6.2 Evaluation of compliance with legal requirements and other requirements
9.3 Internal EnMS audit	4.6.3 Internal audits
9.4 Management review	4.7 Management review 4.7.1 General 4.7.2 Input to management review 4.7.3 Output from management review
10. Improvement	
10.1 Nonconformity and corrective action	4.6.4 Nonconformities, correction, corrective action and preventive action
10.2 Continual improvement	
Annex A (informative) Guidance on the use of this document	Annex A (informative) Guidance on the use of this document
Annex B (informative) Correspondence between ISO 50001:2011, ISO 9001:2008, ISO 14001:2004 and ISO 22000:2005	Annex B Correspondence table ISO 50001:2011 to ISO 50001:201x
	Alphabetical list of terms
Bibliography	Bibliography

Table B.2 - ISO 50001:2011 correspondence to ISO 50001:2018

ISO 50001:2011	ISO 50001:2018
Introduction	Introduction
1 Scope	1 Scope
2 Normative references	2 Normative references
3 Terms and definitions	3Terms and definitions
	4 Context of the organization
	4.1 Understanding the organization and its context
4 Energy management system requirements	
4.1 General requirements	4.3 Determining the scope of the Energy management system 4.4 EnMS
4.2 Management responsibility	5.1 Leadership and commitment
4.2.1 Top management	4.3 Determining the scope and boundaries of the energy management system 5.1 Leadership and commitment And 7.1 Resources
4.2.2 Management representative	5.1 Leadership and commitment And 5.3 Organizational roles, responsibilities and authorities
4.3 Energy policy	5.2 Energy policy
4.4 Energy planning	6 Planning
4.4.1 General	6.1 General
4.4.2 Legal requirements and other requirements	4.2 Understanding the needs, and expectations of interested parties
4.4.3 Energy review	6.3 Energy review
	6.2 Actions to address risks and opportunities
4.4.4 Energy baseline	6.5 Energy baseline
4.4.5 Energy performance indicators	6.4 Energy performance indicators
4.4.6 Energy objectives, energy targets and energy management action plans.	4.3 Understanding the needs and expectations of interested parties 6.6 Objectives, energy targets and planning to achieve them
4.5 Implementation and operation	7. Support 8. Operations
4.5.1 General	
4.5.2 Competence, training and awareness	7.2 Competence
	7.3 Awareness
4.5.3 Communication	7.4 Communications

4.5.4 Documentation	7.5 Documented Information
	7.5.1 General
	7.5.2 Creating and updating
	7.5.3 Control of documented information
4.5.5 Operational control	8.1 Operations planning and control
4.5.6 Design	8.2 Design
4.5.7 Procurement of energy services, products, equipment and energy	8.3 Procurement
4.6 Checking	9. Performance evaluation
4.6.1 Monitoring, measurement and analysis	9.1 Monitoring, measurement, analysis and evaluation 6.7 Planning for energy data
4.6.2 Evaluation of compliance with legal requirements and other requirements	9.2 Evaluation of legal and other requirements
4.6.3 Internal audit of the EnMS	9.3 Internal EnMS audit
4.6.4 Nonconformities, correction, corrective action and preventive action	10.1 Nonconformity and corrective action
4.6.5 Control of records	Documented Information (See 7.5 above under Documentation)
4.7 Management review	9.4 Management review
4.7.1 General	
4.7.2 Input to management review	
4.7.3 Output from management review	
	10.2 Continual improvement
Annex A (informative) Guidance on the use of this document	Annex A (informative) Guidance on the use of this document
Annex B (informative) Correspondence between ISO 50001:2011, ISO 9001:2008, ISO 14001:2004 and ISO 22000:2005	Annex B Correspondence table ISO 50001:2011 to ISO 50001:201x
	Alphabetical list of terms
Bibliography	Bibliography

Alphabetical list of terms

3.1.3	boundary	3.3.8	EnMS audit
3.4.12	competence	3.1.4	EnMS scope
3.3.2	conformity	3.4.5	EnPI value
3.4.16	continual improvement	3.1.5	interested party stakeholder
3.3.4	corrective action	3.2.1	management system
3.3.5	documented information	3.4.1	measurement
3.4.14	effectiveness	3.3.7	monitoring
3.5.1	energy	3.3.3	nonconformity
3.4.7	energy baseline	3.4.10	normalization
3.5.2	energy consumption	3.4.13	Objective
3.5.3	energy efficiency	3.1.1	Organization
3.2.2	energy management system	3.3.9	outsource (verb)
3.2.5	energy management team	3.4.2	Performance
3.4.3	energy performance	3.2.3	policy
3.4.6	energy performance improvement	3.3.6	process
3.4.4	energy performance indicator	3.4.9	relevant variable
3.2.4	energy policy	3.3.1	requirement
3.5.6	energy review	3.4.11	risk
3.4.15	energy target	3.5.7	significant energy use
3.5.4	energy use	3.4.8	static factor
		3.1.2	top management

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