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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 50100

Energy management systems and energy savings — Decarbonization — Requirements with guidance for use

ICS: 27.015; 13.020.40

ISO/TC 301

Secretariat: **ANSI**

Voting begins on:
2025-05-06

Voting terminates on:
2025-07-29

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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 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 [or Project Committee] ISO/TC 301 Energy management and energy savings.

This is the first edition.

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

0.1 Importance of *decarbonization*

Nearly 75 % of global anthropogenic *Greenhouse Gas (GHG) emissions* are from the generation and consumption of *energy*¹⁾. This standard is designed to help *organizations* of all types and sizes to reduce their *GHG emissions* related to *energy consumption*, (noted as *ERGE* in this document) in line with the *organization's* specific targets. This document outlines the *requirements* and provides guidance for *organizations* to develop a pathway that transitions their *energy consumption* to meet *ERGE reduction* targets.

0.2 Achieving *decarbonization*

To achieve *decarbonization*, as established by the Paris Agreement and National Determined Contributions (NDCs), *organizations* across all sectors must take action and implement actions to reduce the *energy consumption* of their *energy uses* and switch to the consumption of low-carbon emission energy types (i.e. *energy* with a lower *GHG emission factor*).

This document provides *organizations* with a comprehensive *decarbonization* process that can be integrated into the *organization's* routine operations. This process is based on a *decarbonization* plan leading to specific *ERGE reduction* actions producing, demonstrable results. The use of this document can result in an energy transition achieved through this *decarbonization* plan.

Processes to manage *energy* have been shown to effectively reduce *energy consumption*²⁾. ISO 50001 is an example of an energy management system that can serve as the foundation for reducing *GHG emissions* from *energy consumption*. While this document is not a management system standard, the processes it outlines can be effectively integrated with an energy management system or any other management system that includes requirements to quantifiably improve energy performance. [Annex A](#) shows the relationship between this document and^[2] ISO 50001:2018, which complement each other to enable an *organization* to achieve a performance based *decarbonization* strategy.

This document is designed to work with the existing GHG quantification documents (e.g [\[4\]](#), ISO 14064-1^[8], GHG protocol, etc.).

This document enables *organizations* to make *claims* ([3.3.6](#)) regarding:

- its plan to meet *ERGE* targets (*validation* ([3.3.4](#)));
- its achievement of *ERGE* targets based on historical data (*verification* ([3.3.5](#))); or
- both its plan and achievement of *ERGE* targets.

0.3 Benefits

This document provides a systematic approach to developing a pathway for transitioning an *organization's* *energy consumption* to reduce *ERGE* in order to help *organizations*:

- a) Align internal systems, processes, and input from *interested parties* to more effectively and efficiently reduce *ERGE*.
- b) Improve the availability and quality of data and information shared internally and with *interested parties*.
- c) Create a culture for reducing *ERGE*. This involves leveraging synergies across different means such as energy management systems, *energy efficiency*, renewable energy, and technology improvements to achieve cost savings through a *decarbonization* strategy.
- d) Provide internal and external *interested parties* assurance that the *organization* has established a clear and transparent *ERGE* target(s) based on an absolute *GHG emissions* value(s).

1) <https://www.wri.org/data/world-greenhouse-gas-emissions-2019>

2) IEA (2019), Multiple Benefits of Energy Efficiency, IEA, Paris
<https://www.iea.org/reports/multiple-benefits-of-energy-efficiency>, Licence: CC BY 4.0^[1]

- e) Develop *ERGE reduction* action plans implemented over time, resulting in achievement of the organizational *decarbonization* strategy.
- f) Demonstrate achievement of historic *ERGE* targets and the ability to achieve future *ERGE* targets.

0.4 Compatibility

This document contains *requirements* and can be used to assess conformity for repeatable and reproducible results related to *ERGE*.

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 capability.

“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.

Information marked as “NOTE” in [clauses 4](#) through [12](#) are intended to assist the understanding or use of the document.

Energy management systems and energy savings — Decarbonization — Requirements with guidance for use

1 Scope

This document specifies *requirements* and guidance that enable an *organization* to reduce its *energy-related GHG emissions*.

This document:

- a) is applicable to any *organization* regardless of its type, size, complexity, geographical location, organizational culture or the products and services it provides;
- b) is applicable to energy-related *Scope 1 emissions* and *Scope 2 emissions*;
- c) is applicable irrespective of the quantity, use, or types of *energy* consumed;
- d) requires demonstration of absolute *energy-related GHG emissions reduction* aligned with *energy-related GHG emission target(s)*.

[Annex B](#) provides information on *GHG emissions* and energy-related *Scope 1 emissions*.

[Annex C](#) provides guidance related to the *decarbonization* plan.

[Annex D](#) provides guidance related to an *organization* making a *claim*.

[Annex E](#) provides guidance on *boundaries* as they relate to *claims*.

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 and definitions

For the purposes of this document, the *following terms and definitions* given in ISO 50001:2018, as well as the *following* 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>

3.1 Terms related to *organization*

3.1.1

organization

person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its targets

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.

[SOURCE: ISO 50001:2018, 3.1.1 - modified to replaced "objectives" with "targets".]

3.1.2

top management

person or group of people who directs and controls an *organization* at the highest level

Note 1 to entry: *Top management* is empowered to delegate authority and provide resources within the *organization*.

Note 2 to entry: Top management controls the *organization* as defined within its *decarbonization boundaries*.

[SOURCE: ISO 50001:2018, 3.1.2 - modified deleted Note 2 to entry, Note 3 to entry changed to Note 2 to entry and EnMS scope replaced with decarbonization, EnMS changed to organization.]

3.1.3

boundary

physical, virtual and/or organizational limits as defined by the entity for a stated purpose

EXAMPLE A process a group of processes; a site; multiple sites under the control of an *organization*; or an entire *organization*.

Note 1 to entry: The entity can be an *organization*, group of organizations, region(s), subset of an *organization* or other depending on the application.

Note 2 to entry: Physical can be equipment, systems, a building, a process, a group of processes, a site or multiple sites, under the control of an *organization*.

[SOURCE: [\[12\]](#) ISO 50006:2023, 3.1.2.]

3.1.4

interested party

stakeholder

person or *organization* that can affect, be affected by, or perceive itself to be affected by a decision or activity

EXAMPLE Examples of *interested parties* include but are not limited to regulators, customers, suppliers, investors, shareholders, corporate, and employees.

[SOURCE: ISO 50001:2018, 3.1.5 -modified added Example]

3.2 Terms related to *requirement*

3.2.1

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* and *interested parties* 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.

Note 3 to entry: A relevant *requirement* is one that the *organization* has determined applies to the decarbonization boundary and/or *decarbonization* activities.

[SOURCE: ISO 50001:2018, 3.3.1- modified added Note 3 to entry]

3.3 Terms related to performance

3.3.1

monitoring

determining the status of a system, a process or an activity

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

Note 2 to entry: In an energy management system, *monitoring* can be a review of *energy* data or *GHG emissions* related data.

[SOURCE: ISO 50001:2018, 3.3.7 - modified added "or GHG emissions related data to Note 2 to entry]

3.3.2

base year

specific, historical twelve-month period identified for the purpose of comparing *ERGE reduction*

Note 1 to entry: The *base-year* can be quantified based on a specific year or averaged from several periods (e.g. several years).

Note 2 to entry: This document uses the unit of tCO₂e/year throughout, thus the period is a year. The twelve-month period does not need to be a calendar year but is a contiguous twelve-months.

3.3.3

reporting year

defined twelve-month period of time selected for quantification and reporting of *ERGE*

Note 1 to entry: The reporting year can be quantified based on a specific year or averaged from several years.

Note 2 to entry: This document uses the unit of tCO₂e/year throughout, thus the period is a year. The twelve-month period does not need to be a calendar year but is a contiguous twelve-months.

3.3.4

validation

confirmation of a *claim*, through the provision of objective evidence, that the *requirements* for a specific intended future use or application have been fulfilled

Note 1 to entry: Objective evidence can come from real or simulated sources.

Note 2 to entry: *Validation* is considered to be a process to evaluate the reasonableness of the assumptions, limitations, and methods that support a *claim* about the outcome of future activities.

Note 3 to entry: Validation is applied to *claims* regarding an intended future use based on projected information (confirmation of plausibility).

[SOURCE: [14] ISO/IEC 17029:2019, 3.2- modified deleted Note 4 to entry]

3.3.5

verification

confirmation of a *claim*, through the provision of objective evidence, that specified *requirements* have been fulfilled

Note 1 to entry: *Verification* is considered to be a process for evaluating a *claim* based on historical data and information to determine whether the *claim* is materially correct and conforms with specified *requirements*.

Note 2 to entry: Verification is applied to *claims* regarding events that have already occurred or results that have already been obtained (confirmation of truthfulness).

[SOURCE: [14] ISO/IEC 17029:2019, 3.3 - modified deleted Note 3 to entry]

3.3.6

claim

information declared by the organization

Note 1 to entry: The claim is the object of conformity assessment by *validation* and/or *verification*.

Note 2 to entry: The claim can represent a situation at a point in time or could cover a period of time.

Note 3 to entry: The claim should be clearly identifiable and capable of consistent evaluation or *measurement* against specified requirements by a validation or verification body.

Note 4 to entry: The claim can be provided in the form of a report, a statement, a declaration, a decarbonization plan, or consolidated data.

[SOURCE: [\[14\]](#) ISO/IEC 17029:2019, 3.1 – modified changed “client” to “organization”, changed project plan to decarbonization plan in Note 4 to entry]

3.4 Terms related to energy

3.4.1

energy

electricity, fuels, steam, heat, compressed air and other similar 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.

[SOURCE: ISO 50001:2018, 3.5.1]

3.4.2

energy consumption

quantity of *energy* applied

Note 1 to entry: *Energy consumption* can be represented in volume (e.g. litres of fuel), mass, weight units or *energy* units (e.g. GJ, kWh).

[SOURCE: [\[12\]](#) ISO 50006:2023, 3.1.5]

3.4.3

energy efficiency

ratio or other quantitative relationship between an output of process and an input of *energy*

EXAMPLE Conversion efficiency; energy required/energy used, output/input, theoretical energy used to operate/energy used to operate.

Note 1 to entry: The output of a process can be products, services, or *energy*.

Note 2 to entry: Both input and output should be clearly specified in terms of quantity and quality and should be measurable.

[SOURCE: [\[12\]](#) ISO 50006:2023, 3.1.6]

3.4.4

energy use

energy end-use

application of *energy*

EXAMPLE Ventilation, lighting, heating, cooling, transportation, process, data storage.

Note 1 to entry: Energy use is based on “what the energy is used for” as compared to *energy consumption* which is based on “how much energy is used”.

Note 2 to entry: This application can be from any energy type including renewables.

[SOURCE: [\[12\]](#) ISO 50006:2023, 3.1.7]

3.5 Terms related to global warming and climate change

3.5.1

decarbonization

reduction of carbon dioxide and other *GHG emissions* into the atmosphere

3.5.2

greenhouse gas

GHG

gaseous constituent of the atmosphere, natural or anthropogenic, that absorbs and emits radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere and clouds

Note 1 to entry: For a list of GHGs, see the latest Intergovernmental Panel on Climate Change (IPCC) Assessment Report. <https://www.ipcc.ch/reports/>

[SOURCE: [8] ISO 14064-1:2018, 3.1.1, modified Note 1 to entry added the web-link.]

3.5.3

GHG emission

release of *GHG* to the atmosphere

[SOURCE: [4] ISO 14050:2020, 3.9.8]

3.5.4

Scope 1 emission

direct GHG emissions

greenhouse gas emission from sources owned or directly controlled by the *organization*

EXAMPLE

- Emissions from processes,
- Emissions from stationary combustion,
- Emissions from mobile combustion,
- Fugitive emissions, (such as methane emissions from coal mines and refrigerant leaks).

Note 1 to entry: This document uses the concepts of equity share or control (financial or operational) to establish energy-related Scope 1 emission responsibility.

Note 2 to entry: Scope 1 emissions do not include those occurring from natural ecosystems owned or controlled by the organization that are not under management or remain in a natural state and have not been modified.

Note 3 to entry: *Scope 1 emissions* for governance organizations operating at a regional level refer to *GHG emissions* from sources located inside the *boundary* of that region. More information on *Scope 1 emissions* is provided in the [6] GHG Global Protocol for Community-Scale Greenhouse Gas Inventories, An Accounting and Reporting Standard for Cities Version 1.1 .

Note 4 to entry: A source is a human based activity or process that releases a *GHG* into the atmosphere.

Note 5 to entry: The *GHG emissions* included are only those *GHG emissions* covered by the [5] Kyoto Protocol (PFCs, CH₄, HFCs, N₂O, SF₆, CO₂, NF₃).

[SOURCE: [16] IWA 42, 3.2.3 modified –added the Example and Note 4 to entry, Note 5 to entry for clarification.]

3.5.5

Scope 2 emission

indirect GHG emission from purchased energy

GHG emission from the generation of purchased electricity, heat, cooling or steam consumed by the *organization*

Note 1 to entry: Purchased electricity is brought into the organizational *boundary*.

Note 2 to entry: Scope 2 emissions can include other purchased energy sources brought into the organizational *boundary* (e.g. compressed air).

[SOURCE: [16] IWA 42, 3.2.4 modified –deleted Note 1 to entry and added Note 1 to entry and Note 2 to entry]

3.5.6**Scope 3 emission**

indirect GHG emission

GHG emissions that is a consequence of the *organization's* activities but arises from sources that are not owned or directly controlled by the *organization*

EXAMPLE Extraction and production of purchased materials, transportation of purchased fuels, use of sold products and services.

Note 1 to entry: Scope 3 emissions include all attributable value chain *GHG emissions* not included in *Scope 1 emissions* or *Scope 2 emissions*.

[SOURCE: [\[16\]](#) IWA 42, 3.2.5 modified –added Example, deleted Note 2 to entry]

3.5.7**energy-related GHG emission**

ERGE

Scope 1 emissions from *energy consumption* and *Scope 2 emissions*

Note 1 to entry: The *organization* can include *Scope 3 emissions* associated with the organization's *energy consumption* (see clause 4.4.4) . Where the available *GHG emission factor* includes *Scope 3 emissions*, the *organization* shall include the related *Scope 3 emissions*.

Note 2 to entry: *ERGE* units are in absolute tCO₂e/year.

3.5.8**energy-related GHG emission reduction**

ERGE reduction

 E_R

quantified decrease in *ERGE emissions*

Note 1 to entry: Adapted from GHG emission reduction[\[8\]](#) ISO 14064-2:2019, 3.1.7

3.5.9**greenhouse gas emission factor**

GHG emission factor

coefficient relating *GHG* activity data with *GHG emission*

Note 1 to entry: In this document “GHG activity data” relates to *energy consumption*.

Note 2 to entry: An *organization* can use multiple *GHG emission factors* depending on energy type.

[SOURCE: [\[4\]](#) ISO 14050:2020, 3.9.20 - Note 1 to entry has been added, Note 2 to entry has been added]

3.6 Symbols and Abbreviations

Terms	Abbreviation
<i>base year</i> (3.3.2) <i>ERGE</i> (3.5.7)	E_B
Carbon capture, utilization, and storage	CCUS
Continuous Emissions Monitoring System	CEMS
energy management system	EnMS
<i>energy-related GHG emission</i> (3.5.7)	ERGE
<i>energy-related GHG emission reduction</i> (3.5.8)	ERGE reduction, E_R
<i>base year</i> (3.3.2) <i>ERGE</i> (3.5.7)	E_B
ERGE monitoring (results)	E_M
<i>ERGE reduction</i> (3.5.8) action plan	A_p

Terms	Abbreviation
ERGE by energy type	R _{EE}
estimated future ERGE with no actions taken by the <i>organization</i> (3.1.1)	E _F
Energy-related GHG emission reduction needed	E _{RY}
global warming potential	gwp
greenhouse gas	GHG
greenhouse gas emission factor	GHG emission factor
Intergovernmental Panel on Climate Change	IPCC
interim ERGE target	E _T
International Energy Agency	IEA
long term ERGE target	E _{LT}
Nationally Determined Contributions	NDCs
projected <i>ERGE</i>	E _P
Tonne CO ₂ equivalent	tCO ₂ e
United Nations Framework Convention on Climate Change	UNFCCC

4 Commitment of the *organization* (3.1.1)

4.1 Requirements (3.2.1) related to the decarbonization boundary

The *organization* (3.1.1) shall establish the *boundary* (3.1.3) for its *decarbonization* (3.5.1) activities. The *organization* (3.1.1) shall include all its *ERGE* (3.5.7) within the decarbonization boundary. The *organization* (3.1.1) shall establish and implement processes to manage its *energy consumption* (3.4.2), energy performance, energy performance improvement, and *energy-related greenhouse gas emissions (ERGE)* (3.5.7).

NOTE 1 [2] ISO 50001 defines processes for the development of an EnMS that includes the management of energy consumption and energy performance improvement.

NOTE 2 Scope 2 emission and Scope 3 emissions arise from outside of the decarbonization boundary.

The decarbonization boundary and any changes to the decarbonization boundary, with the justification for the changes, shall be retained as documented information.

NOTE 3 The decarbonization boundary can be the same as the EnMS boundary

4.2 Commitment by *top management* (3.1.2)

4.2.1 Top management shall demonstrate commitment to *decarbonization* (3.5.1) by:

- a) supporting the processes for establishing:
 - 1) the *base year* (3.3.2) (see [clause 7.2.1](#)) and base year ERGE,
 - 2) interim and long-term ERGE targets, and
 - 3) *ERGE reduction* (3.5.8) action plans (see [Clause 9](#)) to achieve interim and long-term ERGE targets;
- b) supporting the long-term ERGE targets (see [8.1.1](#)) and approving the interim ERGE targets (see [8.1.1](#)) in alignment with the *organization's* (3.1.1) business strategy, risks and opportunities;
 - ensuring risks related to ERGE targets are identified and appropriately addressed (see [4.4](#));