IEC GUIDE 118

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GUIDE

GUIDE

colour inside

Preparation of basic and group energy efficiency publications including energy efficiency aspects

Élaboration des publications fondamentales et de groupe sur l'efficacité énergétique, y compris les aspects d'efficacité énergétique

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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PREPARATION OF BASIC AND GROUP ENERGY EFFICIENCY PUBLICATIONS INCLUDING ENERGY EFFICIENCY ASPECTS

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This second edition of IEC Guide 118 has been prepared, in accordance with ISO/IEC Directives, Part 1, Annex A, by the IEC Advisory Committee on Energy Efficiency (ACEE).

This second edition cancels and replaces the first edition published in 2017. This second edition also replaces the first edition of IEC Guide 119 published in 2017.

The main changes with respect to the previous edition are as follows:

a) merging of IEC Guide 118 edition 1 with IEC Guide 119 edition 1;
b) elimination of duplication;
c) addition of definitions.

The text of this IEC Guide is based on the following documents:

Draft	Report on voting
SMBNC/37/DV	SMBNC/45/RV

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Guide is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Energy efficiency (EE) is key to support energy policies while preserving the environment, thus contributing to UN Sustainable Development Goals (https://www.iec.ch/sdg).

Many energy efficient technologies and solutions are already available and cost-effective; nevertheless, a variety of barriers inhibit the deployment of these technologies and impede harvesting their energy efficiency potential.

Standardization can play an important role to help overcome these barriers and to disseminate and promote energy efficient technologies, solutions and services in order to overcome some of the barriers to the implementation of energy efficient technologies and solutions.

Examples include:

- common measurement and test methods to assess the use of energy and reductions attained through new technologies and processes;
- calculation methods so that sound comparisons of alternatives can be made in specific situations and can help with adaptation of infrastructure to integrate new technologies and interoperability;
- means to codify best practices and management processes for efficient energy use and energy conservation;
- design checklists and guides that can be applied to both the design of new systems as well as the retrofit of existing systems;
- common efficiency classifications, tolerances and minimum energy performance standards;
- the definition of possible energy efficiency metrics.

When developing IEC publications, barriers to energy efficiency should be considered, with the goal to contribute to overcoming such barriers through standardization activity. Annex C provides some examples.

This Guide aims to give advice to technical committees (TCs) on the way energy efficiency should be considered and included in IEC publications.

IEC publications may deal exclusively with energy efficiency or may include clauses specific to energy efficiency; however, TCs are encouraged to:

- consider energy efficiency in their standardization work;
- identify which aspects of energy efficiency are relevant for their standardization;
- use a structured approach when addressing energy efficiency;
- use a systems approach when addressing energy efficiency.

This Guide helps to fulfil IEC Energy Efficiency Policy[1] by indicating how energy efficiency can be included in electrotechnical publications.

TCs with subjects relating to energy efficiency for the whole, or for a specific part of their activities, are invited to follow the provisions of this Guide.

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1 White Paper: Coping with the Energy Challenge. The IEC's role from 2010 to 2030. Smart electrification – The key to energy efficiency.

In this Guide, the term "technical committees" (TCs) includes "subcommittees" (SCs) and "systems committees" (SyCs). The term "publication" includes International Standard, Publicly Available Specification, Technical Report, Technical Specification and Guide.

In addition, the term "product" includes "process", "service" and combinations thereof, commonly known as "systems".

PREPARATION OF BASIC AND GROUP ENERGY EFFICIENCY PUBLICATIONS INCLUDING ENERGY EFFICIENCY ASPECTS

1 Scope

This document is addressed to all TCs and intends to support their work on energy efficiency publications within their specific scope.

This document defines procedures for the preparation and revision of basic and group energy efficiency (EE) publications including energy efficiency aspects (EEAs).

This document:

- describes the contributions of IEC publications to energy efficiency;
- describes the concept of an energy efficiency aspect;
- provides categories of energy efficiency aspects and a list of energy efficiency aspects to be considered by TCs.
- helps in harmonizing the systematic approach to energy efficiency;
- promotes the use of a systems approach when addressing energy efficiency aspects in the context of standardization;
- raises awareness that provisions in IEC publications can affect the energy performance of the product itself (taken individually) and of the entire application (embedding the product), in both negative and positive ways;
- helps TCs to identify energy efficiency aspects that contribute to energy efficiency improvement of the product itself and of the entire application;
- describes the relationship between TCs with basic and group EE functions.

In the context of this document, "EE" refers to energy efficiency of products, systems and organizations.

It uses the boundary concept to address energy efficiency aspects in the context of a systems approach.

It is beyond the scope of this Guide to cover or list all possible aspects relevant for all possible products within the scope of IEC.

NOTE The IEC Standardization Management Board (SMB) has decided that Guides such as this one can have mandatory requirements which shall be followed by all IEC committees developing technical work that falls within the scope of the Guide, as well as guidance which may or may not be followed. The mandatory requirements in this Guide are identified by the use of "shall". Statements that are only for guidance are identified by using the verb "should". (See ISO/IEC Directives, IEC Supplement:2021, A.1.1).

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.

IEC Guide 108, *Guidelines for ensuring the coherency of IEC publications – Application of horizontal standards*

ISO/IEC 13273-1, *Energy efficiency and renewable energy sources – Common international terminology – Part 1: Energy efficiency*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 13273-1 and 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
energy efficiency
EE
ratio or other quantitative relationship between an output of performance, service, goods or energy and an input of energy taking into account the driving parameters and the boundaries

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

Note 1 to entry: Both input and output need to be clearly specified in quantity and quality, and be measurable.

[SOURCE: ISO/IEC 13273-1:2015, 3.4.1, modified – "taking into account the driving parameters and the boundaries" has been added to the definition. The symbol "E_f" has been replaced by the abbreviated term "EE".]

3.2
energy efficiency aspect
EEA
specific way of treating a product in the area of EE application

3.3
energy performance
measurable results related to energy efficiency, energy use and energy consumption

[SOURCE: ISO/IEC 13273-1:2015, 3.3.1]

3.4
energy efficiency improvement
increase in energy efficiency as a result of technological, design, behavioural or economic changes

[SOURCE: ISO/IEC 13273-1:2015, 3.4.3]

3.5
horizontal EE function
task assigned to a technical committee to prepare one or more horizontal EE publications related to a given scope

Note 1 to entry: The assignment of a horizontal EE function to a technical committee (TC) is a pre-condition for a TC to prepare horizontal EE publications.

3.6
horizontal EE publication
document dealing with energy efficiency aspects common to a number of technical committees to ensure the coherence amongst publications

3.7
basic EE publication
BEEP
horizontal publication on the fundamental principles, graphical symbols, terminology or technical characteristics covering energy efficiency aspects applied by the relevant product publications

Note 1 to entry: A basic EE publication is applicable to products within the scope of two or more technical committees.

3.8
group EE publication
GEEP
horizontal publication covering a specific group of products, covering energy efficiency aspects applied by the relevant product publications

Note 1 to entry: A product publication that is developed for a particular product can be designated as a group publication to apply to a group of products covered by one or more technical committees, applicable to a specific boundary.

3.9
product publication
document covering a specific product or family of related products within the scope of a single product committee

[SOURCE: IEC Guide 108:2019, 3.1.4]

3.10
EE publication
publication covering energy efficiency aspects

Note 1 to entry: An EE publication can be a basic EE publication, a group EE publication or a product publication.

3.11
group EE function
task assigned to a technical committee to prepare group EE publications

3.12
basic EE function
task assigned to a technical committee to prepare basic EE publications

3.13
boundary
physical or organizational units

[SOURCE: ISO 50001:2018, 3.1.3, modified – The example and note to entry have been deleted.]

4 General considerations

4.1 Energy efficiency

EE shall be a requirement for products, systems and organizations.

EE improvement shall not compromise safety or electromagnetic compatibility (EMC) impacts, nor affect negatively the level of services.

It is key for energy efficiency to not reduce the given service but to optimize the energy input for a given service.

NOTE 1 Examples of an activity include processes, services, etc.

NOTE 2 Energy performance and energy efficiency are different concepts. The concept of energy performance includes energy use and energy consumption; energy performance, for instance, can be improved without necessarily affecting energy efficiency. Energy efficiency is one aspect of energy performance and is a frequently used metric for measuring energy performance.

NOTE 3 Implementation of energy efficiency improvement can be based on energy price consideration.

Implementation of relevant EE improvement should be in balance with economic and market constraints.

It is not sufficient to improve the energy efficiency of a single product without considering its application.

EE of a product should be in balance with the depletion or voiding of environmental resources that have been used to produce it.

It can be necessary to accept the higher losses of one product if they are offset by an overall improvement of energy efficiency in the entire system, considering its environment, economic impact and application.

4.2 Systems approach

This subclause explains how TCs should consider the systems approach in their work where several TCs need to collaborate. This Guide proposes a way of collaboration between TCs.

Energy efficiency needs to be analysed using a systems approach.

The main part of this approach is a standardized description of this boundary which defines the object of energy efficiency evaluation and improvement as well as the interfaces between the TCs.

The definition of energy efficiency can vary when boundaries change.

EXAMPLE The energy efficiency of an electric motor, the energy efficiency of that motor driving a pump, the energy efficiency of the pumping system made of that motor and pump.

A systems approach to energy efficiency does not only consider the energy performance of the single components. It also considers how efficiently these components are used within the application and its boundary and how much energy is required to provide a targeted service.

A systems approach to energy efficiency implies that the energy efficiency of one or more components can be maximized in order to achieve the optimum efficiency in the considered application and boundary.

A systems approach to energy efficiency is likely to optimize energy efficiency improvements for the following reasons:

- the components and the application are considered together;
- the gains in energy efficiency of an optimized system can be much higher than the gains of a maximized individual component;

  NOTE An optimized system does not necessarily mean that all of its components are in their own optimized conditions.
- an energy efficiency improvement at component level can be totally useless if this high efficiency component is used in poor operating conditions;
- the interactions and dependencies of the components are considered in a specific application.

4.3 Boundary

4.3.1 Description

The description of the boundary should include information about the service(s) that are to be provided. This description will make no assumptions about physical implementation needed to realize the service(s). Examples of services are providing steam, producing metallic parts, converting heat.

The boundary description should be understood by each TC involved.

Boundaries should be defined in terms of:

- intended use (relevant applications);
- energy inputs;
- outputs;
- driving parameters other than internal process parameters (relevant variables, static factors);

  NOTE 1 Driving parameters, other than internal process parameters, are all factors that affect energy efficiency and include weather conditions, operating parameters (indoor temperature, lighting levels, etc.), production volume, range of products, etc.; this includes the relevant variables and static factors as defined by ISO 50006.

- EE key performance indicators (KPIs);
- interactions between components of the system;
- possible interactions with other systems.

Boundaries can include a device, a product or a system depending on the application considered. Physical product boundaries include:

- physical limits of the product;
- power inputs or outputs;
- communication interfaces;
- any measurable inputs or outputs.

Functional boundaries (e.g. in the case of a service) include:

- the starting of a specification;
- the conclusion of a specification;
- the defined transfer of information, of material, or of other services;
- status of operation.

4.3.2 Elements of the boundary description

The boundary description and its elements are shown in Figure 1.