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Sustainability in buildings and civil engineering works — Indicators and benchmarks — Principles, requirements and guidelines

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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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).

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

This document was prepared by Technical Committee ISO/TC 59, *Buildings and civil engineering works*, Subcommittee SC 17, *Sustainability in buildings and civil engineering works*.

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

Minimum requirements for sustainability assessment criteria and sustainability indicators for buildings have been developed as have calculation methods and requirements. Whilst current International Standards on sustainability in buildings and civil engineering works[1)] support the assessment and comparison of buildings and other types of construction works, there is no detailed information on the evaluation process. Assessment is typically a two-step approach including calculation and evaluation. To support the evaluation process, this document describes the use of benchmarks, including principles and requirements for their development.

Building projects often need to be changed to significantly lower the negative impacts to the environment, society and economy. This will require significant improvements in cooperation, communication, and the use of design and assessment tools. As the demand for results of sustainability assessments of buildings and other types of construction works continues to grow, benchmarks can be used for tasks such as

— target setting in early design stages (strategic planning, preparation and briefing stages) and for architectural competitions;

— target setting in public procurement;

— evaluation of designs or buildings and civil engineering works to support decision making;

— certification of buildings/other types of construction works;

— communication to third parties about assessment results (for example used in appraisal process or to support funding decisions).

Although sustainability indicators are commonly used, the assessment results often lack transparency about the development of the applied reference levels and their application[8].

The possible sources for benchmarks depend on the type of value. In this document they are described as: a) limit values, b) reference values, c) target values.

Currently understanding of benchmarks has often been developed in parallel with the development of assessment systems. As a result, the assessment ratings depend on the specific systems, calculation and assessment rules, databases and calculation tools.

Benchmarks are important because there is a need to understand and explain the linkage between the economic value of the asset and issues of sustainable development in order to promote sustainable building. Transparent methods and common principles are needed for the development of benchmarks. A range of stakeholders has an interest in receiving a common understanding of benchmarks for buildings and civil engineering works. These include:

— Policy makers, local authorities, building authorities:

  — to monitor and judge the progress of built environment in terms of sustainability indicators;

  — to define targets and regulatory limit values for built environment.

— Owners and investors, portfolio managers:

  — to compare the performance of buildings/premises/civil engineering works with other buildings or construction works;

  — in case of international property portfolios, to compare and assess the potential for new technologies in different countries;

1) Suite of standards developed by ISO/TC 59 SC 17.

- to set targets.

— Designers and consultants:

  - to compare the performance of design solutions.

— Appraisal specialists and estate agents:

  - to use the benchmarks in comparative valuing;
  - to use the benchmarks in selling/marketing.

— Banks and insurance companies:

  - to use the benchmarks in valuing and assessing financial risks (ISO 14097).

Sustainability in buildings and civil engineering works — Indicators and benchmarks — Principles, requirements and guidelines

1 Scope

This document defines principles, requirements and guidelines for the development and use of benchmarks when assessing the economic, social and/or environmental performance of buildings and civil engineering works by using sustainability indicators.

It complements and supports the application of ISO 21929-1 and ISO/TS 21929-2 by creating principles and requirements for the establishment of benchmarks that support target setting, decision making and communication to third parties. This document is also related to ISO 21931-1 and ISO 21931-2 by creating principles, requirements and guidelines for the establishment and use of benchmarks related to environmental performance and other aspects of sustainability.

This document describes three types of values for benchmarks (performance levels for comparison purposes):

— limit values;

— reference values;

— target values.

This document does not set benchmarks.

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 6707-1, *Buildings and civil engineering works — Vocabulary — Part 1: General terms*

ISO 21929-1, *Sustainability in building construction — Sustainability indicators — Part 1: Framework for the development of indicators and a core set of indicators for buildings*

ISO/TS 21929-2, *Sustainability in building construction — Sustainability indicators — Part 2: Framework for the development of indicators for civil engineering works*

ISO 21931-1, *Sustainability in building construction — Framework for methods of assessment of the environmental performance of construction works — Part 1: Buildings*

ISO 21931-2, *Sustainability in buildings and civil engineering works — Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment — Part 2: Civil engineering works*

ISO/TR 21932, *Sustainability in buildings and civil engineering works — A review of terminology*

ISO 15392, *Sustainability in buildings and civil engineering works — General principles*

ISO 14050, *Environmental management — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6707-1, ISO 15392, ISO 14050, ISO/TR 21932 and the following apply.

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

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

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

3.1
benchmarking
process of collecting, analysing and relating *performance* (3.12) data of comparable buildings or other types of construction works

Note 1 to entry: Benchmarking is typically used for evaluating and comparing performance between or within objects of consideration.

3.2
benchmark
reference point against which comparisons can be made

3.3
best practice
level representing best available real *performance* (3.12)

Note 1 to entry: This value evolves with time.

3.4
functional equivalent
quantified functional requirements and/or technical requirements for a building or other types of construction works for use as a reference basis for comparison

[SOURCE: ISO 21931-1:2010, 3.7, modified — Reference to "other types of construction works" has been added.]

3.5
functionality
suitability or usefulness for a specific purpose or activity

[SOURCE: ISO 15686-10:2010, 3.13]

3.6
indicator
quantitative, qualitative or descriptive measure

[SOURCE: ISO 15392:2019, 3.18]

3.7
life cycle
all consecutive and interlinked stages in the life of the object under consideration

Note 1 to entry: For consideration environmental impacts and environmental aspects, the life cycle comprises all stages, from raw material acquisition or generation from natural resources to end-of-life.

Note 2 to entry: Adapted from the definition of life cycle in ISO 14040:2006, 3.1.

[SOURCE: ISO 21930:2017, 3.3.1]

3.8
limit value
upper or lower acceptable *performance level* (3.13) on an evaluation scale

3.9
mean value
average value
reference value (3.14) representing the sum of values divided by the number of values

3.10
median value
reference value (3.14) separating the upper half of a data sample from the lower half

3.11
modal value
typical value
reference value (3.14) representing the most frequent value of a data sample

3.12
performance
ability to fulfil required functions under intended use conditions

[SOURCE: ISO 6701-1:2017, 3.7.1.1]

3.13
performance level
value indicating the relative *performance* (3.12) required (or provided) for a particular attribute on a relative scale, from the level of the least (performance) to the level of the most (performance)

Note 1 to entry: For some attributes, such as adaptability, the level may be expressed with help of criteria e.g., an 'A level' achieved when 80 % of criteria is fulfilled, or a B level when only 60 % of criteria is fulfilled.

Note 2 to entry: Adapted from the definition of level of performance in ISO 15686-10:2010, 3.16.

3.14
reference value
performance level (3.13) on an evaluation scale that represents state of the art or best practice

Note 1 to entry: A reference value is subject to temporal changes.

3.15
stakeholder
individual or group that has an interest in any decision or activity of an *organization* (ISO/IEC Directives, Part 1)

[SOURCE: ISO 26000:2010, 2.20]

3.16
sustainability indicator
indicator (3.6) related to economic, environmental or social impacts

[SOURCE: ISO 21929-1:2011, 3.33]

3.17
target value
performance level (3.13) on an evaluation scale that represents an objective that goes beyond the *reference value* (3.14)

Note 1 to entry: Target values can follow a top-down or bottom-up approach.

Note 2 to entry: A target value is the result of a target setting process.

Note 3 to entry: A subdivision into short-term, medium-term and long-term target values is possible.

4 Framework for the establishment of benchmarks

4.1 General

Performance parameters which relate to the contribution to sustainable development are frequently linked to indicators. Such indicators should be objective, verifiable and reproducible, and, wherever possible, linked to predetermined benchmarks, reference levels or scales of value of the indicator (see EN 15978).

Although similar sustainability indicators are used globally, the benchmarks of buildings or other types of construction works expressed with the help of these indicators vary according to the local context (i.e. climate and national or regional differences in building methods) and the building/construction work type and functionality.

Benchmarks can be developed for different sustainability indicators.

Appropriate sustainability indicators of performance covering environmental, economic and social aspects shall be selected in accordance with the requirements and guidelines of ISO 21929-1 and ISO/TS 21929-2.

NOTE 1 ISO 21929 (all parts) gives guidelines for the formulation of the sustainability indicators with the help of which sustainability aspects can be either quantitatively expressed or comparably described using performance levels.

NOTE 2 In addition to the core set of sustainability indicators defined in ISO 21929 (all parts), the use of other sustainability indicators can be relevant in the local context when assessing or setting targets for a construction works' contribution to sustainable development.

Sustainability indicators that have specific characteristics and calculation or measurement methods need to be considered using appropriate units. The comparison of buildings or other types of construction works with the help of benchmarks may be expressed using a reference unit. A reference unit is needed when benchmarking in terms of the use of material or energy resources, emissions to air, soil and/or water, or cost[2]. Different approaches to the establishment of benchmarks can be needed for different types of sustainability indicators.

The development of benchmarks requires in specific cases generation of information about the performance of a significant number of buildings or other types of construction works for the chosen indicator(s).

Benchmarks can be developed for use at the design and/or the operational stage. For some sustainability indicators the building/civil-engineering-work level information can be either calculated on the basis of the design or measured. For other indicators, such as global warming potential of a building or other type of construction work and other life-cycle-based emission indicators, the value can only be calculated.

Performance values are closely linked with the methods of calculation (assessment or simulation) and/or with the methods of measurement.

NOTE 3 The calculation of greenhouse gases and other life-cycle-based emission indicators for buildings or other types of construction works requires information about the quantities of materials and fuels needed throughout the life cycle of the building. In addition, the calculation needs information about the environmental impacts of the materials and fuels. Thus, performance values for these indicators are closely linked with the quality of environmental data available about materials and fuels.

2) For instance, emissions/use of resources/cost of buildings can be expressed for example with regard to the building area, building volume, operating hours, or number of users.

