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Interested committees:

Title: Draft BS EN 15978 Draft Sustainability of construction works - Assessment of environmental performance of buildings - Requirements and guidance.

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Full document details: 24/30478334 DC

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.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

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.	

English Version

Sustainability of construction works - Assessment of environmental performance of buildings - Requirements and guidance

Contribution des ouvrages de construction au
développement durable - Évaluation de la performance
environnementale des bâtiments - Exigences et
recommandations

Nachhaltigkeit von Bauwerken - Bewertung der
Umweltleistung von Gebäuden - Anforderungen und
Anleitungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 350.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (prEN 15978:2024) has been prepared by Technical Committee CEN/TC 350 “Sustainability of construction works”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 15978:2011.

In relation to EN 15978:2011, the following changes have been made:

- Environmental impact indicators have been aligned with EN 15804+A2;
- prEN 15978 has been aligned with EN 15643 regarding modules A0, B8 and D1 and D2;
- Use of baseline and future prospect scenarios have been described;
- Requirements and recommendations have been provided for different design stages;
- Existing and forthcoming national and EU regulations have been taken into account in the requirements written in prEN 15978, e.g. decarbonation of energy production;
- System boundaries of module B7 “Operational Water Use” (B7.1, B7.2 and B7.3) have been provided in a detailed way similar to module B6 “Operational Energy Use” (B6.1, B6.2 and B6.3);
- The assignment of activities between B4 (Replacement) and B5 (Refurbishment) has been clarified;
- Two approaches for the reporting of building generated energy have been described in Clause 7 and Annex A to improve transparency:
 - Approach A as in EN 15978:2011 and
 - Approach B where a proportion of the embodied impacts of the energy production appliances that export energy are outside the system boundary of the building together with their operational impacts and these are reported as additional information
- Impacts resulting from the user’s activities may be declared optionally in Module B8, including impacts of commuting of users.
- To ensure that all on-site activities are considered, a separate sub-module A5.1 has been introduced to account for deconstruction of existing construction works with the benefits and loads beyond the system boundary in module D1.
- Synergies between circularity and the environmental performance of buildings are included in the normative text and in Annex C in prEN 15978.
- Demand for information concerning environmental impacts and aspects at the local environment level is in the normative text in prEN 15978.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

Introduction

The purpose of this document is to provide calculation rules for the assessment of the environmental performance of new and existing buildings.

This document is part of a suite of European Standards, Technical Specifications and Technical Reports for the assessment of the environmental performance of buildings that together support quantification of the contribution of the assessed building to sustainable construction and sustainable development.

The environmental performance of a building is only one aspect of its sustainability. The social and economic performance of the building are also aspects of sustainability that should be assessed as part of a sustainability assessment. These are described in the framework standard (EN 15643).

NOTE 1 The environmental assessment at building level requires information from products and services (EN 15804:2012+A2:2019).

The evaluation of technical and functional performance is beyond the scope of this document. Technical and functional characteristics are taken into account here by reference to the functional equivalent, which also forms a basis for comparison of the results of assessments.

This document is intended to support the decision-making process and documentation of the assessment of the environmental performance of a building. The assessment results are based on scenarios that affect the environmental performance of the building, such scenarios are uncertain, for example, there may be new processes and/or technologies or changes in operation, and could affect the assessment result. Figure 1 illustrates how the assessment of the environmental performance takes place within the concept of the sustainability assessment of buildings.

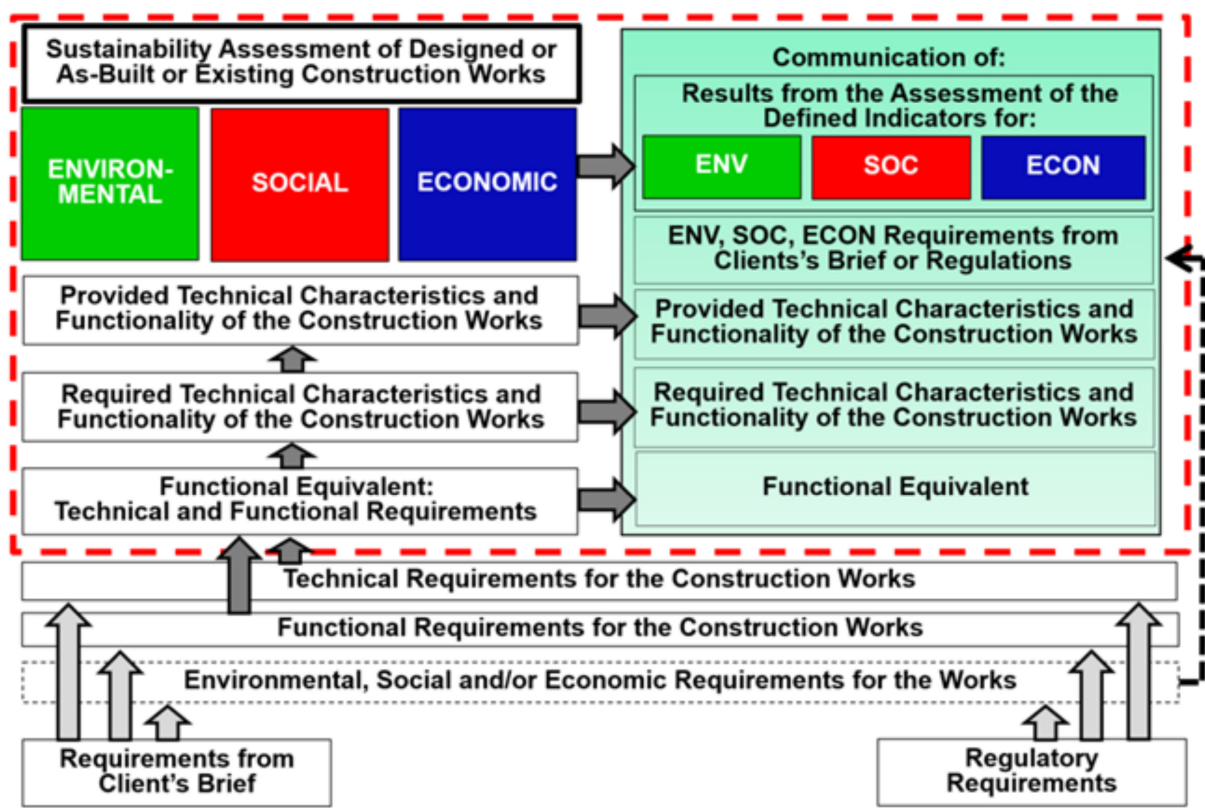


Figure 1 — Concept of sustainability assessment of buildings

NOTE 2 The outer box with the red dotted line represents the area standardized by CEN/TC 350.

In this document, the assessment method for the quantitative evaluation of the environmental performance of the building is based on a life cycle approach. The general requirements for sustainability assessment of buildings are described in EN 15643 (the general framework standard). Other standards developed by CEN/TC 350 in this area, and how they are related to this European Standard, are shown in Figure 2

Framework level	Sustainability Assessment of Construction Works			Technical characteristics	Functionality
	EN 15643:2021 Sustainability of Construction Works – Framework for Assessment of Buildings and Civil Engineering Works			Service Life Planning – Principles ISO 15686-1	
Works level	prEN 15978 rev Assessment of Environmental Performance of Buildings	EN 16309:2014 Assessment of Social Performance of Buildings	EN 16627:2015 Assessment of Economic Performance of Buildings	EN ISO 52000-1 Energy Performance of Buildings	
	EN 17680:2023 Evaluation of the Potential for Sustainable Refurbishment of Buildings				
	EN 17472:2022 Assessment of Civil Engineering Works				
Product level	EN 15804 + A2:2019 Environmental Product Declarations – Core Rules for Construction Products			Service Life Prediction Procedures ISO 15686-2,	
	EN 15942:2021 Communication Format B-to-B			Feedback from Practice ISO 15686-7,	
	EN 15941:2023 Data Quality			Reference Service Life & Service Life Estimation ISO 15686-8	
	prEN 17672 Horizontal Rules for B-to-C Communication				
	CEN/TR 16790 Guidance for EN 15804				
	CEN/TR 17005 Additional Indicators				

Figure 2 — Standards of CEN/TC 350

NOTE 3 This document supports the assessment of buildings within the Level(s) Framework (see Bibliography) for macro objectives 1, (Greenhouse gas emissions along a building's life cycle), 2 (Resource efficient and circular material life cycles) and 3 (Efficient use of water resources). Other standards from CEN/TC350 can also support Level(s) macro Objectives 4 (Healthy and comfortable spaces) and 5 (Adaptation and resilience to climate change), EN16309, and macro objective 6 (Optimized life cycle cost and value), EN 16627.

NOTE 4 Level(s), is a common European approach to assess and report on the sustainability of buildings. Using existing standards, the voluntary Level(s) framework provides a common language for building sustainability, which other initiatives can also use. More information can be found at [Level\(s\) \(europa.eu\)](https://europa.eu/level-s).

Buildings and constructed assets have an impact on sustainable development. Therefore, the internationally recognized Sustainable Development Goals (SDGs) formulated by the United Nations also apply to the construction and real estate industry. As part of targets towards sustainable cities and communities formulated in SDG 11, the construction of sustainable and resilient buildings is also required, as is an efficient use of natural resource and a substantial reduction of waste generation through prevention, reduction, and reuse formulated in SDG12. These goals are closely interrelated with the other SDGs. Both providers and buyers of real estate need clear characteristics and assessment criteria in order to evaluate, assess and communicate the contribution of buildings to sustainable development.

Assessments based on the requirements of this document can be used to demonstrate whether the development and use of an assessed building has the potential to contribute to United Nations SDG Goals 11, 12, and 13, and other SDGs such as 6, 7, and 15 (Figure 3)



Figure 3 — Sustainable Development Goals (SDGs) formulated by the United Nations, particularly relevant to the environmental performance of buildings and constructed assets

NOTE 5 EN ISO 52000-1, in common with all EPB standards, provides a certain flexibility with regard to the methods, the required input data and references to other EPB standards. For the use of EN52000-1, informative default choices are provided in EN ISO 52000-1:2017, Annex B.

NOTE 6 In the case EN ISO 52000-1 is used in the context of national or regional legal requirements, mandatory choices can be given at national or regional level for such specific applications.

1 Scope

This document specifies the calculation method, based on Life Cycle Assessment (LCA) and other quantified environmental information, to assess the environmental performance of a building and its site, and gives the means for the reporting and communication of the outcome of the assessment. The standard is applicable to new and existing buildings and refurbishment projects.

The document gives:

- the description of the object of assessment,
- the system boundary that applies at the building level,
- the procedure to be used for the inventory analysis,
- the list of indicators and procedures for the calculation of these indicators,
- demand for information concerning environmental impacts and aspects at the local environment level (including emissions to indoor air),
- demand for information concerning building generated energy reporting and design for circularity as technical characteristics that support environmental performance,
- the requirements for the data necessary for the calculation, and
- the requirements for presentation of the results in reporting and communication.

The approach to the assessment covers all stages of the building life cycle and is based on data obtained from Environmental Product Declarations (EPD), their “information modules” (EN 15804:2012+A2:2019) and other data and information necessary and relevant for carrying out the assessment. The assessment includes all building related construction products, processes and services, used over the life cycle of the building.

Methodologies for and approaches to the interpretation and the making of value judgments of the results of the assessment are not within the scope of this document.

NOTE 1 This document provides system boundaries, calculation rules and indicators to compile and assess the life cycle inventory and life cycle environmental impacts of buildings.

NOTE 2 The document also provides the methodological basis and assessment rules to support the achievement of environment related macro objectives in Europe and instruments such as the European reporting framework Level(s). More information can be found at [Level\(s\) \(europa.eu\)](https://europa.eu/level-s).

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.

EN 15316-4-5, *Energy performance of buildings — Method for calculation of system energy requirements and system efficiencies — Part 4-5: District heating and cooling*

EN 15643:2021, *Sustainability of construction works — Framework for assessment of buildings and civil engineering works*

EN15804:2012+A2:2019, *Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products*

EN 15941:2024, *Sustainability of construction works — Data quality for environmental assessment of products and construction works — Selection and use of data*

EN ISO 52000-1 *Energy performance of buildings — Overarching EPB assessment — Part 1: General framework and procedures*

ISO 15686-1:2011, *Building and constructed assets — Service life planning — Part 1: General principles and framework*

ISO 15686-2, *Building and constructed assets — Service life planning — Part 2: Service life prediction procedures*

ISO 15686-7, *Building and constructed assets — Service life planning — Part 7: Performance evaluation for feedback of service life data from practice*

ISO 15686-8, *Building and constructed assets — Service life planning — Part 8: Reference service life and service-life estimation*

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 <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

average data

calculated mean of data based on a fully representative sample for a *construction product* (0) or *construction service* (EN 15804:2012+A2:2019, 3.7), provided by one or more manufacturers, either from their multiple plants or based on multiple similar construction products of the manufacturer(s)

Note 1 to entry: The product category or construction service can contain similar products or construction services.

[SOURCE: EN 15941:2024, 3.1]

3.2

brief

document that states the *client's* (3.7) requirements for a construction project

[SOURCE: ISO 6707-2:2017, 3.2.18, modified – terms “client” and “construction” added in the definition]

3.3

building < noun >

construction works (3.14) that have the provision of shelter for its occupants or contents as one of its main purposes and are usually enclosed and designed to stand permanently in one place

[SOURCE: ISO 6707-1:2020, 3.1.1.3 modified – “partially and totally” has been removed from the definition; Note 1 to entry deleted]

3.4

building fabric

all *construction products* (3.11) that are fixed to the *building* (3.3) in a permanent manner, so that the dismantling of the product changes the performance of the building and the dismantling or replacement of the product constitute construction operations

3.5

building integrated system

installed technical equipment that enables the continued operation of a *building's* (3.3) core functions

Note 1 to entry: This includes the technical equipment for space heating, space cooling, ventilation, domestic hot water, built-in (installed) lighting, in building transportation (e.g. lifts, escalators, travelators) building automation and control, on-site electricity generation, or a combination thereof, (including those systems using energy from renewable sources), and other systems e.g. for sanitation, security, fire safety, and IT communications.

Note 2 to entry: Building-integrated technical equipment (including onsite energy generating equipment) are construction products/building components.

3.6

cleaning

all operations that ensure a level of cleanliness and appearance, consisting of separating and eliminating generally visible dirt from a surface by means of the following combined factors, in variable proportions, such as chemical action, mechanical action, temperature, duration of application

[SOURCE: ISO 22716:2007, 2.8]

3.7

client

person or organization that requires a *building* (3.3) to be provided, altered or extended and is responsible for initiating and financing a project, and approving the *brief* (3.2)

[SOURCE: ISO 6707-2:2017, 3.8.2,]

3.8

complementary product category rules

c-PCR

product group specific or horizontal PCR, which provide additional compliant and non-contradictory requirements to EN 15804

Note 1 to entry: c-PCR are meant to be used together with EN 15804.

[SOURCE: CEN/TR 16970:2016, 3.1]

3.9

component

construction product (3.11) manufactured as a distinct unit to serve a specific function or functions

[SOURCE: ISO 6707-1:2020, 3.4.13, modified – term construction added]

3.10**construction element****building component****building element****assembled system****part of works**

component (3.9) or a set of assembled components incorporated in a *building* (0) or other *construction works* (3.14)

[SOURCE: EN 15643:2021, 3.15]

3.11**construction product**

item manufactured or processed for incorporation in *construction works* (3.14)

[SOURCE: EN 15643:2021, 3.16]

3.12**construction site**

area where *construction work* (3.13) is undertaken or *construction services* (EN 15804:2012+A2:2019, 3.7) are provided

[SOURCE: ISO 21930:2017, 3.2.10]

3.13**construction work**

activities of forming a *construction works* (3.14)

Note 1 to entry: Refers to both *buildings* (3.3) and *civil engineering works* (EN 15643:2021, 3.10)

[SOURCE: ISO 6707-1:2020, 3.1.1.1, modified - Note 1 to entry deleted]

3.14**construction works**

all constructed assets (*buildings* (3.3), *civil engineering works* (EN 15643:2021, 3.10), *landscaping* (3.40), *external works* (3.29) and other structures) resulting from construction operations

Note 1 to entry: This includes buildings, civil engineering works, structures, landscaping, external works and other types of construction within a built environment.

Note 2 to entry: From an economic perspective, completed construction works are typically referred to as a constructed asset.

[SOURCE: ISO 15392:2019, modified – some terms in Note 1 to entry combined into definition]

3.15**cut-off criteria**

specification of the amount of material or energy flows or the level of significance associated with unit processes or product system that may be excluded from a study

[SOURCE: EN ISO 14044:2006+A12017, 3.18, modified – term “flow” made plural, term “environmental” deleted from definition, term “to be” replaced in the definition by “that may be” after term “product system”]

3.16

declared unit

quantity of a *construction product* (0) for use as a reference unit in an *EPD* (0) for an environmental declaration based on one or more information modules

EXAMPLE Mass (kg), volume (m³).

Note 1 to entry Adapted from the definition in ISO 21930:2017.

[SOURCE EN 15804:2012+A2:2019, 3.9]

3.17

deconstruction

process of selectively and systematically dismantling a *building* (3.3) to reduce the amount of *waste* (3.68) created and generate a supply of high value *secondary materials* (3.58) that are suitable for *reuse* (3.56) and *recycling* (3.48)

3.18

design for deconstruction

design of a *building* (3.3), *building component* (3.10), or *construction product* (3.11) that will permit the selective and systematic dismantling of a buildings to reduce the amount of *waste* (3.68) created and generate a supply of high value *secondary materials* (3.58) that are suitable for *reuse* (3.56) and *recycling* (3.48)

3.19

disassembly

non-destructive taking-apart of a *construction works* (3.14) or constructed asset into constituent materials or *components* (3.9, 3.10)

[SOURCE: ISO 20887:2020, 3.12, modified - Note 1 has been removed]

3.20

design for disassembly

approach to the design of a product or constructed asset that facilitates *disassembly* (3.19) at the end of its useful life, in such a way that enables *components* (3.9, 3.10) and parts to be *reused* (3.56), *recycled*, (3.47), *recovered* (3.46) for energy or, in some other way, diverted from the waste stream

[SOUCRE: ISO 20887:2020, 3.13]

3.21

embodied impact

sum of an *environmental impact* (3.24) caused within the *system boundary* (3.61, 3.62) by the processes associated with the extraction, production, transportation, installation, emissions in use (excluding operational energy and water use), waste treatment and disposal at end of life of materials and products that comprise the building.

Note 1 to entry: Embodied impact of a building will comprise all impacts associated with the materials and products used within the scope of the object of assessment.

Note 2 to entry: Module D1 captures net embodied impacts beyond the system and is reported separately as additional information

Note 3 to entry: Adapted from the definition for “carbon footprint of a product” in ISO 14067:2018, 3.1.1.1.

3.22**embodied carbon**

sum of the greenhouse gases emissions and removals, within the *system boundary* (3.61, 3.62) in the processes associated with the extraction, production, transportation, installation, emissions in use, waste treatment and disposal at end of life of materials and products that comprise the building, expressed in CO₂ equivalents, using the single impact category of climate change

Note 1 to entry: Embodied carbon of a building will comprise all emissions and removals associated with the materials and products used within the scope of the object of assessment.

Note 2 to entry: Module D1 captures net embodied carbon beyond the system and is reported separately as additional information.

Note 3 to entry: Adapted from the definition for “carbon footprint of a product” in ISO 14067:2018, 3.1.1.1.

3.23**environmental aspect**

characteristic of *construction works* (3.14), *part of works* (3.10), processes or services related to their *life cycle* (3.41) that can cause change to the environment

[SOURCE: ISO 15392:2019 3.13]

3.24**environmental impact**

result of a change to the environment, whether adverse, neutral or beneficial, wholly or partially resulting from environmental aspects

[SOURCE: ISO 15392:2019, 3.17.2, modified – definition of “impact” has been integrated in the definition]

3.25**environmental performance**

performance related to environmental impacts and environmental aspects

[SOURCE: ISO 15392:2019, 3.16, modified - Note 1 has been removed]

3.26**Environmental Product Declaration****EPD****Type III Environmental declaration**

independently verified claim which indicates the environmental impacts and aspects of a product, providing quantified environmental data using predetermined parameters and, where relevant, additional environmental information

Note 1 to entry: Adapted as a combination of definitions in ISO 14025:2006, (3.1) and ISO 21930:2017, (3.1.1)

Note 2 to entry: The additional environmental information can be quantitative or qualitative.

Note 3 to entry: The shorter initialism, EPD, is used as the primary preferred term in this document.

3.27**estimated service life****ESL**

service life (3.59) that a *building* (3.3) or parts of a building would be expected to have in a set of specific in-use conditions, determined from *reference service life* (3.48) data after taking into account any differences from the reference in use conditions

[SOURCE: ISO 15686-1:2011, 3.7]

3.28

exported energy

energy generated in a system and delivered across the system boundary for use by another system

Note 1 to entry: Exported energy can be calculated, or it can be measured.

Note 2 to entry: Adapted from definition in ISO 6707-3:2017, 3.54.

[SOURCE ISO 6707-3:2017, 3.5.4, modified – term “energy delivered from a construction works” changed to “energy generated in a system and delivered across the system boundary”; term “outside its boundary” changed to “by another system”; Notes to entry added]

3.29

external works

construction works (3.14) or landscape work on land associated with, and adjacent to, *civil engineering works* (EN 15643:2021, 3.10) or a *building* (3.3)

[SOURCE: ISO 6707-1:2020, 3.1.1.4]

3.30

foundation

construction for transmitting forces to the supporting ground

[SOURCE: ISO 6707-1:2020, 3.3.1.1, modified – Note 1 to entry omitted]

3.31

functional equivalent

quantified functional requirements and/or technical requirements for a *building* (3.3) or an *assembled system (part of works)* (3.10) for use as a basis for comparison

Note 1 to entry: Adapted from the definition in ISO 21931-1:2010.

[SOURCE: EN 15643:2021, 3.42]

3.32

functional performance

performance related to the *functionality* (3.35) of the *construction works* (3.14) or an *assembled system (part of works)* (3.10), which is required by the *client* (3.7) and/or by *users* (3.67) and/or by regulations

Note 1 to entry: Adapted from the definition in EN 15643:2021.

[SOURCE: EN 15643:2021, 3.43]

3.33

functional requirement

type and level of *functionality* (3.35) of a *building* (3.3) or *assembled system* (3.10) which is required by the *client* (3.7) and/or by *users* (3.67) and/or by regulations

Note 1 to entry: Adapted from the definition in EN 15643:2021.

[SOURCE: EN 15643:2021, 3.44]

3.34**functional unit**

quantified performance of a product system for use as a reference unit

[SOURCE: EN ISO 14040:2006+A1:2020, 3.20]

3.35**functionality**

suitability or usefulness for a specific purpose or activity

[SOURCE: ISO 15686-10:2010 3.10]

3.36**generic data**

data that is not site or enterprise specific

Note 1 to entry: This refers to data that is not directly collected, measured, or estimated by a company, but sourced from a third party LCI database or other sources. Generic data includes industry average data (e.g. from published production data, government statistics, and industry associations), literature studies, engineering studies and patents, and may also be based on financial data, and contain proxy data, and other generic data.

Note 2 to entry: In this context site can mean production site and/or construction site.

[SOURCE: EN 15941:2024, 3.6, modified – Note 2 to entry added]

3.37**ground works**

work done to prepare sub-surfaces for the start of *construction work* (3.13).

[SOURCE: EN17472:2022,3.37]

3.38**handover**

step at which possession of the *construction works* (3.14) is surrendered to the *client* (3.7) upon completion with or without reservation

[SOURCE: ISO 6707-2:2017, 3.47]

3.39**indicator**

quantitative, qualitative or descriptive measure

[SOURCE: ISO 15392:2019, 3.18]

3.40**landscaping**

all the visible features of a *building's* (3.3) site, often considered in terms of their aesthetic appeal, such as gardens, including trees and other vegetation, lawns and turfed recreational areas, car parks, roads and pathways

[SOURCE: ISO 6707-4:2021, 3.1.7, modified – “area of land” replaced in definition by “buildings site”; “public and private gardens, parks, road vegetation including lawns and turfed recreational areas” replaced in definition by “gardens, including trees and other vegetation, lawns and turfed recreational areas, car parks, roads and pathways”]

3.41

life cycle

consecutive and interlinked stages in the life of the object under consideration

[SOURCE: EN 15643:2021, 3.54]

3.42

maintenance

combination of all technical and associated administrative actions during the *service life* (3.59) to retain a *building* (3.3) or an *assembled system (part of works)* (3.10) in a state in which it can perform its required functions

SOURCE ISO 15686-1:2011, 3.13, modified – “or its parts” replaced by “an assembled system (part of works)”

Note 1 to entry: Maintenance may be planned or unplanned.

Note 2 to entry: Planned maintenance covers cleaning, servicing, lubrication, changing wearing parts, testing, inspection, condition monitoring, undertaken on a periodic basis and before a failure would occur.

[SOURCE: ISO 15686-1:2011, 3.13: modified – Notes 1 and 2 to entry added]

3.43

offsetting

mechanism for compensating for the carbon footprint of a product through the prevention of the release of, reduction in, or removal of, an equivalent amount of GHG emissions in a process outside the boundary of the product system

EXAMPLE: External investment in renewable energy technologies; energy efficiency measures; afforestation/reforestation.

[SOURCE: ISO 14021:2016, 3.1.12]

3.44

operational energy use

energy utilized during the use stage for the operation of the *building* (3.3)

Note 1 to entry: Operational energy use may include energy consumption related to building user (3.67) activities occurring within the object of assessment.

[SOURCE: EN 15643:2021, 3.65, modified – terms “use during use and” deleted from definition and replaced with terms “required for”; term “construction works” replaced with “building”; Note 1 to entry added]

3.45

operational water use

water utilized during the use stage for operation of the *building* (3.3)

Note 1 to entry: Operational water use may include water consumption related to building *user* (3.67) activities occurring within the object of assessment.

[SOURCE: EN 15643:2021, 3.66, modified – terms “use during use and” deleted from definition and replaced with terms “required for”; term “construction works” replaced with “building”; Note 1 to entry added]

3.46**recovery**

operation to turn *waste* (3.68) into a useful resource

Note 1 to entry: Recovery operations can include material recovery and energy recovery.

[SOURCE: EN 15643:2021, 3.70, modified – text after term “useful purpose” deleted; Note 1 to entry added]

3.47**recycling**

recovery (3.46) operation by which *waste* (3.68) materials are reprocessed into products, materials or substances either for the original purpose or other purposes

Note 1 to entry Recycling does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations or other recovery operations as defined in Directive 2008/98 Annex II.

[SOURCE: EN 15643:2021, 3.71, modified – Note 1 to entry amended to reference Directive]

3.48**reference service life****RSL**

service life (3.59) of a *construction product* (3.11), component, assembly or system which is known to be expected under a set of reference in-use conditions and which may form the basis of estimating the *service life* (3.59) under other in-use conditions

Note 1 to entry: The RSL is described as part of the functional unit and considered in the calculation of replacements (B4) and refurbishment (B5) at both the construction product level and construction works level.

[SOURCE: ISO 15686-1:2011, 3.22, modified – “construction” has been added in the definition; “particular set, i.e., a reference set of” has been replaced with “a set of reference” in the definition; Note 1 to entry has been added]

3.49**reference study period**

period over which the time-dependent characteristics of the object of assessment are analysed

Note 1 to entry: Time dependent characteristics are described in 8.3.

Note 2 to entry: In some cases, the reference study period may differ significantly from the *required service life* (3.54) of the construction works.

[SOURCE: EN 15643:2021, 3.75, modified – Note 1 to entry added]

3.50**refurbishment****deep renovation****deep retrofit**

large scale (substantial) modification and improvements to an existing *construction works* (3.14)

Note 1 to entry: Refurbishment can be undertaken to facilitate continuation of the current function, including technical modernization and a change of space plan, or a change of function to new use.

Note 2 to entry: In the context of building assessment according to this document, refurbishment can be planned from the outset (e.g. forms part of the client’s brief) or it can be the starting point of the next service life of an existing

building. The first case is addressed in module B5 of a new building under assessment, whilst the second is addressed in a new assessment (see 7.4.5.5).

[SOURCE: ISO 6707-1:2020, 3.5.1.45, modified – synonyms added; “large scale (substantial)” has been added in the definition; “plant, *building* (3.3) or civil engineering works” has been replaced with “*construction works* (3.14)” in the definition; “to bring it up an acceptable condition” has been removed from the definition; Note 1 to entry has been added]

3.51

renewable resource

resource that is grown, naturally replenished or naturally cleansed, on a human time scale

EXAMPLE: Biomass (used for bio-based materials) and fertile soil, wind.

Note 1 to entry: A renewable resource is capable of being exhausted, but may last indefinitely with proper stewardship.

Note 2 to entry: Activities that occur in the technosphere such as recycling are not considered natural replenishment or natural cleansing.

Note 3 to entry: In this context, human time scale refers to the typical lifetime of a human rather than the time humans have been in existence.

[SOURCE: ISO 21930:2017, 3.6.2, modified – “trees in forests, grasses in grassland” has been replaced with “biomass (used for bio-based materials)” in EXAMPLE]

3.52

repair

action outside planned *maintenance* (3.42) to return a *construction product* (3.11), *component* (3.9), *assembled system* (3.10) to an acceptable condition by renewal, replacement or mending of worn, damaged or degraded parts but not changing its original parameters

Note 1 to entry: Repair refers to an unplanned action because the product/assembly/system has lost its function, this can happen because of a lack of correct planned maintenance.

[SOURCE: ISO 6707-1:2020, 3.5.1.7, modified - “item” has been replaced with “actions outside planned maintenance to return a product, component, assembled system” in the definition; “but not changing its original parameters” has been added in the definition; Note 1 to entry has been added]

3.53

replacement

installation of a new *construction product* (3.11), *component* (3.9) or *assembled system* (3.10), which performs the function of the old product, component or system

[SOURCE: EN15643, 3.80, modified – term construction added to definition; term “incorporates” changed to “performs” in definition; term “replaced product” changed to “old product” in definition.]

3.54

required service life

ReqSL

service life (3.59) required by the *client* (3.7) or through regulations

[SOURCE: EN 15643:2021, 3.81]

3.55**retaining walls**

wall that provides lateral support to the ground or that resists pressure from a mass of other material

[SOURCE: ISO 6707-1:2020, 3.1.2.16]

3.56**reuse**

operation by which *products* (3.11) or *components* (3.9), having reached their end of life stage, are used again without reprocessing, but including preparation for further use

Note 1 to entry: Preparation for reuse means, where required, checking, cleaning, removal of connections, trimming, stripping of coatings and/or other recovery operations or repair, by which products or components of products that reached their end of life are prepared so that they can be reused without any other reprocessing.

[SOURCE: EN 15643:2021, 3.83, modified – term “equivalent” deleted in definition, term “that are not waste” deleted from definition replace with term “having reached their end-of-life stage”; term “reuse” at end of definition replaced with term “further use”; Note 1 to entry in SOURCE definition deleted; new Note 1 to entry added]

3.57**scenario**

collection of assumptions and information concerning an expected sequence of possible future events

[SOURCE: EN 15643:2021, 3.84]

3.58**secondary material**

material recovered from a previous use or from *waste* (3.68) which substitutes other materials in a further use

Note 1 to entry: Secondary material is measured at the point where the secondary material enters the system from another system.

Note 2 to entry: Materials recovered from previous use or from waste from one product system and used as an input in another product system are secondary materials.

Note 3 to entry: Examples of secondary materials (to be measured at the system boundary) are reused products, recycled scrap metal, crushed concrete, glass cullet, recycled wood chips, recycled plastic.

[SOURCE: EN 15804:2012+A2:2019, 3.30, modified – term “primary materials” deleted from definition replaced by “other materials in a further use”; term “reused products” added in Note 3]

3.59**service life****working life**

period of time after installation during which a *building* (3.4) or an *assembled system (part of works)* (3.10) meets or exceeds the *technical requirements* (3.65) and *functional requirements* (3.33)

[SOURCE: ISO 15686-1:2011, 3.25, modified – “facility or its component parts” has been replaced with “a building or an assembled system (part of works)” in the definition]

3.60**specific data**

data representative of a product, product group or construction service, provided by one supplier

[SOURCE: EN 15941:2024, 3.10]

3.61

system boundary <building>

boundary based on set of criteria specifying what is included and what is not included in the *building* (3.4) assessment

Note 1 to entry: The system boundary represents the interface in the assessment between a building and its surroundings or other product systems.

Note 2 to entry: Adapted from the definition in EN 15643:2021.

[SOURCE: EN 15643:2021, 3.95]

3.62

system boundary <product>

boundary based on set of criteria specifying which unit processes are part of the product system

Note 1 to entry: System boundary defines what is included and what is not included in the assessment.

[SOURCE: ISO 14040:2006+A1:2020, 3.32, modified – term “product system” replaces term “system under study”, Note 1 to entry in ISO 14040:2006+A1:2020 deleted; Note 1 to entry has been added]

3.63

technical building system

technical equipment for space heating, space cooling, ventilation, domestic hot water, built-in (installed) lighting, in building transportation (e.g. lifts, escalators, travelators) building automation and control, on-site electricity generation, or a combination thereof, including those systems using energy from renewable sources, of a *building* (3.3) or building unit

[SOURCE: EN 15643:2021, 3.96, modified – “in building transportation (e.g., lifts, escalators, travelators)” added to definition]

3.64

technical performance

performance related to the capability of *construction works* (3.14) or *part of works* (3.10) which are required or are a consequence of the requirements made either by the *client* (3.7), *users* (3.67) and/or by regulations

[SOURCE: EN 15643:2021, 3.97]

3.65

technical requirement

type and level of technical characteristics of the *construction works* (3.14) or *part of works* (3.10), which are required or are a consequence of the requirements made by the *client* (3.7), *users* (3.67) and/or by regulations

[SOURCE: EN 15643:2021, 3.98]

3.66

transparency

open, comprehensive and understandable presentation of information

[SOURCE: EN ISO 14044:2006+A1:2018, 3.7]

3.67**user**

person or organization using the *building* (3.3), its facilities, services and the environment it provides

[SOURCE: EN 15643:2021, 3.101, modified – term construction works replaced by building]

3.68**waste**

substance or object which the holder discards or intends to discard, or is required to discard

[SOURCE EN 15643:2021, 3.102]

4 Abbreviations

ADP	Abiotic depletion potential
AP	Acidification potential of soil and water
BIPV	Building integrated photovoltaic(s)
CF	Characterization Factor
EP	Eutrophication potential
EPB	Energy performance in buildings
EPD	Environmental Product Declaration
EoL	End of Life
ESL	Estimated service life
ETP-fw	Eco-toxicity potential, freshwater
GWP	Global warming potential
HTP-nc	Human toxicity potential, non-cancer effects
IRP	Ionizing radiation potential
LCA	Life cycle assessment
LCI	Life cycle inventory
LCIA	Life cycle impact assessment
ND	Not declared
ODP	Ozone depletion potential (Depletion potential of the stratospheric ozone layer)
PCR	Product Category Rules
c-PCR	Complementary product category rules
PM	Particulate matter
POCP	Photochemical ozone creation potential (Formation potential of tropospheric ozone)
ReqSL	Required Service Life
RSL	Reference Service Life
RSP	Reference Study Period
SQP	Soil quality potential
WDP	Water deprivation potential

5 The assessment process

To carry out a robust assessment of environmental performance of buildings, the process illustrated in Figure 4 should be followed for the respective calculations. This will help ensure that the essential information is gathered and processed according to the requirements of this document. The clauses numbered in the right column of the diagram provide more detail on each step of the process.

Although shown as essentially a linear process in Figure 4, assessment can, and in many cases will be an iterative process, (e.g. as part of a design improvement process, or evaluation of changes to the scenarios used). Under such circumstances checks on, for example, the description of the object of assessment, the scenarios used and data requirements, shall be made at each stage to ensure consistency and appropriateness of information used for the assessment. When changes are made, subsequent steps in the process of assessment shall be repeated.

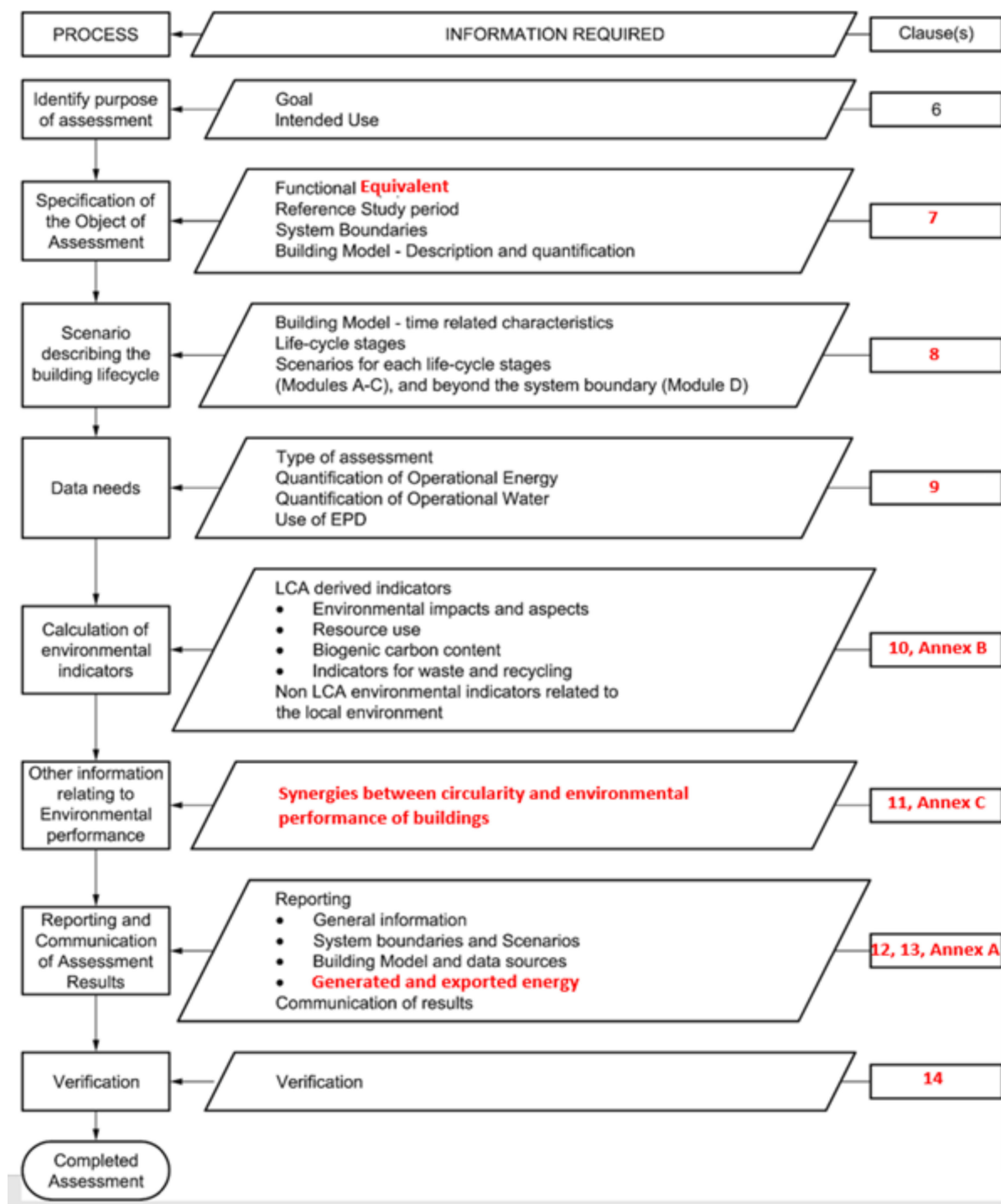


Figure 4 — Flowchart of the process for the assessment of the environmental performance

6 Purpose of the assessment

The purpose of the assessment is to quantify and therefore also to provide the basis to evaluate and communicate the environmental performance of a building (or part thereof) or construction works in a way that suits the intended use of the assessment.

The goal of the assessment is to quantify the environmental performance of the object of assessment by means of the compilation of environmental information.

To calculate the environmental performance of a building in terms of environmental impacts and aspects, using life cycle assessment (LCA), the scope and intended use of the assessment shall be defined, agreed by the person or organization commissioning the assessment and the assessor, and documented in accordance with the requirements of this document before an assessment is carried out.

The scope of an assessment defines what is included in the object of the assessment, in line with the intended use of the assessment. The definition of the scope of the assessment is detailed by Clauses 7 and 8.

The scope of LCA can differ considerably depending on the goal of a particular LCA, as well as affecting the requirements for data collection, thus it is important that it is clearly defined. In defining the goal of the assessment, the intended application, reasons for carrying out the assessment, the intended audience (i.e. to whom the results of the assessment are intended to be communicated), and whether the results are intended to be used in comparative assertions intended to be disclosed to the public shall be stated.

The scope and intended use of the assessment determine the level of detail required of the environmental information, and of other data used in the calculations. However, the calculation method remains the same. Notwithstanding this, minimum requirements for completeness, selection and use of data in accordance with subclause 8.3 and 8.4 in EN 15941:2024 of data shall be followed.

Depending on the context, the intended use of the assessment can include the following:

- a) assistance in a decision-making process from an environmental perspective, for example:
 - comparison of the environmental performance between different design, engineering or specification options for the construction, refurbishment, use and/or end of life of a building,
 - comparison of the environmental performance of refurbishment of an existing building vs. its demolition/deconstruction/disassembly and construction of a new building,
 - plan/design for deconstruction/disassembly,
 - identification of potential for environmental performance improvements,
 - design optimization;
- b) disclosure of environmental performance to comply with legal requirements;
- c) documenting and communicating the environmental performance of a building for use in, for example:
 - declaring/reporting environmental performance,
 - certification and labelling,
 - providing the quantified greenhouse gas emissions (global warming potential) to inform strategies for reducing the contribution to global warming and establishing pathways to achieve net zero carbon emissions and/or carbon neutral status,
 - benchmarking,
 - marketing,
 - other reporting purposes.
- d) support for policy development.

A new assessment should be carried out when an existing building is undergoing major refurbishment or change, particularly where the refurbishment changes the functional equivalent, (e.g. there is a change of building type, use, and/or required service life that was not planned or expected, i.e. typical for the building type). In the new assessment, the environmental impacts and aspects of the production of the refurbishment materials and reconstruction/ installation processes are allocated to modules A1 to A5.

NOTE Where an earlier assessment of the building has been undertaken, it can be updated as appropriate with the as built impacts reported in module B5.

7 Specification of the object of assessment

7.1 General

The object of the assessment shall be defined in line with the purpose and intended use of the assessment.

The object of assessment should be the whole building, new (e.g. during the design and construction process and/or as built at its handover) or existing (e.g. in use and/or under refurbishment), within the curtilage of the building's site, over its entire life cycle. The curtilage (site boundary) used to characterize the site shall be consistent with the definition and intended use of the building.

NOTE 1 The site is identified as the physical space of land occupied by and attached to the building. Objects within the site boundary can include but are not limited to: foundations, parking areas, landscaped areas, pavements and roadways for access/movement around the site, boundary fencing < according to the legal ownership >, networks, energy production and rainwater recovery equipment, etc.

Depending on the specific purpose of the assessment, the object of the assessment may in specific, defined and justified cases be restricted to:

- only part of a building,
- the building and part of the site,
- an individual structure/component within a building,
- an assembly of building components,
- part of the lifecycle.

If the assessment is restricted as described above, or limited to a part of the life cycle, or if any relevant impacts or aspects are not addressed, this shall be documented, reported and justified.

NOTE 2 The environmental assessment of the building excludes permanent construction works outside of the curtilage of the site such as construction of infrastructure for communication, energy, water, waste and transportation. A building on a site which requires such construction works will generate environmental impacts other than those strictly related to the building. The assessment of these environmental impacts and aspects is outside of the scope of this document.

NOTE 3 The assessment of infrastructure (civil engineering works) is addressed in EN 17472 Assessment of Civil Engineering works

The object of assessment shall be described in terms of its physical (see 7.5 for a description of the building model) and time-dependent characteristics (see 7.4 for the life cycle model).

7.2 Functional equivalent

The functional equivalent is a representation of the required technical characteristics and functionalities of the building. It is the means by which the characteristics of the building are rationalised into a minimum description of the object of assessment.

NOTE 1 The term functional equivalent is similar in concept to the use of the term 'Functional Unit' (*"quantified performance of a product system for use as a reference unit: ISO 14040:2006, 3.20"*) that is used in the application of LCA to products. However, it was decided, historically, that it would be useful to be able to differentiate between buildings and products and the alternative term 'Functional Equivalent' was introduced to allow the multiple functions that can be represented in a building to be described.

Although assessments may be carried out on an individual object, they will in most instances form part of the process for the evaluation of decisions in relation to the object of assessment. This includes the decision whether to build new, or refurbish/reconstruct an existing building, the evaluation of the design options, etc.

Comparisons between the results of assessments of buildings or assembled systems (part of works) - at the design stage or whenever the results are used - shall be made only on the basis of their functional equivalency. This means that the technical and functional requirements form the basis for comparisons of the results of the assessment, following the basic principle that the functional equivalent is fulfilled when the technical and functional requirements are met or exceeded. This requires that the major functional requirements shall be described together with intended use and the relevant specific technical requirements. This description allows the functional equivalency of different options and building types to be determined and forms the basis for transparent and unbiased comparison. If the assessment results based on different functional equivalents are used for comparisons, (for example, in a comparison of the environmental performance two entirely different development options such as a school or hospital being considered for the same site (see NOTE 2) then the basis for comparison and non-functional equivalence shall be made clear, through an explanation of the respective functional equivalents, through the inclusion of supporting evidence and additional documentation for such a choice.

NOTE 2 If appropriate, the assessment results of the buildings that have different functional equivalents (e.g. design options for different types of buildings on the same site or the same types of buildings exposed to different conditions) can also be compared based on a common unit of reference. The choice of the common reference unit for all buildings being compared depends on a specific requirement of a regulatory, technical, functional, environmental, social or economic aspect, or combination thereof, which is common to all these buildings and is linked to their corresponding functional equivalents.

A common reference unit may be derived from the functional equivalent and be used to present the result of the indicators of the environmental assessment relative to the functional equivalent. A common reference unit may be dimensionless or qualified with units (e.g. per m², per year, per employee, per room per year, per m² per year). When used, the area that is included in the common reference unit 'per m²' shall be made clear.

When combining separate assessments of environmental, social and economic performance in a sustainability assessment of the same object of assessment, the functional equivalent used in the assessments of the individual dimensions of sustainability shall be the same.

The functional equivalent of a building or an assembled system (part of works) shall include, but is not limited to, information on the following aspects:

- building type (e.g. office, factory),
- relevant technical and functional requirements (e.g. the regulatory and client's specific requirements),
- building related pattern of use (e.g. hours occupied, occupancy),
- required service life (or estimated service life).

NOTE 3 Other specific requirements (e.g. site conditions, interference with local biodiversity and exposure to climate and to other conditions from the immediate surroundings) may be relevant for inclusion in the information on the functional equivalent.

The client's brief and regulations can provide information for defining the functional equivalent. These can include, but not limited to, requirements for energy efficiency, fire safety, adaptability, seismic performance, etc. Where this is not the case, the assessment shall include the assumptions made, the scenarios and the sources of information used by the assessor.

Where no required service life (ReqSL) is specified by the client or by regulation, the estimated service life (ESL) may be used. If the estimated service life is used, how it is derived shall be described, e.g. determined based on empirical, probabilistic or statistical data, see 8.3.1.

The description of the functional equivalent used shall be included in the assessment report, see 12.3 a.

Other relevant aspects that are not included in the description of the Functional Equivalent may be included as additional information in the assessment report, see 12.3 c.

7.3 Reference study period

Assessments are carried out based on a chosen reference study period (RSP).

The default value for the reference study period (RSP) should be the required service life (ReqSL). If there is no required service life specified, the estimated service life (ESL) of the building may be used, see 8.3.1 in which case ESL replaces ReqSL. Any deviations from this (see below) shall be clearly stated and reasons explained.

The reference study period may differ from the required service life given for the object of assessment depending on the intended use of the assessment, or on regulatory requirements or national guidance. However, in all cases, for purposes of consistency, the assessment is based on a defined model of the building life cycle (Figure 5). Results with different RSPs may be determined with appropriate adjustment, as described below.

For modules A1-A5, and C1-C4, see Figure 5:

- if the RSP is less than or equal to the ReqSL (or ESL), the quantified values for the product stage (modules A1, A2, A3, the construction/process stage (modules A4, A5), and the end-of-life stage (modules C1 - C4), are independent of the value of the RSP; or
- if the RSP is greater than the ReqSL (or ESL), the quantified values for the product stage (modules A1, A2, A3), the construction/process stage (modules A4, A5), and the end of life stage (modules C1 - C4) shall be based upon the inclusion of additional scenarios for, refurbishment, or demolition and construction of an equivalent building. These scenarios shall provide for an extension of the service life which, when combined with the required service life of the object of assessment, is equal to or more than the reference study period.

For Modules B1-B7 and B8 when included, see Figure 5, the values for impacts and aspects shall always be calculated using the RSP.

For Module D, the contribution to the loads and benefits reported in module D1 are derived as appropriate from modules A4-A5, modules B1-B5 and modules C1-C4, and for module D2 are derived as appropriate from modules B6-B7.

NOTE 1 As general rule potential loads or benefits from modules A1-A3 do not appear in Module D, see 6.3.5.2 in EN15804:2012+A2:2019.

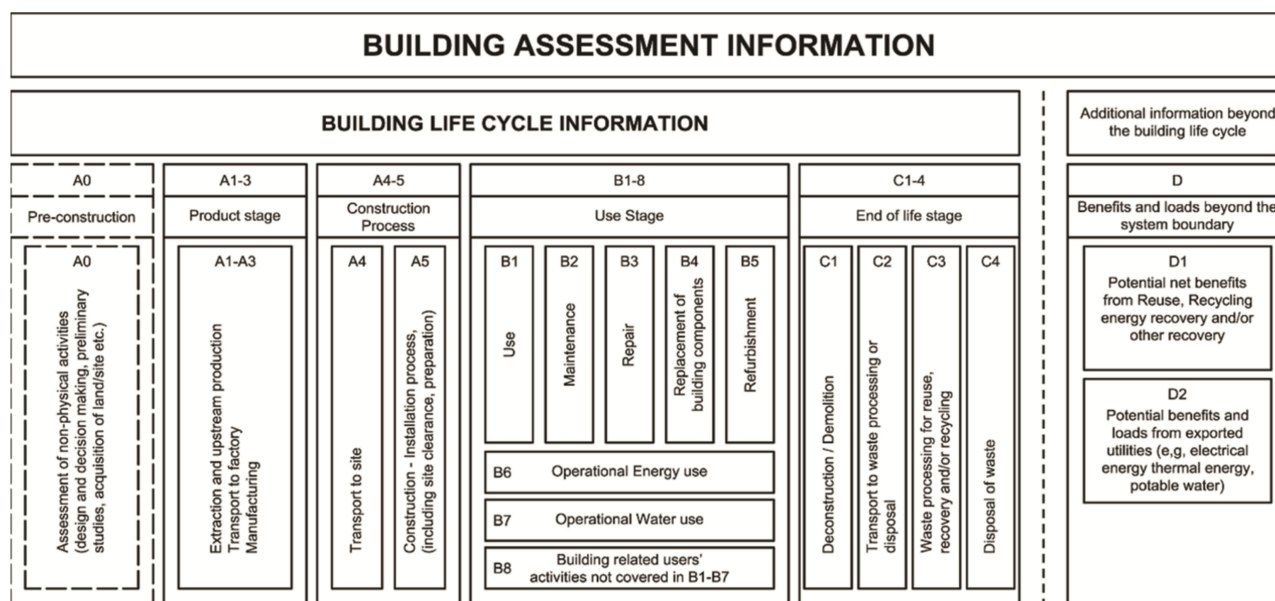


Figure 5— Display of modular information for the different stages of the building assessment

NOTE 2 Modules A5, B1, B6, B7, B8 and D1 shown in Figure 5 are sub-divided, see 7.4.4.3, 7.4.5.6, 7.4.5.7 and 7.4.7.

7.4 System boundary

7.4.1 General

The system boundary determines the processes to be taken into account in the object of the assessment in physical, temporal, and functional terms.

The system boundary of a building (or part thereof) as represented in the life-cycle model (modules A0-C4 in Figure 5) includes the building as described in 7.5, site and all the upstream and downstream processes needed to establish and maintain the intended function(s) of the building, from the acquisition of raw materials to their disposal, see 7.4.6.5, or to the point where materials exit the system boundary either during, see 7.4.5.4 or at the end of the building life cycle, see 7.4.6.4 and 7.4.7.

NOTE 1 Figure 5 illustrates the organization of the different modules for the LCA of a building. It is aligned with the modular structure of information for the LCA for construction products, processes and services according to EN 15804.

The system boundary for the object of the assessment shall be selected and defined in line with the specific purpose of the assessment: its goal, scope and intended use – see Clause 6 and 7.1.

For each new assessment of a building (or part thereof) the system boundary shall include:

- the building life cycle model described by modules A0-C4 as shown in Figure 5, capturing the impacts and aspects from all stages applicable to the object of assessment, and
- the purpose scope and intended use of the assessment, see Clause 6 and 7.1;
- modules B6 - B7 shall be evaluated for the reference study period (RSP) of the object of assessment
- for all newly installed components and materials (including ex-situ reused and recycled items):
 - the production (modules A1-A3) and transport and construction processes (modules A4-A5) for newly manufactured components and materials,

- the upstream processes required to prepare any ex-situ reused and recycled construction products, components and construction elements for use (modules A1-A3), and transportation and construction processes necessary to install them (modules A4-A5),
 - modules B1 – B5 shall be evaluated for the reference study period (RSP) of the object of assessment
- for components and materials retained *in situ* (e.g. in an existing building);
- the original production (modules A1-3) and construction (modules A4-5) processes shall not be considered,
 - modules B1 – B5 shall be evaluated for the reference study period (RSP) of the object of assessment from the point of the start of the assessment. Historic impacts occurring before the studied intervention shall not be considered
- the end of life stage (modules C1-C4) of a building (EoL). In the context of LCA, to facilitate consistency in the assessments, the default scenario for the EoL is the full removal of the building. Other scenarios may be used, and results provided as additional information, for alternatives as part of a decision-making process, see 8.9.

Module D shall be included in the assessment to provide supplementary information on the benefits and loads beyond the system boundary relating to the recovery and repurposing of resources that exit the system boundary. This includes secondary materials, products (module D1) or fuels being reused, recycled, or used for energy recovery and/or other recovery as well as exported energy and other utilities (module D2).

NOTE If the assessment project starts with existing building or other structures on-site, the impacts and aspects of any removal of the existing items, are included separately in sub-module A5.1, see 7.4.4.3.1.

In summary, when assessing a building (or part thereof) information modules to be considered are as follows:

Table 1 — Information modules included in the assessment

Stage/Module of the building	For newly installed components/materials (including ex-situ reused and recycled items)	For components/materials retained <i>in situ</i>	Removed existing component
A0	Yes (as supplementary information), see 7.4.2		No
A1-A5	Yes	No	Yes (impacts and aspects of removal and disposal processes should be reported separately in A5.1)
B1-B5	Yes	Historic processes - No Future processes - Yes	No
B6-B7	Yes		N/A
C1-C4	Yes		No
D1 and D2	Yes		Yes

Setting the system boundaries follows the following principles to avoid double counting:

- “modularity principle”: Where processes influence the building’s environmental performance during its life cycle, they shall be assigned to the module of the life cycle where they occur; all environmental aspects and impacts are declared in the life cycle stage where they appear.

Modules A1 to C4 cover environmental impacts and aspects that are directly linked to products, processes and operations taking place within the system boundary of the building.

EXAMPLE 1 All impacts and aspects due to the planned replacement of a single complete window (glazing, frame, handles, and locks etc.) in the use stage, which includes production, transport, use of ancillary materials, packaging waste and recycling, are assigned to module B4 ‘Replacement’, see 7.4.5.4.

EXAMPLE 2 All impacts and aspects due to the replacement of a broken windowpane in the use stage, which includes production, transport, use of ancillary materials, packaging waste and recycling, are assigned to module B3 ‘Repair’, see 7.4.5.3.

In the case of the examples (or similar), the decision to assign a particular process or operation to modules B3, B4 or B5 is at the discretion of the assessor. The criteria used to make the assignment shall be applied consistently within the assessment and shall be documented in the assessment report.

- The “polluter pays principle”: Processes of waste processing shall be assigned to the system that generates the waste until the end-of-waste state is reached.

7.4.2 Module A0 - Boundary of the pre-construction stage

Module A0 covers the project specific preliminary activities associated with the building (preliminary studies and works, e.g. impact assessments, risk assessments, stakeholders’ engagement, design and technical studies, surveys, additional infrastructure etc.). Such activities incur environmental aspects or impacts and where such activities are significant (or are required by the scope of the assessment) and are not included in module A5, see 7.4.4.3, module A0 may be included in the assessment report as additional information.

7.4.3 Modules A1 to A3 - Boundary of the Product Stage

The boundary for modules A1 to A3 covers the ‘cradle to gate’ processes (raw materials extraction, transport to manufacturing facilities and manufacturing and fabrication processes), for all the construction materials, products, components and services used in the construction of the building, permanent and temporary. The rules for determining their impacts and aspects are defined in EN 15804.

7.4.4 Modules A4 and A5 - Boundaries of the Construction Process Stage

7.4.4.1 General

The construction process stage covers the processes from the factory gate of the different construction products to the completion of the construction works.

The consideration of impacts and aspects of the manufacturing of capital goods (e.g. trucks, cranes, etc.) may be excluded from the assessment unless these are custom made for use as part of the project under assessment and, therefore, are part of the assessment (e.g. a crane foundation which remains on-site after the crane is removed).

7.4.4.2 Module A4 - Boundary of the transport of construction products, materials and equipment

The boundary for module A4 shall include:

- transport of construction products and materials that are integrated into the object of assessment from the factory gate to the building's site, including any related return journeys of vehicles from the site, intermediate storage and distribution (including the provision of heating cooling humidity control etc.),
- transport of construction equipment (cranes, scaffolding, etc.) to and from the site,
- all impacts and aspects related to losses due to transportation (i.e. production, transport and waste management of the construction products and materials that are damaged or otherwise lost during transportation).

7.4.4.3 Module A5 - Boundary of the construction installation process

7.4.4.3.1 Sub-module A5.1- Pre-construction demolition

The boundary for sub-module A5.1 includes all impacts and aspects relating to the following processes/activities:

- demolition/deconstruction of existing construction works or parts thereof, including transport from site and waste processing of removed materials.

7.4.4.3.2 Sub-module A5.2- Construction activities

The boundary for sub-module A5.2 includes all impacts and aspects relating to the following processes/activities:

- preliminary activities to prepare the site, e.g. site clearance (e.g. removal of trees and other natural features, decontamination of the site),
- temporary works, including temporary works located on- and off-site as necessary for the construction installation process,

EXAMPLE Temporary stabilization or supporting structures for neighbouring buildings, temporary pumps for groundwater, fences, etc. used during the construction stage.

- ground works, excavations, levelling, including transport from site and waste processing of removed materials,
- connection to utilities,
- transport of construction products and materials, waste and equipment within the site,
- on-site storage of construction products and materials, including the provision of heating, cooling, humidity, etc.,
- on site production and/or processing and/or assembly of materials, products and components,
- works for the erection/installation of the construction products and materials into the building including ancillary materials not counted in the EPD of the products, e.g. releasing agents (oils and greases) in formworks for concrete, formworks discarded at the end of the project,
- provision of heating, cooling, ventilation, humidity control etc. to site facilities during the construction process,

- energy and water use for construction processes and activities,
- landscaping processes and activities.

7.4.4.3.3 Sub-module A5.3 Waste and waste management

The boundary for sub-module A5.3 shall include all impacts and aspects relating to the following processes and activities:

- production, transportation, end of life treatment/disposal of products and materials wasted during the construction and installation process,
- waste management processes of other wastes generated on the construction site not included in A5.2 (e.g. packaging.). This includes all processes (including transportation from the building's site) until final disposal or until end of waste state is reached,

7.4.4.3.4 Sub-module A5.4 – Transport of construction workers

As additional information, the boundary for sub-module A5.4 includes, when assessed:

- transport of construction workers to and from the site.

NOTE If the transport of personnel to and from site also includes the goods that will be installed to form part of the building, to avoid double counting this is included in module A4 and not as part of module A5.

7.4.5 Modules B1 – B8 - Boundaries of the use stage

7.4.5.1 General

The use stage covers the period from the practical completion of the construction work to the point of time when the building reaches its EoL and is deconstructed/demolished.

The boundary for the use stage includes the use of any resources (materials, products, services, fuels and utilities) for protecting, conserving, conditioning or controlling the object of assessment, e.g. operation of building services such as heating, cooling, lighting, water supply and internal transportation (e.g. by lifts and escalators), and scenarios for building maintenance including cleaning and routine inspections.

The assessment shall include in module B1 the emissions to the environment from products, e.g. release from the façade, roof, floor coverings and other surfaces (interior and exterior), and removals (e.g. carbonation, sequestration by vegetation); in modules B2-B5 for any maintenance, repair, replacement or refurbishment, and in modules B6 and B7 for the impacts and aspects related to any use of energy and water. Production, transport and manufacturing of these items shall be included in modules A1-A5 for their first installation in the building, and their disposal at the end of life of the building is included in modules C1-C4 of the building.

The impacts and aspects of non-building-integrated systems and equipment, such as free-standing appliances and furniture, fixtures and fittings may be assessed as additional information. Where this is the case, the impacts of their operational energy use shall be recorded in sub-module B6.3, see 7.4.5.6, their operational water use in sub-module B7.3 see 7.4.5.7, other related impacts and aspects (e.g. manufacture, replacement and disposal) are recorded and reported separately in sub-module B8.3, as part of the users' activities, see 7.4.5.8.

NOTE Examples of non-building-integrated systems and equipment are domestic, commercial and industrial appliances such as entertainment electronics, washing machines, refrigerators, cooking appliances, office electronics and appliances of industrial processes.

Where assessed, other impacts and aspects related to the users' activities, for example, transport for users (employees and visitors) travelling to and from the building as a place of work, may be reported as additional information in sub-module B8.1, see 7.4.5.8.

7.4.5.2 Module B1 - Boundary of the installed products in use

The boundary of module B1 encompasses the impacts and aspects arising from the normal (i.e. anticipated) conditions of use of construction products, materials, components and integrated technical systems of the building, not including those impacts and aspects related to energy and water use.

For the purposes of assessment these are separated as follows:

- Sub-module B1.1 for materials the assessment of emissions from construction products to outdoor air, soil, ground- and surface-water should be based – among other sources of information – on results of tests and measurements (e.g. blowing agents from insulation and VOCs from surface finishes and also carbonation from materials containing CaO absorbing CO₂, see relevant documents developed by CEN/TC 351 [13]-[17]).

EXAMPLE Release of substances from the facade, roof, floor covering and other surfaces (interior or exterior).

NOTE 1 The local impact of emissions to indoor air are considered in social performance assessment (EN 16309).

NOTE 2 Methods to calculate CO₂ uptake of concrete are included in EN 16757 .

- Sub-module B1.2 for “operational emissions” the assessment of fugitive emissions of refrigerants from building-integrated technical systems

Fugitive emissions from non-integrated equipment (e.g. plug-in equipment such as refrigerators) should be addressed and reported in sub-module B1.2 as additional information.

7.4.5.3 Boundary of maintenance (module B2) and repair (module B3)

In order to ease assessment at the building level and recognizing difficulties in separating facets of maintenance and repair, modules B2 and B3 may be combined.

The boundary of maintenance (planned and unplanned), module B2, and repair, module B3, shall include:

- the production and transportation of the construction products and materials, components and ancillary products used for maintenance (module B2) and/or repair (module B3),
- cleaning processes needed for the technical and functional performance of the interior and exterior of the building (e.g. cleaning of windows, floors, gutters), (module B2),
- all processes for maintaining the functional and technical performance of the building fabric and building-integrated technical systems, as well as aesthetic qualities of the building’s interior and exterior components, (module B2),
- the process of installing/repairing the parts, components and ancillary products in question,
- waste management of the removed parts, components and ancillary products, and any packaging, including their end-of-life treatment.

The assessment may include separately as additional information:

- transport of workers to undertake maintenance processes to and from the site.

EXAMPLE 1 Examples for maintenance (module B2) include painting work on window frames, doors, etc. and the annual inspection and maintenance of the heating, cooling and ventilation systems, including recharging of refrigerant, replacement of filters in the heat recovery or air conditioning units etc.