

BS EN 15643-1:2010



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# **Sustainability of construction works — Sustainability assessment of buildings**

Part 1: General framework

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## Sustainability of construction works - Sustainability assessment of buildings - Part 1: General framework

Contribution des ouvrages de construction au  
développement durable - Évaluation de la contribution au  
développement durable des bâtiments - Partie 1 : Cadre  
méthodologique général

Nachhaltigkeit von Bauwerken - Bewertung der  
Nachhaltigkeit von Gebäuden - Teil 1: Allgemeine  
Rahmenbedingungen

This European Standard was approved by CEN on 30 July 2010.

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## Foreword

This document (EN 15643-1:2010) has been prepared by Technical Committee CEN/TC 350 "Sustainability of construction works", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2011, and conflicting national standards shall be withdrawn at the latest by March 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.



## Introduction

This European Standard is part of a series written by CEN/TC 350 that provides a system for the sustainability assessment of buildings using a life cycle approach. The sustainability assessment quantifies impacts and aspects for the environmental, social and economic performance of buildings using quantitative and qualitative indicators, both of which are measured without value judgements. The purpose of this series of European Standards is to enable comparability of the results of assessments. This series of European Standards does not set benchmarks or levels of performance.

This series of European Standards will allow the sustainability assessment, i.e. the assessment of environmental, social and economic performance of a building, to be made concurrently and on an equal footing, on the basis of the same technical characteristics and functionality of the object of assessment.

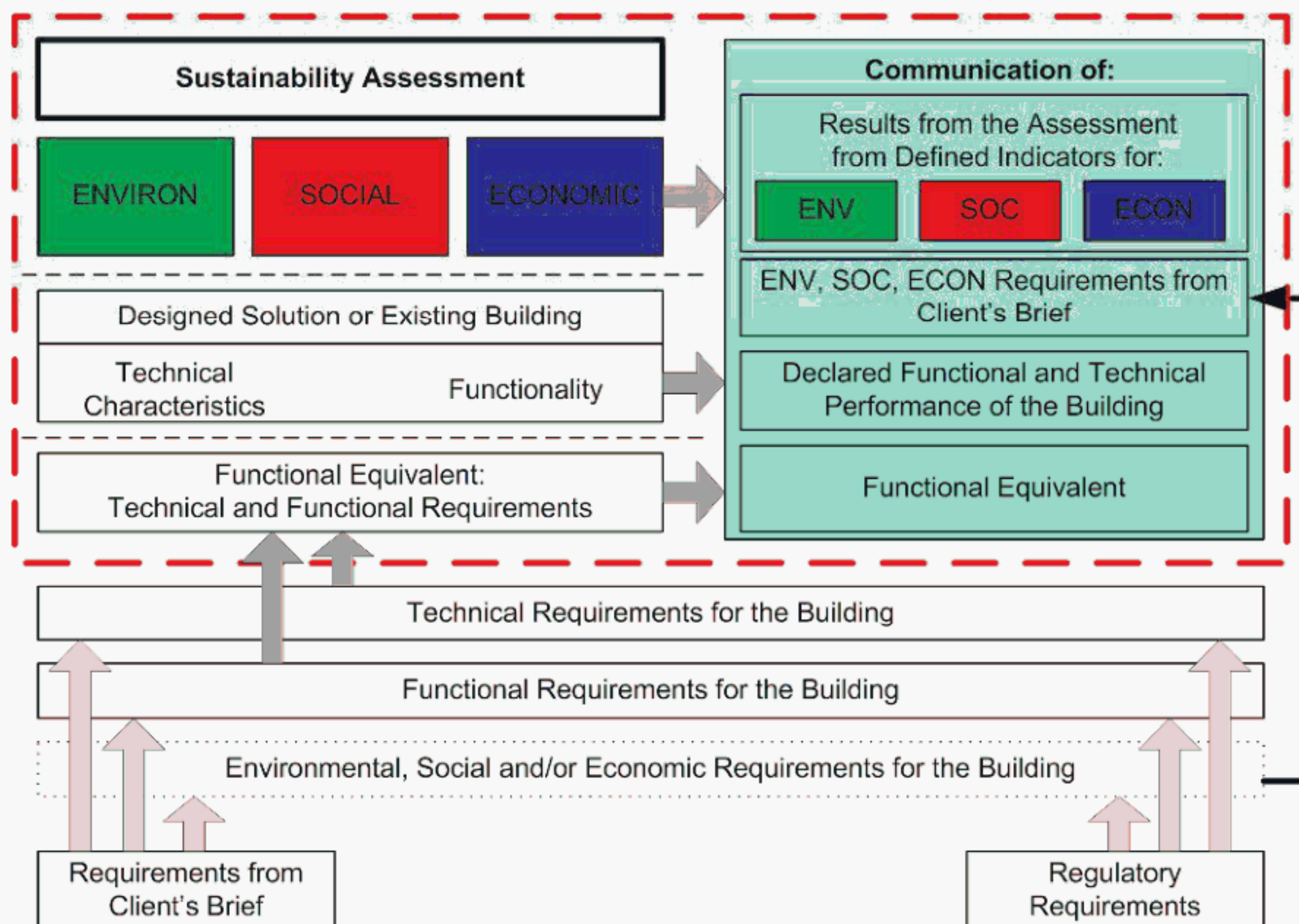
The sustainability assessment of buildings uses different types of information. The results of a sustainability assessment of the building provide values for the different types of indicators, and information on the scenarios and building life cycle stages included in the assessment.

In carrying out assessments, scenarios and a functional equivalent are determined at the building level. Assessment at the building level means that the descriptive model of the building with the major technical and functional requirements has been defined in the client's brief or in the regulations as illustrated in Figure 1. Assessments can be undertaken for the whole building, for parts of the building which can be used separately or for elements of the building.

Although the evaluation of technical and functional performance is beyond the scope of this series of standards, the technical and functional characteristics are considered within this framework by reference to the functional equivalent. The functional equivalent takes into account the technical and functional requirements and forms the basis for comparisons of the results of the assessment.

Any particular demands for, or related to, the environmental, social and economic performance defined in the client's brief or in the regulations, may be declared and communicated. Figure 1 shows how the functional equivalent and the technical and functional characteristics that deviate from those required, either by the client's brief or through regulations, are to be declared and communicated with the results of the assessment.





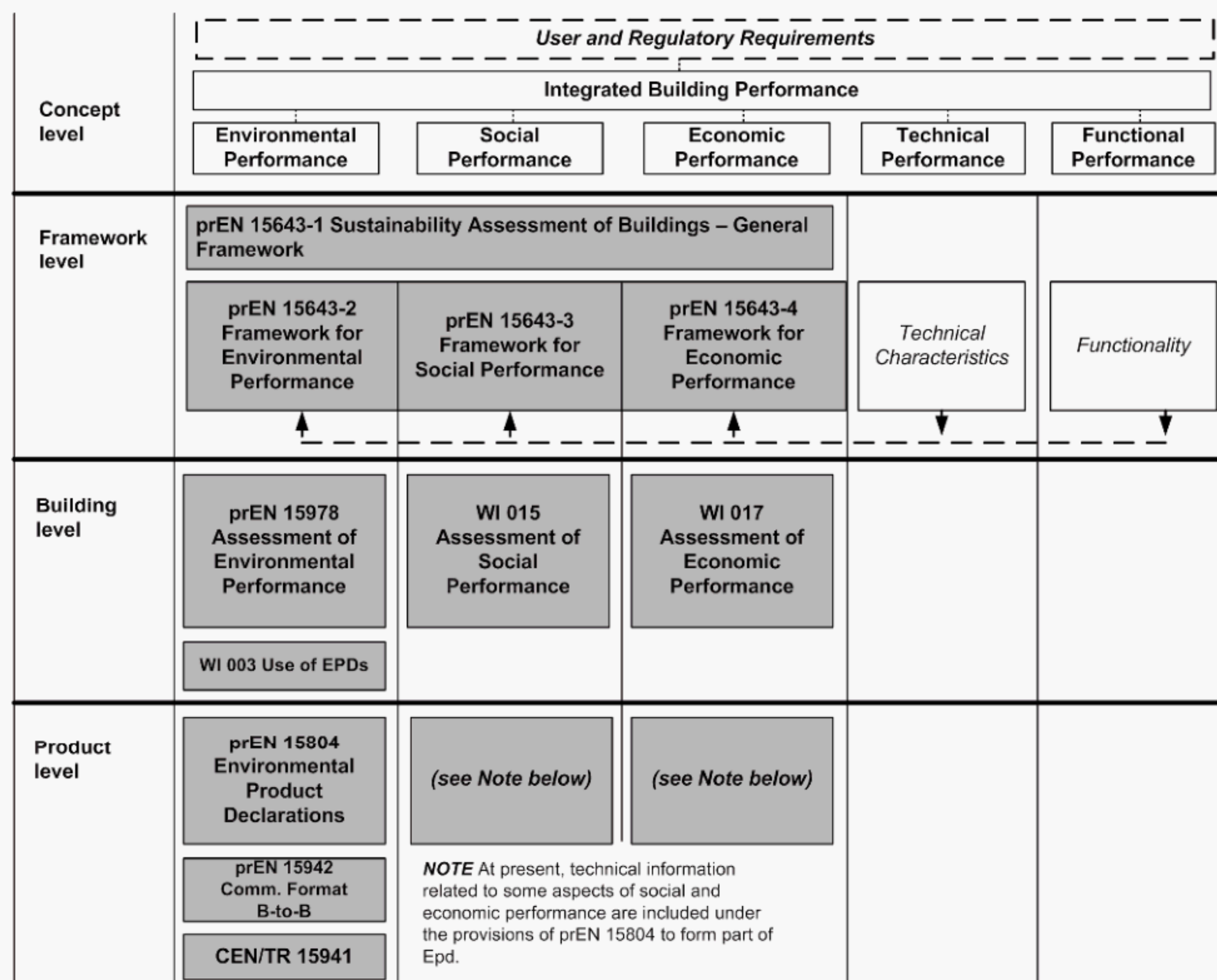
**Figure 1 — The concept of sustainability assessment of buildings**

NOTE 1 The outer box with the dotted line represents the area to be standardised by CEN/TC 350.

In concept, the integrated building performance incorporates environmental, social and economic performance as well the technical and functional performance, and these are intrinsically related to each other, as illustrated in Figure 2. Although the assessment of technical and functional performance does not form part of this series of standards, their interrelationship with environmental, social and economic performance is prerequisite for an assessment of sustainability performance of buildings, and is therefore taken into account.

It is advisable to carry out an assessment at the earliest opportunity during the conceptual stages of a construction or refurbishment project such as in the sketch plan stage in order to provide a broad estimate of the environmental performance, social performance and economic performance. As the project evolves, the assessment may be periodically reviewed and updated to support decision-making. A final assessment (as-built) should be carried out. The results of this final assessment can be used to inform all parties concerned.





**Figure 2 — The work programme of CEN/TC 350**

NOTE 2 The darkened boxes represent the work programme of CEN/TC 350.

This document, EN 15643-1, is the first part of the framework standards for sustainability assessment of buildings. The purpose of EN 15643-1 is to provide a framework with principles, requirements and guidelines for the sustainability assessment of buildings. It focuses on the general principles and requirements for the assessment of the environmental performance, social performance and economic performance of a building as described at the "framework level" in Figure 2.

The first revision of this general framework standard, EN 15643-1, will combine all four parts of the framework of this series of standards into one framework standard. This will ensure simultaneous revision of the interlinked parts of the frameworks within the series of standards.

In the future, the assessment methodologies within this series of standards may be part of an overall assessment of integrated building performance. The assessment methodologies may also be extended to an assessment of the neighbourhoods and wider built environment.



## 1 Scope

This European Standard provides the general principles and requirements, expressed through a series of standards, for the assessment of buildings in terms of environmental, social and economic performance taking into account technical characteristics and functionality of a building. The assessment will quantify the contribution of the assessed construction works to sustainable construction and sustainable development.

The framework applies to all types of buildings and it is relevant for the assessment of the environmental, social and economic performance of new buildings over their entire life cycle, and of existing buildings over their remaining service life and end of life stage.

The standards developed under this framework do not set the rules for how the different building assessment schemes may provide valuation methods. Nor do they prescribe levels, classes or benchmarks for measuring performance.

**NOTE** Valuation methods, levels, classes or benchmarks may be prescribed in the requirements for environmental, social and economic performance in the client's brief, building regulations, national standards, national codes of practice, certification schemes, etc.

The rules for assessment of environmental, social or economic aspects of organizations are not included within this framework. However, the consequences of decisions or actions that influence the environmental, social and economic performance of the object of assessment are taken into account.

## 2 Normative references

The following referenced documents are indispensable for the application 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.

prEN 15643-2, *Sustainability of construction works — Assessment of buildings — Part 2: Framework for the assessment of environmental performance*

prEN 15643-3, *Sustainability of Construction Works — Assessment of Buildings — Part 3: Framework for the assessment of social performance*

prEN 15643-4, *Sustainability of Construction Works — Assessment of Buildings — Part 4: Framework for the assessment of economic performance*

ISO 15392, *Sustainability in building construction — General principles*

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

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

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

ISO 15686-8, *Buildings 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.



### 3.1

#### **assembled system**

##### **part of works**

*component* (3.10) or a set of components incorporated in the *construction works* (3.13)

NOTE Adapted from the definitions in the Construction Products Directive (CPD) Guidance Paper C and from the definition of *construction* in ISO 6707-1:2004.

### 3.2

#### **brief**

written document that states the *client's* (3.9) requirements for a construction project

[ISO 6707-2:1993]

### 3.3

#### **building**

*construction works* (3.13) that has the provision of shelter for its occupants or contents as one of its main purposes and is usually enclosed and designed to stand permanently in one place

[ISO 6707-1:2004]

### 3.4

#### **building fabric**

*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 technical system**

installed technical equipment to support operation of a *building* (3.3)

NOTE This includes *technical building system* (3.70) and other systems for sanitation, security, fire safety, internal transport and building automation and control and IT communications.

### 3.6

#### **building site**

specified area of land where a *building* (3.3) is located or is defined to be located and *construction work* (3.12) of the *building* (3.3) and associated *external works* (3.28) are or will be undertaken

NOTE Adapted from the definition of site in ISO 6707-1:2004.

### 3.7

#### **built environment**

collection of *buildings* (3.3), *external works* (3.28) (landscaped areas), infrastructure and other *construction works* (3.13) within an area

NOTE Adapted from the definition of *built environment* in ISO 6707-1:2004.

### 3.8

#### **civil engineering works**

*construction works* (3.13) comprising a structure, such as a dam, bridge, road, railway, runway, utilities, pipeline, or sewerage system, or the result of operations such as dredging, earthwork, geotechnical processes, but excluding a *building* (3.3) and its associated site works

[ISO/NP 21929-2:2010]



### 3.9

#### **client**

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

[ISO 6707-1:2004]

### 3.10

#### **component**

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

[ISO 6707-1:2004]

### 3.11

#### **construction product**

item manufactured or processed for incorporation in *construction works* (3.13)

NOTE 1 *Construction products* are items supplied by a single responsible body.

NOTE 2 Adapted from the definition in ISO 6707-1:2004 according to the recommendation of ISO/TC59/AHG Terminology.

### 3.12

#### **construction work**

activities of forming *construction works* (3.13)

[ISO 6707-1:2004]

### 3.13

#### **construction works**

everything that is constructed or results from construction operations

NOTE 1 This covers both *building* (3.3) and *civil engineering works* (3.8), and both structural and non-structural elements.

NOTE 2 Adapted from the definition in ISO 6707-1:2004.

### 3.14

#### **decommissioning**

activities that change a *building* (3.3) or an *assembled system (part of works)* (3.1) from an operational status to a non-operational status

### 3.15

#### **delivered energy**

total energy, expressed per energy carrier, supplied to the *technical building system* (3.70) through the system boundary to satisfy the uses taken into account (heating, cooling, ventilation, domestic hot water, lighting, appliances, etc.) or to produce electricity

NOTE 1 For active solar and wind energy systems the incident solar radiation on solar panels or on solar collectors or the kinetic energy of wind is not part of the energy balance of the building. Renewable energy produced on site is part of the *delivered energy*.

NOTE 2 *Delivered energy* can be calculated for defined energy uses or it can be measured.

[EN 15603:2008]

### 3.16

#### **design life**

*service life* (3.62) intended by the designer



[ISO 15686-1:2000]

### 3.17

#### **disposal**

*waste* (3.75) treatment operation other than *recovery* (3.50)

NOTE Adapted from the definition in Directive 2008/98/EC.

### 3.18

#### **durability**

ability to maintain required *technical performance* (3.71) throughout the *service life* (3.62), subject to specified *maintenance* (3.41) under the influence of the foreseeable actions

NOTE 1 Foreseeable actions are actions related to "normal" agents that could be expected to act on the works or parts thereof. Potential degradation agents include, for example, temperature, humidity, water, UV radiation, abrasion, chemical attack, biological attack, corrosion, weathering, frost, freeze-thaw and fatigue.

NOTE 2 Adapted from the definition in CPD Guidance Paper F and in ISO 6707-1:2004.

### 3.19

#### **economic aspect**

aspect of *construction works* (3.13), *part of works* (3.1), processes or services related to their *life cycle* (3.35) that can cause change to economic conditions

[ISO 15392:2008]

### 3.20

#### **economic impact**

change to the economic conditions, whether adverse or beneficial, wholly or partially resulting from *economic aspects* (3.19)

NOTE Derived from the definitions of impact and economic impact in ISO 15392:2008.

### 3.21

#### **economic performance**

*performance* (3.47) related to *economic impacts* (3.20) and *economic aspects* (3.19)

[ISO 15392:2008]

### 3.22

#### **energy carrier**

substance or phenomenon that can be used to produce mechanical work or heat or to operate chemical or physical processes

NOTE Adapted from the definition in EN 15603:2008.

### 3.23

#### **environmental aspect**

aspect of *construction works* (3.13), *part of works* (3.1), processes or services related to their *life cycle* (3.35) that can cause change to the environment

EXAMPLES Use of energy and mass flow, production and segregation of wastes, water use, land use, emissions to air.

NOTE The examples added to the definition of environmental aspect in ISO 15392:2008.

[ISO 21931-1:2010]



### 3.24

#### **environmental impact**

change to the environment, whether adverse or beneficial, wholly or partially resulting from *environmental aspects* (3.23)

NOTE Derived from the definitions of impact and environmental impact in ISO 15392:2008.

[ISO 21931-1:2010]

### 3.25

#### **environmental performance**

*performance* (3.47) related to *environmental impacts* (3.24) and *environmental aspects* (3.23)

[ISO 15392:2008]

[ISO 21931-1:2010]

### 3.26

#### **environmental risk assessment**

process of systematic estimation of the probability of a particular set of circumstances and its negative environmental consequences and process of comparing the estimation results against given criteria to determine their environmental significance

NOTE Adapted from ISO Guide 73:2009.

### 3.27

#### **estimated service life**

*service life* (3.62) that a *building* (3.3) or an *assembled system (part of works)* (3.1) would be expected to have in a set of specific *in-use conditions* (3.34), determined from *reference service life data* (3.54) after taking into account any differences from the *reference in-use conditions* (3.52)

[ISO 15686-1]

### 3.28

#### **external works**

*construction works* (3.13) external to the building structure but within the *building's* (3.3) site

### 3.29

#### **functional equivalent**

quantified *functional requirements* (3.31) and/or *technical requirements* (3.72) for a *building* (3.3) or an *assembled system (part of works)* (3.1) for use as a basis for comparison

NOTE Adapted from the definition in ISO 21931-1:2010.

### 3.30

#### **functional performance**

*performance* (3.47) related to the *functionality* (3.32) of a *construction works* (3.11) or an *assembled system (part of works)* (3.1), which is required by the *users* (3.74) or by regulations, or both

NOTE Adapted from the definition in ISO 15686-10:2010.

### 3.31

#### **functional requirement**

type and level of *functionality* (3.32) of a building or assembled system which is required by the *users* (3.74) or by regulations, or both

NOTE Adapted from the definition in ISO 15686-10:2010.



### 3.32

#### **functionality**

suitability or usefulness for a specific purpose or activity

[ISO 15686-10:2010]

### 3.33

#### **handover**

step at which possession of the *construction works* (3.13) is surrendered to the *client* (3.9) upon completion with or without reservation

[ISO 6707-2:1993]

### 3.34

#### **in-use condition**

circumstance that can impact the *performance* (3.47) of a *building* (3.3) or *assembled system (part of works)* (3.1) under normal use

[ISO 15686-8:2008]

### 3.35

#### **life cycle**

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

### 3.36

#### **life cycle assessment**

##### **LCA**

compilation and evaluation of the inputs, outputs and the potential *environmental impacts* (3.24) of a product system throughout its *life cycle* (3.35)

[EN ISO 14044:2006]

NOTE In this context a building or assembled system is considered a "product" and a part of a "product system".

### 3.37

#### **life cycle cost**

##### **LCC**

cost of a *building* (3.3) or *part of works* (3.1) throughout its *life cycle* (3.35), while fulfilling *technical requirements* (3.72) and *functional requirements* (3.31)

[prEN 15643-4:2010]

[ISO 15686-5:2008]

### 3.38

#### **life cycle impact assessment**

##### **LCIA**

phase of *life cycle assessment* (3.36) aimed at understanding and evaluating the magnitude and significance of the potential *environmental impacts* (3.24) for a product system throughout the *life cycle* (3.35) of the product

[EN ISO 14044:2006]

NOTE In this context a building or assembled system is considered a "product" and a part of a "product system".

### 3.39

#### life cycle inventory analysis

##### LCI

phase of *life cycle assessment* (3.36) involving the compilation and quantification of inputs and outputs for a product throughout its *life cycle* (3.35)

[EN ISO 14044:2006]

NOTE In this context a building or assembled system is considered a "product" and a part of a "product system".

### 3.40

#### maintainability

ability of a *component* (3.10), an *assembled system (part of works)* (3.1) or *construction works* (3.13) to be retained in a state in which it can perform its required functions or be restored to such a state when a fault occurs

NOTE Adapted from the definition in ISO 6707-1:2004.

### 3.41

#### maintenance

combination of all technical and associated administrative actions during the *service life* (3.62) to retain a *building* (3.3) or an *assembled system (part of works)* (3.1) in a state in which it can perform its required functions

NOTE 1 *Maintenance* includes cleaning, servicing, repainting, repairing, replacing parts of the *construction works* (3.13) where needed, etc. (CPD Guidance Paper F).

NOTE 2 Adapted from the definition in ISO 15686-1:2000, ISO 6707-1:2004 and in CPD Guidance Paper F.

### 3.42

#### monetary value

aggregate of costs and revenues of *economic aspects* (3.19) expressed in monetary units

[prEN 15643-4:2010]

### 3.43

#### non-renewable energy

energy from sources which are not defined as *renewable energy* (3.57) sources

### 3.44

#### non-renewable resource

resource that exists in a finite amount that cannot be replenished on a human time scale

[ISO 21930:2007]

### 3.45

#### operational energy use

energy use of *technical building system* (3.70) during use and operation of the *building* (3.3)

### 3.46

#### operational water use

building-related water use of *technical building system* (3.70) or *user* (3.74) during use and operation of the *building* (3.3)

### 3.47

#### performance

expression relating the magnitude of a particular aspect of the object of consideration relative to specified requirements, objectives and/or targets



NOTE Adapted from the definition in ISO 6707-1:2004 according to the draft recommendation of ISO/TC59/AHG Terminology.

### 3.48

#### **primary energy**

energy that has not been subjected to any conversion or transformation process

[EN 15603:2008]

### 3.49

#### **project specification**

specification of *construction works* (3.13) for a specific project that prescribes the *construction work* (3.12) and the *construction products* (3.11) to be used and how they are to be applied

[ISO 6707-2:1993]

### 3.50

#### **recovery**

*waste* (3.75) treatment operation that serves a purpose in replacing other resources or prepares *waste* for such a use

NOTE Adapted from the definition in Directive 2008/98/EC.

### 3.51

#### **recycling**

*recovery* (3.50) operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes

NOTE 1 *Recycling* operations include:

- *recycling* of organic substances which are not used as solvents (including composting and other biological transformation processes);
- *recycling* of metals and metal compounds, and
- *recycling* of other inorganic materials

as defined in Directive 2008/98/EC Annex II.

NOTE 2 *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/EC Annex II.

NOTE 3 Adapted from the definition in Directive 2008/98/EC.

### 3.52

#### **reference in-use conditions**

*in-use condition* (3.34) under which the *RSL data* (3.54) are valid

NOTE The *reference in-use conditions* can be based upon information gathered through testing or from recorded performance and actual service life data of a component.

[ISO 15686-8:2008]

### 3.53

#### **reference service life**

#### **RSL**

*service life* (3.62) of a *construction product* (3.11) which is known to be expected under a particular set, i.e., a reference set, of *in-use conditions* (3.34) and which may form the basis of estimating the *service life* under other *in-use conditions*

[ISO 21930:2007]

### 3.54

#### reference service life data

#### RSL data

information that includes the *reference service life* (3.53) and any qualitative or quantitative data describing the validity of the *reference service life*

EXAMPLE Typical data describing the validity of the *RSL* (3.53) include the description of the *component* (3.10) for which it applies, the *reference in-use conditions* (3.52) under which it applies, and its quality.

[ISO 15686-8:2008]

### 3.55

#### refurbishment

modification and improvements to an existing *building* (3.3) in order to bring it up to an acceptable condition

[ISO 6707-1:2004]

### 3.56

#### renewable energy

energy from renewable non-fossil sources

EXAMPLES Wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases.

NOTE Adapted from the definition in Directive 2009/28/EC.

### 3.57

#### renewable resource

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

NOTE A renewable resource is capable of being exhausted, but may last indefinitely with proper stewardship. Examples include: trees in forests, grasses in grassland and fertile soil.

[ISO 21930:2007]

### 3.58

#### required service life

*service life* (3.62) required by the *client* (3.9) or through regulations

### 3.59

#### re-use

operation by which products or components that are not *waste* (3.75) are used again for the same purpose for which they were conceived or used for other purposes without reprocessing

NOTE Adapted from the definition in Directive 2008/98/EC.

### 3.60

#### scenario

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

### 3.61

#### secondary material

material recovered from previous use or from waste which substitutes primary materials

NOTE 1 Secondary material is measured at the point where the secondary material enters the system from another system.



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

NOTE 3 Examples for secondary materials (to be measured at the system boundary) are recycled scrap metal, crushed concrete, glass cullet, recycled wood chips, recycled plastic.

**3.62**  
**service life**  
**working life**

period of time after installation during which a *building* (3.3) or an *assembled system (part of works)* (3.1) meets or exceeds the *technical requirements* (3.72) and *functional requirements* (3.31)

NOTE Adapted from the definition in ISO 15686-1.

**3.63**  
**sketch plan stage**

stage at which alternative outline proposals are evaluated and a preferred solution produced sufficiently to obtain *client's* (3.9) approval

[ISO 6707-2:1993]

**3.64**  
**social aspect**

aspect of *construction works* (3.13), *part of works* (3.1), processes or services related to their *life cycle* (3.35) that can cause change to society or quality of life

[ISO 15392:2008]

**3.65**  
**social impact**

change to society or quality of life, whether adverse or beneficial, wholly or partially resulting from *social aspects* (3.64)

NOTE Derived from the definitions of impact and social impact in ISO 15392:2008.

**3.66**  
**social performance**

*performance* (3.47) related to *social impacts* (3.65) and *social aspects* (3.64)

[ISO 15392:2008]

**3.67**  
**sustainability**

ability of a system to be maintained for the present and future generations

NOTE In this context "system" comprises environmental, social and economic aspects.

**3.68**  
**sustainability assessment of buildings**

combination of the assessments of *environmental performance* (3.25), *social performance* (3.66) and *economic performance* (3.21) taking into account the *technical requirements* (3.72) and *functional requirements* (3.31) of a *building* (3.3) or an *assembled system (part of works)* (3.1), expressed at the building level

**3.69**  
**system boundary**

interface in the assessment between a *building* (3.3) and the environment or other product systems

NOTE *System boundary* defines what is included and what is not included in the assessment.



[ISO 21931-1:2010]

### 3.70

#### **technical building system**

technical equipment for heating, cooling, ventilation, hot water, lighting or for a combination thereof

NOTE Adapted from the definition in the recast of Energy Performance of Buildings Directive.

### 3.71

#### **technical performance**

*performance* (3.47) related to the capability of *construction works* (3.13) or an *assembled system (part of works)* (3.1) to fulfil its required functions under the intended use conditions

NOTE Derived from the definition of "building performance" in ISO 6707-1:2004.

### 3.72

#### **technical requirement**

type and level of technical characteristics of *construction works* (3.13) or an *assembled system (part of works)* (3.1), which are required or are a consequence of the requirements made either by the users or by regulations, or both

### 3.73

#### **transparency**

open, comprehensive and understandable presentation of information

[EN ISO 14044:2006]

[ISO 21930:2007]

[ISO 21931-1:2010]

### 3.74

#### **user**

person or organization for which a *building* (3.3) is designed (including building owner, manager and occupants)

NOTE Adapted from the definition in ISO 6707-1:2004.

### 3.75

#### **waste**

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

NOTE Adapted from the definition in Directive 2008/98/EC.

## 4 Principles

### 4.1 General

The standards developed under this framework provide a European system for the assessment of environmental, social and economic performance of buildings based on a life cycle approach.

A building assessment system may comprise more than one methodological part: quantifying, analytical part(s) of the method, and a valuation part(s) including value judgements. The standards within this framework only deal with the analytical part. For this reason, these standards do not provide valuation methods and do not set levels, classes or benchmarks for any measure of performance.



NOTE Valuation systems and related calculation rules for aggregation of indicators may be defined in the national standards or schemes according to the national or local preferences.

The principles given in Clause 4 are developed into general requirements for the assessment methods in Clause 5. Specific requirements for assessments of the environmental, social and economic performance of buildings are defined in Clause 6 in prEN 15643-2, prEN 15643-3 and prEN 15643-4.

The assessment methods shall be credible, transparent and systematic in order to achieve verifiability, transparency and comparability in the results of the assessment. The general requirements for communication of the assessment results are given in 5.6.

The assessment methods for environmental, social and economic performance of buildings given in the standards under this framework take into account performance aspects and impacts that can be expressed with quantitative and qualitative indicators, which are measured without value judgements and which lead to a clear result for each indicator.

## 4.2 Objectives of assessment of the building

The objectives of assessments are:

- to determine the impacts and aspects of the building and its site,
- to enable the client, user and designer to make decisions and choices that will help to address the need for sustainability of buildings.

## 4.3 Approach to assessment of environmental, social and economic performance

According to the general principles of sustainability in building construction described in ISO 15392, all three dimensions of sustainability of buildings (environmental, social and economic) are necessary elements in a systemic approach. Statements on the sustainability performance of a building shall address all three dimensions. This implies that when dealing with the sustainability assessment of a building all three dimensions of sustainability shall be included in an assessment of the building's performance, and communication shall be made accordingly. However, assessment of the individual dimensions of sustainability may also be undertaken separately, depending on the scope of assessment, in which case statements shall only be made for the separate assessment(s) – environmental, social, economic – actually carried out.

To link the results from the environmental, social and economic performance assessments requires that their functional equivalent (see 5.3) is the same. By reference to the functional equivalent the results of assessments can be presented in a systematic way. The functional equivalency (see 5.3) forms the basis for comparison at the building level.

## 4.4 Relevance of technical and functional requirements

The technical and functional requirements become fixed when they are prescribed in the client's brief or in the project specification. These requirements influence the results of the assessment and therefore need to be taken into account. How the technical and functional requirements of the building are taken into account in the description of the functional equivalent is given in 5.3.

NOTE The technical and functional requirements can include, for example, requirements on structural safety, fire safety, indoor air quality, security, adaptability, energy efficiency, accessibility, de-constructability, recyclability, maintainability, durability and service life of a building or an assembled system (part of works). Some of these technical and functional requirements are included in the social performance assessment categories.

## 4.5 Consideration of the building life cycle

In fulfilling the technical and functional requirements, environmental, social and economic impacts (which may be adverse or beneficial) and aspects are incurred which extend over the entire life cycle.



The impacts and aspects of a building that relate to its environmental, social and economic performance are influenced by actions taken throughout the entire life cycle of the building. These actions begin with the consideration of the need for a building and continue beyond the decommissioning and de-construction of the building (i.e. the legacy that is left behind once the building has been demolished/disposed of).

**NOTE** In economic considerations the planning and design stage is regarded as the beginning of the building life cycle, whereas the acquisition of raw materials is regarded in environmental considerations as the beginning of the building life cycle.

## 5 Requirements for assessment methods

### 5.1 General

The assessment methods within this framework shall (as far as possible) ensure that double counting of performance aspects and impacts is avoided.

### 5.2 Object of assessment and the system boundary

The object of assessment shall be the building, its foundations and external works within the area of the building's site (curtilage) and temporary works associated with the building's construction.

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

**NOTE 1** Regulatory requirements relating to the infrastructure (energy and water supply, sewage systems and other utilities) within the curtilage may allow exclusion from the assessment.

The system boundary for the assessment shall be defined in the scope of the assessment and shall take into account the requirements defined in this clause. The assessment shall include impacts and aspects of the building-integrated technical system and building-related furniture, fixtures and fittings. The system boundary for the assessment shall exclude impacts and aspects of the appliances and furniture, fixtures and fittings that are not building-related.

**NOTE 2** The impacts and aspects of appliances and furniture, fixtures and fittings that are not building-related may be assessed separately. Where this is the case, the impacts and aspects of the appliances and furniture, fixtures and fittings that are not building-related are recorded and reported separately.

**NOTE 3** Appliances that are not building-related are domestic, commercial and industrial appliances and other non-building-related goods e.g. entertainment electronics, washing machines, refrigerators, cooking appliances, office electronics and appliances of industrial processes.

**NOTE 4** Building-related furniture, fixtures and fittings are products that are fixed to the building, so that the dismantling of the product decreases the performance of the building and the dismantling or replacement of the product constitute construction operations.

### 5.3 Functional equivalent

Comparisons between the results of assessments of buildings or assembled systems (part of works) – at design stage or whenever the results are used – shall only be made on the basis of their functional equivalency. 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 reasonable comparison. If assessment results based on different functional equivalents are used for comparisons, the basis and conditions for this comparison shall be made clear.

**NOTE 1** 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 reference unit. The choice of the common reference unit for all buildings being



compared depends on a specific requirement of a 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.

For sustainability assessment the same functional equivalent shall be used for the assessment of each of the individual dimensions of sustainability.

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, etc.);
- pattern of use (e.g. occupancy);
- relevant technical and functional requirements (e.g. regulatory framework and client's specific requirements);
- required service life.

NOTE 2 Other specific requirements and exposure to climate and to other conditions from the immediate surroundings may be relevant for inclusion in the information on the functional equivalent.

## 5.4 Scenarios

Assessments shall be established on the basis of specified scenarios that represent the building life cycle. The applied scenarios shall be included in the assessment documentation and made available for communication. The scenarios shall be realistic and representative and in accordance with the technical and functional requirements as given in the functional equivalent (see 5.3).

The technical and functional requirements shall be taken from the client's brief, the regulatory requirements and from the project specification. In order to achieve compatible assessments between environmental, social and economic performance of a building, equivalent quantities and specifications for the assembly of products, and equivalent scenarios shall be used. Scenarios shall be defined and modelled explicitly.

The estimated service life of a building or assembled system (part of works) shall be established in accordance with specific rules of European product standards and shall take into account rules and guidance given in the standards ISO 15686-1,-2,-7 and -8.

## 5.5 Transparency

The standards within this framework describing assessment methods shall define the requirements for transparency of data, methodologies, results, reporting and communication.

## 5.6 Reporting and communication

### 5.6.1 General

The assessment report is the systematic and comprehensive summary of the assessment documentation supporting the communication. The assessment report shall contain any information of importance to the content of the communication.

In the context of this suite of standards, communication is regarded as presentation of information from the assessment report to any third party.

Reporting and communication shall be accurate, verifiable, relevant and not misleading or deceptive.



5.6.2 Results of the assessment

5.6.2.1 General

To ensure that the results of the assessment of environmental performance, social performance and economic performance of a building or an assembled system (part of works) can be understood and interpreted in a transparent and systematic way, the results of the assessments shall be reported and communicated according to the information groups as defined in 5.6.2.2, 5.6.2.3 and 5.6.2.4 (see Figure 3). The possible aggregation of the information groups defined in 5.6.2.2, 5.6.2.3 and 5.6.2.4 shall be clearly separated from the assessment results as additional information.

In the assessment report, the results shall be expressed with all the defined indicators given in prEN 15643-2, prEN 15643-3 and prEN 15643-4 (and their supporting standards) without any further aggregation of the defined indicators. If the applied assessment method does not provide a value for a specific indicator given in prEN 15643-2, prEN 15643-3 and prEN 15643-4 (and their supporting standards), this shall be clearly stated in the assessment report as an “indicator not assessed”, INA.

When the results of assessment are communicated to a third party or made publicly available, the indicators to be communicated shall be taken from the defined indicators given in prEN 15643-2, prEN 15643-3 and prEN 15643-4 (and their supporting standards). The results of possible further aggregation of these indicators shall be clearly separated from the assessment results as additional information.

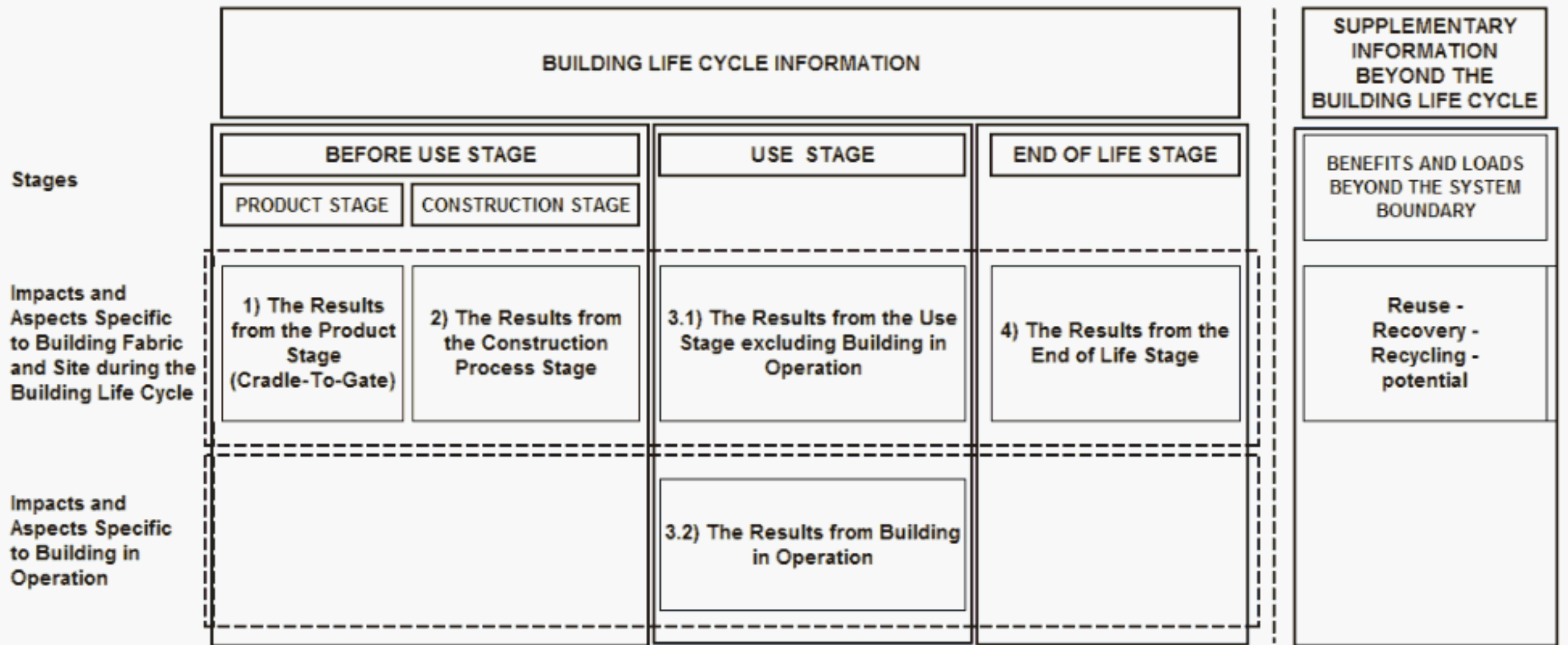


Figure 3 — Organisation of the result of the assessment in accordance with the life cycle stages and the information groups

The results of the assessments shall be organised in the following two main groups:

- impacts and aspects specific to building fabric and site (see 5.6.2.2);
- impacts and aspects specific to building in operation (see 5.6.2.3).

Optionally, supplementary information may be provided in a separate information group:

- benefits and loads beyond the building life cycle (see 5.6.2.4)



#### 5.6.2.2 Impacts and aspects specific to building fabric and site

The results for the impacts and aspects specific to building fabric and site over the building life cycle shall be organised to the following groups of information:

- results from the planning stage and the product stage before the construction process stage (see box 1) in Figure 3);
- results from the construction process stage (including transportation to the construction site) before the handover of the building (see box 2) in Figure 3);
- results from the use stage (after the handover of the building) excluding building in operation (see box 3.1) in Figure 3);
- results from the end of life stage of the building (see box 4) in Figure 3).

#### 5.6.2.3 Impacts and aspects specific to building in operation

Impacts and aspects specific to building in operation concerns a building as a “mechanism”, which uses energy and water to serve the users of the building (see 5.2). Impacts and aspects specific to building in operation start to occur after the handover of the building and last until the beginning of the end of life stage of the building.

The impacts and aspects specific to operational energy and water use shall be grouped as results from building in operation (see box 3.2) in Figure 3).

#### 5.6.2.4 Benefits and loads beyond the building life cycle

The results for impacts and aspects resulting from further reuse, recycling and energy recovery and other recovery operations not included in the building life cycle may be included as supplementary information. If included, this shall be grouped as information on reuse, recovery, recycling potential (see the box on supplementary information in Figure 3).

#### 5.6.3 Functional equivalent

The functional equivalent shall be included in the assessment report and declared as part of the communication.

#### 5.6.4 Environmental, social and economic requirements from client's brief and/or regulations

If, in addition to the technical and functional requirements given in the functional equivalent, there are environmental, social and/or economic requirements that are given in the client's brief and/or result from regulations, they shall be included in the assessment report and declared as part of the communication.

#### 5.6.5 Technical and functional performance

The assessment report and communication shall include information on the main technical characteristics and functionality of the building that deviates from the technical and functional requirements given in the functional equivalent.



## Annex A (informative)

### Work programme of CEN/TC 350

According to the work programme of CEN/TC 350, the following documents are prepared by CEN/TC 350:

- WI 00350003, *Sustainability of construction works — Environmental product declarations — Use of environmental product declaration (EPD)*, prepared by CEN/TC 350/WG 1
- WI 00350004, prEN 15804, *Sustainability of construction works — Environmental product declarations — Product category rules*, prepared by CEN/TC 350/WG 3
- WI 00350006, CEN/TR 15941, *Sustainability of construction works — Environmental product declarations — Methodology for selection and use of generic data*, prepared by CEN/TC 350/WG 3
- WI 00350008, prEN 15643-3, *Sustainability of Construction Works — Assessment of Buildings — Part 3: Framework for the assessment of social performance*, prepared by CEN/TC 350/WG 5
- WI 00350009, prEN 15643-4, *Sustainability of Construction Works — Assessment of Buildings — Part 4: Framework for the assessment of economic performance*, prepared by CEN/TC 350/WG 4
- WI 00350010, prEN 15643-2, *Sustainability of Construction Works — Assessment of Buildings Part 2: Framework for the Assessment of Environmental Performance*, prepared by CEN/TC 350/TG
- WI 00350011, prEN 15978, *Sustainability of construction works — Assessment of environmental performance of buildings—Calculation method*, prepared by CEN/TC 350/WG 1
- WI 00350012, EN 15643-1, *Sustainability of construction works — Sustainability assessment of buildings — Part 1: General framework*, prepared by CEN/TC 350/TG
- WI 00350013, prEN 15942, *Sustainability of construction works — Environmental product declarations — Communication format — Business to Business*, prepared by CEN/TC 350/WG 3
- WI 00350015, *Sustainability of construction works — Assessment of social performance of buildings — Methods*, prepared by CEN/TC 350/WG 5



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- [4] EN 15193, *Energy performance of buildings — Energy requirements for lighting*
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- [15] CEN/TR 15941, *Sustainability of construction works — Environmental product declarations — Methodology for selection and use of generic data*
- [16] prEN 15942, *Sustainability of construction works — Environmental product declarations — Communication format — Business to Business*
- [17] prEN 15978, *Sustainability of construction works — Assessment of environmental performance of buildings — Calculation method*
- [18] WI 00350003, *Sustainability of construction works — Environmental product declarations — Use of environmental product declaration (EPD)*
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