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**Sustainability in buildings and civil  
engineering works — Framework  
for methods of assessment of the  
environmental, social and economic  
performance of construction  
works as a basis for sustainability**

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Part 2:

**Civil engineering works**

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*Développement durable dans la construction — Cadre  
méthodologique de l'évaluation au sens du développement durable  
des performances environnementales, sociales et économiques des  
ouvrages de construction —*

*Partie 2: Ouvrages de génie civil*



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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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

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

A list of all parts in the ISO 21931 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

It is important to measure and understand the sustainability performance of civil engineering works in order to assess, communicate and improve their potential impacts on sustainable development.

This document establishes a framework for methods of assessment of the sustainability performance of civil engineering works and related external works, which is a central part of the process. The sustainability performance assessment evaluates aspects and impacts to assess the environmental, social and economic performance of civil engineering works using qualitative and quantitative indicators measured without value judgements. One of the primary purposes of this document is to improve the quality of the methods of assessment, which can enable greater comparability of the results of assessments. Such assessments can be used for benchmarking performance and monitoring progress towards improvement of performance.

Although there are not as many assessment methods for civil engineering works as there are for buildings, some can be found. The existence of these methods indicates a trend towards construction that contributes to sustainable development, whose main objectives are to minimize negative impacts and maximize positive direct and indirect impacts on sustainability, especially through a focus on

- use of resources (materials, water and energy) and waste generation,
- discharges into water, atmosphere and soil,
- biodiversity and ecosystems,
- social impacts, throughout the value chain, and
- innovative and proactive approach towards selecting the most beneficial and economical alternatives.

Methods of assessment of the sustainability performance of civil engineering works provide a basis for demonstrating and communicating the result of efforts to improve sustainability performance in construction works. The methods typically establish a means of assessing a broad range of considerations related to sustainability against explicitly declared criteria, and give a summary of sustainability performance.

Methods of assessment of the sustainability performance of civil engineering works provide:

- a common and verifiable set of references, so that civil engineering works owners, striving for increasing their beneficial contribution to sustainable development, have a means of measuring, evaluating and demonstrating that effort;
- a reference, for use as a common basis, by which the civil engineering works owners/managers, design teams, contractors and suppliers can formulate effective strategies regarding the design, construction and operation of civil engineering works, with the intent to improve sustainability performance;
- detailed information on the civil engineering works gathered and organized in such a way that it can be used to lower operating, financing and insurance costs and increase operating efficiency and life;
- a clear description of the factors considered to be the key sustainable considerations and their relative importance, thereby assisting the design process.

To achieve the practical goals noted above, methods of assessment of the sustainability performance of civil engineering works refer to limited criteria and seek a balance between rigor and practicality. The sustainability performance assessment of civil engineering works uses different types of information. The results of a sustainability performance assessment of a civil engineering works provide information on the different types of indicators, the related civil engineering works scenarios and the life cycle stages included in the assessment. Life-cycle based approaches play an increasingly significant role for setting performance criteria within methods of assessment of sustainability performance of civil engineering works. In carrying out assessments, scenarios and a functional equivalent are determined

at the civil engineering works level. Assessment at the civil engineering works level means that the descriptive model of the works, along with the major technical and functional requirements, has been defined in the client's brief or in the regulations.

However, the collection and maintenance of current data sets for the multitude of civil engineering works systems and elements may not be practically achievable at the moment. Also, the context of overall civil engineering works performance is important for considering each sustainable criterion.

Considering all these issues, the purpose of this document is to describe the framework and the principles that apply in the sustainability performance assessment of new and existing civil engineering works and their related site works, taking into account the various effects these civil engineering works are likely to have.

Practical relevant rules and recommendations concerning methods for the assessment of the sustainability performance of civil engineering works, which can exist on either a national or regional basis, can be examined and improved by the use of a framework for methods of assessment, which is the basis of this document.

An improvement of the sustainability performance of a civil engineering works requires an appropriate operation of the civil engineering works over its lifetime. In existing civil engineering works, it can be enhanced through the use of "sustainability-related" policies and the implementation of management systems.

This document is one in a suite of documents dealing with sustainability in construction works that includes the following:

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ISO 21931-2:2019  
http://standards.iteh.ai/catalog/standards/sist/50793850-40b0-402f-91c0-293/iso-21931-2-2019
- a) ISO 15392, *Sustainability in buildings and civil engineering works — General principles*;
  - b) ISO 16745-1, *Sustainability in buildings and civil engineering works — Carbon metric of an existing building during use stage — Part 1: Calculation, reporting and communication*;
  - c) ISO 16745-2, *Sustainability in buildings and civil engineering works — Carbon metric of an existing building during use stage — Part 2: Verification*;
  - d) ISO 20887, *Sustainability in buildings and civil engineering works — Design for disassembly and adaptability of buildings*;
  - e) ISO 21929-1, *Sustainability in building construction — Sustainability indicators — Part 1: Framework for the development of indicators and a core set of indicators for buildings*;
  - f) ISO/TS 21929-2, *Sustainability in building construction — Sustainability indicators — Part 2: Framework for the development of indicators for civil engineering works*;
  - g) ISO 21930, *Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services*;
  - h) ISO 21931-1, *Sustainability in buildings and civil engineering works — Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment — Part 1: Buildings*;
  - i) ISO 21931-2, *Sustainability in buildings and civil engineering works — Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment — Part 2: Civil engineering works*;
  - j) ISO/TS 12720, *Sustainability in buildings and civil engineering works — Guidelines on the application of the general principles in ISO 15392*;
  - k) ISO/TR 21932, *Sustainability in buildings and civil engineering works — A review of terminology*.

The relationship among the documents is elaborated in [Figure 1](#).

It should be noted that due to the wide range of different types and scale of civil engineering works it is not practical to include a single core set of indicators within this document. As a result there is a suite of inter-related standards that define the process of assessing the sustainability performance of civil engineering works that includes ISO/TS 21929-2, this document and a future standardization work on systems of indicators for different civil engineering work typologies.

As a suite, they define a methodology that combines rigour, consistence and flexibility in the assessment of a wide range of civil engineering works.

<p><b>Methodological basics</b></p>	<p>ISO 15392 Sustainability in buildings and civil engineering works — General principles                  ISO/TS 12720 Sustainability in buildings and civil engineering works — Guidelines on the application of the general principles in ISO 15392                  ISO/TR 21932 Sustainability in buildings and civil engineering works — A review of terminology                  ISO 20887 Sustainability in buildings and civil engineering works — Design for disassembly and adaptability of buildings</p> <p>ISO 21929-1 Sustainability in building construction — Sustainability indicators — Part 1: Framework for the development of indicators and a core set of indicators for buildings                  ISO/TS 21929-2 Sustainability in building construction — Sustainability indicators — Part 2: Framework for the development of indicators for civil engineering works</p>		
<p><b>Construction works</b></p>	<p>ISO 16745-1 Sustainability in buildings and civil engineering works — Carbon metric of an existing building during use stage — Part 1: Calculation, reporting and communication</p>	<p>ISO 21931-2:2019  <a href="https://standards.iteh.ai/catalog/standards/sist/ab854e79-7850-41ff-9c2f-11e710719293/iso-21931-2-2019">https://standards.iteh.ai/catalog/standards/sist/ab854e79-7850-41ff-9c2f-11e710719293/iso-21931-2-2019</a></p>	
<p>ISO 16745-2 Sustainability in buildings and civil engineering works — Carbon metric of an existing building during use stage — Part 2: Verification</p>			
<p>ISO 21931-1 Sustainability in buildings and civil engineering works — Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment — Part 1: Buildings</p>			
<p>ISO 21931-2 Sustainability in buildings and civil engineering works — Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment — Part 2: Civil engineering works</p>			
<p><b>Construction products and services</b></p>	<p>ISO 21930 Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services</p>		
	<p><b>Environmental aspects</b></p>	<p><b>Economic aspects</b></p>	<p><b>Social aspects</b></p>

Figure 1 — Suite of related documents for sustainability in buildings and civil engineering works

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# Sustainability in buildings and civil engineering works — Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment —

## Part 2: Civil engineering works

### 1 Scope

This document provides a general framework for improving the quality and comparability of methods for assessing the contribution of civil engineering works and their related external works to sustainable development based on a life cycle approach.

This document aims to bridge the gap between regional and national methods for the assessment of the sustainability performance of civil engineering works by providing a common framework for their expression.

This document identifies and describes issues to be taken into account in the development and use of methods for the assessment of the sustainability performance for all types of civil engineering works, both new and existing, and it is relevant for the assessment of the environmental, social and economic performance of both new and existing civil engineering works over their entire life cycle.

The object of assessment in this document is the civil engineering works itself and its area of influence.

NOTE 1 For example, the assessment includes any local civil engineering works beyond the immediate area of the civil engineering works; the transportation of the users of the civil engineering works; and the use and exploitation of the civil engineering works itself.

Assessments can be undertaken either for the whole civil engineering works, for a part of the civil engineering works, or for a combination of several civil engineering works.

This document excludes environmental, social and economic risk assessment, but the results of a risk assessment can be taken into consideration.

This document is intended to be used in conjunction with, and following the principles set out in, ISO 15392 and the ISO 14000 family of International Standards.

The evaluation of technical and functional performance of the civil engineering works is outside the scope of this document, but 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.

Assessment methods that consider only one or two of the three dimensions of sustainability are outside the scope of this document.

## ISO 21931-2:2019(E)

This document does not set benchmarks or levels of performance relative to environmental, social and economic aspects and impacts.

NOTE 2 Valuation methods, levels, classes or benchmarks can be prescribed in the requirements for environmental, social and economic performance in the client's brief, construction regulations, national standards, national codes of practice, civil engineering works assessment and certification schemes, etc.

The rules for methods of assessment to consider in the assessment of environmental, social and economic aspects of operation practices are included within this framework, and the consequences of decisions or actions that influence the environmental, social and economic performance of the object of assessment are identified so that they can be taken into account.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 14025:2006, *Environmental labels and declarations — Type III environmental declarations — Principles and procedures*

ISO 14040, *Environmental management — Life cycle assessment — Principles and framework*

ISO 14044, *Environmental management — Life cycle assessment — Requirements and guidelines*

ISO 14050, *Environmental management — Vocabulary*

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

<https://standards.iteh.ai/catalog/standards/sist/ab854e79-7850-41f9-9c2f-0719-0719-0719>

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*

ISO/TS 15686-9, *Buildings and constructed assets — Service-life planning — Part 9: Guidance on assessment of service-life data*

ISO 21930, *Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services*

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

## 3 Terms and definitions

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

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

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

### 3.1 accessibility

ability for users to access the service(s) that the *civil engineering works* (3.5) is providing and/or to access nature

Note 1 to entry: Examples of services that can be provided include water or energy supply and mobility service.

### 3.2 area of influence

area or combination of areas surrounding a *civil engineering works* (3.5) that can be affected with changes to their economical, environmental or social conditions by the civil engineering works' operations throughout its *life cycle* (3.18)

Note 1 to entry: The area of influence is variable and dependent on the *construction works* (3.8) *project* (3.22), its location and its life cycle stage. As an overall approach, the area of influence is usually limited to the civil engineering works itself and its immediate surroundings.

[SOURCE: ISO/TS 21929-2:2015, 3.2]

### 3.3 avoided impact

benefits and loads that occur as a result of combining functions and thereby avoid the need for additional (i.e. separate) *civil engineering works* (3.5)

Note 1 to entry: Avoided impacts can be positive or negative.

### 3.4 brief

program, US document that states the requirements for a *project* (3.22)

[SOURCE: ISO 6707-2:2017, 3.2.18]

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### 3.5 civil engineering works

civil engineering project, US *construction works* (3.8) 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* (3.21), but excluding a building and its associated site works

[SOURCE: ISO 6707-1:2017, 3.1.1.2, modified — The alternative term “civil engineering project, US” has been deleted; Note 1 to entry has been deleted.]

### 3.6 client

person or organization initiating and financing a *project* (3.22) and approving the *brief* (3.4)

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

### 3.7 construction product

item manufactured or processed for incorporation in a *civil engineering works* (3.5)

Note 1 to entry: Construction products are items supplied by a single responsible body.

Note 2 to entry: In this document, unless otherwise designated, the term construction product is used for any good(s) or service(s) related to civil engineering works.

Note 3 to entry: Construction assemblies, construction elements and integrated technical systems, incorporated within a civil engineering works, can be considered construction products.

[SOURCE: ISO 21930:2017, 3.2.2, modified — The wording “construction works” has been replaced with “civil engineering works”.]

**3.8  
construction works**

construction, US  
everything that is constructed or results from construction operations

Note 1 to entry: Construction works covers all buildings and *civil engineering works* (3.5).

[SOURCE: ISO 6707-1:2017, 3.1.1.1, modified — Original Note 1 to entry has been deleted; new Note 1 to entry has been added.]

**3.9  
downstream process**

*process* (3.21) that is carried out after the designated process in the stream of relevant processes

[SOURCE: ISO 21931-1:2010, 3.2]

**3.10  
economic aspect**

aspect of *civil engineering works* (3.5), part of civil engineering works, *processes* (3.21) or services related to their *life cycle* (3.18) that can cause a change to economic conditions

[SOURCE: ISO 15392:—, 3.11, modified — The wordings “constuction works” and “works” have been replaced with “civil engineering works”.]

**3.11  
economic impact**

change to the economy, adverse or beneficial, wholly or partially resulting from *economic aspects* (3.10)

[SOURCE: ISO 15392:—, 3.16.1, modified — The word “impact” has been replaced with “change”; “adverse or beneficial” has been added.]

**3.12  
economic performance**

*performance* (3.20) of a *civil engineering works* (3.5) related to its *economic impacts* (3.11) and *economic aspects* (3.10)

**3.13  
environmental aspect**

aspect of *civil engineering works* (3.5), part of civil engineering works, *processes* (3.21) or services related to their *life cycle* (3.18) that can cause a change to the environment

[SOURCE: ISO 15392:—, 3.12, modified — The wordings “constuction works” and “works” have been replaced with “civil engineering works”.]

**3.14  
environmental impact**

change to the environment, adverse or beneficial, wholly or partially resulting from *environmental aspects* (3.13)

[SOURCE: ISO 15392:—, 3.16.2, modified — The word “impact” has been replaced with “change”; “adverse or beneficial” has been added.]

**3.15  
environmental performance**

*performance* (3.20) of a *civil engineering works* (3.5) related to its *environmental impacts* (3.14) and *environmental aspects* (3.13)

Note 1 to entry: The environmental performance is influenced by all *processes* (3.21) related to the *life cycle* (3.18) of the civil engineering works.

Note 2 to entry: Environmental performance can be expressed either quantitatively or qualitatively with reference to performance requirements or possibly relative to a scale of values or a benchmark.