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Indicators for the sustainability assessment of roads

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European foreword

CWA 17089 **Indicators for the sustainability assessment of roads** was developed in accordance with CEN-CENELEC Guide 29 “CEN/CENELEC Workshop Agreements – The way to rapid agreement” and with the relevant provisions of CEN/CENELEC Internal Regulations - Part 2.

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Introduction

This document provides a recommended common set of indicators that can be used for sustainability assessment of roads and a suggested deployment procedure, with the aim of supporting National road authorities, private operators, contractors and engineering companies when considering sustainability for roads in their day to day business. These indicators are formulated to cover the three pillars in sustainability: environmental, economic and social. This list is drafted considering current relevant initiatives for the sustainability assessment of road structures.

The starting point for this document was taken from the indicators list produced in the project “Life Cycle Engineering for roads, the new sustainability certification system for roads (LCE4ROADS)”, funded by the European Commission via the 7th Framework Programme (FP7) in the call for “Innovative, cost-effective construction and maintenance for safer, greener and climate resilient roads” where standardization was encouraged.

LCE4Roads project carried out a study to identify and analyse the most relevant methods and indicators used for sustainability assessment of roads such as: Envision TM, FHWA INVEST, and European research projects like COST354, EVITA, SUNRA, among others and the work performed by the Joint Research Centre (EC) to develop the Green Public Procurement Criteria. On the other hand, results from the EDGAR project: “Evaluation and decision process for greener asphalt roads” currently funded by the Conference of European Directors of Roads (CEDR) Transnational Road Research Programme Call 2013 have been also considered for this document.

Sustainability is a current and multidisciplinary topic resulting in many (European) initiatives, standards, technical reports, policies and Directives that are relevant when formulating a common set of indicators. In this introduction relevant initiatives that were taken into account are mentioned.

The “Europe 2020 Strategy” includes the Flagship Initiative: “Resource efficient Europe”, where European Commission presents proposals aiming at cleaner, more efficient and more sustainable transport through the adoption of measures such as research and innovation, setting current standards and developing the necessary infrastructure support as well as regulatory measures such as pricing. The Circular Economy Package consists of an [EU Action Plan for the Circular Economy](#) that establishes a concrete and ambitious programme of action, with measures covering the whole cycle: from production and consumption to waste management and the market for secondary raw materials.

The White Paper on Transport, takes into account major policy initiatives for a competitive and resource efficient transport system under sustainable developments. Furthermore, ERTRAC (European Road Transport Research Advisory Group) sets out the following ambition: “Towards a 50 % more efficient road transport system by 2030”.

The construction and maintenance of roads in an energy and resource efficient way is an important policy objective for Europe. As a consequence the European Commission has developed a process to set the Green Public Procurement Criteria mentioned above (GPP criteria) for design, construction and maintenance of roads and provide guidance on how to effectively integrate these GPP Criteria into the procurement process.

Green Public Procurement is a voluntary instrument and has the ultimate goal of providing precise and verifiable criteria that can be used to procure low environmental impact roads.

Safety is at the core of EU transport policy with ambitious targets to reduce fatalities and injuries on land and sea throughout the European Union. With by far the highest number of accidents occurring on the road, the policy priority is to reduce road casualties, with a target of close to zero deaths by 2050.

In the White Paper 'European transport policy for 2010: time to decide' the European Commission expressed the need to carry out safety impact assessments and road safety audits. The European Directive 2008/96/EC on road infrastructure safety management establishes the related procedures that shall be implemented by Member States.

Considering the challenges mentioned and the general principles of sustainability in construction described in ISO 15392:2008, all three dimensions of sustainability of civil engineering works (environmental, social and economic) are necessary elements in a systemic approach to a sustainable assessment. Statements on the sustainability performance of a civil engineering works shall address all three dimensions.

This implies that when dealing with the sustainability assessment of a civil engineering works, all three dimensions of sustainability shall be included in an assessment of the civil engineering works' performance, and communication shall be made accordingly.

According to prEN 15643-5 for the assessment of the sustainability performance of a civil engineering works (including roads), the life cycle starts with the preparatory works and administrative processes. It proceeds through the contractual arrangements for design and specification, acquisition of raw materials, manufacturing and procurement of products, construction work processes, handover for use, commissioning, actual use including maintenance, repair, replacement and operation of the civil engineering works for roads and finally at the end of life, decommissioning, deconstruction or demolition, waste processing in preparation for reuse, recycling and energy recovery and other recovery operations, and disposal of waste.

The results from assessment of the aspects and impacts specific to user's utilization of the civil engineering works shall be reported as part of Module B8 (see Figure 1) according to prEN 15643-5. These may be, for example, aspects and impacts associated with: traffic using a road, de-icing of an aircraft, energy generated by a dam or a windfarm (only where this is the primary intended function of the asset), use of IT processes provided by the civil engineering works as a primary function, etc.

The following figure summarises this approach:

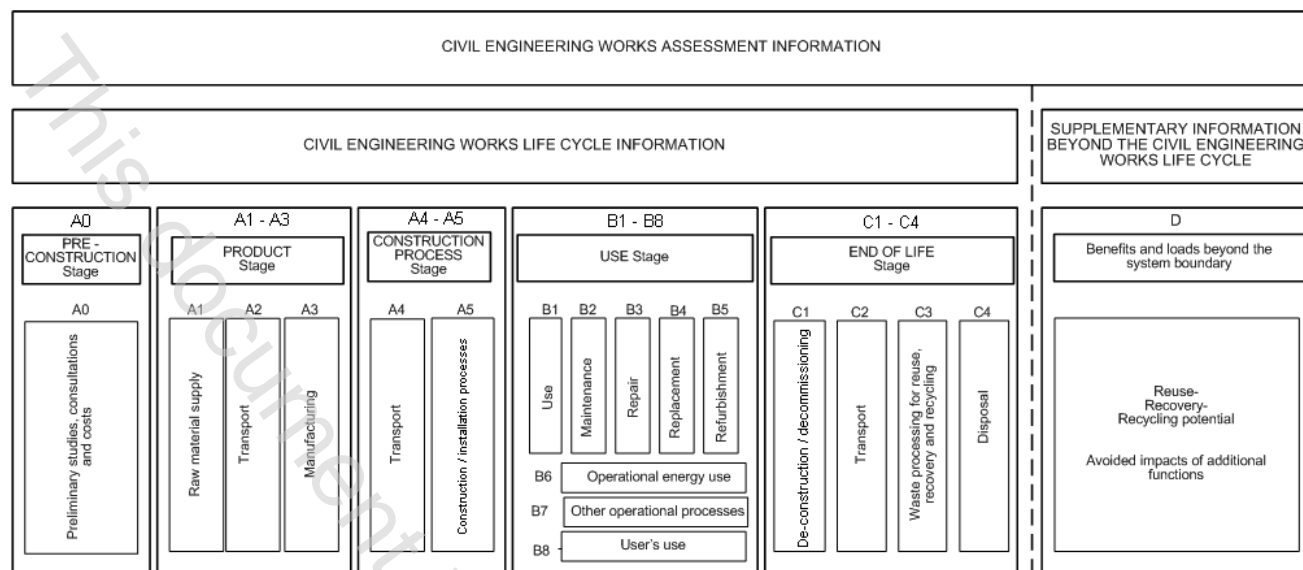


Figure 1 — Information modules applied in the assessment of environmental, social and economic performance according to prEN 15643-5

CEN/TC 350 “Sustainability of construction works” has published standards for sustainability assessment of buildings and construction products. The TC 350 standards for civil engineering works (CEW) are now under development in its WG 6 and are expected to provide a horizontal approach for all CEW projects and constructed assets.

Regarding products and materials used in road construction and maintenance, CEN/TC 227 “Road materials” has numerous standards to measure the technical performance of road building materials and road surfaces and has recently created a working group dealing with sustainability (CEN/TC 227/WG 6). Although the standardisation process has started there is no standardisation document published for sustainability of roads.

For responsible sourcing, BES 6001 and other relevant documents, such as the responsible sourcing scheme from the Concrete Sustainability Council, have been taken into account.

This document provides a recommended common set of indicators that can be used for sustainability assessment of road structures and a suggested deployment procedure.

Finally these indicators are intended to be used according to CEN/TC 350 and CEN/TC 227 methodologies for the assessment of technical, environmental, social or economic performance and it should be mentioned that relevant standards from these TC were considered for the drafting of the indicators.

1 Scope

This document provides a recommended common set of indicators that can be used for the sustainability assessment of future or existing road structures. The indicators include definitions, units and measurements and/or calculation methods.

It does not provide a full assessment methodology, neither benchmarking nor recommendations for weighting indicators.

Alignment choice is not included in this document as it has been determined previously.

Regarding bridges and tunnels, only road structures are included. Other elements of the road (e.g. noise and safety barriers, lighting, signage, etc.) not considered in this document may influence the global sustainability assessment. Where the choices made on the basis of this document have an influence on these other elements, the related impacts should be taken into consideration.

The indicators are intended to be declared using the modularity provided in prEN 15643-5. This document does not assess the relevance of the indicators for each information module but it should be remarked that the global warming potential and energy use are dominated by the emissions from vehicles during the use stage, which can be influenced by pavement characteristics.

The set of indicators presented in this document, covering the whole life cycle should be used. The user of this document can decide to use a part of the content and use other parameters relevant for the scope of the assessment. If a limited set is chosen, the user of the document should consider the risk of burden shifting from one Sustainability Performance Indicator (SPI) to another or from one life cycle stage to another. An impact assessment is recommended to justify the choices made.

NOTE Intended users of the document are Public Administrations, road designers, constructors, etc.

The information about materials or products is based on EN 15804 and EN ISO 14044 for environmental impact categories and indicators, and should include relevant information derived from construction products, processes and services according to prEN 15643-5.

The information for costs is based on ISO 15686-5 and prEN 15643-5.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

prEN 15643-5:2016, *Sustainability of construction works — Sustainability assessment of buildings and civil engineering works — Part 5: Framework for the assessment of sustainability performance of civil engineering works*

EN 15804:2012+A1:2013, *Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products*

CEN/TR 17005:2016, *Sustainability of construction works — Additional environmental impact categories and indicators — Background information and possibilities — Evaluation of the possibility of adding environmental impact categories and related indicators and calculation methods for the assessment of the environmental performance of buildings*

EN ISO 14050:2010, *Environmental management — Vocabulary (ISO 14050:2009)*

ISO 15686-5:2008, *Buildings and constructed assets — Service-life planning — Part 5: Life-cycle costing*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 15643-5, EN 15804:2012+A1:2013, EN ISO 14050:2010, ISO 15686-5 and the following apply.

3.1

disposal

any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy

[SOURCE: Directive 2008/98/EC on waste]

3.2

environmental aspect

element of an individual/organization's activities, products or services that interacts, or can interact, with the environment

3.3

environmental impact

change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects

3.4

environmental product declaration

EPD

environmental declaration providing quantified environmental data using predetermined parameters and, where relevant, additional environmental information

Note 1 to entry: The predetermined parameters are based on the international LCA standards (EN ISO 14040 and EN ISO 14044). The selection of the predetermined parameters is based on ISO 21930 (adapted from ISO 14025).

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

Note 3 to entry: For construction products and services in Europe, EPD are based on EN 15804.

[Based on EN ISO 14025:2010, 3.2, and EN 15804:2012+A1:2013, 3.32]

3.5

functional unit

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

[SOURCE: EN ISO 14040:2006]

3.6

hazardous waste

waste which displays one or more of the hazardous properties listed in Annex III of the Directive 2008/98/EC

[SOURCE: Directive 2008/98/EC on waste, modified]