International Standard

ISO 59020

Circular economy — Measuring and assessing circularity performance

Économie circulaire — Mesure et évaluation de la performance de circularité

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document 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).

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

This document was prepared by Technical Committee ISO/TC 323, *Circular economy*.

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

Introduction

0.1 Background

The global economy is “linear” as it is mainly based on extraction, production, use and disposal. This linear economy leads to resource depletion, biodiversity loss, waste and harmful losses and releases, all of which collectively are causing serious damage to the capacity of the planet to continue to provide for the needs of future generations.[56] Moreover, several planetary boundaries have already been reached or exceeded.

There is an increased understanding that a transition towards an economy that is more circular, based on a circular use of resources, can contribute to meeting current and future human needs (welfare, housing, nutrition, healthcare, mobility, etc.). Transitioning towards a circular economy can also contribute to the creation and sharing of more value within society and interested parties, while natural resources are managed to be replenished and renewed and in a sustainable way, securing the quality and resilience of ecosystems.

Organizations recognize many potential reasons to engage in a circular economy (e.g. delivering more ambitious and sustainable solutions; improved relationships with interested parties; more effective and efficient ways to fulfil voluntary commitments or legal requirements; engaging in climate change mitigation or adaptation; managing resource scarcity risks, increasing resilience in the environmental, social and economic systems), while contributing to satisfying human needs.

The ISO 59000 family of standards (see Figure 1) is designed to harmonize the understanding of the circular economy and to support its implementation and measurement. It also considers organizations, such as government, industry and non-profit, in contributing to the achievement of the United Nations (UN) Agenda 2030 for Sustainable Development[54].

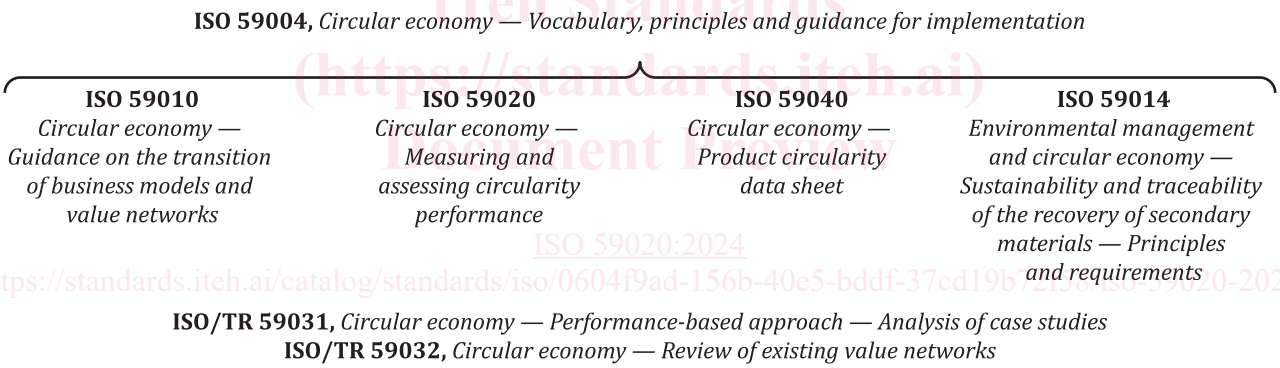

Figure 1 — ISO 59000 family of standards

0.2 Relationship between this ISO 59004, ISO 59010 and this document

ISO 59004, ISO 59010 and this document are interconnected, as shown in Figure 2, and support organizations in implementing a transition towards a circular economy.

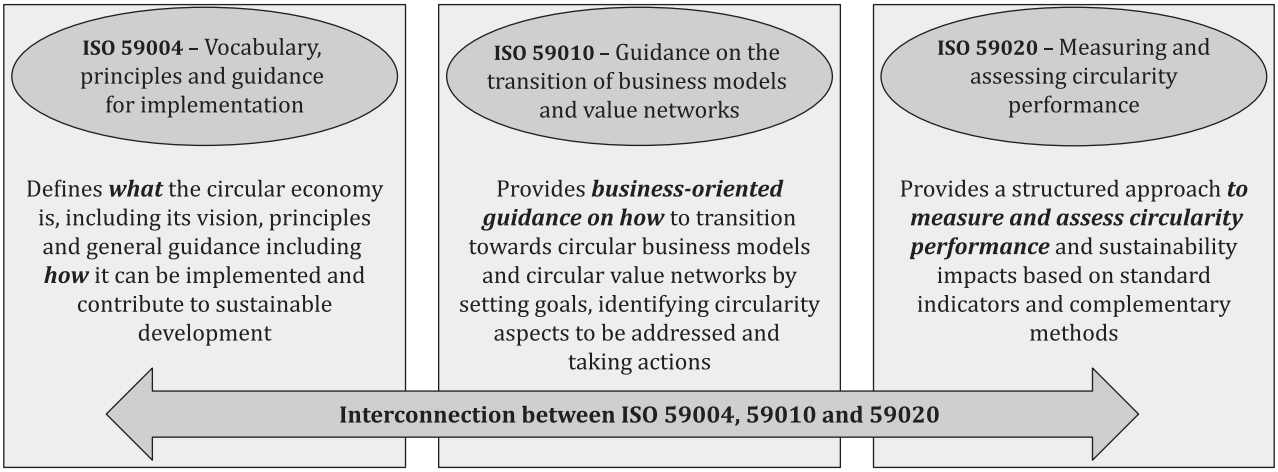

Figure 2 — Relationship between ISO 59004, ISO 59010 and this document

0.3 Purpose and the outline of this document

The purpose of this document is to assist organizations in the collection of the necessary information and the calculation to enable circular economy practices that minimize resource use and optimize the circular flow of resources, while contributing to sustainable development.

The results provide an integrated view of circularity and sustainable development and are intended to be used to support the transition towards a circular economy. In contributing to sustainable development this document also considers the UN Agenda 2030[54] and the Sustainable Development Goals (SDGs).

Terms, definitions and principles are provided to help users and other interested parties interpret and apply the guidance. This document provides a platform for the development of more detailed circularity assessment standards that are appropriate for individual sectors.

Circular economy — Measuring and assessing circularity performance

1 Scope

This document specifies requirements and gives guidance to organizations for measuring and assessing a defined economic system to determine their circularity performance at a specific time. Measurement and assessment are performed by the collection and calculation of data with the help of mandatory and optional circularity indicators.

This document provides a framework to guide users within organizations of all types and sizes through the measurement and assessment process, including system boundary setting and choice of indicators, as well as processing and interpreting data in a consistent and reproducible manner to generate meaningful and verifiable results.

The framework is applicable to multiple levels of an economic system, ranging from regional, interorganizational and organizational to the product level.

To measure and assess social, environmental and economic impacts that are caused by the actions of the organization to achieve circular goals and objectives, the document provides a list of complementary methods that can be used in addition to this document.

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 59004, *Circular economy — Vocabulary, principles and guidance for implementation*

ISO 59010, *Circular economy — Guidance on the transition of business models and value networks*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 59004, ISO 59010 and the following apply.

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

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

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

3.1 Terms related to circularity and the circular economy

3.1.1
circular economy
economic system that uses a systemic approach to maintain a circular flow of resources, by recovering, retaining or adding to their value, while contributing to sustainable development

Note 1 to entry: *Resources* (3.3.11) can be considered concerning both stocks and flows.

Note 2 to entry: The inflow of virgin resources is kept as low as possible, and the circular flow of resources is kept as closed as possible to minimize *waste* (3.3.12), *losses* (3.3.13) and *releases* (3.3.14) from the economic system.

[SOURCE: ISO 59004:2024, 3.1.1]

3.1.2
circular
aligned with the principles for a *circular economy* (3.1.1)

Note 1 to entry: Objectives and goals for a circular economy can be defined with respect to the principles for a circular economy.

[SOURCE: ISO 59004:2024, 3.1.14]

3.1.3
circularity
degree of alignment with the principles for a *circular economy* (3.1.1)

[SOURCE: ISO 59004:2024, 3.1.15]

3.1.4
circularity aspect
element of an organization's activities or solutions that interacts with the *circular economy* (3.1.1)

EXAMPLE Durability, recyclability, reusability, repairability, recoverability.

Note 1 to entry: Circularity aspects should be considered in relation to the principles, as well as the organization's objectives, goals and actions, for the implementation of a circular economy.

[SOURCE: ISO 59004:2024, 3.6.1]

3.2 Terms related to system, boundary and scope

3.2.1
system boundary
boundary representing physical, process, temporal and geographical limits of what is included and what is not included in an assessment

[SOURCE: ISO 21931-2:2019, 3.31]

3.2.2
system in focus
system that is defined by selected *system boundaries* (3.2.1) and is the subject of a *circularity measurement* (3.3.2) and a *circularity assessment* (3.3.3)

Note 1 to entry: Four system levels are being used for measuring and assessing *circularity performance* (3.3.1): regional, interorganizational, organizational and product level.

[SOURCE: ISO 59004:2024, 3.1.23]

3.3 Terms related to measurement and assessment

3.3.1
circularity performance
degree to which a set of *circularity aspects* (3.1.4) align with the objectives and principles for a *circular economy* (3.1.1)

[SOURCE: ISO 59004:2024, 3.6.3]

3.3.2
circularity measurement
process to help determine the *circularity performance* (3.3.1) through collection, calculation or compilation of data or information

[SOURCE: ISO 59004:2024, 3.6.4]

3.3.3
circularity assessment
evaluation and interpretation of results and impacts from a *circularity measurement* (3.3.2)

Note 1 to entry: Assessment includes consideration of the sustainability aspects and can apply *complementary methods* (3.3.7) such as life cycle assessment.

[SOURCE: ISO 59004:2024, 3.6.5]

3.3.4
circularity indicator
metric used to measure one or more *circularity aspects* (3.1.4)

Note 1 to entry: A circularity indicator can represent a measurable aspect or combination of aspects of a *resource* (3.3.11), a solution, process or action.

[SOURCE: ISO 59004:2024, 3.6.6]

3.3.5
quantitative indicator
measure based on numeric data that can be used for mathematical calculations and statistical analysis

Note 1 to entry: The input data can be directly measured or otherwise obtained.

Note 2 to entry: Quantitative input data are based on a physical or economic unit of measurement.

3.3.6
qualitative indicator
measure derived from a checklist or descriptive scale without any quantification

Note 1 to entry: Qualitative indicators can be categorized into classes that can be assigned numeric values.

3.3.7
complementary method
method, approach or standard that is used together with *circularity measurement* (3.3.2) to provide a *circularity assessment* (3.3.3)

3.3.8
primary data
data obtained from known direct measurement or from implicitly or explicitly defined calculations based on data originating from such direct measurement or calculations

[SOURCE: ISO 14033:2019, 3.1.5, modified — “or calculations” added.]

3.3.9
secondary data
data obtained in other ways than *primary data* (3.3.8)

EXAMPLE Literature, public or commercial databases, statistics, modelling or simulation.

[SOURCE: ISO 14033:2019, 3.1.6, modified — Example added.]

3.3.10
aggregation
process of combining data from various sources

[SOURCE: ISO/IEC 29182-2:2013, 2.4.2]

3.3.11
resource
asset from which a solution is created or implemented

Note 1 to entry: Depending on the context, reference to “resource” includes “raw material”, “feedstock”, “material” or “component”.

Note 2 to entry: For the purpose of this document, asset refers to physical resources such as natural resources, virgin resources, recoverable resources and recovered resources.

Note 3 to entry: Resource includes any energy type (e.g. the energy content or energy potential of materials).

Note 4 to entry: Resources can be considered concerning both stocks and flows.

[SOURCE: ISO 59004:2024, 3.1.5]

3.3.12
waste
resource (3.3.11) that is no longer considered to be an asset as it, at the time, provides insufficient value to the holder

Note 1 to entry: The holder can choose to retain, discard or transfer the waste.

Note 2 to entry: Value can be assigned to waste as a result of a need from another interested party, at which point the resource is no longer considered waste.

Note 3 to entry: The assignment of value to waste as a resource is linked, in part, to the available technology (e.g. landfill mining).

Note 4 to entry: Some regulations require the holder to dispose of certain types of waste, while others assign value to waste.

Note 5 to entry: Because resources include the energy content or energy potential of materials, such energy, when liberated during a process and not recovered for another use, can be considered a waste.

[SOURCE: ISO 59004:2024, 3.3.6]

3.3.13
losses
unmanaged outflows of a *resource* (3.3.11) from the *system in focus* (3.2.2) that are not recovered

Note 1 to entry: For the purpose of measuring *circularity performance* (3.3.1), losses can be estimated.

Note 2 to entry: Losses can happen at any stage of the life cycle, such as wear and tear in the use stage (e.g. tire abrasion, microplastic).

[SOURCE: ISO 59004:2024, 3.3.7]

3.3.14
releases
managed emissions to air and discharges to water or land from the *system in focus* (3.2.2)

Note 1 to entry: Releases can be solid, liquid or gaseous.

Note 2 to entry: For the purpose of measuring *circularity performance* (3.3.1), releases are quantifiable but are not recovered at the time of emission or discharge.

Note 3 to entry: Releases can happen at any stage of the life cycle (e.g. car emissions).

[SOURCE: ISO 59004:2024, 3.3.8]

3.3.15
allocation
partitioning of the inflows and outflows of a process or a system between the *system in focus* (3.2.2) and one or more other systems

[SOURCE: ISO 14040:2006, 3.17, modified — “of” added after “partitioning” and the system in focus and one or more other systems” replaced “product system under study and one or more other product systems”.]

3.3.16
data traceability
ability of data to be tracked to original and verifiable sources

Note 1 to entry: Including calculations and operations performed on the data.

Note 2 to entry: ISO 14033:2019 provides a framework both for how to achieve data traceability as well as how to audit and verify the level to which data traceability has been achieved.

Note 3 to entry: Data can be quantitative or qualitative.

3.3.17
reused content
component or part that has reached the end of one use, and is used again with minimal or no physical alterations

Note 1 to entry: Minimal alterations include cleaning or minor adjustments or repairs.

Note 2 to entry: Non-minimal alteration of materials and parts can contribute to *recycled content* (3.3.18). In this document, recycled content and reused content are treated as distinct and separate shares of total content.

3.3.18
recycled content
proportion, by mass, of *recycled material* (3.3.19) in a product

[SOURCE: ISO 14009:2020, 3.2.23]

3.3.19
recycled material
material that has been reprocessed from recovered or reclaimed material by means of a manufacturing process

[SOURCE: ISO 14009:2020, 3.2.10, modified — "and made into a final product or into a component for incorporation into a product" and notes to entry deleted.]

3.3.20
durability
ability of a product or material to function as required, under specified conditions of use, maintenance, repair and update until a limiting state prevents its functioning

Note 1 to entry: Durability can be expressed in units appropriate to the part or product concerned (e.g. operating cycles, distance run). The units should always be clearly stated.

Note 2 to entry: Durability is influenced by reliability, maintenance, repair and updates (e.g. in software).

3.3.21
renewable energy
energy from a renewable resource

[SOURCE: ISO 59004:2024, 3.3.9]

4 Principles of measuring and assessing circularity

4.1 Circular economy principles

A system that is the subject of the circularity measurement and assessment is referred to as the "system in focus". In measuring and assessing the circularity performance of a system in focus, the circular economy principles of ISO 59004 should be considered. These are:

— systems thinking;

— value creation;

— value sharing;

— resource stewardship;

— resource traceability;

— ecosystem resilience.

4.2 Circularity measurement and assessment principles

4.2.1 General

In addition to the general circular economy principles, the following specific measurement and assessment principles should be applied:

— ensure relevant boundaries (see 4.2.2);

— ensure meaningful outcomes (see 4.2.3);.

These principles are also applicable to measuring and assessing the sustainability impacts within the system in focus, and towards wider social, environmental and economic systems.

4.2.2 Ensure relevant boundaries

4.2.2.1 General

The boundaries of the measurement and assessment should be based on a life cycle perspective and appropriate spatial (see 4.2.2.2) and temporal boundaries (see 4.2.2.2) should be chosen.

4.2.2.2 Spatial scale

The spatial scales reflect clear boundaries of the system in focus and its interconnection with the wider socio-economic and environmental other systems.

On the product level, the spatial scale covers different stages across the value chain or value network (e.g. from extraction, processing and supply of materials, manufacturing of parts and products, distribution, use, maintenance and repair to end of life). Such stages are typically located in different places, reflecting the cross-territorial nature of value chains and value networks.

4.2.2.3 Temporal scale

The time scale chosen encompasses the entire life cycle of the system from creation through to final end of life and disposal.

For extended temporal scales, consideration should be given to making periodic measurements and assessments at appropriate intervals to account for changes in inflow or outflow characteristics, properties or values to be accounted for (e.g. new recycling or reuse technologies, changed legislation for end of life treatment, new insights in regeneration of ecosystems).

4.2.3 Ensure meaningful outcome

The methods, models, procedures and data sources used in a circularity assessment should be transparent and understandable for the interested parties involved which include, for example, the target audience, suppliers, users and consumers. Data used in a circularity measurement and assessment should be traceable and as complete as possible. All resource inflows and outflows of the system in focus shall be quantified, when applicable. Any data assumptions or estimates should be properly described. Where possible, the circularity measurement and assessment should allow comparability to other similar or related systems whether internal or external to the system in focus.