

ICCA Sustainability Definitions

Supporting ICCA's sustainability
ambition under the Global
Framework on Chemicals



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As part of its sustainability ambition under the Global Framework on Chemicals (GFC), ICCA promotes a shared understanding of sustainability for the chemical sector. Through common principles, language and practical tools, ICCA seeks to support companies in integrating sustainability into decision-making, driving innovation and advancing more sustainable chemical solutions across value chains.

The definitions below provide a common reference for key sustainability, climate and circularity concepts used in ICCA's sustainability work and are intended for clarification purposes only.

A. Sustainability definitions

1. Green chemistry

Green chemistry is the utilization of a set of principles that aims to reduce or eliminate the use or generation of hazardous substances in the design, manufacture and application of chemical products.

Source: Green chemistry by Anastas and Warner (link [here](#))

2. Green and Sustainable Chemistry

Green and Sustainable Chemistry seeks to promote innovation to unveil the full potential of chemistry such that it is compatible with and supports the implementation of the Sustainable Development Goals.

It is the utilization of a set of principles that aims to reduce or eliminate the use or generation of hazardous substances or their risks in the design, manufacture and application of chemical products.

It is chemistry that helps protect human health, conserve natural resources, minimize

waste, enhance our communities and society, and contribute to technical innovation and economic success.

Sources: Adapted from ACS ([link here](#)) and Green chemistry by Anastas and Warner ([link here](#))

3. Hazardous substances

Chemicals with toxicological considerations for human and the potential environmental impact especially in consumer use, additionally incorporating the end-of-life and circularity aspects.

It should be noted that 'hazardous substance' can have specific regulatory context in national legislations, often defined based on GHS classification criteria to address specific regulatory needs such as workplace safety.

Adapted from: Cefic - Safe and Sustainable by Design guidance ([link here](#))

Safe

Chemicals with low risks for humans and the environment especially for consumer use, additionally considering the end-of-life and circularity aspects.

Adapted from: Cefic - Safe and Sustainable by Design guidance ([link here](#))

4. Safe and Sustainable Chemistry

Safe and sustainable chemistry is performing chemistry in a way to help protect human health, conserve natural resources, minimize waste, enhance our communities and society, and contribute to technical innovation and economic success.

It seeks to promote innovation to unveil the full potential of chemistry such that it is compatible with and supports the implementation of the Sustainable Development Goals.

Safe implies low risks for humans and the environment additionally considering the end-of-life and circularity aspects.

Source: Mixed sources, JRC, European Commission ([link here](#))

5. Safe and Sustainable by Design

Safe and Sustainable by Design is an iterative process guiding innovation and the placement on the market of new chemicals, materials, products, processes and services that are safe, and deliver environmental, societal, and/or economic value through their life cycle.

Safe implies low risks for humans and the environment additionally considering the end-of-life and circularity aspects.

Sources: Adapted from Cefic (link [here](#))

What are safe chemicals?

*Chemicals with low risks for humans and the environment especially for consumer use, additionally considering the end-of-life and circularity aspects.

Adapted from: Cefic - [Safe and Sustainable by Design guidance](#)

6. Sustainability analysis

Sustainability analysis in chemistry involves evaluating the environmental, health, safety, social, and economic impacts (both negative and positive) of chemical substances, processes, and products throughout their entire life cycle.

Sources: Adapted from International Sustainable Chemistry Collaborative Centre (link [here](#))

7. Sustainable development

Sustainable development is development that meets the needs of the present, without compromising the ability of future generations to meet their own needs. Chemistry plays an essential role in driving progress across all three dimensions of sustainable development – environmental, social and economic – and helping to address and overcome the world's most pressing sustainability challenges.

Sources: Adapted from ICCA (link [here](#)), UN – Brundtland report (link [here](#))

8. Sustainable solution

Sustainable solutions refer to strategies and practices that meet present needs without compromising the ability of future generations to meet their own needs. These solutions emphasize balancing economic growth, environmental protection, and social equity.

Sources: Adapted from UN – Brundtland report (link [here](#))

9. Systems thinking

Systems thinking is the ability to recognize and understand relationships; to analyse

complex systems; to think of how systems are embedded within different domains and different scales. It examines the relationships among a system's parts, including feedback processes and patterns over time.

In the context of sustainability, UNESCO (2017) identifies systems thinking as one of the key competencies necessary to achieve the Sustainable Development Goals (SDGs). According to this definition, systems thinking competence involves recognizing and understanding relationships (e.g., between environmental, social, and economic factors).

Sources: Combined from Adapted from UNESCO (2017), Peretz et al., 2023b, Griggs et al., 2017

B. Climate definitions

1. Carbon dioxide (CO₂) equivalent

The amount of carbon dioxide (CO₂) emission that would have an equivalent effect on a specified key measure of climate change, over a specified time horizon, as an emitted amount of another greenhouse gas (GHG) or a mixture of other GHGs.

Source: IPCC, 2021(Annex VII: Glossary) (link [here](#)) → Def. consistent w/ E&CC LG

2. Climate change

A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use.

Sources: IPCC (link [here](#)) → Def. consistent w/ E&CC LG

3. Climate neutral

Concept of a state in which human activities result in no net effect on the climate system, achieved by balancing anthropogenic emissions with **anthropogenic** removals **over a specified period**.

Regional and sectoral specificities may need to be considered in implementation, but do not alter the definition of climate neutrality.

Sources: adapted IPCC (link [here](#)) → Def. consistent w/ E&CC LG

4. Defossilisation

The process of eliminating the use of fossil fuels from energy systems and economic activities-in other words, moving away from dependence on fossil fuels

Source: ICCA E&CC Leadership group

5. Greenhouse gas (GHG)

Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of radiation emitted by the Earth's surface, by the atmosphere itself, and by clouds. This property traps heat and causes the greenhouse effect.

GHGs include Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF₆), and Nitrogen trifluoride (NF₃).

Source: IPCC ([link](#)) → Def. consistent w/ E&CC LG

6. Net zero = net zero GHG

Net zero GHG emissions are achieved when anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period.

Sources: IPCC ([link](#)) → Def. consistent w/ E&CC LG

7. Removals

Transfer of a greenhouse gas (GHG) from the atmosphere to be stored within a non-atmospheric sink

Sources: GRI (Standard 102: Climate Change 2025) ([link](#)) → Def. consistent w/ E&CC LG

8. Removals (anthropogenic)

The withdrawal of greenhouse gases (GHGs) from the atmosphere as a result of deliberate human activities. These include enhancing biological sinks of CO₂ and using chemical engineering to achieve long-term removal and storage. Carbon capture and storage (CCS), which alone does not remove CO₂ from the atmosphere, can help reduce atmospheric CO₂ from industrial and energy-related sources if it is combined with bioenergy production (BECCS), or if CO₂ is captured from the air directly and stored (DACCS)

Sources: IPCC ([link here](#)) → Def. consistent w/ E&CC LG

9. Scope 1

Direct GHG emissions occur from sources that are owned or controlled by the

company, for example, emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.; emissions from chemical production in owned or controlled process equipment.

Sources: GHG protocol ([link](#)) → Def. consistent w/ E&CC LG

10. Scope 2

Indirect emissions from the generation of purchased or acquired electricity, steam, heat or cooling consumed by the reporting company.

Sources: GHG protocol ([link](#)) → Def. consistent w/ E&CC LG

11. Scope 3

All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions.

Sources: GHG protocol ([link](#)) → Def. consistent w/ E&CC LG

12. Sustainable Carbon Cycle

The concept of Sustainable Carbon Cycles describes the use of Carbon in our manufacturing processes and products in such a way that it contributes to reaching the climate neutrality *goals*. To reach this, the chemical industry can rely on a broad array of complementary technologies and efficient processes. It includes feedstock choices or deploying technologies like Carbon Capture and Utilisation (CCU), Carbon Capture and Storage (CCS) and chemical recycling.

Sources: Cefic

13. Value chain

“Value chain” refers to all of the upstream and downstream activities associated with the operations of the reporting company, including the use of sold products by consumers and the end-of-life treatment of sold products after consumer use.

Sources: GHG protocol ([link](#)) → Def. consistent w/ E&CC LG

14. Value network

A value network is composed of numerous interlinked value chains that share resources with each other. Unlike traditional value chain thinking, value network thinking promotes circularity by maximizing the use and recovery of resources and sharing electricity and heat streams. Circularity is described as transforming the linear value chain into a circular one through increased cooperation among value network partners, enhancing the application of different R-strategies such as refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, recycle, and recover.

Sources: Adapted from [Cefic](#)

15. Value

Gain(s) or benefit(s) from satisfying needs and expectations, in relation to the use and conservation of resources (3.1.5).

Source: ISO 59004:2024 Circular economy – Vocabulary, principles and guidance for implementation ([link here](#))

C. Circularity definitions

1. Bio-based products

Bio-based products are wholly or partly derived from materials of biological origin (such as plants, animals, enzymes, or microorganisms, including bacteria, fungi and yeast).

Sources: European Commission ([link](#))

2. Chemical recycling

Chemical recycling is the process of converting waste by changing its chemical structure and turning it back into substances/building blocks that can be used as raw materials for the manufacturing of new products.

*Note: Plastics Europe's definition for chemical recycling ([with link](#))

Sources: Adapted from Plastics Europe ([link here](#))

3. Circularity

Aligned with the principles for a circular economy.

Source ISO 59004:2024 ([link here](#)).

4. Circular business model

A circular business model aims to minimize waste and maximize resource utilization by designing products and services for longevity, reuse, and recycling, rather than the traditional linear "take-make-dispose" approach. This model focuses on keeping materials and products in use for as long as possible, reducing environmental impact and creating new business opportunities.

Sources: Mixed sources

5. Circular Economy

A systems approach involving industrial processes and economic activities along the whole value chain that are restorative or regenerative by design, aiming for a climate-

neutral and resource-efficient economy by maintaining the value of products, materials and resources as long as possible.

Source: Cefic (link [here](#))

6. Circular feedstock

Circular feedstocks describe feedstocks linked to system circularity, where a connection from end-of-life (e.g. waste) to start-of-life (new product) can be created. That can be achieved via a circular economy's different loops (biological and technical). Circular feedstocks include bio-based, recycled and carbon-captured-based feedstocks.

Sources: Plastics Europe (link [here](#))

7. Feedstock

Raw material going into a process or plant as input to be converted into a product.

Sources: adapted from the European Commission (link [here](#))

8. Recycling

Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes.

Sources: Adapted from the EU Waste Framework Directive (2008/98/EC) Article 3:17 (link [here](#))

9. Waste

Any substance, mixture of substances, material or object which the holder discards or intends or is required to be discarded.

Sources: Adapted from EN 16214-1:2012 and EU Waste Framework Directive (2008/98/EC) Article 3:1 (link [here](#)) and EN ISO 14040:2006 (link [here](#))

D. Other definitions

1. Eco-design

'Ecodesign' means the integration of environmental sustainability aspects into product design with the aim of improving the environmental performance of the product throughout its whole life cycle, while also balancing this with health, social and

economic and functionality impacts.

Source: Adapted from [Ecodesign Directive](#), European Commission and ESPR

2. Environmental footprint

Environmental footprint means a quantification of the environmental impacts resulting from a product throughout its life cycle, whether in relation to a single environmental impact category or an aggregated set of impact categories based on scientific methods developed by recognized actors.

Source: Adapted from [ESPR](#) (EU Commission)

3. Environmental handprint

Environmental handprint refers to the positive environmental impact of a product throughout its life cycle.

Source: [From Footprint to Handprint - Handprint](#)

4. Measurability

Measurability is the quality or attribute of a sustainability performance indicator or outcome that permits its quantification using reliable and standardized methods. This attribute ensures that environmental and social impacts can be objectively observed, tracked, and compared over time and across different entities. A metric is measurable when it possesses clear units, a defined collection process, and an established frequency of reporting. It transforms abstract sustainability goals into verifiable data points.

Source: [Sustainability Directory](#)

5. Natural chemicals

Naturally occurring chemicals are chemicals that are found in nature, such as chemicals from plants, micro-organisms, animals, the earth and the sea. Chemicals that are found in nature and extracted using a process that does not change its chemical composition.

Source: [Industrial chemicals](#)

6. Responsible sourcing

Responsible sourcing is an approach to procurement and supply chains. It's when an organization actively sources products and services for their operations in an ethical, environmentally sustainable and socially conscious way.

Source: [Sedex](#)

7. Safer material

A safer* material is one with a measurably lower health risk potential and more favorable environmental profile over its intended life cycle(s) as compared to the incumbent solution.

Source: [Dow](#)

What are safe chemicals?

*Chemicals with low risks for humans and the environment especially for consumer use, additionally considering the end-of-life and circularity aspects.

Adapted from: Cefic - [Safe and Sustainable by Design guidance](#)

8. Transparency

Transparency in sustainability is about making relevant information accessible to stakeholders (e.g., consumers, investors, employees, and the wider community).

Source: Adapted from [Sustainability Directory](#)

About ICCA:

ICCA is an association of innovators, visionaries, solutions providers, and product stewardship pioneers. Above all, we are optimists. What others see as challenges, we see as opportunities to solve some of the world's biggest problems. Our mission is to help the global chemical industry improve financial performance and reputation by tackling global issues and by helping the industry to improve continuously.

ICCA is a virtual organization, coordinating the world of individuals from member associations and their member companies. We are governed by a Board of Directors representing member associations, and a Steering Committee responsible for oversight of several working level groups.

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