# Verifiable Sustainability Claims

*Guidance and overview*
*(Public version corr.)*

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# Summary

This report provides an in-depth examination of the requirements for creating and substantiating verifiable sustainability claims within the regulatory framework of the European Green Deal. It focuses on the EU Commission's proposed Green Claims Directive, alongside related legislative initiatives such as the Corporate Sustainability Reporting Directive (CSRD) and the European Sustainability Reporting Standards (ESRS). These frameworks collectively aim to combat greenwashing and ensure that sustainability claims are factual, transparent, and credible.

The report refers to a "verifiable sustainability claim" as one that is both correct and formulated in a way that it can be evaluated against objective, standardized criteria. It presents practical methodologies and tools, including checklists, to assess whether a claim is verifiable and whether a claim would comply with the current proposal of the EU Commission's Green Claims Directive. To ensure relevance and practical guidance, real cases of sustainability statements and claims are studied at the participating process industry companies, regarding how to interpret, express, and set requirements for verifiability and substantiation of sustainability claims. This report also includes an extensive literature study presenting relevant directives, standards and other literature relevant to the subject of sustainability claims and green claims.

The study extends beyond consumer-focused claims to explore implications for business-to-business communication and reporting. By integrating insights from international standards (e.g., ISO 14020, ISO 14067), certification systems (e.g., Nordic Swan, ISCC), and methodologies for lifecycle assessments and environmental product declarations (EPDs), the paper provides actionable guidance. Recommendations emphasize avoiding vague, misleading, or irrelevant claims and adopting structured approaches to ensure precision and compliance. In addition, this report, developed under the Climate-leading Process Industry initiative (https://klimatledande.lindholmen.se), not only supports industries in fulfilling regulatory obligations but also enables them to establish credibility and trust. It aligns with the EU's broader climate objectives, including the "Fit for 55" initiative, aiming to reduce emissions by 55% by 2030 and achieve climate neutrality by 2050.

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# 1. Core guidance

This short chapter summarizes the core guidance of this document. Readers are encouraged to return here while reading after having read the more technical texts in the report.

Claims shall be

- fact-based, correct and verifiable (2.),
- understandable and relevant to the intended audience (7.2.2).

Claims shall not be

- vague or misleading (7.2.3),
- irrelevant or self-evident (7.2.4).

Implement routines

- to form and formulate claims (7.2.1),
- to verify correctness (7.1.1) and regulatory compliance (7.1.3) of claims.

# 2. Principles for sustainability statements or claims

This chapter is a condensed summary of requirements on a verifiable sustainability claim. It is generally based on the international standard ISO 14020:2022 Environmental statements and programmes for products — Principles and general requirements [1]. This summary is also in line with the requirements formulated in the current proposal for the Green Claims directive [2].

Claims shall

- demonstrate correctness[1],
- be fact-based, and
- be verifiable[2], or be supplied with a certificate[3].

Sustainability claims shall not be:

- Unsubstantiated, meaning they shall not address a credible methodology or certification scheme, yet not refer to its underlying statement.
- Misleading means that they shall not address the result of a methodology or reference a certification scheme that they have not also fully applied and verified.

[1] **correctness**: correspondence with the universe of discourse (4.24), ISO 19157:2013, 4.5
[2] **verifiable**: can be checked for correctness by a person or tool, ISO/IEC/IEEE 15289:2019, 3.1.29
[3] A certificate ensures that even if the detailed underlying data cannot be disclosed, the scope and method of the verification is made available together with a verification of how the credibility of the verifying team or organization is ensured.

- Vague, meaning that they shall not address a sustainability benefit using vague terms such as ‘green’, ‘environment friendly’, ‘not harmful’, ‘nature positive’, etc.
- Irrelevant, meaning that they shall not address a sustainability benefit, or, more often, lack a sustainability deficit that products in its product category seldom or never have.
- Redundant, meaning that they shall not address sustainability benefits that all products in their product category have, such as be compliant with regulation.
- Comparative without reference, meaning that they shall not address that their sustainability performance is better without clearly referencing to what and how the comparison on is made.

Correspond with the ‘universe of discourse’ means (see definition of **correctness** in clause 3), for example:

- Statements relating to some measurement, such as a laboratory test or measurement in the open environment, need to be supplied with all relevant facts about the measurement method and equipment, as well as with all relevant facts, circumstances under which the measurement was made, statistical choice of measurement sample, etc.
- Life cycle assessment (LCA) results [3,4], such as full LCA:s or carbon footprints need to be supported both by their actual study report, as well as by the report of a third-party expert verifier, or in the case of environmental product declarations (EPD), by the programme verifier’s report.
- Statements of mass balance [5] need to be specified with the scope of the chain of custody (start and end and scope of included sites), the certification scheme applied to that scope (how the included sites and their material exchange is ensured and audited), as well as how the percentage of certified material is verified in any mixed production time frame (start date and end date), as well as the date of the actual sample/product claiming to be certified.
- Any comparative statement, such as ‘lower’, ‘more’, ‘better’ need to be supported by at least two comparable measurements, studies, calculations or other way of which the comparison has been made. How all relevant parameters and system boundaries have been made fair and comparable shall be clearly explained.
- Improvements (comparing to earlier versions of the product, the trader’s or another trader), the substantiation of the claim shall explain how the addressed improvement affects other relevant environmental impacts, aspects and overall performance and clearly state the baseline year for the comparison. It should be priority that the improvement is within the trader’s own operations and value chains rather than relying on offsetting of greenhouse gas emissions or other environmental impacts.
- Certificates and certified labels shall not only show the certificate but shall also be supplied with the scope and validity of the certificate.

- Often statements are not entirely based on original measurements (*primary data*[4]) but are wholly or partly based on data acquired from unspecified sources (*secondary data*[5]) [6]. For primary data, the source data shall be available to a verifier. For secondary data, a substantiated estimate of the uncertainty shall be available to a verifier. The fact that data shall be available to a verifier does not mean that it shall be made available to the public.

# 3. Definitions

This clause provides a list of definitions of standardized terms to indicate what is here meant with verifiability. The sources from where the definitions are copied are provided after each definition, but all 'Notes' connected with the definitions are left out from this text. Visit https://www.iso.org/obp/ui/ for full definition.

**environmental statement**
Deprecated: environmental claim
information on one or more environmental aspect(s) or environmental impact(s) of a product, which intends to inform an intended audience and intends to influence the market of this product
Source ISO 14020:2022, 3.2.1 [1]

**verifiable**
can be checked for correctness by a person or tool
Source: ISO/IEC/IEEE 15289:2019, 3.1.29 [7]

**verification**
Deprecated: check
confirmation, by examination of objective evidence, that specified requirements have been fulfilled
Source: ISO 10286:2021, 3.4.4 [8]

**verification**
confirmation of a claim (3.1), through the provision of objective evidence, that specified requirements have been fulfilled
Source: EN ISO/IEC 17029:2019, 3.3 [9]

**check**
confirmation of acceptable instrument response, without adjustment
Source: ISO 23431:2021, 3.3 [10]

[4] **primary data**: data obtained from known direct measurement or from implicitly or explicitly defined calculations based on data originating from such direct measurements [ISO 14033:2019, 3.1.5]
[5] **secondary data**: data obtained in other ways than primary data [ISO 14033:2019, 3.1.6]

**check**
<evaluation> generate a verdict by a simple comparison
Source: ISO/IEC 18045:2022, 3.1 [11]

**correctness**
correspondence with the universe of discourse
Source: ISO 19157-1:2023, 3.4 [12]

**correctness**
principle of information quality according to which information for use is technically accurate and contains current information about the supported product
Source: ISO **24183**:2024, 3.6.5.1.3 [13]

**validation**
confirmation of a claim (3.1), through the provision of objective evidence, that the requirements for a specific intended future use or application have been fulfilled
Source: ISO/IEC 17029:2019, 3.3 [9]

# 4. Introduction

This report provides an in-depth examination of the requirements for creating and substantiating verifiable sustainability claims within the regulatory framework of the European Green Deal, as well as provides practical guidance both how to produce such claims and how to verify them.

A central pillar of the European Green Deal ('the Green Deal') [14] is fostering trust in market forces by encouraging citizens and businesses to make sustainable choices in both their private and business decisions. Achieving this relies on providing consumers and decision-makers with factual, transparent, and actionable sustainability information. However, this goal remains elusive, as widespread issues with "greenwashing" persist. Studies reveal that over half (53.3%) of sustainability-related claims directed at consumers are vague, misleading, or unfounded, while 40% lack adequate substantiation. Furthermore, many claims fail to clarify whether they apply to entire products (36%), specific components (50%), or particular lifecycle stages (75%), leaving stakeholders confused and undermining trust. The report highlights the complexities of creating verifiable sustainability claims that meet both regulatory and market expectations. For example, claims about recycled or renewable materials require careful scrutiny to ensure they genuinely reduce environmental impacts compared to their virgin or fossil-based counterparts. Similarly, assertions about for example bio-based materials being less hazardous must be substantiated through credible data. By addressing these issues, the report aims to empower decision-makers with tools and methodologies to make accurate, transparent, and, thereby, trustworthy claims, while avoiding pitfalls such as vague or misleading statements.

At the same time, the growing complexity of sustainability reporting poses challenges for companies, particularly in meeting the needs of diverse stakeholders. Businesses must navigate regulatory requirements, ensure scientific accuracy, and communicate clearly with their customers. These demands often create significant burdens, especially for small and medium-sized enterprises (SMEs) with limited resources. Larger companies, while better equipped to handle these challenges, still struggle with defining data boundaries and ensuring the credibility of claims.

The consequences of these new sustainability requirements are particularly significant for the process industry, where compliance depends on rigorous data collection, lifecycle assessments, and alignment with evolving EU regulations. This report provides practical guidance for applying principles of verifiability and substantiation of sustainability statements and claims, as prescribed in different European Green Deal [14] implementations. The report draws from key regulatory and methodological sources, including:

- The European Green Deal (5.1.4.) [14],
- The EU Taxonomy for Green Finance (5.1.3.) [15],
- The proposed Green Claims Directive (5.1.4.), [2]
- The Eco-design Directive, including the requirement for the Digital Product Passport (5.1.2.) [16]
- The general approach of the implemented Corporate Sustainability Reporting Directive (CSRD) [17] and European Sustainability Reporting Standards (ESRS) [18] (5.1.1.),
- The “Fit for 55” initiative (5.1.5.) [19]
- The International Chamber of Commerce’s view on environmental claims (5.2.) [20],
- The international family of standards on environmental claims, statements, programmes and quality infrastructure (5.3.) [21-41],
- Different formalized methodologies and certification systems on which common sustainability claims are based (e.g. Nordic Swan, EU Flower, international EPD-system, EU PEF, ICSS, RSB Certification) (7.2.2.). [42-46]

The most far-reaching of these implementations, the Green Claims directive [2] is still pending and does not yet have its final form. To ensure relevance and practical guidance, real cases of sustainability statements and claims were studied at the participating process industry companies, offering insights into how sustainability claims are interpreted, substantiated, and communicated. These examples are used to develop practical guidance for businesses of all sizes, helping them identify data requirements, navigate certification schemes, and adopt verifiable methods of claim formulation. Though the Green Claims directive focuses on claims targeted to consumers, this study considers the implications for business-to-business sustainability information sharing.

This project has been financed by the Climate-leading Process Industry[6], a West Swedish initiative that strives towards a fossil-independent and competitive industrial region [47]. The program supports this project in establishing essential prerequisites for measuring progress and verifying compliance with EU climate laws. Behind the initiative are the members of the West Sweden Chemicals and Materials Cluster.

# 5. Literature study

There is a growing and overwhelming scientific consensus that, to halt the degradation of our natural environment and steer humanity toward sustainable development, society as a whole must integrate economic, social, and environmental progress into a comprehensive framework of sustainability. Figure 1 represents how this scientific consensus is the root cause for agreements international market and political agreements. It is also exemplified by the globally recognized United Nations Sustainable Development Goals (UNSDGs) [48].

Note: This report provides brief summaries of its referenced documents. Read the full documents for a comprehensive understanding.

## 5.1. EU and law: Empowering consumers and setting regulations

In reference to the scientific consensus to halt the degradation of our natural environment. The European Green Deal [14] outlines a comprehensive strategy for transforming the EU into a climate-neutral, resource-efficient, and sustainable economy by 2050.

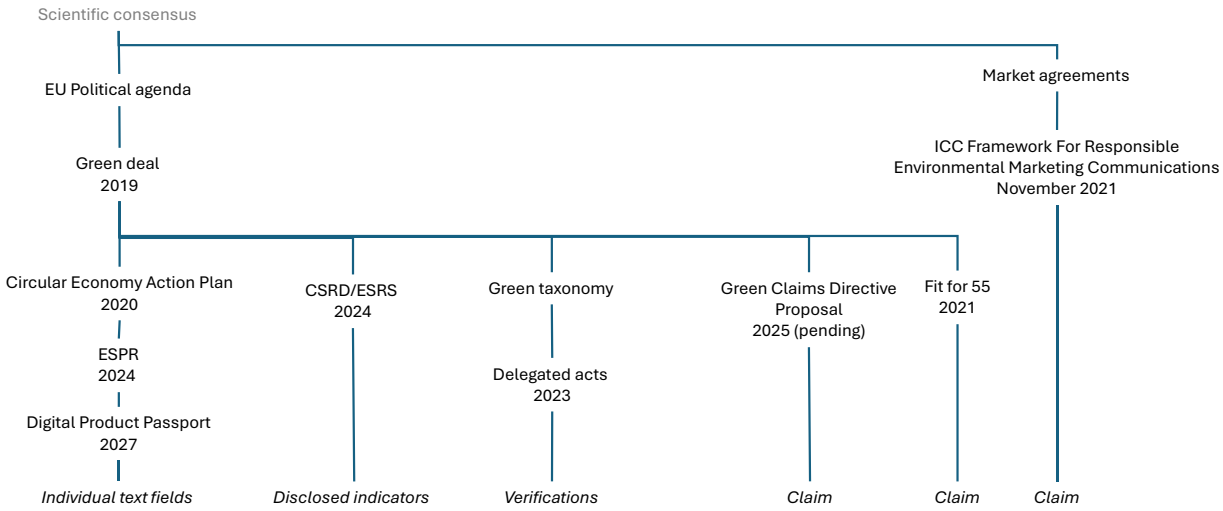



**Fig. 1.** Schematic overview of relationships between and implementation dates of scientific and business consensus, EU Political agenda and EU implementation strategies.

[6] For a fossil-free Western Swedish industrial region
Climate-leading Process Industry is a West Swedish initiative that strives towards a fossil-independent and competitive industrial region through project activities and knowledge dissemination. Behind the initiative are the members of the West Swedish Chemistry and Materials Cluster. URL-address: https://klimatledande.lindholmen.se/en

The European Green Deal [14] is an EU political agenda that intends to implement the instruments needed to realize an economy based on sustainability principles. The following subchapters briefly present some of the instruments already installed or are planned and which are closely related to the need and requirements for verifiable, fact-based, correct and credible data and claims.

The instruments presented here are the Circular Economy Action Plan [49] and its sustainable product design and directive, including the Digital Product Passport (DPP) specified in the Ecodesign for Sustainable Products Regulation [16], the Corporate Sustainability Reporting Directive [17] and the European Sustainability Reporting Standards [18], the European Taxonomy for Green finance [15], the proposed directive regarding Green Claims [2], as well as the flagship Fit for 55 [19] aiming to reduce EU's carbon dioxide emissions to net zero by 2050.

#### *5.1.1. The Corporate Sustainability Reporting Directive (CSRD)*

Included in the Green deal are the requirements that organizations shall monitor and disclose their sustainability performance [17,18]. The Corporate Sustainability Reporting Directive [17] is an EU regulation aimed at enhancing and standardizing sustainability reporting among companies. It expands the scope of sustainability disclosures, requiring more organizations to provide detailed information on their environmental, social, and governance (ESG) impacts. The CSRD emphasizes transparency, ensuring that sustainability information is accessible and comparable for stakeholders. This regulatory framework promotes accountability, encouraging companies to adopt sustainable practices and measure their performance effectively. The European Sustainability Reporting Standards (ESRS) [18] provide a comprehensive framework for companies to report on their sustainability efforts. These standards detail specific requirements for disclosure, ensuring consistency and reliability in the information presented. By aligning reporting practices across sectors, ESRS enhances the quality and comparability of sustainability data. This helps investors and stakeholders make informed decisions based on credible and standardized information. Together, the CSRD and ESRS drive improved sustainability reporting, facilitating better understanding, management, and communication of sustainability performance among businesses.

Other valuable reference documents concerning ESG reporting standards are the Global Reporting Initiative (GRI) [75], the *ISO IWA 48:2024 - Framework for implementing environmental, social and governance (ESG) principles* [76], and the *ISO/PC 343. Sustainable development goals management* [77].

### *5.1.2. Ecodesign for Sustainable Products Regulation (ESPR)*

The Circular Economy Action Plan (CEAP) [49], a core component of the European Green Deal, aims to shift the EU from a linear to a circular economy by promoting resource reuse, repair, and recycling while minimizing waste and environmental impact. It focuses on enhancing product sustainability through durability, repairability, and recyclability, supporting circular business models, to facilitate for concerned consumers to make informed choices. Complementing this, the Ecodesign for Sustainable Products Regulation (ESPR) [16] introduces mandatory sustainability criteria for a wide range of products, emphasizing durability, repairability, and recyclability, along with a range of other environmentally related product data. A cornerstone of both CEAP and ESPR is the Digital Product Passport (DPP), which is intended as the information system that provides consumers or any other stakeholder throughout a product's and its components' and materials' circular life cycles.

The initial implementation of DPP is planned for 2027. Data exchanged through DPP is expected to integrate with third-party verification bodies, such as environmental claims verified by third-party reviewers complying with requirements of the quality infrastructure components ISO 17029 (5.3.8.) [9], ISO 14065 (5.3.9) [35] and ISO 14064-1 (5.3.6.) [6], to ensure real-time, tamper-proof data, supporting credible sustainability claims. DPPs facilitate the circular economy by tracking materials, ensuring claims about recyclability are credible. They also simplify compliance reporting with sustainability regulations, allowing for easier auditing of claims and reducing greenwashing risks. By providing direct access to verified information, DPPs aims to build consumer trust and reduce the risk of false sustainability claims. Moreover, DPPs are interoperable with global standards like ISO, ensuring that sustainability data is standards-compliant and auditable.

### *5.1.3. The taxonomy for green finance*

The European taxonomy for green finance [15] establishes a framework to facilitate and incentivize sustainable investment within the EU. Its purpose is to create uniform criteria for determining whether an economic activity qualifies as contributing to a sustainable transformation of the EU. It establishes the conceptual and terminological framework for identifying sectors eligible for favourable financial terms, such as extended payback periods or lower interest rates on loans and investments. The regulation aims to promote transparency, encourage sustainable investments, and address concerns like greenwashing. It contributes to the EU's goals of transitioning to a climate-neutral, sustainable economy in alignment with broader international commitments like the Paris Agreement [50] and the UNSDGs [48]. The taxonomy framework is of substantial importance to all stakeholders involved in financial instruments, which includes loans, bonds, or other investments. The taxonomy helps ensuring that only financial objects obtain the benefits they need to be described and monitored with adequate accuracy and verifiability. Examples of standards of

importance to acquire, compile, monitor and follow-up on greenhouse gas reduction investments, bonds and loans are *ISO 14064-2:2019. Greenhouse gases. Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements* [78], the Science Baset Targets [79] and the Greenhouse Gas Protocol [80].

#### *5.1.4. The Green Claims Directive*

As part of empowering consumers, the EU Commission has proposed The EU Green Claims Directive [2] which intends to ensure that environmental claims made by companies are accurate, reliable, and verifiable. Its goal is to combat "greenwashing," where companies mislead consumers with false environmental benefits. It requires companies to substantiate claims with standardized and scientifically verifiable evidence.

The proposed directive intends to prevent misleading claims and protect consumers from vague, unproven labels. Instead, it is proposed that claims must be verified by independent third-party bodies to ensure transparency and substantiation. The proposed directive promotes clear labelling, including digital tools like QR codes, for accessible information on product sustainability.

The proposal includes setting strict requirements for what companies can promise about their products, including clear wording on third-party certification, which in turn affects statements about what companies can say about their products' circularity, metrics, certification and eco-labels. Existing systems, such as certified eco-labels and existing certification schemes are also stressed. The Nordic Swan Ecolabel [42] and the EU flower (7.2.2.2.) [43] may be affected, as well as external communication of life cycle assessment results and footprints (7.2.2.3.). A positive effect of increased verifiability requirements is that owners, financiers, customers and even the management themselves will have access to better decision-making data for the management system's environmental and sustainability performance evaluations, which in turn need to be utilized in the best way.

#### *5.1.5. Fit for 55*

"Fit for 55" [19] is an initiative by the European Commission, aimed at delivering the EU's 2030 climate targets and advancing toward climate neutrality by 2050. It emphasizes creating a fair, competitive, and green transition through systemic changes across industries, energy, and transport while addressing social equity. The initiative introduces a comprehensive package of interconnected proposals, including carbon pricing, renewable energy expansion, energy efficiency, and social support measures. Its purpose is to establish EU as a global leader in sustainable transformation, ensuring environmental and economic

benefits for its citizens. Hence, the "Fit for 55" initiative depends on data verifiability to ensure the effectiveness, fairness, and accountability of its measures.

## 5.2. Internationally agreed principles for ethical market claims

The International Chamber of Commerce (ICC) [20] provides guidelines for businesses to ensure that sustainability claims are accurate and transparent. These guidelines align with international standards like ISO 14020 family of standards ISO 14020 [23-27], the UNSDGs [48] and the proposed EU Green Claims Directive [2]. The ICC guidelines states that:

- Claims must be fact-based, verifiable, and backed by credible evidence like lifecycle assessments or third-party certifications.
- Vague terms such as “eco-friendly” should be avoided unless specific, measurable evidence supports the claim.
- Businesses must disclose the scope of their sustainability claims, clarifying if they apply to the entire product lifecycle or specific phases.
- The ICC encourages third-party verification to enhance credibility and prevent misleading claims.

## 5.3. Standards related to the need for verifiable data

Standards play a key role in verifiability of sustainability claims for three basic reasons. Standards are consensus-based solutions to recurring problems or challenges, such as how to measure or assess the sustainability performance for a particular perspective. Standards are written by experts who have reached consensus on terminology and fundamentals of how to solve the problem or challenge. Standards hep ensuring that one performs a solution in an understandable and verifiable way, and thereby also facilitates verification.

### *5.3.1. Chain of custody*

Chain of custody (CoC) is a concept to provide information about origin of input materials, product components, product outputs and the conditions under which they are produced.

The *ISO 22095:2020 - Chain of custody — General terminology and models* [5] establishes a standardized framework for managing the (CoC) across various sectors, enhancing transparency, traceability, and accountability of materials throughout production and distribution.

The standard introduces consistent terminology and categories of models of CoC, two that refers to CoC without mixing, two referring to mixing and one referring to a certification scheme for a market mix. Here we will only look deeper into the two latter CoC models,

since the project found that those are the ones that the process industry sector currently applies and communicate. These are:

- Chain of custody models with *mixed blending*
    - Controlled blending, relating to an organization producing a stable %-mix of input of one well-specified input and the remaining input as not specified.
    - Mass balance, relating to an organization producing a time varying %-mix of input of one well-specified input and the remaining input as not specified, where the time variation stabilizes to an average over a specified time period.
- Book and claim model, focussing on a *market mix*, where a well-specified resource, such as available amounts of renewable electricity or recycled steel is associated with a certificate that is traded together with the available resources, ensuring integrity of the available claimed specified resources.

All three categories are described in more detail in the following. The detailed descriptions here is summarized for the purpose of this report. For full details it is necessary to read the ISO 22095:2020 standard.

Important statement regarding communication in the standard ISO 22095:2020:
“This document can enhance the transparency of specific claims regarding materials or products by providing common terminology and chain of custody models.” “However, organizations shall not use this document on its own to make or verify such claims. This would be misleading, especially to consumers and other end customers, as the existence of a chain of custody system alone does not specify characteristics or the conditions under which products are produced and therefore cannot support the characteristics or the conditions under which materials or products are produced.” “any communication associated with materials or products solely concerning conformity to this document shall be avoided, especially towards consumers and other end customers.” “to make claims about an organization’s materials or products, rather than the chain of custody itself, further evidence on conformity with specified characteristics shall be provided.” “When materials or products come with a claim of adherence to a certification scheme, which has its own chain of custody rules, for example third-party assessment as certification or verification, and an organization aims to use that claim for its materials or products, the rules of that scheme shall be followed unless that scheme allows the use of this document instead.”

Examples and guidance concerning chain of custody communication is provided in clause 6.1 and 7.2.2.1.

#### *5.3.1.1. Controlled blending*

According to the ISO 22095:2020 [5] standard controlled blending addresses the mixing of materials with different origins (e.g., certified and non-certified) while maintaining specific

controls to ensure transparency and accountability regarding the proportions of those materials. In controlled blending materials from different sources are combined (e.g., certified and non-certified). The blend is managed to ensure that the proportion of certified material in the output matches the proportion of certified material in the input. The physical characteristics of the materials may mix, but the system ensures the accurate representation of certified content in the blended product. For example, if 40% of the input is certified, then 40% of the output can be claimed as certified. Documentation and verification are required to confirm the proportions and ensure the integrity of the system. For the quality to be certified systems must be in place to monitor and document the blending process, ensuring that proportions are not overstated.

Controlled blending is useful in industries where physical mixing is unavoidable, but stakeholders demand a clear representation of the certified content in the final product.

Note: Unlike the mass balance approach (next subchapter), where certified and non-certified materials are tracked at the system level (not necessarily in specific products), controlled blending the proportion of certified materials ties the input directly to the corresponding output.

*Claims, verification and transparency*
Claims must reflect the proportion of certified content resulting from controlled blending. To ensure compliance, the system must be audited or verified by a third-party entity. Accurate records of inputs, blending processes, and outputs are essential for transparency.

*Controlled Blending Example:*
A company sourcing coffee beans uses 60% certified beans and 40% non-certified beans. During blending, the certified and non-certified beans are physically combined. Through controlled blending:

- The proportion of certified beans in the final packaged coffee is labelled as 60%.
- This proportion must be documented and verified in the chain of custody system.

In summary, controlled blending in ISO 22095:2020 [5] ensures that claims about certified content reflect the actual proportions of materials used in the blending process, supporting accountability and transparency in supply chains. This model balances operational flexibility with the need for accurate sustainability claims.

#### *5.3.1.2. Mass balance*

According to the ISO 22095:2020 standard [5], mass balance refers to a system in which inputs and outputs are tracked, and the overall quantities are reconciled to ensure accountability. The physical characteristics of a product (e.g., raw material, semi-finished or finished goods) may not directly follow through the chain, but the accounting for quantities and attributes is maintained. Mass balance ensures that the amount of certified or specified

material entering a system equals the amount leaving the system, possibly considering conversions or losses during processing. Materials with different characteristics (e.g., certified vs. non-certified) can be mixed, provided the accounting accurately reflects the proportions. Organizations must document and verify the methodology used to calculate and account for material flows. A challenge is to ensure robust tracking systems to maintain the integrity of claims made under the mass balance model.

Note: Unlike the Controlled blending approach (previous subchapter), where the proportion of certified materials directly ties the input to the corresponding output, the mass balance approach tracks certified and non-certified materials at the system level (not necessarily in specific products).

In summary, mass balance is a pragmatic and efficient approach to managing supply chains while supporting sustainability and ethical sourcing initiatives.

#### *5.3.1.3. Book and Claim*

According to the ISO 22095:2020 standard [5], the Book and Claim model allows for the separation of physical flows of materials and their sustainability claims. The book and claim model is a chain of custody approach where the physical flow of materials is decoupled from the flow of sustainability claims. Certified or sustainable inputs are tracked virtually through a registry or system, allowing the claims to be allocated to outputs, even if the physical product contains no certified material. It means that physical segregation of certified and non-certified materials is not required. Sustainability attributes (e.g., certification, environmental credits) are 'booked' in a registry and can be 'claimed' by a product or entity at a different point in the supply chain. The focus is on the accurate recording and allocation of claims rather than physical material tracking.

The operational mechanism of book and claim is that 1) producers or suppliers certify a quantity of material (e.g., renewable energy, sustainable palm oil) and register it in a digital system, 2) buyers can purchase the associated sustainability claims, even if the physical material they receive is not certified, 3) the registry ensures there is no double counting, and claims are accurately matched to certified production volumes.

Challenges with book and claim is that buyers and consumers must understand that the claim relates to the support of sustainable production, not to the physical characteristics of the product. This means that claims must clearly communicate that the sustainability attribute is supported through a book and claim system, not through physical product characteristics. Robust systems and third-party audits are essential to prevent fraud or double counting. To enable this, a digital registry tracks certified production, claim allocation, and retirement of claims to ensure integrity. In addition, periodic audits or verifications are needed to ensure compliance and system credibility.

*Example of Book and Claim*
A renewable energy company generates 1,000 MWh of green energy, certifies it, and records it in a registry. A manufacturer purchasing 500 MWh of these green energy credits can claim that their operations support renewable energy production, even if the electricity they receive is from a conventional grid mix.

### *5.3.2. Standards on communication and claims*

The ISO 14020 series of standards [1, 23-27] sets principles, provides guidelines and formulates requirements for environmental labelling and declarations. It is intended to ensure that environmental claims are accurate, transparent and reliable to build market trust. The standard *ISO 14020:2022 Environmental statements and programmes for products — Principles and general requirements* includes the definition of environmental claim or statement:

Note: A core principle in the ISO 14020 standard is credibility, which means: 'Communication of the environmental aspects and environmental impacts of products using environmental statements and associated programmes is truthful, accurate, impartial and not misleading.' Whenever any of the term 'credible' or 'credibility' are used throughout this report it should be understood in this way.

The ISO 14020 series of standards include:

- ISO 14020 [1] outlines general principles for all environmental labels, requiring claims to be scientifically based.
- ISO 14021 [23] focuses on self-declared claims, ensuring terms like "recyclable" are based on verifiable evidence.
- ISO 14024 [24] addresses third party-certified ecolabels, like the EU Ecolabel, based on lifecycle performance.
- ISO 14025 [25] covers Environmental Product Declarations (EPDs), providing lifecycle-based claims verified by third parties. (7.2.2.3.)

The series emphasizes transparency, accuracy, and preventing misleading claims about environmental benefits. It helps businesses communicate environmental performance responsibly and reduce greenwashing.

The standard *ISO 17033:2019 Ethical claims and supporting information — Principles and requirements* [40] may be regarded as a generalization of the ISO 14020:2022 standard [1]. ISO 17033 provides a framework for any type of ethical claim. It supports organizations to make credible, verifiable, and transparent ethical claims about their products, services, or practices. It aims to enhance trust and consistency in how such claims are communicated, helping consumers and stakeholders to make informed decisions. The standard outlines principles for ethical claims, such as honesty, clarity, and substantiation, ensuring that the

claims are not misleading and are supported by evidence. Additionally, ISO 17033 specifies requirements for the verification and communication of these claims, emphasizing the importance of transparency about the criteria and methods used to substantiate them. The standard applies to a wide range of ethical considerations, including social responsibility, labor practices, animal welfare, and environmental sustainability. By providing a robust structure for ethical claims, ISO 17033 helps organizations align with global expectations for accountability and integrity while fostering consumer confidence and fair competition.

Note: A core principle in the ISO 17033 standard is reliability, which means: 'Ethical claims are accurate, verifiable, relevant and not misleading.' Whenever any of the terms 'reliable' or 'reliability' are used throughout this report it should be understood in this way.

#### *5.3.3. Life cycle assessment and communication of results*

Life cycle assessment (LCA) [3,4] is a family of methodologies used to assess the unintended impacts from products and services. Included in the methodologies are eco-efficiency (ISO 14045 [51]), social life cycle assessment (ISO 14075 [52]), carbon footprint (ISO 14067 [53]) and other footprints (e.g. ISO 14046 [54]). LCA is a complex method, including many systems analytical challenges, such as the need to include data from all over the life cycle of a product, from cradle to grave and all its intermediate processes and possible loops. When performing an LCA data is usually hard to acquire, leading to that data is acquired from many different indirect sources, such as literature and databases. Only small fractions of data come from direct sources of a real physical supply chain. Hence, the way to communicate LCA results to mediate the actual meaning, quality and uncertainty of data is complex, therefore several approaches to handle this has been developed. A general list of what need to be communicated is mentioned in the Reporting chapter of the ISO 14040 standard: "A reporting strategy is an integral part of an LCA. An effective report should address the different phases of the study under consideration, as well as a detailed report of the results and conclusions of the LCA in an adequate form to the intended audience, addressing the data, methods and assumptions applied in the study, and the limitations thereof."

A way to streamline data requirements and scope of life cycles to enable comparison is described in the Environmental Product Declaration (EPD) standards [25,27], and ways to particularly communicate different types of footprints are described in the footprint communication standard [26].

#### *5.3.4. Net zero and carbon neutrality*

The standard *ISO 14068-1:2023 - Climate change management - Transition to net zero - Part 1: Carbon neutrality* [55] provides guidance for achieving and demonstrating carbon neutrality through the quantification, reduction, and offsetting of greenhouse gas (GHG)

emissions. It employs a hierarchical approach, prioritizing direct emission reductions and removal enhancements within the boundary of the entity before resorting to offsetting. The document emphasizes principles such as transparency, scientific grounding, and accountability, underscoring that carbon neutrality should contribute to the broader transition toward net-zero emissions. It outlines requirements for organizations to develop carbon neutrality management plans, including ambitious targets and a commitment to continuous improvement. The standard applies to organizations and products but excludes geographic territories such as countries and cities.

The ISO international workshop agreement *IWA 42:2022 – Net Zero Guidelines* [56] provides guidelines for achieving global net-zero greenhouse gas (GHG) emissions by 2050, emphasizing equity, transparency, and scientific rigor. It outlines principles and strategies for organizations, including setting science-based targets, prioritizing emissions reductions, and balancing residual emissions through verified removals. The document highlights the importance of comprehensive monitoring, reporting, and third-party verification to ensure accountability and progress. It also stresses aligning actions with broader sustainability goals, such as biodiversity preservation and social equity, to ensure a just transition. Ultimately, the guidelines aim to harmonize efforts across sectors and geographies to limit global warming to 1.5°C.

#### *5.3.5. ISO 59000 standards on circular economy*

The standards in the ISO 59000 series [57-59] focuses on circular economy, providing frameworks and guidelines to support organizations in transitioning from linear economic models (take, make, dispose) to sustainable, circular practices. By adopting these standards, organizations can better align with global sustainability goals, such as reducing greenhouse gas emissions, conserving natural resources, and fostering innovation in product and service lifecycles. The standards ISO 59004, ISO 59010, and ISO 59020 are integral components of the ISO 59000 series, collectively supporting the implementation and measurement of the circular economy. *ISO 59004 Circular Economy — Vocabulary, principles and guidance for implementation* [57] serves as the foundational standard, outlining key principles and a structured framework to guide organizations in transitioning to circular models. Building on this, *ISO 59010 Circular Economy — Guidance on the transition of business models and value networks* [58] provides practical guidance for designing and adopting circular business models and transforming value chains. *ISO 59020 Circular Economy — Measuring and assessing circularity performance* [59] focuses on the metrics and methodologies for assessing circularity performance. Together, these standards create a cohesive system that facilitates the design, implementation, and assessment of circular practices, empowering organizations to achieve economic, environmental, and social sustainability. Given the large global participation in consensus building during the development of these standards, the

concepts, terminology and definitions are important to adhere to when addressing circular economy in statements, claims or other market communication.

### *5.3.6. Intra-organization value of verifiability of data*

High-quality, transparent, precise, and verifiable information is important for organizations not only for communicating externally but is of value also for internal communication, for effective decision making and operation. For example, ISO 14001 [60] emphasizes the importance of accurate, reliable information to support environmental management decisions. Data must be verified through tools like lifecycle assessments (LCAs) [3,4] and greenhouse gas (GHG) reporting (ISO 14064-1 [61]). These tools provide insights into environmental impacts, aiding sustainable product design and resource use. Establishing Key Performance Indicators (KPIs) enables tracking of environmental performance and compliance. Periodic reviews help identify areas for improvement and ensure alignment with regulatory standards. Third-party verification enhances reliability and prevents misleading environmental claims. By using verified data an organization supports its data driven management system as well as fosters its perceived credibility to its market.

### *5.3.7. Acquiring, maintaining, reviewing and continual improvement of sustainability information*

The international standard *ISO 14033 - Quantitative environmental information – Guidelines and examples* [6] provides a general framework for transparently, verifiably and with relevance to the needs for the objective of the target audience, acquiring and compiling quantitative data to represent sustainability performance of systems. It is developed for any quantitative information and data across the whole ISO 14000-series of standards.

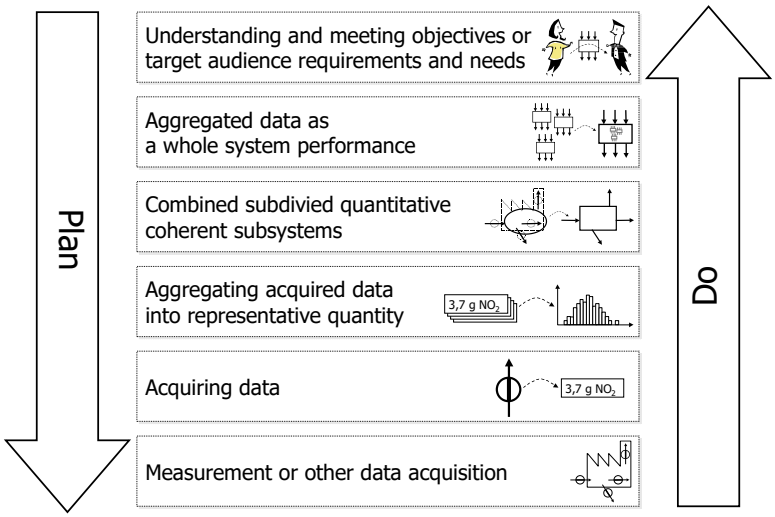



**Fig. 2.** Simplified representation of the framework of the ISO 14033 – Quantitative environmental information.

Figure 2 shows a simplified representation of the framework of the ISO 14033 standard, after the original source of the standardized framework [62,63].

When planning to acquire the data needed for a specific sustainability performance measurement, the framework is approached from top down. The needs and the requirements of the objective or the target audience is to be well-understood and summarized, in terms of which method is needed to measure and assess the system performance (e.g. laboratory tests, due diligence, material flow analysis, life cycle assessment, repair) which sustainability scope to represent (e.g. temporal, technological, organizational, geographical, demographical), as well as which data quality requirements to meet (e.g. age and uncertainty of data, accepted data sources). At each consecutive level from top to bottom, the system for which data is to be acquired is further subdivided, to subsystem, to parameters, to quantitative data needs, down to acquisition at a desired measurement system or other data source. By having established a good understanding of the objective during the plan stage, the focus is to acquire data within the specified range and quality needs for the stepwise bottom to top aggregation, through statistical analysis, coherent subsystem aggregation, final whole system aggregation, and eventual reporting according to the objective or needs of the target audience.

For specific terminology and description refer to the ISO 14033 standard [6].

#### *5.3.8. The overarching standards for quality control*

The ISO 17000 series is a family of international standards [28-33, 37-40] developed by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) that focuses on compliance and conformity assessment. These standards provide a consistent framework for organizations to evaluate whether products, services, systems, or personnel meet specific requirements. Together, the ISO 17000-series of standards establishes the link between the international quality infrastructure of ISO CASCO [64] and any standardized requirements, whether they are voluntary, governmental or intergovernmental regulated requirements or individually signed trade agreements.

Part of the References section lists the ISO 17000 series of standards.

#### *5.3.9. Standards for quality control of sustainability information*

*ISO 14065:2020 - General principles and requirements for bodies validating and verifying environmental information* [35] outlines requirements for bodies validating environmental data, emphasizing competence, impartiality, and quality management. It applies to GHG emissions reporting and sustainability initiatives. In contrast, *ISO 14066:2023 - Environmental information — Competence requirements for teams validating and verifying environmental information* [36] specifies the competence requirements for personnel

validating and verifying environmental claims, focusing on the necessary knowledge and skills for effective evaluation. Together, these standards ensures that data and conclusions have been checked by reliable verification processes and qualified, impartial teams, hence establishing reliability in environmental reporting addressing climate change mitigation and sustainability efforts.

*ISO 14016:2020 - Environmental management — Guidelines on the assurance of environmental reports* [21] provides guidelines for the assurance of environmental reports, aimed to ensure correctness in reports regarding environmental performance. By establishing standardized processes for assurance, it helps organizations identify discrepancies and improve data accuracy and are intended to foster stakeholder trust. Additionally, it supports regulatory compliance and aids in risk management by providing a clear framework for environmental reporting.

*ISO 14017:2022 - Environmental management — Requirements with guidance for verification and validation of water statements* [22] sets requirements for the verification and validation of water statements, ensuring that claims related to water usage and management are reliable and transparent. This standard enhances accountability by promoting consistent methodologies for assessing water-related data, aiding organizations in meeting sustainability goals. It also contributes to better water stewardship practices, benefiting both the environment and community relations.

Together, these standards enhance the integrity of environmental communications, promoting responsible management practices and supporting organizations in achieving their sustainability objectives.

The following standards are also finalized while this text is written

- *ISO/DIS 14019-1 - Sustainability information — Part 1: General principles and requirements for validation and verification* [65]
- *ISO/DIS 14019-2 - Sustainability information — Part 2: Principles and requirements for verification processes* [66]
- *ISO/DIS 14019-4 - Sustainability information — Part 4: Principles and requirements for bodies validating and verifying sustainability information* [67]

# 6. Examples with discussions and guidance

## 6.1. Real cases as source

During the project, practical examples of relevance to the participating companies were identified to be able to produce realistic and relevant examples, without reference to real claims. The examples included a broad width of statement types, ranging from material toxicity and life cycle assessment, certified traceability and mass balance, from levels of

vagueness and to being very specific as well as certificates. With the basis of those examples, the project participants discussed reasons, backgrounds, challenges and alternatives to the different ways that formulations were made. The result of these exercises provided experiences resulting in the guidance provided in this chapter as well as the recommendations in chapter 7.

## 6.2. The Product with Enhanced Sustainability Performance

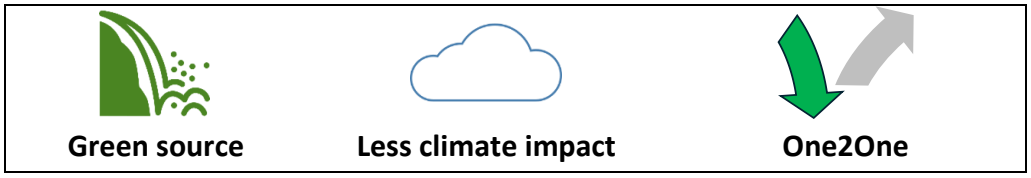



**Fig. 4.** Three combined sustainability advantages of a product category

A category product is claimed to have three combined sustainability advantages, as shown in Figure 4. Discussions about each advantage are divided into three subsections where each discusses the problems with the formulated claim followed by guidance on how to instead formulate a verifiable and substantiated claim with the same intended message.

*Green source*

*Context:*

When browsing through the information on the website of the company, one can learn that this means that raw material is acquired according to ISCC PLUS (International Sustainability & Carbon Certification). At purchase, every customer receives documentation about the GHG value of the product which can be used to calculate your contribution to reducing $CO_2$ emissions. The claim implies that the customers may measure the progress against their own $CO_2$ targets and take it further into their products and value chains. By choosing this product, the customers can contribute to reduced $CO_2$ emissions in their value chain, and also obtain valuable propositions in their business.

*Problem:*

The term "*Green source*" refers to the ISCC PLUS Certified Materials that uses the Mass Balance approach. Stated in isolation, this claim creates ambiguity, as it suggests a general notion of sustainability that might obscure the precise scope and limited criteria defined by the ISCC PLUS system.

*Guidance:*

To correctly understand an ISCC PLUS certificate it is essential to specify the percentage of sustainably sourced materials and evaluate whether hydrocarbons in the supply chain meet sustainability standards, as even within the certification framework, this requires further

substantiation. The certification scheme allows any percentage of material certified to originate from a sustainable source. Therefore, when addressing an ISCC PLUS certificate it is important to specify the percentage of the certified sustainable amount as well as what aspect is certified. Typically, it is either sustainable sourced bio-based material or recycled material.

*Relevant references in this report:*

- ISCC, subchapter 7.2.2.1.
- Chain of Custody, subchapter 5.3.
- Vague, subsection 7.2.3.1
- Misleading, subsection 7.2.3.2

*Less climate impact*

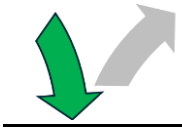
*Context:*
The claim is made mainly with reference to the inclusion of bio-based raw materials in the product.

*Problem:*
"Less climate impact" is a general claim of a universal relative advantage and needs to be verifiably substantiated. Such is not provided.

*Guidance:*
A comparative statement like 'lesser' need to be supported by a reference stating 'lesser than what'. The term "Less climate impact" implies that there are at least two general and comparable items. In this case, the two comparable items should be two carbon footprint results with comparable system boundaries scoping their product systems. Such comparable system boundaries do not have to be the same, since, in this example, the system boundary for extracting fossil or bio-based carbohydrates are very different. Therefore, any such comparison needs to be explicit down to all relevant details and be described in sufficiently comprehensible documentation.

*Relevant references in this report:*

- Life cycle assessment, subsection 5.3.3
- Vague, subsection 7.2.3.1



*One2One*

*Context:*
The context of this statement is that it is grouped together with the two previous sustainability statements.

*Problem:*
*One2One* – First of all this statement is not generally understood and therefore does not mean anything to most people in a general audience. But since it is at the level of both the grand concept of sustainability and even carbon emissions, it is associated as a very positive statement. So together with the other two statements it becomes a third positive statement, even though the positive sustainability aspect is not directly explained.

*Guidance:*
The term *One2One* could be better explained. The graphics are also recommended to be reconsidered.

*Relevant references in this report:*

- Vague, subsection 7.2.3.1
- Misleading, subsection 7.2.3.2

## 6.3. Words of well-meaning

*Environmentally adapted*

*Context:*
The term is used at a company website to claim how the company makes efforts to comply with different sustainability demands.

*Problem:*
The term *Environmentally adapted* lacks a definition. The concept of 'environmentally adapted' is misleading and vague. It resembles the term ‘environmental adaptability’, which is a term related to how a measurement instrument withstands a range of temperatures. Hence, the meaning of the term in relation to the ‘green’ environmental domain is not clear.

*Guidance:*
Instead of a claim that lacks definition but seems to indicate a non-specified advantage, rethink what the company has actually done. If, for example, the company has changed process or purchase of raw material or components with certified sustainability advantages, use a way to express such advantages.

*Relevant references in this report:*

- Vague, subsection 7.2.3.1

*Environmentally efficient*

*Context:*
The term is used at a company website to claim how the company's product or service of course negatively impacts nature but makes efforts to be better.

*Problem:*
The concept of 'environmentally efficient' is not known or defined. Environmental efficiency does not relate to any known methodology.

*Guidance:*
The linguistically similar concept of 'eco-efficiency' is defined as with regards to how much good is produced per environmental or sustainability damage. This is generally calculated as a ratio between a product life cycle cost based on produced value (product lifetime scoped from design to end of use), divided by a life cycle assessment based on environmental or sustainability cost (life cycle scope from raw material extraction to end-of-life loss of resources).

*Relevant references in this report:*

- Life cycle assessment, subsection 5.3.3

*Sustainable material*

*Context:*
The term is used on a company website to claim how the company's products have some sustainability benefits concerning the choice of material.

*Problem:*
The term 'sustainable material' is broad and vague, lacking a clear definition. Under the Green Claims Directive, claims must be precise and refer to specific aspects of environmental performance.

*Guidance:*
Claiming that material is "sustainable" without detailing which aspects of sustainability are addressed (e.g., energy consumption, resource use, recyclability, toxicity, etc.) can mislead customers into believing the material is fully sustainable across all dimensions, which is practically impossible in most of today's industrial value chains.

*Relevant references in this report:*

- Misleading, subsection 7.2.3.2

*Recyclable material*

*Context:*
The term is used on a company website to claim how the company's products are made wholly or partially of recyclable material.

*Problem:*
'Recyclable' is a common sustainability claim, but this must be substantiated.

*Guidance:*
The proposal for a Green claims directive emphasizes that recycling claims must not mislead customers by overestimating the environmental benefit or suggesting broader recyclability than what is practically achievable.

It should be noted that the standard ISO 14021:2016 states that recyclable is "*a characteristic of a product, packaging or associated component that can be diverted from the waste stream through available processes and programmes and can be collected, processed and returned to use in the form of raw materials or products*" [23].

*Relevant references in this report:*

- Standards on communication, 5.3.2.

*Environmentally sustainable products and recipes*

*Context:*
The term is used on a company website to claim how the company's products are made wholly or partially of raw materials with environmental advantages.

*Problem:*
The term 'environmentally sustainable' is misleading. The concept of environmental sustainability addresses aspects of sustainable development related to the environment.

*Guidance:*
Rephrasing into "choosing environmentally preferable ingredients and production processes" and being precise about which such choices are made over the full life cycle of the materials, which potential environmental trade-offs have been needed to achieve the expected both material and environmental properties, as well as be backed by verifiable data.

*Relevant references in this report:*

- Standards on communication, 5.3.2.

*Fossil-free products*

*Context:*
The term is used on a company website to claim how the company's products do not contribute to resource depletion and climate change.

*Problem:*
The term *'fossil-free'* is incorrect since the production of even the bio-attributed product normally uses fossil fuels over its life cycle.

*Guidance:*
Fossil-free refers to products, materials, energy sources, or processes that do not use fossil fuels—such as coal, oil, or natural gas—at any stage of their production, operation, or lifecycle.

The standard ISO 14021:2016 states that "*an environmental claim of '…free' shall only be made when the level of the specified substance is no more than that which would be found as an acknowledged trace contaminant or background level."* [23].

Note 1: This fact does not contradict that the material of the product is 100% bio-attributed.

*Relevant references in this report:*

- ISCC, subchapter 7.2.2.1.
- Chain of Custody, subchapter 5.3.
- Standards on communication, 5.3.2.

*Environmentally friendly*

*Context:*
The term is used on a company website to claim how the company has a general positive attitude towards environmental concerns.

*Problem:*
The term "environmentally friendly" is not technically defined and does not refer to any specific aspect of the environment or any specific action taken to protect the environment in any particular way. Without detailing which environmental impacts are being addressed (e.g., reduced emissions, resource use, or recyclability), the term creates a false impression of no or minimal negative environmental effects across all areas of a product or company.

*Guidance:*
Environmental impacts are often complex and multi-faceted, involving trade-offs between different environmental aspects (e.g., water use, energy consumption, pollution). Using such a broad term ignores these trade-offs and can overstate the product's overall environmental benefits.

*Relevant references in this report:*

- Standards on communication, 5.3.2.

## 6.4. The strategic statement

*Net zero throughout all business activities*

*Context:*
The company website states that it shall reach net zero emissions throughout all business activities by 2040.

*Problem:*
The statement is unclear since the text mass where the target is described first addresses the global and standardized meaning of the concept 'net zero' (scopes 1, 2 and 3), by referring to that: 'nations of the world states goals to achieve net zero emissions by 2050'. However, the company itself only relates to its business activities, implying only scopes 1 and 2.

*Guidance:*
Globally 'net zero' means to apply all three scopes of the greenhouse gas protocol, scopes 1, 2 and 3. A company's internal scope shall be clearly distinguished from the globally defined meaning of the term 'net zero'.

*Relevant references in this report:*

- Net zero and carbon neutrality, 5.3.4.

*Honest circular economy and real circular economy*

*Context:*
The company website states that they operate with an honest circular economy and also with the real circular economy.

*Problem:*
'*Honest circular economy*' and '*real circular economy*' seem to refer to some defined types of circular economy. However, there are no defined gradations of circular, such as 'honest' or 'real'

*Guidance:*
The term circular economy has been used since May 2024. It is suggested that a claim referring to a high degree of compliance with the principles of circular economy refers to the standards ISO 59004:2024 [57] and measures and assesses its degree of compliance in accordance with ISO 59020:2024 [59].

*Relevant references in this report:*

- ISO 59000 standards on circular economy, 5.3.5

# 7. Recommendations

This chapter provides recommendations for how to verify both whether verification of correctness is possible and, if so, how to systematically also verify the correctness of a claim (7.1.1.), as well as how to verify regulatory compliance of claims (7.1.2.). The chapter also provides practical recommendations on how to form and formulate verifiable claims (7.2.).

## 7.1. Verification of claim

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Please contact the authors to learn about this tool.

This page contains an intentionally removed tool in this public version of the project report. The tool is based on the based on the ISO 14033 standard, presented in subclause 5.3.7.

Please contact the authors to learn about this tool.

### *7.1.1. Verification of claim's compliance with regulation*

Table 2 (next page) is a checklist to verify a claim's compliance with a regulatory list of requirements (exemplified by the proposed green claims directive). Each requirement is presented in the left column. If, for a claim, it is possible to answer each requirement sufficiently positive, the claim complies with the regulation. If one or more of the questions cannot be answered the claim may not comply with regulations. If the claim complies with regulation, it may also be tested for correctness.

Note: This checklist must be updated once the final version of the proposed green claims directive is published.

**Table 2**. Checklist for verifying a claim's compliance with regulation

| **Substantiation of explicit environmental claims** | |
|---|---|
| **Aspect** | **Substantiation verification** |
| The claim | |
| (a) specify if the claim is related to the whole product, part of a product or certain aspects of a product, or to all activities of a trader or a certain part or aspect of these activities, as relevant to the claim; | Statements of verification process |
| (b) rely on widely recognised scientific evidence, use accurate information and take into account relevant international standards; | |
| (c) demonstrate that environmental impacts, environmental aspects or environmental performance that are subject to the claim are significant from a life-cycle perspective; | |
| (d) where a claim is made on environmental performance, take into account all environmental aspects or environmental impacts which are significant to assessing the environmental performance; | |
| (e) demonstrate that the claim is not equivalent to requirements imposed by law on products within the product group, or | |
| (f) provide information whether the product or trader which is subject to the claim performs significantly better regarding environmental impacts, environmental aspects or environmental performance which is subject to the claim than what is common practice for products in the relevant product | |
| (g) identify whether improving environmental impacts, environmental aspects or environmental performance subject to the claim leads to significant harm in relation to environmental impacts on climate change, resource consumption and circularity, sustainable use and protection of | |
| (h) separate any greenhouse gas emissions offsets used from greenhouse gas emissions as additional environmental information, specify whether those offsets relate to emission reductions or removals, and describe how the offsets relied upon are of high integrity and accounted for correctly to reflect | |
| (i) include primary information available to the trader for environmental impacts, environmental aspects or environmental performance, which are subject to the claim; | |
| (j) include relevant secondary information for environmental impacts, environmental aspects, or environmental performance which is representative of the specific value chain of the product or the trader on which a claim is made, in cases where no primary information is available. | |

## 7.2. Forming and formulating a verifiable claim

This chapter build on the standards and regulations presented in this report and provide concentrated practical guidance.

### *7.2.1. Universal guide to form and formulate a verifiable claim*

When forming and formulating a claim the following steps may be applied.

1. *Purpose and target audience*
   Describe the intended purpose of the claim and to whom it is intended, with regards to the technical level of detail, complexity of information and necessary explanations. Examples of intended purposes are to mediate a fact, such as to quantify the carbon footprint, % of bio-material or when to emphasize a comparison, such as a relative improvement or advantage.
   The needs and the requirements of the objective or the target audience is to be well-understood and summarized, in terms of which method is needed to measure and assess the system performance (e.g. laboratory tests, due diligence, material flow analysis, life cycle assessment, repair) which sustainability scope to represent (e.g. temporal, technological, organizational, geographical, demographical), as well as which data quality requirements to meet (e.g. age and uncertainty of data, accepted data sources). By establishing a clear understanding of the objective during the plan stage, acquisition of appropriate data within the specified range and quality needs the requirements of the objective and the needs of the target audience can be met. (Addresses *objective* in ISO 14033 [6])

2. *The correct technical terminology to describe the claim*
   By referencing standards or other recognized terminology describe whether the claim concerns, for example, an LCA study according to ISO 14040/14044 [3,4], a carbon footprint according to ISO 14067 [53], a chain of custody model [5] or a chemical composition analysis.
   (Addresses *objective* in ISO 14033 [6])

3. *Specify relevant methodological parameters*
   In accordance with bullet 2, specify relevant methodological parameters and parameter values, such as system boundaries, including system components and their relevant interrelationships, threshold levels for inclusions, whether values are based on design parameters or yearly averages, etc. For large systems analysis, like LCA, systems relate to technical, environmental and social system boundaries and components. For laboratory test results and test beds, the system boundaries relate

to the whole set of equipment used to study a material or phenomenon, including its relevant environment.
The specification should sufficiently explain how the values for all selected parameter values when calculated and otherwise aggregated together by the chosen method verifies the claim.
(Addresses *6.3.5* and *6.3.4* in ISO 14033 [6])

4. *Explain parameters selection and definition, and data source and recalculation*
Concerning the *methodological parameters and parameter values* introduced in bullet 3: provide an explanation about how parameters were selected and defined, and how and from where data were acquired and recalculated into the values used for calculations.
(Addresses *6.3.3*, *6.3.2* and *6.3.1* in ISO 14033 [6])

5. *Verifiability and Certification Schemes.*
Bullets 3 and 4 above refer to the provision of fully transparent information about any claim. However, there are two reasons why such complex and rich information is not generally published as part of claims. The first reason is that most of such information is too complex for most receivers to interpret. The second, and most important reason is that such information may contain business and trade secrets, such as facts about product ingredients, designs or recipes or specific supplier networks.
Certificates of authenticity may be issued by an authorizing third party where accredited expertise, with integrity and confidentiality, has verified claims. When such certificates can be issued they can substantially simplify information exchange and establish the necessary trust. If a certificate is available and provided bullet points 3 and 4 above can be omitted.

### *7.2.2. Certified claims*

Certificates can be issued for different sustainability claims, such as mass balance calculations, life cycle assessments or criteria-based labels. Though the certification systems in themselves have a specified scope, the certified statement generally have a range of parameters, which gives that two claims certified by the same scheme can have very different meanings and lead to misunderstanding.

#### *7.2.2.1. Certificates relating to chain of custody*

The chain of custody certificates relates to the standards addressed in subchapter 5.3.1.

The International Sustainability & Carbon Certification (ISCC) [45] and the Roundtable on Sustainable Biomaterials (RSB) [46] certifications are internationally recognized frameworks that ensure sustainability and traceability in supply chains, particularly for biomass, bio-based materials, and renewable resources. Both certifications rely heavily on a robust chain of custody (CoC) system, which tracks the flow of materials and ensures compliance with sustainability standards throughout the lifecycle of a product.

The International Sustainability & Carbon Certification (ISCC) [45] is a globally recognized system ensuring the sustainability and traceability of raw materials and products across supply chains. Its chain of custody requirements includes a mass-balance system, which guarantees that the volume of certified sustainable material entering a system boundary corresponds to the amount leaving, with accurate records maintained for transformations. It also enforces stringent sustainability criteria, verifying compliance with ecological and social standards like reducing greenhouse gas emissions and preventing deforestation. Additionally, traceability is a core aspect, enabling the tracking of certified materials from their raw material origins to the final product, ensuring transparency and accountability throughout the supply chain.

It needs to be stressed that the ISCC traceability certificate does not encompass a similar comprehensive and holistic system around its supply chain as an LCA according to the ISO 14040-series of standards. Instead, the supply chain of the ISCC certificate means only the chain of individual system boundaries of each certified supply chain element.

“An individual GHG emission calculation is not performed for the whole supply chain but only within the system boundary of a certified supply chain element.” [68].

ISCC is also currently developing guidelines to harmonize the ISCC Carbon Footprint Certification with established norms and standards (e.g., ISO 14067, Together for sustainability PCF guideline) [69]. ISCC aims to introduce additional sets of minimum requirements for the developed certification and carbon footprint calculation approaches to improve comparability and reproducibility of the PCF results.

The report ISCC 208 Logos and Claims Version 1.3 [70] provides much useful guidance for how to communicate business-to-business and to consumers.

The RSB Certification [46] is a comprehensive sustainability framework that certifies the production of bio-based, renewable, and circular products, ensuring their compliance with rigorous social, environmental, and economic criteria. It covers diverse sectors, including fuels, chemicals, and materials, and offers specific schemes like RSB Global Fuels and RSB Advanced Products. The certification assesses greenhouse gas (GHG) reductions, biodiversity protection, and human rights adherence. It ensures traceability through robust chain-of-custody models such as mass balance, segregation, and book-and-claim systems, enabling credible sustainability claims. RSB also supports operators with tools like risk assessments,

stakeholder consultations, and environmental and social management plans, helping them navigate compliance and certification.

Communication of certificates for the different types of chain of custody models, such as controlled blending, mass balance or book and claim, need to clearly communicate:

- The chain of custody model applied
- Whether the model applies to a physical blending (follow the atom) or an attributed blending.
- The ratio (%) of certified material.

For calculating the carbon footprint according to the RSB certification, the system boundary is from cradle (fossil fuel feedstock extraction and biofuel feedstock production, respectively, for fossil fuels and biofuels) up to, but not including use of the fuel in an engine. Practically this means that, the boundary of the GHG calculation has to coincide with the scope of certification. The boundary should include all operations that are required for the production of the biofuel or the processing of co-products and waste [71].

#### *7.2.2.2. Certified labels*

Certified labels refer to that a third party has verified the statement mplied and/or expressed by a label:

Third-party verified ecolabeling schemes, such as Nordic Swan [42] and the EU Ecolabel [43] are eco-certifications designed to help consumers identify products and services that meet high environmental and sustainability standards. The Nordic Swan Ecolabel, established by the Nordic Council of Ministers, is widely used in Nordic countries and ensures that certified products are environmentally friendly throughout their lifecycle, covering criteria such as raw material sourcing, production processes, and energy efficiency. Similarly, the EU Ecolabel, symbolized by the Flower, is a European certification that highlights products with reduced environmental impact, emphasizing criteria like energy conservation, reduced hazardous substances, and resource efficiency. The EU Ecolabel helps consumers identify sustainable choices while encouraging manufacturers to reduce their environmental footprint through rigorous certification standards. Both are ISO 14024 Type I ecolabelling schemes [24], meaning they operate independently and apply a comprehensive lifecycle approach. This ensures that the environmental impact of products is assessed from raw material sourcing to disposal. Its criteria are developed holistically, considering the entire lifecycle of the product to address multiple environmental aspects. When communicating such criteria-based certified labels it is needed to address the certification body and provide an understandable description of the certification and the criteria for which the certificate is valid.

#### 7.2.2.3. Third-party verified life cycle assessment-based declarations

*EPD (Environmental Product Declaration)*

An EPD is a standardized document that provides transparent and comparable information about the environmental impacts of a product throughout its lifecycle. It is based on a LCA (5.3.3.) and adheres to specific international standards, such as ISO 14025 [25] and EN 15804 (for construction products) [72]. By the concept of Product Category Rules (PCR), an EPD provides a more uniform method to assess environmental impacts compared to traditional LCAs. An EPD is independently verified to ensure accuracy and compliance with the relevant standards. EPDs have a global network of different national verification bodies [44], and it is applied both for broad sets of environmental impact categories, as well as for single issue footprints, like carbon footprint [53] and water footprint [54].

*PEF (Product Environmental Footprint)*

The Product Environmental Footprint [73] is a European methodology designed to evaluate the environmental performance of a product or service throughout its entire lifecycle. It is based on the ISO 14025 EPD system [25] but was further developed by the European Commission as part of the EU's sustainability initiatives. Where EPDs have PCRs, the PEF has Product Environmental Footprint Category Rules (PEFCRs) [74] for consistent application within specific product sectors. A PEF thereby provides an even more uniform method than EPDs for EU regulations.

### 7.2.3. Avoiding common mistakes

Without reference to reasons why mistakes about green claims are are commonly done, common mistakes are avoided by applying the following guidance.

#### 7.2.3.1. Vague

Do not make vague claims. A statement is vague when there is no literal relation to a standardized or otherwise recognized term providing clear references to a method of measurement or verifiably clear categorization or metrics.

Examples of vague claims are

- 'green', 'environmentally friendly', 'environment efficient'
- any sustainability label that is not based on a certification scheme

#### 7.2.3.2. Misleading

Do not make misleading claims. A claim shall be factual and correctly advice a decision-maker. A claim is misleading if a decision-maker is likely to take wrong decision because of the formulation of the claim.

Examples are

- Statement that seems to refer to a known method of measurement or verifiability but in fact is not.
- A claim about the entire product when it concerns a certain aspect of the product.
- A claim for which the trader cannot demonstrate such performance.
- A claim about any stage of the product life cycle which cannot be verified.
- Climate-related claims have been shown to be particularly prone to being unclear and ambiguous and to mislead consumers. This relates notably to environmental claims that products or entities are “climate neutral”, “carbon neutral”, “100% CO2 compensated”, or will be “net-zero” by a given year, or similar. Such statements are often based on “offsetting” of greenhouse gas emissions through “carbon credits” generated outside the company’s value chain, for example from forestry or renewable energy projects. Methodologies underpinning offsets vary widely and are not always transparent, accurate, or consistent.

#### *7.2.3.3. Irrelevant or self-evident*

Do not make irrelevant claims. A claim should only relate to an environmental aspect of the product that exists or is likely to be realized. It should not be made to state an absence of some aspect that have never been associated with the product category.

#### *7.2.3.4. Aspirations, goals and promises*

Do not make lofty claims. Claims made of aspired goals and future performance should be made only after sincere and realistic commitment is secured by top management of the organization that makes the claim

Examples of how such commitment can be made tangible and verifiable are given in the international standards ISO IWA 42 Net Zero guidelines [56] as well as in ISO 14068-1:2023 Carbon neutrality [55], two standards that provide guidance towards significant greenhouse gas reduction. Communication about the commitment is to be made by the highest level of leadership who publicly states that the organization is committed to achieving the net zero or carbon neutrality targets as soon as possible. Then, on the way towards achieving the goal publicly and regularly communicate the transition plans and its achievements, always accompanied by the practical actions inside the organization and along the value chain.

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