FINAL DRAFT International Standard

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Wood and wood-based products — Greenhouse gas dynamics —

Part 1: Framework for value chain calculations

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Foreword

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

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

This document was prepared by Technical Committee ISO/TC 287, *Sustainable processes for wood and wood-based products*.

A list of all parts in the ISO 13391 series can be found on the ISO website.

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

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Introduction

Climate change is consistently identified as a significant threat to the environment, business and our collective way of life. Forest management and subsequent wood-based products can make significant contributions to each of the two principal climate change mitigation goals established in Article 4.1 of the UN Framework Convention on Climate Change (UNFCCC)[23] and applied in climate policy at international and national levels:

— "[…] control, reduce or prevent anthropogenic emissions and of greenhouse gases in all relevant sectors […]"; and

— "[…] conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems".

The production and use of wood and wood-based products have the potential to mitigate climate change in several ways, through:

— sustainable forest management by considering the net amount of carbon sequestered by the forest, and striving to mitigate impacts from natural disturbances;

— reducing value chain emissions (including emissions associated with forest operations, transport and processing in the forest and in the industry) to minimize the emissions associated with wood products;

— use of wood products with longer lifetimes and high recycling rates to store carbon for a longer time period, thereby delaying emissions to the atmosphere; and

— directing the use of wood products to replace emissions-intensive materials and hard-to-abate fossil fuel burning emissions in order to lower the overall emissions from all sectors.

The ISO 13391 series provides methodologies for calculating the overall greenhouse gas dynamics of wood and wood-based products across the two climate change mitigation goals established by the UN Framework Convention on Climate Change. It serves as a complement to other methodologies, protocols and life cycle assessments. The ISO 13391 series can serve as a tool in supporting regulatory policies, strategies and private sector initiatives for mitigating climate change.

Growing trees sequester carbon from the atmosphere into biomass (above and below ground) and into forest soils. This benefit is partially counteracted by greenhouse gas emissions from fossil fuel use associated with seedling production, forest management activities, harvesting and subsequent manufacturing. Carbon can also be emitted from decomposition or combustion in the forest. However, when trees are harvested, the carbon absorbed by the forest can be preserved in wood-based products for many decades (e.g. in buildings and in solid wood furniture), with a portion of the carbon returned to the atmosphere in much shorter timescales, from products that have a shorter service life or are used as fuel. An additional benefit of using wood-based products occurs when wood-based products substitute alternative products with higher fossil-based greenhouse gas emissions such as steel, concrete, plastics, and fossil fuels, leading to displacement (avoidance) of fossil-based greenhouse gas emissions.

Based on the identified and potential contributions of wood and wood-based products to climate change mitigation, the ISO 13391 series addresses four components of the greenhouse gas dynamics of wood and wood-based products through the value chain.

With respect to controlling, reducing or preventing emissions:

— value chain greenhouse gas emissions from producing and placing wood-based products on the market including reuse, recycling and final use or fate; and

— potential prevention of value chain greenhouse gas emissions from alternative products through the use of wood-based products, including final use or fate.

With respect to greenhouse gas sinks and carbon pools:

— carbon stored in forests, including biomass and soil; and

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— carbon stored in wood-based products throughout the value chain, including recycling and final use or fate.

NOTE 1 The displacement potential of greenhouse gas emissions (avoided emissions) is calculated based on the two components addressing:

— value chain greenhouse gas emissions for wood-based products; and

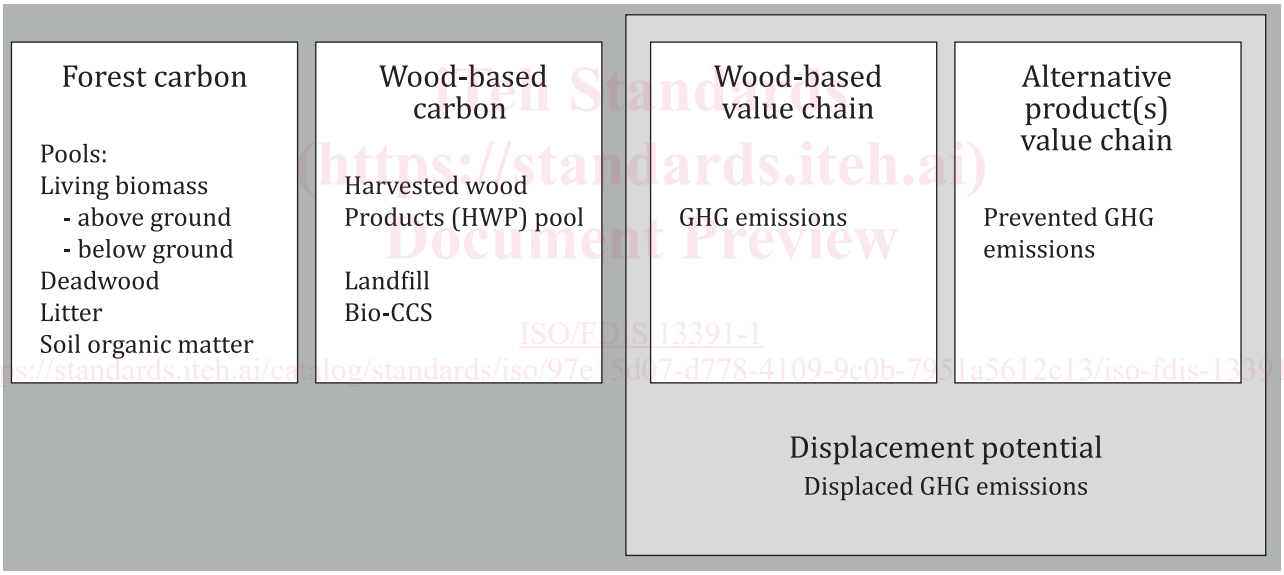
— value chain greenhouse gas emissions from alternative products.

The calculation also uses information about the biogenic carbon contained in both product(s) or product system(s) where appropriate.

Figure 1 shows how the four components of the greenhouse gas dynamics fit together – namely the carbon stored in the forest; the wood-based carbon relating to storage in harvested wood products; the wood-based value chain greenhouse gas emissions; and the value chain greenhouse gas emissions from the alternative products. The two components on the right-hand side of Figure 1 can be combined to derive the displacement potential by subtracting the wood-based value chain greenhouse gas emissions from the sum of the value chain greenhouse gas emissions from the alternative product(s). The details of this calculation are given in ISO 13391-3. Each component is calculated and reported on separately. Users of this document can report calculations on one or several components, provided the choices are explained.

NOTE 2 The wood-based product can be a product or a product system based predominantly on woody materials, e.g. it can be a building element with a wood content.

NOTE 3 Bio-CCS refers to carbon capture and storage of biogenic emissions.



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Figure 1 — Illustration of the components of the greenhouse gas dynamics of wood and wood-based products

The greenhouse gas-related aspects of forests, wood and wood-based products are one among a set of interrelated aspects of sustainability. The ISO 13391 series does not address other connections between the climate and forests and wood and wood-based products, nor does it address important aspects of sustainability, such as biodiversity, climate resilience, water resources and societal impacts.

The goal of the ISO 13391 series is to provide tools to assess each component which can be reported in appropriate combinations to understand greenhouse gas dynamics of wood and wood-based products for the entire value chain and combine multiple products at an organizational or aggregated level (while providing information about data quality and system boundary differences that this can contain).

This document addresses the overall framework for greenhouse gas dynamics calculations. It also links the other parts of the ISO 13391 series together. This document also covers two of the four components: value

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chain greenhouse gas emissions for wood-based products, and the calculation of carbon in the harvested wood products carbon pool.

ISO 13391-2 addresses the carbon balance of forest management units. The forest carbon balance can vary widely. Influences include tree species composition and distribution, the local climate and soil type, and the sustainability of forest management practices. In addition, external factors such as fire, drought, pests and diseases can add increasing risk to stores of forest carbon, whilst other factors can enhance carbon removals.

ISO 13391-3 addresses displacement of greenhouse gas emissions, the situation in which wood-based products or product systems placed on the market are assumed to replace alternative products or product systems with higher greenhouse gas emission profiles.

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Wood and wood-based products — Greenhouse gas dynamics —

Part 1: Framework for value chain calculations

1 Scope

This document specifies how to calculate the greenhouse gas dynamics of a set of wood and wood-based products on the organizational or aggregated level (the area of study). It includes the greenhouse gas emissions, greenhouse gas removals, or carbon pools related to:

— one or multiple forest management unit(s),

— harvested wood product(s),

— value chain(s), and

— potential displacement of greenhouse gas emissions from alternative products replaced by wood-based products.

Together, these four components represent the greenhouse gas dynamics of a set of wood and wood-based products.

This document sets general requirements and provides overarching terminology.

This document specifies the different components of a greenhouse gas dynamics calculation.

This document includes information on how claims and declarations can be communicated based on this document, both within the value chain and to customers and consumers.

This document is intended to be used by organizations seeking to understand, commit to or contribute to climate change mitigation. These organizations can be either private or public, regardless of type or size, and located in any jurisdiction or any position within a specific value chain.

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2 Normative references

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

ISO 13391-2, *Wood and wood-based products — Greenhouse gas dynamics — Part 2: Forest carbon balance*

ISO 13391-3, *Wood and wood-based products — Greenhouse gas dynamics — Part 3: Displacement of greenhouse gas emissions*

ISO 14020, *Environmental statements and programmes for products — Principles and general requirements*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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

3.1
greenhouse gas dynamics
group of *greenhouse gas sources* (3.11), *greenhouse gas sinks* (3.9) and greenhouse gas fluxes reported together for *forest management unit(s)* (3.20), *harvested wood product(s)* (3.23), *value chain(s)* (3.32), and *displacement potential* (3.4) within defined *system boundaries* (3.33) and within a specified time period

3.2
forest carbon balance
net of *greenhouse gas* (3.7) emissions and removals of *forest management unit(s)* (3.20) within a specified time period

Note 1 to entry: The five *carbon pools* (3.8) of the *forest* (3.19) are included.

Note 2 to entry: *Value chain* (3.32) greenhouse gas emissions related to *forestry operations* (3.21), for example, are excluded.

3.3
displacement
situation in which the use of any *wood* (3.22) and *wood-based products* (3.23) contribute to avoiding *greenhouse gas* (3.7) *emissions from alternative products* (3.5), excluding biogenic CO_2 emissions

Note 1 to entry: "Displacement" is a broader term than *substitution* (3.6).

Note 2 to entry: The scale of displacement will depend on market conditions.

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3.4
displacement potential
quantity of avoided *greenhouse gas* (3.7) emissions due to *displacement* (3.3) based on the quantity of products placed on the market

Note 1 to entry: Measured in tonnes of *carbon dioxide equivalents* (3.13) (t CO_2e)

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3.5
emissions from alternative products
value chain *greenhouse gas* (3.7) emissions from a product or product system potentially not occurring due to the use of a product or product system containing *wood* (3.22) with functional equivalence

Note 1 to entry: A “product system” can be, for example, a building element.

3.6
substitution
situation in which a specific *wood-based product* (3.23), assembly, structure or building is used instead of a specific alternative product, assembly, structure or building (with functional equivalence), thus leading to avoided *greenhouse gas* (3.7) emissions associated with the alternative product, assembly, structure or building

3.7
greenhouse gas
GHG
gaseous constituent of the atmosphere, both natural and anthropogenic, that absorbs and emits radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth’s surface, the atmosphere and clouds

[SOURCE: ISO 14050:2020, 3.9.1]

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3.8
carbon pool
component in the environment, other than the atmosphere, that has the capacity to accumulate, store or release carbon

EXAMPLE *Forest* (3.19) *biomass* (3.15), *wood-based products* (3.23) and soils.

Note 1 to entry: The quantity of stored carbon is expressed as a mass.

Note 2 to entry: See 5.1.1 and Annex A for details on the carbon pools included in this document.

3.9
carbon stock
total mass of carbon contained in a *carbon pool* (3.8) at a specified point in time

3.10
greenhouse gas sink
process that removes a *greenhouse gas* (3.7) from the atmosphere

Note 1 to entry: A given *carbon pool* (3.8) can act as a net sink for atmospheric greenhouse gases if, during a given time interval, more carbon is sequestered from the atmosphere or transferred to that pool than released.

[SOURCE: ISO 14064-1:2018, 3.1.3, modified — Note 1 to entry added.]

3.11
greenhouse gas source
process that releases a *greenhouse gas* (3.7) into the atmosphere

Note 1 to entry: A given *carbon pool* (3.8) can act as a net source for greenhouse gases, aerosols or precursors of greenhouse gases if, during a given time interval, more carbon is released than sequestered or transferred to that pool.

Note 2 to entry: Greenhouse gas sources include the combustion of fossil fuels, forest fires and respiration.

[SOURCE: ISO 14064-1:2018, 3.1.2, modified — Notes 1 and 2 to entry added.]

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3.12
carbon fluxes
amount of carbon exchanged between *carbon pools* (3.8) and between a carbon pool and the atmosphere over a specified time period

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3.13
carbon dioxide equivalent
CO_2e
CO_2 equivalent
unit for comparing the radiative forcing of a *greenhouse gas* (3.7) to that of carbon dioxide

Note 1 to entry: Non-carbon dioxide greenhouse gases are converted to CO_2e using Global Warming Potentials (GWP). These are found in the latest Intergovernmental Panel on Climate Change (IPCC) publications and are typically based on a 100 year time horizon. Other GWP time horizons are sometimes used and reported separately.

[SOURCE: ISO 14050:2020, 3.9.3, modified — Note 1 to entry added]

3.14
biogenic carbon storage
carbon that has been removed from the atmosphere and retained for some time as biogenic carbon in *biomass* (3.15) or in *wood-based products* (3.23)

3.15
biomass
material of biological origin excluding material embedded in geological formations or transformed to fossilized material

[SOURCE: ISO 13065:2015, 3.4, modified — “raw material” has been replaced with "material".]

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3.16
allocation
partitioning of the inputs or outputs of a process or product system between the product system under study and one or more other product systems

Note 1 to entry: Definition adapted from the description in ISO 14044:2006/Amd 2:2020, Clause D.1.

3.17
primary data
quantified value of a unit process or an activity obtained from a direct measurement or a calculation based on direct measurements at the original source

[SOURCE: ISO 14050:2020, 3.6.34]

3.18
secondary data
data that have already been collected and are available from another source or which are indirectly derived, and do not fulfil the requirements for *primary data* (3.17)

Note 1 to entry: Secondary data can include data from databases and published literature, default greenhouse gas emission factors from national inventories, calculated data, estimates or other representative data, validated by competent authorities.

Note 2 to entry: Secondary data can include data obtained from proxy processes or estimates.

[SOURCE: ISO 14067:2018, 3.1.6.3, modified — "data which" has been replaced by "data that have already been collected and are available from another source or which are indirectly derived, and"]

3.19
forest
land spanning more than 0,5 ha (5 000 m^2) with trees higher than 5 m and a canopy cover of more than 10 %, or trees able to reach these thresholds in situ

Note 1 to entry: A forest is determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 m in situ.

Note 2 to entry: A forest includes areas with young trees that have not yet reached but which are expected to reach a canopy cover of 10 % and tree height of 5 m. The term also includes areas that are temporarily unstocked due to clear-cutting as part of a forest management practice or natural disasters, and which are expected to be regenerated within 5 years. Local conditions can, in exceptional cases, justify that a longer time frame is used.

Note 3 to entry: A forest also includes:

— forest roads, firebreaks and other small open areas;

— forest in national parks, nature reserves and other protected areas such as those of specific environmental, scientific, historical, cultural or spiritual interest;

— windbreaks, shelterbelts and corridors of trees with an area of more than 0,5 ha (5 000 m^2) and width of more than 20 m;

— abandoned shifting cultivation land with a regeneration of trees that have, or are expected to reach, a canopy cover of 10 % and tree height of 5 m;

— areas with mangroves in tidal zones, regardless whether this area is classified as land area or not;

— rubber-wood, cork oak and Christmas tree plantations;

— areas with bamboo and palms provided that land use, height and canopy cover criteria are met;

— areas outside the legally designated forest land which meet the definition of "forest".

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