INTERNATIONAL STANDARD

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# Graphic technology — Quantification and communication for calculating the carbon footprint of print media products

*Technologie graphique — Quantification et communication relatives au calcul de l'empreinte carbone des produits imprimés*



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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 documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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The committee responsible for this document is ISO/TC 130, *Graphic technology*.



 

# Introduction

Reduction of worldwide greenhouse gas (GHGs) emissions is central to the mitigation of climate change (see Annex A), considered to be arising from natural and anthropogenic activities. Industry and governments are already aware of the importance of contributing to this reduction, both nationally and internationally. The printing and associated industries (prepress, finishing, postpress, paper making and related services) have substantially reduced their GHG emissions in recent years. Although this data reduction can be formally captured and measured, it is difficult to compare without a common reference methodology.

This International Standard has been developed to provide a consistent framework methodology for carbon footprint calculation. It is written for prepress, print service providers, printers, media companies, other print content publishers, related industry associations and providers of carbon footprinting tools. It offers a program-neutral method for calculating and communicating the life cycle GHG emissions of print media products, based on calculated $CO_2e$ values, for the single impact category of climate change. This single criteria approach provides the foundation for future work addressing multicriteria impacts which assess all potential impacts that a print media product can have on the environment. This International Standard is based on work done for ISO/TS 14067 and PAS 2050 to provide a specific implementation for the graphic arts industry. Multicriteria calculations based on all four phases of Life Cycle Assessment (LCA), as outlined in ISO 14040, are not within the scope of this International Standard. Further information for conducting LCA are outlined in ISO 14044.

According to this International Standard, quantification of the carbon footprint of a print media product requires a defined goal and scope for the carbon footprinting study. This International Standard also requires a specification of the system boundaries and process inventory as the basis for calculations. It allows for calculations of the whole or part life cycle of print media products.



This International Standard provides consistency, transparency, flexibility and accountability for print media carbon footprint quantifications and their communication. It may provide the following benefits to companies, public bodies and consumers, industry and regulatory bodies:



— consistency in carbon footprint calculator design, to aid relevance and applicability for different print media product sectors and geographies;

— provide print buyers and consumers with a means of quantifying and communicating the carbon footprint of print media products using a common methodology and defined boundaries;

— provide the printing industry with a framework for quantifying and communicating the carbon footprint of print media products using a common methodology and defined boundaries;

— encourage media buyers and consumers of print media products to make informed media investment, purchase and usage decisions, using information validated with calculation, communication and reporting tools that are consistent with this International Standard;

— facilitate the continuous monitoring of the carbon footprint of print as part of its overall environmental impact, and encourage constant improvement within all print sectors;

— enhance the credibility of the printing industry's efforts to quantify, communicate and reduce the carbon footprints of print media products and their raw materials;

— be used as part of GHG emissions management; and

— facilitate performance tracking and progress in GHG emissions reduction for the printing industry.

This International Standard provides a framework methodology for calculating the life cycle GHG emissions of print media products. It aids the print customer's contribution to national and international $CO_2e$ reduction targets, via government schemes or through industry associations. A common framework for calculation and parameter requirements minimizes ambiguity and enables the comparison of the carbon footprints of print media products, based on the goals and scopes of individual carbon footprinting studies (see Annex E). This framework allows contributors to print media supply chains to

calculate partial carbon footprints for use in the supply chain. This International Standard can also be used to calculate carbon footprint values for use in carbon offsetting programs.

A print media product's carbon footprint calculated in compliance with this International Standard can be benchmarked against similar products. This, over time, may provide the following benefits:

— reduced environmental impact of print media products;

— assistance for print buyers making media purchase decisions;

— a framework for comparative estimates of average carbon footprints in different print media sectors, such as newspapers, magazines, books, signs and displays, etc.;

— greater appreciation of the differences in media carbon footprints, and more informed process and supply chain choice for print buyers, printers, service providers, customers and other interested parties;

— enhanced market awareness of print's sustainability and environmental impact;

— criteria for selecting a carbon footprinting tool to calculate the carbon footprint or partial carbon footprint of print media products; and

— comparable preliminary estimations of the carbon footprint of a print media product, based on a pre-existing study.

This International Standard includes examples of carbon footprinting studies and guidance for communicating and verifying carbon footprint information to printers, print buyers, consumers, industry and any other interested parties.



Use of this International Standard facilitates the comparison of the carbon footprint of cross media content and media products delivered digitally, for instance to websites, in emails, on DVDs, mobile devices and so on. However the carbon footprint of specific digital media is outside the scope of this International Standard.

# Graphic technology — Quantification and communication for calculating the carbon footprint of print media products

## 1 Scope

This International Standard specifies the requirements for quantifying the carbon footprint of those processes, materials and technologies required to produce print media products using any form of printing technology and that are within the user's knowledge and control. It is based on a Life Cycle Assessment (LCA) approach, using defined system boundaries and a specified functional unit as the basis for complete or partial carbon footprinting studies. This data can be referenced throughout supply chains for individual print media products.

Together with ISO 14020 and other ISO standards, this International Standard defines standards of completeness to be followed when communicating the results of a carbon footprint study for print media products to business and consumers.

This International Standard provides a framework for carbon calculators that organisations can follow, and that can be used as the structure for market or sector-specific carbon footprinting tools. Studies and tools constructed within this framework methodology provide carbon footprint quantifications of print media products that can be validated and verified.



## 2 Normative references

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



ISO 14044, *Environmental management — Life cycle assessment — Requirements and guidelines*

ISO/TS 14067, *Carbon footprint of products — Requirements and guidelines for quantification and communication*

## 3 Terms and definitions

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

### 3.1 Terms relating to carbon footprint

**3.1.1**
**carbon footprint (CF)**
net amount of GHG emissions and GHG removals, expressed in $CO_2$ equivalents

**3.1.2**
**carbon footprint of a product**
**CFP**
carbon footprint of a product system

**3.1.3**
**carbon footprinting tool**
means of calculating the carbon footprint of an object or process

**3.1.4**
**carbon storage**
carbon removed from the atmosphere and stored as carbon

**3.1.5**
**product system**
collection of processes with elementary and product flows performing one or more defined functions and which models the life cycle of a product

**3.1.6**
**product category rules**
set of specific rules, requirements and guidelines for one or more product categories

## 3.2 Terms relating to greenhouse gases

**3.2.1**
**carbon dioxide equivalent**
**$CO_2e$**
**$CO_2$ equivalent**
unit for comparing the radiative forcing of a GHG to carbon dioxide

Note 1 to entry: The carbon dioxide equivalent is calculated using the mass of a given GHG multiplied by its global warming potential.

[SOURCE: ISO 14064-1:2006; 2.19, without Note 2]

**3.2.2**
**global warming potential**
**GWP**
factor describing the radiative forcing impact of one mass-based unit of a given GHG relative to an equivalent unit of carbon dioxide over a given period of time



Note 1 to entry: Annex A contains a list of GHGs and their global warming potentials published by the Intergovernmental Panel on Climate Change.



[SOURCE: ISO 14064-1:2006; 2.18, modified]

**3.2.3**
**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

Note 1 to entry: See Annex A for a list of GHGs and their $CO_2e$ values, per Kyoto.

Note 2 to entry: Water vapour and ozone are also anthropogenic as well as natural GHGs but are not included as recognized GHGs due to difficulties in calculating their global warming potentials.

[SOURCE: ISO 14064-1:2006; 2.1, modified]

**3.2.4**
**greenhouse gas emission**
mass of a GHG released to the atmosphere

[SOURCE: SOURCE: ISO 14064-1:2006, 2.5, modified]

**3.2.5**
**greenhouse gas emission factor**
mass of a GHG emitted relative to an input or an output of a unit process or a combination of unit processes

**3.2.6**
**greenhouse gas removal**
mass of a GHG removed from the atmosphere

**3.2.7**
**greenhouse gas sink**
process that removes a GHG from the atmosphere

**3.2.8**
**greenhouse gas source**
mechanical or natural process that releases a GHG into the atmosphere

EXAMPLE Electrical energy use where the electrical energy has been created from fossil fuel resources.

## 3.3 Terms relating to life cycle assessment

**3.3.1**
**allocation method**
method by which inputs and outputs are allocated to different print media products

**3.3.2**
**cumulative method**
method by which values for inputs and outputs for print media products are accumulated throughout the supply chain

**3.3.3**
**end-of-life**
stage which begins when the used product is ready for disposal, recycling, reuse, etc. and ends when the product is returned to nature (combustion, deterioration), or is recycled or reused



**3.3.4**
**energy**
sources of GHG emissions used for the provision and use of the product



**3.3.5**
**functional unit**
quantified and defined single iteration of a printed product, used as a reference unit in a carbon footprinting study

Note 1 to entry: to entry See Figure B.1.

EXAMPLE An A4 page, one square metre printed, a single iteration of a printed product or a complete print run.

[SOURCE: ISO 14040:2006; 3.20, modified to be specific to ISO 16759]

**3.3.6**
**interpretation**
process of explaining the results of a life cycle assessment such that it is relevant to the goal and scope of a CFP study

**3.3.7**
**life cycle**
consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal

[SOURCE: SOURCE: ISO 14044:2006; 3.1]

**3.3.8**
**life cycle assessment**
**LCA**
compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle

**3.3.9**
**life cycle impact assessment**
**LCIA**
phase of life cycle assessment aimed at understanding and evaluating the magnitude and significance of the potential environmental impacts for a product system throughout the life cycle of the product

**3.3.10**
**life cycle inventory**
**LCI**
phase of life cycle assessment involving the compilation and qualification of inputs and outputs for a product throughout its life cycle

**3.3.11**
**process**
set of interrelated or interacting activities transforming inputs into outputs

[SOURCE: SOURCE: ISO 14044:2006; 3.11, modified to be specific to ISO 16759]

**3.3.12**
**product group**
collection of print media products that share common physical characteristics

## 3.4 Terms relating to organisations and consumers

**3.4.1**
**consumer**
individual purchasing products or services for personal or private use



**3.4.2**
**organization**
company, corporation, firm, business, authority or institution with its own administration and purpose



**3.4.3**
**supply chain**
linked and interdependent processes that result in the delivery of print media products to consumers

**3.4.4**
**unit process**
smallest element considered in the life cycle inventory analysis for which input and output data are quantified

[SOURCE: SOURCE: ISO 14040:2006, 3.34]

**3.4.5**
**user**
individual using print media products

## 3.5 Terms relating to printed media product and process — Prepress

**3.5.1**
**prepress**
preparation of data files in analogue or digital format for printing

EXAMPLE Separating RGB files into CMYK.

**3.5.2**
**prepress consumables**
materials used as part of the prepress process, including materials which can be recycled or otherwise reused

**3.5.3**
**data**
information known or assumed as fact

**3.5.4**
**data management**
process of keeping track of all data and/or information related to the creation, production and distribution of a print media product, and associated processes

**3.5.5**
**colour management**
process of managing all data in a colour production workflow, such that the colours are accurate and consistent in appearance across substrates and imaging processes, including print and electronic rendering

**3.5.6**
**file preparation**
readying data files for subsequent production in the print media product supply chain

**3.5.7**
**preflight checking**
file inspection to determine that the digital data contained therein will process such that all data can be accurately imaged to a image carrier or substrate

**3.5.8**
**file delivery**
delivery of print media data files within the supply chain

**3.5.9**
**proofing**
process of evaluation of pre-production files used to check the accuracy of content and colour reproduction



**3.5.10**
**imposition**
arrangement of pages on the image carrier such that when cut, trimmed and finished the pages are in the correct reading sequence



**3.5.11**
**raster image processing**
conversion of content data into a bitmap file including screening, trapping, imposition and all other process data, relevant to the output constraints

**3.5.12**
**screening**
predominantly electronic process to create the printing and nonprinting elements of a page to mimic the halftone values of an original contone

**3.5.13**
**trapping**
process of how overprinted colours should be defined so that on press the positioning of separations disguises any misregistration

**3.5.14**
**workflow management**
process of managing all tasks in the print media supply chain

## 3.6 Terms relating to printed media product and process — Press

**3.6.1**
**press consumables**
materials used as part of the printing process, including materials which can be recycled or otherwise reused

**3.6.2**
**image carrier**
surface prepared such that some parts of it transfer printing ink whereas other parts do not

**3.6.3**
**ink**
substance containing pigment(s) or dye(s), resin(s) and carrier fluid(s)

**3.6.4**
**toner**
solid material, which might or might not include colorant, capable of taking on an electrostatic charge, designed for deposition onto a substrate under the control of electrostatic forces in conjunction with a surface having a controlled distributed charge

**3.6.5**
**plastic**
synthetic or semi-synthetic organic material used to produce certain categories of print media products

**3.6.6**
**substrate**
material onto which inks, coatings and varnishes are printed or laid down

**3.6.7**
**print**
material onto the surface of which a mark or impression has been made

EXAMPLE Printed documents, sign and display material, magazines, newspapers.

**3.6.8**
**printing**
process of transferring text, line art and graphic content in one or more colours to a substrate



**3.6.9**
**printing process**
technology used to produce print, including analogue and digital methods



**3.6.10**
**coating**
process of applying an additional layer on top of printed inks

**3.6.11**
**coatings and varnishes**
substances applied to a substrate in addition to printed inks

**3.6.12**
**drying**
process of removing moisture, solvents or co-solvents from a substrate, localized environment or film formation by resins

**3.6.13**
**laminating**
process of applying a transparent layer to protect a printed substrate

**3.6.14**
**oxidation**
process resulting from the combination of a substance with oxygen

## 3.7 Terms relating to printed media product and process — Postpress

**3.7.1**
**postpress consumables**
materials consumed as part of the finishing process, including materials which can be recycled or otherwise reused

 

**3.7.2**
**binding**
process of holding materials together by means of staples, adhesives, thread, wire or other means

**3.7.3**
**stitching**
process of securing printed, folded and gathered pages in their folds

**3.7.4**
**finishing**
process associated with manipulating printed materials into a final product

EXAMPLE Cutting, slitting, binding.

**3.7.5**
**stacking**
piling up printed media as it comes off the press

**3.7.6**
**cleaning materials**
materials used to clean machinery and equipment used to create, produce and distribute print media products

**3.7.7**
**distribution**
process of ensuring that print media products can be made available to consumers



**3.7.8**
**print media product**
product created using printing and/or finishing processes



**3.7.9**
**colorant**
substance added in order to change colour appearance

## 3.8 Terms relating to data and data quality

**3.8.1**
**primary data**
directly measured, calculated or obtained quantified value of a unit process or activity and related information within a product system or company, based on specific original source measurements

Note 1 to entry: Primary data can be emissions factors from recognized reference sources.

**3.8.2**
**secondary data**
indirectly measured, calculated or obtained quantified value of a unit process or activity and related information within a product system or company, not based on specific original source measurements

**3.8.3**
**site-specific data**
data obtained from a direct measurement or a calculation based on direct measurement at its original source within the product system

**3.8.4**
**transparency**
open, comprehensive, accessible, clear and understandable presentation of information

[SOURCE: SOURCE: ISO 14040:2006; 3.7, modified to be specific to ISO 16759]