

# CARBON FOOTPRINT - what it is and how to measure it

## Executive Summary

Climate change is of high concern, driving growing demand for carbon footprint information. This leaflet is designed to help your organisation get started with an efficient and effective approach to address this topic, building on existing international standards and European reference data; further information and data sources including links to service providers are included.

We recommend to maximise the benefits of work on Carbon footprints to “get the most out of this”. This includes providing customers and other stakeholders with broader life cycle information related to your products and for internal purposes such as for identifying hot-spots along the supply-chain, potential risks, opportunities for related improvements, to avoid shifting burdens to other types of environmental impacts as well as to anticipate upcoming demands in the context of “Sustainable Consumption and Production”, a core commitment of the European Commission. This can all be achieved using existing, well-established approaches.

## What is a carbon footprint?

**Carbon footprint (CF)** – also named Carbon profile - **is the overall amount of carbon dioxide (CO<sub>2</sub>) and other greenhouse gas (GHG) emissions (e.g. methane, laughing gas, etc.) associated with a product<sup>1</sup>**, along its supply-chain and sometimes including from use and end-of-life recovery and disposal. Causes of these emissions are, for example, electricity production in power plants, heating with fossil fuels, transport operations and other industrial and agricultural processes.

The carbon footprint is quantified using indicators such as the Global Warming Potential (GWP). As defined by the Intergovernmental Panel on Climate Change (IPCC)<sup>2</sup>, a GWP is an indicator that reflects the relative effect of a greenhouse gas in terms of climate change considering a fixed time period, such as 100 years (GWP<sub>100</sub>). The GWPs for different emissions (see Table 1) can then be added together to give one single indicator that expresses the overall contribution to climate change of these emissions.

## How can I measure the carbon footprint of my product?

The carbon footprint is a sub-set of the data covered by a more complete Life Cycle Assessment (LCA). LCA is an internationally

standardized method (ISO 14040, ISO 14044)<sup>3</sup> for the evaluation of the environmental burdens and resources consumed along the life cycle of products; from the extraction of raw materials, the manufacture of goods, their use by final consumers or for the provision of a service, recycling, energy recovery and ultimate disposal.

One of the key impact categories considered in an LCA is climate change, typically using the IPCC characterization factors for CO<sub>2</sub> equivalents. Hence, **a carbon footprint is a life cycle assessment with the analysis limited to emissions that have an effect on climate change**. Suitable background data sources for the footprint are therefore those available in existing LCA databases. These databases contain the life cycle profiles of the goods and services that you purchase, as well as of many of the underlying materials, energy sources, transport and other services.

Table 1: Global warming potentials of some Greenhouse Gases (source: IPCC, 2007)

Species	Chemical formula	GWP <sub>100</sub>
Carbon dioxide	CO <sub>2</sub>	1
Methane	CH <sub>4</sub>	25
Nitrous oxide	N <sub>2</sub> O	298
HFCs	-	124 - 14800
Sulphur hexafluoride	SF <sub>6</sub>	22800
PFCs	-	7390 - 12200

<sup>1</sup> ISO 14040 defines the term “product” as both “goods” (e.g. consumer goods, intermediate goods) and “services” (even complex services like events, conferences and exhibitions).

<sup>2</sup> [www.ipcc.ch](http://www.ipcc.ch)

<sup>3</sup> ISO 14040:2006 Environmental Management – Life Cycle Assessment – Principles and Framework. ISO 14044:2006 Environmental Management – Life Cycle Assessment – Requirements and Guidelines.

### **Why the evaluation must be broadened to avoid misleading results and wrong decisions?**

Although building upon a life cycle approach, carbon footprints address only impacts on climate change. When exclusively carbon footprint data are used to support procurement decisions or to improve goods and services, other important environmental impacts are neglected while often running opposite to climate change, resulting in a “shifting of burdens”. **Achieving sustainable consumption and production requires the consideration and evaluation of all relevant environmental impacts** at the same time, such as e.g. acid rain, summer smog, cancer effects and land use. This can only be ensured by the more complete Life Cycle Assessment.

If organizations are now developing carbon footprint data, then it makes sense to evaluate also relevant non-greenhouse gas emissions (e.g. NO<sub>x</sub>, particles, SO<sub>2</sub>) along the product supply chain or full life cycle. The in-house effort is only slightly higher and same background data sources will be used.

### **Are there standards or guidelines to perform carbon footprint calculations?**

The international standards **ISO 14040-14044 provide robust and practice-proven requirements for performing transparent and accepted carbon footprint calculations**. Over the past ten years, a wide consensus on climate change evaluations in this life cycle context has been built up in the scientific community and has successfully been applied by many leading companies in all sectors. In a policy context, the carbon footprint can be seen as a subset of the growing demand for life cycle based information that is being used for knowledge-based decision making in the context of sustainable consumption and production.

ISO standards also support specific communication needs on climate change topics. The ISO type I Eco-labels and type III Environmental Product Declarations are the best reference framework for third party verified claims on carbon performance of products. We note here the importance of critical third-party reviews to help ensure problems do not arise later.

### **Where do I get professional help, data and further information?**

There are many available sources of data, software tools, consulting services, handbooks, and technical guidance on Life cycle assessment and the climate change impacts from goods and services, either for a fee or free of charge. The LCA Resources Directory for identifying such sources (in Europe and beyond) is available at [http://lca.jrc.ec.europa.eu/lcainfohub//directory\\_vm](http://lca.jrc.ec.europa.eu/lcainfohub//directory_vm)

Complementing available information and services, the European Commission is developing free of charge recommended methodological guidance documents, reference life cycle data for commonly used materials, energy sources, and services, and recommended factors to calculate impact indicators for not only climate change but also other impacts along the life cycle. The objective is to facilitate the availability of high quality and consistent data, studies, and claims.

Visit the European Platform on LCA website or contact us.

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#### **Contact:**

European Platform on Life Cycle Assessment  
European Commission – Joint Research Centre  
Institute for Environment and Sustainability  
TP 460  
Via E. Fermi 2749  
I-21027 Ispra (VA), Italy

Fax: +39 0332 78-5601

Email [lca@jrc.it](mailto:lca@jrc.it)

<http://lca.jrc.ec.europa.eu/>

You can also pose your questions on the LCT forum:

<http://lca.jrc.ec.europa.eu/EPLCA/mailing.htm>

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