



Life Cycle Assessment
A product-oriented method
for sustainability analysis

UNEP LCA Training Kit
Module 1 – Carbon Footprint



UNEP

Life Cycle



Initiative



Contents

- **What is a carbon footprint?**
- **Why is carbon footprint useful?**
- **Calculating carbon footprint**
- **Evolving standards**

What is a carbon footprint?

- **A Carbon footprint is the result of life cycle thinking applied to one impact category: Global Warming (Climate Change)**
- **It is not a true LCA because it only models one impact category.**
- **Carbon footprint supports lifecycle thinking.**

What is a carbon footprint?

Carbon footprint impact units are **kg CO₂ equivalents** or global warming potential (**GWP**).

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

Global warming potentials of some Greenhouse Gases
(IPCC, 2007, 100 year time frame)

Why is carbon footprint useful?

- **Global Climate Change is understood by many people as the most urgent ecological impact category**
- **It is a direct approach that uses absolute units**
 - CP2 equivalents or GWP
- **It is easily communicated.**

Calculating carbon footprint

- **Apply LCA procedures for carbon footprint:**
 - Define scope, goal and system boundaries
 - Compile and analyse inventory data
 - Perform Global Warming impact characterisation
 - Normalisation and weighting are not usually performed
 - Interpret results:
 - Check completeness, sensitivity and consistency
 - Identify uncertainties

Calculating carbon footprint

- **Example:
carbon footprint/
lamp lifetime**



Incandescent lamp

Fluorescent lamp

120000 kg CO₂-eq.

40000 kg CO₂-eq.

Calculating carbon footprint

- **Example:**
**carbon footprint/
1000 lumen-hours**



Incandescent lamp

Fluorescent lamp

160 kg CO₂-eq./
1000 lumen-hour

4.7 kg CO₂-eq./
1000 lumen-hour

Calculating carbon footprint

- **The GHG Protocol**
 - A framework to inventory and calculate “company-level” GHG emissions
 - It results from a partnership between the World Resource Council and the World Business Council for Sustainable Development
 - Free guide for modeling the organisation carbon footprint: www.ghgprotocol.org/

Evolving standards

- **Currently no standard for carbon footprint of products**
 - Carbon Trust (UK) is developing a carbon foot-print methodology in coordination with manufacturers, LCA professionals and retailers.
 - Uses 100 year global warming potential recommended by IPCC
 - is being formalized into the British Publicly Available Specification (PAS 2050) to be approved in late 2008.
 - ISO will evaluate it and revise it to become an international standard for calculation and reporting.

Related standards

- **ISO 14060 series address some carbon footprint aspects**
 - ISO 14064-1:2006 Greenhouse gases -- Part 1: Guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals
 - ISO 14064-2:2006 Greenhouse gases -- Part 2: Guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements
 - ISO 14064-3:2006 Greenhouse gases -- Part 3: Guidance for the validation and verification of greenhouse gas assertions
 - ISO 14065-3:2007 Greenhouse gases -- Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition



You may want to review parts of this module on carbon footprint.

- **What is a carbon footprint?**
- **Why is carbon footprint useful?**
- **Calculating carbon footprint**
- **Carbon footprint standards**



You may also want to review any of the modules in this series on Sustainability Analysis.

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c	Goal and scope definition
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