Carbon Footprint Guidance Document

Position Paper- Technical Information

International Aluminium Institute

Introduction

The significant concerns around climate change have brought into focus not only the importance of reducing greenhouse gas emissions at plant level, but also increasingly the impact and potential of products and services. Therefore different attempts are emerging to quantify specifically the Carbon Footprint of products and services.

In this context it is important to note that, while the term Carbon Footprint is relatively new, tools to estimate the climate change impacts of products and services have existed for several years, for instance the climate change impact category in life cycle assessment according to ISO 14040. Based on these fundaments, we define the Carbon Footprint of a product or service as the sum of the greenhouse gas emissions of all processes which are allocated to the product or the service during their whole life cycle.

In many cases Carbon Footprint studies cover the energy aspects and other greenhouse gas related impacts of a process or a product quite well. However, compared with a life cycle assessment (LCA) study, such studies do not take into account environmental impact categories other than climate change. They can therefore give a distorted picture of the environmental performance of a product or a service. Statements and claims based on Carbon Footprint studies can easily be misunderstood and can lead to market distortions without any environmental benefit.

Key statements and recommendations

The following recommendations summarize the major points required to ensure that footprint - particularly Carbon Footprint - assessments for products and services use established and recognized methodologies:

1) The Carbon Footprint of a product should be the result of a study with a well-documented procedure. It is a minimum requirement that the entire life cycle[1] must be considered, in order to obtain reliable information on greenhouse gas performance. The optimisation of one stage of the life cycle might lead to suboptimal results with respect to the full life cycle. In particular, greenhouse gas impacts in the use and recycling stages must be taken into account.

2) Special care should be exercised to ensure that comparisons between different products are made on the basis of the same functional unit (e.g. a can with a can of the same volume and not 1kg of cans with 1kg of cans). The functional unit should be well defined and the resulting reference flows are determined.
3) For comparative studies it is strongly recommended that the full range of environmental aspects, not just greenhouse gas emissions, be considered. These additional aspects should, at the very least be mentioned qualitatively, if not quantified.

The Carbon Footprint is an indicator based on average figures for key parameters along the supply chain, such as transport distances and consumer behaviour, which are an approximation of the real life situation. There can be a significant difference between the real local situation, which is relevant for policy decision-makers, and the theoretical global average, which can be misleading. As an example, the global average recycling rate for aluminium cans (63%) should not be applied to Brazil, where a rate of 96% has been achieved

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1) [1] In order to avoid misunderstandings, the term "life cycle" should be used instead of "supply chain"

Principles and requirements to be considered when assessing Carbon Footprints

The Carbon Footprint of a product should be understood as the indicator result of the impact category "climate change", determined in accordance with the requirements of ISO 14044 and based on the characterization factors published by the IPCC.

The ISO 14044 standard requires modelling of the product life cycle as a product system in order to determine the Carbon Footprint. For recyclable products, such as metals, it is appropriate to apply the cradle-to-cradle approach. In this approach the starting point is the raw material, in the form of granules, powders or ingots, which is fabricated and manufactured into final products and then used and recycled back into the raw material.

The determination of the Carbon Footprint of a product requires that the principles of LCA, as laid down in ISO 14040, subclause 4.1, have to be fulfilled. These include:

- life cycle perspective;
- environmental focus;
- relative approach and functional unit;
- iterative approach;
- transparency;
- priority of the scientific approach
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The resulting requirements in ISO 14040 and ISO 14044 also have to be fulfilled. Only the requirements of ISO 14040 and ISO 14044, which are derived from the principle of comprehensiveness (which requires consideration of all types of environmental impacts) can be disregarded.

Recommended Procedure to determine the Carbon Footprint

General

The Carbon Footprint is a parameter that reflects the impacts of greenhouse gas emissions, which can be assigned to a process, a group of processes, a product system, a plant or a group of plants.

The Carbon Footprint of a unit process

The Carbon Footprint of a unit process can be determined as follows:

1. Determine all inputs and outputs of the unit process.
2. Select all direct greenhouse gas emissions of the unit processes (Scope 1 greenhouse gas emissions) and add them up after having multiplied them with the relevant characterisation factors, to obtain the Carbon Footprint of the direct emissions.
3. Select all inputs and outputs which are non-elementary flows and cannot be excluded according to cut-off rules which are defined in advance. Such inputs can be material inputs (including water and ancillary material) and energy inputs. Such outputs can be by-products, for example production scrap, emissions to air or water for further treatment and waste for further treatment.
4. Determine the relevant (background) processes for each of these non-elementary flows and calculate the Carbon Footprint for each of these processes. In order to obtain the Carbon Footprint of the indirect emissions, all these Carbon Footprint values have to be summed up.
5. Determine the Carbon Footprint value of the unit process as the sum of the Carbon Footprint of the direct emissions and the Carbon Footprint of the indirect emissions.

The Carbon Footprint of a system

By adding up the Carbon Footprint values of the different unit processes, the Carbon Footprint values of systems can be obtained, including:

- the Carbon Footprint of the production process, including all processes from the raw material (metal ingot or plastics granule) to the final product;
- the Carbon Footprint of a production plant, including all processes of the plant;

- the Carbon Footprint of a company as the sum of all the Carbon Footprint values of its different plants;
- the Carbon Footprint value of an industry sector (e. g. the global aluminium industry), as the sum of the Carbon Footprint values of the all plants of the relevant industry sector;
- the Carbon Footprint of a product as the sum of all processes of the relevant product system;
- the Carbon Footprint of an assembled product or a group of products (e. g. all vehicles).

General considerations for calculating the Carbon Footprint for aluminium products

For the determination of the Carbon Footprint of aluminium products, the following has to be considered

General

Generic data should be used, as appropriate:

- **Production of primary raw material**: see reference IAI LCI data www.world-aluminium.org/cache/fl0000162.pdf for global data. For Europe, reference LCI data can be ordered from the European Aluminium Association (www.eaa.net).
- **Production of semi finished product**: reference LCI data can be ordered from the European Aluminium Association
- **Production of recycled raw material**: reference LCI data can be ordered from the European Aluminium Association

Specific data have to be collected for the fabrication of final products from semis.
All end-of-life operations, from the product after use to the recycled ingot, have to be considered, based on expected recycling rates. In order to document the benefits of the recycling of products which replace primary material, the substitution principle should be applied.

Automotive and mass transport sector

In comparative studies, the savings of energy through the reducing the weight of a vehicle have to be included see IAI transport study: www.world-aluminium.org/cache/fl0000124.pdf

Building sector

The high durability and the end-of-life recycling rate of aluminium products in the building sector have to be included in the study (see the TU Delft study “Collection of Aluminium from Buildings in Europe”, which can be downloaded from the EAA website). The advantages of aluminium products for specific building applications (e.g. electrical conductivity of cables, reflectivity for solar applications) have to be taken into account.

Packaging sector

In a comparative study, the functional unit (e.g. a can to a can of the same volume and not 1kg to 1kg) must be identical, especially the quantity of the product in the package, the expected life-time, the aroma conservation and the spoilage rate of the product in the package.

In the incineration process of packaging waste, energy is generated by the combustion of the aluminium foil, but, contrary to paper and plastics, no CO_2 is produced.

The positive impacts resulting from the transportation of the packaging material, including the distribution of the packaged goods and the sealing properties (for conservation of product and avoidance of spoilage) have to be taken into account. Usually aluminium packaging systems have a lower mass than those from competing materials and provide better protection for the packaged goods.