INTRODUCTION TO PCF AND LCA

In many discussions around the theme of Sustainability the terms 'LCA' and 'PCF' are widely used as measurements to 'characterise' the sustainability of a material or a process. Sometimes they are even used to refer to the same characteristic but they are NOT the same thing! How familiar are we with these terms?

DEFINITIONS

PCF is the acronym for Product Carbon Footprint. PCF communicates the amount of greenhouse gas emissions that are produced or consumed during the life cycle of a product. This can include all the stages of the use of a product from its production to its final end of life, although more typically the PCF calculation is limited to a portion of its overall life cycle. The emissions involved in a PCF calculation for a product are split into three broad groupings: Scope 1, Scope 2 and Scope 3.

SCOPE 1 – The CO_2 emissions associated with manufacturing a product energy for the manufacturing process and transport of materials during the production process.

SCOPE 2 – The indirect CO_2 emissions associated with the energy used for manufacturing & transport of a product, usually the CO_2 emissions generated in producing the energy used for the manufacturing process.

SCOPE 3 – The indirect CO_2 emissions associated with the production of the raw materials used to make a product as well as deliver it to the production point.

LCA is the acronym for Life Cycle Analysis. LCA is a methodology that is designed to help measure and quantify the end-to-end environmental impacts of a product, process or service. LCA's key elements are:

- identify and quantify the environmental loads involved (e.g. the energy and raw materials consumed, the emissions and wastes generated);
- evaluate the potential environmental impacts of these loads;
- assess the options available for reducing these environmental impacts.

A key observation here is that the LCA should consider not only the energy (especially the carbon dioxide emissions associated with it), but also impacts on other resources (such as use of water or land).

CRADLE TO .... (GATE/GRAVE/CRADLE) When evaluating a PCF or LCA it is important to identify what part of the life cycle of the product/process is being included in the evaluation. There are a number of approaches to take, but the three most common are: "Cradle to Gate", "Cradle to Grave" and "Cradle to Cradle".

- The term **Cradle to Gate** is widely used by raw material producers since they are able to evaluate the PCF/LCA from the whole process of producing the base raw materials needed by them until the point at which they deliver them (the factory gate), including intermediate steps, energy usage and internal transport. With each intermediate step in the production chain the Cradle-to-Gate becomes longer and more detailed.
- For **Cradle-to-Grave** further information is then needed on what happens to the product AFTER it is produced including how it is used in the end-product (the labelled article in the case of a self-adhesive label), and how it is disposed of at the end of the product life. At each stage information on the footprint is needed which includes any process handling information and transport needs.
- For **Cradle-to-Cradle** evaluations we need to consider a process where some (all) of the materials are to be recycled for use as new raw materials for the same product. This would include some of the same steps for "Cradle to Gate" scenario (although the base raw material sources may be changed), through to the end-use of the final product, and then all of the steps involved with recycling of the end-product back into raw material streams.

THE CHALLENGES FACED

In many PCF calculations the Scope 3 emissions are often the largest component of the overall PCF. This becomes a challenge as the information needed for Scope 3 calculations is not coming from the manufacturer of the final product but from the rest of the upstream value chain.

Where in the process is important. Cradle to Gate is the most common approach but Cradle to Grave and even Cradle to Cradle might be important depending on the application and how and where the information is being used.

Geographical origin for a raw material is often a significant variable. Not just in terms of the energy needed to transport from location to location, but also HOW the raw material might be produced (especially important impact on Scope 3 figures).

CO_2 is the measure used for emissions for the PCF but CO_2 is NOT the only emission that can influence global warming! Methane (CH_4), and Nitrous Oxide (NO_2) are two others, and both have a much bigger influence. Fortunately there are global standards which apply a 'factor' multiplier to different emissions (e.g. 1kg of NO_2 is calculated as being equivalent to 298kg of CO_2).

Origin of the data. Much of the background data used for PCF calculations (such as electricity generation numbers), comes from external databases. There can be considerable differences between the outputs of different databases.

Different approaches to PCF, different standards used by different producers and different industries can lead to different end-results. There can also be issues to reconcile these different approaches.

FINAT
Empowering the label industry

AN INTRODUCTION TO

PRODUCT CARBON FOOTPRINT & LIFE CYCLE ANALYSIS

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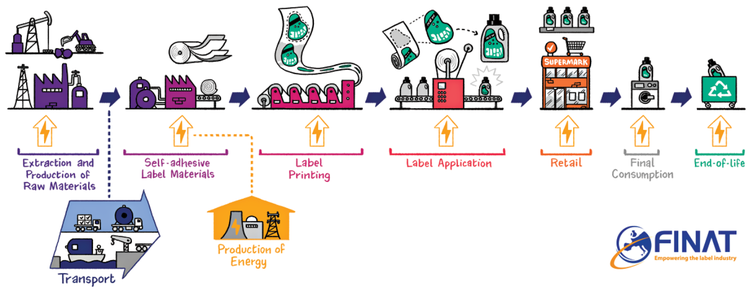
LIFE CYCLE OF A PRODUCT

The full life cycle of a product includes the extraction of resources, production of the product, use of the product and recycling up to the disposal of remaining waste.



PCF (PRODUCT CARBON FOOTPRINT)

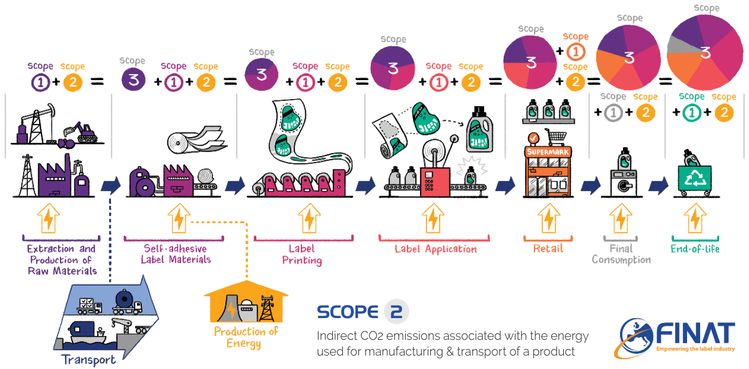
The PCF communicates the amount of greenhouse gas emissions that are produced or consumed during the life cycle of a product.

SCOPE 1

Direct CO2 emissions associated with manufacturing a product

SCOPE 3

Indirect CO2 emissions associated with the production of the raw materials used to make a product as well as deliver it to the production point

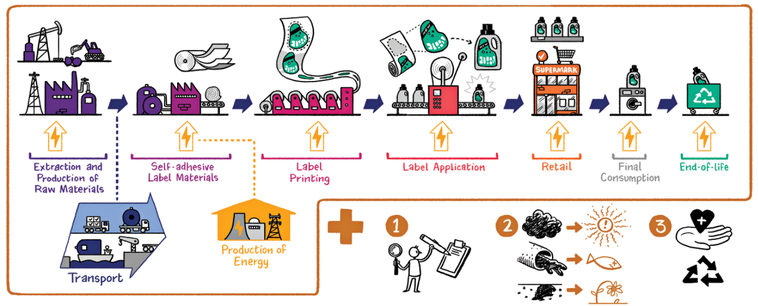


SCOPE 2

Indirect CO2 emissions associated with the energy used for manufacturing & transport of a product

LCA (LIFE CYCLE ANALYSIS)

LCA is a methodology that is designed to help measure and quantify the end-to-end environmental impacts of a product, process or service. LCA considers not only the Greenhouse Gas Emissions but also the impacts on other resources which may include water and soil.

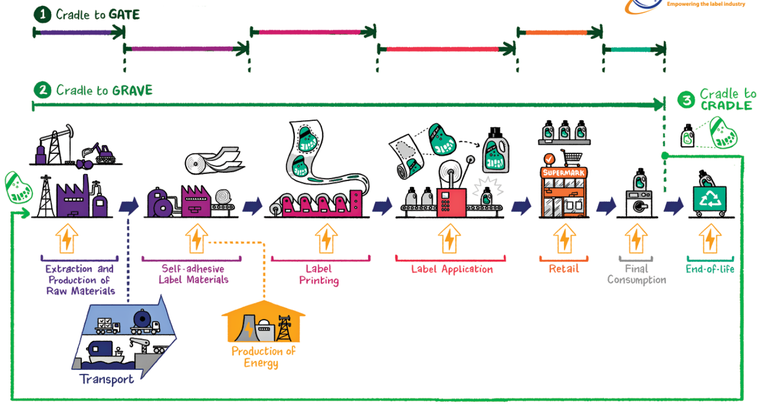


The key elements of Life Cycle Analysis are:

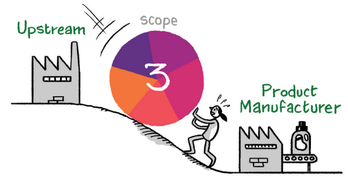
1. Identify and quantify environmental loads involved
2. Evaluate potential environmental impacts of loads
3. Assess options for reducing impacts

'CRADLE TO' LIFECYCLE STAGES

When evaluating a PCF or LCA it is important to identify what part of the life cycle of the product or process is being included in the evaluation. **The three most common approaches are:**



INDIVIDUAL CHALLENGES



SCOPE

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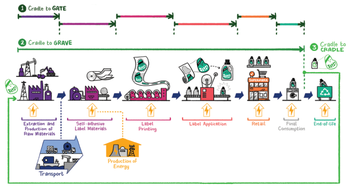

WHERE

Where in the process is important. Cradle to Gate is the most common approach but Cradle to Grave and even Cradle to Cradle might be important depending on the application and how and where the information is being used.

GEOGRAPHICAL ORIGIN

Geographical origin for a raw material is often a significant variable. Not just in terms of the energy needed to transport from location to location, but also HOW the raw material might be produced (especially important impact on Scope 3 figures).

CO2

CO2 is the measure used for emissions for the PCF but CO2 is NOT the only emission that can influence global warming! Methane (CH4), and Nitrous Oxide (NO2) are two others, and both have a much bigger influence. Fortunately there are global standards which apply a 'factor' multiplier to different emissions (e.g. 1kg of NO2 is calculated as being equivalent to 298kg of CO2).

ORIGIN OF THE DATA

Much of the background data used for PCF calculations (such as electricity generation numbers), come from external databases. There can be considerable differences between the outputs of different databases.

DIFFERENT APPROACHES TO PCF

Different standards used by different producers and different industries can lead to different end results. There can also be issues to reconcile these different approaches.