Facts about carbon calculations

– what you should know about carbon footprint and LCA calculations

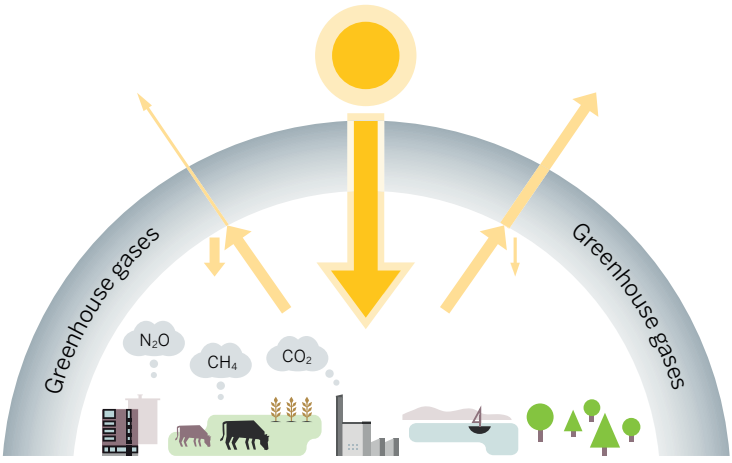
Climate change is caused by human activity, especially the burning of fossil fuels, emitting carbon dioxide (CO_2) and other greenhouse gases (GHGs) into the atmosphere. When mitigating climate change it is vital to know the burden each material is placing on the environment. Carbon footprint calculations and life cycle assessments (LCA) are widely used to demonstrate the carbon emissions and environmental impacts of a product. When evaluating the results it is important to know which parts of a product's total value chain are included in the calculation and which data can be compared.

The ability of trees to absorb CO_2 makes forests an important carbon sink. Good forest management practices, including regeneration, play a key role in ensuring that forests bind carbon efficiently and therefore remain a carbon sink.

WHAT ARE GREENHOUSE GASES?

Greenhouse gases, or GHGs for short, are gaseous compounds that absorb infrared radiation, trap heat in the atmosphere and contribute to the greenhouse effect – in other words, the warming of the surface and lower atmosphere of the planet caused by the conversion of solar radiation into heat. The main gases responsible for the greenhouse effect include carbon dioxide, methane, nitrous oxides and water vapour – which all occur naturally – and fluorinated gases, which are synthetic.

GREENHOUSE GASES FROM FOSSIL FUELS CAUSE GLOBAL WARMING



Solar radiation heats the Earth´s surface and lower atmosphere, but some of this radiation is reflected back to space. Some of this heat is trapped by the greenhouse gases (CO_2, CH_4 and N_2O, for example) in the atmosphere, warming the Earth and enabling life on the Earth.

The main cause of the increase in greenhouse gases in the atmosphere is the use of fossil fuels. This leads to extra heat being trapped, causing temperatures to rise.

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WHAT IS A CARBON FOOTPRINT?

The amount of greenhouse gases emitted by something (such as a service or a product) during a given period is known as its carbon footprint. The carbon footprint takes into account all the life cycle stages of the finished product or service. These include all raw material and energy sourcing, upstream transportation and manufacturing as well as specified downstream activities such as product transportation, use and end-of-life treatment. It is good to bear in mind that calculation scopes can vary and the results are not necessarily comparable.

Carbon footprint, or global warming potential as it's sometimes termed, is one of the environmental impacts measured in a life cycle assessment.

WHAT IS A LIFE CYCLE ASSESSMENT?

A life cycle assessment (LCA), also known as a life cycle analysis, is a methodology for assessing the environmental impacts associated with all stages of the life cycle of a product, process or service. For instance, in the case of a product, environmental impacts are assessed from raw material extraction (cradle) and processing, through the product's manufacture (gate), distribution and use, to the recycling or final disposal of the materials it is made from (grave).

An LCA study involves a thorough inventory of the energy and materials that are required across the value chain of a product, process or service and calculation of their corresponding impacts on the environment as well as on human and ecosystem health. For example, the more material-efficient a product is, the less it needs to be used. The categories that are evaluated include global warming potential, eutrophication potential, acidification potential, human toxicity and ecotoxicity. An LCA thus assesses cumulative potential impacts. The aim is to document and improve the overall environmental profile of the product, process or service. As with carbon footprint calculations, the scope of LCAs varies and the results are not always comparable.

Widely recognised procedures for conducting LCAs are included in the International Organisation for Standardisation (ISO) 14000 series of environmental management standards, in particular ISO 14040 and ISO 14044. ISO 14040 provides the principles and framework of the standard, while ISO 14044 provides an outline of the requirements and guidelines.

> What should we keep in mind when comparing the results of carbon footprint or LCA calculations for construction products?
>
> - The material and material-efficiency of the product
> - The amount of carbon stored in products
> - The type of energy used to manufacture the product
> - The weight of the material

WHAT IS A CARBON SEQUESTRATION AND CARBON STORAGE?

Carbon sequestration refers to the process of capturing and storing carbon dioxide (CO_2) from the atmosphere. The end result of carbon sequestration, total amount of carbon contained in e.g. a tree or soil, is called carbon storage.

The stored carbon originates from the atmosphere as trees absorb CO_2 and water to produce carbohydrates for the tree and release oxygen back to atmosphere by utilizing the energy from sunlight, this process is called photosynthesis. These carbohydrates are part of the tree structure in which the carbon stays stored. When a forest is harvestested and as long as the wood product is in use, carbon stays stored. Reuse and recycling ensure prolonged carbon storage. Once the material is disposed, biogenic carbon is released back to the atmosphere. The released carbon is again absorbed by trees from in the form of CO_2 and used to produce new carbohydrates and oxygen.

The long service life wood products ensure long carbon storage times. Every tree used in construction stores carbon and makes room for new seedlings – a new carbon sink.

WHAT IS RENEWABLE AND NON-RENEWABLE ENERGY?

Fossil-free energy			**Fossil-based energy**
Renewable energy		Non-renewable energy	
Bio-based energy (biomass)	Renewable energy from other sources (solar, wind, hydro)	Nuclear power	Fossil fuels (e.g., oil, coal, natural gas, peat)

"It is important to pay attention to the design and choose a product that is not only suitable for the application but also the most sustainable choice."

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