

Results

Ecological footprint (SPI), CO₂ lifecycle emissions, energy consumption

Ecological footprint – Sustainable Process Index (SPI)

There are several different types of ecological footprints, each taking account of human behaviour to a different extent. *One* of these calculation types represents the so-called Sustainable Process Index (SPI[®]) (Krotscheck und Narodoslowsky, 1995). In this method all material and energy flows required for a product or service, are converted into land areas. This relates in normal cases, to both the production and the use of a product and also comprises the emissions that result. The conversion of these material and energy flows is in accordance with two principles:








1. Anthropogenic material flows must not change the global cycles of matter.

This principle relates first and foremost to the carbon cycle and it means that no more fossil carbons (from coal, oil, natural gas, ...) may be brought into circulation than the oceans can reabsorb and sediment.

2. Anthropogenic material flows must not change the quality of the local environment.

This means that pollutant levels in the ground, air and water must not exceed the absorption capacity of the local environment.

The overall footprint area cumulates from following seven partial areas:

-  Area for area (e.g. land occupation)
-  Area for non-renewable material
-  Area for renewable material
-  Area for fossil carbon
-  Area for emission to water
-  Area for emission to soil
-  Area for emission to air

A higher ecological footprint results in a higher environmental burden!

SPI values were established for all activities in the ELAS calculator which finally accumulate to give an overall footprint for the settlement or household. The basis for these are past SPI values from former projects, or newly generated SPI values using raw data from the ecoInvent database (the Swiss Centre for Life Cycle Inventories).

Further information on the issue of ecological footprint calculation can be found under:

<http://www.fussabdrucksrechner.at>

<http://spionexcel.tugraz.at>

CO₂ lifecycle emissions

The quantity of CO₂ emissions can be calculated from the ecological footprint. By dividing the footprint into 7 categories it is possible to calculate out the CO₂ emissions from the area "land surface required for the absorption of carbon (C)". The use of fossil raw materials is taken into account across the entire production chain for all goods and services. The quantity of carbon is established from the land area. The basis for this is the natural global carbon cycle. Since the natural carbon balance is compensated by biomass (CO₂ emissions from combustion are later bound again by the new development of biomass) the sea bed is the only CO₂ sink. The emission quantity per year can be established based on the sedimentation rate of the sea bed (500 m²/kg*a) (Krotscheck und Narodoslowsky, 1995).

It must always be taken into account here that the CO₂ emissions are always life cycle emissions. This means that while the settlement is the causer of these emissions, these are not to be considered on a local basis, but are relevant in a global perspective.

Energy consumption

The energy consumption is summarised direct from the user entries (kWh electricity and room heat) and output at the end. The mobility area is covered in energy consumption by the use of fuels, which can be converted into kWh on the basis of energy content by quantity (minus efficiency losses).

Reference

Narodoslowsky, M., Krotscheck, Ch., 1995, The sustainable process index (SPI): Evaluating processes according to environmental compatibility, *Journal of Hazardous Materials*, Volume 41, Issue 2-3, 383-397

Imprint

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Legal basis : Universitätsgesetz 2002



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