# Environmental footprint of soy

## Life Cycle Assessment

### How to calculate the environmental footprint of a product?

Life Cycle Assessment (LCA) is a research method to evaluate the environmental impact of a product throughout the entire life cycle. An LCA gives the opportunity to capture the whole life cycle of a certain product and assess all the individual stages, from raw materials, packaging and transport to retail, consumption and waste processing (cradle-to-grave). Multiple environmental impact categories are captured, such as climate change, eutrophication, acidification, water use and land use. An LCA reveals the environmental impacts and where they occur in the life cycle of a product (hot-spots).


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| International standard: ISO 14040 / 14004 | | Reveals environmental hot-spots in product life cycle |
| Multiple environmental impacts | Quantitative measurement | Analysis of whole life cycle |
| Applications: decision making, benchmarking, product development, product improvement, policy making, communication, strategic planning, eco-labelling, CSR and sustainability reporting | | |

## Carbon footprint of soybean

**Soybean is an important source of protein for both feed and food products, and its global demand is rising steadily. It is an efficient crop that needs relatively few inputs as it is able to fix nitrogen from the atmosphere. The expanding area cultivated with soybeans, however, raises environmental concerns, as it is often cultivated in tropical areas where it is a driver of deforestation.**

When forests are cleared to make way for farming, the carbon that was stored in the trees is released into the atmosphere as carbon dioxide. In LCA, such emissions as a result of land use change (LUC) also needs to be accounted for, which is not a straightforward exercise as appropriate data is often lacking. In an ideal situation, information, such as satellite imagery, would be used to establish the exact historic land use of a certain area (over the past 20 years). As such data is often not available, as it is e.g. not known where crops are exactly cultivated, other methods will have to be employed. The PAS 2050, a standard method for calculating a product's carbon footprint, provides guidance on how to do this. Based on country-level statistics on the expansion or regression of cropland and forest area, deforestation is assigned to crops with high relative expansion. The European Commission adopted the PAS 2050-1 LUC-method and made it a requirement for Product Environmental Footprint (PEF) calculations.

Based on this methodology, Blonk Consultants has developed a tool that calculates LUC for each country-crop combination. This LUC is also integrated in Blonk Consultants' Agri-footprint database, the most extensive LCA database on agricultural and food products. The figure on the right shows the carbon footprint of soy of several key soy producing countries, as derived from the Agri-footprint database. It clearly shows that LUC is in many cases responsible for the lion's share of the crop's carbon footprint. This high footprint is also reflected when looking at products in which soy is used.

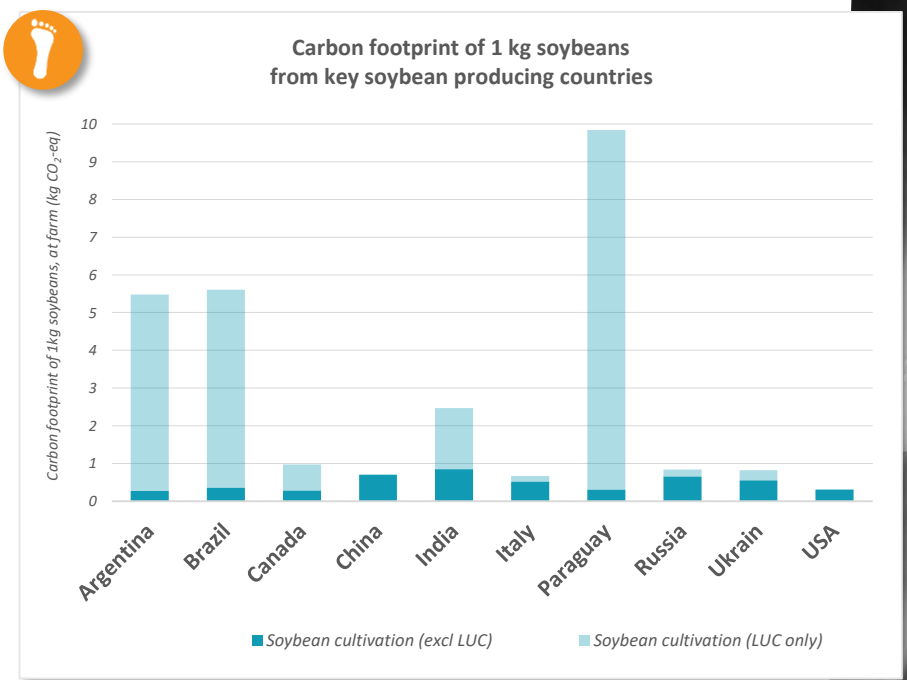


*Figure 1 (source: Agri-footprint 5.0)*

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Figure 3. shows the contribution of soy to the overall footprint of animal products. This concerns soybean meal that is used as animal feed (in this case, the Dutch market mix is used which mainly comprises soy from Brazil and Argentina).

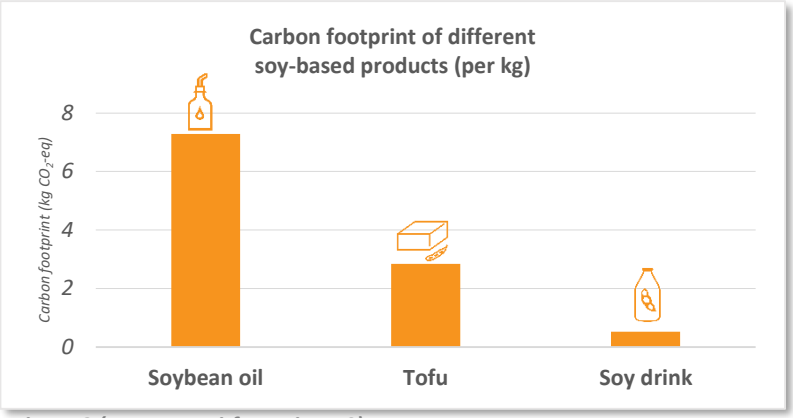


*Figure 2 (source: Agri-footprint 5.0)*

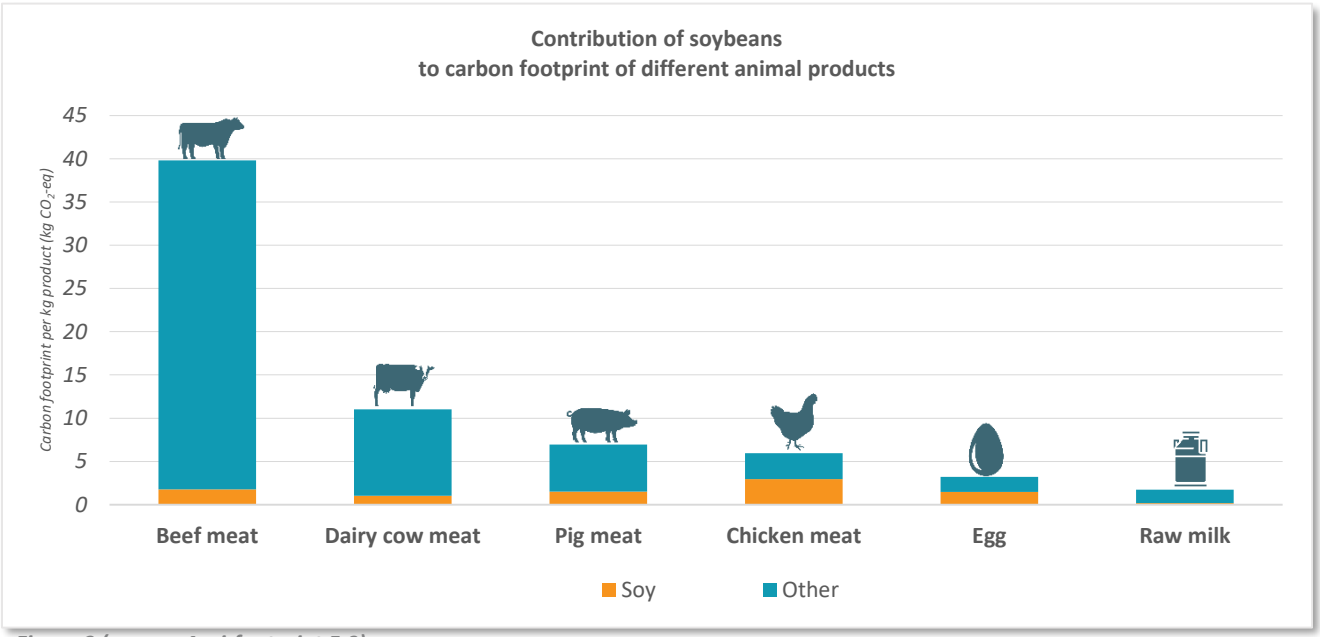


*Figure 3 (source: Agri-footprint 5.0)*

## Some considerations: Strengths & weaknesses of LCA

Even though the carbon footprint (also referred to as climate change or global warming impact) is by far the most well-known impact category, LCA goes much further than that. It includes many other categories that capture important environmental issues, such as water consumption, fine particulate matter formation, acidification or eutrophication. This generates a complete picture of the impact of a product or process on the environment and allows for a balanced comparison of the environmental impact of different products. It is possible to aggregate several of these environmental impact categories (into so-called endpoint categories, such as biodiversity), to get a complete overview of the environmental impact.

However, it should be considered that LCA can only provide an approximation of the environmental impact, and is as good as the data that is entered. Detailed and accurate data will result in most robust impact results, whereas a lack of data necessitates making assumptions (e.g. using background data or estimations), which influences the quality of results.

Despite the many impact categories to choose from in LCA, still not all environmental issues are covered, such as soil degradation. Using few mineral or organic fertilizers would lead to a low footprint, however the resulting depletion of soil nutrients is unaccounted for.

When it comes to soybeans, its cultivation is most efficient in tropical regions. The high carbon footprint associated with soy production in these regions could however lead to expansion of soy cultivation in areas that are less suitable for soy, or to cultivation of alternative crops that are less efficient.



**Blonk Consultants**
info@blonkconsultants.nl | +31 (0) 182 579970
www.blonkconsultants.nl