SUSTAINABLE EUROPE RESEARCH INSTITUTE

Soy granule –how sustainable it really is?

WHY IS SOY A SUSTAINABILITY ISSUE?

On one hand, soy provides a significant contribution to the global food supply as a source of vegetable protein in various forms. On the other hand, the production of raw soybeans is associated with significant economic, ecological and social consequences. Therefore the type of production (organic or conventional farming) and the country of origin of the soybeans have a major influence.

Especially environmental issues-conscious consumers are aware of the consequences of their dietary habits and consciously choose therefore sometimes-vegetarian, vegetarian or vegan diets. For them, soy is a particularly important source of protein. However, persistent doubts about the usefulness of organic soy exist.

WHAT IS THE OUTPUT OF THE CURRENT PROJECT?

In the present project on behalf of the initiative GreenMonday the environmental impacts of soy granule and its raw material - the soybean - were studied. Such solid information offers consumers the critical answers they need.

The life-cycle-wide analysis of soy granules means that all process steps from the cultivation of soy bean to the finished product are analyzed. These were in the case of soy granules the types: organic/conventional and country of origin: Brazil/EU Countries/Austria.

The data for the production of soybean meal, the feedstock for the production of soy granules, were from the LCA database “ecoinvent” and of existing SERI studies that have been modified for the purpose. The data for all subsequent process steps to the finished packaged product were originally collected by the client and made available.

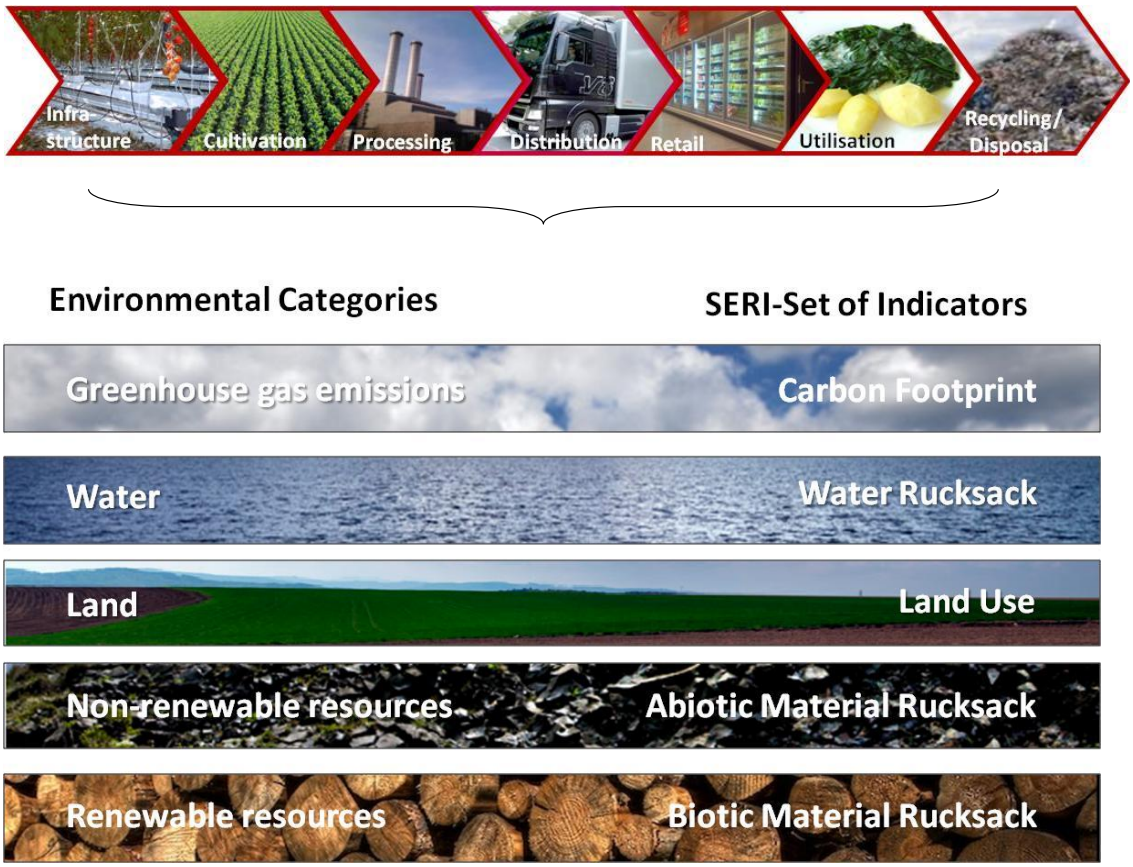
SERI's METHOD OF ENVIRONEMTAL FOOTPRINTING

At the heart of research

In our analysis we consider the entire life cycle of the examination object. The work is based on the methods of Life Cycle Assessment (LCA) and Input-Output Analysis (IOA). Clients can thus benefit directly and immediately from the latest scientific findings. Moreover SERI works closely with European institutions to evolve the environmental standards and guidelines of tomorrow, which allows us, to align our work to the standards of tomorrow.

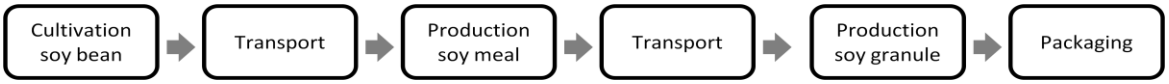
Footprint-Indicator-Set

The main element is the footprint-indicator-set developed by SERI. It consists of the indicators: material-footprint (renewable and non-renewable), land-footprint, water-footprint and carbon-footprint. Furthermore the European Commission sees it as a model for future environmental and resource strategies. The set is feasible, it addresses the environmental impacts and the main environmental categories and the scarcity of resources are taken into account too. In addition, the set is applicable for all opportunities, products and services and accepted socially and academically.



RESULTS

To illustrate the results they were presented in wet mass (1 kg DM = 3 kg WM).
The system boundary includes cradle-to-gate: the cultivation of soybeans, transportation and processing to the finished packaged product soy granule. The climate effects of land use and land use changes (LULUC) were included in the CO_2-footprint.



The following table shows the results for soy granule of the analyzed factory. Other variants were created and analyzed to identify potential improvements and draw comparisons to other products.

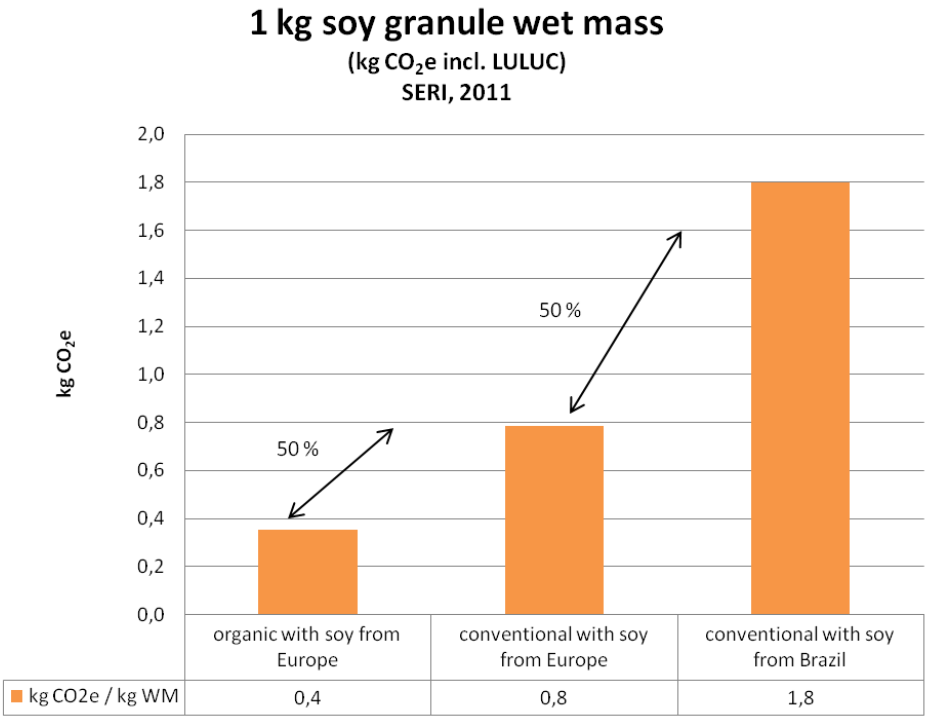
	biotic	**abiotic**	**land**	**water**	**CO_2e**
Result 1kg soy granule wet mass	*kg*	*kg*	*m²a*	*l*	*kg*
conventional soy from Europe	0,27	0,33	1,34	9,38	0,79
conventional soy from Austria	0,27	0,21	1,33	8,78	0,41
conventional soy from Brazil	0,27	0,59	0,73	9,98	1,80
organic soy from Europe	0,26	0,46	0,59	6,17	0,35
organic soy from Austria and processing with clean power	0,26	0,40	0,59	2,56	0,26

For the core finding of our study "conventional soy granule with soy from Europe" the source material for the production of soy granule was conventional soybean meal from Europe. The **hot spots** (the biggest environmental impact) of the analyzed soy granule production are:

- the raw material soybean meal
- the transport of the soybean meal to the production plant
- the power consumption in the production plant

Due to the fact, that the power consumption in the production of soy granule accounts for approximately 20% of the abiotic material consumption, 38% of the water-rucksack and 12% of the CO_2-footprint, switching to green electricity is advisable to reduce the environmental impacts in all categories.

The following figure compares the greenhouse gas emissions associated with the production of one kilogram soy granule made out of conventional Brazilian soy, conventional European soy and organic soy from Austria. It is obvious that the greenhouse gas emissions are reduced by 50% with each different production step. This is a great opportunity to reduce the climate impact of the product.


1 kg soy granule wet mass
(kg CO_2e incl. LULUC)
SERI, 2011
kg CO_2e
2,0
1,8
1,6
1,4
1,2
1,0
0,8
0,6
0,4
0,2
0,0
50 %
50 %
organic with soy from Europe
conventional with soy from Europe
conventional with soy from Brazil
kg CO2e / kg WM
0,4
0,8
1,8

APPENDIX

The result refers to the functional unit of 1kg dry soy granule.

Result 1kg soy granule dry mass	**biotic** *kg*	**abiotic** *kg*	**land** *m²a*	**water** *l*	**CO_2e** *kg*
conventional soy from Europe	0,81	0,98	4,01	28,15	2,36
conventional soy from Austria	0,81	0,62	4,00	26,34	1,23
conventional soy from Brazil	0,81	1,76	2,18	29,94	5,40
organic soy from Europe	0,78	1,39	1,77	18,50	1,06
organic soy from Austria and processing with clean power	0,79	1,19	1,77	7,68	0,77

In **Comparison 1**, the origin of soy was varied which has, due to the large differences in the LULUC of the countries, a significant impact on the overall result, especially on greenhouse gas emissions.

Comparison 1: 1 kg soy granule dry mass	**biotic** *kg*	**abiotic** *kg*	**land** *m²a*	**water** *l*	**CO_2e** *kg*
conventional soy from Brazil	0,81	1,76	2,18	29,94	5,40
conventional soy from Europe	0,81	0,98	4,01	28,15	2,36
Savings when changing per kg product	0,00	0,78	-1,83	1,79	3,04

The CO_2 footprint of conventional soy granule from Brazilian soybeans is two times higher than the one of conventional soy granule from European soy. This is justified by the LULUC in Brazil (deforestation). Greenhouse gas emissions, water and non-renewable resources can be saved, but the land use increases.

Comparison 2: 1 kg soy granule dry mass	**biotic** *kg*	**abiotic** *kg*	**land** *m²a*	**water** *l*	**CO_2e** *kg*
conventional soy from Europe	0,81	0,98	4,01	28,15	2,36
organic soy from Austria and processing with clean power	0,79	1,19	1,77	7,68	0,77
Savings when changing per kg product	0,02	-0,21	2,23	20,47	1,59

In **Comparison 2**, the cultivation method of soy was varied. If the soy granule is produced from European soy from certified organic cultivation, this means a reduction of the greenhouse gas emissions by 50%. Even if due to higher equipment expenses in organic farming a higher abiotic rucksack is caused.