CARBON FOOTPRINT CALCULATION
SELKO SR70
NOREL SA

Sergio Merinero Martin

NUVET AGRISERVICES S.L.U.

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CALCULATION OF THE CARBON FOOTPRINT OF THE PRODUCT SELKO SR70

1. CARBON FOOTPRINT OF THE PRODUCT — DETERMINATIONS

The carbon footprint is an environmental indicator that quantifies the total amount of greenhouse gases (GHGs) emitted directly or indirectly by a person, company, product, event, or organization. It is calculated using greenhouse gas (GHG) emissions generated throughout the entire life cycle within the scope defined in the study (e.g., cradle-to-gate, cradle-to-grave, etc.).

These emissions include both direct emissions from the process and indirect emissions associated with the production of inputs. The carbon footprint assessment covers **270 GHGs**, categorized as halogenated compounds, HFCs, PFCs, CFCs, HCFCs, halons, and others such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Results are reported as a single consolidated figure expressed in **mass of carbon dioxide equivalent (CO_2e)**.

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2. DECLARED UNIT

In general, the declared unit of a life cycle assessment is the functional reference—the element (product or service) on which the study is based and for which carbon footprint results are reported. In this study, the declared unit used for the LCA is:

1 kg of SELKO SR70 manufactured by Norel SA and delivered at the factory gate, once packaged and palletized.

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3. PRODUCT LIFE CYCLE

This study was conducted by assessing the cradle-to-gate life cycle of the SELKO SR70 product.

The life cycle considered includes the production phase and upstream raw material use, up to the packaging stage of the product, prepared for shipment to the customer.

The product is manufactured at the NOREL plant in Valls. This facility operates seven production lines, including the encapsulation line (internally designated as Line 7), which produces the product under study (SELKO SR70).

3.1. COMPANY DESCRIPTION

NOREL SA is a Spanish company founded in 1980 that specializes in the development, manufacturing, and marketing of additives and ingredients for animal nutrition. Its headquarters are located in Madrid, Spain.

- **Global presence:** Operates in more than 70 countries and has more than 250 employees worldwide.
- **Production plants:** Maintains 5 production centers located in Spain, Mexico, Egypt, and the United States.
- **Sector and activity:** Classified within the manufacturing industry sector, specifically the manufacture of products for feeding farm animals (CNAE 1091).

Products and specialization

The company develops nutritional solutions designed to improve nutrient absorption and animal performance:

- **Bypass Fats:** Global leaders in protected fats for ruminants.
- **Physiological Additives:** Probiotics, organic acids, and non-medicated growth promoters.
- **Organic Minerals:** Production of methionates and fat concentrates by spraying.
- **Animal Health:** Natural alternatives to reduce the use of antibiotics in livestock production.

Strategic commitment (ESG)

- **Alignment with SDGs:** Norel declares its commitment to the 17 United Nations Sustainable Development Goals, prioritizing those related to responsible production and climate action.
- **Equality and governance:** Norel has a Gender Equality plan and collaborates with NGOs; although these initiatives are social in nature, they are typically integrated into comprehensive sustainability reporting frameworks (ESG).

3.2. METHODOLOGY AND APPLICABLE STANDARDS — CALCULATION SOFTWARE

The methodology applied in this project to calculate the carbon footprint of SELKO SR70 is **ISO 14067**.

The carbon footprint quantification of the feed additive evaluated in this report has been structured in accordance with the methodological requirements of the international standard **UNE-EN ISO 14067:2019**. This standard establishes the principles, requirements, and guidance for quantifying and reporting a **Product**

Carbon Footprint (PCF), ensuring a scientifically robust baseline derived from **Life Cycle Assessment (LCA)** standards **ISO 14040** and **ISO 14044**.

Under this regulatory framework, the study applies a "**cradle-to-gate**" scope, defining the system boundary from the extraction and synthesis of raw chemical or biological ingredients and their subsequent transport, up to the thermal processing, blending, and/or reaction processes carried out at the manufacturing facility. The life cycle also includes product packaging and preparation for final use. Consequently, downstream stages such as commercial distribution, feed compounding, and animal metabolism are appropriately excluded from this boundary.

For the selection of the **PCR (Product Category Rules)**, the study follows **P-2250 — Additives and Feed compounds** from the **Instituto de Huella Ambiental**.

In compliance with the standard's most stringent specifications for the agri-food sector, rigorous criteria have been applied to allocation procedures for co-products and to the specific treatment of biogenic carbon. Furthermore, potential impacts associated with direct and indirect land use change (dLUC/iLUC) related to plant-based ingredients—where applicable—have been accounted for, ensuring that the GHG inventory minimizes uncertainty and eliminates bias. Accordingly, the results reflect the actual climate impact of the additive up to the point of dispatch, with the highest level of consistency, transparency, and reproducibility. This provides a high-confidence environmental indicator that downstream customers and feed manufacturers can readily integrate into their own life cycle assessments, thereby facilitating the decarbonization of the animal nutrition supply chain and supporting compliance with third-party verification audits.

Given the complexity of the analysis methodology, the model used in the study, and the multiple inputs and outputs, a robust software tool is necessary to perform the calculations, allowing all data to be handled accurately, efficiently, and reliably. In this project, **Air.E.LCA** software from **Solid Forest** (**www.solidforest.com**) was used. The software version applied was **V3.22**.

3.3. LIFE CYCLE PHASES

The calculation approach applied for determining the carbon footprint has been to assess the system **FROM CRADLE TO GATE**. This means accounting for emissions associated with inputs and raw materials along the supply chain, up to the point where the products are ready to leave the factory—packaged and prepared for transport to the final customer.

a) Upstream processes:

- **Purchase of raw materials** (butyric acid, bags for packaging, stearines, and sodium hydroxide) for the Cañete plant.
- **Transport of raw materials** from the port of Valencia to Cañete, and also the tansport of bags from supplier.

b) Main processes:

- **Encapsulation of sodium butyrate** (SELKO SR70).
- **Packaging of SELKO SR70**.
- **Waste generated in the production process** (packaging).

c) Downstream processes:

Downstream processes are **not considered**, as the study boundary is limited to the **factory gate**. The process ends at our own facilities, with the product ready to be transported and marketed.

d) Losses

Losses are considered at **5%** as a result of continuous process operations. This accounts for the difference between the total amount of raw materials purchased and the amount effectively converted into the encapsulated product.

Therefore, the following elements have been taken into account for the determination of the environmental footprint:

- **Energy use**
- Electricity
- Fuel consumption
- **Integrated emissions in the production of imported/purchased inputs**
- Raw materials required for the production process
- Transport to the different plants (see both production stages)
- Required packaging material
- **Allocation of emissions related to waste materials**
- Packaging according to waste collection declarations
- Wooden waste

To calculate the GHG emissions associated with **fuel**, **raw materials**, **product transport**, and the **collection and disposal/destruction of waste** (packaging and wood material), the study used the **Ecoinvent 3.11 emission factors**.
For the calculation of **purchased electricity consumption** associated with the production process, as well as for the **transport-related activities** required in both plants, **OECD 2025 emission factors** and the **Ecoinvent dataset** were used.

4. LIFE CYCLE ASSESSMENT

The production cycle takes place **100%** at the **Cañete** plant.
Mass allocation was selected because all product lines are comparable; i.e., there are no specific lines with distinct requirements in terms of inputs or waste.
This mass allocation approach is applied consistently for the following impact categories:

- Electricity consumption.
- Paper utilization.
- Paper waste.
- Water waste.

At the same factory (**Cañete**), the plant produced **3,494,880 kg** of products, of which **286,000 kg** correspond to **SELKO SR70**. Therefore, an allocation factor of:

- **286,000 / 3,494,880 = 0.082**

is applied to the total **electricity** and **fossil fuel** consumption.

Electricity consumption

The total line consumed **549,665 kWh**. Of this, **45,072 kWh** were allocated to **Selko SR70**.

Fossil fuel consumption

There is **no fuel consumption** reported for the **Cañete** plant.
The same allocation approach is applied to determine the amounts of residues:

- **Paper residues (Cañete):** **12,430 kg** of paper waste for the whole plant.

Therefore, **1,019 kg** are allocated to paper residues (Cañete).

- **Water residues (Cañete):** **264,500 kg** of water residues for the whole plant.

Therefore, **21,689 kg** are allocated to water residues.

4.1 EXCLUSIONS TO THE CALCULATION

Due to the small quantity of **wooden residues** generated in both plants, it was decided to exclude them from the calculation.

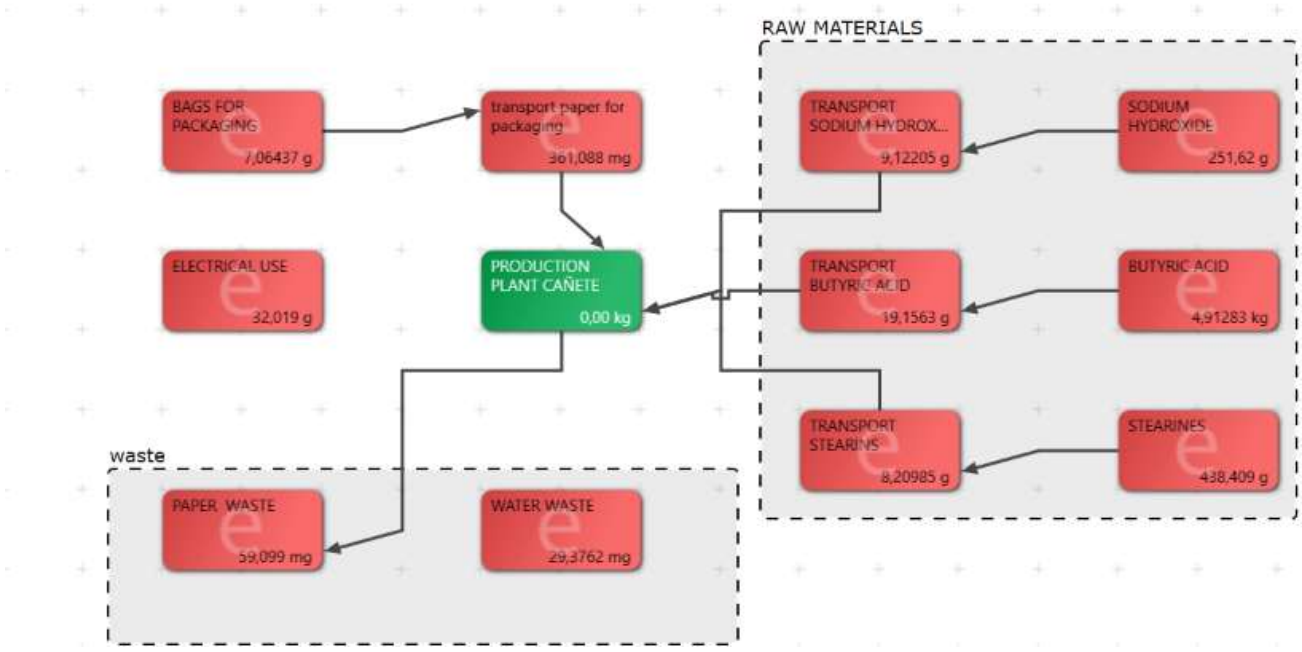
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5. OPERATIONAL LIMIT

The operational boundary of the analyzed life cycle follows a **cradle-to-gate** approach. This means that all materials, processes, and any other elements required for the production and packaging of the **SELKO SR70** product are included within the LCA.

The time boundary of the data used in this study is **2025**; therefore, all data included correspond to this period

5.1. EMISSIONS INVENTORY



Impact	kg CO2 eq	DQR
BUTYRIC ACID	4,913	3,1
ELECTRICAL USE	0,032	2,9
BAGS FOR PACKAGING	0,007	2,6
SODIUM HYDROXIDE	0,252	3,8
STEARINES	0,438	2,8
transport paper for packaging	0,000	3,5
TRANSPORT BUTYRIC ACID	0,019	3,5
TRANSPORT SODIUM HYDROXIDE	0,009	3,5
TRANSPORT STEARINS	0,008	3,5
PAPER WASTE	0,000	3,0
WATER WASTE	0,000	3,5
	5,679	**3,2**

In total, the calculated carbon footprint data is 5,679 kg of CO2 equivalent per kg of SELKO SR70

UPSTREAM PROCCESSES AND TYPE OF EMISSIONS

IMPACT		kg CO2 eq
BAGS FOR PACKAGING	GWP100 fossil	6,94E-03
BAGS FOR PACKAGING	GWP100 air emissions	0,00E+00
BAGS FOR PACKAGING	GWP100 absortions	-2,12E-07
BAGS FOR PACKAGING	GWP100 biogenics	4,19E-05
BAGS FOR PACKAGING	GWP100 land use	8,49E-05
BAGS FOR PACKAGING	GWP100 TOTAL	7,06E-03
BUTYRIC ACID	GWP100 fossil	4,91E+00
BUTYRIC ACID	GWP100 air emissions	0,00E+00
BUTYRIC ACID	GWP100 absortions	-4,45E-05
BUTYRIC ACID	GWP100 biogenics	1,90E-03
BUTYRIC ACID	GWP100 land use	2,15E-03
BUTYRIC ACID	GWP100 TOTAL	4,91E+00
SODIUM HYDROXIDE	GWP100 fossil	2,51E-01
SODIUM HYDROXIDE	GWP100 air emissions	0,00E+00
SODIUM HYDROXIDE	GWP100 absortions	-2,68E-06
SODIUM HYDROXIDE	GWP100 biogenics	6,19E-04
SODIUM HYDROXIDE	GWP100 land use	4,17E-04
SODIUM HYDROXIDE	GWP100 TOTAL	2,52E-01
STEARINES	GWP100 fossil	2,73E-01
STEARINES	GWP100 air emissions	0,00E+00
STEARINES	GWP100 absortions	-6,74E-06
STEARINES	GWP100 biogenics	6,94E-02
STEARINES	GWP100 land use	9,59E-02
STEARINES	GWP100 TOTAL	4,38E-01
TRANSPORT BUTYRIC ACID	GWP100 fossil	1,91E-02
TRANSPORT BUTYRIC ACID	GWP100 air emissions	0,00E+00
TRANSPORT BUTYRIC ACID	GWP100 absortions	-7,94E-08
TRANSPORT BUTYRIC ACID	GWP100 biogenics	6,07E-06
TRANSPORT BUTYRIC ACID	GWP100 land use	6,12E-06
TRANSPORT BUTYRIC ACID	GWP100 TOTAL	1,92E-02
TRANSPORT PAPER FOR PACKAGING	GWP100 fossil	3,61E-04
TRANSPORT PAPER FOR PACKAGING	GWP100 air emissions	0,00E+00
TRANSPORT PAPER FOR PACKAGING	GWP100 absortions	-1,48E-09
TRANSPORT PAPER FOR PACKAGING	GWP100 biogenics	1,13E-07
TRANSPORT PAPER FOR PACKAGING	GWP100 land use	1,14E-07
TRANSPORT PAPER FOR PACKAGING	GWP100 TOTAL	3,61E-04
TRANSPORT SODIUM HYDROXIDE	GWP100 fossil	9,12E-03
TRANSPORT SODIUM HYDROXIDE	GWP100 air emissions	0,00E+00
TRANSPORT SODIUM HYDROXIDE	GWP100 absortions	-3,78E-08
TRANSPORT SODIUM HYDROXIDE	GWP100 biogenics	2,89E-06
TRANSPORT SODIUM HYDROXIDE	GWP100 land use	2,91E-06
TRANSPORT SODIUM HYDROXIDE	GWP100 TOTAL	9,12E-03
TRANSPORT STEARINS	GWP100 fossil	8,20E-03
TRANSPORT STEARINS	GWP100 air emissions	0,00E+00
TRANSPORT STEARINS	GWP100 absortions	-3,40E-08
TRANSPORT STEARINS	GWP100 biogenics	2,60E-06
TRANSPORT STEARINS	GWP100 land use	2,62E-06
TRANSPORT STEARINS	GWP100 TOTAL	8,21E-03

TOTAL UPSTREAM PROCCESSES

GWP100 fossil	5,48E+00
GWP100 air emissions	0,00E+00
GWP100 absortions	-5,43E-05
GWP100 biogenics	7,20E-02
GWP100 land use	9,86E-02
GWP100 TOTAL	5,65E+00

CORE PROCCESSES AND TYPE OF EMISSIONS

Impact	Categoría	kg CO2 eq
ELECTRICAL USE	GWP100 fossil	3,15E-02
ELECTRICAL USE	GWP100 air emmisions	0,00E+00
ELECTRICAL USE	GWP100 absortions	-5,34E-08
ELECTRICAL USE	GWP100 biogenics	7,62E-05
ELECTRICAL USE	GWP100 land use	4,32E-04
ELECTRICAL USE	GWP100 TOTAL	3,20E-02
PAPER WASTE	GWP100 fossil	5,91E-05
PAPER WASTE	GWP100 air emmisions	0,00E+00
PAPER WASTE	GWP100 absortions	-1,91E-10
PAPER WASTE	GWP100 biogenics	1,18E-08
PAPER WASTE	GWP100 land use	2,05E-08
PAPER WASTE	GWP100 TOTAL	5,91E-05
WATER WASTE	GWP100 fossil	2,53E-05
WATER WASTE	GWP100 air emmisions	0,00E+00
WATER WASTE	GWP100 absortions	-3,28E-10
WATER WASTE	GWP100 biogenics	4,03E-06
WATER WASTE	GWP100 land use	3,42E-08
WATER WASTE	GWP100 TOTAL	2,94E-05

TOTAL CORE EMISSIONS

	kg CO2 eq
GWP100 fossil	3,16E-02
GWP100 air emmisions	0,00E+00
GWP100 absortions	-5,39E-08
GWP100 biogenics	8,02E-05
GWP100 land use	4,32E-04
GWP100 TOTAL	3,21E-02

	UPSTREAM	CORE	TOTAL
GWP100 fossil	5,48E+00	3,16E-02	5,51E+00
GWP100 air emmisions	0,00E+00	0,00E+00	0,00E+00
GWP100 absortions	-5,43E-05	-5,39E-08	-5,44E-05
GWP100 biogenics	7,20E-02	8,02E-05	7,21E-02
GWP100 land use	9,86E-02	4,32E-04	9,90E-02
GWP100 TOTAL	5,65E+00	3,21E-02	5,68E+00

Downstream processes are **not considered**, as the study boundary is limited to the **factory gate**.

6. RESULTS AND VERIFICATION

These results have been reviewed and independently verified by the Environmental Footprint Institute and certified in November 2026 based on records provided by NOREL and the study conducted by NUVET AGRISERVICES, S.L.U. The certification was issued under reference number 261004PCD CRP-2250.