Greenhouse Gas Emissions Inventory 2023

Salmones Camanchaca S.A

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Content

1. Executive Summary

The total GHG emissions inventory for the year 2023, according to the GHG Protocol, was 244,827 tCO2e across its 3 scopes—considering the market-based emissions criterion in Scope 2—which are distributed as follows: 23,685 tCO2e (4.45%) for Scope 1, while Scope 2 resulted in 1,037 tCO2e (0.42%), and finally Scope 3, whose carbon footprint amounts to 220,105 tCO2e (89.90%). The most relevant impact category is related to the purchase of salmon feed, which generates 135,166 tCO2e (55.21%), followed by the GHG emissions associated with the sale of the product "on the way to the customer," whose activities generate 56,079 tCO2e (22.91%).

Comparing the results with the year 2021, it is identified that although there was an 18.10% increase in total emissions, when analyzed with the level of production per tWFE, the emissions intensity is reduced by 7.90%, decreasing from 4.79 tCO2e/tWFE in 2021 to 4.41 tCO2e/tWFE in 2023.

While comparing the results with the year 2022, it is identified that there was an 18.00% increase in total emissions, and similarly, an increase in the production indicator per tWFE is identified, increasing by 3.32%, from 4.27 tCO2e/tWFE in 2022 to 4.41 tCO2e/tWFE in 2023.

2. Introduction

Imagine a world where products and services not only alleviate the guilt of environmentally conscious consumers but also curb climate change. This is not a distant utopia. Regenerative methods that conserve and rehabilitate our planet are taking root worldwide, and forward-thinking brands are joining the movement. Welcome to the era of the regenerative economy, where consumerism goes hand in hand with climate activism and planet care.

While sustainability has often been about limiting harm to our planet, consumers are eager to use their purchasing power in efforts that can genuinely repair and restore. In the regenerative economy, a piece of clothing can become evidence of cleaning plastics from the oceans, and a juice bottle can directly contribute to greening the desert. This new way of doing business will allow consumers to rehabilitate the planet, one purchase at a time, and purpose-driven brands can lead the way.

3. Carbon Footprint

The carbon footprint is an environmental indicator that measures the impact an activity or process has on climate change. It serves as an estimation tool for GHG emissions and is based on internationally recognized methodologies, acting as a global standard for carbon footprint studies.

This indicator demonstrates environmental commitment through the quantification and reduction of emissions by means of energy efficiency measures and the reduction of fossil fuel consumption, among other initiatives aimed at increasing process efficiency.

To estimate the carbon footprint of a company, it is necessary to define the operational boundaries, distinguishing three types of scopes based on the type of emissions.

- **Scope 1 (mandatory)**

These are direct emissions resulting from the company's own control activities. Sources include heat, electricity, or steam generated by boilers located on company premises, as well as chemicals and materials resulting from production processes, emissions from company vehicles, and hydro chlorofluorocarbon (HCFC) emissions from refrigeration and air conditioning equipment. Two types of emissions are identified: fuel and refrigerant use emissions.

Fuel Emissions

This includes fuel acquired by the organization, used in equipment and vehicles, as well as gas burned on-site.

Fuel Emissions = Fuel Quantity (Lt, Kg) × Emission Factor (Kg CO2e / Lt, Kg)

Refrigerant Use Emissions

These are emissions derived from the use of refrigerant gases for industrial refrigeration equipment or air conditioning in offices or stores.

Refrigerant Emissions = Refrigerant Quantity (Kg) × Emission Factor (Kg CO2e/ Kg)

- **Scope 2 (mandatory)**

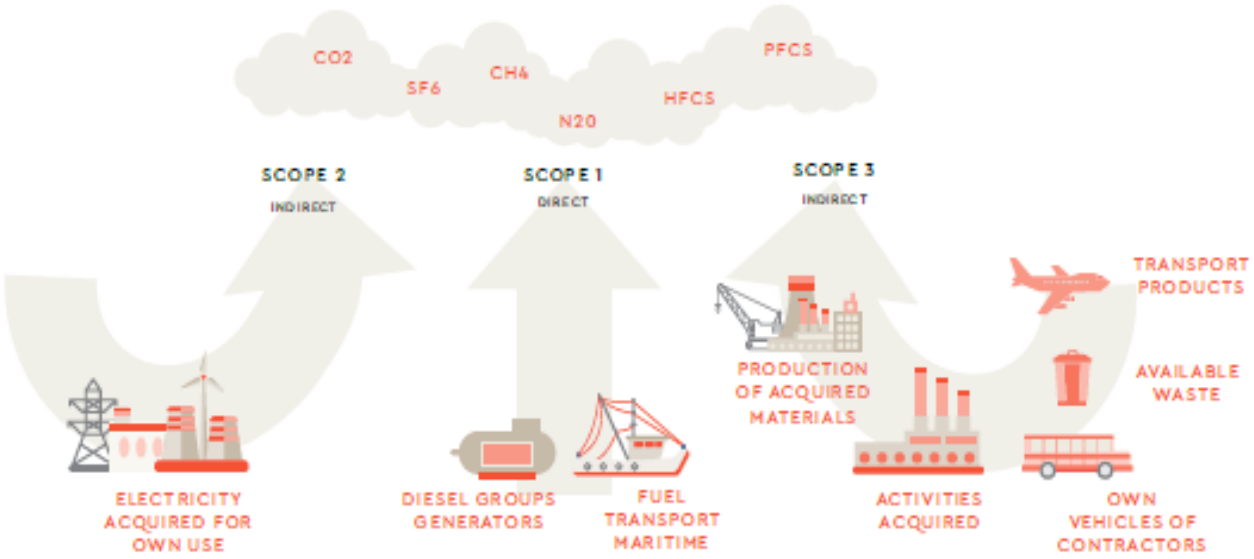
These are indirect emissions generated by the use of electricity, heat, or steam from external sources consumed by the organization. This scope includes emissions from the generation of consumed and purchased electricity. The emissions in this scope occur physically at the plant where electricity is generated.

Electricity Emissions = Electricity Consumption (Kwh) × Emission Factor (Kg CO2e/ Kwh)

- **Scope 3 (optional)**

These are emissions that are a consequence of the organization's activities but originate from sources not owned or controlled by the organization. Examples include emissions from waste disposal, employee commuting, business travel, transportation of raw materials and products, among others.

GHG Emissions = Activity Data × Emission Factor



3.1 Greenhouse Gas Protocol

The Greenhouse Gas Protocol is a guide detailing the methodology for measuring and reporting GHG emissions and removals, as well as providing information on their validation and verification. This protocol has become a widely used tool for estimating the carbon footprint, backed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD).

The objective of this protocol is for its standards to serve as reliable parameters for measuring GHG emissions across all sectors, standardizing the methodology and allowing for comparability between companies. In this way, companies using the documents can identify critical points in their operations and work to reduce their impact.

The protocol includes two standards: the GHG Protocol Corporate Accounting and Reporting Standard and the GHG Protocol Project Quantification Standard. The first provides a detailed guide for companies interested in quantifying and reporting their GHG emissions, while the second is a guide for quantifying GHG emission reductions from specific projects.

This study is conducted in compliance with the GHG Protocol Corporate Accounting and Reporting Standard.

3.2 Definition of the Study's Objective and Boundaries

3.2.1 Objective

-To conduct the Carbon Footprint emissions inventory based on the scopes proposed by the GHG Protocol, generate results, and provide proposals for continuous improvement.

- Additionally, to compare the results with previous years.

3.2.2 Temporal Scope

The measurement period is from January 2023 to December 2023.

3.2.3 Organizational Boundaries

The study measured the emissions from Hatcheries in Biobio Region and Los Lagos region, processing plants in Tomé, Calbuco, and Grow-out farms located from the Los Lagos region to the Aysén region.

3.2.4 Operational Boundaries

This study considers scopes 1, 2, and 3, as described in Table 1, under operational control.

Table 1: Operational Boundaries of the Study by Production Area

Scope	Description	Detail
Scope 1	Direct emissions	Emissions generated by reactions inherent to the operation, in this case, **fuels and refrigerant refills**
Scope 2	Indirect emissions	Emissions produced by the generation, distribution, and consumption of **electrical energy**
Scope 3	Indirect emissions	Emissions generated by complementary activities to the operation that add value but are outside the company's direct control, including: logistics, packaging, waste management, corporate travel and material usage

3.2.5 Greenhouse Gases Considered

The gases considered in the standards are the same as those listed by the Kyoto Protocol and include:

- Carbon dioxide (CO2)
- Methane (CH4)
- Nitrous oxide (N2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur hexafluoride (SF6)

These emissions are quantified through a GHG inventory and expressed by international convention in metric tons of CO2 equivalents (tCO2e).

3.2.6 Data Collection

The information used in this study comes directly from Salmones Camanchaca. To obtain it, the company was provided with a questionnaire in Excel format, where they had to report information on fuel and electricity consumption, organized on a monthly basis and with details on types and uses. Additionally, information was requested on logistics, material usage, waste management, and corporate travel.

The emission factors used come from the 2023 Department for Environment, Food & Rural Affairs (DEFRA) of the United Kingdom and the Ministry of Energy of Chile for the National Electric System (SEN) and Aysén Electric System (SEA), in their most updated versions, as well as emission factors provided by feed suppliers. Finally, the emission factor for hydroelectric power supplying the Río Petrohué Fish Farm was extracted from the Ecoinvent 3.8 database.

4. Results

4.1 General Results

The Greenhouse Gas (GHG) inventory for the year 2023 yielded a total of 244,827 tCO2e, considering the three scopes for market-based emissions. On the other hand, when quantifying location-based emissions, the result amounts to 249,103 tCO2e.

Table 2. GHG Emissions by Scope

Scope	Market-based GHG Emissions [tCO2e]	Location-based GHG Emissions [tCO2e]
Scope 1	23,685	23,685
Scope 2	1,037	5,023
Scope 3	220,105	220,396
Total	**244,827**	**249,103**

From this point forward, only market-based emissions will be considered.

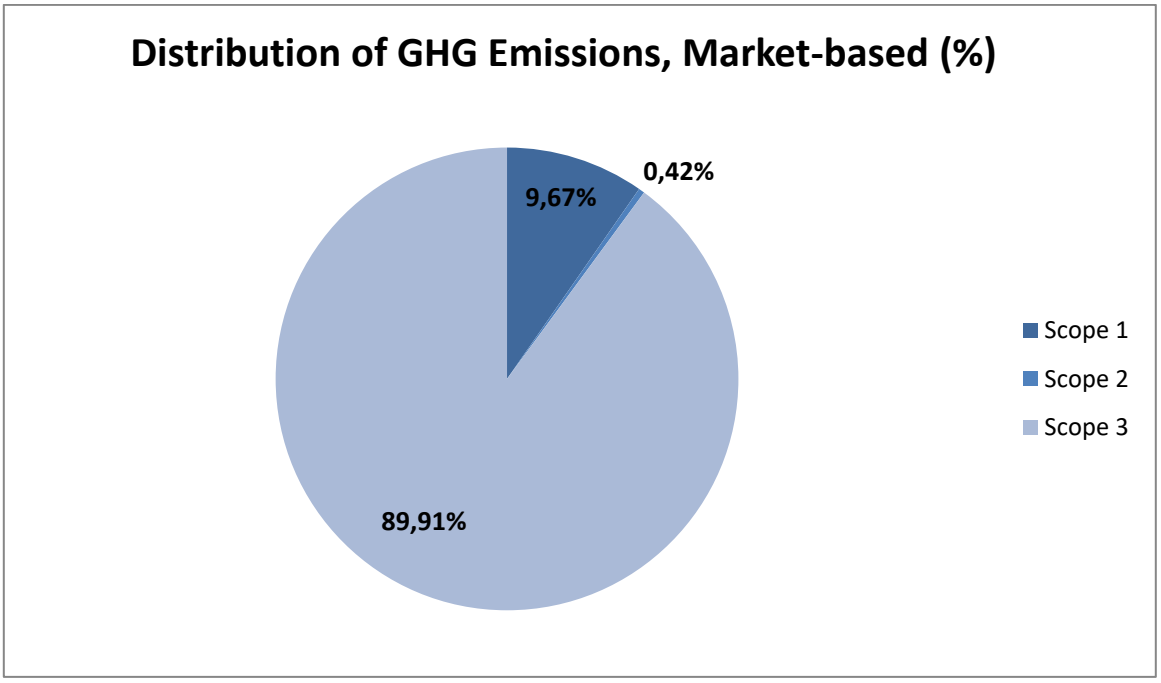


Figure 2. Percentage Distribution of GHG Emissions by Scope

4.2 Scope 1.

This section includes all emissions produced by the use of fuels and refrigerant refills. This scope represents 9.67% of total emissions.

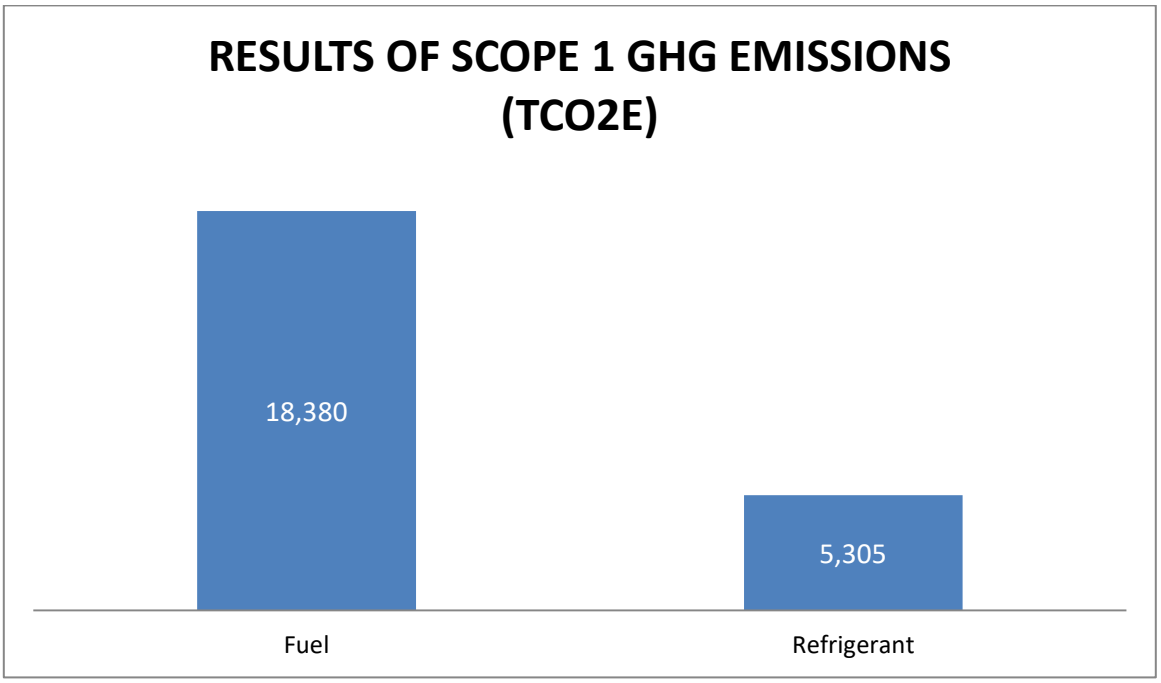
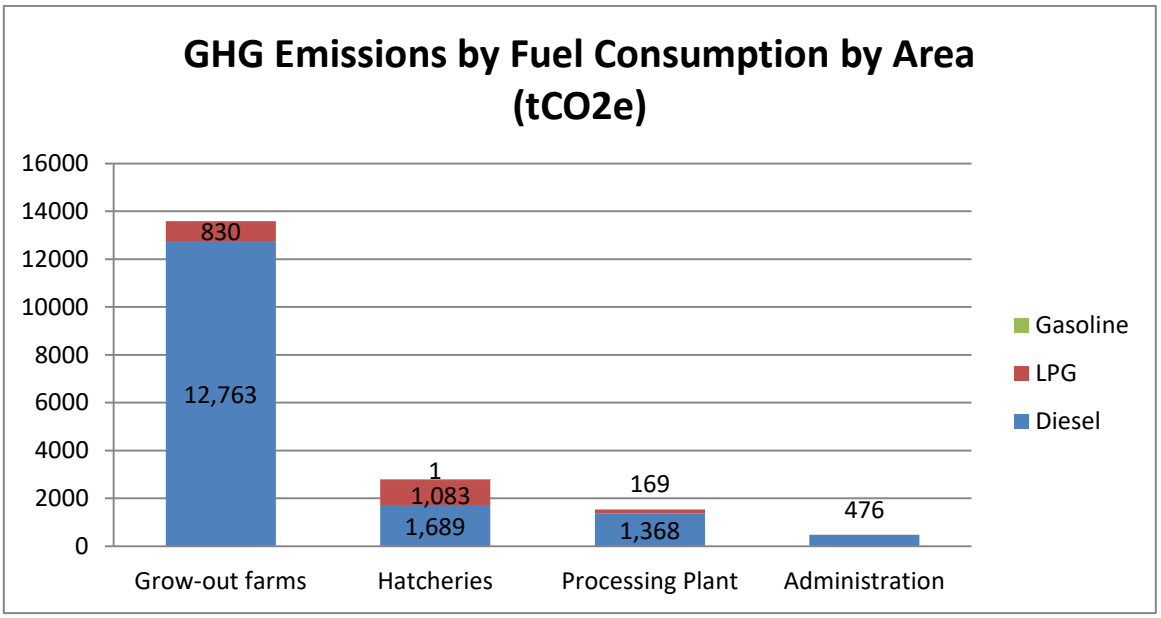


Figure 3. Scope 1 emissions by type of emission sources.

Fuel consumption between stationary and mobile sources represents 77.60% of Scope 1 GHG emissions.



73.96% of greenhouse gas emissions from fuel consumption come from the Grow-out farms, mainly from the consumption of 5,159,165 liters of diesel in various activities. As part of Salmones Camanchaca's corporate emissions reduction strategy, in 2023 the Río Petrohué Hatchery, which was previously supplied with diesel for operation of the facility with a generator, was supplied with electricity directly from a hydroelectricity provider. This measure reduced the use of diesel from 2,790,239 liters in 2022 to 516,500 liters in 2023, with a downward trend in this consumption as the connection to "Hidro Elena" stabilizes. Due to this difference in diesel consumption between one year and another, around 6,255 tCO2e of emissions have been avoided.

Simultaneously, Salmones Camanchaca, under Law 21.305 on energy efficiency, implemented an Energy Management System based on the international standard ISO 50,001, which has allowed it to identify its uses, consumption, and energy efficiency, as well as to establish plans, objectives, and measured goals that will enable it to manage its costs and consumption while reducing emissions and becoming more competitive.

It is suggested to expand the SGEn with a corporate focus, applicable to all facilities.

Refrigerant	Annual Consumption (Kg)		GHG Emission (tCO2e)	
	Cold Storage	Processing Plant	Cold Storage	Processing Plant
Ammonia		5.830		-
R507		226		901
R22	1.550	952	2.729	1.676
Grand Total	**1.550**	**7.008**	**2.729**	**2.576**

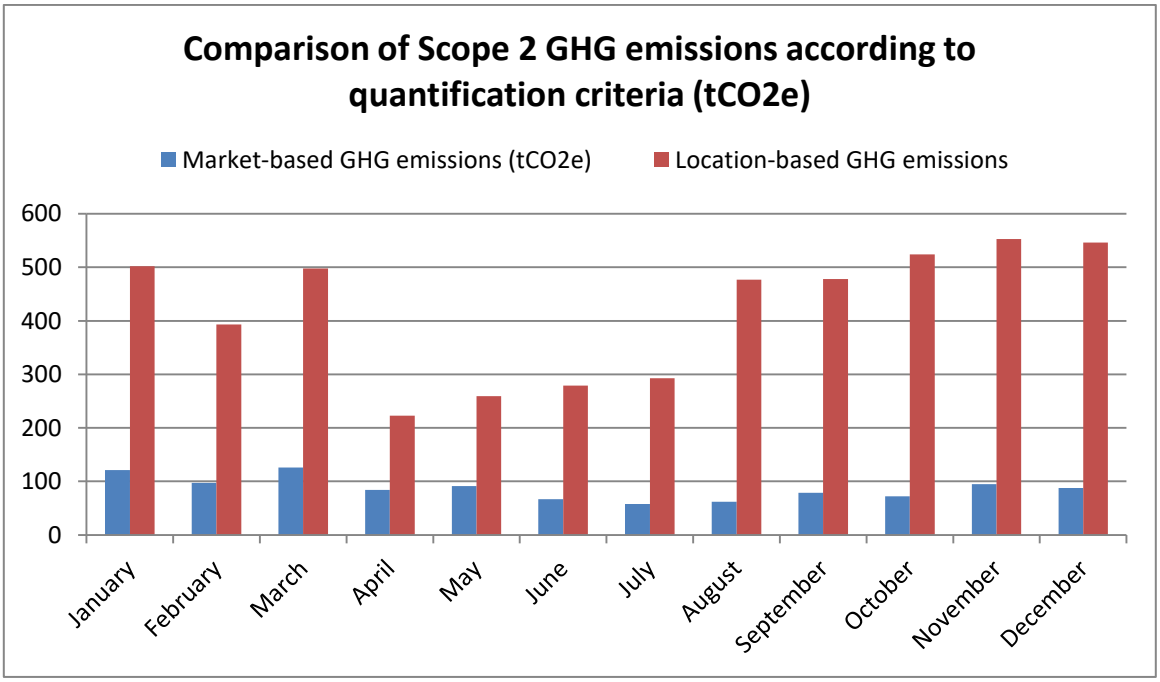
The total of 5,830 kilograms of Ammonia recharged in Process Plants in 2023 did not generate GHG emissions, while the use of R507 and R22 generated a carbon footprint equivalent to 5,305 tCO2e. Transitioning to ammonia-based refrigeration systems could potentially reduce emissions associated with this item by up to 5,305 tCO2e. This point is relevant in the context of the Kigali Amendment, which will limit the availability of HFC and HCFC refrigerant gases due to their impact on the ozone layer and associated GHG emissions. It is key to define a timeline for the transition to ammonia-based refrigeration systems, as this measure has the potential to reduce total emissions by 2.17%.

4.3 Scope 2

Scope 2 emissions are considered indirect as they gather emissions caused by the generation, distribution, and consumption of electrical energy, and therefore vary with each electrical system. In the Chilean case, they are updated annually due to the evolution of the national energy matrix. This scope represents 0.42% of Salmones Camanchaca's emissions.

Table 3. Electric consumption and Scope 2 GHG emissions

	Consumption [kWh]	Emissions [tCO_2e]
January	2,293,872	121
February	2,346,523	97
March	2,352,303	126
April	1,559,732	84
May	1,739,642	91
June	1,818,096	67
July	2,245,490	58
August	2,823,918	62
September	2,465,287	78
October	2,660,961	72
November	2,684,570	94
December	2,726,027	88
Total	**27,716,422**	**1,037**



Unlike the previous year, in 2023, the Río Petrohué Hatchery started operating with electricity supplied by a provider using hydroelectric technology. This has allowed the facility's energy consumption to be met, reducing reliance on fossil fuels in this area and enabling emissions reductions.

According to the GHG Protocol, Scope 2 emissions must be considered both market-based and location-based. Accordingly, it is reported that under the "location-based" criterion, the result for Scope 2 would amount to 5,025 tCO2e, which translates to a total carbon footprint for Salmones Camanchaca of 249,106 tCO2e.

Finally, the implementation of the Energy Management System (SGEn), as mentioned earlier, will allow continued management of energy consumption from electrical sources in their facilities. These improvement measures will enable the company to identify critical points to address in their energy use and consumption.

.4.4 Scope 3

Scope 3, referring to the company's indirect emissions, generates total emissions reaching 220,105 tCO2e, representing 89.90% of the overall emissions.

Table 4. GHG Emissions by Source and Scope

Emission Source	Emissions [tCO_2e]
Feed	135,166
Customer deliveries	56,079
Logistics	20,447
Packaging	5,194
Wastes	1,863
Acquired services	1,245
Corporate travel	112
Grand Total	**220,105**

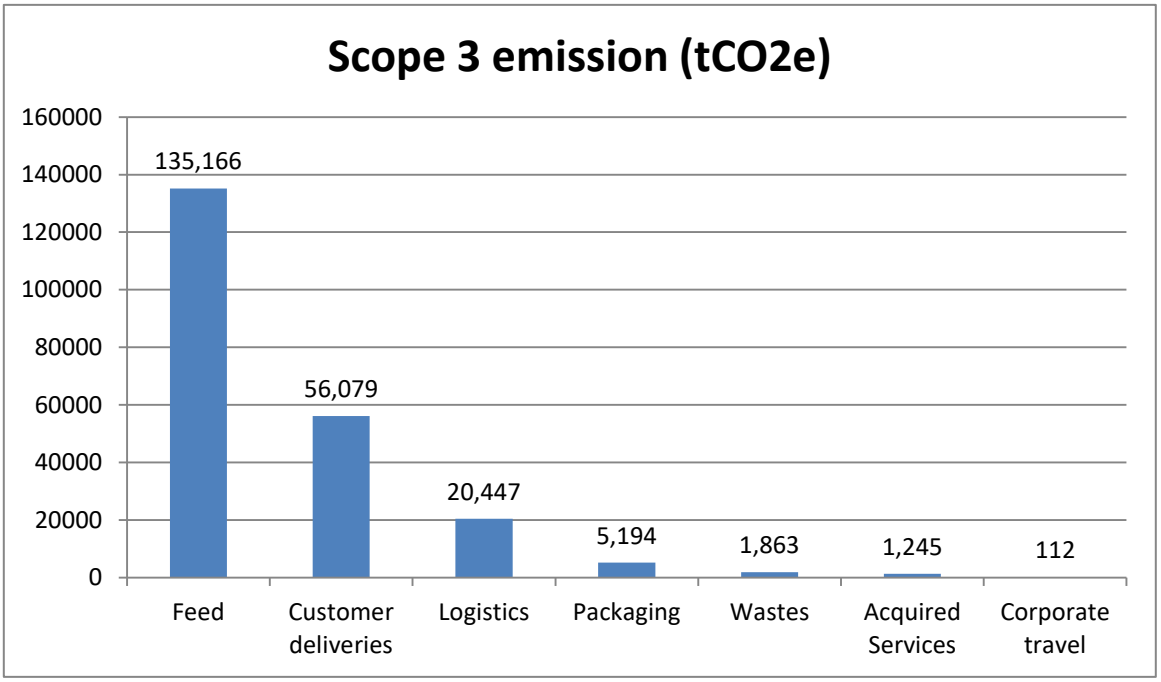


Figure 4. Scope 3 emissions by emission source type.

4.4.1 Feed

The consumption of salmon feed during the freshwater and seawater phase is the main source of emissions, contributing 135,166 tCO2e due to the annual feed consumption equivalent to 68,890 tons.

The feed suppliers have developed their own emission factors, which currently consider quantification limits ranging from the extraction of raw materials to distribution.[1]

Supplier	FE (kgCO2e/kg)	Annual Quantity	GHG Emissions (tCO2e)
Supplier 1	1.86	18,912,560	35,177
Supplier 2	1.311	9,391,258	12,312
	2.43	9,366,954	22,762
Supplier 3	1.87	8,049,497	15,053
	2.03	4,204,056	8,534
	2.15	9,756,633	20,977
	2.21	9,208,625	20,351
Total		**68,889,584**	**135,166**

[1] This information and its quantification limits may vary between suppliers, being the sole responsibility of the feed producers.

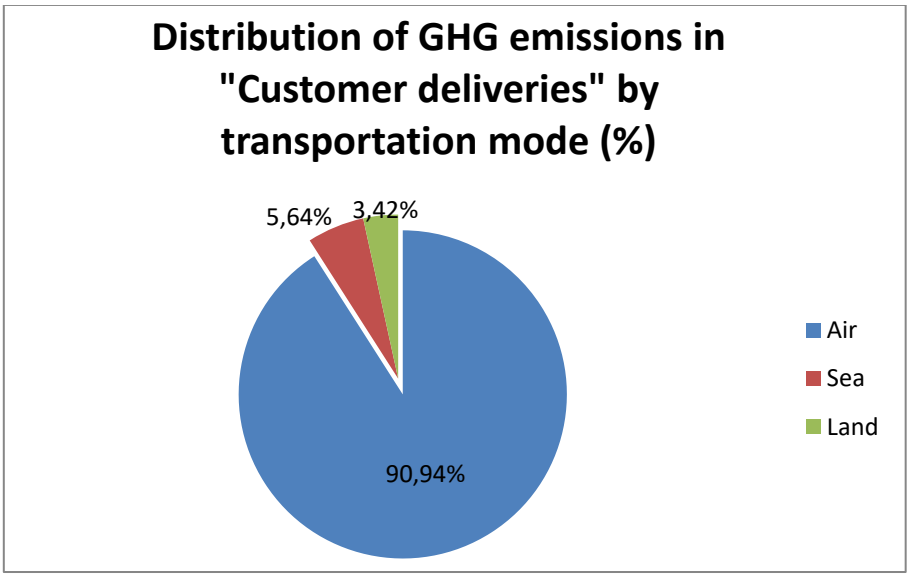
4.4.2 Customer deliveries

The "Customer deliveries" emissions correspond to commercial logistics and refer to the number of kilometers traveled by tons of final product sent to market.

In the year 2023, these emissions amounted to 56,079 tCO2e, representing the second most relevant impact category.

Transportation mode	Gross Kilogram transported	Average distance (Kilometers)	GHG Emission tCO2e
Air	8,385,969	11,449	51,000
Sea	22,229,983	10,512	3,164
Land	35,408,166	460	1,915
Total	**66,024,118**	**5,168**	**56,079**

From the previous table, it can be observed that 8,386 tons of salmon generate the highest carbon footprint, equivalent to 51,000 tCO2e.

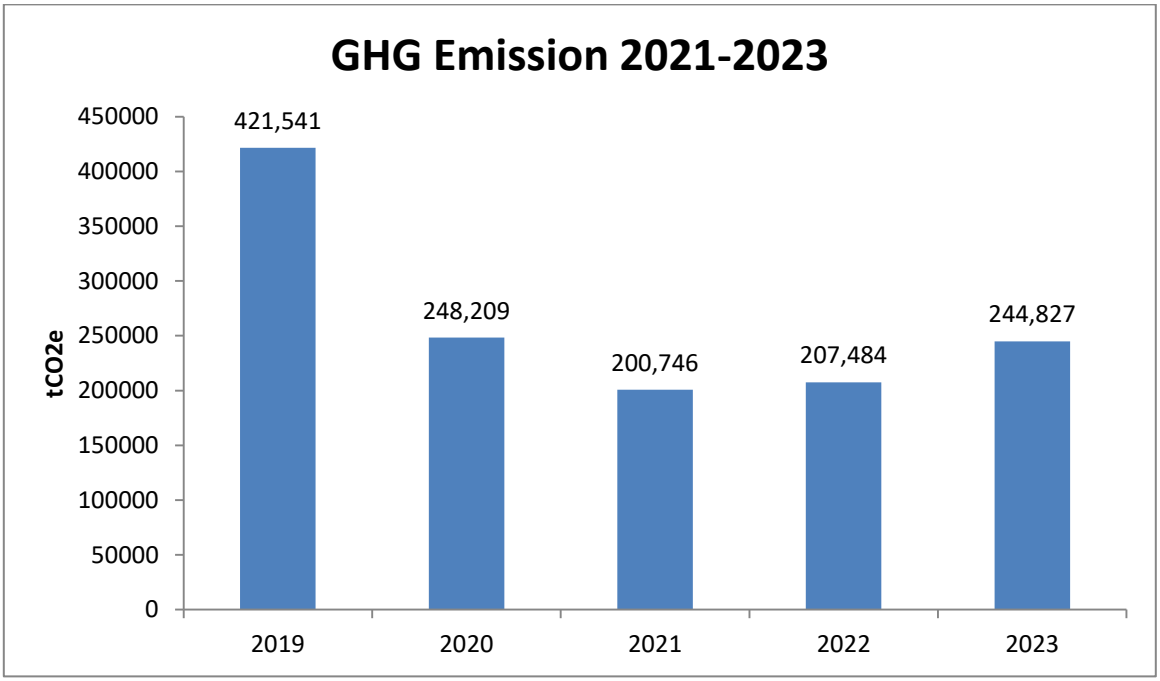


Analyzing strategies that allow reaching the market with frozen products could significantly reduce emissions from product sales.

5. Comparison with previous years

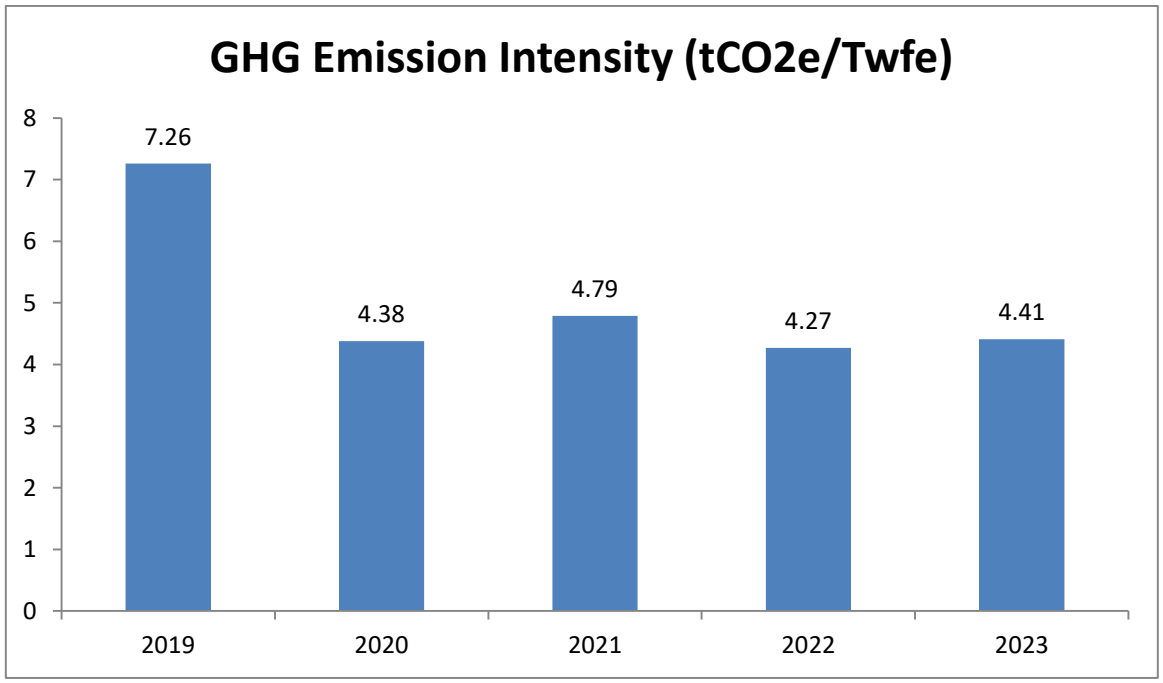
Below is a summary table of total emissions over the years.

Scope (tCO2e)	2019	2020	2021	2022	2023
Scope 1	29,995	32,198	21,629	23,058	23,685
Scope 2	6,659	4,397	1,674	1,233	1,037
Scope 3	384,887	211,614	177,443	183,193	220,105
Total	**421,541**	**248,209**	**200,746**	**207,484**	**244,827**



Below is a summary table of the evolution of the intensity indicator in tCO2e/tWFE.

Scope tCO2e/tWFE	2019	2020	2021	2022	2023
Scope 1	0.52	0.57	0.52	0.47	0.43
Scope 2	0.11	0.08	0.04	0.03	0.02
Scope 3	6.63	3.73	4.23	3.77	3.97
Total	**7.26**	**4.38**	**4.79**	**4.27**	**4.41**


GHG Emission Intensity (tCO2e/Twfe)
8
7
6
5
4
3
2
1
0
7.26
4.38
4.79
4.27
4.41
2019
2020
2021
2022
2023

6. Conclusions and recommendations

For the sixth consecutive year, the company quantifies its emissions to assess its progress over the years, with the measures it has implemented and the actions it has yet to execute to comply with its commitment to carbon neutrality by 2025 in scope 1 and 2 GHG emissions, positioning itself as a leading company in this area.

While a reduction in the emissions intensity indicator compared to 2021 is identified, equivalent to a 7.90% reduction, when conducting the exercise for 2022, there is an increase equivalent to a 3.32% in tCO2e/tWFE.

Among the key milestones identified in 2023 is the commissioning of the electric supply system at Río Petrohué Hatchery, which resulted in the avoidance of around 6,255 tCO2e, in a year when the operation was in the start-up phase and it is expected that by the current year 2024, diesel oil consumption will be further reduced.

The company has improvement opportunities regarding its energy management system, which will allow it to analyze, reduce, and set reduction targets for energy consumption in its facilities. It is suggested to implement a corporate energy management system that addresses all company facilities and energy consumption from suppliers.

Analyze the technical and economic feasibility of moving towards an ammonia-based cooling system, aligned with international initiatives that will limit the production of HFCs and HCFCs.

The management of emissions in the supply chain with food suppliers for diet formulation that consider climate change and emission generation as a critical variable in the short, medium, and long term.

Promote and encourage the sale of frozen products to reduce emissions associated with commercial logistics.

In addition to the previous recommendations, keeping stakeholders informed about improvement measures and progress on climate change challenges is the key for greater transparency and competitiveness of the company.

7. References

- Department of Environment Food and Rural Affairs, Department for Energy and Climate Change. [2023). *Guidelines to Defra's GHG conversion factors for company reporting.*
- Ministerio de Energía. [2023). Factores de Emisión. Obtenido de Energía Abierta: http://energiaabierta.cl/visualizaciones/factor-de-emision-sic-sing/
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