Salmones Camanchaca

# GREENHOUSE GASES

# 2022

Emissions inventory

greenticket

UN SIMPLE GESTO UN GRAN IMPACTO.

FIRST PAGE.

Companies play a key role in society in many ways. They have far-reaching financial, environmental and social consequences. Every year the world consumes more resources than the planet can naturally produce. The world's population is likely to grow to more than eight billion people by 2030. Therefore, responsibly consuming natural resources is becoming increasingly important. At the same time, global competition is becoming increasingly intense. While new challenges are arising all the time, such as climate change, political turmoil and the global consequences of the coronavirus pandemic. And let's not forget consumers who are generating pressures by accelerating changes in demand. There are also growing expectations from various stakeholders that the economy should be focused on sustainability.

The aquaculture industry plays a key role in the response to these changes. Therefore, Greenticket has grouped the key challenges to help companies with four strategic issues.

These are decarbonization, the circular economy, social partner and supply chain responsibility.

We know that global social and environmental changes are driving productive sectors to examine their entire value chain with the aim of continuously improving sustainability across their entire businesses.

Greenticket has adopted this commitment. We help our partners to achieve sustainable growth, generate value and reduce their environmental footprint.

Greenticket Team.

## SUMMARY

This carbon dioxide emissions report was prepared according to the greenhouse gas protocol (GHG Protocol), which measures the direct and indirect emissions by Salmones Camanchaca. These totaled **205,313** tonnes of carbon dioxide equivalent (tCO2e) based on market emission factors for electricity supplies and **210,755** (tCO2e) for emissions calculated based on location under scope 2.

The analysis was based on 205,313 tCO2e and the main source of emissions was salmon feed, which represents 56.66% of the company's GHG inventory, followed by product transportation "Customer deliveries", which represents 22.16%, and operational fuels, which represent 8.35%. Grow out has the greatest impact on inventory, which represents 63.39% of the company's emissions. Scope 3 represents 88.65% of corporate emissions, which is **7.81 times** greater than the sum of the Scope 1 and 2 emissions. Therefore, managing supply chain emissions is key to developing sustainable aquaculture.

# INTRODUCTION

## Aquaculture is part of the solution to sustainable food supplies in the future.

**But we must continue to develop effective solutions to ensure that the world can feed 10 billion people by 2050, while reducing emissions, curbing deforestation and alleviating poverty.**

Sustainably feeding this growing population requires simultaneously fulfilling three requirements. The world will have to close a 56% gap between the amount of food produced today and the amount required by 2050, according to the World Resources Institute. It must reduce the impact of agriculture on the climate, ecosystems and water. It must ensure that agriculture supports inclusive economic and social development. However, hundreds of millions of people are still hungry today, while agriculture uses almost half the world's vegetated land, and food production generates a quarter of global greenhouse gas emissions. Simultaneously, more than one billion tons of food is lost or wasted each year, while tastes and menus in many parts of the world are driving demand for more resource-intensive foods.

Our research in recent years indicates that aquaculture is key to meeting the food challenges of the future. But we must leave the water behind to make this sector more sustainable, since our measurements indicate that the real impact on the climate and ecosystems does not occur in fish farming cages, but where the raw materials for fish feed are produced.

We need to develop joint strategies with the entire supply chain. We must sustainably increase feed production by restoring the productivity of degraded land, regeneratively increasing yields, and improving land and water management. To ensure that tastes in the future help to reduce the climate footprint of food.

This report describes the carbon footprint of Salmones Camanchaca for the fourth consecutive year and covers its freshwater, grow out, processing, customer deliveries and office activities. Salmones Camanchaca monitors its performance by measuring its annual carbon footprint, while increasing its transparency standards and its commitments to improving its environmental indicators.

# METHOD

Greenticket was commissioned by Salmones Camanchaca to measure the carbon footprint of its fresh water, grow out, processing, customer delivery, cold storage and office activities for 2021. Therefore, Greenticket collected data on its energy consumption, refrigerant gases, feedstuffs, product transport and personnel. This analysis uses the method described in the Greenhouse Gas Protocol.

## OVERVIEW

Various organizations worldwide commonly use the carbon footprint as a tool to estimate GHG emissions. It demonstrates their commitment to the environment by reducing their emissions, introducing energy efficiency measures, reducing their consumption of fossil fuels, and other measures.

The carbon footprint measures the GHG emissions of an activity. Internationally recognized analysis methods are used that represent a worldwide standard for carbon footprint studies.

The purpose of the method is to analyze the physical flows for an activity and estimate its GHG emissions based on calculations and conversions.

The operational emissions by Salmones Camanchaca from its fresh water, grow out, processing, customer deliveries, cold storage and office activities were calculated using various emission factors. These factors were applied to usage indicators for electricity, fuel, refrigerant gases, corporate flights, finished product transportation, water consumption and treatment, and finally waste. For example, kilowatt-hours of electricity, liters of fuel, kilograms of refrigerant gas, volumes of waste, kilometers traveled per passenger on corporate flights, cubic meters of water consumed and treated. The emission sources included in this study are described in the table below:

| Scope | Emissions Source | Description | Description |
|---|---|---|---|
| Scope 1 | Direct | Fuel and Refrigerant Gases | Direct emissions from burning fuel at its facilities and using refrigerant gases in company-owned equipment |
| Scope 2 | Indirect | Electricity | Indirect emissions from burning fossil fuels in electricity generating plants, and electricity from non-conventional renewable energy suppliers. |
| Scope 3 | Indirect | Salmon feed, product sales, energy consumption in the supply chain, packaging, waste management and corporate flights | Indirect emissions from generating and disposing of waste, transporting Salmones Camanchaca's employees, transporting products using various methods and supply chains |

## GREENHOUSE GAS PROTOCOL

This analysis complies with the Greenhouse Gas Protocol[1]. The GHG Protocol is a detailed guide to quantifying, reporting, validating and verifying greenhouse gas emissions and removals. It has become a widely used carbon footprint estimation tool supported by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD).

The guiding principles of the protocol are:

- Relevance
- Integrity
- Consistency
- Transparency
- Precision

This protocol's goal is to produce a standard indicator that can accurately measure GHG emissions for all sectors. Accordingly, companies using this standard will be able to identify where their carbon footprint is high and consequently how to reduce it.

The gases considered by the protocol when estimating GHG emissions are those listed by the Kyoto Protocol:

- Carbon dioxide
- Methane
- Nitrous oxide
- Hydrofluorocarbons
- Perfluorocarbons
- Sulfur hexafluoride

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

## CARBON FOOTPRINT APPROACH AND PARAMETERS (GHG INVENTORY)

### PERSON RESPONSIBLE FOR THE GHG INVENTORY

This GHG inventory was coordinated by Greenticket using data provided by Salmones Camanchaca. Greenticket performed data processing, calculations and finally extracted conclusions from the GHG inventory. It also collected information from every aspect of the business.

### ORGANIZATIONAL BOUNDARIES

Setting organizational boundaries requires consistently defining the business units and operations that form the enterprise, for GHG accounting and reporting purposes.

Setting the measurement boundaries means defining which company areas are included in data gathering and calculations. The carbon footprint measurement should include as many of the company's areas as possible.

[1] Greenhouse Gas Protocol - Corporate Accounting and Reporting Standard

This GHG emissions inventory is based on the consolidated approach to Operational Control. This approach measures the GHG emissions attributable to operations over which Salmones Camanchaca has full control.

## OPERATIONAL BOUNDARIES

After the organizational boundaries have been identified, the emissions included in the carbon footprint analysis are specified, which represent the scope. There are three differential emission scopes, according to the GHG Protocol.

### SCOPE 1 (MANDATORY)

These are direct emissions from activities controlled by the company. These sources include heat, electricity or steam generated by boilers on the company's premises, chemicals and materials from production processes, emissions from company vehicles, and HCFC emissions from refrigeration and air conditioning equipment.

#### FUEL EMISSIONS (SCOPE 1)

These include fuel purchased by the organization that is used in its equipment and vehicles, and gas burned on site. These emission factors have been issued by the UK Department of Food and Rural Affairs (DEFRA), specifically in Defra/DECC (2021)[2].

$$Fuel\ Emissions = Fuel\ Quantity\ (Lt, Kg) \times Emission\ Factor\ (\frac{Kg\ CO2e}{Lt, Kg})$$

#### REFRIGERANT EMISSIONS (SCOPE 1)

These are emissions from using refrigerant gases in industrial refrigeration equipment. These emissions are attributable to the R-22, R-410 and R-507 gases used by processing plants and cold storage facilities. These emission factors have been issued by the UK Department of Food and Rural Affairs, specifically in Defra/DECC (2021)[3].

$$Refrigerant\ Emissions = Refrigerant\ Quantity\ (Kg) \times Emission\ Factor\ (\frac{Kg\ CO2e}{Kg})$$

### SCOPE 2 (MANDATORY)

[2] 2021 Guidelines to Defra's GHG conversion factors for company reporting. Department of Environment Food and Rural Affairs/Department for Energy and Climate Change, London. Liquid fuels.

[3] 2020 Guidelines to Defra's GHG conversion factors for company reporting. Department of Environment Food and Rural Affairs/Department for Energy and Climate Change, London. Refrigerant & others.

These are indirect emissions from producing the external electricity, heat or steam consumed by the organization. It includes emissions from generating electricity consumed by the company. Scope 2 emissions physically occur at the plant where electricity is generated.

Scope 2 emissions are produced as electricity is consumed. Indirect emissions physically occur at the plant where the electricity is generated. The emission factor for non-conventional renewable energy sources was used, due to the acquisition of 13.79 GWh from certified renewable sources and the emission factor proposed by the Chilean Energy Ministry for 2021[4].

$$Electricity\ Emissions = Electricity\ Consumed\ (KWh)\ \times Emission\ Factor\ \left(\left(\frac{KgCO2e}{KWh}\right)\right)$$

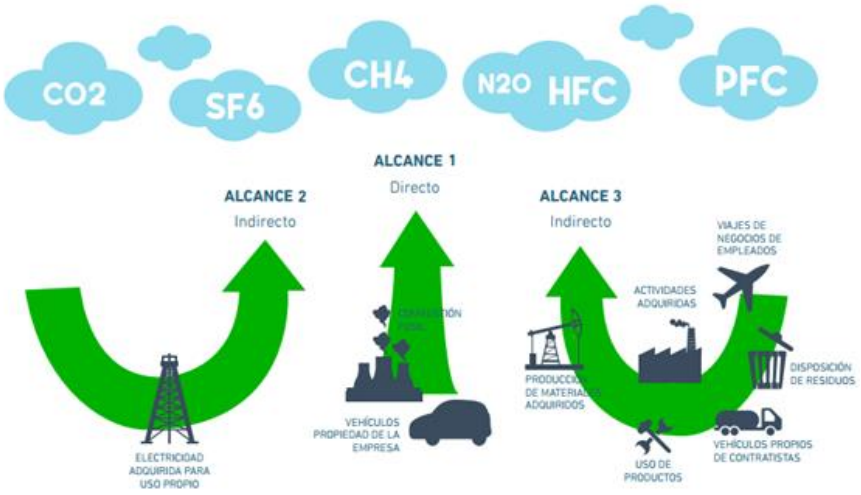
SCOPE 3 (OPTIONAL)

These emissions are a consequence of the organization's activities, but are produced by sources that are not controlled by the organization. Examples are emissions during waste disposal, transporting staff, business travel, transporting raw materials and finished products.

The GHG Protocol states that emissions under the first two scopes must be quantified, while quantifying Scope 3 emissions is voluntary.

$$GHG\ Emissions = Activity\ Data\ \times Emission\ Factor$$

The following diagram summarizes emissions under each of these scopes:




Source: Greenhouse Gas Protocol - Corporate Accounting and Reporting Standard

The following table specifies the GHG emissions produced by business units.

[4] Retrieved from: http://energiaabierta.cl/visualizaciones/factor-de-emision-sic-sing/

**TABLE: GHG EMISSION CATEGORIES BY SCOPE AND ACTIVITY**

| Area | Scope 1 | Scope 2 | Scope 3 |
|---|---|---|---|
| Hatcheries | Fuel consumption | Electricity | Feed, logistics and waste |
| Grow out | Fuel consumption | Electricity | Feed, logistics and waste |
| Processing and cold storage | Fuel and refrigerants consumption | Electricity | Supply chain fuels and refrigerants, waste, packaging and logistics |
| Offices | Fuel consumption | Electricity | Waste and corporate travel |
| Customer deliveries | - | - | Product sales |

# OVERALL RESULTS AND ANALYSIS FOR SALMONES CAMANCHACA

Salmones Camanchaca's business units produce varying environmental impacts. This is due to the nature of the activities of each business unit. Salmon farming takes approximately 27 to 31 months for Atlantic salmon, and 18 months for Coho salmon. Salmon pass through various stages during this process.

**FRESH WATER**

During the first year the eggs are fertilized and the fish grow to around 150 grams in a controlled environment. The productive stages cover genetics, reproduction and breeding. These processes produce emissions from Salmones Camanchaca's "Hatcheries". This includes feed consumption, fuel use for boilers, heating, electricity, boats and other equipment.

**GROW OUT**

After the fresh water stage, the fish are transported to seawater cages where they grow. This process takes between 14 and 18 months for Atlantic salmon, and 9 months for Coho salmon. Eventually the fish weigh approximately 3 to 5 kg. These processes produce emissions from feed consumption, burning fuels on pontoons at farming sites, generators, boats, machinery, other equipment and waste, which are analyzed in the "grow out" section of this report.

**PROCESSING PLANT AND COLD CHAIN**

After the fish reach an ideal harvest size, they are transported to a plant where they are processed for sale. These processes produce the emissions from "processing" and include emissions from burning fuels, refrigerant gases and waste.

**CORPORATE OFFICE**

The emissions associated with Salmones Camanchaca's productive areas and "Administration" are quantified, which includes emissions associated with consuming fuel, electricity, and corporate flights.

**CUSTOMER DELIVERIES**

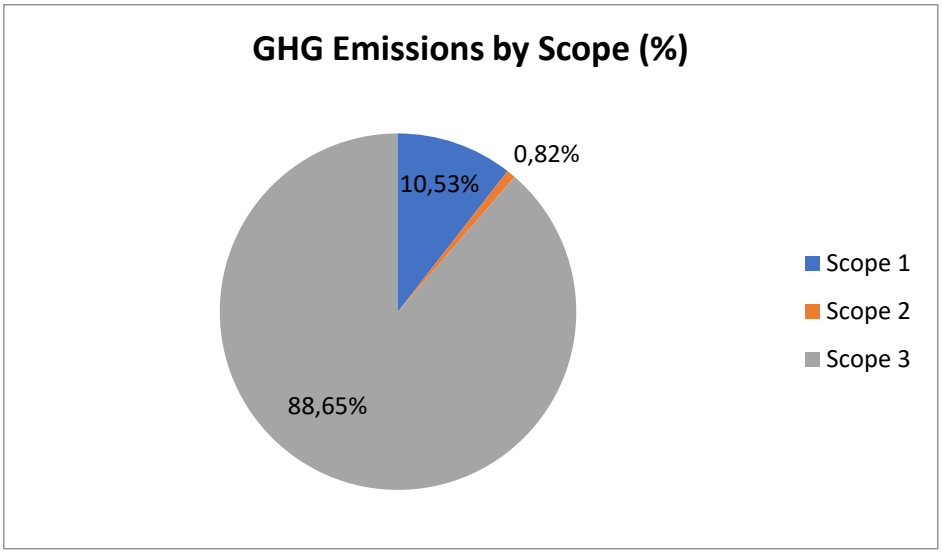
Salmon products are packaged, stored and distributed to markets around the world by land, air and sea. These processes produce the emissions from "Customer deliveries".

This section reflects the overall results of the emissions analyzed for 2021.

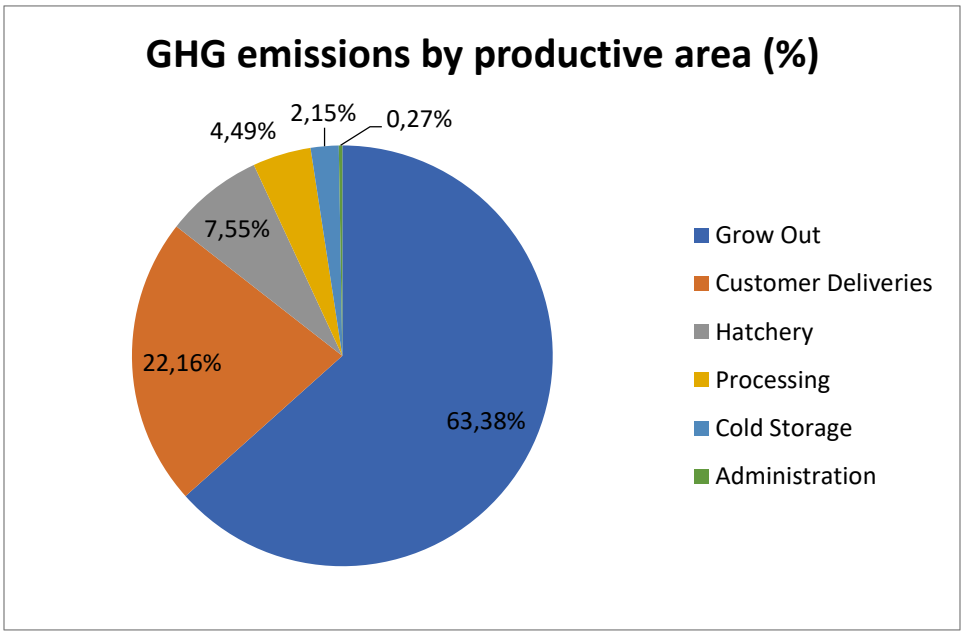
The GHG emissions inventory at Salmones Camanchaca for 2021 totaled **205,313 tCO2e** by market and 210,755 tCO2e by location.

| | Market-based GHG emissions (tCO2e) | Location-based GHG emissions (tCO2e) |
|---|---|---|
| Scope 1 | 21,629 | 21,629 |
| Scope 2 | 1,674 | 7,116 |
| Scope 3 | 182,009 | 182,009 |
| **Total** | **205,313** | **210,755** |

The results from this section onwards are analyzed on the basis of market-based GHG emissions.

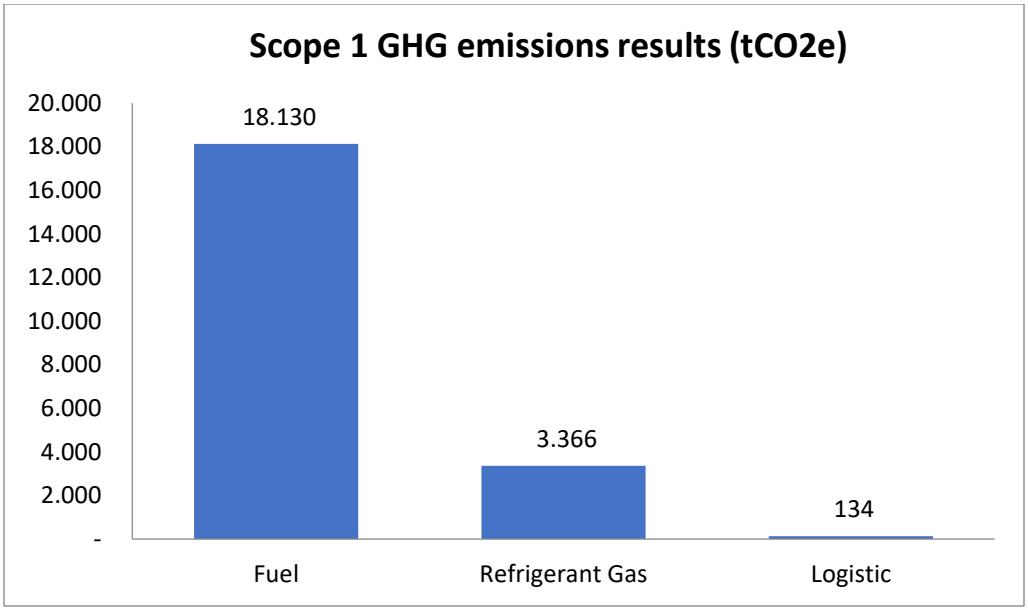



The business unit that contributes most to this total is grow out, with 63.39% of the GHG inventory. Second place is held by "Customer deliveries", which contributes 22.16% of the company's total inventory, while hatcheries contribute 7.55%, processing 4.49%, cold storage 2.15% and administration 0.27%. This distribution indicates where to focus emission reduction initiatives.


GHG emissions by productive area (%)
4,49%
2,15%
0,27%
7,55%
22,16%
63,38%
Grow Out
Customer Deliveries
Hatchery
Processing
Cold Storage
Administration

## SCOPE 1

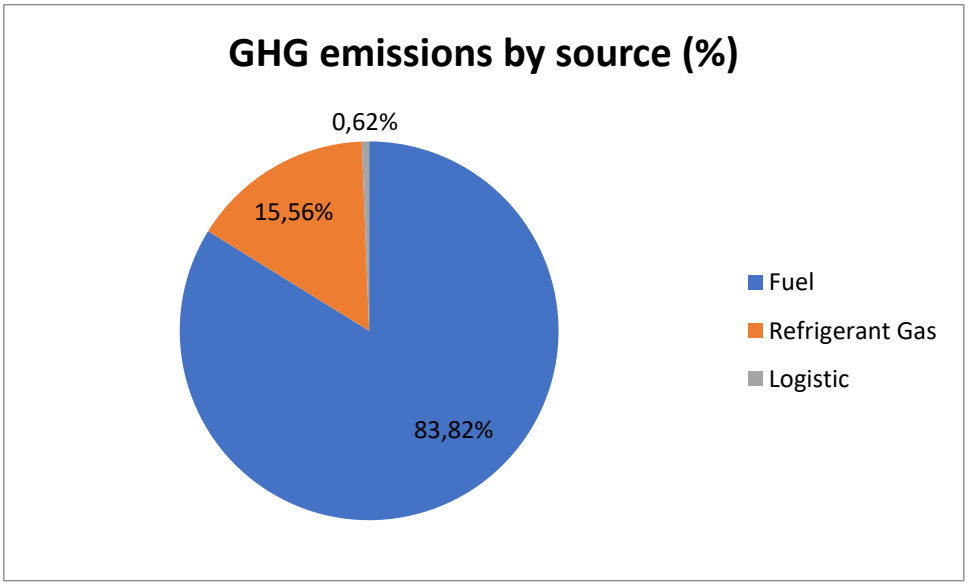
Scope 1 emissions are generally due to refrigerant gas recharges in the processing plant and the consumption of diesel, LPG and gasoline at the company's facilities.



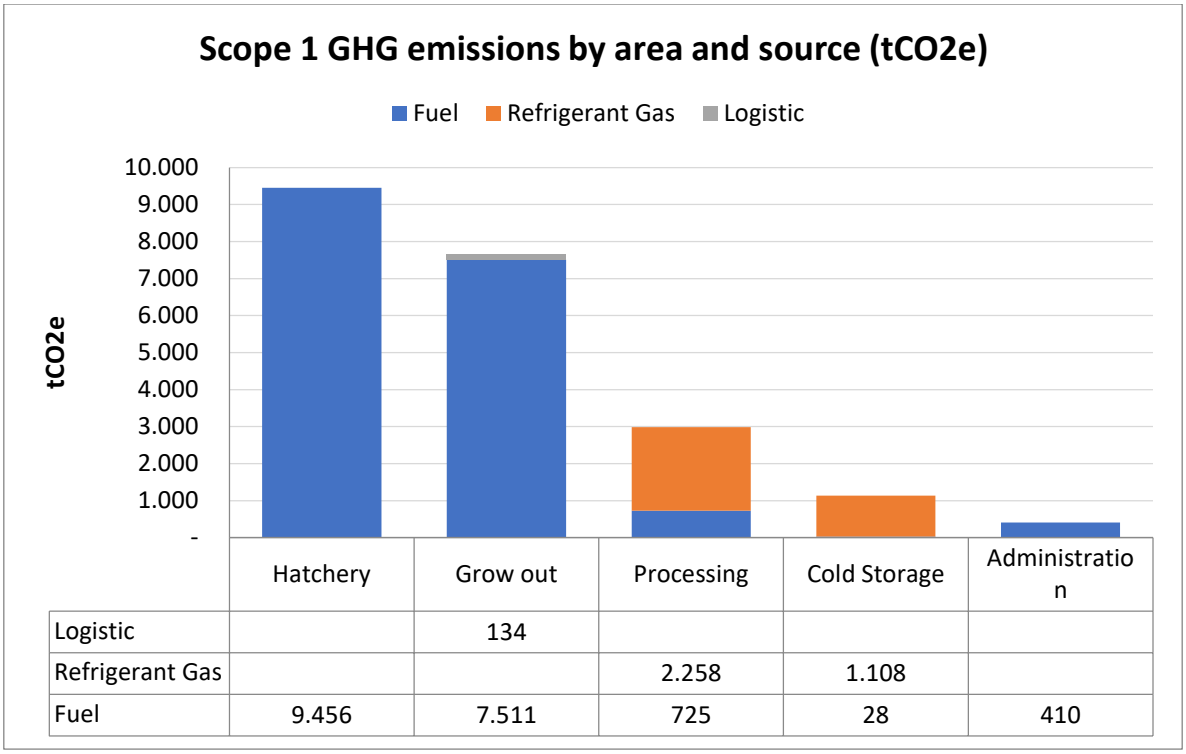

Fuel emissions are due to general uses, mobile sources and stationary sources, wherever these can be distinguished.

Emissions from refrigerant gases are due to recharging R-507, R-22 and R-410 gases. However, these refrigerant gases are not emitted during use.

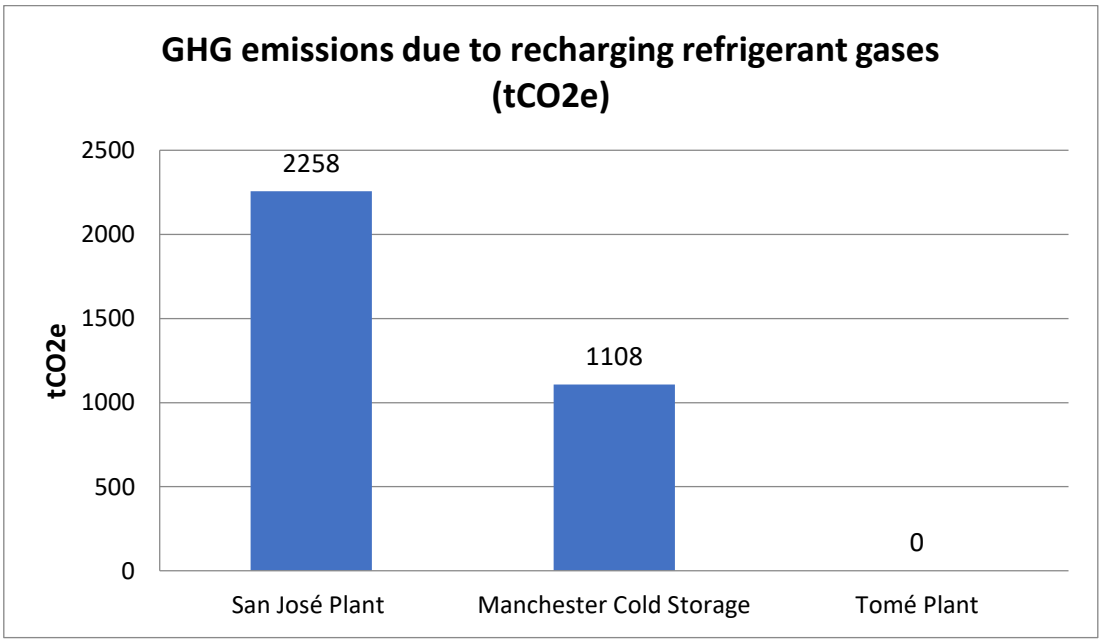
Finally, fuel consumed by Wellboat “Ana Cristina” produces the logistics emissions.



Hatcheries produce 43.72% of Scope 1 emissions, followed by grow out, which produces 35.34%.




Unlike the previous year, GHG emissions from recharging refrigerant gases increased from 317 tCO2e to 3,336 tCO2e in 2021. We recommend that information management systems strictly monitor gas recharging by clearly identifying the date, refrigerant and quantity.




International guidelines in the Kigali Agreement establish a baseline for refrigerant gas consumption by year as follows:

- **2024: FREEZE CONSUMPTION AT THE BASELINE (AVERAGE CONSUMPTION FOR 2020-2022)**
- **2029: REDUCE THE COUNTRY'S CONSUMPTION BY 10% OF THE BASELINE**
- **2035: REDUCE THE COUNTRY'S CONSUMPTION BY 30% OF THE BASELINE**
- **2040: REDUCE THE COUNTRY'S CONSUMPTION BY 50% OF THE BASELINE**
- **2045: REDUCE THE COUNTRY'S CONSUMPTION BY 80% OF THE BASELINE**

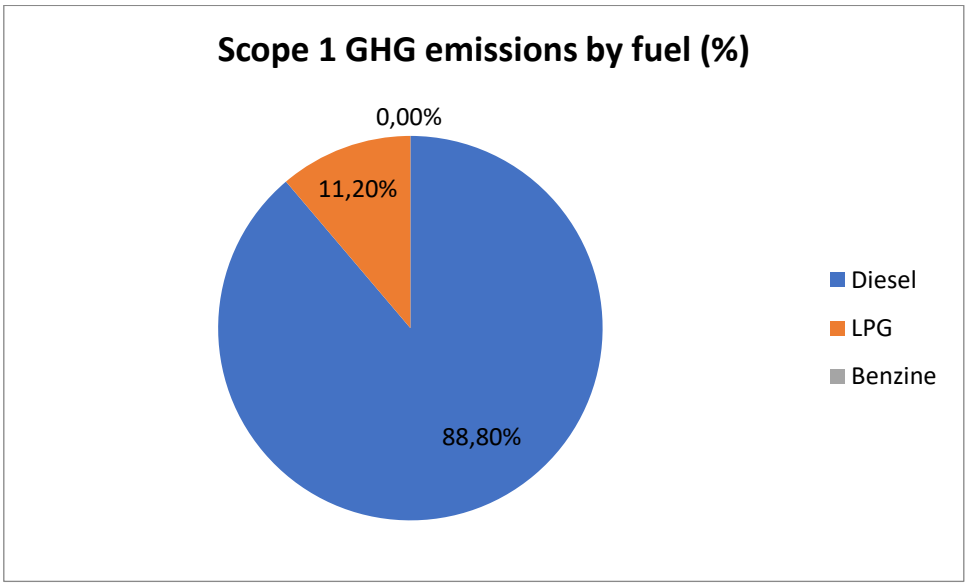
Reducing HFC gas consumption worldwide would prevent an increase in global warming of 0.1°C by 2050 and 0.5°C by 2100. This features among the mitigation strategies with the greatest impact.

Salmones Camanchaca recharged a total of 2,500kg of refrigerant gases, as follows.

| Facility | Gas description | Recharge (kg) | GHG Emissions (tCO2e) |
|---|---|---|---|
| **San José** | R-507 | 565 | 2,252 |
| | R-410 | 3.2 | 7 |
| | Ammonia | 110 | 0 |
| **Manchester Cold Storage** | R-22 | 612 | 1,108 |
| **Tomé** | R-22 | 0 | 0 |
| | Ammonia | 1210 | 0 |
| **Grand Total** | | **2,500** | **3,366** |

Consequently, 3,366 tCO2e were emitted. We recommend analyzing the feasibility of using Ammonia, R-290 or another low global warming gas, to reduce emissions from recharging refrigerant gases at fresh water facilities, cold storage facilities and processing plants, and performing preventive maintenance on refrigeration equipment to minimize leaks.

Diesel produces 88.79% of fuel consumption emissions, while LPG produces 11.20% and benzine is not significant.



Fixed sources, mobile sources and general sources produce emissions. The facilities where fuel emissions occur must be clearly distinguishable, in order to implement improvement measures.

## SCOPE 2

Scope 2 reflects emissions produced by generating the electricity consumed in 2021 at Salmones Camanchaca's facilities, analyzed by market and by location, which includes hatcheries, cold storage, grow out, administration and processing.

| Scope | Quantity (kWh) | Market based GHG emissions (tCO2e) | Location based GHG emissions (tCO2e) |
|---|---|---|---|
| Hatcheries | 2,159,735 | 844 | 844 |
| Cold Storage | 1,887,503 | 737 | 737 |
| Grow out | 119,664 | 62 | 62 |
| Administration | 79,050 | 31 | 31 |
| Processing | 13,927,179 | 0 | 5,441 |
| **Grand Total** | **18,173,131** | **1,674** | **7,116** |

A table is included that compares emissions by market characteristics and emissions by the national electricity system.

Electricity consumption by the company in 2021 was 18,173 MWh. We suggest continuing to reduce emissions by implementing energy efficiency systems, developing clean energy, implementing technological solutions that reduce electrical inefficiency and continuing to perform preventive and corrective maintenance at all the company's facilities.

## SCOPE 3

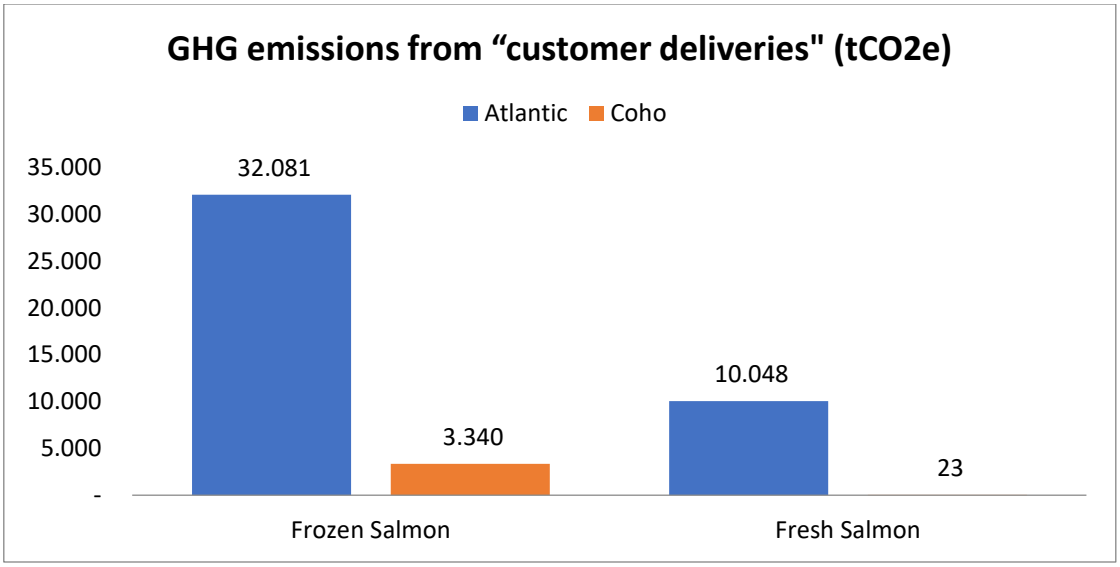
This section presents the results of the emissions identified in the voluntary indirect impacts section.

The results indicate that Scope 3 sources produce 88.65% of the company's emissions, as they produce 182,009 tCO2e mainly during feed production and product transportation.

The freshwater and seawater areas consumed 57,375 tonnes[5] of feed provided by various suppliers. Improvements in the economic and biological conversion factors at each salmon feeding stage will reduce the carbon footprint while reducing costs.

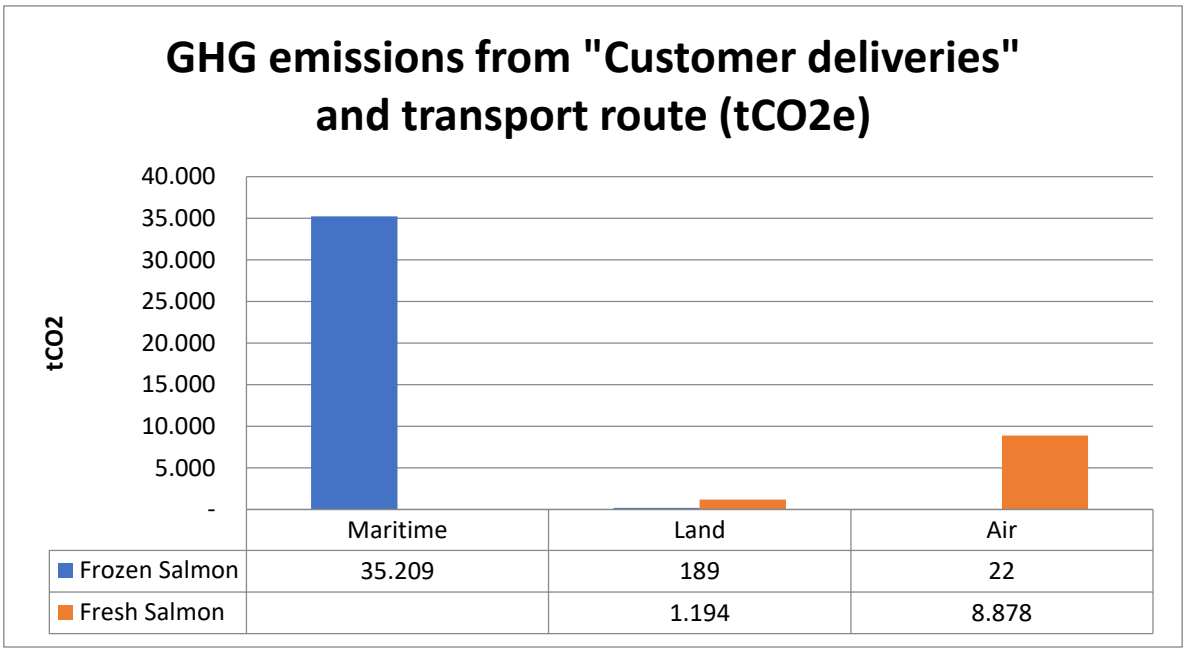
The carbon footprint of the company's salmon products can be reduced by involving the supply chain, which will improve its integrated performance. So we suggest evaluating climate change and sustainability management strategies together with suppliers, as the results will be reflected in the company's future emissions.

Furthermore, the emissions produced by transporting frozen, fresh and smoked finished products or customer deliveries were analyzed in 2021. The results by specie were as follows.

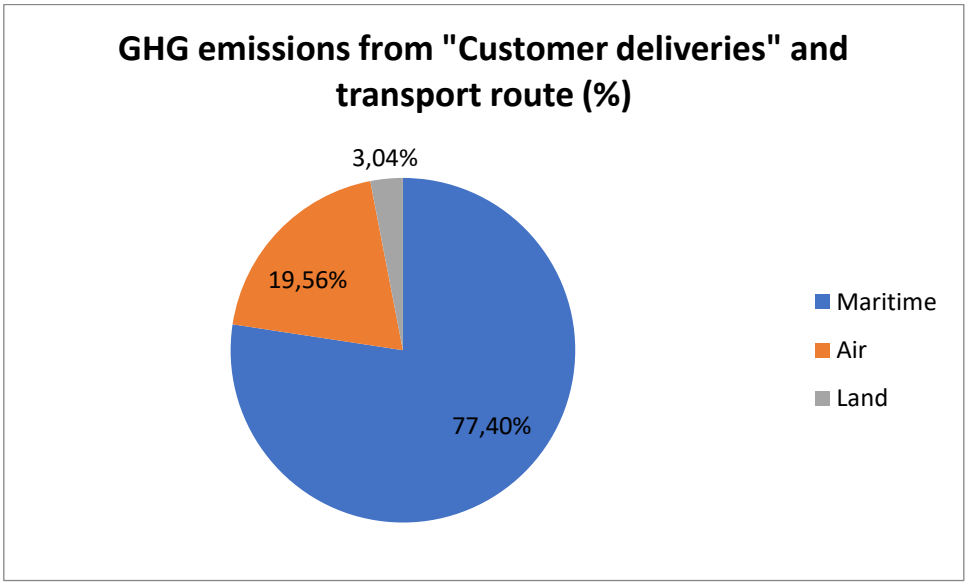



Emissions considering the transport route are as follows.

[5] The salmon feed emission factors suffer from significant uncertainty since there is no standard, so the results are not comparable and could vary from one year to another, depending on the calculations and inferences. We recommend that Salmones Camanchaca request values that cover the feed life cycle, at least from the cradle to the door, including the emissions caused by changes in land use.




Measures to be implemented to reduce emissions include reducing the weight of packaging and encouraging markets to prefer frozen or smoked products, in order to reduce the impact of product transportation.




The company has managed its waste over the years, as waste recycling and recovery is important throughout its business. This has reduced the emissions from its waste and strengthened its local suppliers.

| Waste management | Waste description | Unit | Quantity | GHG Emissions (tCO2e) |
|---|---|---|---|---|
| Elimination | SLUDGE | kg | 3,824,487 | 2,397 |
| | SOLID INDUSTRIAL WASTE | kg | 1,843,895 | 1,006 |
| | SILAGE | kg | 126,910 | 80 |
| | RESPEL | kg | 43,148 | 20 |

| | | | | |
|---|---|---|---|---|
| | **BEACH CLEANUP** | kg | 34,488 | 11 |
| | **TREATED AS HOUSEHOLD WASTE** | kg | 312 | 0 |
| | **RECYCLED** | kg | 3,220 | 0 |
| **Recovery** | **SILAGE** | kg | 28,008,425 | 596 |
| | **RECYCLED** | kg | 794,102 | 17 |
| | **RESPEL** | kg | 1,150 | 0 |
| | **TREATED AS HOUSEHOLD WASTE** | kg | 2,027 | 0 |
| | **SOLID INDUSTRIAL WASTE** | kg | 380 | 0 |
| **Grand Total** | | | **34,682,543** | **4,127** |

While emissions associated with personal transportation on domestic and international corporate flights are equivalent to 113 tCO2e.

| **Source** | **Flight** | **Unit** | **Quantity** | **GHG Emissions (tCO2e)** |
|---|---|---|---|---|
| **Flights** | **International** | Passengers | 43 | 26 |
| | **Domestic** | Passengers | 1,307 | 87 |
| **Grand Total** | | | **1,350** | **113** |

## COMPARISON WITH PREVIOUS YEARS.

Over the years Salmones Camanchaca's measurement and reduction initiatives have reduced its scope 1 and 2 corporate emissions, which has achieved progress towards carbon neutrality by 2025.

*Milestones*

1) *Fuel emissions from suppliers whose fuel was delivered by Salmones Camanchaca were included under Scope 3 from 2021 onwards, so the results are not comparable with previous years.*
2) *Refrigerant gas recharges were identified at processing and cold storage plants, which increased the KPI for Scope 1 emissions compared to the previous year.*
3) *The reductions associated with NCRE supplied to the San José and Tomé plants were included.*
4) *Although the results are not comparable, there is a percentage reduction equivalent to 13.85%.*
5) *Others that may be indicated by the company.*

| **Scope** | **2019 GHG emissions (tCO2e)** | **2020 GHG emissions (tCO2e)** | **2021 GHG emissions (tCO2e)** |
|---|---|---|---|
| Scope 1 | 29,995 | 32,198 | 21,269 |
| Scope 2 | 6,659 | 4,397 | 1,674 |
| **Total (tCO2e)** | **36,654** | **36,595** | **23,304** |
| KPI A1 (kgCO2e/kgWFE) | 0.517 | 0.568 | 0.516 |
| KPI A2 (kgCO2e/kgWFE) | 0.115 | 0.078 | 0.040 |
| **Total KPI** | **0.632** | **0.645** | **0.556** |

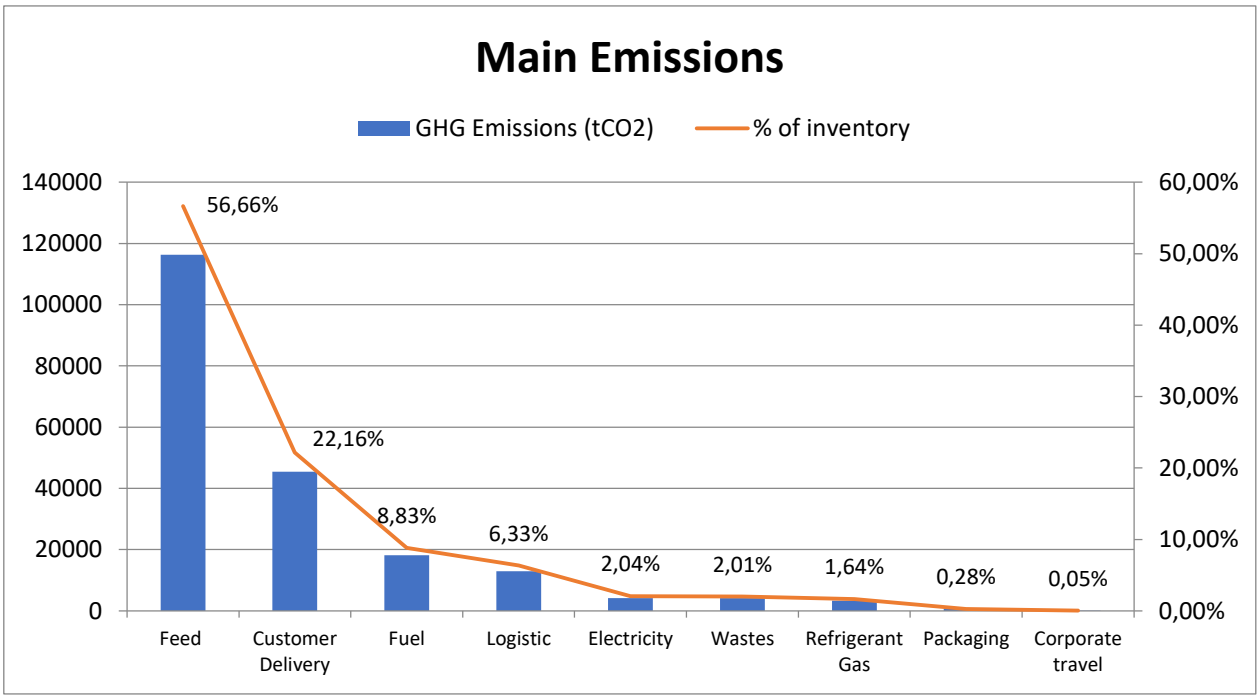
| **Scope** | **2019 tCO2e** | **2020 tCO2e** | **2021 tCO2e** |
|---|---|---|---|
| Scope 1 | 29,995 | 32,198 | 21,629 |
| Scope 2 | 6,659 | 4,397 | 1,674 |
| Scope 3 | 384,887 | 211,614 | 182,009 |
| **Total** | **421,541** | **248,209** | **205,313** |
| | | | |
| Total A1+A2 | 36,654 | 36,595 | 23,304 |
| Total A1+A2+A3 | 421,541 | 248,209 | 205,313 |
| A1+A2 (tCO2e/tWFE) | 0.63 | 0.65 | 0.56 |
| A1+A2+A3 (tCO2e/tWFE) | 7.26 | 4.38 | 4.90 |

Final considerations and recommendations

This study offers an analysis of Salmones Camanchaca's carbon footprint in 2021, which is the fifth consecutive year that the company has analyzed its emissions. It has built a database to monitor the performance of its carbon footprint and implement energy efficiency and sustainable development policies.

Emissions for 2021 were **205,313 tCO2e**. This represents a corporate carbon footprint that covers both its mandatory Scope 1 and 2 emissions referring to fuels, refrigerant gases and electricity, and other significant supply chain emissions in the company's GHG inventory.

- Significant refrigerant gas recharges were detected in 2021, as these were only 317 tCO2e in 2020 compared to 3,336 tCO2e in 2021.
- Emissions from logistics where the fuel was supplied by Salmones Camanchaca were excluded from this analysis and included in Scope 3.
- Scope 2 emissions were measured by market and by location, in accordance with the GHG Protocol. The report was based on zero emissions for the electricity supplied to the processing plants.
- Product deliveries or "Customer deliveries" were included, to implement packaging improvement measures that reduce the gross weight of products exported to consumer markets and reduce Scope 3 emissions.
- Unlike the previous year, Scope 1 and 2 emissions produced 0.556 tCO2e/tWFE.
- We recommend managing emissions in the supply chain for at least feed and logistics suppliers throughout the product cycle, to detect improvement opportunities in fuel efficiencies and environmental improvements driven by innovation and development, cost reduction and other improvements.
- We have made recommendations throughout this report, and we suggest constantly monitoring the company's environmental performance and communicating the results to *stakeholders,* in order to clarify its commitment to national and international industry sustainability, enhance the company's image and encourage its supply chain to measure their greenhouse gases, which will support the company's decarbonization.




## APPENDIX: ASSUMPTIONS

- Scope 2 emissions measured by market and by location according to the GHG Protocol. The report was based on zero emissions for the electricity supplied to the processing plants.

- The estimated gross weight of finished products is based on information provided by the company.

## APPENDIX: EXCLUSIONS

- The report does not include carbon footprints by product.
- Purchased goods such as nets or cages are excluded.