



2023 Greenhouse Gas Emissions Inventory Findings Report

Prepared for:



Prepared by:



ecología • evaluación • economía

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Introduction

Grupo Rotoplas, S.A.B. de C.V. (Henceforth, Rotoplas), Mexican company with nearly 4 decades of experience and a culture of innovation and sustainability, participates in every stage of the water cycle offering individual and integrated storage, waterflow, and improvement solutions; this positions the company as a leader in the development and sale of water solutions.

The purpose of this pre-verification of its Greenhous Gas (GHG) emissions inventory 2023, scopes 1 and 2, is to review and recalculate them, to ensure that the data estimated by Rotoplas is correct, in addition to provide recommendations for estimating and reporting emissions as defined in the GHG Protocol standard. Likewise, a tolerable materiality threshold was established as defined by the Mexican National Emissions Registry (RENE, for its Spanish acronym) and its regulations.

Scope 1 included emissions related to Rotoplas' direct operations, using fuels such as natural gas, LP gas, diesel and gasoline. Scope 2 considers the indirect emissions generated by the electric energy production plants, considering the consumption from the power grid, cogeneration, and renewable energy.

1. General company inventory data

No.	Pre-verification data	Answer	
1	Company name	Grupo Rotoplas, S.A.B. de C.V.	
2	Year of inventory to be pre-verified	2023	
3	Summary of environmental indicators 2023	ISO:14064-1:2015	()
		ISO:14064-1:2018	()
		RENE	()
		GHG Protocol	(X)
4	Do you estimate Scope 1 emissions (direct emissions)?	Yes (X)	No()
4.1	Amount of Scope 1 emissions reported (tCO ₂ e)	16,281.83	
5	Do you estimate Scope 2 emissions (indirect emissions)?	Yes (X)	No ()
5.1	Amount of Scope 2 emissions reported (tCO ₂ e)	23,522.80	

2. Objective of the pre-verification

To evaluate compliance of GHG emissions reporting with the reporting standards established by the Greenhouse Gas Protocol (GHG Protocol), using its main reference: "A Corporate Accounting and Reporting Standard", through the controls associated with the information system and the data corresponding to the GHG emissions reported by Rotoplas, taking as a reference the documentary information received.

3. Verification Criteria

- The GHG Protocol Corporate Accounting and Reporting Standard.
- Agreement that establishes greenhouse gases or compounds that are grouped together for emissions reporting purposes, as well as their warming potentials.
- Agreement that establishes the technical particulars and formulas to apply methodologies for calculating greenhouse gas or compound emissions.
- List of fuels and their calorific values (National Commission for the Efficient Use of Energy, CONUEE for its Spanish acronym) to be used for reporting to RENE 2023.
- Criteria for the verification of Greenhouse Gas and Compound Emissions Reports in the framework of the National Emissions Registry.

4. Scope of the Verification

The pre-verification was based on GHG Protocol standards, and the materiality threshold was established in accordance with the National Emissions Registry (RENE, for its Spanish acronym), which includes the types of GHGs emitted, energy used, production generated and technology installed for pollutant control in the corresponding reporting period.

Scope						
Emissions:	Direct: Scope 1 (X) Indirect: Scope 2 (X) Direct from stationary sources and industrial processes (X)					
Types of GHGs in the emissions report (CO₂,CH₄,N₂O, HFC, PFC,SF₆, Compounds):	CO ₂	CH ₄	N ₂ O	HFC	PFC	SF ₆
Materiality threshold:	5%					

The activities associated with the pre-verification of documents included the following:

- 1) Review and analysis of the 2023 GHG emissions calculation tool, developed by Rotoplas;
- 2) Reproduction of emission calculations considering the following variables: - Emission factors,
 - Global warming potentials,
 - Conversion factors,
 - Calorific values.

The documentation was provided through Raul Maganda Mendez as *ESG Environmental Head* and Guillermo Punzo Suazo as Head of Sustainability; the documentation presented is listed below:

Name of the document
Summary of environmental indicators 2023.xlsx

5. Control approach

An operational control approach was defined; that is, all activities in which Grupo Rotoplas can introduce and implement operation policies are considered.

Table 1 shows the location of the facilities:

Table 1. Location of facilities included in the GHG inventory.

Country	Facility type	Reference
Mexico	Plant	Anahuac, Veracruz (Gulf), Guadalajara, Leon Rotomolding, Leon Rotopinsa, Lerma, Merida (Southeast), Monterrey Compounds, Monterrey Rotomolding, Los Mochis (Pacific), Tuxtla
	Headquarters	MX Corporate and RSA Corporate
Argentina	Plant	Pilar, Pilarica, Loma Hermosa and San Martín.
Nicaragua	Plant	Nicaragua
Guatemala	Plant	Guatemala
Peru	Plant	Peru
United States	Stores	US Stores
Costa Rica	Distribution center	CEDIS Costa Rica
Honduras	Distribution center	CEDIS Honduras

Source: Own development.

6. Period analyzed

This emissions inventory report pertains to the operations performed during 2023, regarding the period between January 1 and December 31.

7. Recalculation of emissions and materiality

The base document considered for the recalculation of emissions was the calculation tool "Summary of environmental indicators 2023.xlsx" developed by Rotoplas, which includes the information required to calculate Scope 1 and Scope 2 emissions (emission factors, calorific values, references and equations used).

The procedures and/or methods applied to recalculate emissions and the corresponding comparison with the calculation tool presented by Rotoplas were carried out considering the methodologies and calculation variables applicable for each emission source (See References).

Table 2 shows the total emissions by facility estimated by e3 Consultora Ambiental and their percentage of materiality with regard to the emissions estimated by Rotoplas:

Table 2. Materiality obtained by facility.

Facility	Emissions (tCO ₂ e)		Materiality (%)
	e3 Consultora Ambiental	Rotoplas	
Anahuac	2,970.58	2,972.80	0.07
Gulf - Veracruz	1,417.00	1,413.15	-0.27
Guadalajara	842.28	842.37	0.01
Leon Rotomolding	2,678.48	2,670.99	-0.28
Leon Rotopinsa	4,770.42	4,745.79	-0.52
Lerma	2,525.34	2,513.19	-0.48
Merida	1,281.85	1,279.93	-0.15
Monterrey Compuestos	7,078.77	7,047.77	-0.44
Monterrey Rotomolding	1,317.13	1,311.90	-0.40
Pacific Sinaloa	2,204.81	2,199.13	-0.26
Tuxtla	1,014.51	1,014.24	-0.03
Nicaragua	259.62	259.78	0.06
Guatemala	1,465.41	1,466.22	0.06
Peru	2,006.41	2,007.22	0.04
Pilar	1,532.70	1,533.19	0.03
Pilares	2,291.81	2,292.36	0.02
Loma Hermosa	1,665.27	1,666.04	0.05
San Martín	2,394.78	2,395.89	0.05
US Stores	91.80	91.80	0.00
Cedis Costa Rica	0.19	0.20	0.71
Cedis Honduras	4.19	4.19	-0.02
Headquaters MX	86.94	86.34	-0.68
Headquaters RSA	9.28	9.21	-0.68
Total	39,909.57	39,631.95	-0.70

Source: Own development.

Table 3 shows the total emissions estimated by e3 Consultora Ambiental and their percentage of materiality with regard to the emissions estimated by Rotoplas:

Table 3. Results of the recalculation of Grupo Rotoplas GHG emissions.

Team	Scope 1 emissions (tCO ₂ e)	Scope 2 emissions (tCO ₂ e)	Total (tCO ₂ e)
Rotoplas	16,296.73	23,335.22	39,631.95
e3 Consultora Ambiental	16,281.84	23,627.73	39,909.57
Materiality % (e3 - Rotoplas)			-0.70

Source: Own development.

8. Conclusions and Recommendations

- Based on the results presented in Tables 2 and 3, the 5% materiality threshold between the emissions estimated by e3 Consultora Ambiental and Rotoplas is not exceeded, which means that the difference in reported emissions is minimal and not deemed significant. This supports a positive result in the GHG Inventory 2023 pre-verification exercise.
- Based on the results obtained, it is clear that emissions total **39,909.57 tCO₂e**, where those corresponding to Scope 1 amount to **16,281.84 tCO₂e** (40.80%) while Scope 2 total **23,627.73 tCO₂e** (59.20%).
- Compared to the 2022 inventory, the results for 2023 show that there was a decrease of 5,816.49 tCO₂e in Scope 1 emissions, related to a lower consumption of LPG and natural gas, while there was a 771.5 tCO₂e increase in Scope 2 emissions related to higher consumption of electricity from the grid and a reduction in cogeneration consumption.
- The increase in energy consumption from the power grid is due to the termination of the contract with the clean energy supplier in 2023, which initiated the process of transitioning to renewable energy sources. However, due to government permitting restrictions, Rotoplas experienced delays in implementation, resulting in a reduction in renewable energy consumption this year.
- Annex I includes five tables with estimates of other atmospheric pollutant emissions related to the inputs considered within the Environmental Indicators Summary 2023.

9. Recommendation

- Use emission factors and calorific values for the corresponding country to calculate emissions. If national data are not available, values provided by international institutions can be used.

10. References

- List of fuels and their calorific values 2023 to be considered to identify the users with a high consumption pattern, as well as the factors to determine equivalences in terms of barrels of oil equivalent.
- AGREEMENT that establishes the technical particulars and formulas to apply methodologies for calculating greenhouse gas or compound emissions.
- AGREEMENT that establishes greenhouse gases or compounds that are grouped together for emissions reporting purposes, as well as their warming potentials.
- Emission factor of the National Power System 2023.
- Energy Balance 2020, Government of Guatemala.
- TECHNICAL NOTE FOR THE USE OF THE SOCIAL PRICE OF CARBON IN THE SOCIAL ASSESSMENT OF INVESTMENT PROJECTS, Peru 2021.
- Low Carbon Power, Electricity consumption in Nicaragua 2021.

Annex I



Table 4. Other emissions of atmospheric pollutants from the use of natural gas.

Planta	Gas Natural (ton)								
	Mónóxido de Carbono (CO)	PS	COT	COV	SO3	SO2	NOX	PSFILTRABLES	Total
Anahuac	1.99	0.18	0.26	0.13	No Aplica	0.00	2.38	No Aplica	4.94
Golfo Veracruz	0.51	0.05	0.07	0.03	No Aplica	0.00	0.61	No Aplica	1.27
Guadalajara	0.57	0.05	0.07	0.04	No Aplica	0.00	0.68	No Aplica	1.41
León Rotomoldeo-Soplo	0.98	0.09	0.13	0.06	No Aplica	0.00	1.17	No Aplica	2.43
León Rotopinsa	-	-	-	-	No Aplica	-	-	No Aplica	-
Lerma	-	-	-	-	No Aplica	-	-	No Aplica	-
Mérida	0.59	0.05	0.08	0.04	No Aplica	0.00	0.71	No Aplica	1.47
Monterrey Compuestos	-	-	-	-	No Aplica	-	-	No Aplica	-
Monterrey Rotomoldeo-Soplo	0.24	0.02	0.03	0.02	No Aplica	0.00	0.28	No Aplica	0.59
Pacífico Sinaloa	-	-	-	-	No Aplica	-	-	No Aplica	-
Tuxtla	-	-	-	-	No Aplica	-	-	No Aplica	-
Totales México	4.88	0.44	0.64	0.32	-	0.00	5.82	-	12.11
Nicaragua	-	-	-	-	No Aplica	-	-	No Aplica	-
Guatemala	-	-	-	-	No Aplica	-	-	No Aplica	-
Totales Centroamerica	-	-	-	-	-	-	-	-	-
Loma Hermosa	0.01	0.00	0.00	0.00	No Aplica	0.00	0.01	No Aplica	0.01
Perú	1.28	0.12	0.17	0.08	No Aplica	0.00	1.53	No Aplica	3.17
Pilar	1.00	0.09	0.13	0.07	No Aplica	0.00	1.20	No Aplica	2.49
Pilarica	1.18	0.11	0.15	0.08	No Aplica	0.00	1.41	No Aplica	2.92
San Martín	0.01	0.00	0.00	0.00	No Aplica	0.00	0.01	No Aplica	0.02
Totales Argentina	2.19	0.20	0.29	0.14	-	0.00	2.62	-	5.45
									17.55

Source: Own development.

Table 5. Other emissions of atmospheric pollutants from the use of LP gas.

Planta	Gas LP (ton)								
	CO	PS	COT	COV	SO3	SO2	NOX	PSFILTRABLES	Total
Anahuac	0.02	0.00	0.00	No Aplica	No Aplica	0.04	0.03	0.00	0.09
Golfo Veracruz	0.02	0.00	0.00	No Aplica	No Aplica	0.03	0.03	0.00	0.08
Guadalajara	0.01	0.00	0.00	No Aplica	No Aplica	0.01	0.01	0.00	0.04
León Rotomoldeo-Soplo	-	-	-	No Aplica	No Aplica	-	-	-	-
León Rotopinsa	0.02	0.00	0.00	No Aplica	No Aplica	0.05	0.04	0.00	0.12
Lerma	0.03	0.00	0.00	No Aplica	No Aplica	0.06	0.05	0.00	0.15
Mérida	0.02	0.00	0.00	No Aplica	No Aplica	0.04	0.04	0.00	0.10
Monterrey Compuestos	0.12	0.01	0.02	No Aplica	No Aplica	0.23	0.22	0.00	0.60
Monterrey Rotomoldeo-Soplo	0.02	0.00	0.00	No Aplica	No Aplica	0.04	0.04	0.00	0.11
Pacífico Sinaloa	0.82	0.08	0.11	No Aplica	No Aplica	1.58	1.47	0.02	4.07
Tuxtla	0.58	0.05	0.08	No Aplica	No Aplica	1.11	1.03	0.01	2.86
Totales México	1.66	0.16	0.22	-	-	3.20	2.96	0.04	8.22
Nicaragua	0.16	0.02	0.02	No Aplica	No Aplica	0.31	0.28	0.00	0.79
Guatemala	0.88	0.08	0.12	No Aplica	No Aplica	1.70	1.57	0.02	4.37
Totales Centroamerica	1.04	0.10	0.14	-	-	2.00	1.86	0.02	5.16
Loma Hermosa	-	-	-	No Aplica	No Aplica	-	-	-	-
Perú	0.02	0.00	0.00	No Aplica	No Aplica	0.03	0.03	0.00	0.08
Pilar	0.01	0.00	0.00	No Aplica	No Aplica	0.02	0.02	0.00	0.05
Pilarica	-	-	-	No Aplica	No Aplica	-	-	-	-
San Martín	-	-	-	No Aplica	No Aplica	-	-	-	-
Totales Argentina	0.01	0.00	0.00	-	-	0.02	0.02	0.00	0.05
									13.43

Source: Own development.

Table 6. Other emissions of atmospheric pollutants from the use of Diesel.

Planta	Diésel (ton)								Total
	CO	PS	COT	COV	SO3	SO2	NOX	PSFILTRABLES	
Anahuac	0.00	0.00	0.00	No Aplica	0.00	0.06	0.02	0.00	0.08
Golfo Veracruz	-	-	-	No Aplica	-	-	-	-	-
Guadalajara	-	-	-	No Aplica	-	-	-	-	-
León Rotomoldeo-Soplo	0.00	0.00	0.00	No Aplica	0.00	0.01	0.00	0.00	0.01
León Rotopinsa	-	-	-	No Aplica	-	-	-	-	-
Lerma	0.00	0.00	0.00	No Aplica	0.00	0.00	0.00	0.00	0.00
Mérida	-	-	-	No Aplica	-	-	-	-	-
Monterrey Compuestos	0.00	0.00	0.00	No Aplica	0.00	0.01	0.00	0.00	0.01
Monterrey Rotomoldeo-Soplo	-	-	-	No Aplica	-	-	-	-	-
Pacífico Sinaloa	0.00	0.00	0.00	No Aplica	0.00	0.00	0.00	0.00	0.00
Tuxtla	-	-	-	No Aplica	-	-	-	-	-
Totales México	0.01	0.00	0.00	-	0.00	0.08	0.02	0.00	0.11
Nicaragua	-	-	-	No Aplica	-	-	-	-	-
Guatemala	-	-	-	No Aplica	-	-	-	-	-
Totales Centroamerica	-	-	-	-	-	-	-	-	-
Loma Hermosa	-	-	-	No Aplica	-	-	-	-	-
Perú	-	-	-	No Aplica	-	-	-	-	-
Pilar	-	-	-	No Aplica	-	-	-	-	-
Pilarica	0.00	0.00	0.00	No Aplica	0.00	0.05	0.01	0.00	0.07
San Martín	-	-	-	No Aplica	-	-	-	-	-
Totales Argentina	0.00	0.00	0.00	-	0.00	0.05	0.01	0.00	0.07
									0.18

Source: Own development.

Table 7. Other emissions of atmospheric pollutants from the use of Gasoline.

Planta	Gasolina (ton)				Total
	CO	NOX	NMCOVS	SO2	
Anahuac	0.26	0.81	0.06	No Aplica	1.13
Golfo Veracruz	-	-	-	No Aplica	-
Guadalajara	-	-	-	No Aplica	-
León Rotomoldeo-Soplo	-	-	-	No Aplica	-
León Rotopinsa	-	-	-	No Aplica	-
Lerma	-	-	-	No Aplica	-
Mérida	-	-	-	No Aplica	-
Monterrey Compuestos	-	-	-	No Aplica	-
Monterrey Rotomoldeo-Soplo	0.03	0.10	0.01	No Aplica	0.15
Pacífico Sinaloa	-	-	-	No Aplica	-
Tuxtla	-	-	-	No Aplica	-
Totales México	0.29	0.92	0.07	-	1.27
Nicaragua	-	-	-	No Aplica	-
Guatemala	-	-	-	No Aplica	-
Totales Centroamerica	-	-	-	-	-
Loma Hermosa	-	-	-	No Aplica	-
Perú	-	-	-	No Aplica	-
Pilar	-	-	-	No Aplica	-
Pilarica	-	-	-	No Aplica	-
San Martín	-	-	-	No Aplica	-
Totales Argentina	-	-	-	-	-
					1.27

Source: Developed by the authors.

Table 8. Summary of other atmospheric emissions by country

Resumen de Otras emisiones por país (ton)					
	Mexico	Centroamérica	Argentina	Perú	Totales
CO	6.83	1.04	2.21	1.29	11.37
PS	0.60	0.10	0.20	0.12	1.02
COT	0.86	0.14	0.29	0.17	1.45
COV	0.32	-	0.14	0.08	0.55
SO3	0.00	-	0.00	-	0.00
SO2	3.28	2.00	0.07	0.03	5.39
NOX	9.72	1.86	2.65	1.56	15.78
PSFILTRABLES	0.04	0.02	0.00	0.00	0.07
NMCOVS	0.07	-	-	-	0.07
				Total	35.70

Source: Developed by the authors.

Annex II



Table 9. Emission factors and calorific values.

Fuel	Emission factors			Calorific power
	CO2	CH4	N2O	
	(t/MJ)	(kg/MJ)	(kg/MJ)	(MJ/m3)
Dry gas	5.61E-05	1.00E-06	1.00E-07	33.54
Liquefied petroleum gas	6.31E-05	1.00E-06	1.00E-07	26,121.58
Diesel	7.41E-05	3.90E-09	3.90E-09	38,147.70
Gasoline and naphtha	6.93E-05	2.50E-08	8.00E-09	35,304.71

Table 10. Electric emission factors by country.

Source	Electric emission factor
	tCO2e/ MWh
National power grid (Mexico)	0.438
National power grid (Argentina)	0.428
National power grid (Nicaragua)	0.354
National power grid (Guatemala)	0.281
National power grid (Peru)	0.452
National power grid (USA)	0.394
National power grid (Costa Rica)	0.028
National power grid (Honduras)	0.633
Cogeneration energy	0.391
Renewable Energy	0.000



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Executive Summary

In 2023, the Rotoplas supply/value chain emitted approximately 400,019.23 tons of carbon dioxide equivalent (tCO₂e).

In the second exercise for estimating Scope 3 screening emissions, 9 categories of the "GHG Protocol Scope 3" were calculated; the following table shows the emissions per Scope 3 category:

Category ID	Description	Category emissions (tCO ₂ e)	Scope 3 Contribution (%)	
Upstream	1	Goods and services acquired	53,276.66	15.04%
	2	Capital assets	12,452.39	3.52%
	3	Activities related to fuel and energy (not included in Scope 1 and 2)	9,977.39	2.82%
	4	Upstream transportation and distribution	26,892.25	7.59%
	5	Management of waste generated in operations	157.42	0.04%
	6	Business travel	1,553.73	0.44%
	7	Employee commutes	4,853.36	1.37%
	8	Upstream leased assets	N/A	0%
Downstream	9	Downstream transportation and distribution	N/A	0%
	10	Processing of products sold	N/A	0%
	11	Use of products sold	230,618.93	65.11%
	12	End-of-life treatment of products sold	14,421.72	4.07%
	13	Downstream leased assets	N/A	0%
	14	Franchises	N/A	0%
	15	Investments	N/A	0%
Total		354,203.86	100%	

The most relevant categories in terms of the magnitude of emissions are:

- Category 11 Use of products sold
- Category 1 Goods and services acquired
- Category 4 Upstream transportation and distribution

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Chapter 1

General Aspects of Scope 3 GHG Emissions

Screening



1. CHAPTER I GENERAL ASPECTS OF SCOPE 3 SCREENING

1.1. Introduction

Rotoplas S.A. de C.V. Is a leading company in the development and sale of water solutions. With nearly 4 decades of experience and a culture of innovation and sustainability, Rotoplas participates in every stage of the water cycle and offers individual and integrated storage, waterflow, and improvement solutions.

e3 Consultora Ambiental is a provider of environmental services and solutions for the public and private sectors. Among others, it specializes in supporting companies on their path to sustainability and low-carbon development. This document reports the results obtained from the project:

- Screening of Rotoplas Scope 3 GHG Emissions 2023

The screening estimate is developed under the methodologies and parameters of the Greenhouse Gas Protocol Guidance for Scope 3 (GHG). The Scope 3 screening standard of the GHG Protocol defines 15 categories classified into two groups—upstream and downstream groups—which focus on assessing the value chain’s activity data by collecting data to estimate emissions.

1.2. Objective of the project

To preliminarily estimate and report Rotoplas' GHG Scope 3 emissions in 2023, using the methodology defined by the GHG Protocol as a reporting framework.

1.2.1. Specific objectives

- To reflect, in accordance with the GHG Protocol accounting and reporting principles, a screening of the value chain emissions resulting from Rotoplas' corporate activities.
- To identify the main Scope 3 categories that contribute to Rotoplas' value chain emissions.

1.3. Greenhouse Gas Protocol Initiative

The GHG Protocol emerged in the late 1990s, when the WRI¹ and the WBCSD^{2 3} saw the need to have an international standard for corporate GHG accounting and reporting.

The GHG Protocol establishes comprehensive global standardized frameworks for the measurement and management of greenhouse gas (GHG) emissions from public and private sector operations, as well as their value chain and mitigation actions.

¹ World Resources Institute

² World Business Council for Sustainable Development

³Source: WRI, WBCSD, Technical Guidance for Calculating Scope 3 Emissions, GHG Protocol (2013)

1.4. Scope 3 emissions: Corporate Value Chain Standard

1.5. Scope 3 emissions are those that occur in the value chain as a consequence of the company's activities. The standard is part of the total emissions assessment and its objective is to identify significant emissions generated by supplier and customer activities. This scope shows a broader picture of an organization's contribution to climate change, as it complements the impact of direct and indirect process emissions (scopes 1 and 2). By knowing the three scopes, a company can make decisions that allow for comprehensive emission reduction strategies (Figure 1).

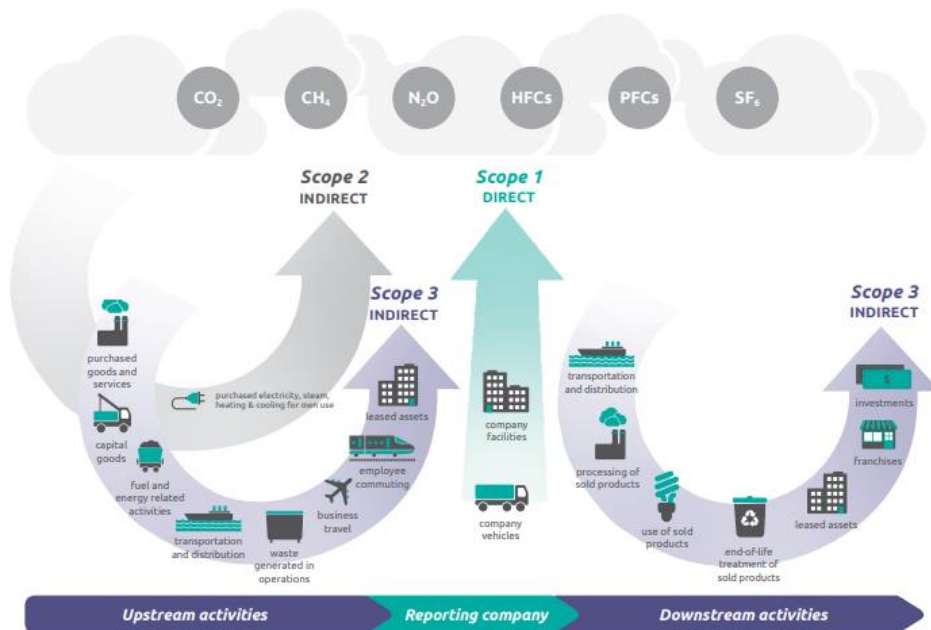


Figure 1 Scope 3 categories

The standard describes 15 categories under which GHG emissions attributed to the company can be calculated. A description of the 15 GHG Protocol categories can be found in Table 12 of Annex 1 "GHG Protocol Scope 3 Categories".

1.6. Control approach and organizational and operational boundaries

Scope 3 emissions correspond to the emission of greenhouse gases (GHG) that originate in business operations from sources that are not owned by Rotoplas or under its organizational or operational control.

The approach for the Scope 3 screening corresponds to upstream and downstream emissions from the Rotoplas supply/value chain, considering the most relevant categories according to the sector and operations of the organization.

It was decided to estimate emissions for the Rotoplas business models in the countries where they are present, considering the availability of information, as can be seen in Figure 2.



Figure 2 Rotoplas presence and business models

1.6.1. Rotoplas: Business models and context

Rotoplas has two business models: The first focuses on the production and marketing of water storage, waterflow, and water improvement products. The first model includes water tanks, cisterns, pipes, valves, pumps, purifiers and heaters, among others (Figure 3).



Figure 3 Rotoplas products

The second business model integrates services and maintenance, and includes wastewater treatment plants (WWTP), purification and desalination plants, residential and commercial purifiers (Bebbia brand) and agricultural water management through intelligent irrigation systems (Rieggo brand)⁴. At the end of 2023, Rieggo Rotoplas acquired HiTech Irrigation Mexico, boosting Rieggo's services into the sale and installation of irrigation systems and topographical surveys.

⁴Source: Rotoplas website <https://rotoplas.com.mx/>

1.7. Base year

The 2022 screening exercise was considered as the base year for Rotoplas' Scope 3 value chain emissions. In 2022, Rotoplas' Scope 3 emissions were **202,084.23 tCO₂e**.

The baseline year is established according to the year with the best quality of emissions information and can be established according to the best quality and traceability of information for subsequent Scope 3 inventory screening exercises.

1.8. Methodology

For the estimation of Scope 3 emissions, GHG Protocol defines several methods:

- Activities by magnitude of GHG emissions (industry average data, input-output data)
- Activities based on financial expenses or revenues (considering that some activities do not directly correlate to costs with emissions)
- Activities based on other criteria (activities on which the organization has influence, exposure to organizational risks, consideration by stakeholders, any additional criteria established by the company, industry or government)

To estimate Rotoplas' scope 3 emissions, a hybrid model was established that makes it possible to estimate certain categories by carbon intensity, carbon footprint, activity data and emission factors, as well as indirect estimates from average factors in Rotoplas' sector based on expenses and revenues.

1.9. Scope 3 calculation tool

A tool that uses the "Quantis Scope 3 Evaluator" factors was used to estimate Scope 3 category emissions following an average value methodology.

Quantis was an interface used to calculate the Scope 3 screening of greenhouse gas emissions from the value chain. The interface is based on the hybrid calculation of emissions per category. The main data inputs are based on expenses and revenues according to the sector to which an organization's purchases and sales belong. The Quantis tool worked through EEIO (environmentally extended input output) emission factors: Organization's Co₂e/spending in USD.

The methodology used by the tool follows the standards and guidelines established by GHG Protocol, making it an attractive interface for the Scope 3 screening estimate; however, in August 2023, the interface and servers, which were free of charge, were decommissioned. This was due to multiple factors such as technological, technical factors in the emissions field, and operational factors of the GHG Protocol organization.

e3 Consultora Ambiental developed a tool derived from the Quantis methodology, which updates the Co₂e₂e emission factors by costs and revenues for the Scope 3 screening estimate of the organizations' value chain. For further reference, Annex 2 shows the factors that the tool used for the calculations in this report.

1.10. Rotoplas Scope 3 Screening Exercise 2023

For the 2023 Scope 3 emissions screening exercise, different estimation methods and approaches were established for the defined categories subject to reporting. Table 1 shows the categories to be estimated in 2023.

Table 11 Rotoplas Scope 3 Categories

Rotoplas Scope 3 Category Status 2023			
Category ID		Subject to reporting	Comments
Upstream	1. Goods and services acquired	Yes	Available information 2023
	2. Capital assets	Yes	Available information 2023
	3. Activities related to fuel and energy (not included in Scope 1 and 2)	Yes	Available information 2023
	4. Upstream transportation and distribution	Yes	Available information 2023
	5. Waste generated in operations	Yes	Available information 2023
	6. Business travel	Yes	Available information 2023
	7. Employee commutes	Yes	Available information 2023
	8. Leased assets	S/I	No information available 2023
Downstream	9. Transportation and distribution	N/A	Category does not apply
	10. Processing of products sold	N/A	Category does not apply
	11. Use of products sold	Yes	Available information 2023
	12. End-of-life treatment of products sold	Yes	Available information 2023
	13. Leased assets	S/I	No information available 2023
	14. Franchises	N/A	Category does not apply
	15. Investments	N/A	Category does not apply

Table 2 shows the table of methodology approaches for estimating the applicable categories for 2023.

Table 12 Emissions Estimation Methodology and Approach

Methodology and approach to Scope 3 category estimation		
Category ID	Methodology/approach	Database
1	Supplier carbon intensity	Sustainability reports: The Dow Chemical Company - Climate Change 2022 (CDP), Hyosung Chemical - Climate Change 2022 (CDP), Braskem S/A - Climate Change 2022, Borealis Ag Combined Annual Report 2022, Ternium Sustainability Report 2021.
	Average values: expenses and revenues	Consolidated cost of goods and services Rotoplas 2023
2	Average values: expenses and revenues	Capex of Rotoplas projects 2023
3	Average values: Ratio of Scope 1 and 2 emissions Rotoplas 2023	Rotoplas 2023 GHG Emissions Inventory Findings Report
4	Emission factors: distance and fuel consumption	Consolidated fuel consumption and transportation distances Rotoplas 2023
5	Emission factors: DEFRA Emission Factors	Rotoplas waste consolidation 2023
6	Average values: expenses and revenues	Rotoplas business travel and other activities consolidation 2023
7	Average values: Emission factors by personnel	Rotoplas workforce consolidation 2023
11	Carbon footprint and products sold	Rotoplas Consolidated Forecast 2023
12	Carbon footprint and products sold	Rotoplas Consolidated Forecast 2023



Chapter 2

Results



2. CHAPTER II RESULTS

Rotoplas' Scope 3 emissions were estimated using the information available for the reporting year. The screening estimate was developed under a hybrid quantification scheme, in which a tool based on Quantis is applied; this tool works with an average factor approach for expenses and revenues. Direct emission factors and the carbon footprint and intensity of some products were also used.

2.1. Scope 3 screening results

According to the GHG Protocol methodologies for estimating the Scope 3 categories applicable to Rotoplas, the Rotoplas value chain emitted approximately **400,019.23 tCO₂e** in 2023. Table 3 shows the breakdown of emissions by category, as well as the contribution percentage.

Table 13 Scope 3 Emissions Results Table

Category	Description	Methodology	Total Emissions tCO ₂ e	Contribution %	
Upstream	Category 1	Goods and services acquired	Average cost and expense factors / Estimation by carbon intensity	53,276.66	15.04%
	Category 2	Capital assets	Average expense and cost factors	12,452.39	3.52%
	Category 3	Activities related to fuel and energy (not included in Scope 1 and 2)	Average factors based on Quantis	9,977.39	2.82%
	Category 4	Upstream transportation and distribution	Emission factors	26,892.25	7.59%
	Category 5	Waste generated in operations	Emission factors	157.42	0.04%
	Category 6	Business travel	Average expense and cost factors	1,553.73	0.44%
	Category 7	Employee commutes	Average factors based on Quantis	4,853.36	1.37%
	Category 8	Upstream leased assets	No information available for 2023	N/A	0%

Category	Description	Methodology	Total Emissions tCO ₂ e	Contribution %	
Downstream	Category 9	Downstream transportation and distribution	No information available for 2023	N/A	0%
	Category 10	Processing of products sold	Not applicable	N/A	0%
	Category 11	Use of products sold	Estimation by product carbon footprint	230,618.93	65.11%
	Category 12	End-of-life treatment of products sold	Estimation with product carbon footprint	14,421.72	4.07%
	Category 13	Downstream leased assets	No information available for 2023	N/A	0%
	Category 14	Franchises	Not applicable	N/A	0%
	Category 15	Investments	No information available for 2023	N/A	0%
Total Scope 3 emissions			354,203.86	100%	

Regarding Scope 1 and 2 emissions, value chain emissions correspond to a 90.94% contribution in Rotoplas' total emissions in 2023 (Table 4).

Table 14 Rotoplas Scope 1, 2 and 3 emissions contribution in 2023

Scope	Emissions (tCO ₂ e)	Contribution %	Overall contribution %
Scope 1	16,281.84	4%	10%
Scope 2	23,627.73	6%	
Scope 3: Value chain	354,203.86	90%	90%
Total	439,928.80	100.00%	100.00%

Figure 4 shows the magnitude of emissions by category, considering that, for 2023, Rotoplas estimated 9 Scope 3 categories.

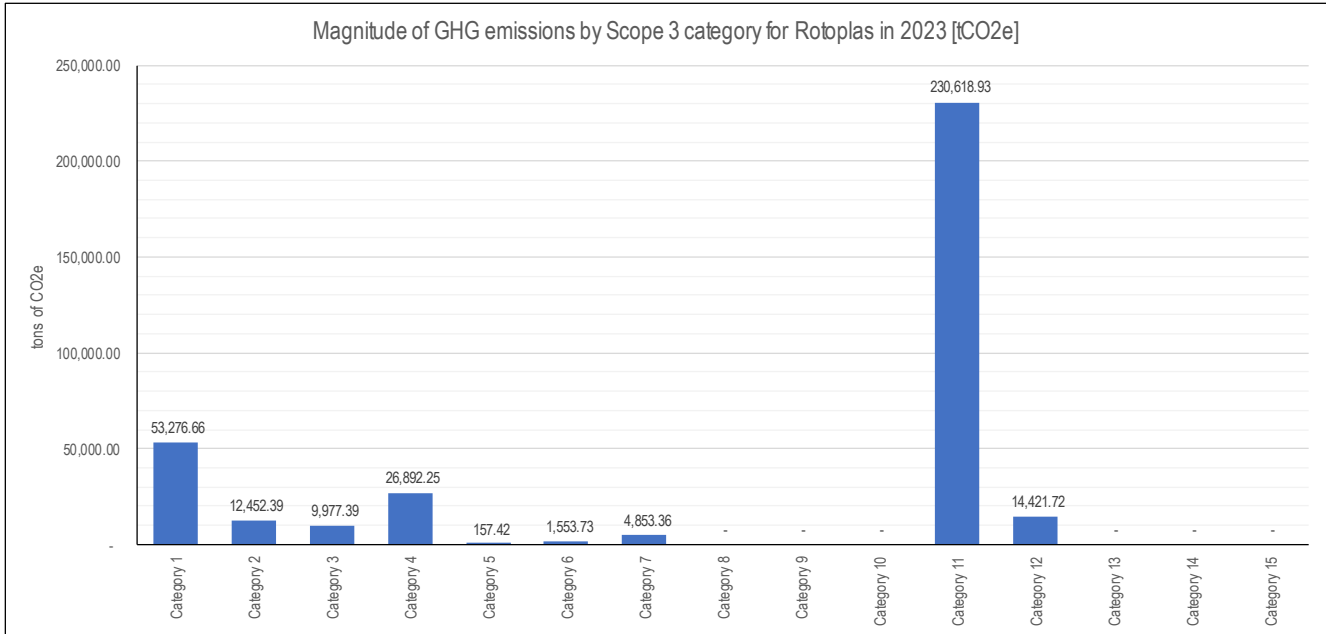


Figure 4 Magnitude of CO₂e emissions by category Scope 3

As shown in Figure 4, emissions from category 11 "Use of products sold" contribute 230,618.93tCO₂e, a value corresponding to 65.11% of Scope 3 emissions.

Emissions from category 1 "Purchased goods and services" and category 4 "Transportation and upstream distribution" contribute 15.04% and 7.59%, respectively, while the least significant Scope 3 emissions are those corresponding to category 5 "Waste generated in operations" and category 6 "Business travel", with percentage values of 0.04% and 0.44%, respectively.

Figure 5 shows the emissions contribution of Rotoplas in 2023. Rotoplas' value chain emissions in 2023 represent 90% while Scope 1 emissions stand for 4% and Scope 2 emissions for 6%.

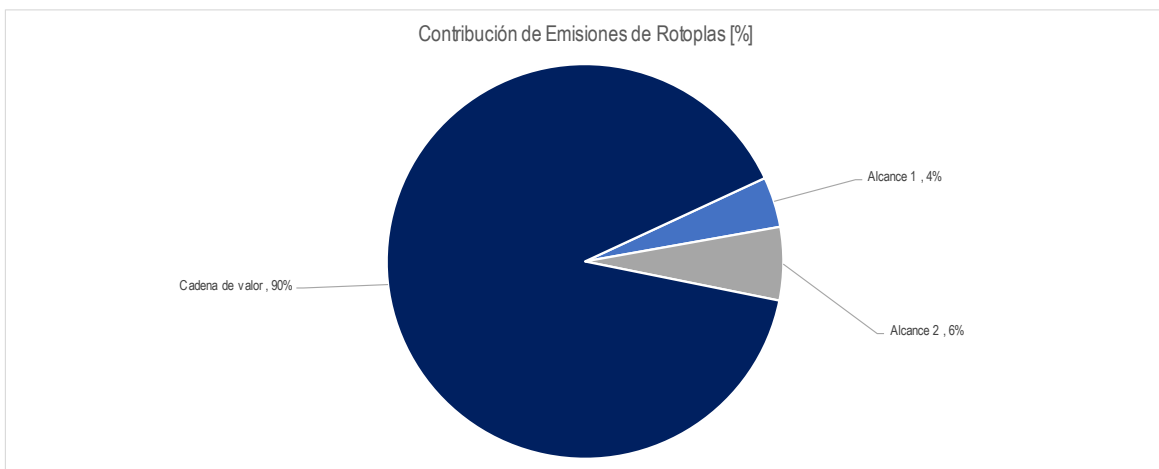


Figure 5 Rotoplas Scope 1, 2 and 3 emissions contribution in 2023

2.1.1. Results Category 1 Goods and services acquired

Category 1 of Rotoplas' "Goods and services acquired" contributed 15.04% of total scope 3 emissions, equivalent to **53,276.66 tCO₂e**. Average factors based on expenses and costs, as well as the carbon intensity of Rotoplas' main raw materials, were used to estimate the emissions of this category.

89% of category 1 emissions corresponds to the development of the calculation based on costs and expenses, while the remaining 11% corresponds to the estimation by carbon intensity. These values translate into 47,336.13 tCO₂e and 5,940.53 tCO₂e, respectively.

Regarding the breakdown of procurement sectors in category 1, as shown in Table 5, the most influential procurement sector in category 1 is the acquisition of various products, other than Rotoplas' raw material, representing 43%, followed by the purchase of various services, such as IT, marketing, and consulting, among others. These services represent a 40% contribution. Emissions from the purchase of raw materials for the manufacture of products correspond to approximately 17% (PE, PPR, PCR, resins and MB's).

Table 15 Category 1 Procurement Sectors

Procurement sector/Product	Emissions (tCO ₂ e)	Contribution %
PE	3,792.86	7%
PPR, PPR + cargo	2,624.52	5%
MBs	1,661.78	3%
Resins and PCR	1,161.47	2%
Products other than PE, PPR, MBs, PCR, and resins	22,772.81	43%
Miscellaneous services	21,263.23	40%
Total	53,276.66	100%

The emission factors used to estimate emissions from expenses and costs can be viewed in Annex 2 "Tool emission factors", while suppliers' carbon intensity can be viewed in Annex 3 "Suppliers and their carbon intensity".

2.1.2. Results Category 2 Capital goods

Category 2 on "capital goods" contributed **12,452.39 tCO₂e**, equivalent to 3.52% of total Scope 3 emissions. The category 2 emissions estimate was fully developed under a cost and expenditure approach, using EEIO average factors.

As shown in Table 6, the purchase of equipment, household appliances and electrical components contributes 40% of Rotoplas' category 2 emissions, followed by emissions from the purchase of machinery, with a value of 35%. The purchase of a fleet of vehicles stands at 3%, which is considered the least significant value in this category.

Table 16 Category 2 Procurement Sectors

Procurement sector	Emissions (tCO ₂ e)	Contribution %
Machinery	4,365.38	35%
Electrical equipment, appliances and components.	5,036.08	40%
Computer and electronic products.	585.51	5%
Motor vehicles, bodies and trailers, and parts thereof	357.30	3%

Construction, furniture and related products.	2,108.12	17%
Total	12,452.39	100%

The emission factors used for the estimation of emissions from costs and expenses can be seen in Annex 2 "Tool emission factors".

2.1.3. Results for category 3 Fuel and energy-related activities

Category 3 summarizes the emissions generated by the extraction, production and/or transportation of fuels or energy so that the organization can consume these inputs; i.e. emissions resulting from Rotoplas' electricity or fuel consumption.

Category 3 on "Fuel and energy-related activities (not included in scope 1 and 2)" contributed 2.82% of Rotoplas' scope 3 emissions in 2023, this value is equivalent to **9,977.39 tCO₂e**.

For the calculation of emissions in this category, the scope 1 and scope 2 emissions ratio factor based on the Quantis tool was used (Annex 2).

2.1.4. Category 4 Upstream transportation and distribution

Category 4 of Rotoplas' emissions from "Upstream transport and distribution" contributed 7.59% of Scope 3 emissions, equivalent to **26,892.25 tons of CO₂e**. The estimation of this category was developed by emission factors and direct activity data, collecting information on fuel consumption for the transfer of group Rotoplas materials and products.

Table 7 shows the contribution of emissions by fuel type in category 4. Diesel consumption in the transportation of materials and products represents 90% of emissions, while gasoline and LP gas consumption represent 8% and 2%, respectively.

Table 17 Emissions by type of fuel in category 4

Country	Emissions from fuel in tCO ₂ e			Total
	Diesel	Gasoline	LP gas	
Mexico	17,355.81	2,018.41	583.83	19,958.05
Argentina	3,631.15	-	-	3,631.15
Central America	2,133.18	-	-	2,133.18
Peru	1,169.86	-	-	1,169.86
Total	24,290.00	2,018.41	583.83	26,892.25
Contribution	90%	8%	2%	100%

The emission factors used to calculate these emissions can be seen in Annex 4 of this document: "Fuel emission factors".

2.1.5. Results Category 5 Waste generated in operations

Category 5 on Rotoplas' "Waste generated in operations", had the lowest percentage contribution in 2023 at 0.04%, a value equivalent to **157.42 tons of CO₂e**. The estimation of emissions for this category was developed under the approach of emission factors and activity data.

The emission factors used to calculate these emissions can be seen in Annex 5 of this document: "Waste disposal emission factors".

2.1.6. Results category 6 Business travel

Category 6 on "business travel" emissions contributed 0.44% of Rotoplas' total Scope 3 emissions, equivalent to **1,553.73 tCO₂e**. The estimation of these emissions was developed using average cost and expense factors for air and ground transportation, lodging and other related activities.

For this exercise, the emissions from lodging (room nights) for financial year 2023 were excluded from category 6. Figure 6 shows the contribution by type of activity. 95% of category 6 emissions correspond to air travel, while 4% and 1% correspond to ground transportation in buses and ancillary activities (such as ground vehicle rental), respectively.

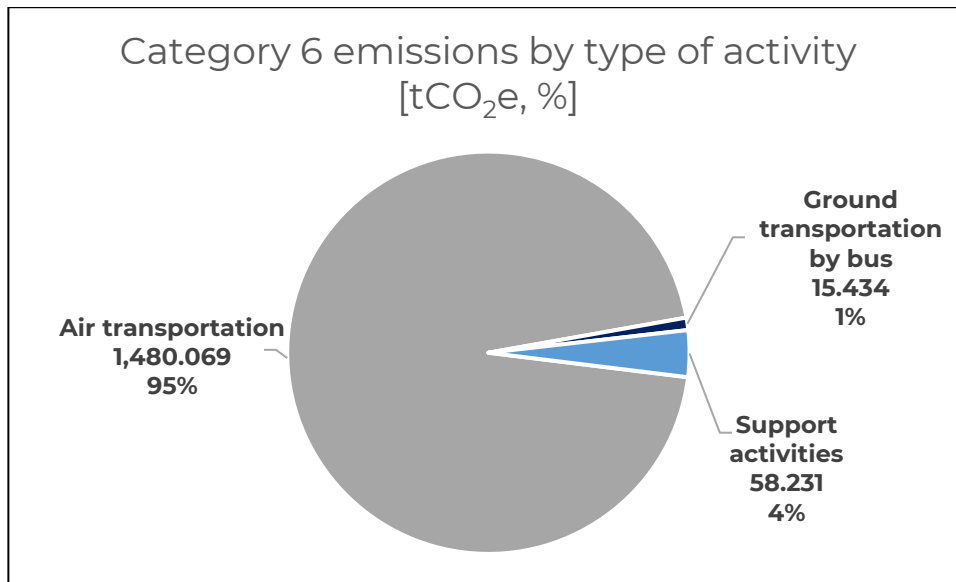


Figure 6 Contribution of emissions by activity in category 6

Emissions from lodging, also called hotel nights, have a magnitude of **475.35 tCO₂e**; however, they were excluded from this exercise.

The emission factors used for the estimation of emissions from costs and expenses can be seen in Annex 2 "Tool emission factors".

2.1.7. Results Category 7 Personnel commutes

Emissions from personnel commutes from their homes to work centers in 2023 were **4,853.36 tCO₂e**. The estimation of these emissions was developed using factors based on the Quantis tool and the sector of the reporting organization.

In 2023, Rotoplas had a total of 3,483 direct employees in different countries, as shown in Table 8.

Table 18 Rotoplas Employees 2023

Country	Number of employees
MEX	2,315
ARG	800
BR	44
CR	3
USA	91
SALV	4
GT	67
HN	5
NI	16
PE	138
Total	3,483

The factor used for the estimation of category 7 emissions can be found in Annex 2 "Tool emission factors".

2.1.8. Results Category 11 Use of products sold

Category 11 on "Use of products sold" was the category with the greatest impact and contribution in 2023, with **230,618.93 tCO₂e**, equivalent to 65.11% of Rotoplas' Scope 3 contribution. For the estimation of emissions in this category, the technical data sheets and carbon footprint of Rotoplas products sold in 2023 were used.

Category 11 emissions were classified as defined in the GHG Protocol standard: direct emissions from the use of products sold and indirect emissions from the use of products sold, excluding indirect emissions in financial year 2023. Table 9 shows the emissions from Rotoplas products sold in 2023.

Table 19 Category 11 emissions by classification

Category 11 Emissions			
Direct emissions		Indirect emissions	
Product	Emissions tCO ₂ e	Product	Emissions tCO ₂ e
Water purifiers and alkalizers	5,455.83	Hydraulic and fusion pipes	9,529.39
Pumps	669.98	Water tanks	21,805.97
Heaters	222,613.28	Cistern	2,469.90
Water treatment and recycling plants	1,879.84		
Total	230,618.93	Total	33,805.26

Of the emissions reported as direct emissions, the sale and use of water heaters translates into **230,618.93 tCO₂e**, equivalent to 97% of Rotoplas' category 11 emissions, while the use of purifiers/dispensers and pumps corresponds to 2% and 0.29%, and emissions from treatment plant services contribute 1% (Table 10).

Table 20 Category 11 Emissions contribution by product

Product sold	Emissions (tCO ₂ e)	% of contribution
Water purifiers and alkalizers	5,455.83	2%
Pumps	669.98	0.29%
Water treatment and recycling plants	1,879.84	1%
Heaters	268,428.65	97%
Total	274,554.461	100%

The emission factors from the use of the products sold, energy and fuel consumption, as well as the average lifetime, can be found in Annex 6 "Emission factors and data for the calculation of Category 11 and 12".

2.1.9. Results Category 12 End-of-life treatment of products sold

Category 12 on "End-of-life treatment of products sold" contributed 4.07% of Rotoplas' Scope 3 emissions in 2023, equivalent to **14,421.72 tons of CO₂e**. The emissions estimate for this category was developed using the technical data sheets of Rotoplas products sold in 2023.

As shown in Figure 7, emissions from the end of life of fusion and hydraulic pipes have the highest contribution, since they correspond to a combined value of 88% (46% and 42%, respectively), while emissions from the end of life of tanks and cisterns correspond to 4% and 8%, respectively.

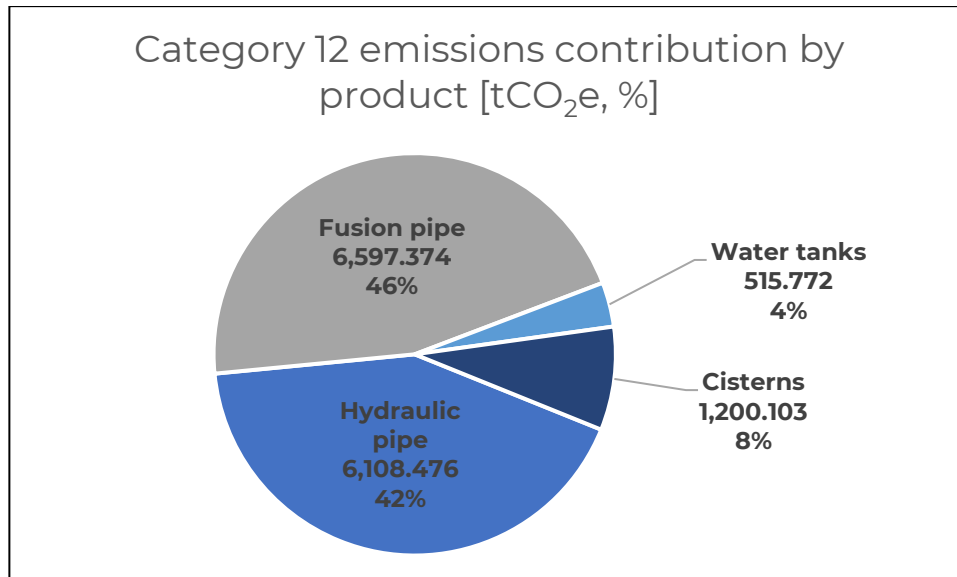


Figure 7 Category 12 emissions contribution by product



Chapter 3 Conclusions



3. CHAPTER III CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations can be drawn from the exercise to estimate the emissions of the Rotoplas value chain in 2023:

3.1. Conclusions

- The Rotoplas value chain emitted approximately 354,203.93 tCO₂e in 2023.
- The 2023 screening estimate of Rotoplas' Scope 3 emissions covered 9 of the 15 GHG Protocol Scope 3 categories.
- The categories with the highest contribution to scope 3 were:
 1. Category 11 Use of products sold 230,618.93 tCO₂e (65.11%)
 2. Category 1 Goods and services acquired 53,276.66 tCO₂e (15.04%)
 3. Category 4 Upstream transport and distribution 26,892 tCO₂e (7.59%)
- Regarding category 11, emissions from the sale and use of water heaters correspond to 230,618.93 tCO₂e, which is equivalent to a contribution of 65% of total scope 3 emissions and 97% of category 11 emissions.
- With regard to the base year, there is an increase in scope 3 emissions from 202,084.23 tCO₂e (2022) to 400,019.23 tCO₂e. This is because emissions from water heaters were excluded from the base year report due to lack of information on consumption and use patterns by final customers. In this exercise, approximate standard values were used for the calculation; therefore, in future exercises, there may be a variation compared to the emissions of this product.
- Scope 3 emissions correspond to 90% of Rotoplas' global emissions, while Scope 1 and 2 emissions correspond to the remaining 10%, so the most relevant "hotspots" to reduce emissions are in Scope 3—more specifically, categories 11, 1 and 4.

As Scope 3 emissions exceed 40% of Rotoplas' total emissions, adherence to the *Science Based Target initiative* (SBTi) must include emission reduction targets in the value chain.

Estimates made with factors based on Quantis may be above or below actual emissions; however, they serve as a benchmark for informed decision-making and to drive the value chain to participate in Rotoplas' emissions estimation and reduction targets.

3.2. Estimation recommendations and considerations

General recommendations and considerations for future exercises focus on the implementation of document and information management systems to achieve a traceable and reliable scope 3 inventory. Each category needs particular information and activity data, so Table 11 shows the recommendations by category.

Table 21 Particular recommendations by Scope 3 category

Category ID	Description
Category 1	<p>Establish upstream supply chain engagement programs to have specific values of the carbon footprint or carbon intensity of the product or service purchased. This program can focus on the main suppliers in the Rotoplas value chain.</p> <p>Engagement programs may be aimed at collecting Scope 1 and 2 information from suppliers for use in future exercises or recalculate past inventories.</p> <p>Depending on the level of quality of research and emissions estimation of some suppliers, the specific method may be more or less accurate; therefore, the value chain engagement program should highlight the level of quality expected by the reporting company, or decide whether to use other methods with certain items in the supply chain, such as average value methods or the cost and expense approach.</p> <p>Increase the amount of estimated data based on mass, service or other relevant units of acquired products and services in case of not having specific information from suppliers, and use industry average factors, e.g. average CO₂e emissions/unit or services.</p> <p>If it is not possible to use average or supplier-specific methods, continue with the cost and expense-based method, improving the quality, traceability and cost itemization of products and services acquired, as well as procurement sector emission factors.</p> <p>Method based on costs and expenses: to avoid overestimation or double counting of emissions, it is recommended to define the restructuring of digital systems for the acquisition of services and goods. Rotoplas may define new sections based on the findings in future exercises.</p>
Category 2	<p>Category 2 has the same bases and accounting methods; therefore, with regard to the areas of opportunity in the emissions calculation method, these are similar to category 1.</p> <p>Method based on costs and expenses: it is recommended to improve the interfaces for entering the purchases of common and capital goods, define the procurement sector and the product acquired, along with more accurate emission factors for the type of product purchased, separating construction services from the purchase of goods for construction.</p>
Category 3	<p>The emission factor used for the calculation of category 3 emissions is based on the Quantis tool—average emission factor by the ratio of Scope 1 to Scope 2 emissions—so the results may have a certain degree of uncertainty.</p> <p>It is recommended to classify category 3 emissions into the four activities that GHG Protocol Scope 3 defines and estimate emissions from the applicable activities:</p> <ol style="list-style-type: none"> 1. Purchased fuels (upstream emissions from fuels consumed and reported in Scope 1) 2. Electric energy consumed (upstream emissions from electricity consumed and reported in Scope 2) 3. Energy losses in transmission and distribution of electricity, steam, heating and cooling (if applicable) 4. <i>The 4th activity only applies to organizations that generate and sell electricity</i> <p>Emission estimates for category 3 activities can be calculated by supplier-specific values, average values, and life cycle analysis factors; therefore, it is recommended that this information be compiled for future exercises.</p>

Category ID	Description
Category 4	Category 4 emissions can be summarized as cradle-to-gate transportation in third-party vehicles and all transportation and distribution services that Rotoplas pays to have performed; therefore, all these services should be identified.
	Identify these from the purchase of standard goods or capital goods, which already consider the transportation service in the carbon footprint or carbon intensity of the purchased product. From a cost and expense approach, identify which entries consider the transportation of the product and identify who is paying for the transportation. Emissions from transportation and distribution in these types of entries can be reported in category 1.
	Transportation and distribution activities are classified as follows: <ul style="list-style-type: none"> • Air transportation • Maritime transportation • Ground transportation (cargo trucks) • Rail transport • Storage of purchased products: Identify whether there are any purchases of products from upstream warehouses, distribution centers or retail outlets
Category 5	It is recommended to establish interfaces to trace waste production, as well as treatment and final disposal, keeping in mind that category 5 emissions are not significant for Rotoplas, since they contribute only 0.04%.
Category 6	Since category 6 emissions are not significant for Rotoplas (0.44% of Scope 3 contribution), it is possible to continue with the estimates based on cost and expense factors (EEIO).
	It is recommended to continue the optional estimation of housing emissions to observe their variation over time.
Category 7	The emission factor used for the calculation of category 7 emissions is based on the Quantis tool—average emission factor per number of employees in the manufacturing and plastics sector—so the results may have a certain degree of uncertainty.
	Based on the screening, it is determined that category 7 is not significant for Rotoplas scope 3 emissions (1.37% of total scope 3 contribution); it is recommended to adopt the average factor method, which uses the following data: <ul style="list-style-type: none"> • Number of direct Rotoplas employees • Average distance traveled by employees per day • Average itemization of employees' form of transportation • Average working days • Average emission factors of transports used (CO₂e/pkm)
Category 8	Identify whether the organization rents any assets to a third party; if not, the category does not apply.
Category 9	It should be stated that transportation in third-party vehicles of products sold and paid for by Rotoplas should be considered under category 4. Category 9 reports emissions after the Rotoplas point of sale. Category 9 emissions may also report emissions from third-party distribution centers and warehouses.
	For distribution emissions, it is recommended to use the method of average values and factors; this will require: <ul style="list-style-type: none"> • Sales volume of stored products (whether per m², m³, pallet, etc.) • Average days of products in storage

Category ID	Description
	<ul style="list-style-type: none"> Emission factors by type of warehousing and (e.g.: CO₂e/m² day)
Category 10	Not applicable.
Category 11	<p>Work must be done with the industrial design team to homogenize the technical data sheets of Rotoplas products sold—mainly the Argentinean water heaters, which represent 65% of total scope 3 emissions from sales in 2023.</p> <p>The information on the habits and patterns of use of this equipment should be improved, since one of the water heater models works in a hybrid way, and the mode of operation that the customer might be using is unknown.</p> <p>Hotspots must be defined for this type of product, from the redesign, change of fuel operating technologies to panels or solar cells, to the use of residual energy to reduce emissions over time.</p> <p>Water heaters are the products with the highest emissions impact for Rotoplas; therefore, their correct estimation of emissions and mitigation goals are an important part of Rotoplas' decarbonization pathway towards 2030 and 2050.</p>
Category 12	The estimation of category 12 may also include emissions from the types of packaging of the products sold; thus, it is necessary to identify the quantity of items sold and the type of packaging used.
Category 13	The bebbia dispensers are equipment leased to Rotoplas clients; therefore, their emissions were reported under category 11; however, there is another sector that sells water treatment plant operation services, which operate in a similar way to bebbia's services and equipment; nonetheless, since they are a product and service sold, they can be reported under category 11, just like the dispensers. It is recommended to make a decision regarding these products based on the estimation of an emissions screening of the treatment plants that takes into account their entire life cycle.
Category 14	Not applicable.
Category 15	<p>At the end of 2023, Rotoplas acquired HiTech Irrigation Mexico, a brand specialized in irrigation systems and services.</p> <p>GHG Protocol Scope 3 defines financial investments in four types:</p> <ul style="list-style-type: none"> Capital Investments Debt investments Project financing Managed investments and customer services <p>Rotoplas shall identify whether for the next financial year it will report HiTech's emissions as part of the Rotoplas group (scope 1 and 2) or tally these emissions under category 15, either by the specific methodology or by average values.</p>



Chapter 4

References and Annexes



4. CHAPTER IV REFERENCES AND ANNEXES

CONUEE (National Commission for the Efficient Use of Energy for its Spanish acronym) (2023) List of fuels and their calorific values to be used for reporting to RENE 2023.

DEFRA (2010) Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting

DEFRA (2022) UK Government GHG Conversion Factors for Company Reporting

Official Gazette of the Federation Mexico (2015) Agreement that establishes the greenhouse gases or compounds that are grouped together for the purposes of reporting emissions, as well as their warming potentials.

Official Gazette of the Federation, Mexico. Agreement that establishes the technical particulars and formulas to apply methodologies for calculating greenhouse gas or compound emissions.

GHG Protocol (2013) Technical Guidance for Calculating Scope 3 Emissions Complement to the Value Chain (Scope 3) accounting and reporting standard

GREENHOUSE GAS PROTOCOL (2003) The GHG Protocol for Project Accounting

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GREENHOUSE GAS PROTOCOL (2013) Technical Guidance for Calculating Scope 3 Emissions. Version 1.0

GREENHOUSE GAS PROTOCOL (2024) Life Cycle Data Bases, THIRD PARTY DATABASES

USEPA (2020) Supply Chain Greenhouse Gas emission factors for US Industries and Commodities, USEPA Report

WRI- GHG(2017) WRI- GHG Protocol Calculation tool database



Annexes

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ANNEX 1 GHG Protocol Scope 3 Categories

Table 22 Description of Scope 3 Categories

		Categories	Scope of emissions
Upstream	Category 1	Goods and services acquired	Includes upstream emissions from the manufacture of products purchased or acquired by the company during the reporting year. Goods (tangible products) and services (intangible products) should be included.
	Category 2	Capital assets	Includes upstream emissions from capital goods that are final products and usually have an extended life, and are used by the company to manufacture a product, provide a service, sell, store and deliver merchandise: Includes equipment, machinery, buildings, facilities and vehicles, among others,
	Category 3	Activities related to fuel and energy (not included in Scope 1 and 2)	Includes upstream emissions related to the production of fuels and energy purchased and consumed by the company that are not included or reported in Scope 1 and 2 (emissions from combustion or electricity consumed by the reporting company).
	Category 4	Upstream transportation and distribution	Covers the transportation and distribution of all products and third-party distribution and transportation services purchased by the company. Includes inbound and outbound logistics services; transportation and distribution by third parties between company facilities. These emissions can be from air, rail, road, or sea transportation, product storage, distribution centers and retail facilities.
	Category 5	Waste generated in operations	Includes all emissions from the disposal and treatment by third parties of waste generated in the activities reported by the company. This category includes emissions from the disposal of solids and wastewater and the treatment of waste in facilities owned by third parties. It also includes future emissions from waste generated in the reporting year. Landfill disposal, landfills with gas conversion, energy landfills, composting and incineration should be considered.
	Category 6	Business travel	Includes emissions from employee transportation for business purposes: air, train, bus, and automobile travel, and car rentals; but does not include employee commutes to and from work.
	Category 7	Employee commutes	Covers emissions from employees' travel between their homes and workplaces, in any type of vehicle. Telework emissions can also be included.
	Category 8	Upstream leased assets	Emissions from the operation of assets leased by the reporting company in the reporting year that are not included in scopes 1 and 2. This category is only applicable to companies that own and lease assets to others.

Categories		Scope of emissions	
Downstream	Category 9	Downstream transportation and distribution	Emissions that occur from transportation and distribution of products sold in vehicles and facilities that are not owned or controlled by the reporting company. Emissions from retail trade and warehousing are included. These are outbound transportation and distribution services purchased by the reporting company.
	Category 10	Processing of products sold	Emissions from the transformation of intermediate products sold, and carried out by third parties after their sale by the reporting company. They are those producers that require further processing for transformation or inclusion in another product, prior to its use by the final consumer. These emissions are allocated to the intermediate product.
	Category 11	Use of products sold	Includes emissions from the use of goods and services sold by the reporting company during the reporting year. It mainly covers end users, who may be consumers or commercial customers who make use of the final product. These emissions are divided into two types: direct emissions in the usage phase of the products sold, and indirect emissions from the use of the product. It is up to the company to decide whether or not to consider the indirect effects. It includes the total expected lifetime emissions of all relevant products that are sold during the reporting year. Optionally, emissions associated with the maintenance of the products sold can be included.
	Category 12	End-of-life treatment of products sold	It includes all emissions coming from the disposal and treatment of waste from products sold by the company in the reporting year. All emissions expected at the end of its useful life are considered.
	Category 13	Downstream leased assets	It includes emissions from the operation of assets owned by the reporting company during the reporting year and leased to other entities in the reporting country. These leased assets may also be included in a company's inventory 1 or 2, depending on the type of lease and the consolidation approach used by the company to define organizational boundaries.
	Category 14	Franchises	It covers emissions from the operation of franchises that are included in Scope 1 or 2. A franchise is a company that operates under a license to sell or distribute another company's goods or services in a particular location. This category applies only to franchisers, which must account for the emissions produced by the operation of the franchises.
	Category 15	Investments	Emissions associated with the reporting company and are the investments in the year. This category applies to those who make an investment with the objective of making a profit, to financial companies, and to companies that make

Categories	Scope of emissions
	investments for non-profit purposes. The category refers to capital or financing provided by the reporting company.

ANNEX 2 Tool emission factors

Table 23 EEIO tool factors category 1 and 2

CATEGORIES 1 AND 2		
Sector or activity	tCO ₂ e/USD	Reference
Farms	0.001771	USEPA (2020) Supply Chain Greenhouse Gas emission factors for US Industries and Commodities, USEPA Report
Forestry, fishing and related activities	0.000307	
Oil and gas extraction	0.001353	
Mining, except oil and gas.	0.001393	
Mining support activities.	0.000809	
Construction	0.000315	
Food and beverages and tobacco products.	0.000825	
Textile mills and textile product factories.	0.000378	
Garments and leather and related products.	0.000439	
Wood products	0.000246	
Paper products	0.000394	
Printing and related support activities.	0.000258	
Petroleum and coal products.	0.001277	
Chemical products	0.000323	
Plastic and rubber products.	0.000201	
Non-metallic mineral products	0.000594	
Primary metals	0.00006	
Fabricated metal products	0.000267	
Machinery	0.000213	
Computer and electronic products.	0.000064	

CATEGORIES 1 AND 2		
Sector or activity	tCO ₂ e/USD	Reference
Electrical equipment, appliances and components.	0.00026	USEPA (2020) Supply Chain Greenhouse Gas emission factors for US Industries and Commodities, USEPA Report
Motor vehicles, bodies and trailers, and parts thereof	0.000216	
Other transport equipment	0.00009	
Furniture and related products.	0.000274	
Miscellaneous manufacturing	0.000255	
Wholesale trade	0.000141	
Distributors of motor vehicles and spare parts	0.000148	
Food and beverage stores	0.000247	
General merchandise stores	0.000178	
Air transportation	0.000927	
Rail transport	0.000721	
Water transportation	0.000691	
Truck transportation	0.001374	
Transit and ground passenger transportation.	0.00034	
Pipeline transportation	0.001864	
Storage and warehousing	0.000454	
Other retail	0.000175	
Publishing industries, except Internet (includes software)	0.000055	
Film and sound recording industries.	0.000055	
Broadcasting and telecommunications	0.000078	
Data processing, Internet publishing and other information services.	0.000081	
Federal reserve banks, credit intermediation and related activities	0.000069	

CATEGORIES 1 AND 2		
Sector or activity	tCO ₂ e/USD	Reference
Insurance companies and related activities	0.000042	USEPA (2020) Supply Chain Greenhouse Gas emission factors for US Industries and Commodities, USEPA Report
Funds, trusts and other financial vehicles	0.00021	
Rental and leasing services and lessors of intangible assets	0.00009	
Legal Services	0.000058	
Miscellaneous professional, scientific and technical services.	0.000137	
Design of computer systems and related services.	0.00006	
Management of companies and enterprises.	0.000102	
Administrative and support services.	0.000116	
Waste management and remediation services.	0.001506	
Educational services	0.000204	
Outpatient medical care services.	0.000088	
Hospitals	0.000172	
Residential and nursing care facilities	0.000168	
Social assistance	0.000163	
Performing arts, spectator sports, museums and related activities.	0.000073	
Entertainment, gaming and recreation industries.	0.000382	
Food services and drinking places.	0.000222	
Other services, except government.	0.000152	
Other real estate	0.000433	

CATEGORIES 1 AND 2		
Sector or activity	tCO ₂ e/USD	Reference
Electricity, Gas and Water Supply	0.0048743	Based on Quantis factor

Table 24 Emissions ratio factor category 3

CATEGORY 3	
tCO ₂ e/tCO ₂ e (A1+A2)	Reference
0.250	Based on Quantis factor

Table 25 EEIO factors category 6

CATEGORY 6	tCO ₂ e/USD	Reference
Transit and ground passenger transportation.	0.00034	USEPA (2020) Supply Chain Greenhouse Gas emission factors for US Industries and Commodities, USEPA Report
Other transportation and support activities.	0.000427	
Lodging	0.000463	Based on Quantis factor
Air transportation	0.001637	
Maritime transportation	0.001932382	USEPA (2020) Supply Chain Greenhouse Gas emission factors for US Industries and Commodities, USEPA Report

ANNEX 3 Supply vendors and their carbon intensity

Table 26 Carbon intensity of supply chain category 1

Supplier	Product	Carbon intensity
The Dow Chemical Company	PE	0.100
Indelpro S.A. De C.V.	PPR	0.140
Equistar Chemicals Lp	PE	0.140
Vinmar International, Llc	PE	0.140
Hyosung Chemical Corporation	PPR	0.140
Mac Polimeros Sa De Cv	PPR + Cargo, mbs	0.140
Omnigreen Sapi De Cv	PCR	0.204
Borealis Ag	PE	0.204
Corporativo Mineral Quimico Sa De C	MB's	0.960
Ck Orlix Sa De Cv	MB's	0.960
Petroquimica Cuyo S.A.I.C.	PPR	0.140
Ternium Argentina S.A.	Steel	1.700
Braskem Argentina Sa	PPR	0.140

ANNEX 4 Fuel emission factors

Table 27 Fuel emission factors and calorific values

Emission factors and calorific values- Category 9								
Mobile sources		Equivalence factors ¹				Emission factors ²		
Fuel	Unit	NCV	Units	NCV	Units	[tCO ₂ /MJ]	[tCH ₄ /MJ]	[tN ₂ O/MJ]
LP gas	L	4,153	MJ/bl	26.12	MJ/l	6.31E-05	6.20E-08	2.00E-10
Diesel	L	6,064	MJ/bl	38.14	MJ/l	7.41E-05	3.90E-09	3.90E-09
Gasoline	L	5,613	MJ/bl	35.31	MJ/l	6.93E-05	2.50E-08	8.00E-09

Table 28 GHG GWPs

Global Warming Potentials (GWP) ³	
Pollutant	GWP
CO ₂	1
CH ₄	28
N ₂ O	265

Table 29 Mobile sources emission factor

Emission factor (Mobile Sources) ⁴			
Fuel	Compound / Substance	GHG Protocol Initiative -WRI-	
		Emission factor	Unit
LP gas	CO ₂	1.61	Ton CO ₂ /m ³
Gasoline	CO ₂	2.27	Ton CO ₂ /m ³
Diesel	CO ₂	2.68	Ton CO ₂ /m ³

References for category 9 estimation:

- 1- List of fuels and their calorific values (National Commission for the Efficient Use of Energy, CONUEE for its Spanish acronym) to be used for reporting to RENE 2023
- 2- Official Gazette of the Federation, Mexico. Agreement that establishes the technical particulars and formulas to apply methodologies for calculating greenhouse gas or compound emissions, (Sep.30.2015).
- 3- Official Gazette of the Federation, Mexico, Agreement that establishes the greenhouse gases or compounds that are grouped together for the purposes of reporting emissions, as well as their warming potentials, (Aug.14.2015).
- 4- WRI- GHG Protocol Calculation tool database (2017)

ANNEX 5 Emission factors for waste disposal

Table 30 USW emission factors

Activity	Type of waste	Unit	Combustion	Composting	Landfill	Anaerobic digestion
			Total kg Co2 _{2e} per unit	Total kg Co2 _{2e} per unit	Total kg Co2 _{2e} per unit	Total kg Co2 _{2e} per unit
Waste	Domestic waste	Tons	21.280	-	446.204	-
	Organic: food and beverages	Tons	21.280	8.911	626.856	8.911
	Organic: garden waste	Tons	21.280	8.911	578.940	8.911
	Organic: Mix of food and garden waste	Tons	21.280	8.911	587.326	8.911
	Commercial and industrial waste	Tons	21.280	-	467.008	-

Table 31 Metals emission factors

Activity	Type of waste	Unit	Open loop	Closed loop	Combustion	Landfill
			Total kg Co2 _{2e} per unit	Total kg Co2 _{2e} per unit	Total kg Co2 _{2e} per unit	Total kg Co2 _{2e} per unit
Metals	aluminum cans and foil	Tons	21.280	21.280	21.280	8.883
	mixed cans	Tons	21.280	21.280	21.280	8.883
	Scrap	Tons	21.280	21.280	21.280	8.883
	steel cans	Tons	21.280	21.280	21.280	8.883

Table 32 plastics emission factors

Activity	Type of waste	Unit	Open loop	Closed loop	Combustion	Landfill
			Total kg Co2 _{2e} per unit	Total kg Co2 _{2e} per unit	Total kg Co2 _{2e} per unit	Total kg Co2 _{2e} per unit
Plastic	Plastic	Tons	21.280	21.280	21.280	8.883
	plastic film	Tons	21.280	21.280	21.280	8.883
	medium plastic	Tons	21.280	21.280	21.280	8.883
	HDPE	Tons	21.280	21.280	21.280	8.883
	LDPE and LLDPE	Tons	21.280	21.280	21.280	8.883
	PET	Tons	21.280	21.280	21.280	8.883
	PP	Tons	21.280	21.280	21.280	8.883
	PS	Tons	21.280	21.280	21.280	8.883
PVC	Tons	21.280	21.280	21.280	8.883	

Table 33 wood emission factors

Activity	Type of waste	Unit	Closed loop	Combustion	Composting	Landfill
			Total kg Co2e per unit	Total kg Co2e per unit	Total kg Co2e per unit	Total kg Co2e per unit
Construction	Wood	Tons	21.280	21.280	8.911	828.014

References for the estimation of category 5:

1- Department for Business, Energy & Industrial Strategy (DEFRA), UK Government GHG Conversion Factors for Company Reporting (2022)

ANNEX 6 emission factors and data for the calculation of category 11 and 12

Table 34 Electric network emission factors, water heaters

Electric emission factor	Unit	Country
0.438	tCO ₂ e/ MWh	Mexico
0.4589	tCO ₂ e/ MWh	Argentina

Table 35 Rotoplas product end-of-life emission factors 2023

Product	Product end-of-life emission factor ¹	Unit
Average value: fusion pipe and hydraulic pipe	0.096	kg CO ₂ e
Average value: Water tanks	0.410	kg CO ₂ e
Average value: Cisterns	17.315	kg CO ₂ e

Table 36 Emission factors from stationary fuel sources, Water heaters

Emission factor (Stationary)			
Fuel	Compound / Substance	GHG Protocol Initiative -WRI-	
		Emission factor	Unit
Natural gas	CO ₂	0.002	Ton CO ₂ /m ³
	CH ₄	0.000000840	
	N ₂ O	0.000000795	
LP gas	CO ₂	0.002	Ton CO ₂ /liters
	CH ₄	0.0000008	
	N ₂ O	0.00000	

Table 37 NCV from fuels, Water heaters

Stationary sources	Equivalence factors ²
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Fuel	Consumption units	NCV	Units	NCV	Units
LP gas	Liters	4,153	MJ/bl	25.9595	MJ/liter
Natural gas	m ³	33,543	kJ/m ³	33.54	MJ/m ³

Table 38 Average life time of products sold Rotoplas 2023

Product	Value ³	Unit
Average value: BEBBIA purifier and dispensers	5	Years
Average value: Pumps	2	years
Average value: Thermostatic Tank Heaters	2,485	Days (7 years with 355 days of average annual use)

WWTP Emission factor	Emission factor ⁴	Unit
Factor per m ³ of treated water	0.431	kg CO ₂ /m ³

References for the estimation of categories 11 and 12:

1-Rotoplas 2023 Product Data Sheet, retrieved from: <https://rotoplas.com.mx/productos/>

2- List of fuels and their calorific values (National Commission for the Efficient Use of Energy, CONUEE for its Spanish acronym) to be used for reporting to RENE 2023

3-Technical data sheet of Rotoplas, Señorial and Bebbia products, Rescued from:

<https://rotoplas.com.mx/productos/>

<https://senorial.com.ar/tienda/>

<https://www.bebbiainstitucional.com/dispensadores>

4-Ecoinvent Database (2023)



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