

2026

Greenhouse Gas Report

Gruppo Eurpack

QUANTIFYING AND REPORTING
GREENHOUSE GAS EMISSIONS UNDER THE
GHG PROTOCOL FRAMEWORK

2025 GHG INVENTORY REPORT



Kassena

Partner per un futuro sostenibile



UNIVERSITÀ
DEGLI STUDI DELLA
TUSCIA

Summary

1. Reporting objectives	2
2. Reporting principles	3
3. Organizational boundaries	4
4. Reporting year	4
5. Operational boundaries and data sources	5
6. Basis of estimation and data hierarchy	6
7. GHG emissions calculation method	6
8. Assumptions	6
9. Quantitative uncertainty assessment of data	7
10. Results	8
10.1 Scope 1 - direct emissions	12
10.2 Scope 2 - indirect emissions from electricity	12
10.2.1 Location-based approach	12
10.2.2 Guarantees of Origin (market-based)	12
10.3 Scope 3 - all other indirect emissions	13
11. References	14
12. Annex	15
13. Key assumptions	22
14. Non-materiality assessment - IT equipment and selected machinery	23



1. Reporting objectives

This corporate GHG inventory is prepared to: (i) quantify Eurpack Group's greenhouse gas (GHG) emissions for the reporting year 2025; (ii) support internal decision-making on emission reduction initiatives; and (iii) provide transparent disclosure to interested stakeholders. The inventory follows the GHG Protocol Corporate Accounting and Reporting Standard (<https://ghgprotocol.org/corporate-standard>). Results are expressed as CO₂-equivalents (CO_{2e}) using IPCC 2021 GWP100.

2. Reporting principles

Eurpack applies the following GHG Protocol principles throughout this report:

- **Relevance:** the boundary reflects Eurpack's production activities under operational control, ensuring that the inventory serves decision-making needs.
- **Completeness:** all relevant emission sources within the stated organizational and operational boundaries are included; exclusions (e.g., non-production warehouses) are disclosed and assessed for materiality.
- **Consistency:** methods, emission factors and data sources are applied consistently across sites and over time; any methodological changes are documented to preserve comparability.
- **Transparency:** calculation methods, data sources, assumptions and any estimates are clearly described.
- **Accuracy:** data quality controls and uncertainty assessments are implemented to reduce bias and achieve a decision-useful level of accuracy; overall quantitative uncertainty is tracked.

The inventory informs Eurpack's climate strategy and may be used for voluntary disclosure. It is not intended for product-level claims or comparative assertions unless accompanied by additional product-specific studies.

3. Organizational boundaries

Eurpack applies a control-based consolidation using the operational control criterion. Emissions are consolidated for facilities and operations over which Eurpack has the full authority to introduce and implement operating policies.

The organizational boundary includes only production facilities included in the Environmental Management System, which are:

- ✓ via dell'Industria, 13 Aprilia (LT)
- ✓ via della meccanica, 83 e via della meccanica 15 Aprilia (LT)
- ✓ via delle due porte, 1 Robecco sul Naviglio (MI)
- ✓ viale del commercio, 148 Ascoli Piceno (AP)



4. Reporting year

The reporting year is 2025.

5. Operational boundaries and data sources

The inventory was compiled primarily from primary data extracted from the company's management/ Enterprise Resource Planning (ERP) systems, purchase invoices, and ad-hoc questionnaires.

Where primary data were not available, emissions were estimated using methods designed to be representative of the company's operations, applying conservative assumptions where appropriate.

All activity data, emission factors, and assumptions were documented to ensure traceability and reproducibility. *Table 1* reports, by category and sub-category, the emission sources included in the inventory and the origin of the underlying data (primary vs estimated/secondary).

Consistent with the GHG Protocol Corporate Standard, all emission sources are classified and reported under:

- **Scope 1** (direct emissions from sources owned or controlled by Eurpack);
- **Scope 2** (indirect emissions from purchased electricity, reported both *location-based* and *market-based*);
- **Scope 3** (all other indirect emissions across the value chain). Electricity transmission and distribution losses are included in Scope 3.

Table 1. Emission sources considered in the corporate GHG inventory, structured by Scope

Scope 1 (direct emissions)	Data	
	Type	Source
Natural gas combustion	Primary	Monthly utility/gas invoices
Use of company-owned fleet vehicles	Primary/Secondary	Company fuel invoices
Use of rented vehicles (operating-leased under operational control)	Primary/Secondary	Company fuel invoices
Refrigerant leakage from site equipment	Primary	Annual F-gas inspection/maintenance reports
Scope 2 (indirect emissions from electricity)		
Electricity consumption	Primary	Utility bills
Scope 3 (all other indirect emissions)		
Transport of raw materials, purchased goods and waste (inbound/onsite)	Primary/Secondary	Supplier/haulier questionnaires;
Transport of sold finished products (outbound)	Primary/Secondary	Company logistics records;
Employee commuting	Primary	Ad-hoc employee questionnaire
Fuel- and energy-related activities not in Scopes 1&2 (e.g., electricity losses)	Secondary	Specific emission factors
Production of purchased raw materials (e.g., paper & board, aluminium)	Primary/Secondary	Procurement records; secondary database
External processing / third-party conversion	Primary/Secondary	Purchase orders/service invoices; secondary database
Capital goods	Primary	Company registers
Waste treatment and disposal	Primary/Secondary	Company registers; secondary database

6. Basis of estimation and data hierarchy

Primary activity data are used where available (metered energy, invoices, logistics records); otherwise, well-documented secondary data and reputable databases are applied (e.g., ecoinvent v3.11), with calculations performed in SimaPro 10.3.0.1. All results are reported using GWP100 IPCC 2021. Assumptions and uncertainty ranges are recorded to support transparency and decision-useful accuracy.

7. GHG emissions calculation method

GHG emissions are calculated by multiplying activity data by the appropriate emission factor (EF). For each source:

$$GHG = AD \times EF$$

where AD is the activity data (e.g., kWh, L, t, km) and EF converts activity data into mass of greenhouse gases (GHG) (e.g., kg CO_{2e} per kWh). Emissions in CO_{2e} are obtained by applying 100-year global warming potentials (GWP100, IPCC 2021). Totals are then aggregated by scope.

8. Assumptions

Key estimation assumptions are documented in the report Annexes.



9. Quantitative uncertainty assessment of data

To quantify the uncertainty of the data used in this study, we employed the “Pedigree” function in SimaPro, which allows source-specific characterization of uncertainty for both primary data entered in the calculation model and secondary data sourced from the ecoinvent v3.11 database.

Specifically, the Pedigree method relies on a semi-quantitative matrix in which each dataset is assessed against five qualitative criteria:

- Reliability
- Completeness
- Temporal representativeness
- Geographical representativeness
- Technological representativeness

Each criterion is assigned a score (1 to 5) reflecting data quality for the modelled process. These scores are then converted into numerical uncertainty parameters, most notably the geometric standard deviation (GSD), which defines the width of the probability distribution associated with each flow. The Pedigree matrix thus provides, for each process, a parametric representation of uncertainty consistent with the quality of the available sources.

Building on these distributions, quantitative uncertainty was computed using Monte Carlo simulation. This sampling-based approach draws independent pseudo-random values according to the assumed probability distributions of the input variables. In this study, each process was assigned a log-normal distribution, and the simulation was run for 1,000 iterations as a stopping criterion (Frischknecht et al., 2007). At each iteration, input parameters are sampled from their predefined distributions, generating a series of possible realizations of the carbon footprint.

This approach quantifies the combined effect of input-data uncertainty on the model outputs, yielding a probabilistic characterization of results (e.g., mean, standard deviation, and confidence intervals).

10. Results

Across Eurpack Group's production sites, total *location-based* GHG emissions in 2025 amount to 35,553 tCO_{2e} (Figure 1).

- Scope 1 = 404 tCO_{2e};
- Scope 2 *location-based* = 947 tCO_{2e};
- Scope 3 = 34,202 tCO_{2e}).

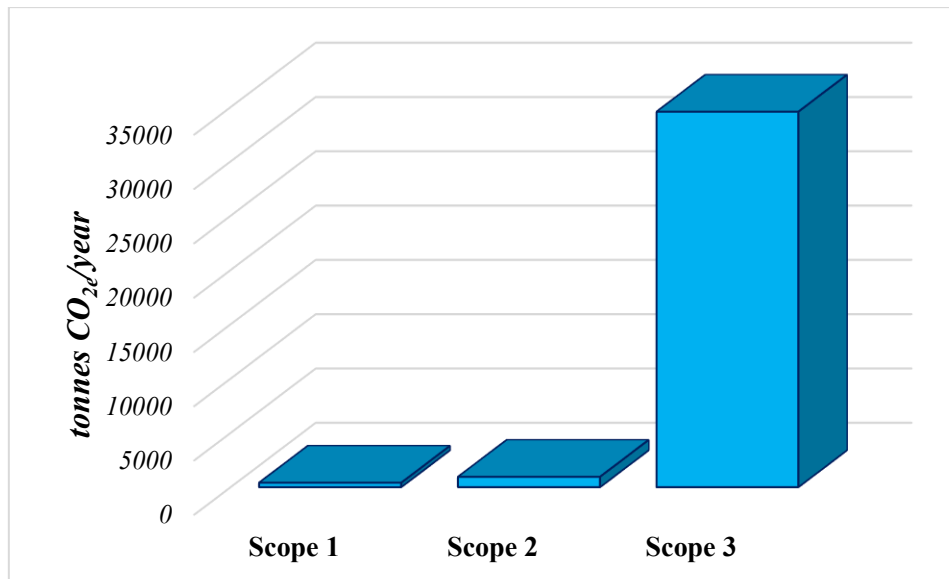


Figure 1. Eurpack Group - 2025 GHG emissions by scope (tCO_{2e}/year, *location-based*)

Using the *market-based approach*, whereby Eurpack's purchased electricity is matched with Guarantees of Origin (GOs) valid for 2025 and exclusively retired on behalf of the company, Scope 2 *market-based* emissions amount to 0 tCO_{2e}, while upstream electricity-related emissions increase by approximately 126 tCO_{2e} compared with the *location-based* upstream electricity estimate, due to the use of the specific residual/upstream emission factor applied under the *market-based* modelling. As a result, the 2025 Group total amounts to 34,732 tCO_{2e} on a *market-based basis*, compared with 35,553 tCO_{2e} on a *location-based basis*.

Emissions (*location-based*) are concentrated in Robecco and Aprilia, which together account for over 99.8% of the Group total; Ascoli contributes the remaining ~0.2% (Figure 2).



Figure 2. Share of Eurpack Group's 2025 total GHG emissions by production site (location-based)

Table 4 presents, for each Scope, source type and production site, the 2025 emissions in tCO_{2e} together with their associated quantitative uncertainty (derived from the Pedigree/Monte Carlo analysis). Considering the overall inventory-wide quantitative uncertainty of ~3.6% calculated on the total reported GHG emissions, the results in this report can be regarded as having a good level of reliability for decision-making and external disclosure. Further details on emission sources by sub-category are provided in the Annexes to this report.



Table 4. Eurpack Group's 2025 corporate GHG inventory by scope, source type and site (tCO_{2e}), with associated quantitative uncertainty

	t CO _{2e} /year				Incidence (%)		Uncertainty
	Aprilia	Robecco	Ascoli	Total	Within scope	On total emission	
Scope 1 (direct emissions)							
Natural gas combustion	34	148	9	191	47%	0.5%	2.0%
Use of company-owned fleet vehicles	89	87	-	176	44%	0.5%	NA**
Use of rented (operating-leased) vehicles	21	15	-	36	9%	0.1%	NA**
Refrigerant leakage	-	-	-	-	-	-	-
<i>Subtotal</i>	<i>145</i>	<i>250</i>	<i>9</i>	<i>404</i>	<i>100%</i>	<i>1.1%</i>	<i>0.9%</i>
Scope 2 (indirect emissions from electricity)							
Purchased electricity consumption (location-based)	486	446	15	947	-	2.7%	NA***
Purchased electricity consumption (market-based)	-	-	-	-	-	-	-
Scope 3 (all other indirect emissions)							
Transport of raw materials and third-party processing movements	1562	2136	2	3700	10.8%	10.4%	7.9%
Transport of finished products	163	362	0.5	526	1.5%	1.5%	9.6%
Transport of waste generated by the organization	14	98	2	114	0.3%	0.3%	16.1%
Employee commuting	378	303	12	693	2%	1.9%	8.2%
Upstream electricity	3	3	0.1	6	0.02%	0.02%	37.4%
Upstream natural gas	9	41	2	52	0.2%	0.1%	16.6%
Production of purchased raw materials and external processing/services	12225	16407	11	28643	83.7%	80.6%	3.9%
Capital goods	116	153	6	275	0.8%	0.8%	41.7%
*Waste treatment and disposal	100	94	-	194	0.6%	0.5%	23.1%
<i>Subtotal</i>	<i>14570</i>	<i>19597</i>	<i>36</i>	<i>34202</i>	<i>100%</i>	<i>96.2%</i>	<i>4%</i>
¹Total t CO_{2e}	15,201	20,293	59	35,553		100%	3.6%

*Cut-off allocation approach applied to all waste categories sent for recovery. (Recycling benefits are allocated to the receiving system; no credits are claimed within Eurpack's boundary.)

**Quantitative uncertainty was not estimated because the emission factor used was derived from the tables provided by the Italian Ministry of the Environment and Energy Security, rather than from the ecoinvent database.

***Quantitative uncertainty was not estimated, as the emissions associated with electricity consumption were calculated using the location-based emission factor reported by ISPRA in the report "CO₂ emissions in the national and regional electricity sector" (Report 413/2025).

¹ **Note:** Figures reported in Table 4 are subject to rounding; therefore, row and column sums may not equal the displayed totals. These minor differences do not affect the accuracy or validity of the results and reflect common accounting practice for handling decimal values.

10.1 Scope 1 - direct emissions

Scope 1 (direct) emissions account for 1.1% of the Group's total GHG footprint. Within Scope 1, natural gas combustion is the largest hotspot, as shown in Figure 3.

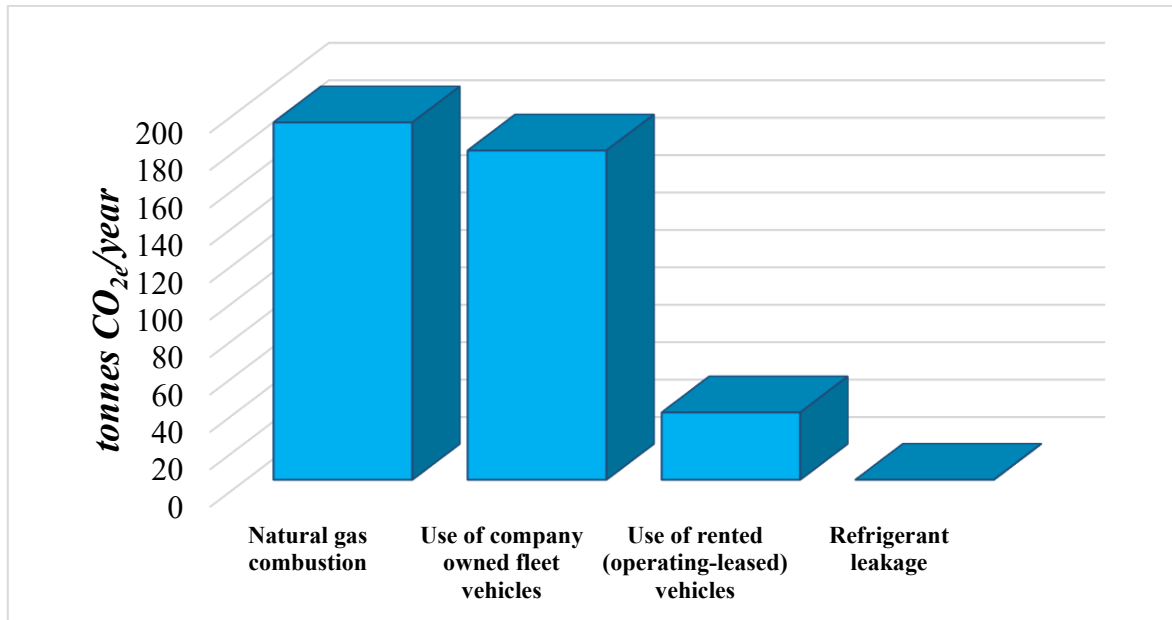


Figure 3. Breakdown of Scope 1 (direct) GHG emissions by source

10.2 Scope 2 - indirect emissions from electricity

10.2.1 Location-based approach

Annual emissions associated with the use of the national electricity mix, calculated under the *location-based* approach, amount to 947 tCO_{2e} (2.7% of Eurpack Group's total annual emissions). This approach applies the national average grid emission factor of 200.4 g CO_{2e}/kWh, representative of Italy's electricity generation mix, as published by ISPRA (413/2025).

10.2.2 Guarantees of Origin (market-based)

Under the GHG Protocol Scope 2 Guidance (<https://ghgprotocol.org>), indirect emissions from purchased electricity may be reported using a *market-based* approach that reflects contractual instruments. When EU Guarantees of Origin (GOs) meet quality criteria (i) valid for the reporting year, (ii) exclusively cancelled for the reporting entity, and (iii) explicitly 100% renewable (within the relevant market), the associated *market-based* emission factor for those kWh is 0 tCO_{2e}/kWh.

Eurpack's electricity consumption is fully covered by GOs that are valid for 2025 and exclusively retired for the company, certifying 100% renewable supply.

10.3 Scope 3 - all other indirect emissions

The dominant contributor is the production of purchased raw materials and external processing/services, accounting for about 84% of Scope 3 emissions (Figure 4). This is followed by transport of raw materials and third-party processing movements (~11%), employee commuting (~2%), and transport of finished products (~1.5%).

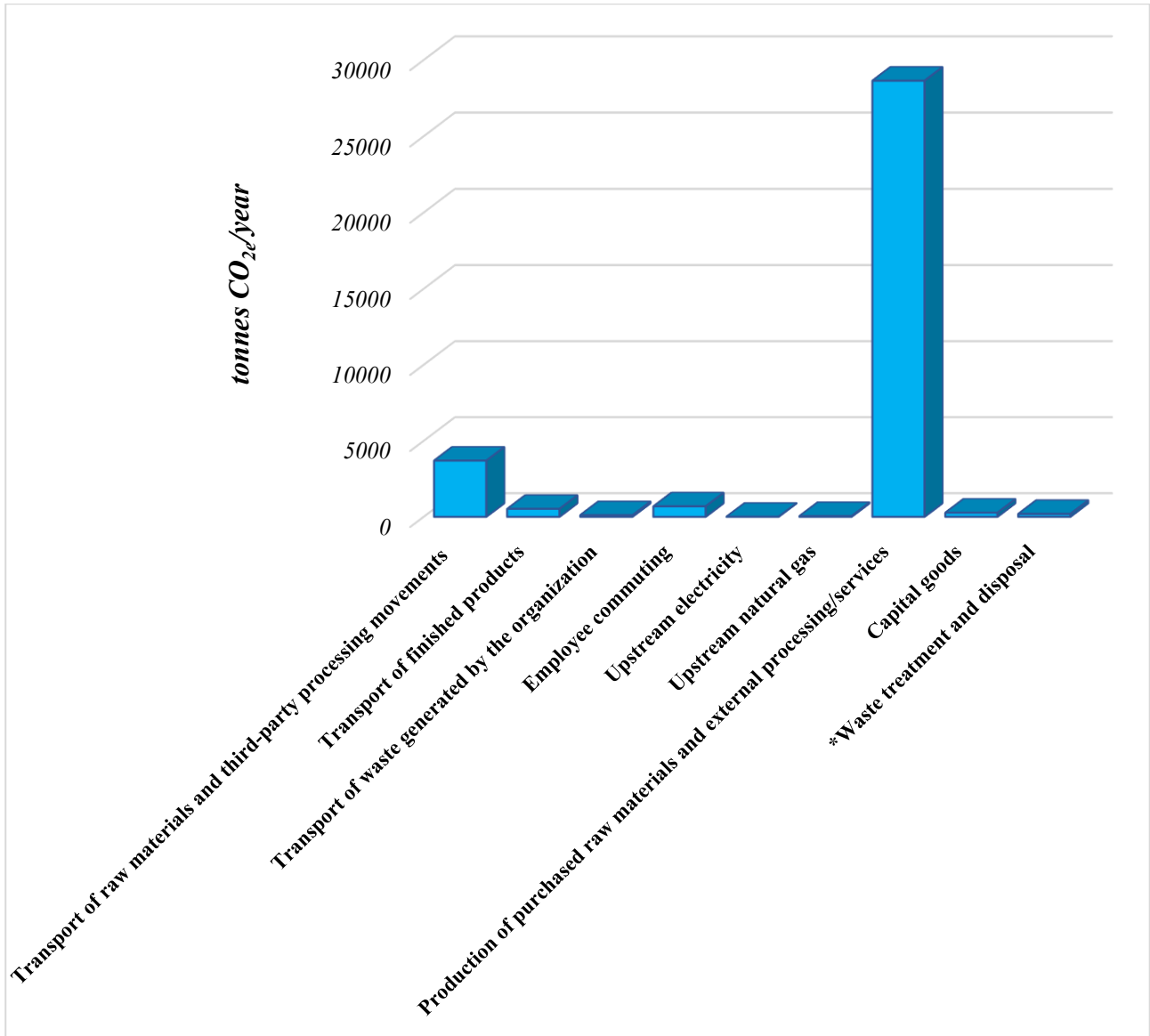


Figure 4. Scope 3 GHG emissions by category

*Cut-off allocation approach applied to all waste categories sent for recovery. (Recycling benefits are allocated to the receiving system; no credits are claimed within Eurpack’s boundary.)

11. References

- Frischknecht R., Jungbluth N., Althaus H.-J., Doka G., Heck T., Hellweg S., Hirschier R., Nemecek T., Rebitzer G., Spielmann M., Wernet G. 2007. Overview and Methodology. ecoinvent report No. 1. Swiss Centre for Life Cycle Inventories, Dübendorf, 2007. Available at: https://www.ecoinvent.org/files/200712_frischknecht_jungbluth_overview_methodology_ecoinvent_2.pdf
- IPCC, 2021: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. doi:[10.1017/9781009157896](https://doi.org/10.1017/9781009157896).
- ISPRA, (2025): Le emissioni di CO₂ nel settore elettrico nazionale e regionale 2024. Rapporti 413/2025. Available at: www.isprambiente.gov.it

12. Annex

Table 1A. Scope 1: Direct GHG Emissions (2025)

Type of input	Aprilia (t CO _{2e})	Robecco (t CO _{2e})	Ascoli (t CO _{2e})	Total (t CO _{2e})
Natural gas combustion	34.3	148.2	8.9	191.5
Use of company-owned fleet vehicles	89.4	86.9	-	176.3
Use of rented (operating-leased) vehicles	21.1	15.2	-	36.3
Refrigerant leakage	-	-	-	-
Total	144.9	250.3	8.9	404.1

Table 1A-bis. Scope 1 (Direct) - GHG breakdown by gas (2025)

Type of gas	t CO _{2e}	Breakdown
Carbon dioxide (CO ₂)	387.4	95.88%
Methane (CH ₄)	16.6	4.11%
Nitrous oxide (N ₂ O)	0.05	0.01%
Sulfur hexafluoride (SF ₆)	0.00015	0.00004%
Perfluorocarbons (PFCs)	0.00006	0.00002%
Hydrofluorocarbons (HFCs)	0.00013	0.00003%
Other GHG	0.00008	0.00002%
Tot.	404.1	100%

Table 2A. Scope 2: Indirect GHG Emissions from Purchased Electricity (2025)

Type of input	Aprilia (t CO _{2e})					Robecco (t CO _{2e})					Ascoli (t CO _{2e})					Total (t CO _{2e})
	CO ₂	CH ₄	N ₂ O	other GHG	Tot	CO ₂	CH ₄	N ₂ O	Other GHG	Tot	CO ₂	CH ₄	N ₂ O	Other GHG	Tot	
Purchased electricity consumption (location-based)	482,4	1,4	2,2	*NA	486,0	442,9	1,2	2,0	*NA	446,2	14,6	4E-02	0,1	*NA	14,7	946,9
Total	482,4	1,4	2,2	*NA	486,0	442,9	1,2	2,0	*NA	446,2	14,6	4E-02	0,1	*NA	14,7	946,9

* A further split for other GHGs is not available; therefore, only CO₂, CH₄ and N₂O are reported separately where available.

Table 3A. Scope 3: Breakdown of Transport-related Emissions (2025)

Type of input	Aprilia (t CO _{2e})					Robecco (t CO _{2e})					Ascoli (t CO _{2e})					Total (t CO _{2e})
	CO ₂	CH ₄	N ₂ O	Other GHG	Tot	CO ₂	CH ₄	N ₂ O	Other GHG	Tot	CO ₂	CH ₄	N ₂ O	Other GHG	Tot	
Transport - paper & board	1219.4	123.3	14.3	0.9	1357.8	1450.2	144.2	17.6	1.0	1613.0	5E-03	5E-04	4E-05	5E-06	6E-03	2970.8
Transport - aluminium	15.5	1.8	0.2	1E-02	17.5	2.2	0.3	3E-02	2E-03	2.5	-	-	-	-	0.0	20.0
Transport - inks & varnishes	12.0	1.3	0.1	2E-02	13.4	4.8	0.5	5E-02	7E-03	5.3	-	-	-	-	0.0	18.7
Transport - cutting dies	2.2	0.2	2E-02	3E-03	2.5	0.7	0.1	6E-03	9E-04	0.7	-	-	-	-	0.0	3.2
Transport - printing plates	2.3	0.3	3E-02	2E-03	2.6	0.3	0.0	4E-03	2E-04	0.3	-	-	-	-	0.0	2.9
Transport - miscellaneous	23.3	2.5	0.3	2E-02	26.2	8.4	0.9	0.1	9E-03	9.4	0.1	8E-03	4E-04	6E-05	0.1	35.7
Transport - packaging materials	3.1	0.3	2E-02	3E-03	3.4	3.3	0.4	2E-02	3E-03	3.7	0.1	8E-03	4E-04	8E-05	0.1	7.2
Transport - pallets	6.6	0.7	0.1	9E-03	7.4	439.2	46.4	4.3	0.6	490.5	-	-	-	-	0.0	497.9
Transport to/from external processors	117.4	12.7	1.2	0.1	131.3	9.2	1.0	0.1	9E-03	10.3	1.2	0.1	7E-03	1E-03	1.4	143.0
Outbound transport of finished products to customers	144.7	15.9	1.7	0.1	162.5	322.1	36.1	3.7	0.3	362.3	0.4	4E-02	3E-03	4E-04	0.5	525.2
Transport of waste	12.1	1.3	0.1	1E-02	13.6	87.2	9.5	1.1	0.1	97.9	1.7	0.2	2E-02	2E-03	1.9	113.3
Employee commuting	340.0	33.9	2.9	0.9	377.7	272.9	27.1	2.5	0.7	303.1	11.0	1.1	0.1	3E-02	12.2	693.1
Upstream electricity	2.7	0.2	4E-02	0.2	3.2	2.5	0.2	3E-02	0.2	2.9	0.1	7E-03	1E-03	6E-03	0.1	6.2
Upstream natural gas	5.4	3.9	3E-02	2E-02	9.4	23.5	17.0	0.1	0.1	40.7	1.4	1.0	7E-03	6E-03	2.5	52.5
Total	1906.7	198.3	21.0	2.3	2128.5	2626.5	283.7	29.6	3.0	2942.6	16.0	2.5	0.14	0.04	18.8	5089.7

Table 4A. Scope 3: Breakdown of Product & Services related Emissions (2025)

Type of input	Aprilia (t CO _{2e})					Robecco (t CO _{2e})					Ascoli (t CO _{2e})					Total (t CO _{2e})
	CO ₂	CH ₄	N ₂ O	Other GHG	Tot	CO ₂	CH ₄	N ₂ O	Other GHG	Tot	CO ₂	CH ₄	N ₂ O	Other GHG	Tot	
Production of paper & board	7631.2	709.8	127.5	38.0	8506.4	9942.7	925.6	166.8	49.5	11084.6	0.1	1E-02	2E-03	3E-04	0.1	19591.1
Production of aluminium	2334.2	163.9	13.5	100.4	2612.0	3358.8	235.9	19.4	144.5	3758.5	-	-	-	-	0	6370.5
Production of inks & varnishes	97.5	12.7	3.5	0.2	113.8	212.5	27.7	7.6	0.4	248.2	-	-	-	-	0	362.1
Production of cutting dies	5.7	0.8	0.1	2E-02	6.6	17.0	2.4	0.2	5E-02	19.6	-	-	-	-	0	26.3
Production of printing plates	205.9	14.5	1.2	8.9	230.4	269.7	18.9	1.6	11.6	301.8	-	-	-	-	0	532.2
Miscellaneous production	89.3	7.3	1.3	0.3	98.3	139.9	11.5	2.1	0.4	153.9	0.3	2E-02	5E-03	9E-04	0.3	252.5
Production of packaging materials	67.3	7.3	2.0	0.2	76.8	55.2	6.0	1.7	0.1	63.0	0.8	0.1	2E-02	2E-03	0.9	140.7
Production of pallets	91.7	10.3	1.0	0.2	103.2	152.3	17.2	1.6	0.3	171.4	-	-	-	-	0	274.6
External processing	407.3	63.1	5.8	1.8	478.0	516.2	79.9	7.4	2.3	605.8	7.9	1.2	0.1	4E-02	9.3	1093.1
Capital goods	105.9	9.2	0.6	0.4	116.2	138.8	12.6	0.8	0.6	152.8	5.7	0.4	3E-02	3E-02	6.2	275.2
Waste treatment and disposal	4.91	91.6	3.1	2E-02	99.7	4.62	86.3	3.0	2E-02	93.9	-	-	-	-	0	193.7
Total	11040.8	1090.6	159.7	150.4	12441.4	14807.8	1423.9	212.1	209.9	16653.7	14.8	1.8	0.2	0.1	16.8	29111.9

Quantitative Uncertainty (Pedigree Matrix)

Reliability: Refers to the data sources, acquisition methods, and QA/verification procedures used to obtain the data.

Completeness: Refers to statistical properties and representativeness: adequacy of sample size and whether the time span captures relevant fluctuations.

Temporal correlation: Alignment between the study year (as defined in the goal/scope) and the reference year of the data.;

Geographical correlation: Alignment between the defined geographical scope and the origin of the data.

Technological correlation: Similarity between the technology/process represented by the data and the modelled system; covers aspects other than time and geography (e.g., data from similar processes or industries)

Table 5A. Qualitative-quantitative characteristics of the parameters in the Pedigree Matrix

Category	Description	Points
Reliability	Data verified based on measurements	1
	Partially verified measurement-based data, or unverified data based on measurements	2
	Unverified data partly based on qualified estimates	3
	Qualified estimate (e.g., by a subject-matter expert)	4
	Unqualified estimate	5
Completeness	Data representative of all important sites for the market considered, over a period adequate to smooth normal fluctuations	1
	Data representative of >50% of important sites for the market considered, over an adequate period	2
	Data representative of some sites (<50%), or >50% of sites but for shorter periods	3
	Data representative of one important site only, or of some sites but for shorter periods	4
	Representativeness unknown, or data from few sites and short periods	5
Temporal correlation	< 3 years difference between the dataset period and the study year	1
	< 6 years difference	2
	< 10 years difference	3
	< 15 years difference	4
	Unknown age or > 15 years difference	5
Geographical correlation	Data from the area under study	1
	Average data from a wider area that includes the area under study	2
	Data from an area with similar production conditions	3
	Data from an area with somewhat similar production conditions	4
	Unknown area or different area	5
Technological correlation	Data from the same companies, processes and materials under study	1
	Data from the same processes/materials (i.e., identical technology) but different companies	2
	Data for the same processes/materials but with different technology	3
	Data for related materials or processes	4
	Data for related materials/processes at laboratory scale or with different technology	5

Note. Pedigree scores (1-5) are converted into numerical uncertainty parameters (e.g., geometric standard deviation) used in the Monte Carlo analysis.

Table 6A. Pedigree Matrix adopted for quantitative uncertainty assessment in SimaPro

Scope	SimaPro category	Reliability	Completeness	Temporal correlation	Geographical correlation	Technological correlation
Scope 1: direct emissions						
Natural gas combustion	Natural gas Combusted in Industrial Equipment	1	1	1	1	1
Use of company-owned and rented fleet vehicles	Diesel (100% mineral diesel)	NA	NA	NA	NA	NA
	Petrol (100% mineral petrol) (Motor Gasoline)	NA	NA	NA	NA	NA
Refrigerant leakage	F-gas reports	NA	NA	NA	NA	NA
Scope 2: indirect emissions from electricity						
Purchased electricity consumpt.(location-based)	Italian Energetic Mix – location based (ISPRA 2025)			NA		
Scope 3: breakdown of transport-related input						
Transport of raw materials, finished products to customers, and waste	Transport, freight, aircraft, unspecified {GLO} market for transport, freight, aircraft, unspecified Cut-off, U	1	1	1	1	1
	Transport, freight, light commercial vehicle, fleet average {RER} market group for transport, freight, light commercial vehicle, fleet average Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, >32 metric ton, diesel, EURO 3 {RER} market for transport, freight, lorry, >32 metric ton, diesel, EURO 3 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, >32 metric ton, diesel, EURO 4 {RER} market for transport, freight, lorry, >32 metric ton, diesel, EURO 4 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, >32 metric ton, diesel, EURO 5 {RER} market for transport, freight, lorry, >32 metric ton, diesel, EURO 5 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, >32 metric ton, diesel, EURO 6 {RER} market for transport, freight, lorry, >32 metric ton, diesel, EURO 6 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, 16-32 metric ton, diesel, EURO 3 {RER} market for transport, freight, lorry, 16-32 metric ton, diesel, EURO 3 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 {RER} market for transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, 16-32 metric ton, diesel, EURO 5 {RER} market for transport, freight, lorry, 16-32 metric ton, diesel, EURO 5 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, 16-32 metric ton, diesel, EURO 6 {RER} market for transport, freight, lorry, 16-32 metric ton, diesel, EURO 6 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, 3.5-7.5 metric ton, diesel, EURO 4 {RER} market for transport, freight, lorry, 3.5-7.5 metric ton, diesel, EURO 4 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, 3.5-7.5 metric ton, diesel, EURO 5 {RER} market for transport, freight, lorry, 3.5-7.5 metric ton, diesel, EURO 5 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, 3.5-7.5 metric ton, diesel, EURO 6 {RER} market for transport, freight, lorry, 3.5-7.5 metric ton, diesel, EURO 6 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, 7.5-16 metric ton, diesel, EURO 3 {RER} market for transport, freight, lorry, 7.5-16 metric ton, diesel, EURO 3 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, 7.5-16 metric ton, diesel, EURO 4 {RER} market for transport, freight, lorry, 7.5-16 metric ton, diesel, EURO 4 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, 7.5-16 metric ton, diesel, EURO 5 {RER} market for transport, freight, lorry, 7.5-16 metric ton, diesel, EURO 5 Cut-off, U	1	1	1	1	1
	Transport, freight, lorry, 7.5-16 metric ton, diesel, EURO 6 {RER} market for transport, freight, lorry, 7.5-16 metric ton, diesel, EURO 6 Cut-off, U	1	1	1	1	1

Transport, freight, lorry, diesel, unspecified {RER} market for transport, freight, lorry, unspecified Cut-off, U	1	1	1	1	1
Transport, freight, sea, container ship, heavy fuel oil {GLO} market for transport, freight, sea, container ship, heavy fuel oil Cut-off, U	1	1	1	1	1
Transport, passenger, bus, diesel, regular {CH} transport, passenger, bus, diesel, regular Cut-off, U	1	1	1	1	1
Transport, passenger, car, diesel, large size, EURO 4 {RER} transport, passenger, car, diesel, large size, EURO 4 Cut-off, U	1	1	1	1	1
Transport, passenger, car, diesel, large size, EURO 5 {RER} transport, passenger, car, diesel, large size, EURO 5 Cut-off, U	1	1	1	1	1
Transport, passenger, car, diesel, medium size, EURO 3 {RER} transport, passenger, car, diesel, medium size, EURO 3 Cut-off, U	1	1	1	1	1
Transport, passenger, car, diesel, medium size, EURO 4 {RER} transport, passenger, car, diesel, medium size, EURO 4 Cut-off, U	1	1	1	1	1
Transport, passenger, car, diesel, medium size, EURO 5 {RER} transport, passenger, car, diesel, medium size, EURO 5 Cut-off, U	1	1	1	1	1
Transport, passenger, car, diesel, small size, EURO 5 {RER} transport, passenger, car, diesel, small size, EURO 5 Cut-off, U	1	1	1	1	1
Transport, passenger, car, electric {GLO} transport, passenger, car, electric Cut-off, U	1	1	1	1	1
Transport, passenger, car, liquefied petroleum gas, medium size, EURO 5 {GLO} transport, passenger, car, liquefied petroleum gas, medium size, EURO 5 Cut-off, U	1	1	1	1	1
Transport, passenger, car, natural gas, medium size, EURO 4 {RER} transport, passenger, car, natural gas, medium size, EURO 4 Cut-off, U	1	1	1	1	1
Transport, passenger, car, natural gas, medium size, EURO 5 {RER} transport, passenger, car, natural gas, medium size, EURO 5 Cut-off, U	1	1	1	1	1
Transport, passenger, car, petrol, medium size, EURO 3 {RER} transport, passenger, car, petrol, medium size, EURO 3 Cut-off, U	1	1	1	1	1
Transport, passenger, car, petrol, medium size, EURO 4 {RER} transport, passenger, car, petrol, medium size, EURO 4 Cut-off, U	1	1	1	1	1
Transport, passenger, car, petrol, medium size, EURO 5 {RER} transport, passenger, car, petrol, medium size, EURO 5 Cut-off, U	1	1	1	1	1
Transport, passenger, car, petrol, small size, EURO 3 {RER} transport, passenger, car, petrol, small size, EURO 3 Cut-off, U	1	1	1	1	1
Transport, passenger, car, petrol, small size, EURO 4 {RER} transport, passenger, car, petrol, small size, EURO 4 Cut-off, U	1	1	1	1	1
Transport, passenger, car, petrol, small size, EURO 5 {RER} transport, passenger, car, petrol, small size, EURO 5 Cut-off, U	1	1	1	1	1
Transport, passenger, motor scooter, fleet average {CH} transport, passenger, motor scooter, fleet average Cut-off, U	1	1	1	1	1
Transport, passenger, tram, electric {CH} transport, passenger, tram, electric Cut-off, U	1	1	1	1	1
Transport, passenger, car, petrol, medium size, EURO 5 {GLO} market for transport, passenger, car, petrol, medium size, EURO 5 Cut-off, U	1	1	1	1	1
Transport, passenger, car, diesel, medium size, EURO 5 {GLO} market for transport, passenger, car, diesel, medium size, EURO 5 Cut-off, U	1	1	1	1	1
Transport, passenger, car, electric {GLO} transport, passenger, car, electric Cut-off, U	1	1	1	1	1
Transport, passenger, car, liquefied petroleum gas, medium size, EURO 5 {GLO} market for transport, passenger, car, liquefied petroleum gas, medium size, EURO 5 Cut-off, U	1	1	1	1	1

Employee commuting and customer & visitor travel to company sites

	Transport, passenger, car, natural gas, medium size, EURO 5 {GLO} market for transport, passenger, car, natural gas, medium size, EURO 5 Cut-off, U	1	1	1	1	1
Upstream electricity	Electricity, upstream Cut-off, U	1	1	1	1	1
Upstream natural gas	Natural gas, high pressure {IT} market for natural gas, high pressure Cut-off, U	1	1	1	1	1
Scope 3: breakdown of product & services related emissions						
Production of paper & board	Folding boxboard carton {RER} market for folding boxboard carton Cut-off, U	1	1	1	1	1
	Kraft paper {RER} market for kraft paper Cut-off, U	1	1	1	1	1
	Paper, newsprint {RER} market for paper, newsprint Cut-off, U	1	1	1	1	1
Production of aluminium	Aluminium, wrought alloy {GLO} market for aluminium, wrought alloy Cut-off, U	1	1	1	1	1
Production of inks & varnishes	Printing ink, offset, without solvent, in 47.5% solution state {RER} market for printing ink, offset, without solvent, in 47.5% solution state Cut-off, U	1	1	1	1	1
Production of cutting dies	Steel, low-alloyed, hot rolled {GLO} market for steel, low-alloyed, hot rolled Cut-off, U	2	1	1	1	3
	Brass {RoW} market for brass Cut-off, U	2	1	1	1	3
	Pressed raw panels, hardwood, at engineered wood flooring plant {US} Pressed raw panels, hardwood, at engineered wood flooring plant, E	2	1	1	2	3
	Seal, natural rubber based {GLO} market for seal, natural rubber based Cut-off, U	2	1	1	1	3
	Phenolic resin {RER} market for phenolic resin Cut-off, U	2	1	1	1	3
	Polyethylene, low density, granulate {RER} polyethylene production, low density, granulate Cut-off, U	2	1	1	1	3
	Aluminium, wrought alloy {GLO} market for aluminium, wrought alloy Cut-off, U	2	1	1	1	2
Production of printing plates	Paper, newsprint {RER} market for paper, newsprint Cut-off, U	2	1	1	1	3
	Adhesive mortar {GLO} market for adhesive mortar Cut-off, U	2	1	1	1	3
Miscellaneous production	Polyethylene, low density, fines {RER} market for polyethylene, low density, fines Cut-off, U	2	1	1	1	3
	Soap {GLO} market for soap Cut-off, U	2	1	1	1	3
	Sheet rolling, steel {RER} sheet rolling, steel Cut-off, U	2	1	1	1	3
	Corrugated board box {RER} market for corrugated board box Cut-off, U	1	1	1	1	1
Production of packaging materials	EUR-flat pallet {RER} EUR-flat pallet production Cut-off, U	2	1	1	1	1
Production of pallets	Road, company, internal {RoW} road construction, company, internal Cut-off, U	2	1	1	1	2
	Packaging box factory {RER} packaging box factory construction Cut-off, U	2	1	1	1	2
Waste treatment and disposal	Sludge from pulp and paper production {Europe without Switzerland} treatment of sludge from pulp and paper production, sanitary landfill Cut-off, U	1	1	1	1	1

13. Key assumptions

Scope 3 - Indirect GHG emissions (value chain)

- ✓ For the hybrid vehicle categories included under employee commuting and customer visits, in the absence of a direct match in the SimaPro databases, mileage was allocated by assuming 50% operation with a petrol engine and the remaining 50% with electric power.
 - ✓ In the absence of detailed information on engine displacement and vehicle segment for cars used for customer visits, a simplified assumption was adopted for the categories indicated as ND — not available — by allocating 50% of the mileage to petrol-powered vehicles and the remaining 50% to diesel vehicles.
 - ✓ As part of the commuting modelling, since the ecoinvent v3.11 database does not include a specific category for EURO 6 passenger cars and the most recent available class is EURO 5, vehicles classified as EURO 6 were conventionally assigned to the EURO 5 category.
 - ✓ It was assumed that the quantity of raw materials purchased in 2025 was put into production in the same year.
 - ✓ For items included in the “Miscellaneous” category, since detailed information on their composition was not available, an estimate was made based on the expert judgement of Eurpack operators and the modellers. Based on this assessment, an average composition representative of the category was defined, consisting of sheet rolling, steel (82%), polyethylene, low density, fines (8%), paper, newsprint (7%), adhesive (2%), and soap (1%).
 - ✓ For the reconstruction of the composition of cutting dies, in the absence of specific detailed data, expert judgement from Eurpack operators and the modeller was used. Based on this assessment, an average composition was assumed, with an equal allocation among the following materials: (i) steel, low-alloyed, hot rolled; (ii) brass; (iii) pressed raw panels, hardwood; (iv) seal, natural rubber based; (v) phenolic resin; and (vi) polyethylene, low density, granulate.
 - ✓ For pallets, the CO_{2e}/pallet emission factor available in the ecoinvent v3.11 database was used, which is based on a standard weight of 24.9 kg per unit. The total pallet weight reported by Eurpack was therefore divided by 24.9 to estimate the number of pallets used in 2025 and calculate their overall climate change impact.
 - ✓ In line with the cut-off approach, the environmental burdens and benefits arising from the treatment and subsequent use of recycled waste are allocated to the system that uses those materials, rather than to the system that generated them. In this assessment, only the environmental impacts associated with waste not sent for recovery were considered. For waste sent for recycling, only the emissions related to transport to the recovery site were included.
 - ✓ To estimate emissions associated with real estate assets, the ecoinvent datasets “packaging box factory construction {RER}” were used for buildings and “Road, company, internal {RoW}” for roads and internal parking areas. Since the emission factor of the building-related dataset refers to a site with a production volume of approximately 14 kt/year, it was rescaled to the characteristics of the Eurpack sites, taking into account the useful life of the site — assumed to be 50 years — and the total production volume included within the reporting boundary. The dataset relating to parking areas and internal roads, instead, directly provides an annual emission factor expressed in m²·year.
-

14. Non-materiality assessment – IT equipment and selected machinery not included in Scope 3 capital goods

The assessment of non-materiality for this sub-category is justified as follows:

- ✓ **Magnitude (0pt):** The annualised impact from capital purchases (e.g., industrial printers, PCs) is negligible relative to other indirect sources and to asset useful lives. Preliminary screening for 174 PCs using a generic factor of ~24.5 kg CO_{2e} per PC per year yields ~4.3 tCO_{2e}/year, i.e. <0.012% of the company total (~35,553 tCO_{2e}). Comparable, representative factors for industrial printers are not available for the specific technologies/models in use; given their very long lifetimes (often >20 years) and low purchase frequency, the annualised contribution is expected to be marginal.

 - ✓ **Influence (1pt):** Although Eurpack can choose brands/models at purchase, it has limited influence over upstream manufacturing and full life-cycle impacts of such equipment.

 - ✓ **Importance (1pt):** Given the few purchases per year and long service lives (printers >20 years; PCs ≥5 years), emissions from these assets are not strategically significant in the current environmental policy context.

 - ✓ **Data availability (2pt):** Inventory counts (e.g., PCs/printers) are available; however, emission factors are generic and not technology-specific for the equipment actually in use, limiting the reliability of a refined estimate.
-