ARKIMEDIA

CORPORATE CARBON FOOTPRINT

Summary presentation of the study carried out for the reporting of Category 1, Category 2 CO2 emissions, and indirect emissions not included in Category 1 and 2 (Category 6)

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with the technical collaboration of

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Arkimedia S.r.l. : WHO WE ARE

We are a company based in Camposampiero (PD), and have been manufacturing high quality watch straps for important luxury brands since 1993.

We work according to the principles of *sustainable ethics*, showing respect for leather, the raw material, which is used in such a way as to limit waste, and for the environment, through the use of solar energy that is produced by our photovoltaic system and that is currently undergoing further construction and expansion.

Over time we obtained the ISO 14001 certification (Environmental Management System), the ISO 45001 certification (Occupational Health and Safety Management System) and the "*TF-Traceability and fashion*" system certifications. Arkimedia products are also covered by 2 patents: *App Strap and Diamond* Strap [5].

Introduction and purpose of the study

This study sets out to quantify greenhouse gas emissions by calculating the company's Carbon Footprint for the year 2022.

The Carbon Footprint (CF) represents an environmental KPI aimed at quantifying the emissions of climate-altering gases produced directly or indirectly by a company, an organisation, an individual, a product or an event, with the purpose of measuring the impact that human activities have on climate change. This has implications for both human and natural systems and could lead to significant changes in resource use, production and economic activities.

The purpose of the study was to:

- update the previous assessment made on the 2020 data to understand and manage the risks due to greenhouse gases as an integral part of the risks assessed for the company business, for its success in the market in the face of competitors and stakeholders who are increasingly attentive and sensitive to environmental aspects, and as a tool for public reporting of GHG emissions;

- update the company dashboard of greenhouse gas emissions and their trend over time in relation to the improvements implemented and planned by the company, in order to evaluate their impact over time in terms of potential or actual reduction of GHG emissions, and also in relation to the type and volume of activity carried out.

The Carbon Footprint study:

- was carried out in line with the ISO 14064-1:2019 standard, as an international reference standard, which describes its execution and reporting in detail;

- used the Life Cycle Assessment (LCA) reference methodology which, according to the ISO 14040/14044 standards, can be summarized into the following four main phases:
    - Preliminary phase to define the purpose of the study, the functional unit, the boundaries of the system analysed, data needs and assumptions;
    - Inventory analysis for the quantification of incoming and outgoing flows for all LCA processes;

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- Impact assessment to gather inventory results into a number of potential environmental impacts by using scientific models;
- Interpretation of LCA results in order to draw conclusions and recommendations, as well as actions for potential improvement.
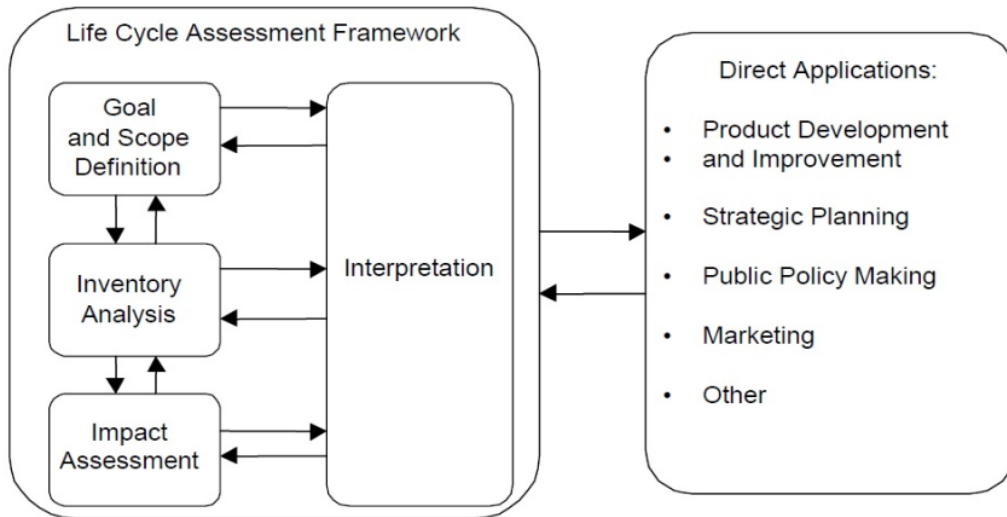

Figura 1 Fasi della LCA secondo le norme ISO 14040/14044 [3] [4].

Figure 1
LCA phases according to ISO standards 14040/14044 (3) (4)

The LCA approach used is attributive, and represents the assessment of the real, average or estimated supply chain of a product or process. It relies on a type of modelling whereby environmentally relevant inputs and outputs for each process involved in the life of the product are attributed to the functional unit in question, which forms Arkimedia S.r.l.'s activity throughout 2022.

The existing or estimated system is placed in a static technological context.

The ISO 14064-1:2019 standard divides the emissions reported within a corporate Carbon Footprint into the following categories:

- **Category 1** – Direct emissions produced by a source owned or controlled by the organisation;

- **Category 2** - Indirect greenhouse gas emissions related to the production and consumption of energy imported by the organisation;

- **Category 3** - Indirect emissions of greenhouse gases deriving from transport;

- **Category 4** - Indirect greenhouse gas emissions from products used by the organisation;

- **Category 5** - Indirect greenhouse gas emissions associated with the use of products from the organisation;

- **Category 6** - Indirect greenhouse gas emissions from other sources.

This analysis presents itself as a partial company Carbon Footprint, as it includes only direct emission categories (Category 1), indirect emissions from imported energy (Category 2) and indirect emissions

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referring to natural gas, electricity and company vehicles not included in Category 1 and 2 (Category 6). A critical review is not expected due to the internal nature of the study.

Organisational boundaries

The organisational boundaries have been defined on the basis of the control approach, i.e., 100% of emissions and/or removals of greenhouse gases relating to operations and structures/plants over which the company has financial or operational control, are reported. The organisational boundaries of Arkimedia S.r.l. concern the Camposampiero (PD) headquarters, in via M. Visentin 14/A.

Reporting boundaries

The reporting boundaries have been defined on the basis of the indications provided by the ISO 14064-1:2019 standard, and consider direct emissions (Category 1) and indirect emissions from imported energy (Category 2) of greenhouse gases generated by Arkimedia S.r.l's activities. Indirect emissions referring to natural gas, electricity and company vehicles not included in Category 1 and 2 (Category 6) were also reported.

REPORTING BOUNDARIES		
Category 1 - Direct emissions (scope 1)	**Category 2 - Indirect emissions from imported energy (Scope 2)**	**Category 6 – Indirect emissions from other sources (Scope 3)**
direct emissions of greenhouse gases from sources owned or controlled by the organization	*indirect emissions of greenhouse gases from energy consumption*	*indirect emissions of greenhouse gases deriving from transport*
⬆	⬆	⬆
• Natural gas boiler • Fuels used for company vehicles	• Electricity from the network	• Emissions relating to company vehicles not included in Category 1 • Emissions related to natural gas not included in Category 1 • Emissions relating to electricity from the grid not included in Category 1 • Emissions related to the photovoltaic system

Indirect emissions relating to Categories 3, 4 and 5 are not included in the analysis.

Data quality

The study used:

- **primary data** referring to the consumption of natural gas and electricity from the network, the production of electricity through the photovoltaic system, and fuel consumption for company travel referred to the entire year 2022. 2020 was used as the reference year (on

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which data the previous study, carried out on 28/05/2021, was based) and as the first time period for which the Carbon Footprint was calculated.

- **secondary data** for the other processes, using, in particular, the ecoinvent v3.6 LCA database

Assumptions and simplifications

ISPRA factors relating to the latest year available, were used to quantify direct emissions caused by the use of fuels from sources owned or controlled by the company (Category 1), and indirect emissions generated by the production of electricity purchased by the company (Category 2). The ISPRA factors used are listed in the 341/2021 report for natural gas, and on the ISPRA website in the section relating to electricity and transport.

In particular:

- Emission factors relating to natural gas and electricity refer to the year 2021 (1990-2021).

- Transport emission factors refer to 2020.

- Arkimedia S.r.l. did not detect greenhouse gas emissions in relation to stack emissions. Furthermore, no fugitive emissions of refrigerant gases were detected for the reporting year, as shown in the FGAS maintenance and control reports on the systems.

- Indirect emissions relating to natural gas, electricity and company vehicles not included in Categories 1 and 2 were reported by subtracting the emissions calculated with the ISPRA emission factors from the emissions calculated with the ecoinvent v3.6 process. These indirect emissions have been assigned to Category 6 – indirect emissions from other sources.

- Indirect emissions relating to natural gas boilers (Category 6) were calculated using the ecoinvent 3.6 process referring to the technology (condensing boiler < 100 kW) and the type of fuel - natural gas - indicated, and considering the geographic area of reference (RER). Since the selected process uses the MJ consumed as a unit of measurement, in order to relate it to the data provided (Sm3 of natural gas consumed), the process has been converted into m3. The m3 consumed per MJ produced were deduced from the ecoinvent database process (0.025 m3/MJ).

- The emission factors used for company vehicles (Category 6) derive from the processes of the ecoinvent database "Transport, passenger car, medium size, diesel, EURO 5 {RER}| Cut-off, S" for diesel powered cars and "Transport, passenger car, medium size, petrol, EURO 5 {RER} | Cut-off, S" for the Mild-Hybrid car (petrol). The process relating to the EURO 5 class was used in the absence of a specific process in the database for the EURO 6 class. For the Mild-Hybrid car, the emission factor relating to petrol cars was considered representative, with reference to the litres of petrol consumed in the year 2020.

- In order to relate the selected datasets to the litres of diesel/petrol consumed, the processes, whose unit of measure is the number of kilometres travelled, were converted into litres of fuel consumed. Consumption per kilometre was deduced from the ecoinvent database process (0.056 kg/km for diesel-powered cars; 0.063 kg/km for petrol-powered cars). In order to relate the kg of fuel to the primary data supplied in litres, a density of 0.833 kg/l was considered for diesel (average value referring to the density of diesel

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specified by the UNI EN 590 standard) and 0.748 kg/l for petrol (average value referring to the density of the petrol specified by the UNI EN 220 standard).

- Indirect emissions relating to the consumption of energy from the electricity grid were calculated by creating the specific electricity mix from the Arkimedia S.r.l. supplier's bill, based on the Italian electricity mix listed in the ecoinvent database v3.6.

- Indirect emissions relating to the heat pump used for heating were not included in the analysis, for lack of data relating to the quantity of thermal energy produced.

- The data relating to the production of electricity from the photovoltaic plant for 2022 (27,046.50 kWh) was obtained from primary data. In the calculation model, the emissions relating to the entire annual production of the photovoltaic system were considered.

Environmental impact assessment method

The Carbon Footprint (CF) represents an environmental indicator that quantifies the greenhouse gas emissions produced directly or indirectly by a company, an organisation, an individual, a product or an event, with the purpose of measuring the impact that human activities have on climate change. In particular, the impact is expressed in kilograms of CO_2 equivalents. The kilograms of CO_2 equivalents are calculated by multiplying the emissions of each greenhouse gas by its equivalence factor (EF). Greenhouse gas equivalence factors, developed by the Intergovernmental Panel on Climate Change (IPCC), represent the contribution of a given greenhouse gas to global warming related to carbon dioxide, whose equivalence factor by definition is equal to 1.

The calculation of the corporate Carbon Footprint for Arkimedia Srl was performed by applying the IPCC 2013 GWP 100a method. The IPCC method used for the calculation of the Carbon Footprint counts all the greenhouse gases considered in the ISO 14064-1:2019 standard, and in the IPCC report " AR 5 Climate Change 2013: The Physical Science Basis". The most recent IPCC 2021 method (and that of the AR 6 report) has not been applied to use consolidated data and allow better result comparisons with respect to the previous study.

According to the reference standard, CO_2 emissions of biogenic origin from anthropogenic activity were also quantified and reported separately.

CO_2 uptake was not assessed in the study, nor were environmental impacts related to other environmental impact categories considered in the study.

Inventory analysis

Inventory analysis involves data collection and calculation procedures to quantify the inputs and outputs affecting the product system. The term "input data" refers to energy consumption and the use of materials entering the production system (for example chemical compounds, construction material, water), while the term "output data" refers to emissions, waste, production scrap and co-products leaving the system.

Data collection took place through direct interviews, documents, data sheets and e-mail exchange.

INVENTORY DATA				
	Inventory data		**Consumption**	**Unit of measure**
Category 1 (Scope 1)	Natural gas		4,469	Sm3
	Company vehicle fuels	Diesel	5,810	l
		Petrol	2,321	l
Category 2 (Scope 2)	Electricity from the network		41,473	kWh
	Inventory data		**Production**	**Unit of measure**
Category 6 (Scope 3)	Photovoltaic electricity		27.046	kWh

FACTORS AND PROCESSES FOR LCA CALCULATION			
Sources of GHGs	**ISPRA emission factor**	**Ecoinvent process**	**Ecoinvent emission factor 3.6**
Natural gas	1.976 kg CO2/Sm3	Central or small-scale heat, natural gas {Europe, excluding Switzerland}| heat production, natural gas, at boiler condensing modulating <100kW | Cut-off, S	2.804 kg CO2eq/Sm3
Electricity network	0.2686 kg CO2/kWh consumption factor	Electricity, medium voltage {Mix Arkimedia}| market for | Cut-off, S	0.4050 kg CO2eq/kWh
Diesel car	0.154 kg CO2/km (equal to 2.314 kg CO2/l)	Transport, passenger car, medium size, diesel, EURO 5 {RER}| Cut-off, S	0.303 kg CO2eq/km (equal to 4.531 kg CO2eq/l)
Petrol car	0.195 kg CO2/km (equal to 2.352 kg CO2/l)	Transport, passenger car, medium size, petrol, EURO 5 {RER}|Cut-off, S	0.335 kg CO2eq/km (equal to 4.033 kg CO2eq/l)

Inventory results
The study quantified the greenhouse gases for carbon dioxide, methane, nitrous oxide, sulphur hexafluoride and other greenhouse gases and their impact in terms of GWP (Kg of CO2 equivalents).
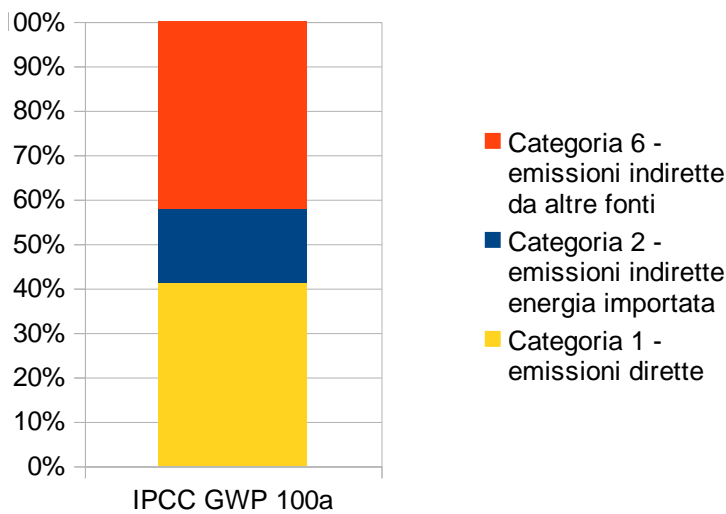In addition, biogenic CO2 was calculated.

Impact assessment

The impact assessment phase is intended to aggregate and convert the inventory results into its related potential environmental impacts. In fact, this phase enables associating the data in the inventory table with environmental issues such as global warming, through the use of impact indicators and equivalence factors.

The IPCC 2013 GWP 100a method was selected to assess the environmental impact. It evaluates the contributions of all greenhouse gases listed in the ISO 14064 standard, including carbon dioxide, methane gas, nitrous oxide, sulphur hexafluoride, nitrogen trifluoride, and expresses them in kg of CO_2 equivalents, as a single result.

The results obtained through the calculation of Arkimedia's Carbon Footprint for the year 2022 are presented below, divided by category.

IPCC 2013 GWP 100a		IPCC	
		kg CO2 eq	%
Category 1 (Scope 1)	Natural gas - direct emissions from stationary sources	8830.8	13.14%
	Company vehicle fuels - direct emissions from mobile sources	18903.3	28.13%
	TOTAL	**27734.1**	**41.27%**
Category 1 (Scope 2)	Electricity from the grid - indirect emissions from imported energy	11139.6	16.57%
	TOTAL	**11139.6**	**16.57%**
Category 6 (Scope 3)	Company vehicles - indirect emissions not included in Category 1	16782.5	24.97%
	Natural gas - indirect emissions not included in Category 1	3700.4	5.50%
	Electricity from the grid - indirect emissions not included in Category 2	5656.9	8.42%
	Electricity from photovoltaic system - indirect emissions	2196.2	3.27%
	TOTAL	**28336**	**42.16%**
TOTAL		**67209.7**	**100%**

Emissions of biogenic CO2	**3282 kg**

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Carbon Footprint Arkimedia - IPCC 2013 GWP 100a method (including biogenic CO2 emissions)

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The calculation of the corporate Carbon Footprint of Arkimedia Srl therefore highlighted:

▪ an impact of 67209.7 kg CO2 eq for the emission categories analysed, relating to the company's activities for 2022. Based on the analysis carried out:

▪ direct emissions (Category 1) contribute significantly to the GWP impact (27734.1 kg CO2 eq), where the consumption of natural gas and the consumption of fuel for company vehicles respectively have an impact of 8830.8 kg CO2 eq and 18903.3 kg CO2 eq

▪ indirect emissions relating to Category 6 are also significant, and have an impact of 28336 kg CO2 eq, which are primarily due to indirect emissions relating to company vehicles (16782.5 kg CO2 eq)

▪ indirect emissions relating to imported electricity (Category 2) instead, are equal to 11139.6 kg of CO2 eq.

The TOE (consumption) calculated is equal to 24.7 and therefore entirely insignificant, also in relation to the level of company turnover.

Interpretation

The uncertainty analysis concerning the calculation of Arkimedia S.r.l.'s Carbon Footprint was carried out with reference to the individual categories considered and the overall result. The uncertainty value was calculated using the Montecarlo analysis and relates to a 95% confidence interval, based on a lognormal probability distribution (in line with the ecoinvent database entries) for the data included in the study.

The uncertainty value considered refers to the average between the higher uncertainty interval and the lower uncertainty interval resulting from the Monte Carlo analysis, which was carried out for 1000 iterations.

The results of the analysis show a global uncertainty in the calculation of the company's Carbon Footprint, which is equal to +/- 11%.

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Conclusions

- The total emissions reported by the study and described in this document, are equal to 67209.7 kg of CO2 eq.
- The greatest contributions to the GWP impact are due to direct emissions related to the combustion of petrol and diesel in company vehicles (28.13%), followed by indirect emissions related to company vehicles (24.97%), indirect emissions from energy imported (16.57%) and direct emissions of natural gas (13.14%).
- CO2 emissions of biogenic origin have been calculated separately and are equal to 3282 kg biogenic CO2.
- The analysis of the categories analysed could be improved by including the indirect impacts of heat pumps, by retrieving the specific data related to pump consumption.
- The uncertainty analysis carried out considers a 95% confidence interval, and is globally equal to +/- 11%.

Potential improvement plans to achieve a reduction in greenhouse gas emissions:

the company can utilise electricity as a solution to lower the amount of CO2 equivalent emitted through:

▪ *greater use of electricity from renewable sources. This is the improvement plan aimed at doubling the potential of the photovoltaic system.*

▪ *the technological replacement of the current heating / cooling systems to systematically reduce the use of methane gas; exploiting the upgraded photovoltaic system in terms of on-site exchange, also as a way to further reduce the company's overall TOE value, albeit fully under control*

•*the company can consider the opportunity to reduce emissions generated by vehicular transport, through the implementation of policies aimed at improving transport rationalisation, given their significant percentage contribution to overall emissions.*

• *a more comprehensive assessment of the Carbon Footprint could be carried out by including in the primary data all the contributions that were not assessed (Categories 3, 4 and 5). They include contributions related to the purchase and transport of raw materials, employees' commutes to work, products sold by the company (use and end of life) and company waste. At present however, this is considered to be far too demanding compared to the potential savings that can be obtained, and is therefore subject to the implementation of the aforementioned action plan.*

In any event, we believe that both this study and the previous one undoubtedly allowed us to increase widespread awareness of the company's carbon footprint in relation to its business. They were instrumental in identifying feasible improvement actions, while also providing a basis for calculating the emissions reduction that can actually be achieved over time.

THE DIRECTION