2014

Environmental Sustainability Report

Carbon Foot Print / GHG Report

zanninieast

PalladioZannini
Industrie Grafiche Cartotecniche S.p.A.

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1. Purpose and Company's details

The purpose of this document is to report on the main environmental impacts of Palladio Group's production activities, in particular through the calculation, the verification of the activities and the outcome of some key indicators, such as the carbon footprint and the typical performance indicators of industrial processes.

This report on Environmental Sustainability takes into account:

- The Italian plants of Palladio Zannini Industrie Grafiche Cartotecniche spa
- The Irish plant of Zannini Ireland ltd
- The Serbian plant of Zannini East doo

The Group is composed of:

• three Italian plants:
- Dueville plant (VI) - registered office of the Company Palladio Zannini;
- Thiene plant (VI)
- Pontedera plant (PI),

• two foreign plants incorporated as autonomous entities which are fully owned by Palladio Zannini:

- Zannini Ireland, Tullamore (Ireland)
- Zannini East, Vršac (Serbia)

Our target market is the pharmaceutical market and our core business is the production of folding cartons. In this context, our organisation is constantly committed to develop process innovation.
It should be noted that in recent years several investments have been made in equipment and machineries - aiming in particular at supplying micro-batches of folding cartons and modernising equipment and machineries for the production of leaflets/booklets - and in the text control and product compliance sector (Eye C).
Furthermore, other major success factors that led Palladio Zannini IGC to be a market leader are the continuous service to customers - with a focus on customer care - and the commitment to lean production.

The goal of Palladio Zannini is to provide products, services and expertise in compliance with the requirements and at the same time to anticipate and meet the customers' needs.

The scope of the activities of all plants (Group) can be summed up in the design and production of folding cartons, partitions, blister cards, information leaflets, illustrated catalogues, labels and aluminium tapes for the pharmaceutical and cosmetics industries.

- The production cycle consists of the following main stages that are common to all plants:

  • Pre-printing (all the activities that start from paper or digital artwork and lead to achieve/develop polymers for printing).
  • Printing (all the activities that via special machines, printing plates and inks/paints, allow to get printed media in one or more colours (in this case paper sheets or cardboard or laminated materials).
  • Post-printing (all the activities that start from printed material, use special machines, glue, auxiliary materials and packages, and lead to the production of finished products through cutting/die-cutting, folding, gluing and packaging stages).

  Production supporting activities can be classified as follows:

  • Computerisation of management processes and production planning
  • Supply and transformation of energy
  • Supply of utilities (gas, water, etc..).
  • Procurement/storage and use of raw materials, packaging materials and auxiliary materials (chemicals, films, aluminium plates, etc.)
  • Maintaining equipment and facilities
  • Shipping and Delivery
  • Controlled management of waste produced by/at the plants (temporary storage and handling)
  • Administration and Sales
  • Training of staff
  • Prevention and protection of human resources and the environment.

2. Conversion factors used

The data in this report refer to the last 3-year period and are given per production unit and at Group level too. Some data might have been revised compared to those of the previous years due to coefficient changes, basic errors or reporting errors.
The coefficients used in the three year-period are the following:

CONVERSION FACTORS							
	ADOPTED CRITERIA	REF.	M.U.	CONVERSION FACTOR 2011	CONVERSION FACTOR 2012	CONVERSION FACTOR 2013	SOURCES
GASOIL	What is described below is used to determine the CO_2 emissions resulting from the combustion of gas oil in the reference period (calendar year). The amount of fuel used is expressed in terms of energy content (TJ) and therefore the basic calculation formula is: Ton/CO_2 = (t of gas oil x LCV x Emission factor x Oxidation factor) x 0.000001. Where: the quantity of gas oil is given by the purchase invoices. The other data are retrieved from the table of national benchmarks communicated by EPA (Environmental Protection Agency)	DENSITY	KG/L	0.82	0.82	0.82	http://www.epa.ie/pubs/reports/air/airemissions/Emission_Factors_%20for_2013%20V1121112013.pdf
		LCV	TJ/KT	43.31	43.31	43.31	
		EMISSION FACTOR	TCO_2/TJ	73.30	73.30	73.30	
		OXIDATION FACTOR	COEFF.	1.000	1.000	1.000	
METHANE	What is described below is used to determine the CO_2 emissions resulting from the combustion of methane in the reference period (calendar year). The amount of fuel used is expressed in terms of energy content (TJ) and therefore the basic calculation formula is: Ton/CO_2 = (Sm3 of gas x LCV x Emission factor x Oxidation factor) x 0.000001. Where: The amount of gas used is derived from the invoice data. The other data are retrieved from the table of national benchmarks communicated by the Ministry of the Environment (Emissions Trading Directive)	LCV	GJ/ 1000SM3	35	35	35	http://www.minambiente.it/sites/default/files/archivio/allegati/emission_trading/tabella_coefficienti_standard_nazionali_2010_2012_v3_rdl.pdf
			MCAL/ STDM3	8	8	8	
		EMISSION FACTOR	TCO_2/TJ	56.00	56.00	55.89	
			TCO_2/ 1000 STDM3	1.96	1.96	1.96	
		OXIDATION FACTOR	COEFF.	0.995	0.995	1	
ELECTRIC POWER	What is described below is used to determine the volume of CO_2 in relation to the electricity purchased regardless of how this is used. The specific quantity of CO_2 grams related to 1 kW/h (as provided by the grid or by recognized standards) needs to be calculated. Through these benchmarks the amount of electricity-produced CO_2 is determined. The formula will then be: (amount of purchased energy in kWh x conversion factor) x 0.000001.	CONVERSION FACTORS	GCO_2/ KWH ITALY	402	402	402	A publication by IEA (International Energy Agency) identifying for each country the emission coefficient (the updating of these coefficients is delayed by two years, even though they are a good approximation). http://www.iea.org/publications/freepublications/publication/CO2EmissionsFromFuelCombustionHighlights2013.pdf
			GCO_2/ KWH SERBIA	784	784	784	
			GCO_2/ KWH IRELAND	427	427	427	
TRANSPORTATION	Transformation from km to gCO_2	FROM KM TO GCO_2	GCO2/ KM	712	712	712	A publication by ANPA (National Agency for Environment Protection) on CO_2 emissions from road transport: 712 gCO_2/travelled km
STICKERS	Transformation from sqm to kg	COEFF.	KG/MQ	0.107	0.107	0.107	Specific weight
RAW MATERIALS		CONVERSION COEFFICIENT	TCO_2/ Produced paper tons	cardboard 0.936	cardboard 0.936	cardboard 0.936	ETS data provided by the suppliers or maximum value specified in the table
				paper 0.571	paper 0.571	paper 0.571	
				adhesive 0.936	adhesive 0.936	adhesive 0.936	

3. Environmental Sustainability

Consistently with Palladio Zannini's role as a Socially Responsible Company, we hereby confirm its commitment to promote new development opportunities by ensuring the protection and compatible and ethical use of natural and human resources.

In setting the contents of this Report, the organisation was inspired by material principles, stakeholder inclusiveness, sustainability context and completeness, in order to ensure quality information and adequate presentation modes consistently with the principles of balance, clarity, accuracy, timeliness, comparability and reliability.

The reporting activities and the drawing up of the final document involved all functions of all the Italian plants and were centrally coordinated by the Quality, Safety and Environment Management function.

In line with Palladio Zannini's commitments made and pursued over the years, the Company will make of sustainability a core element of all business processes that contribute to the manufacturing of products for the market in which it operates.

The vision of our Company can be summed up in the belief that sustainable development is the only form of society's development that does not compromise the ability of future generations to continue to develop, while preserving the quality and quantity of natural assets and reserves.

The objective of the whole Palladio Zannini group is to maintain an economic development compatible with social equity and ecosystems, operating under the rules of the environmental balance.

This means that the economic, social and environmental issues are closely interrelated and each planning intervention will inevitably have to take into account their mutual interrelationships.

This report will be published on the UN Global Compact website (as an attachment to the Communication on Progress) and on the company website www.palladiozannini.com.

3.1 Life Cycle Assessment (LCA)

1) The LCA systematically evaluates the environmental aspects and impacts of a product system or multiple product systems, from the extraction of raw materials and resources to their final disposal, in accordance with the objectives and the scope defined.

   The LCA was carried out on each plant of the Group.

The following environmental aspects were identified and taken into account:

1) Greenhouse gas emissions due to the transportation of raw materials, products and waste (indirect emissions);

2) Greenhouse gas emissions due to the processing of raw materials getting into to the production cycle (indirect emissions);

3) Greenhouse gas emissions from the combustion of natural gas in the plants (direct and controllable emissions);

4) Greenhouse gas emissions from the production of electricity needed in the plants (direct and controllable emissions);

5) Water consumption;

6) Waste and scrap generated from raw materials (paper, cardboard and by-products). This aspect, albeit indirectly, impacts the consumption of raw materials;

7) Production of liquid waste.

3.2 Life Cycle Inventory (LCI)

In this phase data relating to the period 2011/2012/2013 were collected for each plant under the system scope. All data, whether measured, calculated or estimated, were used to quantify the in-bound elements within the scope set for reporting purposes.

Greenhouse gas emissions from transportation of raw materials, products and wastes
The material available included:
• List of incoming trips (for the procurement of paper and cardboard as raw materials) and outgoing trips from the plant in Pontedera;
• List of all incoming trips (for the procurement of paper and cardboard as raw materials) and outgoing trips from the two plants in Vicenza (Dueville and Thiene);
• List of incoming trips (for the procurement of paper and cardboard as raw materials) and outgoing trips from the plant in Vršac ;
• List of incoming trips (for the procurement of paper and cardboard as raw materials) and outgoing trips from the plant in Tullamore;

Greenhouse gas emissions from processing of incoming materials (paper, cardboard and their by-products)
Data for the last three years referring to the quantities of incoming raw material to each plant were given. In detail, the following incoming materials were identified:
• Cardboard for folding cartons;
• Paper for information leaflets;
• Self-adhesive labels for stickers;

Greenhouse gas emissions from consumption of natural gas for heating the premises
For each plant the natural gas consumption level (invoices) for the last three years was provided.

Greenhouse gas emissions from consumption of electricity
The company provided data on energy consumption (invoices) of plants for the past three years.

Water consumption
The company provided data on water consumption (invoices) for the last three years.

Waste and scrap generated from raw materials (paper, cardboard and by-products)
Data for the last three years were provided on the quantities of raw materials (paper, cardboard and by-products) entered into to the plants and the production of waste and scrap of paper and paperboard products at each plant (Environmental Declaration Form and/or by-product packing list).

Production of liquid waste

The quantities of liquid waste produced at each plant in the last three years were given (the annual production of waste e.g. MUD - Environmental Declaration Form for the Italian plants).

The following types of waste were considered:

- EWC 08 01 11: waste paint and varnish containing organic solvents
- EWC 08 01 12: waste paint and varnish other than those mentioned in 080111
- EWC 08 03 13: waste ink;
- EWC 08 03 14*: ink sludge containing dangerous substances;
- EWC 08 04 16: aqueous liquid waste containing adhesives or sealants;
- EWC 08 01 20: aqueous suspensions;
- EWC 08 01 21: print scrap
- EWC 09 01 01*: water-based developer and activator solutions
- EWC 09 01 02: offset plate developer solutions
- EWC 09 01 04: fixer solutions
- EWC 14 06 03*: other solvents and solvent mixes;
- EWC 16 10 02: water-based washing solutions.

3.3 Life Cycle Impact Assessment (LCIA)

The results from the life cycle inventory were related to specific environmental categories by using indicators of impact categories. These indicators represent the relevant categories in a quantifiable manner.
Once the impact categories and the relevant indicators were selected, the LCI results were converted using the characterisation factors, thus getting the results of the different category indicators.

The sum of the contributions for each category allows to obtain the LCIA's profile, which has the purpose of providing information with regard to environmental factors associated with the incoming and outgoing flows of the system chosen.

Selection of impact categories

Here below the environmental categories are given as proposed by the Society of Environmental Toxicology and Chemistry (SETAC Europe) in its Working Group on LCIA:

• *Extraction of abiotic resources*: These resources include three different types of natural elements:
◦ Non-renewable resources (fossil fuels and minerals);
◦ Resources (groundwater, sand and gravel);
◦ Renewable resources (surface water, solar energy, wind energy, etc...).

• *Extraction of biotic resources*: including biomass harvested in sustainable modes as well as in unsustainable ways (deforestation).

• *Land use*: reduction of animal and plant species in a given area.

• *Global Warming (Greenhouse Effect)*: increase in temperature in the lower atmosphere as a result of the presence of greenhouse gases that capture infrared radiation

• *Depletion of the ozone layer*: a consequent increase in the incidence of ultraviolet rays, which are harmful to humans and all ecosystems in general.

• *Eco-toxicity*: impacts on species and ecosystems due to direct emissions or subsequent degradation of products.

• *Human toxicity*: due to the presence of chemical or biological substances released into the environment.

• *Photochemical smog*: due to the formation of tropospheric ozone as a result of reactions of volatile organic compounds in the presence of light and NOX.

• *Acidification*: release of protons (H^+) in aquatic and terrestrial ecosystems.

• *Eutrophication*: due to an excess of nitrates, phosphates, organic substances and nutrients.

Classification

Once the emissions' effects and potential damage on human health and the environment are known, the results from the life cycle inventory can be associated with one or more impact categories.

Characterisation

At this stage, the generated impact is quantified. The data of the inventory are transformed into numeric indicators, thereby determining the relative contribution of each individual substance or resource used.

Application to PalladioZannini Group

With reference to the findings of the life cycle inventory, here below the relevant impact categories are listed:

• greenhouse gas emissions were associated with the GLOBAL WARMING category;
• water consumption was associated with the EXTRACTION OF ABIOTIC RESOURCES category;
• waste production and therefore, albeit indirectly, paper and cardboard consumption, were associated with the EXTRACTION OF BIOTIC RESOURCES category;
• the production of liquid waste was associated with the ECOTOXICITY category.

GLOBAL WARMING

Following the classification, this impact category was associated with greenhouse gas emissions resulting from:

• Transportation of raw materials, products and waste;
• Processing of incoming paper material;
• Consumption of natural gas;
• Consumption of electricity.
• Consumption of heating gas oil.

GLOBAL WARMING – plants' comparison

CARBON FOOTPRINT UNIT DATA				
Reference items	Measuring unit	years		
		2011	2012	2013
CO_2 emissions	tCO_2	15,564.02	16,161.41	17,548.31
CO_2 direct emissions from fossil fuels (methane)	tCO_2	725.00	627.01	594.52
CO_2eq indirect emissions (i.e. generate from the electricity supplier)	tCO_2	4,081.16	4,471.60	4,291.18
CO_2 indirect emissions from paper and cardboard production (as finished product)	tCO_2	9,279.25	9,363.61	10,777.78
CO_2 indirect emissions from transportation	tCO_2	1,478.61	1,699.18	1,884.83
Total inbound raw materials	tons	16,807.67	17,614.61	19,987.14
Total finished product (picked up - scrap)	tons	11,088.40	11,306.81	13,499.63
Carbon footprint from fuel	tCO_2 /tons of shipped product	0.0653834	0.0554545	0.0440396
Carbon footprint from electricity	tO_2 /tons of shipped product	0.3680565	0.3954789	0.3178741
Carbon footprint from paper and cardboard production	tCO_2 /tons of shipped product	0.8368431	0.8281387	0.7983758
Carbon footprint from transportation	tCO_2 /tons of shipped product	0.1333471	0.1502797	0.1396209
Carbon Footprint (from all sources)	tCO_2 /tons of shipped product	1,4036302	1,4293518	1,2999104

VARIATION OVER THE LAST 2 YEARS		
Reference items	%	tCO_2
CO_2 emissions	9%	1,386.90
CO_2 direct emissions from fossil fuels (methane)	-5%	-32.50
CO_2eq indirect emissions (i.e. generate from the electricity supplier)	-4%	-180.42
CO_2 indirect emissions from paper and cardboard production (as finished product)	15%	1,414.17
CO_2 indirect emissions from transportation	11%	185.65
Total inbound raw materials	13%	2,372.53
Total finished product (picked up - scrap)	19%	2,192.82
Carbon footprint from fuel	-20.58%	
Carbon footprint from electricity	-19.62%	
Carbon footprint from paper and cardboard production	-3.59%	
Carbon footprint from transportation	-7.09%	
Carbon Footprint (from all sources)	-9.06%	

CO_2 total emissions and plants' comparison

The following graphs compare the total emissions, the emissions at each plant and the emission percentage breakdown according to the different sources.

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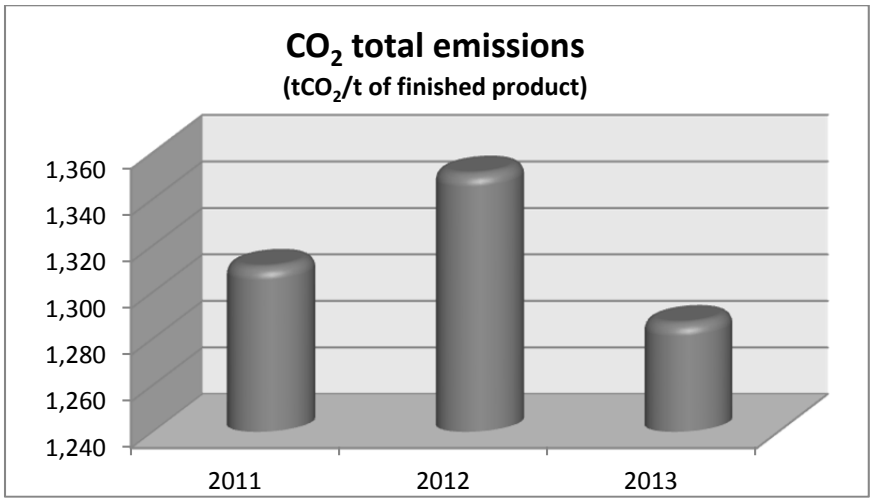

Figure 1 – Total emissions of CO_2 in the 3-year period

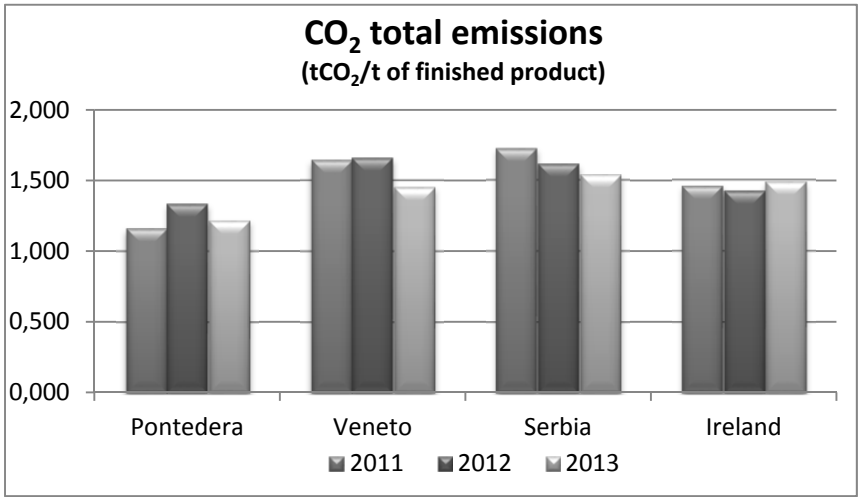

Figure 2 – Total emissions of CO_2 per plant

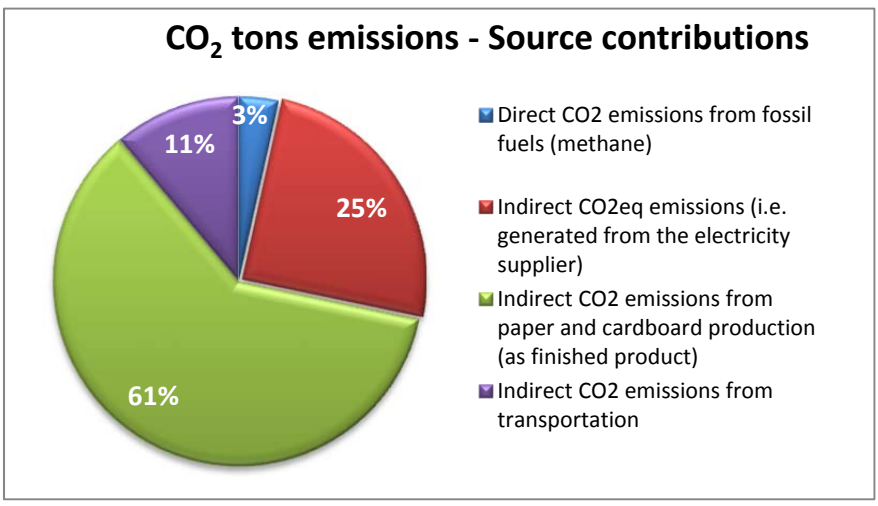

Figure 3 – Total emissions of CO_2 _ contributions of different sources

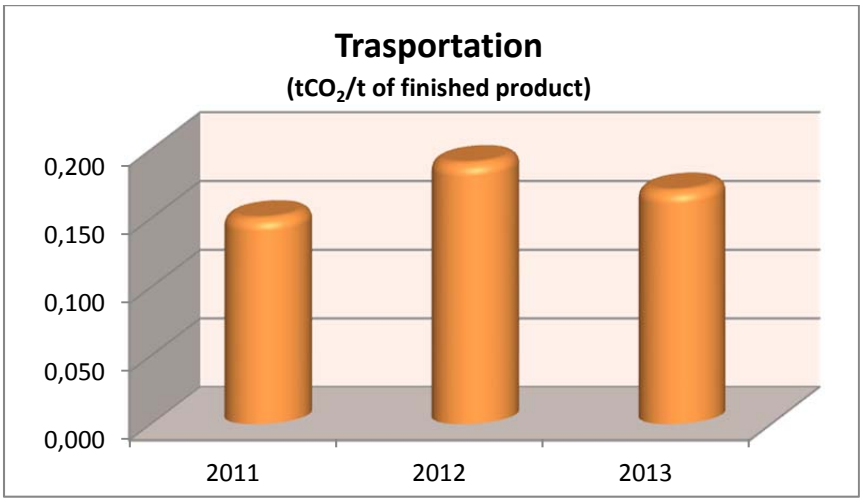

Figure 5 – Total emissions of tCO_2 from transportation

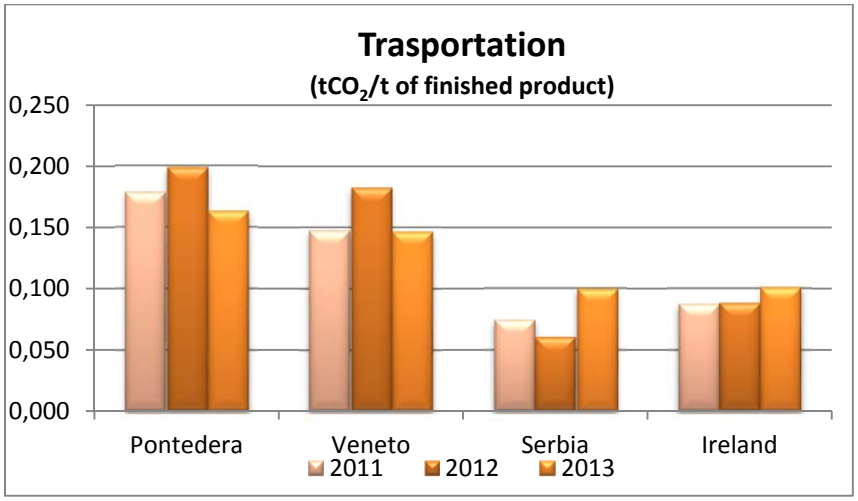

Figure 5 - Total emissions of tCO_2 from transportation per plant

The amount of CO_2 released per kilometre travelled was calculated using the values provided by ANPA (National Agency for Environmental Protection).

Incoming and outgoing trips from the plant

With regard to inbound trips, distances travelled over the three-year period were calculated taking into account the recordings (transport documents) regarding the arrivals of raw materials to the plants, individually for the plants in Pontedera, Tullamore and Vršac and collectively for the two plants in Vicenza.

For outbound trips, on the basis of the number of trips and their routes, the kilometres travelled during three-year period were thus calculated: individually for the plants in Pontedera, Tullamore and Vršac and collectively for the two plants in Vicenza.

It was therefore possible to determine the greenhouse gas emissions of the plants in

Pontedera, Tullamore, Vršac and the two plants in Vicenza.

During the data evaluation for the calculation on the CO_2 emissions related to transport (raw materials and finished products), CO_2 tons out of the tons of finished product were considered.

Figure 4 shows the total emissions, whereas Figure 5 shows the emissions for each plant, with the variations in the last three years.

CO_2 emissions from processing of raw materials (paper, cardboard and other paper material) entered into the process

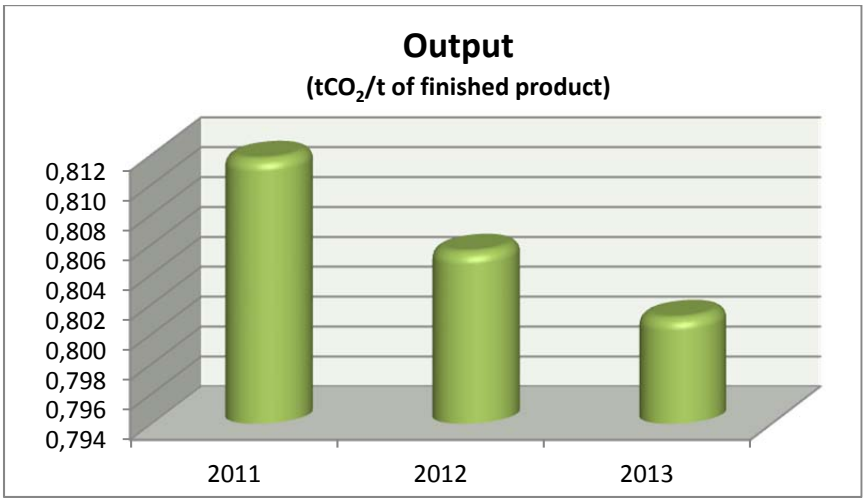

Figure 6 – Total emissions of tCO_2 from the processing of raw materials

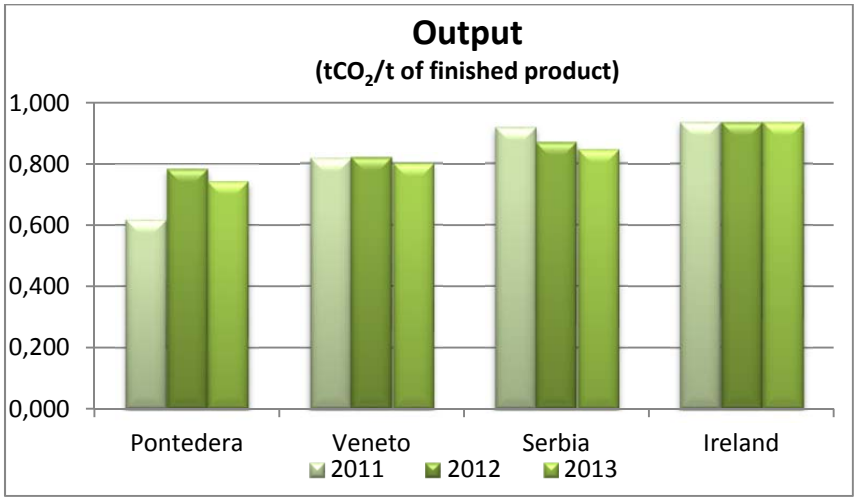

Figure 6 – Total emissions of tCO_2 from processing of raw materials per plant

For calculating the greenhouse gas emissions from the processing of paper-based materials used at the factories of Palladio Zannini, the value of CO_2 emissions per ton of raw material produced was considered on the basis of the quantities sent by the various paper mills.

In particular, the CO_2 emissions were weighed based on the quantity of picked up material. Where the supplier did not send/provide the value of CO_2 per ton, the highest value available was applied.

It should be noted that CO_2 emissions considered and referred to as 'CO2 from processing' are derived from the result of the conversion index provided by the paper mills and weighed against the quantity of raw material purchased and the difference between the purchased material and the production waste.
Figure 6 shows the total emissions and figure 7 shows the CO_2 emissions for each plant with the variations over the last three years.

CO_2 emissions from consumption of natural gas and heating gas oil

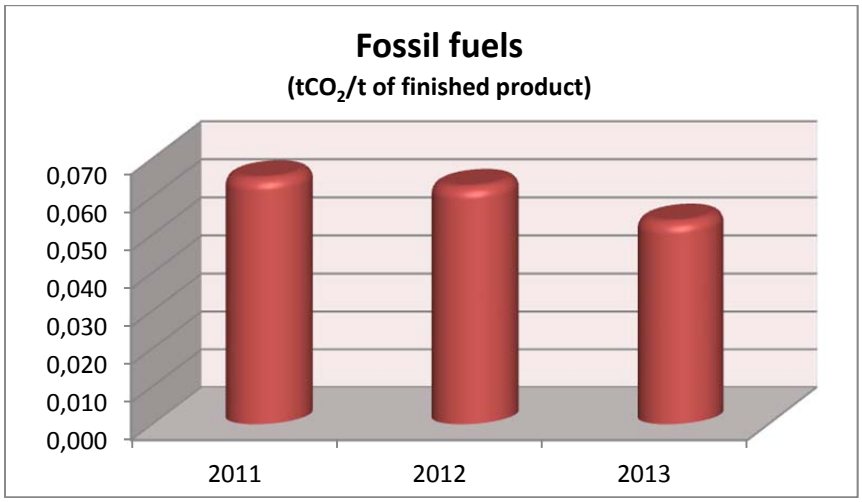

Figure 8 – Total emissions of tCO_2 from fossil fuels

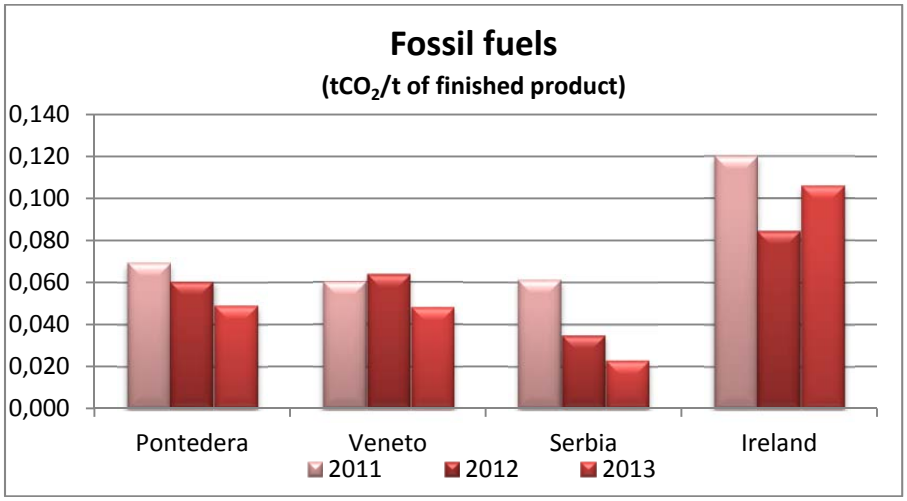

Figure 9 – Total emissions of tCO_2 from fossil fuels per plant

As above stated, natural gas is consumed for heating premises at the Italian and Serbian plants, while the Irish factory uses gas oil to the same purpose. Based on the invoice data relating to the consumption of each plant, emissions of individual production units were calculated.

Figure 8 shows the total emissions, while Figure 9 shows the CO_2 emissions for each plant with the variations over the last three years.

CO_2 emissions from electricity consumption

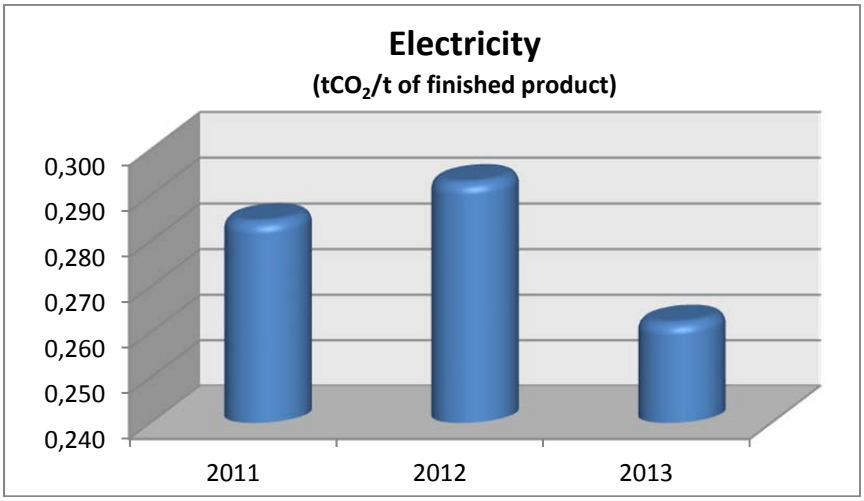

Figure 10 – Total emissions of tCO_2 from electricity

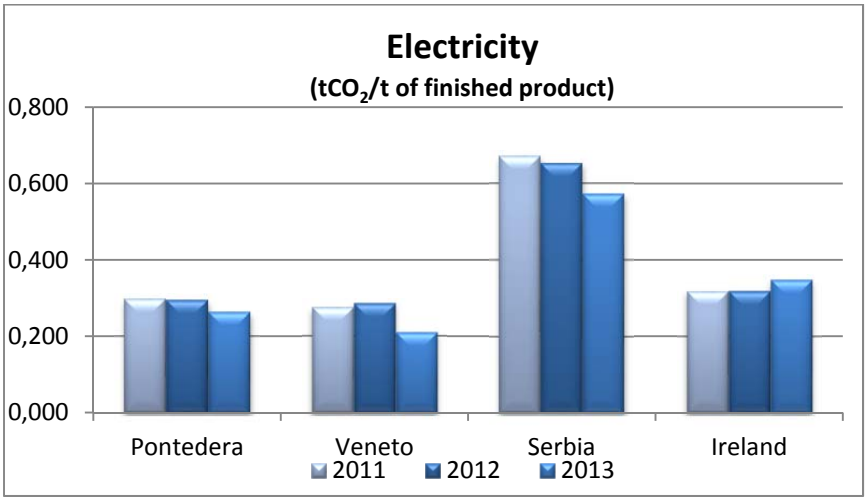

Figure 11 – Total emissions of tCO_2 from electricity per plant

The amount of CO_2 released into the environment was determined through the transformation of consumption (in kWh) in Tons of CO_2 Equivalent via the application of a country-specific conversion factor recommended by the IEA (International Energy Agency, Report on 'CO_2 Emissions from Fuel Combustion - 2012 Edition').

EXTRACTION OF ABIOTIC RESOURCES: Water consumption

The graph below shows the total water consumption.

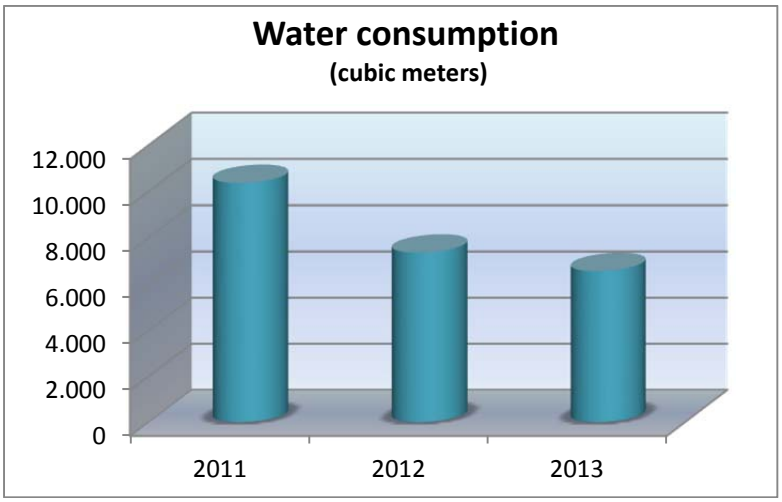

Figure 12 – Water consumption

EXTRACTION OF BIOTIC RESOURCES: Production of waste and scrap from raw materials (paper, cardboard and by-products)

The graph below shows the percentage of waste and scrap of raw materials out of the total quantity of raw materials picked-up for production.

Figure 13 – Total waste production

ECOTOXICITY

Liquid waste

On the basis of the quantities of liquid waste produced over the last three, an on-going percentage decrease has been recorded relative to the amount of raw materials picked-up/used for production.

The following types of waste were considered:
- EWC 08 01 11: waste paint and varnish containing organic solvents
- EWC 08 01 12: waste paint and varnish other than those mentioned in 080111
- EWC 08 03 13: waste ink;
- EWC 08 03 14: ink sludge containing dangerous substances;
- EWC 08 04 16: aqueous liquid waste containing adhesives or sealants;
- EWC 08 01 20: aqueous suspensions;
- EWC 08 01 21: print scrap
- EWC 09 01 01: water-based developer and activator solutions
- EWC 09 01 02: offset plate developer solutions
- EWC 09 01 04: fixer solutions
- EWC 14 06 03: other solvents and solvent mixes;
- EWC 16 10 02: water-based washing solutions.

Figure 13 – Production-related waste

Hazardous waste

The quantities of hazardous waste generated over the last three years show a decrease in percentage relative to the amount of raw materials picked up/used for the production.

Figure 14 – Hazardous waste production