



Co-funded by the Intelligent Energy Europe
Programme of the European Union

WP5 Specific Guidelines Development

D5.3: Guideline – environmental indicators based on carbon footprint

EMSPI: Energy Management Standardization in Printing Industry

08-10-2015

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A. Management summary

The energy management system of a printing company is often focusing only on the direct energy consumption in the company by managing the consumption of electricity and fuels for heating. However, the energy management system can easily be extended to cover the most important environmental impacts of printing by focusing also on the indirect energy consumption.

From an environmental perspective the indirect energy consumption is extremely relevant since the supply chain to the printing company is rather energy intensive and approximately 80% of the total energy consumed in the life cycle of the printed product is allocated to the manufacturing of the raw materials in the supply chain. From the perspective of a printing company this means that the raw material efficiency in the company is far the most important environmental impact of the company.

By including the indirect energy consumption in the energy management system the company can easily extend an energy management system according to ISO 50001 to also cover the ISO 14001.

A simple way to manage the most important energy consumptions and environmental impacts in the supply chain is to work with the carbon footprint of the printed product due to the direct link between the energy consumption and the emission of greenhouse gases. This means that the most obvious way for a printing company to start working with some of the most important environmental indicators is to use indicators based on carbon footprint.

B. Introduction: How can I use carbon footprint as an environmental indicator

The consumption of energy is an important environmental impact in the life cycle of the printed product. Besides the energy consumed in the printing company there are significant energy consumptions related to the manufacturing of the most important raw materials in the supply chain with paper, printing plates and inks as the most important. As a consequence of this the material efficiency in the printing company is normally the most important environmental impact for a printing company.

Since there is a clear connection between the consumption of energy and the emission of greenhouse gasses the consumption of energy in the life cycle of a printed product is closely linked to the carbon footprint of the individual processes of the supply chain. One way to manage the indirect energy consumption is to calculate the total carbon footprint of the company and its products by making a carbon account. The carbon account can then be used for making targets and action plans for continual improvements as an integrated part of the energy management system.

The easiest way to make a carbon account is to use one of the existing carbon calculators on the market but the company should be aware that there are major differences in the way the different carbon calculators are calculating and how much they cover in the calculations. This can be of significant importance if the company wishes to benchmark the performance or use the carbon footprint in the marketing of the company or the products. In these cases the company should use a carbon calculator based on international standards like www.climatecalc.eu. ClimateCalc is introduced in section C in this guideline.

In case the company wishes to work with carbon calculators which are not standardized the company should be aware that the calculation boundaries and the reference data can have significant influence on the calculations which can make the comparison between companies and products impossible. This is described in section D in this guideline.

C. Using ClimateCalc as part of the energy management system

ClimateCalc is a carbon calculator aimed for printing companies in Europe. ClimateCalc is developed by the printing industry and is based on the Intergraf standard for making carbon footprint in the printing industry. ClimateCalc uses standardized data which makes it possible to benchmark between printing companies and printed products across borders in Europe.

C.1. ClimateCalc or ClimateCalc Basic

ClimateCalc offers two different calculation platforms depending on the needs in the company:

ClimateCalc Basic	Easy operated calculation tool targeted the company who wish to get quickly started making carbon calculations. The company only needs to type in data for the energy consumption and the amount of substrate and substrate waste. ClimateCalc Basic uses worst case data for the remaining parameters.
ClimateCalc	Advanced calculation tool targeted the company who wish to work with carbon calculations on a detailed level. The tool offers the opportunity to benchmark the performance of the company with other printing companies.

C.2. Carbon account

ClimateCalc uses a combination of company data, product data and generic data to calculate the carbon account of the company. The carbon account of ClimateCalc covers data for a one year period and is renewed every year. The company data and the product data are verified by an external auditor.

The carbon account of ClimateCalc calculates the following indicators and key performance indicators (KPI):

Indicator	Unit
Total quantity of delivered printed matters	Ton
Total emissions of greenhouse gases	ton CO2 eq
Total energy consumption	GJ
KPI: Emissions of greenhouse gases	ton CO2 eq / ton product
KPI: Energy consumption	GJ / ton product
KPI: Waste substrate (substrate efficiency)	%

All the indicators can be used directly as an integrated part of the energy management system of the company for both monitoring and for setting targets for continual improvement.

REMARK:

ClimateCalc is primarily targeted the benchmark of companies in relation to the products and as a consequence of this all the KPI's have the tonnage of products as a reference. Since indicators based on output data can be influenced by variations in waste it is preferable if the company defines additional indicators based on input data like e.g. consumed substrate. Please refer to the [WP4 manual].

Besides the indicators ClimateCalc also calculates the emission of greenhouse gasses from the different activities in the companies which can be used for a more detailed monitoring and analysis. An example on a complete carbon account is shown in figure 1.

Figure 1: Example of ClimateCalc Basic carbon account.

Carbon account	Product calculation	Company information	Input company	Input paper and other substrate	
Company:	Speed Print	Accounting period:	01-01-2013 - 31-12-2013		Basic
Address:	Print Road 4	Basic year:	01-01-2013 - 31-12-2013		
City:	1000 Brussels	Responsible for the account:	Tom Hansen		
Country:	Belgium	Certificate number:			
The account includes:	Printing in sheetfed and in-house finishing.				
Total quantity of delivered printed matters:	6343 t	Waste paper:	20%		
Total emissions of greenhouse gases (Scope 1+2+3):	14590 t CO ₂ eq	Key figures:	2300 kg CO ₂ eq/t		
Total energy consumption (Scope 1+2):	28039 GJ	Key figures:	4420 MJ/t		
Emissions from activities					Total emissions
Burning of fuel in stationary burning units at the company					435 t CO ₂ eq 3%
Burning of fuel in own or leased vehicles					613 t CO ₂ eq 4%
Direct emissions (Scope 1)					1048 t CO₂ eq 7%
Purchase of electricity					1135 t CO ₂ eq 8%
Purchase of district heating					141 t CO ₂ eq 1%
Energy indirect emissions (Scope 2)					1276 t CO₂ eq 9%
Production of paper and other substrate					6579 t CO ₂ eq 45%
Transportation of paper and other substrate (incl. upstream)					1253 t CO ₂ eq 9%
Production of printing ink and varnish					564 t CO ₂ eq 4%
Production of PE- and cardboard packing					214 t CO ₂ eq 1%
Transportation of products to and from subsupplier					0 t CO ₂ eq 0%
Transportation of products to the customer					793 t CO ₂ eq 5%
Production of fountain solution and cleaning agents					80 t CO ₂ eq 1%
Production of plates and cylinders					2481 t CO ₂ eq 17%
Employee's commuting to and from work (incl. upstream)					99 t CO ₂ eq 1%
Emissions from production of purchased fuel					202 t CO ₂ eq 1%
Other indirect emissions (Scope 3)					12266 t CO₂ eq 84%
Total (Scope 1+ 2+3)					14590 t CO₂ eq 100%

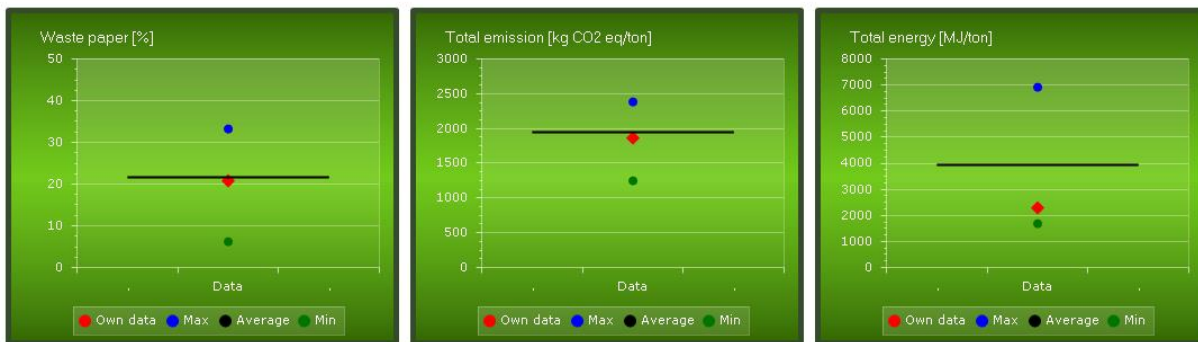
C.3. Product calculation

ClimateCalc offers the facility to calculate the carbon footprint of the single printed product taken into account the carbon emission of the specific substrate qualities used in the production. This makes it possible for the company to optimize the performance of the products by selecting the substrate with the best carbon and energy performance.

When working with carbon and energy optimization on product level the company can achieve major improvements in the energy consumption in the supply chain.

C.4. Benchmarking

The full version of ClimateCalc offers the opportunity to benchmark the performance of the company with other printing companies. By comparing to other companies' performance it is easier for the company to assess the potential for improvements.



C.5. How to get access?

ClimateCalc is owned by the International Association ClimateCalc (IACC) and all graphic trade associations which are members of IACC can grant access to their member companies. For access please go to: www.climatecalc.eu.

D. Calculation scope and reference data for carbon footprint

If the company wishes to use the carbon footprint to benchmark or use the carbon footprint as a marketing tool and publicise the results it's preferable if the company uses a carbon calculator based on international standards like www.climatecalc.eu described in section X.1 in this guideline. If the company doesn't use a standardized carbon calculator the company should pay particular attention to the boundaries and the emission factors of the carbon calculator since these parameters are detrimental for a suitable comparison of companies and products.

D.1. Boundaries of the calculation

There are various ways to calculate the carbon footprint of a printing company depending on how much is covered in the calculations. The most frequent used method for reporting Carbon Footprints is the method described in the Greenhouse Gas Protocol (GHG Protocol) and the method is a reference for most of the existing carbon standards and carbon calculators. The GHG Protocol divides the emission of greenhouse gasses into three scopes:

- Scope 1: Direct emissions of greenhouse gases from the company, e.g. burning of oil or gas in own boilers or vehicles.
- Scope 2: Indirect emissions of greenhouse gases from production of purchased energy, e.g. electricity and district heating.
- Scope 3: Other indirect emissions of greenhouse gases, e.g. production of raw material, purchased transportation services, and the employee's commuting to and from work. The emissions in scope 3 are optional to report according to the GHG Protocol.

The energy consumptions in relation to **Scope 1 and Scope 2 both represent the direct consumptions of energy in the company**, because the consumption can be influenced directly by the company. The energy consumptions related to Scope 1 and 2 are traditionally covered by energy management activities of companies.

The energy consumptions in relation to **Scope 3 represent the indirect consumptions of energy**, which cannot be influenced directly by the company.

The figure below shows an average carbon footprint of a printed product with the emission of greenhouse gases divided into the three scopes.

Figure 2: Distribution of the greenhouse gas emission from the life cycle of an average printed product.

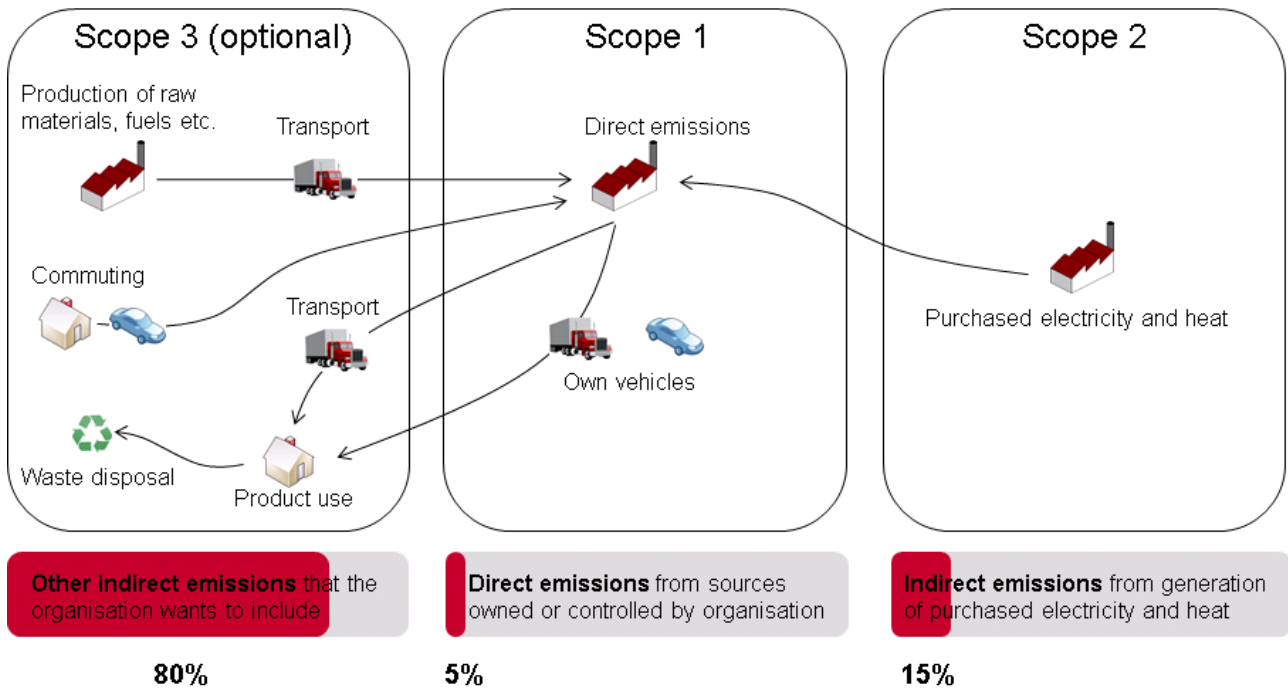


Figure 2 shows clearly that the energy consumed in the company (scope 1 and 2) only represents a minor part of the overall energy consumption in the life cycle of the printed product. Since the majority of the emissions are related to activities in scope 3 and since the reporting of the activities in scope 3 is optional according to the GHG Protocol there can be major differences in the carbon footprint calculated between companies if the calculation scope is not standardized.

To ensure a comparable scope the carbon footprint must be calculated using the internationally recognised standards for calculation. Particularly, it is recommended that, within the same sector, a sectorial standard is used, to enhance comparability. The only existing specific standard for the printing industry is the *INTERGRAF recommendations on CO2 emissions calculation in the printing industry*. The calculation www.climatecalc.eu which is presented in section X.1 is calculating according to this standard.

D.2. Emission factors

To be able to calculate the carbon footprint the company will need to obtain emission factors for the consumed energy and raw materials. The emission factors related to the energy consumption (Scope 1 and 2) can in general be easily obtained, but the emissions factors of raw material emissions (Scope 3) require specific databases, which may imply economic costs for companies.

Furthermore, it can be very difficult to achieve a harmonised use of emission factors between companies and countries, mainly because of the existence of different methods for the definition of the emission factors for the production of electricity. To ensure a comparable calculation based on uniform emission factors for consumption of energy and raw materials, companies can refer to international calculation systems like www.climatecalc.eu which is presented in section X.1.

E. Relevant interesting hyperlinks:

The Greenhouse Gas Protocol: www.ghgprotocol.org

ClimateCalc: www.climatecalc.eu

INTERGRAF recommendations on CO2 emissions calculation in the printing industry:
<http://www.intergraf.eu/printing-and-the-environment/carbon-footprint>.