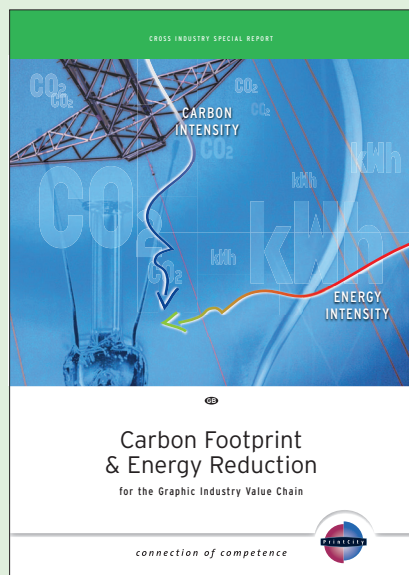


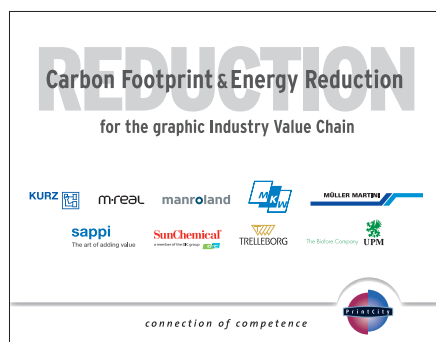
# Carbon Footprint & Energy Reduction

The purpose of this guide is to help provide some clarity to this complex subject, providing information on issues, strategies, techniques and technologies to help improve the overall cost and environmental performance of printers, publishers, brand owners, and their suppliers.

The report seeks to promote, in principle and practice, that the optimum response to the carbon and energy challenge resides in collaborative working across the industry value chain – printers, publishers, their associations and suppliers working within a common frame- work.



*The companies participating in this unique cross-industry project have shared their expertise to gain a better understanding of the issues and provide more effective solutions.*



**Climate change is accelerating. The year 2010 was the warmest\* since at least the middle of the 19th century and possibly for 125 000 years according to James Hansen, University of Colombia, in spite of an unusually cold autumn and winter in Europe.** (\*UN World Meteorological Organisation data, January 2011, is the average from research teams at the UK Hadley Centre, NASA and NOAA in the US.)

The primary cause of global warming leading to climate change is greenhouse gas emissions (GHG) produced by a wide range of human activities. The 'greenhouse effect' is not new – in 1863 Irish-born scientist John Tyndall was writing about GHGs, and in the 1890s the Swedish scientist Svante Arrhenius made the first known attempt to calculate the impact of increased carbon dioxide in the earth's atmosphere.

Human generated climate change is global and only coordinated international action can resolve it. Under the 1997 Kyoto treaty 37 industrialised countries agreed to reduce their collective GHG emissions by 5.2% from the 1990 level (8% for the EU-15). Major emission producers who had not implemented Kyoto – USA, China, India and Brazil – are now participating in negotiations to replace the treaty, which expires in 2012. Progress is slow and currently hampered by a political divide of responsibility between developed countries and newly industrialising economies. The related financial responsibilities are difficult to address by national political institutions in the short term. In late 2010 there was some consensus to an environmental tax on air and sea transport. The 2010 Cancun UN environmental conference established some new agreements to minimise and control emissions.

Significant segments of business and industry would welcome a new global treaty that gives them a clear legislative business environment within which they can make long term investment decisions with some security and, also, ensures that the global competitive playing field is relatively level.

Climate change, resource availability, waste disposal and pollution are linked to sustainability. Sustainable development calls for long-term changes in patterns of production and consumption to meet the needs of the present without compromising the ability of future generations to meet their needs.

Climatic and other environmental issues already have an accelerating impact across the industry-wide process and value chain systems of publishers, advertisers, packagers, printers, and their suppliers. The European industry has been proactive in its response, with industry associations like CEPI, Intergraf, PostEurop, and PPA developing carbon footprint methodologies and calculators. The optimum response to the carbon and energy challenge is in collaborative work across the industry value chain. One example is the Strategic Workshop of European Graphic Industry Value Chain on Carbon Footprint Standardisation in 2010, hosted by CEPI, FAEP, FIPP, Intergraf, PrintCity, VDMA and WAN-IFRA, with representatives from other graphic industry associations, which defined a common vision:

1. Carbon Footprinting is a tool to help reduce carbon emissions and is becoming a fundamental regulatory requirement. It is one part of sustainability, not the whole, and needs to be viewed within the overall environmental context.
2. Carbon Footprinting is also an evaluation tool to help increase energy efficiency.
3. International harmonisation of carbon footprint definitions, methodology, and data is needed.
4. There is a need to resolve uncertainty on some key issues: energy, biogenic, and end-of-life stage.

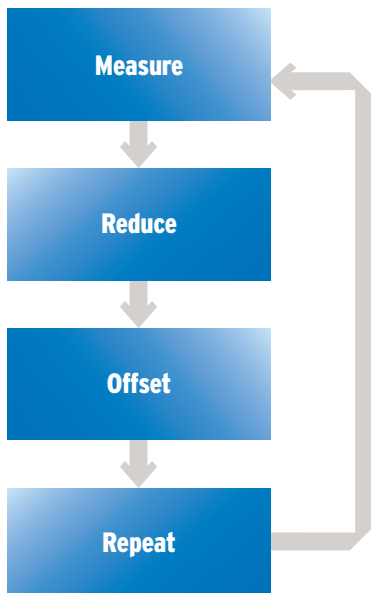
There is currently a dual approach to international harmonisation. An ISO Working Group was set up in October 2010 to explore the environmental impact of print, including a harmonised carbon footprint calculation, within the framework of the ISO draft 14067. In early 2011 a pragmatic alliance of European printing associations combined existing work from industry sectors to provide coherent calculation procedures and transparent data exchange. The important point is that the industry proactively tackles this issue and positions itself in the climate change issue as an international industry leader.

Sections of the electronic media and their suppliers position themselves as being more environmentally friendly than print – a mantra that is generally erroneous or incomplete. Both paper and electronic media have a place in a sustainable future and the question is not which medium is environmentally preferable but, rather, how both platforms can work together to reduce the overall environmental burden.

## Carbon Footprint & Energy Reduction

### Contents

Executive Summary  
Glossary  
Standards & Specifications  
The carbon & energy dynamic  
Carbon impact on print as a media  
and for packaging  
Carbon Footprint evaluation  
Carbon & energy across the supply chain  
Case studies



Emissions and Energy reduction is a set of 3 repetitive steps. Source UPM

A Lean and Green manufacturing strategy improves both environmental and business performance. Source PrintCity



## Carbon & energy reduction ... work in progress

For every business and inhabitant of the planet the transition to a low-carbon and more sustainable society is becoming one of the single most important drivers of the first half of the 21st century. Therefore, environmental issues will have an increasing impact on the graphics industry value chain for publishers, advertisers, packagers, printers, and their suppliers.

There is a direct correlation between CO<sub>2</sub> fossil emissions, energy generation and consumption. The industrial revolution was sustained by fossil fuels that drove carbon extraction and combustion, with its subsequent effect on the climate. Coal is still the emissions 'king' in terms of CO<sub>2</sub> emissions even in the 21st century. Avoiding catastrophic climate change requires a massive reduction in GHGs from 1990 levels.

European carbon emissions continue to decrease and could over achieve the Kyoto target by 5,1% but if only if all so called additional measures are implemented. A further positive point is that pulp, paper and printing is responsible for only 0.6% of total GHG emissions in Europe, and these have dropped by 3% from 1990 to 2008, while production has increased by around 12%. In 2008, the EC defined its 20/20/20 mandatory reduction targets by 2020 (20% reduction of GHGs / 20% increase in energy efficiency / 20% increase of renewable energy sources).

One of the key issues is how much would a massive reduction in GHGs levels cost? A recent Inter-governmental Panel on Climate Change (IPCC) report states that the most stringent mitigation target would reduce global growth by 0.12% per year to 2050; it could be less.

According to Corporate Social Responsibility (CSR) Europe "The sustainability issue is now a priority across boundaries – political, cultural and professional. In a business context, sustainable development means taking a triple bottom-line approach so that the business measures its success not just on financial performance but on its environmental and social performance too". Research from the UK's Carbon Trust in 2009 showed that 63% of consumers are more likely to buy a product if they know action is being taken to reduce its carbon footprint.

Clean technologies themselves are already a big business with a global revenue in 2009 of \$530 billion according to HSBC — this is about the size of the Swiss economy and bigger than the telecom services and media sectors.

### Why is energy policy important?

There are three realities concerning energy that impact on all users:

- Conventional energy supply is limited and many alternatives are expensive = need to reduce.
- The cheapest kWh of energy is the one not used = need to improved energy efficiency.
- Significant reduction of fossil fuelled energy = need to have cleaner generation.

The energy challenge is not just the massive reduction in GHGs in developed countries but also that world population is predicted to increase substantially, with many countries moving to more developed economies with an increasing demand for energy. Four trends that will shape the world's energy system this century are electrification, decarbonisation, localisation and optimisation.

An energy strategy that takes only the carbon factor into account is simplistic because GHG emissions are significantly influenced by the source of energy used. Climate change is linked with resource use, waste disposal and pollution within sustainable development — therefore, any single dimension (such as the carbon footprint) is an inadequate basis on which to make balanced environmental decisions. For those companies seriously interested in reducing their overall energy consumption, the measurement of the total energy used is essential. The most suitable single unit of energy to use is the Tonne Oil Equivalent (toe).

### Carbon responses

The objective of Carbon Footprinting is to measure the emissions of a business, production site, product, or service. The primary reason to do this is to drive steps to reduce GHG emissions and fossil energy use. A secondary reason is to act as a base for carbon compensation and communication. Current sector or national Carbon Footprinting approaches are confusing, costly and complex — they need to be clear, concise and credible. A uniform, international approach to Carbon Footprinting that takes into account all elements of the graphics industry value chain is required.



## Carbon Footprint & Energy Reduction

### Some initial conclusions . . .

- 1 Climate change is a dynamic international issue driven by geopolitics, NGOs, legislation, customers, and users. It remains a key global political issue because climate deterioration continues. Energy and GHGs are important legislative and commercial factors.
- 2 Fossil fuelled energy supply is limited and it will become more expensive. Energy optimisation is a key to reducing demand, GHG emissions and related business costs.
- 3 'Lean' and 'Green' frequently go hand-in-hand to improve both environmental and business performance.
- 4 Carbon Footprinting is an evaluation tool to measure the environmental impact of a product or process. It facilitates the reduction of energy consumption leading to lower GHG emissions and provides a calculation base to offset emissions that cannot be reduced.
- 5 Current sector or national Carbon Footprinting approaches are confusing, costly and complex – they need to be clear, concise and credible. A harmonised international approach to applying Carbon Footprinting across all elements of the graphics industry value chain is required. Carbon Footprinting will be challenging for small companies unless simplified.
- 6 Uncertainty needs to be removed from some Carbon Footprint issues, including definition of scope or boundaries, methods to calculate energy mix and conversion factors, avoided emissions, sequestration, and biogenics – many of these are general issues that, nevertheless, concern the graphics industry. A key issue is the calculation of emission factors called "secondary data" in the future ISO14067 along with transparent reporting and communication.
- 7 Caution – the inappropriate use of Carbon Footprinting as a single parameter to compare goods or services can lead to unbalanced environmental decisions.
- 8 For those companies seriously interested in reducing their overall energy consumption, it is recommended to use Tonne of Oil Equivalent (toe) as a parallel metric to CO<sub>2</sub>e.
- 9 Inflation of ecolabels leads to confusion and their devaluation (over 300 label types from more than 200 countries).
- 10 Ink-on-paper is not always perceived as being environmentally friendly but it is the only media with a one-time carbon footprint – all other media require energy every time they are looked at.

### ... work in progress

Political administrations are increasingly looking at standards, labels and other instruments relevant to consumers to involve them in climate change mitigation. Therefore, attention goes beyond the carbon emissions of production activities, companies or sectors, focussing also on emissions associated with products.

There are a number of Carbon Footprinting issues that need to be resolved: the definition of boundaries can be the source of incompatibility, confusion and concerns over data precision; how to calculate energy mix and conversion factors; avoided emissions are not covered in standards and are seen as having a sliding scale of creativity and credibility. More clarity is also required for carbon sequestration, neutral/offsets, and trading.

### Carbon impact on print & electronic media

It is estimated that internet data centres are responsible for around 1% of all GHG emissions — about a quarter of the ICT (information and communication technology) footprint of 4% (Gartner). These figures may be higher as a German Federal government report estimated that ICT took 10,5% of the country's electricity consumption in 2007. In a sustainable future, paper and electronic media each have a relevant place. Misplaced perceptions that electronic media are more environmentally friendly than print confuse the issue. The real question is how the two platforms can work together to reduce the overall environmental burden. The internet will also be crucial to a low carbon world by facilitating smart energy grids. Therefore, it is not just technology developments that will affect the growing carbon footprint of the internet, but more importantly how this medium is used.

The pulp and paper industry is one of the world's largest users of renewable, low-carbon energy. Around 50% of the primary energy used (e.g. purchase fuels) to make paper in Europe and the US comes from carbon neutral renewable resources and is produced on site at mills. In comparison, most IT data systems rely on conventional distributed power generation using fossil fuels.

Recycling can have a significant impact in the reduction of GHGs and energy use. The paper industry is the recycling leader in Europe with over 50% of its raw materials for production coming from recovered products.

### Carbon Footprint value chain — making it 'leaner and greener'

Mapping of value/process streams identifies the multiple sources of CO<sub>2</sub>e and energy consumption. The most effective optimisation approach is to work across the entire value stream to measure, identify and prioritise areas where improvements can be made; this should take into account:

1. What parameters are under control of the printer/the customer/the suppliers?
2. What actions have low cost and short term to implement – expected return on investment?
3. What actions have higher cost and mid- to long-term implementation – expected return on investment?

Improvement measures can be direct and indirect. Direct measures include, for example, energy savings achieved by technical or organisational changes and substitution of raw materials (or of a supplier or a process). Indirect measures may involve such actions as positively influencing employees' behaviour, e.g. switching off light/equipment whenever not needed, implementing improved processes with suppliers or customers, e.g. optimised logistics. You can't manage what you don't measure. Therefore effective reporting is an essential action in conjunction with Reduce, Reuse, Recycle.

Printing process optimisation should begin with control of the workflow and process, the use of quality standards and profiles to minimise paper waste, overinking and excessive drying energy. Optimised maintenance is also crucial to minimise consumption of energy and materials.

New technologies can provide significant reductions in energy consumption and emissions. However, the industry has relatively long reinvestment cycles, which means there will be periodic large step change improvements.

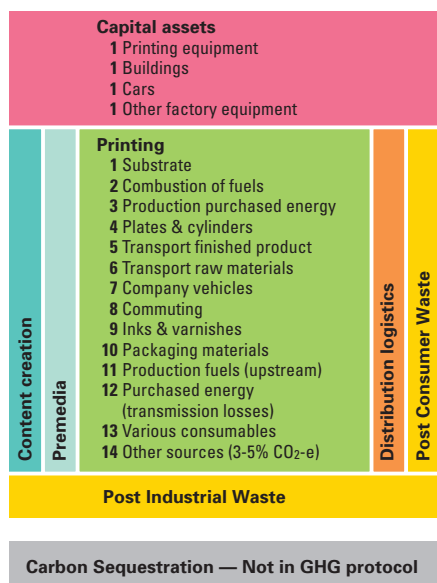
This report concludes that the graphics industry has made significant improvements to its carbon and energy efficiency. However, these issues are ongoing and will remain 'work in progress' for many years.

## Carbon Footprint & Energy Reduction

## Carbon Footprinting is an evaluation tool

The objective of Carbon Footprinting is to measure the GHG emissions of a business, production site, product, or service. The primary reason to do this is to drive steps to reduce GHG emissions and fossil energy use. A secondary reason is to act as a base for carbon compensation and communication. Caution: the inappropriate use of Carbon Footprinting as a single parameter to compare goods or services can lead to unbalanced environmental decisions. There is no single universally accepted definition. The one chosen for this report is:

**The Carbon Footprint is the total amount of fossil carbon dioxide (CO<sub>2</sub>) and other GHGs emitted over the full lifecycle of a product, process, company, location or service. Normally, a Carbon Footprint is expressed as a CO<sub>2</sub> equivalent (mass of CO<sub>2</sub>-e) to allow the different properties of six defined GHGs to be expressed collectively as a carbon dioxide equivalent, 'equivalent' means having the same warming effect over 100 years.**



Defining the boundaries between the links in the graphics industry value chain are prerequisites to an efficient and modular approach. Intergraf recommends that 13 principal parameters be included in any calculation of emissions of a printing site or product because these usually cover around 95% of all GHG emissions in the life-cycle of printed material – this scope excludes emissions related to capital assets, customer distribution and end-of-life of printed material. Graphic PrintCity

“The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard” sets the Carbon Footprinting approach. The definition of operational boundaries describes at three levels the extent to which emissions will be analysed:

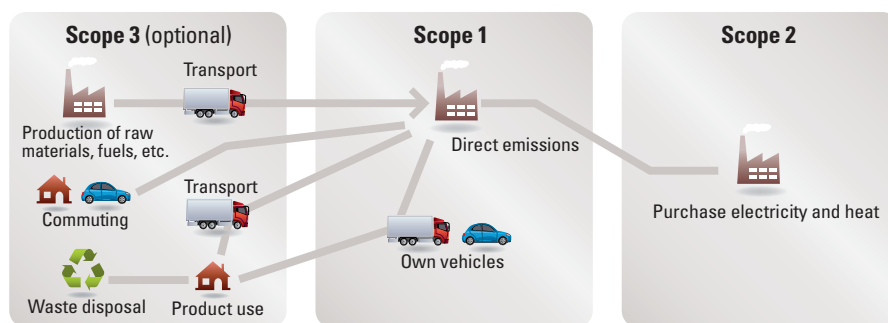
**Scope 1:** Measures *only the emissions from the direct activities* of equipment owned or controlled by a company.

**Scope 2:** Accounts for emissions from the production of purchased energy. *The energy source is important as fossil energy generation has a high GHG impact, while sustainable and nuclear have the lowest. The use of European or national factor averages will make a difference to results.* How to calculate energy mix, averages or site specific, national or European factors. National fuel mixes are a problem. Preference is for a single figure for average energy in EC.

**Scope 3:** Optional calculation of ‘embodied emissions’ from the activities of a company and also from external sources, e.g. created from manufacturing, materials and services purchased, logistics, employee commuting, etc. Not everything has to be included – but it is essential to define what is excluded and why, and where estimates are used. Embodied emissions in the supply chain are the most comprehensive and there is a growing trend to measure them. *The definition of boundaries is often the largest source of incompatibility, confusion and concerns about precision of data.*

Common definition of boundaries across the supply chain is essential to avoid non-productive collection of non-standard data, and allow a holistic approach to minimising GHG emissions and energy use across the entire supply chain.

Political administrations are increasingly looking at standards, labels and other instruments relevant to consumers to involve them in climate change mitigation. Therefore, attention goes beyond carbon emissions of production activities, companies or sectors, and is also focussing on emissions associated with products. Emissions are not yet reported consistently, clearly and with transparency which has created barrier to direct comparability. Some use absolute emissions and others emissions intensity (e.g. relative to production, or sales). Be aware of the complexity of the Carbon Footprints and possible differences due to chosen scope, assumptions, and default factors used. If Carbon Footprints are used to compare products or suppliers, they must use the same system boundaries, the same percentage of coverage of the total lifecycle emissions (cut-off criteria) and similar standards (calculation methods). Avoided emissions are currently not covered (in PAS or ISO) and represent a sliding scale of creativity and credibility.



“The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard” defines the principal implementation steps and where to set the boundaries and what will be included, excluded, and reported. The organisation boundary defines which parts of a company, group, subsidiaries, joint venture, etc. are concerned; and the operational boundary’s three scope levels define the depth at which emissions will be analysed.

Graphic Association Denmark (GA)