



Project Results Report

Product Carbon Footprinting – The Right Way to Promote Low Carbon Products and Consumption Habits?

Experiences, findings and recommendations from the
Product Carbon Footprint Pilot Project Germany

www.pcf-project.de

Publisher

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Abstract

Introduction

In Germany, private consumption is responsible for approx. 40 percent of the annual per capita emissions of greenhouse gases (source: "Die CO₂ Bilanz des Bürgers", Federal Environment Agency, 2007). So, what impact do the products and services we use every day have on the climate? In an attempt to find an answer to this question, researchers and companies have been talking about so-called Product Carbon Footprinting (PCF) for some years now. The Product Carbon Footprint, or "CO₂ footprint"¹, is a unit of measurement for calculating all greenhouse gas emissions which accumulate during the life cycle of a certain product. As such, the PCF is an appropriate instrument for determining, evaluating and communicating the effect that goods and services have on our climate.

Despite years of experience in the area of life cycle assessment, the discussion on PCF has given rise to new questions. That is why ongoing developments are a dynamic process and many questions have not yet been resolved conclusively. For example, we still do not have a scientifically substantiated, consistent and internationally harmonised convention for defining how a CO₂ footprint is to be measured.

The issues

This report brings together the principle findings of the German PCF Pilot Project, which was initiated by research institutes and environmental bodies and carried out in cooperation with ten large companies. The project focused on the practical experience which has been gained in measuring the CO₂ footprints of actual products consumed and used in our day-to-day lives. It was not the main aim of the project to develop an own method for calculating PCF. The CO₂ footprint was measured in six steps based largely on the method used for life cycle assessments. Those involved in the Pilot Project concerned themselves mainly with three questions:

- How practicable are the methods which have been used to calculate a CO₂ footprint up to now?
- What findings support the development of a consistent, internationally accepted methodology?

- How can the results of the PCF calculations be presented to consumers in a way that is simple, credible and relevant to promoting climate conscious consumption habits?

Results

Those involved in the Pilot Project have come up with important findings from the case studies; for example, that the ISO 14040/44 standard has proved to be a suitable methodological framework for calculating PCFs. From an international point of view, they nevertheless see the development of a uniform convention to be important in the coming years, so that Product Carbon Footprinting can be firmly established in global climate discussions.

What is more, the work carried out in the Pilot Project has also shown that Product Carbon Footprinting can make an impact in many ways. For example, it increases the awareness among company managers, employees and suppliers about what impact their own products and services have on the climate. PCF is also a key factor in recognising and developing the potential for reductions all along the value chains. The transparent documentation of CO₂ footprints can also form the basis for clearly communicating the climate impact of a product.

However, above all, a communicated CO₂ footprint can raise awareness among private consumers about low carbon consumption - however, this will only be true, if factors such as practical relevance to consumer decision making, credibility, comprehensibility, comparability and transparency in the communication can be guaranteed. The Pilot Project has drawn up a series of recommendations to deal with this.

For example, information about the CO₂ footprint is not only to be gathered for the entire life cycle, but will also be broken down into individual phases such as production, use and disposal. An aggregated overall figure in the form of a static carbon label is something which those involved in the Pilot Project do not consider to be conducive to achieving aims. A figure of this kind suggests a precision to the consumer which cannot realistically be achieved at the present time using the variety of different methods and interpretations currently available. Communicating Product Carbon Footprints should also be placed within a context which provides the consumers with a clear idea about the climate impact of their actions.

¹"CO₂ footprint" is used as the simplified form of "CO_{2e} footprint".

Stakeholder dialogue

The results presented in this report cannot be seen as a final debate on the calculation and communication of Product Carbon Footprints. The Corporate Partners are therefore looking forward to intensive feedback from interested stakeholders. A newsletter with up-to-date information on the PCF Project and on the admission of new partners is available through registration at www.pcf-project.de. Until a uniform convention for calculating PCF has been established, interested companies should gather their own experiences with Product Carbon Footprints in overarching initiatives such as the PCF Project to ensure consistency and credibility.

Last but not least, the Project Initiators want to actively promote international debate on the harmonisation of Product Carbon Footprinting. PCFs can only be measured, evaluated and reliably communicated in a consistent and comparative manner if an internationally accepted standard is in place.

1. Introduction

The goods that we consume every day have an impact on the climate. This is true for the bicycle in your garage, French fries in your fridge freezer, your new pair of jeans or a modern flat screen monitor, and even for more service-based products, such as your holiday or a book you have ordered on the internet; in fact, every product that we use in our daily lives generates greenhouse gases during production, transport, storage, use and when disposed of. Scientists and companies have been looking for years at the question of how to calculate and evaluate the impact that products have on our climate. One way that has seen intensive discussion is the calculation of a "CO₂ footprint", so-called Product Carbon Footprinting.

The Product Carbon Footprint (PCF) helps us measure all of the greenhouse gas emissions which accumulate during the life cycle of a certain product. However, calculating a PCF is not simple. Most products have covered a long and complicated way before they reach the end consumer. Many of them are made up of a whole range of different raw materials. There are products where the greenhouse gases are mainly caused during the production process and, with others, such as packaging which only has a short useful life, the disposal or recycling of these packages plays a significant role for the GHG balance. Appliances that run on electricity, like fridges, produce the highest emissions while switched on, but less when being produced or disposed of. That is why a clear definition of how and how long the consumer uses a product needs to be found before the PCF can be calculated. This paper brings together the principle findings of the German PCF Pilot Project, which was initiated by research institutes and environmental bodies and carried out in cooperation with ten large companies. The project has focused mainly on gaining practical experience in calculating PCF by looking at consumer goods that are used on a daily basis. In the process, it was examined how this can be done correctly and in a way that makes sense. What is more, the project participants look at the central question about how to present the results of such calculations to consumers in a form that is easy to understand so that, as a consequence, they will be prompted to act in a way that impacts less on the climate.

The CO₂ footprint as a way to measure the effect that goods and services have on the climate is still a relatively new idea. That is why we do not yet have broadly accepted standards or methods about how a PCF can be calculated and evaluated. The findings that have emerged from the Pilot Project are the result of intensive research into the process of Product Carbon Footprinting using 15 individual products from various branches: bed linen, insulating material, toilet paper, wine stabiliser, a frozen meal,

“ A Low carbon society requires maximum energy efficiency for both the network and products. ”

Claudia Schwab, Vice President Environmental Protection & Sustainable Development Corporate Responsibility, Deutsche Telekom AG / T-Home



eggs, strawberries, coffee, shampoo, washing detergent, sealant, packaging adhesive, a sports bag, a telephone and internet connection and a beverage carton. Last but not least, PCF is a subject which is moving all the time. For this reason, the project also involved in-depth dialogue with international organisations and interested stakeholders.

2. The starting point

2.1 Climate change as one of the main challenges we face

Global climate change is reality and is one of the main challenges facing society, politicians, industry and the economy. The mean worldwide increase in temperature must be kept to a maximum of two degrees Celsius above its pre-industrial level if we want to contain the effects that global warming has on human beings and our planet. According to the Intergovernmental Panel on Climate Change (IPCC), this means that, by 2050, we have to reduce the worldwide emissions of greenhouse gases by more than half compared to what they were in the year 1990. Industrial countries in particular are called upon to act here with a recommended reduction in annual greenhouse gas emissions by 80 percent and more compared to 1990.

2.2 Private consumption has a significant influence on our climate

Private consumption is one of the main factors when it comes to protecting the climate: it is responsible for more than 40 percent

of per capita emissions of greenhouse gases (source: "CO₂-Bilanz des Bürgers", Federal Environment Agency, 2007). Every citizen in Germany emitted an average of around 11 tons of CO₂ equivalents in 2007 (one equivalent is equal to the total of all six greenhouse gases included in the Kyoto Protocol converted into the impact CO₂ has on the climate). These 11 tons per year mean about 30 kilogrammes per day. This amount includes the emissions from areas in our lives like residential, mobility, nutrition and the emissions from the production and consumption of goods and services of all kinds.

Eleven tons per year is clearly far too high. A simple calculation shows that reducing the worldwide greenhouse gases from 1990 by half would require a per capita global average of a mere two tons per year or 5.5 kilogrammes per day. The following comparison makes it even more clear: if we want to achieve our climate goals, it is the industrial nations, Germany among them, that need to reduce their greenhouse gases considerably in all areas of life. While, in the past, debates on emission focused mainly on energy supply and industry as a whole, an increasing number of players and groups in society have now come to realise the significance of private consumption and the role that consumers play in protecting the climate.

2.3 Companies and consumers united to promote low carbon consumption

One thing is clear: companies and their suppliers carry responsibility for the value chain and for how products are designed. What is also clear, however, is that consumers' buying patterns and consumption behaviour affect what products are in demand and therefore what is produced. Consumers also determine how

“ The methods for calculating PCF are partly inadequate at the present time. There is no CO₂ credit for green power, for example. In Germany, both our administration and production facilities are supplied with 100% green power and this should be reflected in the GHG balance of our products. ”

Dr. Heike Schiffler, Director Communication and Environment, Tetra Pak GmbH & Co. KG



and for how long goods and services are used. Manufacturers and consumers bear shared responsibility for ensuring that products cause fewer emissions and that consumption behaviour changes to have less impact on our climate. Manufacturers and suppliers can reduce the emissions during the life cycle of goods and services in lots of ways. Some examples are improving the resource and energy efficiency of production processes, buying materials with lower embodied emissions and reducing materials consumption or optimising the material selection process in the product design phase. Consumers can contribute towards a reduction in emissions by deliberately buying long life goods, by asking for environmentally-friendly and low carbon products, and by reconsidering their everyday buying patterns or consumption behaviour and changing these accordingly.

2.4 The consumer must be informed - but how should this be done?

Consuming in a way that has little impact on the climate is only possible if consumers are able to assess how much of an impact the products they buy and use have on the climate. In the past years, several very good instruments have been created for providing consumers with this kind of information. Some examples are the EU Energy Label for large household appliances, energy certification for buildings or the fact that commercial vehicles are required to indicate their emissions. A standardised methodology has been developed in each case to facilitate a comparison of the options. If consumers and companies gain a better understanding of the effect that everyday goods and services have on the climate and adjust their consumption habits accordingly, then they will pave the way for a systematic reduction in emissions.

In the food and consumer goods sectors, however, there have not had any tested and widely accepted instruments for informing

people directly about the climate impact of such products. As a consequence, information is lacking about the significance of private consumption for climate change, about low-impact products or about how to use these products “correctly”. This means that companies are not yet in a position to inform customers about the climate impact of their products and the corresponding value chains. Also, customers and consumers are not yet able to identify or compare low carbon goods and services. For this reason, measuring the CO₂ footprint of specific products was not the only reason why the process of Product Carbon Footprinting was tested and discussed as part of the PCF Pilot Project. At the same time, the question of how results could be communicated to end consumers and industrial customers in a way that is both transparent and relevant to their respective decision making was discussed.

2.5 Product Carbon Footprinting: an extremely dynamic area of interest

How can greenhouse gas emissions of consumer goods and services be assessed and evaluated? In the past two years, an increasing number of international initiatives have been set up to deal specifically with this subject and these have been building upon the already existing methodological framework provided by the ISO standards on life cycle assessments. Since 2007, British organisations have been working on the PAS (publicly available specification) 2050, the first specification for calculating the carbon footprint of goods and services. We also now have the first instruments aiming to provide companies and consumers with information. For example, Great Britain tested a “carbon label” on individual products for the first time in 2007. After that, other countries followed suit and have been developing similar approaches for evaluating and labelling products. However, we still do not have any consolidated test results in most cases.

“ Product Carbon Footprint is an integral part of Tengelmänn’s climate initiative which coordinates the numerous climate protection measures of our company. ”

Sieglinde Schuchardt, Head of Public Relations, The Tengelmänn Group



3. Product Carbon Footprint Pilot Project Germany

The PCF debate is in full swing. The PCF Pilot Project took advantage of this momentum and the plurality of ideas in its work and discussions. The objective was to furthermore use the experience gained by companies in different industries in order to develop recommendations for a uniform convention for Product Carbon Footprinting. The project partners were not trying to come up with a new methodology for PCF.

In addition to examining the CO₂ footprint, other environmental criteria were taken into account to varying degrees. This makes it possible to estimate the relevance of greenhouse gas emissions as an individual factor compared to other types of environmental impact. Such a comparison also shows whether reducing the greenhouse gas emissions of a product might negatively affect other environmental categories. The recommendations developed in the project were derived from actual case studies and have been tested for practicality. The meaning and the effect that these recommendations have on the result of the PCF have been checked and documented on the internet: www.pcf-project.de

3.1 Objectives

The parties involved in the project set the following objectives:

1. **Gain experience:** Project Initiators and Partners use concrete case studies to gain experience in the application of existing methods for determining the CO₂ footprint of products and check them for feasibility (ISO standards for life cycle assessment, PAS 2050).

2. **Draft recommendations:** The findings from the case studies are used to compile recommendations for developing and harmonising a transparent and scientifically sound methodology. The Pilot Project explicitly refrains from developing its own methodology.

3. **Communicate results:** Consumers must be informed in an easily comprehensible and appropriate manner. Those involved in the Pilot Project therefore resolve to discuss credible communication at the industry, company and product levels for the promotion of low impact purchase decisions and use patterns. These deliberations focus on the practical relevance of measures for consumers to promote low carbon consumption. The Pilot Project explicitly avoids developing its own carbon label because the methodological conventions currently in place are not sufficiently robust and have limited relevance for consumer decision making.

4. **Standardise internationally:** By applying the knowledge and recommendations developed in the project, the parties resolve to make an active contribution to the international debate on the assessment and communication of PCF.

3.2 Project Initiators

The Project Initiators are the WWF, the Institute for Applied Ecology (Öko-Institut), the Potsdam Institute for Climate Impact Research (PIK) and THEMA1. They are responsible for project management as well as operational oversight of the work. The appendix provides additional information about the individual Project Initiators.

“ By assessing the CO₂ footprint, we have gained extensive knowledge which is a good basis to further optimise processes. In this way, we are moving towards our goal of manufacturing our products in a climate-compatible manner. ”

Stefan Dierks, Senior Manager Environment, Corporate Citizenship & Corporate Governance, Tchibo GmbH



3.3 Corporate Partners and case studies

Under the direction of the Project Initiators, ten large, multinational companies determined the Product Carbon Footprints for individual products in their portfolio. For additional information about the individual Corporate Partners, refer to the appendix or www.pcf-project.de.

Corporate Partner	Case Studies ²
BASF	BASF insulation material Neopor®
	Textile finishing "BASF Fixapret® AP"
dm-drogerie markt	Own quality brand sanft + sicher toilet paper
DSM	Wine stabiliser Claristar™
FROSTA	FROSTA Tagliatelle Wildlachs (wild salmon)
Henkel	Schwarzkopf & Henkel shampoo (Schauma 7 Kräuter)
	Henkel washing detergent (Persil Megaperls®)
	Sealant (products of the Sista and Ceresit brands)
	Industrial packaging adhesives (Liofol®)
REWE Group	Best Alliance strawberries (REWE contract farming of sustainably grown early season strawberries in the south of Spain)
Tchibo	Privat Kaffee Rarity Machare
	Sports bag from an Asian supplier
The Tengelmann Group	Private label certified organic eggs "Naturkind"
Tetra Pak	Tetra Pak beverage carton "Tetra Brik Aseptic® Slim"
Deutsche Telekom/ T-Home	Call & Surf Comfort (router hardware + network solution)

3.4 Stakeholder dialogue

The PCF Pilot Project sees itself as an open platform and is in direct dialogue with national and international actors and stakeholders in science, politics, business and society in the fields of PCF and CO₂ product labelling. Direct feedback from stakeholders and interested parties regarding the presented results and recommendations is therefore expressly appreciated.

In 2008, the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) started a comprehensive stakeholder process for developing standards and principles for calculating Product Carbon Footprints. Participants in the PCF Pilot Project are represented in the steering committee and in the technical working groups. The aim is to develop a standard by the end of 2010. The already successfully introduced "Greenhouse Gas Protocol" for corporate GHG emissions serves as the basis for establishing standards for product-specific greenhouse gas emissions.

The International Organization for Standardization (ISO) has also started a process for developing an international standard for "Carbon Footprints of Products". The Pilot Project is in close contact with the involved national and international parties to ensure that crucial methodological requirements are taken into account and to ensure close coordination with other important standardisation projects.

² Detailed documentation of the case studies is available online at www.pcf-project.de

“ We will actively pursue climate protection as part of our Groupwide sustainability strategy in the systematic selection of our production locations and methods. ”

Dr. Ludger Breloh, Head of Strategic Purchasing, REWE-Group



4. Basic methodological principles for Product Carbon Footprinting

Three basic questions stood at the outset of the work on calculating a Product Carbon Footprint.

- **What** does the term Product Carbon Footprint mean?
- **Why** is it measured?
- **How** can a clear basic method for calculating the PCF be developed?

4.1 Defining the Product Carbon Footprint (PCF)

The definitions and uses of the term “Product Carbon Footprint” differ internationally. Within the scope of the PCF Pilot Project Germany, the project stakeholders agreed on the following definition:

“Product Carbon Footprint describes the sum of greenhouse gas emissions accumulated during the full life cycle of a product (good or service) in a specified application.”

In this context, greenhouse gas emissions are understood as all gaseous substances for which a Global Warming Potential coefficient has been defined by the Intergovernmental Panel on Climate Change (IPCC). The life cycle of a product encompasses the entire value chain: from the acquisition and transport of raw materials and primary products, to production and distribution, as well as use, recycling and disposal. The term ‘product’ is used as a generic term to describe goods and services.

The term Product Carbon Footprinting includes the calculation and evaluation of a PCF. In Germany, the Product Carbon Footprint is mostly referred to as the “CO₂ footprint”.

4.2 Aims and uses of Product Carbon Footprinting

Various goals of the PCF and ideas about how it could be used in numerous applications are discussed in the international debate. These uses each entail specific requirements for the calculation method. One of the aims of the project was therefore to examine whether the currently available set of methods is already well-developed enough to fulfil all of the goals or whether the methodological requirements need to be adapted more to suit the different uses.

Calculating Product Carbon Footprints can help a company:

- to create transparency in the value chain with respect to upstream and downstream processes and the players involved,
- to increase awareness of the greenhouse gas emissions along the value chain and identify emissions-intensive phases in particular,
- to identify areas where there is potential for reducing emissions (for example, by optimising the process chains),
- to come up with ideas for the (further) development of their own climate strategy,
- to analyse and evaluate how relevant greenhouse gas emissions are in comparison to other impacts that a product has on the environment.

Assuming that international standards are established, a PCF can be used in the communication process between suppliers, industrial customers and consumers:

- to make clear what effect everyday goods and services have on the climate and to emphasise the shared responsibility of all those involved in protecting the climate,
- to work together with suppliers and industrial customers to decrease emissions in the value chain,
- to inform customers and consumers of alternatives when they buy and use products and, by doing so, improve their overall competitiveness,
- to provide information about PCF-related offsetting activities, for example, through CDM-projects,
- to demonstrate the company's sense of social responsibility with regard to climate protection using a specific product as an example.

The PCF can become one of the building blocks in climate-related product communication and an important instrument in encouraging low-carbon consumption, once an internationally accepted, consistent standard is in place. Product Carbon Footprinting can highlight potential for emission reductions throughout the entire product life cycle and can make consumers more aware of how to consume in a way that impacts less on the climate.

Whether the various aforementioned goals can be achieved in the short term with the current state of knowledge and whether the uses named are acceptable is something that the participants in the PCF Pilot Project discussed at great length. They came to the conclusion that more international efforts are needed to create a consistent methodological basis for many of these uses. What is more, the requirements are not always the same: communication with the end consumer, for example, has different requirements for level of detail and quality of data than would be the case with only company-internal uses.

4.3 Methodological approaches for calculating the PCF

At the beginning of the Pilot Project, there still did not exist any consistent and internationally coordinated method for calculating the Product Carbon Footprint. Nevertheless, the international life cycle assessment standard (ISO 14040/44) provides a solid foundation for the upcoming international coordination and standardisation process and many of the partners involved in this process have already gained a great deal of useful experience over many years with the standard.

In 2007, a first initiative for developing a PCF calculation method evolved in Great Britain. British organisations drew up the Publicly Available Specification 2050, the "Specification for the assessment of the life cycle greenhouse gas emissions of goods and services" (PAS 2050), which goes back to an initiative set up by the Carbon Trust and the British Department for Environment, Food and Rural Affairs and which was coordinated by the British Standards Institution (BSI).³ The PAS 2050 is a first step in creating consistent basic principles for calculating the PCF. The final version of the guideline was published at the end of October 2008. Since then, other countries such as France, Japan and Korea have been working on developing their own methods. In the opinion of the PCF Pilot Project, the diversity of approaches hinders their applicability and, if anything, they are counterproductive. The project participants are therefore pushing for the development of an internationally coordinated and broadly accepted standard as soon as possible. Only a consistent, cross-industry standard which applies to a wide range of products can adequately serve the complex nature of value chains and narrow down the scope for interpreting how a PCF is to be calculated, and minimise the proliferation of different inconsistent methods.

In the middle of 2008, two parallel initiatives were launched, both with the aim of creating a scientifically substantiated and internationally coordinated standard for calculating the Product Carbon Footprint.

1. The International Organization for Standardization (ISO) has initiated a process to draw up the international standard "Carbon Footprints of Products". This standard is to be published in the spring of 2011.

³ The PAS ranks below a national standard. In Great Britain, it is seen as the first step towards national and international standardisation.

- As part of their “Greenhouse Gas (GHG) Protocol” initiative, the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI) have entered into a dialogue with international scientific experts, business experts and environmental institutions. A “Product and Supply Chain Accounting and Reporting Standard” is to be developed by the end of 2010.

Both of these processes make sense and are valuable initiatives on the way to developing a consistent methodology and are supported by those involved in the PCF Pilot Project, provided that close coordination among the two processes is ensured. However, as an international standard will not be available until two or three years from now, the Partners in the PCF Pilot



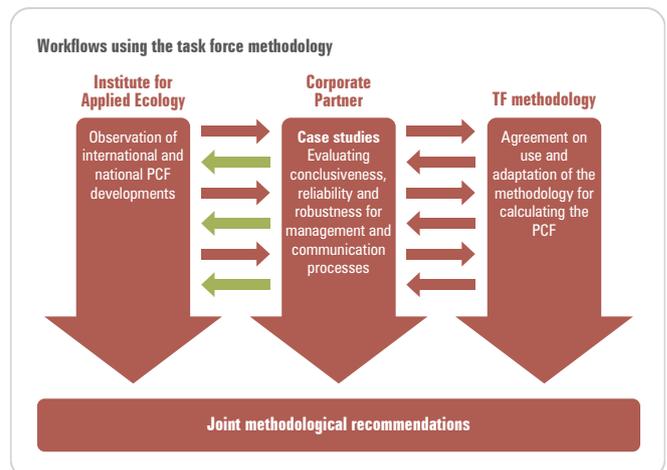
Project have been looking at the practical feasibility of existing methods for calculating PCF based on the extensive experience gained in life cycle assessment. The issue of feasibility is of great importance. In the coming years, numerous companies will decide what their position is with regard to the uses and advantages of elaborating CO₂ footprints. The project participants have therefore exchanged ideas with manufacturers, scientific partners and stakeholders to discuss and come up with answers to the practical questions concerning the further development and application of PCF methods as a product-specific interpretation of the LCA standard.

4.4 Approach in the PCF Pilot Project

The Project Initiators and Corporate Partners took the international LCA standard (ISO 14040 and 14044) as the methodological framework for calculating a Product Carbon Footprint. This standard has also been the basis for the British PAS 2050 as well as for the aforementioned dialogue processes initiated by ISO and to a certain extent the WBCSD/WRI. Within the PCF Pilot Project, the ISO 14040/44 was therefore an essential source of input for the work carried out on methodology and thereby also for the case studies.

Many of the basic methodological conditions of ISO 14040/44 can be applied in the case of the PCF methodology, but several have to be adapted. Some terms of reference of the ISO 14040/44 are loosely formulated, making it necessary to examine whether it is possible to develop less ambiguous terms of reference which have a comprehensive or product group-specific foundation. This would simplify the comparability of different PCF studies. This constitutes one of the greatest methodological challenges facing international coordination, especially for all uses for which the PCF is publicly communicated.

Every partner company in the project selected at least one product from its own portfolio for which a PCF was then determined. In this way, methodological frameworks or rules of interpretation regarding ISO 14040/44 could be practically tested on specific case studies. In turn, the case studies also gave rise to specific methodological questions.

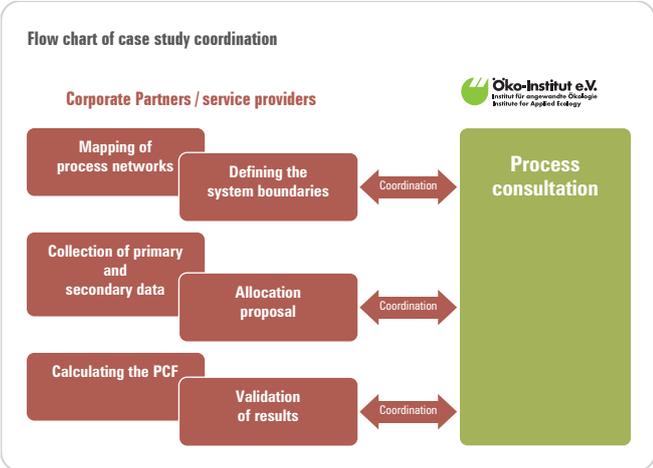


The broad spectrum of selected products entailed comprehensive discussions. The participation of companies from very different sectors was challenging, fruitful and an essential prerequisite for developing and optimising a methodology with the broadest possible range of applications. In addition, involving well-known experts from the area of life cycle assessment in the case studies proved to be an absolute bonus for the project.⁴

Different criteria were taken into consideration when choosing the products:

- transparency in the supply chain
- stability of the supply chain
- willingness of suppliers to cooperate
- availability of primary and secondary data
- possible methodological learnings
- ecological significance of the product
- potential for reducing emissions
- importance of the product for the company
- market relevance of a Product Carbon Footprint

The PCF was measured in the following six steps basically following the international standard on LCA: setting up the process networks, defining the system boundaries, collecting primary and secondary data, setting allocation rules, calculating the PCF, carrying out sensitivity analyses. The Institute for Applied Ecology coordinated with the case managers after the second and fourth step for each case study.



Finally, the results were validated and it was examined whether the predefined methodological conventions could be adequately put into practice when calculating the PCF.

In order to support the current discussion on Product Carbon Footprinting, both at national and international level, those who worked on the Pilot Project drew up various recommendations:

- 1. Methodological recommendations:** The Project Initiators and Corporate Partners came up with a series of concrete recommendations for developing a method which should be taken into account when developing an international standard (but also for the interim calculation of PCF).
- 2. Limitations of Product Carbon Footprinting:** Experiences gained in the (further) development of a methodology and during the case studies identified areas where the PCF comes up against limitations.
- 3. Recommendations on the focuses of international standardisation:** There are some issues and areas where, because of the sheer complexity of these, the Project Partners refrained from giving comprehensive recommendations. These are better dealt with in the international standardisation processes.

⁴ The following LCA experts worked on the project: Ecofys (for the Tengelmann Group); Institute for Energy and the Environment (IFEU, for Tetra Pak); the Institute for Applied Ecology (for Tchibo); PE International (for dm-drogerie markt); PRé Consultants (for DSM); University of Bonn (for the REWE Group); University of Bremen (for FRoSTA).

4.5 Recommendations on developing a methodology

The concrete recommendations for developing a PCF methodology are based on the contents of the LCA standard and are briefly introduced in the following.

Principles

Life cycle assessments and measurements of greenhouse gas emissions at company or product level generally follow certain principles. Criteria such as completeness, consistency, precision and transparency should all apply in equal measure when calculating a CO₂ footprint. In addition, it makes sense to establish conservativeness as a principle. This principle entails that a PCF must be calculated in such a way that the importance of certain steps, for example, the selection of data, especially secondary data, is not underestimated.

SIGNIFICANCE FOR THE CASE STUDIES: It was agreed that a conservative approach was to be followed in the case studies.

Goals

The goals that are pursued when calculating a PCF are extremely important with respect to their implications for methodological requirements. For this reason, the goals must be named explicitly in each case, documented transparently and the consequences that these have for the applied method (scope definition) must be discussed.

SIGNIFICANCE FOR THE CASE STUDIES: The specific goals of each company are named in the case study documentation.

Emissions

Emission factors for consumed electricity

The methods currently being used to assess PCF cannot be used to map the individual supply relationships for electricity. As the way in which electricity is generated plays an enormous role in climate protection, specific supply relationships must be taken into consideration in any future methodology. This is particularly true for the inclusion of electricity from renewable sources.

SIGNIFICANCE FOR THE CASE STUDIES: The respective national electricity mix was taken as a basis in the case studies. Supply relationships which provided precise proof or origin were included in a sensitivity analysis.

Certified green power from renewable energy sources

There still is not a good, broadly accepted method for including green power in the calculation of a PCF. This not only applies to the PCF, but also for company-related GHG inventories. The emission factor for green power is often assumed to be zero, which generally does not constitute a correct evaluation. The Institute for Applied Ecology is currently working together with other research bodies in Germany to come up with recommendations as to how certified green power should be evaluated with respect to its additional benefits for the environment. In the PAS 2050, green power is included in the national electricity mix in order to avoid it being accounted for twice unless it can be proven otherwise.

SIGNIFICANCE FOR THE CASE STUDIES: In the case studies, green power was calculated in the best case estimates according to the national electricity mix. Following a suggestion made by the Institute for Applied Ecology and IFEU, in the sensitivity analyses, only those shares of renewable electricity supplied by plants that were less than six years old were awarded the direct emission factor of zero. The emissions from upstream (indirect) processes were, of course, additionally taken into account.

“ A product’s PCF makes the subject of climate protection tangible. It offers both the company and consumers the opportunity to identify ways in which they can make their own personal contribution. ”

Uwe Bergmann, Head of CSR / Sustainability Steering, Henkel AG & Co. KGaA



EXAMPLE

Tetra Pak uses certified green power in all of its German production and administration sites (NaturEnergie). If we were to allocate this electricity an emissions factor of zero for the direct emissions from new plants supplying renewable energy (in this case 33%), then the PCF would fall from 82g to 81.3g per package examined (**Tetra Brik Aseptic® Slim**), that is, a reduction of slightly less than 1%. Assuming that the total supply of green power was calculated at zero emissions, the PCF would fall by 3.7% altogether to 79g per packaging unit. This makes clear that Product Carbon Footprinting should in the future be refined to display the real additional benefit for the environment from certified green power where possible. As a consequence this could also provide further incentives for companies and people to change their behaviour and use certified green power.

Compensation

Compensating for greenhouse gas emissions (so-called “offsetting”) must be displayed separately, as including “offsetting” directly in the calculation would give a false impression of the actual impact that a product has on the climate.

SIGNIFICANCE FOR THE CASE STUDIES: “Offsetting” was not looked into in any of the case studies.

Emissions from aviation

Not only CO₂, but also other substances such as water vapour and nitrogen oxides contribute to the global warming effect of air traffic. The effect is described using the so-called Radiative Forcing Index (RFI). That is why the use of the more extensive RFI instead of CO_{2e} emissions is so important in the case of air traffic.

SIGNIFICANCE FOR THE CASE STUDIES: Air traffic did not play a role in any of the case studies looked at, because all of the raw materials and preliminary products used were transported and distributed via roadway, railway and waterway.

System boundaries**Including all phases in the product life cycle**

To calculate the PCF correctly, the entire life cycle of a product must be taken into consideration. Assessing only individual phases can lead to false recommendations for appropriate action. Under certain circumstances, however, it may make sense to display information about individual phases separately. When communicating with industrial customers, for example, it may be sufficient to assess the life cycle only as far as the customer’s factory gate (cradle to gate). However, this means that in this case the PCF is only of limited use for corporate communication and communication towards the end customer.

SIGNIFICANCE FOR THE CASE STUDIES: A partial PCF is irrelevant. All of the case studies assessed all life cycle phases of the respective products.

EXAMPLE

The PCF Pilot Project case studies demonstrate the importance of looking at all life cycle phases. The **Tchibo Privat Kaffee Rarity Machare** case study, for example, clearly shows that the PCF’s life cycle approach can open up completely new perspectives. In the last years, Tchibo has been making considerable efforts to reduce the GHG emissions of the company’s logistics. One could have assumed that carriage by sea plays a very significant role for this coffee, which comes from Tanzania. However,

the results of the case study show that, with approximately 59g of CO₂ equivalents per cup of coffee (taken from the best case estimate), the cultivation of the coffee on farm accounts for the quantitatively largest share at about 56%: here, the input of agrochemicals (fertilisers and pesticides) are particularly relevant. Surprisingly, this was then followed by preparation of the coffee by the consumer with a share of about 30%. All transports added up along the value chain and put together with the roasting and packaging of the coffee only accounted for about 12%, a rather low percentage. These results make clear how important it is to keep an eye on the total PCF when deciding on priority emission reduction potentials.

EXAMPLE



Similar findings came from the case study carried out by the **Tengelmann Group** on their **Naturkind organic free range eggs** (pack of 6). A more precise analysis of the PCF of a little more than 1.1kg per pack shows that the majority of the greenhouse gas emissions, at about 62%, are caused by the pullet rearing and egg laying farms. The most important factor here is the chicken feed, which had the biggest influence. The next biggest driver is the use phase, accounting for approx. 21% of emissions. Another 10% of emissions were generated in the shops. Transportation between the individual process modules was responsible for only 1.5%. Sensitivity analyses have shown how important it is to create a good and transparent set of basic data, especially for the areas that play a decisive role for the PCF.

Significance of the use phase

Products are used in different ways and for different lengths of time. That is why it makes sense to assume different use patterns so that we can adequately map the influence and the time span of this important phase, especially if the PCF is to be communicated to the end consumer.

SIGNIFICANCE FOR THE CASE STUDIES: In cases where the use phase had a significant influence on the PCF, different patterns of use were assumed. This made it possible to emphasise the importance of this phase in external communication.

EXAMPLE



The case study on **Persil Megaperls** from **Henkel** highlights the most decisive influences in the use phase, in particular through the selected wash temperature. On the basis of current surveys, the figure of 46°C was chosen as the average wash temperature in Germany. This entailed a PCF per wash cycle over all life cycle phases of around 700g CO₂ equivalents.⁵ As such, more than 70%, or approx. 510g of CO₂ equivalents accumulated during the use phase. At a wash temperature of 30°C, the energy consumption is reduced in the use phase by around 50%, entailing a reduction in greenhouse gas emissions down to 240g. At a wash temperature of 60°C, emissions in the use phase increase to almost 750g. This shows what influence the wash temperature and the different patterns of behaviour can have on the PCF while maintaining a comparable wash performance.

⁵ Assuming the standard conditions of A.I.S.E.

EXAMPLE



In the **FROSTA Tagliatelle Wildlachs** case study, the shopping trip, the length of time the product is stored at home before eating and how the meal is prepared (incl. lighting) and washing the dishes afterwards all affect emissions during the use phase. Best case estimates put these at approx. 430g. This is a 29% share of the PCF over all of the product’s life cycle phases. Less favourable assumptions for the use phase were also discussed in sensitivity analyses. Assuming these less favourable conditions, emissions of up to 2,700g may be caused in the use phase alone. This is seven times the best case estimate and highlights how important the use phase is. In the case analysed by **FROSTA**, differences in shopping tour assumptions had the biggest influence on the overall PCF.

EXAMPLE



In the **T-Home** case study, the PCF of a combined telephone and internet connection (**Call & Surf Comfort**) was assessed. Different patterns of use and the influence these had on the PCF were analysed. With 41.4kg CO_{2e} emissions per year, using the Call & Surf Comfort package made up for about 46% of the PCF of 89.6kg CO₂ equivalents over all life cycle phases. Different use scenarios (low use, average use and frequent callers/surfers) were looked at.

Significance of the shopping tour

There is no systematic reason to leave the shopping tour involved in buying a product out of the assessment, something which was proposed in the PAS 2050. When communicating information to the consumer, the significance of the shopping tour and the effect this has on a product’s CO₂ footprint is by all means an important aspect.

SIGNIFICANCE FOR THE CASE STUDIES: In all of the case studies where the shopping tour was relevant, it was included in the calculation and assessed separately. Where concrete information was lacking, generic assumptions were made in order to assess the relevance of the shopping tour for the overall PCF.

As information on shopping tour behaviour was not accessible in any of the case studies, a basic distance of 5km in an average passenger car was assumed. In addition to this, a shopping volume of 20kg was taken as the basis. The greenhouse gas emissions for the individual product were allocated according to the mass of the respective products. The relevance of the shopping tour for the PCF of the products that were examined may vary significantly among the different products.

EXAMPLE



In the “Best Alliance” strawberries case study of the REWE Group, the relevance of the shopping tour for a 500g carton of strawberries (as part of a 20kg shopping volume) was analysed in this way. It became clear that the shopping tour, which accounted for a 15% share of the overall PCF of around 442g CO_{2e} is very relevant and should not be excluded. This fact speaks against systematically ignoring this phase in the life cycle when calculating the PCF.

EXAMPLE



In the case study on sanft + sicher toilet paper from dm-drogerie markt, under the same assumptions, the shopping tour accounted for a 4% share of the total PCF of about 2.5kg CO_{2e} for a packet containing 10 toilet rolls (3-layered). Here, it would also be misleading to ignore this share. In this case study, it was also assessed how this share changes when the basic travel distance doubles from 5km to 10km. This increases the share taken up by the shopping tour from 4% to 12%. If it is assumed that the shopping tour is made only to buy the toilet paper, this percentage changes drastically, meaning that the total PCF could then increase by about 50%. In this case, the shopping tour would become an essential influencing factor on the PCF.

Significance of capital goods

In general, capital goods are seen to be of little significance for the PCF and are therefore often neglected when undertaking life cycle assessments. Capital goods may very well be relevant for the result of PCF calculations for certain products, product groups or services. If this is the case, they should be included in respective product-specific guidelines (potentially in Product Category Rules, PCR).

SIGNIFICANCE FOR THE CASE STUDIES: The relevance of capital goods was assessed in some of the case studies with the help of sensitivity analyses, only to find out that capital goods were not relevant to the results in any of these.

Allocations

Allocation in cases of co-production

Emissions should be allocated to their actual source in accordance with the specifications of the ISO 14040ff standard and then substantiated in product-specific rules. The reasons for choosing a particular allocation method must be outlined. What is more, it makes sense to use at least one other method and then present and analyse the differences in the results.

SIGNIFICANCE FOR THE CASE STUDIES: In cases where it seemed necessary and expedient, different allocation methods were tested to find out how relevant they were for the results.

EXAMPLE



In the **DSM** case study for **Claristar™**, a wine stabiliser, different allocation procedures were examined in a sensitivity analysis to see how they influenced the result. The allocation is relevant in the extraction of molasses as a residue in the production of sugar. Molasses is the main raw material from which **Claristar™** is extracted. Allocation to the sugar and to the molasses can be done in two ways: economic allocation or mass allocation. Both methods were examined and the difference was significant. Mass allocation results in a PCF of 66g CO_{2e} / hl wine for the molasses and, using economic allocation, this resulted in a mere 25g CO_{2e} / hl wine. That is a difference of 40g CO_{2e} / hl wine for a PCF of altogether about 295g CO_{2e} / hl wine. Even though mass allocation in this case shows the results of the conservative approach, using this would turn the real production situation on its head. For this reason, economic allocation for sugar and molasses was chosen. This example clearly shows how much allocation influences the results and demonstrates

that it is important for the comparability of a PCF to take a closer look at the consistent definition, at least at the level of defined product categories.

EXAMPLE



In the **Fixapret®** case study of bed linen from **BASF**, the influence of allocation procedures was also examined in the co-production of cotton and recyclable organic waste products. This examination showed that the economic allocation chosen by **BASF** for the best case estimate resulted in considerably higher PCF values than was the case with mass allocation. The economic allocation represents the conservative approach which is why **BASF** prefers it, as the cotton is the end product for which production takes place. In the best case estimate, bed linen with **Fixapret®** have a PCF of about 231.5kg CO_{2e} over the entire life cycle of the product using economic allocation. If mass allocation is applied to the cotton production process, this would result in a PCF of about 174.3kg CO_{2e} under the same general conditions. **BASF** sees the economic allocation as the better approach here, because it better reflects the real production situation. This example once again shows, particularly when compared to the example above, that generally valid allocation procedures for all products are hard to imagine and it also shows that a product (category) specific definition can make sense. When aiming to make product comparisons, a consistent definition for the allocation procedure is essential at the product level (Product Category Rules). However, it is difficult to imagine that agreements on such product category rules can be reached soon which would facilitate the calculation of easily reproducible single values.

Allocation in open loop recycling

When using materials and products for new production processes and their transformation into other, new products (open loop recycling), a 50:50 allocation should be applied, unless different assumptions have been taken based on product-specific aspects.

SIGNIFICANCE FOR THE CASE STUDIES: These rules were followed in all of the case studies and documented where required.

The documentation process

The documentation must be transparent and understandable if credible communication of the results of a Product Carbon Footprinting effort is to be achieved.

SIGNIFICANCE FOR THE CASE STUDIES: All of the case studies are presented in a coordinated, consistent documentation format which is as transparent and comprehensible as possible. The documentation is publicly available in the internet under www.pcf-project.de. The Corporate Partners have agreed that, when communicating information on the results of the individual case studies, they will refer to the central documentation in the internet and, as an option, use the uniform visual reference (see Section 6.3) which has been jointly agreed on.

4.6 The limitations of PCF

The main aim of Product Carbon Footprinting is to calculate and assess the impact products have on the climate. Other effects on the environment or social aspects are often not taken into account here. This may affect how conclusive the recommendations are and how they stand up to scrutiny, and may limit their use in decision making.

In the **Fixapret®** case study of bed linen from **BASF**, an examination of different environmental categories showed that not greenhouse gas emissions, but acidification potential is the dominant environmental category for this product. This means that, in this case, looking at the greenhouse gas emissions alone can lead to a false interpretation of the environmental impact or could lead to recommending the wrong alternatives for action when aiming to optimise the overall environmental impact.

When comparing the impact that products have on the climate and in public communication of PCF, the question arises, for example, as to whether this diverts attention away from other environmental criteria. That is why, where possible, other environmental impacts should also be taken into consideration, among these, eutrophication, land use, energy and raw materials consumption and the toxicity or acidification of soil and water. If other ecological criteria are examined to ascertain their relevance, this can corroborate the reliability of PCF-related statements and prevent incorrect decisions being taken. The case studies in the PCF Pilot Project looked into other environmental criteria at different levels of detail.

A comprehensive sustainability assessment of products cannot be carried out on the basis of the PCF alone. Other useful evaluation tools in this respect are life cycle assessments, eco-efficiency analyses and sustainability analyses. Nevertheless, the PCF is a fundamental indicator for some products or product groups. In the future, it would be interesting to link up

“ It was a positive surprise for us to discover that, when compared to other similar products and home-made meals with regard to CO₂, our products stood up well to such a comparison. ”

Dr. Andreas Bosselmann, Head of Research and Development, FRoSTA AG



product-related assessment methods in a more modular way and make them more compatible with one another. Companies could build upon the conclusions on the PCF and use these for a comprehensive environmental and sustainability assessment at a later date. Conversely, it is also interesting to generate the PCF as a specific valuation module from life cycle or sustainability assessments.

The PCF is subject to variances in the precision and reproducibility of calculations. This comes from the different quality or source of data used or the definition of certain assumptions in the individual phases of the product's life cycle. Whether all of the uncertainties and room for assumptions that arise can be remedied by an internationally standardised methodology remains uncertain, if anything. This is something that is of particular importance when communicating the PCF.

Calculating Product Carbon Footprints, like undertaking a full life cycle assessment, involves a considerable amount of time, personnel and financial expenses. As such, a PCF is mainly interesting at the present time for strategic or exemplary products whose results can be extrapolated to other goods from the same product group or even to other product groups. It is unlikely that a PCF can be calculated for every single product from companies with a broad product portfolio within an acceptable time frame.

The Product Carbon Footprint will not be the most expedient option for calculating the climate impact for all products. In the area of energy-intensive goods in particular, meaningful and adequate indicators have already been developed (energy efficiency labelling) and these should be extended, but not necessarily replaced by the PCF. On the other hand, the portfolio of those products for which PCF is a suitable instrument should be more clearly defined so that the PCF can then be implemented more sensibly and efficiently in management and communication processes.

4.7 Recommendations for standardising the PCF methodology

The partners of PCF Pilot Project see a number of overriding questions for international standardisation:

- how to deal with other environmental impact categories within Product Carbon Footprinting
- how to handle data quality requirements
- harmonising allocation rules
- inclusion of green power
- treatment of the greenhouse gas emissions from air travel
- dealing with compensation (offsetting)
- developing product category rules (PCRs)

The findings of the PCF Pilot Project have shown that certain provisions for the calculation of Product Carbon Footprints cannot be equally applied to all products or product groups. What is more, it makes sense to draw up product category rules which specify allocation methods or the uniform definition of the product use phase, for example. Specific rules of this kind already exist today for some product groups or products, although the definition of the PCR is seen as being very time-consuming and not feasible in its present form for Product Carbon Footprinting. For this reason, the process for defining the PCR should be simplified.

4.8 Interim conclusions

Even without an international standard, it is already possible today to assess the PCF in a way that is both rooted in a scientific approach and consistent, first and foremost to fulfil management-related goals. However, at the present time, Product Carbon Footprinting has to be seen as a “work in progress”. As the methods for calculating PCF become increasingly standardised internationally, the PCF itself will be changed by the further development of the methodology and its increasing specificity. This is of particular importance for the communication with customers and consumers and also points out how important it is that results of a PCF are documented transparently. As such, the documentation of the case studies presented here provides the reader with a picture of the situation as it is today and acts as the basis for continued discussion about what constructive steps can be taken next. What is more, the debates on the PCF are already providing us with a whole series of important ideas about the uses and limitations of the PCF in communicating corporate and product-related information concerning the climate impact of goods and services.

5. Product Carbon Footprinting as the basis for providing credible information

5.1 Carbon labelling – a controversial debate

Apart from information on the energy consumption of individual appliances, it has been difficult up to now for consumers to understand the climate impact of goods and services and to take this information into account in their consumption decisions.

How and under what conditions can goods be labelled as “low carbon”? This is a question which has prompted extensive international debate. Organisations in various countries have developed very different approaches towards communicating climate impact and labelling products, with one example being the British Carbon Reduction Label.

Coming up with simple and reliable information derived from Product Carbon Footprinting which will enable consumers to move towards carbon-conscious consumption is a real challenge. On the one hand, the information must be communicated in a way that is clear, unambiguous and easy to understand. On the other hand, it also has to make sure that it takes into consideration all of the criteria that affect the greenhouse gas emissions of a certain product and then packages these facts in an understandable form so that consumers can use this information to make clear decisions about what and how they consume.

At the present time, there are no consistent regulations, either for the communication with consumers or for the labelling of goods and services. The PCF Pilot Project had detailed discussions about the different international approaches. Those who took part in the Project came to the following conclusion: If fundamental requirements and recommendations are taken into account in the communication process, Product Carbon Footprints can act as a strong basis for conveying product information which can, in turn, encourage carbon-conscious consumption habits. These requirements are presently not fulfilled by a Carbon Label.

“ The need to change towards a low-carbon economy will challenge us to create a low-carbon offering, create transparent and trusted insight in the Product Carbon Footprint, invite and engage the consumer to change buying-behavior. ”

Fokko Wientjes, Director Corporate Sustainable Development, Royal DSM N.V.



“ The findings from the PCF Project show the urgent need for all partners throughout the product life cycle to enter into multilateral dialogue in order to continue and strengthen existing approaches in joint activities on the way to a better future. ”

Daiga-Patricia Riemer, Responsible of Environment & Resources / Logistics, dm-drogerie markt GmbH & Co. KG



5.2 Requirements for climate-related product labelling

Labelling products to provide information about their greenhouse gas emissions makes sense if and when basic requirements for communicating this information have been met:

I. Relevance to decision making

Consumer-oriented information on product-related greenhouse gas emissions should be displayed in such a way that corresponding consumer behaviour can actually contribute towards reducing GHG emissions and the overall impact on the environment. The following gives some indication of the important questions that need to be answered:

- Is CO₂ the most relevant aspect in the life cycle of the product? Or are other factors more important (such as water consumption, for example)?
- Can the kind of information that is presented help the consumer to consciously make a contribution towards protecting the climate?
- Does the way in which the information is presented provide advice and assistance which help the consumer behave in a way that is climate compatible?
- Is the information about the climate impact conveyed in such a way that it can influence decisions about buying and using the product?
- Does the information provided ensure that displaying the CO₂ footprint does not conceal other important environmental impacts?

II. Credibility

Communication must be credible to generate trust and win acceptance. The following questions are relevant to credibility:

- Is there sufficient transparency with regards to the methodology used, the process for assessing the PCF and the people involved in this process?
- Have all of the relevant greenhouse gas emissions throughout the entire life cycle of a product been taken into consideration?
- Where was the provision for assessing the climate impact checked and perhaps influenced by independent third parties?
- Do the guidelines for calculating and communicating the CO₂ footprint also account for information on the overall environmental impact of a product?
- Does the communication of product-related greenhouse gas emissions go beyond individual ideal cases?

III. Consistency

The instruments for communicating with customers, consumers or business partners will usually be implemented across a range of different companies. This is why a consistent set of basic principles is required:

- Do the same guidelines for assessing the PCF apply for all comparable goods and services?
- Are the assumptions described and documented in a way that is transparent, comparable and consistent?
- Are any individual changes (for example, changes to units or system boundaries) presented clearly and coherently?

IV. Understandability

Any information communicated must be easy to understand for the person it is aimed at. The instruments used to convey information must therefore be adapted to suit both the target group and the situation in which the information is being used and yet be sufficiently flexible:

- Does the information being conveyed meet the information requirements of the target group?
- Is the information presented in a way that is adequate to the communication skills (ability to understand abstract ideas, language skills, etc.) of the target group?
- Is the information density and design adequate for the context in which it is provided?

V. Comparability

Information about the climate impact of products often only makes sense if it is possible to compare the impact with other consumption alternatives:

- Does the information provided (for example, values or values margins) make it possible to compare it to alternative products which have an identical or similar use?
- Is it possible to make a comparison across products or a comparison of different types of product use?
- Does the information provide the consumer with advice about more climate-compatible consumption options?

If we take a look at these requirements, the CO₂ footprint can act as an expedient instrument for communicating climate-related product information. Nevertheless, if we want to promote low-carbon consumption in the long term, consistent and internationally accepted guidelines for communicating climate-related product information which are based on a standardised method for calculating PCF will have to be established.

“ Experience has shown that the mere consideration of the production phase is incomplete and misleading for many products. Therefore it is essential to assess the environmental impact of products throughout the entire life cycle. ”

Dr. Peter Saling, Head of Eco-Efficiency Analysis, BASF SE



5.3 Recommendations for communicating climate-related product information

Based on their own experience gained from an analysis of the different international communication approaches and after in-depth talks with relevant stakeholders, the participants in the PCF Pilot Project came up with the following recommendations:

- Information about the CO₂ footprint of a product or a service should be presented in a differentiated manner: on the one hand, for the entire life cycle and, on the other hand, broken down into individual phases, for example, the production, use and disposal phases. This will allow conclusions to be reached, for example, about potential reduction strategies on the part of the manufacturer or about CO_{2e} reductions during the product use phase brought about by changing consumer behaviour.
- Providing a total CO₂ footprint figure in the form of a static carbon label, as is already practiced by some companies, does not make sense and is not very relevant for consumer decision making. A figure of this kind suggests a precision and conclusiveness which cannot be achieved using the current state of methodology.
- PCF is an instrument which manufacturers can use to inform the public about individually achieved or planned reductions in emissions, but this can only be done if the PCF can be calculated and documented consistently over a certain period of time. Particularly important in this context is disclosure of the underlying assumptions.
- Based on the current progress in methodological development there is still scope for interpretation and margins in the calculation. That is why the motivation for calculating a PCF and assumptions and quantifiers used in the calculations need to be transparently documented. Any publication of the data must be clear, understandable, conclusive and open to scrutiny. Last but not least, it is important to what extent PCF calculations are reliable and/or uncertain and whether other important environmental impacts have been taken into consideration.
- It is important to document communicated results in a transparent and accessible manner. The project partners have agreed that, when communicating information on the results of the case studies, they will refer to the central documentation in the internet (www.pcf-project.de) and, optionally, use the uniform visual reference which was jointly agreed on:



- Checks carried out by independent third parties increase the credibility of any information provided about impacts that goods and services have on the environment and climate. Such checks are particularly recommended if information is used in product-related communication and for the purpose of product comparisons with competitors. As soon as a generally accepted standard has been established, checks should be carried out in the form of "critical reviews".

“ It is becoming increasingly important to ensure clarity about the sources of emissions during a product’s life cycle. The fact that the PCF Project recognised the dynamics of this despite its very complex nature and that only a holistic approach to efficient and effective reduction strategies makes sense, is very positive. ”

Matthias Kopp, Climate Programme, Industry and Finance Sector, WWF Germany



- In the face of the dynamic international developments that are taking place, comprehensive approaches which are not product or branch-specific will be helpful in establishing credibility, in avoiding isolated statements and will stay abreast of ongoing methodological developments.

With these recommendations in mind, Product Carbon Footprints can act as a solid basis on which to set up an expedient tool for communicating climate-related information about products. Ideally, the PCF can be used to convey a simple message to consumers which can positively influence their consumption behaviour.

“ The PCF Pilot Project has been a huge step towards reaching a consistent methodology. It is now important to build on this in corporate strategies and climate policy. ”

Dr. Fritz Reusswig, Head of Lifestyle and Consumption Research, Potsdam Institute for Climate Impact Research (PIK)



6. Conclusion

The German PCF Pilot Project has learned a great deal from the detailed and intensive work carried out in the individual case studies:

- The ISO 14040/44 standard and further specifications provide a solid basis for calculating CO₂ footprints of goods and services. On this basis and provided that all GHG emissions over the entire life cycle have been accounted for, a comprehensive assessment of the climate-impact of goods and services is possible. Other environmental aspects must be taken into consideration if a comprehensive ecological evaluation of products is undertaken.
- To potentially allow for comparisons of individual CO₂ footprints, the Project Partners will continue to resolve open issues in the relevant international harmonisation processes (in particular WBCSD/WRI and ISO).
- Calculating the CO₂ footprint increases awareness among the employees, suppliers and management of a company about what effect their products and/or services have on the climate.
- Calculating the CO₂ footprint helps to identify emission reduction opportunities along the value chain and creates impetus for internal improvements and the refinement of the corporate climate strategy.

- By documenting a product's carbon footprint transparently, a strong foundation for targeted product-related communication is established and consequently climate-compatible consumption behaviour fostered.

The collected findings from the German PCF Pilot Project provide the basis for an intensive debate with a broad circle of stakeholders. The project participants are looking forward to receiving direct feedback on the findings and recommendations presented in the report.

“ After the very successful pilot phase, the PCF Pilot Project is evolving into a platform for the promotion of low carbon consumption. It will enable companies to gain valuable experience in the area of product-related climate protection. ”

Rasmus Prieß, Project Manager PCF Pilot Project, Thema1



“ The PCF is a good starting point for companies to optimise the CO₂ footprint of products throughout their life cycle. The challenge for the future is to promote climate-friendly consumption through innovative approaches beyond a CO₂ label! ”

Christian Hochfeld, Deputy Director, Öko-Institut – Institute for Applied Ecology, Berlin



7. What next?

In the PCF Pilot Project, scientists, experts and companies took a joint look at the question of how to calculate and publicly communicate the impact that everyday goods and services have on our climate. Looking at specific case studies, the project participants talked about the CO₂ footprint for each one and then, based on the results of these discussions, came up with a series of specifications and recommendations. The work carried out in the Pilot Project is by no means to be regarded as the last word on Product Carbon Footprinting. It is rather a starting point for continued discussion on this issue. The project partners are therefore very much looking forward to comprehensive feedback from interested stakeholders.

At the same time, using the knowledge they have gained, the Project Initiators will actively support the international debate on the harmonisation of a consistent Product Carbon Footprinting methodology. Only through an internationally accepted standard, will Product Carbon Footprints be calculated, evaluated and communicated in a consistent, comparative and credible manner.

Until a consistent method for PCF is established, any other companies who are interested in this topic shall have the opportunity to gain their own experience with Product Carbon Footprinting. The Project Initiators are currently elaborating various modular offers within a broader platform for climate compatible consumption, which will support interested companies in the practical calculation of PCF, in the implementation of strategies to reduce the climate impact of products once the PCF has been calculated and in the communication of climate-related information for products with the aim of promoting low carbon consumer products and carbon-conscious consumption.

A newsletter with up-to-date information on the PCF Project and on the admission of new partners is available through registration at www.pcf-project.de.

8. Appendix

8.1 Project Initiators and contact persons

The Project Initiators are the WWF, the Öko-Institut - Institute for Applied Ecology, the Potsdam Institute for Climate Impact Research (PIK) and THEMA1. They are responsible for project management as well as operational oversight of the work. Additional information about the project is available online at www.pcf-project.de

WWF

The WWF is one of the largest independent nature conservation organisations worldwide. Within the global network, the WWF is involved in over 2000 projects in more than 100 countries with 59 partner organisations and partner offices. The WWF fosters long-term partnerships with companies and plays a constructive role in business-driven initiatives such as the international climate saver programme while maintaining its critical distance. For additional information see: www.wwf.de

Through its involvement in the project management and steering committee, the WWF has ensured that the activities in the PCF Pilot Project are socially and ecologically relevant. The WWF also heads up the institutional design task force, which works on proposals for projects following the pilot phase.

CONTACT PERSON

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Öko-Institut - Institute for Applied Ecology

The Öko-Institut – Institute for Applied Ecology is one of Europe’s leading independent research and consulting institutions for a sustainable future. It sees itself as a scientific think tank and strategic consultant for politics, business and society - specifically for international climate protection and sustainable consumption. For almost 25 years, the Öko-Institut - Institute for Applied Ecology has helped define the international methodological development and application of ecological accounting

frameworks for developing more sustainable goods and services. For additional information see: www.oeko.de

In the PCF Pilot Project, the Öko-Institut - Institute for Applied Ecology ensured scientific consistency and credibility. Through the methodology task force, the Öko-Institut made sure that Product Carbon Footprints were calculated in a manner that was both grounded in internationally recognised methodological standards and appropriate to product-specific communication requirements.

CONTACT PERSON

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Potsdam Institute for Climate Impact Research (PIK)

The PIK is an internationally renowned research institute committed to the interdisciplinary examination of global climate change and its ecological, economical and social consequences. Recently, the PIK has been increasingly researching solutions to the climate problem at the global, national and local levels. For additional information see: www.pik-potsdam.de

As a project management and steering committee member, the PIK promotes the Pilot Project as a vehicle for future externally financed research ventures and integrates essential questions from the Pilot Project into existing scientific and political discourses.

CONTACT PERSON

Dr. Fritz Reusswig, Head of Lifestyle and Consumption Research,
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THEMA1

The Berlin think-do-tank THEMA1 develops projects that speed up the transition to a low carbon society. At discussion forums in the "Dialogue Forum Low Carbon Society" series (www.low-carbon-society.org), stakeholders from politics, business and civil society discuss current aspects of social transformation. In projects like the Green Music Initiative and Shift2050, various partners demonstrate the potential and opportunities of a low carbon economy and society. THEMA1 initiated the PCF World Forum (www.pcf-world-forum.org), an international platform for all major initiatives from around the world on Product Carbon Footprinting and Carbon Labelling. The first international PCF World Summit was held at the end of February 2009 in Berlin. For additional information see: www.thema1.de

In the PCF Pilot Project THEMA1 is responsible for operational management and coordinates project management and steering committee. Interested parties, stakeholders and companies can contact THEMA1 as the central point of contact.

CONTACT PERSON

Rasmus Prieß, Project Manager PCF Pilot Project,
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8.2 Corporate Partners and contact persons

Under the direction of the WWF, Öko-Institut - Institute for Applied Ecology, Potsdam Institute for Climate Impact Research (PIK) and THEMA1, ten large, multinational companies calculated the Product Carbon Footprints for individual products in their portfolio. Additional information about the project and the detailed documentation of the case studies is available online at www.pcf-project.de

BASF SE

BASF is the world's leading chemical company, with a portfolio that ranges from oil and gas to chemicals, plastics and finishing products to pesticides and fine chemicals. With its high-value products and intelligent solutions, BASF contributes to overcoming challenges such as climate protection, energy efficiency, nutrition and mobility. BASF employs more than 95,000 people with revenues in 2008 reaching more than 62 billion Euros. For additional information see: www.basf.com

Products for which BASF has determined the PCF:

- High-performance BASF Neopor® plastic granules for building insulation
- BASF high performance finish "Fixapret® AP" for non-iron bed linen

CONTACT PERSON

Dr. Peter Saling, Head of Eco-Efficiency Analysis,
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dm-drogerie markt GmbH & Co. KG

According to AC Nielsen and Procter & Gamble analyses, dm-drogerie markt is Germany's largest retailer of drugstore goods. With 1,012 stores across the country, dm experienced an increase in turnover of 11.4 percent to 3.36 billion Euros in the 2007/2008 fiscal year. There are more than 2,000 dm stores across Europe, which achieved a rise in sales of 13.4 percent to 4.71 billion Euros in the 2007/2008 fiscal year. More than 30,000 people work at dm in total; about 19,400 of them in Germany. For additional information see: www.dm-drogeriemarkt.de

Product for which dm-drogerie markt has determined the PCF:

- Own quality brand sanft + sicher toilet paper

CONTACT PERSON

Daiga-Patricia Riemer, Responsible for Environment & Resources/ logistics,
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Royal DSM N.V.

Dutch DSM develops a multitude of products and services in the life sciences and materials science field, which promote a healthier, more sustainable and more enjoyable way of life: Nutrition and health, personal care and pharmaceuticals, automotive, coatings and paints, electrics and electronics, life protection and housing. DSM generates an annual turnover of close to 8.8 billion Euros and employs some 23,000 people worldwide. For additional information see: www.dsm.com

Product for which DSM has determined the PCF:

- Claristar™ Wine Stabiliser

CONTACT PERSON

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fokko.wientjes@dsm.com

FROSTA AG

FROSTA AG is one of Europe's largest producers of frozen food. It produces in three plants in Germany and in one plant in Poland. The company employs around 1,400 people and generated 349 million Euros of turnover in 2007. The FROSTA brand is the market leader in frozen ready meals in Germany. As the first and only frozen food brand, FROSTA has been avoiding added colorants, aromas, flavour enhancers, stabilisers and emulsifiers since 2003. For additional information see: www.frosta.de

Product for which FROSTA has determined the PCF:

- FROSTA Tagliatelle Wildlachs (wild salmon)

CONTACT PERSON

Dr. Andreas Bosselmann, Head of Research and Development,
bosselmann@frosta.de

Henkel AG & Co. KGaA

For more than 130 years, Henkel has been a leader with brands and technologies in three business areas – Home Care, Personal Care, and Adhesive Technologies – and is ranked among the Fortune Global 500 companies. More than 60 percent of Henkel's sales are in fast-moving consumer goods, while the industrial business accounts for almost 40 percent of the company's total sales. In fiscal 2008, Henkel generated sales of 14,131 million euros and adjusted operating profit of 1,460 million euros. For additional information see: www.henkel.com

Products for which Henkel has calculated the PCF:

- Schwarzkopf & Henkel shampoo (Schauma 7 Kräuter)
- Henkel universal laundry detergent (Persil Megaperls)
- Products for joint sealing (Sista and Ceresit brands)
- Industrial packaging adhesives (Liofol®)

CONTACT PERSON

Uwe Bergmann, Head of CSR / Sustainability Steering,
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REWE Group

The REWE group is one of Europe's leading wholesale, retail and tourism groups. In Germany alone, the REWE group has about 3,000 REWE supermarkets and toom consumer markets plus nearly 2,300 PENNY discounters as well as toom Baumarkt (hardware), ProMarkt, REWE bulk consumer service and the Fegro/Selgros cash & carry markets. Tourism is the second core business, which includes tour operators ITS, Jahn Reisen, Tjaereborg, Dertour, Meier's Weltreisen and ADAC Reisen. In 2007, the REWE group generated record turnover of more than 45 billion Euros and employed nearly 300,000 people. For additional information see: www.rewe-group.com

Product for which REWE has determined the PCF:

- Best Alliance strawberries (REWE contract farming of sustainably grown early season strawberries in the south of Spain)

CONTACT PERSON

Dr. Ludger Breloh, Head of Strategic Purchasing,
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Tchibo GmbH

With its headquarters in Hamburg, Tchibo is one of the largest German, internationally active consumer goods and retail companies. The company was founded in 1949 and stands for a unique business model. Tchibo is the fourth largest coffee producer worldwide. At the same time, the company has a sophisticated multi-channel distribution system for everyday articles with branded outlets, strong online operations and an extensive presence via third-party retailers. For additional information see: www.tchibo.com and www.tchibo-nachhaltigkeit.de

Products for which Tchibo has determined the PCF:

- Privat Kaffee Rarity Machare
- Sports bag from an Asian supplier

CONTACT PERSONS

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Anne Lehmbrock, press contact,
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The Tengelmann Group

The Tengelmann Group is an international retail group in its fifth generation of family ownership involved in various business fields in Germany and Europe. Today, the group includes the Kaiser's and Tengelmann supermarkets, the OBI DIY stores, the textile discounter KiK, the Plus Online Shop as well as Plus Eastern Europe. Across Europe, the group employs around 83,000 people. The company has been supporting conservation and environmental protection for more than 40 years and is now particularly committed to climate protection. For additional information see: www.tengelmann.de

Product for which the Tengelmann Group has determined the PCF:

- Certified organic eggs of the "Naturkind" private label.

CONTACT PERSONS

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Werner Kalter, Head of Tengelmann Energy,
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Tetra Pak GmbH + Co KG

Tetra Pak is the world's leading supplier of food processing and packaging systems. Worldwide, the company is represented by 43 market subsidiaries and employs more than 20,000 people. In the year 2007, about 69 billion litres of food and beverages were filled into 137 billion Tetra Pak packages. For additional information see: www.tetrapak.de

Product for which Tetra Pak has determined the PCF:

- Tetra Pak beverage carton "Tetra Brik Aseptic® Slim"

CONTACT PERSONS

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Caroline Babendererde, Manager Environmental Affairs Health
& Safety Officer,
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Deutsche Telekom AG / T-Home

The Deutsche Telekom AG / T-Home is one of the world's leading telecommunications companies, offering its customers the entire spectrum of IT and telecommunications services from a single source. Network access, communication and value-added services are provided via cable and wireless with increasing bandwidth. The company promotes the speedy social networking of its customers by offering innovative products and services. For additional information see: **www.t-home.de**

Product for which Deutsche Telekom / T-Home has determined the PCF:

- Call & Surf Comfort (router hardware + network solution)

CONTACT PERSON

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www.pcf-project.de

Project Initiators



Corporate Partners

