

European Commission

DG Environment

Product Carbon Footprinting – a study on methodologies and initiatives

Final report

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Contents

A. Introduction	3
B. Executive summary	7
C. Identification of main methodologies and initiatives.....	19
1. Study of existing methodologies and initiatives	19
2. Selection of major methodologies and initiatives.....	27
D. Focus on the methodological options	34
1. Calculation and technical features	34
2. Implementation system.....	72
E. Scenario building.....	73
1. General objectives of PCF policies.....	73
2. General description of the scenarios.....	74
3. Presentation of the limitations in the scenario building and analysis.....	77
4. Scenario 0: Business as usual	82
5. Scenario 1: Favouring the internal use of PCF by companies	85
6. Scenario 2: Encouraging communication to consumers.....	90
7. Scenario 3: Implementing market-based incentives	99
8. Scenario 4: Setting minimum requirements	105
9. Impact of technical elements on the scenarios	110
10. Methodologies assessment.....	114
F. Conclusions	131
Appendix 1: Detailed analysis of major methodologies and initiatives	134
Appendix 2: Detailed grading system.....	267
Appendix 3: Explanation of the weighting of the grading system	284
Appendix 4: Detailed assessment of methodologies.....	287
Appendix 5: Complements on burden shifting.....	298
Appendix 6: Bibliography	303

Study made by Ernst & Young France and Quantis for the European Commission – DG Environment.

Contacts

Eric Mugnier (Ernst & Young) – eric.mugnier@fr.ey.com – +33 1 46 93 78 15

Anthony Mairet (Ernst & Young) – anthony.mairet@fr.ey.com – + 33 1 46 93 69 72

Julien Boucher (Quantis) – julien.boucher@quantis-intl.com – +41 21 693 91 93

A. Introduction

A range of policies are in place to improve the energy and environmental performance of products. The Ecodesign (EuP) Directive¹ establishes a framework for setting ecodesign requirements for energy-using products. A number of other pieces of legislation address specific aspects of the life-cycle of products, such as waste. The labelling schemes set by the Energy Labelling Directive², the Energy Star Regulation³, the Ecolabel Regulation⁴ and other schemes developed by Member States, retailers and other economic operators provide consumers with information on the energy and environmental performance of products. Incentives and public procurement are being implemented by Member States to stimulate the better performance of products. The Energy Star Regulation also obliges EU institutions and Member State authorities to purchase office equipment meeting specific levels of energy efficiency.

However, a number of shortcomings are hampering the potential of these policies. Most product legislation addresses only specific aspects of a product's life-cycle. While the Ecodesign Directive takes a life-cycle perspective, the environmental impact of energy-using products currently covered by the Directive only account for 31-36% of the environmental impact of products⁵. Information to consumers under EU policy has focused on energy efficiency for household appliances and office equipment under the Energy Labelling Directive and Energy Star Programme, or has covered only a limited number of products (under the Ecolabel). Finally, actions at national level are not coordinated.

In its conclusions on the Sustainable Production and Consumption Action Plan the Council of the European Union invited the European Commission to study the possibility of introducing the carbon footprint of products in the existing EU environmental labelling instruments such as the Eco-label and energy labelling; and, taking into account Member States' experience, to start working as soon as possible on common voluntary methodologies facilitating the future establishment of carbon assessments for organisations and the calculation of the carbon footprint of products.

There are now many different methodologies under development for the 'carbon footprinting' of products in a number of EU countries and in other countries around the world. Some of these initiatives aim to develop the measurement of carbon footprinting into labelling schemes, while others focus on the efficiency benefits companies can gain from undertaking carbon analysis of their products.

Given the different approaches used in these methodologies and initiatives, it is important for the Commission to prepare a sound analysis of these methodologies and initiatives, which would be an adequate input for considering options in the area of carbon footprint of products.

¹ Directive 2005/32/EC of the European Parliament and of the Council establishing a framework for the setting of ecodesign requirements for energy-using products.

² Council Directive 92/75/EEC of 22 September 1992 on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances.

³ Regulation (EC) No 106/2008 of the European Parliament and of the Council of 15 January 2008 on a Community energy efficiency labelling programme for office equipment.

⁴ Regulation (EC) No 180/2000 of the European Parliament and of the Council of 17 July 2000 on a revised Community ecolabel award scheme.

⁵ See Staff Working Paper SEC (2008) 2110 Impact assessment for recast of Directive 2005/32/EC, Table 3.

The objective of this study is to **identify, analyse and compare the existing major methodologies and initiatives in the field of product carbon footprinting**. The analysis aims to get a clear picture of the existing methodologies and initiatives in the EU and globally, and of features that might be relevant for future policy development. As so, the study should:

- identify existing schemes related to product carbon footprint at a worldwide scale;
- select some of them (based on criteria like robustness, ease of use...) for a deeper analysis which compares their main strengths and weaknesses;
- prepare scenarios of public policy implementation which could be used by the European Commission and identify the appropriateness of selected schemes against requirements for implementation, in order to clarify points to be strengthened in further works.

Given the fact that schemes have heterogeneous aims and approaches, a **methodological framework** needs to be set up to allow a **fair assessment of their relative appropriateness** against requirements for an EU-wide implementation.

Terms and definitions

It is assumed that usual terms and definition related to this subject are known and, as a consequence, only the most important are reported here. If this list is not sufficient, please refer to ISO 14067 (1 & 2) where the following definition have been taken.

- **Carbon footprint (CF):** weighted sum of greenhouse gas emissions and greenhouse gas removals of a process, a system of processes or a product system, expressed in CO₂ equivalents
- **Product Carbon Footprint (PCF):** carbon footprint of a product system
- **Product Category Rules (PCR):** set of specific rules, requirements and guidelines for developing environmental declarations for one or more product categories
- **Carbon footprint product category rules (CF-PCR):** set of specific rules, requirements and guidelines for developing carbon footprint declarations for one or more product categories
- **Product system:** collection of unit processes with elementary and product flows, performing one or more defined functions and which models the life cycle of a product
- **Life Cycle Assessment (LCA):** compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle
- **Life Cycle Inventory Analysis (LCI):** phase of life cycle assessment involving the compilation and quantification of inputs and outputs for a product throughout its life cycle
- **Functional unit:** quantified performance of a product system for use as a reference unit
- **Products:** any good and services
- **Primary data:** quantified value originating from a direct measurement or a calculation based on direct measurements of a unit process of the product system at its original source
- **Secondary data:** quantified value of an activity or life cycle process obtained from sources other than the direct measurement or calculation from direct measurements
- **Greenhouse gas (GhG):** gaseous constituent of the atmosphere, both natural and anthropogenic, that absorbs and emits radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds.
NOTE: GHGs include among others carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).
[ISO 14064-1]
- **Global warming potential (GWP):** factor describing the radiative forcing impact of one mass-based unit of a given GHG relative to an equivalent unit of carbon dioxide over a given period of time
- **Carbon dioxide equivalent (CO₂e):** unit for comparing the radiative forcing of a GHG to carbon dioxide
NOTE: The carbon dioxide equivalent is calculated using the mass of a given GHG multiplied by its global warming potential.

The following definitions have been used in the analysis:

- **Carbon footprint declaration:** claim indicating the quantified carbon footprint of a product
- **Adjustive LCA:** LCA in which the product specific information comes from a baseline assessment adjusted with a limited amount of product specific data. This is a new concept, developed in this report to describe a new type of LCA approach identified within the studied methodologies.
- **Simplified LCA:** LCA not fully compliant with ISO standards, due to time and resource constraints, that is based on a higher number of hypothesis and generic data with less environment impact categories considered, and less sensitivity and uncertainty analysis performed.
- **Full LCA:** LCA compliant with the ISO standards (ISO 14 040 – 14 044)
- **Environmentally extended input/output analysis:** method of estimating the GHG emissions (and other environmental impacts) arising from sectors within an economy through the analysis of economic flows (source: PAS 2050)
- **Mono-criterion:** environmental impact of the product is only considered under the carbon footprint aspect (contrary: multicriteria)
- **Multi-criteria:** environmental impact of the product is evaluated through various indicators that can depend on the type of product: carbon footprint, water consumption, eco-toxicity...
- **Initiative:** political framework or organizational structure related to a carbon footprint action.
- **Methodology:** calculation rules and guidelines enabling to evaluate a carbon footprint.
- **Labelling:** on-pack or off-pack information related to product characteristics.
- **PCRs-like documents:** these documents are a set of specific rules, requirements and guidelines for developing environmental declarations for one or more product categories, like PCRs. However, they can be not product-specific and more related to a sector approach.

B. Executive summary

Objective of the study

This study aims to identify, **analyse** and **compare** the **existing major methodologies and initiatives in the field of product carbon footprinting**, in order to clarify the current landscape of schemes and provide the European Commission with information that might be relevant for future policy development.

Screening and selection of schemes

During the early phase of this study, a wide spectrum of product environmental footprint methodologies and implementation policies was studied. The diverse selection could be characterized by the following features (among others):

- international, national or local;
- initiated by public authorities or private actors;
- already tested or in development;
- based on a complete or simplified LCA, on an input/output approach;
- implemented with a variable framework: methodology, use of results, etc.

All of these aspects have been considered in the screening and lead to the selection of 11 methodologies and 11 implementation policies considered both interesting for future policy development and representative of the current picture.

Regarding methodologies, the following points were investigated so as to select the most suitable cases for the study:

- Maturity and acceptance
- Reliability and robustness
- Ease of use and cost
- Consistency
- Suitability for EU wide implementation

The table below summarizes the list of studied practices:

Methodologies already in use	Implementations policies
PAS 2050 (UK)	Ecocheck (Belgium)
Korea PCF (Korea)	Ecological Bonus-Malus (France)
Carbon Footprint Program (Japan PCF)	The "Grenelle 2" Act (France)
Carbon index Casino (France)	The Korea PCF label (in the frame of the Korean EDP Program) (Korea)
Greenext (Leclerc - France)	Carbon Label for California (US)
Climate certification system SE (Sweden)	Carbon Label of Carbon Trust (UK)
Climatop (Switzerland)	Carbon Disclosure Project (worldwide)
Methodologies under development	Climate Bonus (Finland)
GhG Protocol - Product Life Cycle Accounting and Reporting Standard (worldwide)	Cities for Climate Protection (CCP) Campaign (USA)
BP X30-323 (France)	Carbon Tax (Sweden)
ISO 14067 (General title: "Carbon Footprint of products", Part 1:"Quantification", Part 2: "Communication") (worldwide)	"Japan as a low carbon society" (Japan)
Sustainability consortium (Wal-Mart)	

Note: methodologies indicated as under development are in different states of development:

- BP X30-323: General guidelines are finalized; however, in its current state, product category rules have been prepared by a limited number of working groups.
- "GhG Protocol - Product Life Cycle Accounting and Reporting Standard" has gone through a first road testing session and a second version of the standard is in preparation.
- Sustainability consortium (Wal-Mart) was conceived in order to develop a global approach including (among others) a calculation methodology and an open database. However, many details remain unknown such as, for example, the amount of information coming from LCI databases as well as from input/output approaches. Future methodology developments still need to be detailed.
- ISO 14067 documents are currently discussed at international level. They have been updated during the preparation of this report but some important issues are still discussed.

Detailed analysis of schemes

Given the fact that schemes have heterogeneous aims and approaches, the selected methodologies were analyzed and compared using a variety of criteria among which some are difficult to assess quantitatively or do not allow to compare objectively for concluding that one methodology is better than another, while others allow an assessment. This led to two types of analysis:

- Qualitative comparison of methodological issues which can not be assessed quantitatively;
- Quantitative assessment for other criteria.

Qualitative comparison of methodological issues

Some technical features have been specifically highlighted but were hardly assessable quantitatively. For these criteria, a qualitative comparison of the methodologies' positions has been conducted.

- **Environmental issues covered:** the interest of including other environmental impacts is generally accepted as to avoid misleading consumers and to grasp a full understanding of a product's environmental impacts. This type of approach is more complete but requires important additional work (e.g.: including other activity data, performing a detailed sensitivity analysis, improving the uncertainty management, using experts and specific databases). Furthermore, the availability of appropriate data for calculating these impacts may be limited due to the lack of knowledge on some of these issues. Both aspects may limit the capacity of a quick evolution and dissemination in this field.
- **Functional Unit:** PCF methodologies were mainly built using LCA principles and, as so, recognize the interest in defining a functional unit; however, establishing a commonly agreed definition of functional unit remains a point of discussion.
- **Cut-off rules:** this criterion enables a compromise between the precision of the results and the data collection effort. However, many aspects remain heterogeneous, like the target for these rules (mainly physical flows or CO₂ emissions) or thresholds values, and generally depend on methodologies' objectives.
- **Use phase:** including use phase is usually recommended but methodologies acknowledge that it raises many difficulties, in particular regarding the scenarios of use phase to be considered. As such, specific consideration should be given to this life cycle stage and to the consequences of the methodological choices made (regarding uncertainty for example). An appropriate system for recording and tracing information (e.g.: data, assumptions) related to this specific stage should be set up.
- **Data quality:** all methodologies require the use of data with a certain level of quality so as to ensure the reliability of the final information. Points to assess regarding data quality are heterogeneously treated, but the main issue regarding this topic is the compromise between representativeness (adaptation to each specific case) and data quality (e.g.: use of commonly accepted and trusted sources).
- **Allocation:** the interest of this topic is generally recognized and methodologies keep an open approach on this subject, in order to remain flexible. However, this flexibility reduces the ease of implementation for user, since no detailed guideline is provided. This also implies risks of misleading and non comparable information for the final user of the information.
- **Uncertainty/sensitivity analysis:** this topic brings together both uncertainty management and sensitivity analysis. Understanding the limits of results' validity is often required but the level of expectations regarding this issue is heterogeneous (calculation procedure, level of analysis, communication specificities, etc.).
- **Methodological assumptions:** schemes flexibility depends on the project objectives. It enables the user to make more or less assumptions (variability of the framework) and it leads similar methodologies to make different choices (for example, Global Warming Potentials from the IPCC are usually recommended in methodologies aiming to calculate a PCF, but

depending on the methodology considered, a different IPCC Assessment Report is needed and, as a consequence, values for GWPs are not the same). This limitation in methodology comparability is however partially compensated by the insistence of standards on the traceability of choices made.

- **GHG offset:** little information is available; however, methodologies dealing with this issue require a separate reporting system to avoid misleading communication (as the same reporting system would not make the distinction between a reduction of GhG emissions obtained through the improvement of product “carbon efficiency” and a corporate purchase of carbon credits). Calculation rules are not commonly agreed upon and discussions are still necessary to define a clear framework for defining and calculating GhG offset.
- **Partial reporting (not full life cycle):** partial reporting is generally not recommended but authorized if properly justified and not leading to a change in the reader’s conclusions. Requirements may be stronger in the case of communication to consumers.
- **Land use change/carbon storage:** international approaches on this topic should be preferred as well as a separate reporting system of the related information. However, the level of integration of this issue is greatly variable and calculation methodologies have to be improved.
- **Biogenic carbon accounting:** little information is available; it is generally recommended to consider it and to report it separately.
- **Review requirements:** this issue covers quite a wide range of practices between internal and external verification of the methodology and/or the results. Calculating a PCF on an entire life cycle generally requires methodological choices, and it is generally acknowledged that an appropriate reviewing system could allow for an increased process reliability on these assumptions. Verifiers have to prove their skills against a wide panel of standards (which depends on the methodology) and have to determine an appropriate methodology for verification. However, methodologies with a general approach (e.g.: ISO 14067, GhG Protocol) try to remain flexible and simply recommend levels of verification adapted to the objective of the methodology. Verification level has to be increased when the final information is communicated to consumers.

Quantitative assessment of methodologies: definition of scenarios

Each methodology has its own technical features (such as environmental issues covered, cut-off rules; they are detailed above) that have consequences in terms of possible implementation policies. Therefore the relevance of methodologies for future EU policy development should be assessed in regards to the objectives targeted and the implementation options. Thus, **it is necessary to consider scenarios rather than methodologies alone** when assessing methodological options. A scenario is the combination of a methodology (calculation rules and guidelines enabling to evaluate a carbon footprint) and an implementation system (political framework or organizational structure related to a carbon footprint action, with specific objectives).

Based on our analysis of the risks and benefits associated with the initiatives examined, five main scenarios were defined:

- **Scenario 0: Business as usual.** The objective of this scenario is to identify the risks associated with the upholding of the European Commission's current position on product carbon footprint. Additional involvement would be limited to communication initiatives.
- **Scenario 1: Favouring the internal use of Product Carbon Footprint (PCF) by companies.** This scenario consists in implementing systems that makes easier for companies to work together for a better assessment of the PCF of their products and include these elements into their strategic choices.
- **Scenario 2: Encouraging communication to consumers.** This scenario covers all means of communication of PCF information (either on-pack or off-pack), aiming to improve the consumers' knowledge of the footprint of the products they buy and ultimately diverting their purchases towards products with low PCF.
However, the mean of communication chosen influences the requirements to be verified by the methodology; thus, three sub-scenarios are highlighted:
 - **Sub-scenario 2a: The voluntary best in class label**
 - **Sub-scenario 2b: The voluntary index or reduction claim**
 - **Sub-scenario 2c: The mandatory index**
- **Scenario 3: Implementing market-based incentives.** This scenario is comprised of financial bonuses and taxes towards various actors (consumers, producers and retailers) that target the promotion of products with low PCF and/or taxation of high emitting products.
- **Scenario 4: Setting minimum requirements.** This scenario corresponds with the implementation of mandatory minimum requirements for producers in terms of ecodesign, in line with the Ecodesign Directive.

Limitations in scenario building and analysis

Our approach has limitations that should be kept in mind. They are linked to:

- The scope of the study:
 - Technical features on which assumptions can be made are highlighted because it could create trade distortions, but there is no deep analysis of related trade and legal risks;
 - Consumers' expectations regarding communication require a specific study. As a result, we focused on the main existing communication schemes to understand which specific requirements they imply regarding PCF methodology;
 - Methodologies are studied in the frame of a given scenario which may not correspond with their initial objective, but for which they could be adapted if correctly framed in the future.
- The methodologies studied:
 - Availability and robustness of information is variable (especially for methodologies under development);
 - Comparability of methodologies is limited due to their own implementation contexts and/or the divergence of objectives;
 - Some technical features were hardly assessable. For example, a cut-off threshold of 1% is not intrinsically better than a threshold of 5%: it enables a more precise result,

but it requires a more thorough data collection. Furthermore this effort is only justified when the objective of the initiative implementing the methodology requires it; as such, assessing the methodologies quantitatively on this aspect is quite difficult.

This means in particular that **methodologies' scoring is only one part of the analysis based on specific criteria made for evaluating their appropriateness for a given scenario: other features assessed qualitatively must also be considered for further implementation.**

Moreover, focusing on carbon footprint may in some cases create a risk of **burden shifting** to other environmental impacts. Indeed, carbon footprint can represent a good indicator of the overall environmental impact for specific product categories, mainly those considered as highly energy intensive and simple in terms of emission sources (no land use change, no biogenic emission, etc.). On the contrary, for some product categories, other indicators than carbon footprint may be more relevant.

Eventually, the environmental efficiency improvement of each product does not guarantee the intended global environmental impact reduction: the number of products consumed may increase and compensate the environmental benefits generated by each product. Individual product carbon footprint reduction can therefore result in a global GHG increase. This phenomenon, known as the **"rebound effect"** is an intrinsic limitation of the studied scenarios even if its risk of occurrence and consequences depend on each scenario.

Methodologies assessment according to the scenarios

For scenarios/sub-scenarios 1 to 4, selected methodologies were graded according to some of the following 21 criteria (depending on the scenario), with grades ranging from 0 to 2, and then weighted according to the importance of the criterion for each scenario/sub-scenario.

- Management - Designed for fulfilling scenario objective
- Management - Stakeholders diversity
- Management - Involvement of public authorities
- Management - Existence of specific working groups (by sector/industry/market/etc.)
- Management - International structure
- Methodology validation
- Methodology documentation availability
- Methodology maturity - Number of products for which the methodology has been applied
- Data collection - Possibility to use default values in the absence of primary data
- Data collection - Transparent description of the required primary data
- Data collection - Amount and detail of information required
- Data collection - Data quality rules
- Results - Expected product range of application

- Results - Uncertainty assessment / sensitivity analysis
- Results - Level declared for product comparability
- Results - Time scale validity of the CF assessment
- Results - External critical review of the results
- Results - Transparent procedure to identify the best in class
- Tools - Database
- Tools - PCR-like documents
- Tools - Tool availability

Below are the total weighted grades of the studied methodologies for each sub-scenario.

Scenario 1: Favouring the internal use of PCF by companies

Methodologies already spread	PAS 2050	Japan PCF	Korea PCF	Carbon Index Casino	Greenext (Lederc)	Climate certification system SE	Climateop
Weighted score	27	26	25	23	17	18	15

Methodologies under development	Product GHG Protocol	ISO 14067	BP X30-323	Sustainability Consortium (Wal-Mart)
Weighted score	25	25	26	24

Various existing or in-development methodologies seem appropriate for helping firms to work internally on the reduction of their PCF.

A widespread management structure involving many and diverse stakeholders – like for ISO 14067 or Product GhG Protocol – is an advantage for developing a European scheme. However, gathering so many actors could limit the precision of the developed methodology (in order to remain flexible and adaptable) and the interest for firms (working on general issues does not help to solve specific issues; this fact probably explains, for example, the increase of sector approaches).

A structure with various working groups – like in the BP X30-323 – that focuses on specific products' categories could be a solution for focusing on dedicated issues, and feedback from “older” methodologies could enable to progress more quickly.

As such, **an extension of PAS 2050, ISO 14067, Product GhG Protocol or BP X30-323 structures seems to be the best solution for this scenario.**

Sub-scenario 2a: The voluntary best in class label

Methodologies already spread	PAS 2050	Japan PCF	Korea PCF	Carbon Index Casino	Greenext (Lederc)	Climate certification system SE	Climateop
Weighted score	44	42	41	37	28	33	38

Methodologies under development	Product GHG Protocol	ISO 14067	BP X30-323	Sustainability Consortium (Wal-Mart)
Weighted score	44	42	49	40

The scores reveal the necessity of a precise and transparent definition of the LCA calculation rules for this scenario, and in particular a higher level of expectations regarding data.

Current “best in class” methodologies (Climatop and Climate certification system SE) suffer from different weaknesses such as: the lack of transparency in calculation rules, not enough international participative process. Therefore, they do not obtain the highest scores, although their objectives are in line with those of the scenario.

Indeed, for this scenario, an ideal methodology would combine:

- a precise and transparent definition of the LCA calculation rules with a large involvement of the stakeholders in the production of LCA studies that would guide the definition of simple environmental criteria (BPX 30-323)
- a definition of simple environmental criteria (Climate certification system SE)
- a best in class labelling scheme (Climatop).

Sub-scenario 2b: The voluntary index or reduction label

Methodologies already spread	PAS 2050	Japan PCF	Korea PCF	Carbon Index Casino	Greenext (Lederc)	Climate certification system SE	Climatop
Weighted score	39	38	37	32	25	22	23

Methodologies under development	Product GHG Protocol	ISO 14067	BP X30-323	Sustainability Consortium (Wal-Mart)
Weighted score	40	37	37	33

Current major schemes (Product GhG Protocol, PAS 2050, Korea PCF, BPX30-323, etc.) are appropriate for this scenario, as many of them rely on the same methodological basis. Two points are however of first importance for implementing such a scheme at a European level:

- **Consistency with other schemes:** in order to avoid “wasting” PCF already calculated by some users, a detailed gap analysis has to be performed with locally used methodologies to correct existing PCFs. As such, a specific work of comparing calculation for a same product with various methodologies could be performed. Regarding this issue, **PAS 2050** currently seems to be the best option for developing a common basis for comparison, since other methodologies often rely on it, and it is recognized as an important and reliable methodology. Worldwide methodologies which are being developed (**Product GhG Protocol** and **ISO 14067**) may be suitable options when finalized.
- Possibilities to highlight **the user’s carbon footprint reduction engagement**: current schemes are not designed to highlight user engagement, except the **Korea PCF** which has 2 logos (one for PCF, one for low carbon products) and **PAS 2050** in the private Carbon Label of Carbon Trust.

Sub-scenario 2c: The mandatory index

Methodologies already spread	PAS 2050	Japan PCF	Korea PCF	Carbon Index Casino	Greenext (Lederc)	Climate certification system SE	Climatop
Weighted score	52	54	50	42	41	35	33

Methodologies under development	Product GHG Protocol	ISO 14067	BP X30-323	Sustainability Consortium (Wal-Mart)
Weighted score	55	49	56	55

A mandatory index scenario would require a methodology with:

- a precise and transparent definition of the LCA calculation rules that reaches a consensus among the stakeholders,
- a sufficient level of data collection requirements to ensure robust results that allow scientifically sound PCF comparisons,
- a data management system that could provide default values for all users affected by the mandatory scheme.

The studied methodologies, in their current state of development, do not fulfil all of these requirements and therefore are not yet mature enough for mandatory implementation. The development of PCR-like documents may be useful in the future for reaching an international agreement on criteria such as the functional unit, allocation rules, etc.

BP X30-323 slightly stands out but is still under development and we therefore lack insight to fully assess its applicability to a mandatory index scenario. The same applies for Product GhG Protocol and Sustainability Consortium (Wal-Mart).

Current schemes based on a governmental initiative (PAS 2050, BP X30-323, Japan PCF) may be suitable for further implementation. They should be improved taking into account experience from methodologies that have been able to:

- reduce the amount of information required (e.g. **Sustainability Consortium, Greenext**),
- involve the stakeholders belonging to the same value chain and have them work together (e.g.: **Sustainability Consortium**) in order to have appropriate and accepted industry approaches.

Scenario 3: Implementing market-based incentives

Methodologies already spread	PAS 2050	Japan PCF	Korea PCF	Carbon Index Casino	Greenext (Lederc)	Climate certification system SE	Climatop
Weighted score	51	50	47	38	35	35	34

Methodologies under development	Product GHG Protocol	ISO 14067	BP X30-323	Sustainability Consortium (Wal-Mart)
Weighted score	49	49	54	49

BP X30-323 seems to be slightly more efficient for this scenario than other PCF methodologies. This is partly due to:

- the direct involvement of public bodies in the methodology elaboration, which provides a good structure for mandatory schemes;
- the presence of working groups by industry to support the definition of the differentiating criteria, which is a good structure to support a market approach.

However, a market-based scheme may increase pressure on some economic operators of the value chain. For example, in the “meat” market, the allocation key chosen for the upstream impacts takes on particular importance: choosing an allocation rule based on weight could transfer an important part of these environmental impacts on the disposal fields (the carcass weighs more than the meat itself), whereas an allocation rule based on economic values mainly targets the meat producers. As such, it is important to promote a networking structure that involves the whole value chain in the methodology elaboration. This risk is currently not sufficiently mitigated and may lead to stress in the value chain; a networking structure like the one used in **Sustainability Consortium** could be a good source of mitigation.

Scenario 4: Setting minimum requirements

Methodologies already spread	PAS 2050	Japan PCF	Korea PCF	Carbon Index Casino	Greenext (Lederer)	Climate certification system SE	Climatop
Weighted score	53	54	51	42	41	35	34

Methodologies under development	Product GHG Protocol	ISO 14067	BP X30-323	Sustainability Consortium (Wal-Mart)
Weighted score	55	49	58	54

The ranking is similar to the other mandatory scenarios (2c and 3). This is mainly due to the fact that defining minimum requirements requires being able to precisely define the range of products performances and to compare them.

The main conclusion of the assessment is that none of the schemes is perfectly suitable for such a scenario:

- Methodologies which could have the greatest acceptance (many and diverse stakeholders involved in the methodology elaboration, like the Product GhG Protocol) choose to develop a general approach by providing a flexible framework, which can be adapted to every product. As such, product comparability is not immediate because underlying assumptions made in each case have to be clarified.
- Methodologies targeting work by product category (like BP X30-323) provide detailed calculation rules and increase the product comparability, which is important in defining the requirements. Yet, these methodologies are currently not sufficiently widespread at an international level, even if they are included in current discussions.
- Methodologies which have been widely tested (like PAS 2050) provide an interesting basis for determining requirements since for some products, many PCF results are available. However, specific additional work has to be conducted to compare results on same products using different methodologies, in order to define appropriate requirements (insufficient basis of products assessed to build a scale of performance for each product).

Therefore, **it is not recommended to implement such a system for the moment.**

Conclusions

The current panorama of methodologies and initiatives for product carbon footprint is quite broad and quickly evolving, which has led firms, public bodies and other structures to develop their own methodologies to support their own needs. This may generate a loss of interest in PCF since consumers and other stakeholders are presented a plethora of information said to be comparable but in reality quite different in terms of their approaches, which leads to further confusion about this topic.

The European Commission has an important role to play because it is at the appropriate decision-making level to homogenise national approaches without being perceived as willing to take advantage of the process.

Main observations issued from the present study are that:

- **Many methodologies were built from the ISO 14040/14044 norms** which have been used for 10 years and can provide a complementary feedback to current PCF methodologies.
- **Very significant progresses have been made over the last two years** in developing PCF methodologies. The existing initiatives have already led to voluntary PCF labelling in many countries.
- **Some products categories have already been widely tested** throughout existing schemes, and **most consumer product categories could be tested within the next years** given current development of existing methodologies, while PCRs are being developed to support methodologies wider implementation.
- Experienced methodologies have shown a **good adaptability during past experimentation**.
- However, specific product footprint methodologies are quite **recent** (the oldest dates back to 2008) and **none of them has presently been tested over all product categories so as to conclude now their perfect suitability for a wide-scale implementation on consumer products**.
- **Current systems are presently not mature enough to implement a mandatory scheme**; indeed, none of the studied methodologies is currently commonly accepted, each methodology has its own strengths and weaknesses (which could be related to their objectives), and consensus on some critical methodological options (e.g. allocation rules, cut-off criteria) is not sufficient to provide a balance between PCF robustness and complexity/cost of implementation for users, enabling objective choices for consumers. This might be achieved by way of the harmonization efforts currently in progress, but also by way of an increase in detailed calculation rules which could be obtained through the development of PCR-like documents (PCRs or sectorial methodologies for example).
- Current methodologies still **lack precision on some critical aspects**: scenarios to be used for the use phase / end-of-life phase, cut-off criteria, land use, etc. Specific work should be undertaken on these subjects in order to provide users with an accepted framework.
- **Future European schemes will have to consider consistency with existing international initiatives** aiming to homogenise PCF methodologies (Product GhG Protocol, ISO 14067) and to take into account experience from their more mature predecessors (such as PAS 2050).
- The selection of the appropriate methodology to be applied at EU level should take into account the **possibility of widening the environmental scope of the methodology to include environmental impacts other than climate change**, as well as to ensure that the whole life

cycle is considered in the analysis. Indeed, the idea of getting the full picture of environmental impacts is essential in order to ensure that a consumer is not misled and that efficient action for protecting the environment is undertaken. With this objective in mind, specific consideration should be paid to the respect of LCA principles that have been widely applied.

The appropriate scenario should fulfil, in the long term, the ultimate goal of such initiative: to reduce the global environmental impact of consumption. A relevant **action plan for the European Commission** could consist in:

- **Keeping on actively supporting current operations for homogenising PCF methodologies.** In particular, international methodologies with a general approach like ISO 14067 would be a good framework to promote: they provide a global framework for other methodologies and are developed within a widely accepted structure. This is useful for further international actions like those undertaken by the European Commission.
The European Commission could then facilitate the improvement of these general standards regarding aspects that are insufficiently precise; for example, it could help organizing discussions around the appropriate PCRs to be used in the framework provided by the selected methodology.
- **Once a global and commonly accepted framework is defined, undertaking a gap analysis with existing methodologies** in order to identify points to be covered and corrected.
- **Defining the level of ambition of the EU policy regarding PCF** (communication to consumers; market-based incentives; minimum requirements) and the corresponding timeframe. These three options could even be considered as **three implementation steps**. With this objective, the best compromise among the studied methodologies should be selected, in parallel with supporting homogenisation works.

C. Identification of main methodologies and initiatives

1. Study of existing methodologies and initiatives

The first step of the analysis was to draw the picture of existing methodologies and initiatives related to product carbon footprint worldwide. This analysis has been widened to other types of initiatives when considered relevant in terms of their implementation at the European level.

As detailed in the terms and definitions section above,

- Methodology refers to a set of calculation rules and guidelines
- Initiative refers to a framework for a methodology implementation; initiatives considered in the frame of our analysis are mainly public policy projects.

The isolated analysis of a methodology or an initiative is complex since a methodology should be implemented through an initiative and an initiative needs to be based on a methodology to achieve its goal. Thus, methodologies' analysis also covers the related initiatives (in order to have a better understanding of the implementation conditions) and initiatives' analysis is linked to the related methodologies if relevant.

The following table describes the projects that have been mainly considered and gives a brief summary of some schemes' features.

There are numerous projects initiated around the world; in particular approaches may be initiated either by individual companies or by an industry/sector. This list is therefore not exhaustive.

Number	Type	Name	Description	Country/Region
1	Methodology	PAS 2050	Methodology to calculate the embodied GHG emissions associated to products. No requirement for communication. It includes: - GHG emissions sources to consider - Principles for the definition of product units - Principles of boundaries - Rules about materiality - Rules for co-products - Rules for primary and secondary data - Principles to take into account variable supply chain data (seasonal, geographical) This methodology, the oldest one, is currently being reviewed to take into account feedbacks from the experimentation.	UK
2	Methodology	GhG Protocol - Product Life Cycle Accounting and Reporting Standard	Draft standard methodology to calculate product carbon footprint It includes standard requirements and guidance for the following steps: - Establishing the methodology - Defining the functional unit for the product system - Identifying the product system boundary - Collecting data - Performing allocation - Calculating emissions - Performing data quality assessment - Granting assurance - Reporting emissions It will include databases in the future.	Worldwide

Number	Type	Name	Description	Country/Region
3	Methodology	BP X30-323	<p>General principles - coming in the form of a good practices referential - for an environmental communication on mass market products</p> <p>To be completed by precise guidelines by product category for product footprint calculation</p> <p>Developed by a platform led by the French EPA (ADEME), in relation with working groups gathering all voluntary stakeholders.</p> <p>It includes:</p> <ul style="list-style-type: none"> - Principles for the environmental communication of products - Main principles for drawing up methodological guides specific to product categories - Data for calculating the environmental impacts - Data relating to the greenhouse effect - Governance system of the public database 	France
4	Methodology	ISO 14067 (General title: "Carbon Footprint of products", Part 1: "Quantification", Part 2: "Communication")	<p>Part 1 sets "principles and framework requirements for determining the necessary methods and indicates the topics to be considered in the goal and scope definition phase" of carbon footprint of products</p> <p>Part 2 defines "requirements for communication, including procedures to support transparency and credibility to allow informed choices"</p> <p>A draft was proposed by ISO technical committees for voting by ISO member bodies.</p> <p>Part 1 includes:</p> <ul style="list-style-type: none"> - guidelines to define the scope, functional unit and boundary - the type of data to take into account - exclusions - time basis - a method for determining use and end-of life stages - guidelines for data collection, allocation and validation - timing - treatment of specific cases - PCF calculation and interpretation - reporting verification <p>Part 2 includes:</p> <ul style="list-style-type: none"> - general principles - use of category rule - requirements and guidance for communication of carbon footprints - verification 	Worldwide
5	Methodology	Korea PCF	<p>Guidelines published by Korea Environmental Industry and Technology Institute for the application to a PCF label.</p> <ul style="list-style-type: none"> - It defines the boundaries, principles of data collection and calculation, principles about declarations in order to create PCF labels. - Differences are made between products that use energy when in use and others. - 2 certificates are related to this initiative: the Greenhouse gas emissions certificate (carbon emissions baseline) and the low carbon certificate (the greenhouse gas emission certified goods satisfy the minimum reduction target). 	Korea
6	Methodology	Carbon Footprint Program (Japan PCF)	<p>The carbon footprint program is an index which shows customers the CO₂ emissions produced throughout a product or service's lifecycle by putting a label to indicate the amount of emissions. The system enables customers to choose products that have a smaller impact on the environment and encourages businesses' efforts to make products with smaller environmental footprints. This program is included in a wider program also including labelling aspects and aiming at helping build an international standard.</p> <p>The documentation provided describes the general considerations for the PCF and labelling, but also the basic rules for the calculation of PCF.</p>	Japan

Number	Type	Name	Description	Country/Region
7	Methodology	Sustainability Consortium / Wal-Mart sustainability index	<p>- First step: Evaluation of 100000 suppliers sustainability through a questionnaire</p> <p>- Second step: Development of LCA Database by a multi-stakeholders consortium (NGOs, government, suppliers, retailers) and creation of an open platform with a technology partner.</p> <p>- Third step: Finally develop an index for customers translating the info into a simple rating</p> <p>Evaluation of suppliers' sustainability, support to the creation of a consortium of universities to collaborate with suppliers, retailers, non-governmental organizations and government officials. The consortium will help develop a global database of information on products' lifecycles – from raw materials to disposal. Finally develop an indicator for customers</p>	USA
8	Methodology	Carnegie Mellon's Economic Input-Output LCA	<p>The Economic Input-Output Life Cycle Assessment (EIO-LCA) method estimates the materials and energy resources required for, and the environmental emissions resulting from, activities in our economy.</p> <p>Specific tools have been designed to simplify the approach and to make it accessible for non-experts</p> <p>Economic Input-Output Life Cycle Assessment (EIO-LCA) is a mathematically defined procedure using economic and environmental data to determine the effect of changing the output of a single sector. The method can be applied to any economy defined by the transactions between sectors. Each application of the method defines an EIO-LCA model.</p>	USA
9	Methodology	Carbon Index Casino	<p>Product labelling available on both packaging and internet website. Its main objective is to educate consumers but it also serves for improving products performances.</p> <p>It covers 600 products from 150 suppliers. Eventually 3,000 products will bear the label.</p> <p>Emissions based on 5 life cycle stages: farming, manufacture, transport, packaging and distribution. Data were claimed and obtained directly from the suppliers.</p> <p>Methodology developed with an external consultant specialized in LCA approaches.</p>	France
10	Methodology	Greenext / Leclerc	<p>Product labelling displayed on the counter and on the sales receipt.</p> <p>20,000 food items now have CO₂ labels in two Leclerc centres. 60,000 households are covered.</p> <p>Emissions are based on full life cycle analysis, but using generic data for each product group. Scheme will start introducing more specific data soon.</p>	France
11	Methodology	Climate certification system SE	<p>Scheme targeting food products in a first approach, based on two existing labels. Rules are defined for each product categories. These rules are based on certain fixed criteria (ex: use of 100% of electricity coming from renewable energy) and plans for improvement (increase energy efficiency, decrease use of fossil fuels...).</p>	Sweden
12	Methodology	Climatop	<p>This NGO has created a label to certify climate-positive products and services. The methodology is based on a comparative analysis performed according to ISO 14040 between the product performance and the one of a reference product; this analysis is also peer-reviewed</p>	Switzerland
13	Methodology	Etiquetage des Caisses d'Epargne	<p>Product-labelling system for rating the carbon intensity of banking products, enabling customers to choose their investments regarding environmental impact. Calculation uses an emission factor of CO₂ per euro for each bond owned by customer.</p>	France
14	Methodology	CarboNZero	<p>It is an internationally accredited greenhouse gas certification programme, providing tools and resources to greenhouse gas emissions measurement, and reduction (through the provision of credible and verified offsets or carbon credits). It is the world's first accredited GHG Certification Scheme under the ISO 14064.</p>	New Zealand
15	Methodology	Carbonfree - carbonfunds	<p>Certification service of 'carbon neutral' products, based on the calculation of carbon footprint followed by reduction actions and offset programs.</p>	UK
16	Methodology	Greenhouse Friendly TM	<p>- Certification of products as 'carbon neutral' through lifecycle analysis</p> <p>- Generation of approved abatement projects</p>	Australia

Number	Type	Name	Description	Country/Region
17	Methodology	Origin Carbon Reduction Scheme	End-to-end voluntary carbon aggregator that pools various independently verified abatement projects. - offset projects - offset products - offset sales	Australia
18	Methodology	Renault Eco2	Guarantee that CO ₂ emissions of the labelled car are below 140 g/km or use of biofuels	France
19	Methodology	Peugeot "Blue Lion"	Guarantee that CO ₂ emissions of the labelled car is below 130 g/km or use of GNV	France
20	Methodology	"Objectif Zero Carbone" (Alter Eco)	Carbon footprinting of fair-trade products and offset of residual emissions.	France
21	Methodology	"Smart Neutroclimat" de Smart	Carbon footprint performed on emissions due to the car manufacturing and to a distance of 50 000 kms. The car is then commercialized with 50 000 km offset through CDM projects.	France
22	Methodology	The Blue Angel	The scheme considers itself as a market-conform instrument of environmental policy designed to distinguish the positive environmental features of products and services on a voluntary basis. The label indicates the 3 main features of the product.	Germany, but open to foreign companies
23	Methodology	IACA (outil d'Information pour l'Amélioration Continue des Articles)	This is a dialogue base dedicated to suppliers, which will allow shops to provide their customers with detailed data on each supplier but also on each product. Social and environmental performance of products is based on a simplified LCA.	France
24	Methodology	"Bilan produit" (ADEME)	Software allowing to model the products' life cycle in a simple way and to calculate the impacts of products on environment, according to 8 indicators.	France
25	Methodology	Post Europ GHG reduction Program	A GHG reduction program for Europe and Public postal operators.	Europe
26	Methodology	National inventory report of German Greenhouse gases	Reporting of Germanys national Greenhouse gas emissions: obligation to prepare and submit an annual National Inventory Report (NIR) containing detailed and complete information on the entire process of preparation of such greenhouse-gas inventories	Germany
27	Methodology	Voluntary certification program to choose eco-products	Voluntary certification program to choose eco-products. Producers or sellers can utilize Eco-label certification as a marketing means for their product.	South-Korea
28	Methodology	Carbon reduction label	Labelling of products meeting defined criteria in terms of good manufacturing process.	Thailand
29	Methodology	China Environmental labelling program	Indicates reduced environmental impact over the product's life-cycle compared to similar products.	China
30	Methodology	Decours et Cabaud	Product label with GhG, air pollution and water pollution indicators	France
31	Methodology	Hofer	Private label on organic agricultural products which can be traced back to their origin online by customers thanks to their product code	Austria
32	Methodology	Carbon Fund (USA): CarbonFree Product Certification	It provides carbon neutral labels after determining products' carbon footprint, reducing that footprint where possible and offsetting the remaining carbon emissions through third-party validated carbon reduction projects.	USA
33	Methodology	EPD	Type III Environmental Declaration: Quantified environmental data for a product with pre-set categories of parameters based on the ISO 14040 series of standards, but not excluding additional environmental information provided within a Type III environmental declaration programme according to ISO TR 14025.	Sweden
34	Methodology	EcoLeaf program	The ECO-LEAF environmental label is designed to present quantitative information about the environmental impact of a product or service without making any judgment about whether the product or service meets any environmental quality standard. The ECO-LEAF label is obtained following four steps: - specification of criteria - collection of product environmental data - verification of the data - registration	Japan
35	Methodology	Electronic Industry Citizenship Coalition	The on-line system allows companies in the electronics industry to calculate their greenhouse gas emissions (GHG) and share the data with other companies in the industry. The system was developed to improve measurements and increase understanding of GHG emissions across the electronics industry supply chain. This is a key category of "Scope 3" emissions under the Greenhouse Gas Protocol.	Worldwide

Number	Type	Name	Description	Country/Region
36	Methodology	TEAM: GHG Validation – SMART	SMART is a practical, cost-effective method of accurately and transparently evaluating GHG reductions. TEAM works with several international GHG standards and protocol bodies, including the ISO, WRI, WBCSD and IEEE. TEAM supports projects that are designed to demonstrate technologies that mitigate greenhouse gas (GHG) emissions nationally and internationally, and that sustain economic and social development.	Canada
37	Methodology	Carbon Counted	Carbon Counted enables businesses to calculate their carbon emissions with a web-based greenhouse gas inventory system	Canada
38	Methodology	Seattle Climate Partnership (SCP)	Voluntary agreement between companies located in the area of Seattle to take actions to reduce their own emissions. Online calculator focused on four areas that tend to have significant greenhouse gas impacts: transportation, energy use, materials purchasing, and waste generation.	USA, Seattle area
39	Methodology	GHGenius	Model for the calculation of transportation fuels' LCA.	Canada
40	Methodology	The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model	Model for the calculation of transportation fuels and vehicles' LCA.	USA
41	Methodology	Les réflexes verts (par Orange)	Scoring of telephone terminals based on data provided by manufacturers.	France
42	Methodology	Affichage des performances environnementales pour les mobiles SFR	The project is still confidential, so no information is available yet.	France
43	Methodology	Klimakost	Klimakost is a model for calculating life cycle (direct and indirect) emissions for companies, organizations and municipalities in a cost-effective, yet still methodologically concise, manner.	Norway
44	Methodology	Beverage Industry Sector Guidance for Greenhouse Gas Emissions Reporting	This standard aims at dealing with GhG emissions calculation both at corporate and product levels in the beverage industry. Specific attention is paid to the main sources of emissions for this sector.	Worldwide
45	Initiative	Integrated Environmental Strategies (IES)	The Integrated Environmental Strategies (IES) program engages developing countries to build support for integrated planning to reduce greenhouse gases and address local environmental concerns. The program promotes the analysis and local support for implementation of policy measures with multiple public health, economic and environmental benefits. To date, government agencies and research institutions in Argentina, Brazil, Chile, China, India, Mexico, the Philippines and South Korea have participated in the IES program.	Worldwide
46	Initiative	International City/County Management Association (ICMA)	The professional and educational organization for appointed managers, administrators and assistants in cities, towns, counties and regional entities throughout the world. ICMA's mission is to create excellence in local government by developing and fostering professional local government management worldwide. Their air/climate resources are accessible, including a search engine that looks through all local government web sites and other local government climate documents, and an E-Library on Air and Climate Management	Worldwide

Number	Type	Name	Description	Country/Region
47	Initiative	Rocky Mountain Institute's Community Energy Opportunity Finder, Version 1.0	Rocky Mountain Institute's Community Energy Opportunity Finder is designed to calculate the potential benefits of implementing energy efficiency within a community including energy and dollar savings, air emissions reductions and number of jobs created. The tool provides a preliminary analysis, much like what an expert consultant might supply. The online tool helps community collect information on its energy use, and then demonstrates the potential energy savings; dollar savings; emission reductions of nitrogen oxides (NOx), sulphur dioxide (SO ₂), and carbon dioxide (CO ₂); and jobs creation that could be achieved through energy efficiency programs. The Finder includes information to help a community get started with its own energy projects, such as case studies of programs that have been successful in other communities, places to turn for information and advice and ideas for funding. In addition, the Finder provides an overview of the kinds of renewable energy sources that could power a given community. The Finder was developed in partnership with the Land Information Access Association, with support from EPA.	Worldwide
48	Initiative	U.S.-Asia Environmental Partnership (USAEP) State Environmental Initiative	The State Environmental Initiative is a matching-grant program to encourage international partnerships in environment and economic development between U.S. states and Asian/Pacific nations and territories. The initiative seeks to transfer environmental expertise and technology, create public-private partnerships, and promote clean technologies and environmental management. This is achieved through information dissemination, targeting the needs of Asian partners, and a matching grant program.	Worldwide
49	Initiative	Environmental Protection Law of the People's Republic of China	Framework national environmental protection law which has sufficient breadth to include greenhouse gases (although these are not regulated at present). It includes framework for national monitoring and disclosure to be administered by regulatory bodies: "Article 11. The competent department of environmental protection administration under the State Council shall establish a monitoring system, formulate the monitoring norm and, in conjunction with relevant departments, organize a monitoring network and strengthen the management of environmental monitoring. The competent departments of environmental protection administration under the State Council and governments of provinces, autonomous regions and municipalities directly under the Central Government shall regularly issue bulletins on environmental situations. "	China
50	Initiative	Ecocheck	Attribution of specific checks dedicated to buy ecological products (similar to meal pass or meal vouchers)	Belgium
51	Initiative	Ecological Bonus-Malus	French Law providing bonus for car emitting less than 130 gCO ₂ /km and malus to high emitting cars.	France
52	Initiative	The "Grenelle 2" Act	It is a draft law on national commitment to the environment currently going through the National Assembly. It states that "from 1 January 2011, the consumer must be informed, by marking, labelling, display or any appropriate process, of the carbon equivalent content of products and their packaging, as well as the consumption of natural resources or impact on natural environments that are attributable to these products during their life cycle"	France
53	Initiative	The Korean EDP Program	Publication of environmental information about natural resources used and environmental pollutants discharged during the life cycle of the products. It is supported by 3 legal acts voted in 1994 and 1995. When a product category is selected, an LCA is developed using PCRs, then products of the category can apply for EDP and certification.	South-Korea

Number	Type	Name	Description	Country/Region
54	Initiative	Carbon Label for California	<p>A California carbon label will allow consumers to choose between two comparable products on the basis of their carbon content.</p> <p>It is based on a cradle-to-market methodology that relies on readily available industry-wide secondary data for many inputs to the production process and company-specific primary data for the California-based portions of the manufacturing process.</p> <p>A hybrid LCA combines the practicality of EIO-LCAs and the specificity of process LCAs by relying on company measurements of energy use and national averages of embedded carbon for purchased inputs. Companies can utilize information they already track to develop the information contained in a label. To the extent that manufacturers believe that their suppliers are less carbon intensive than the national average, documentation can be developed, and this information can be substituted for the national average data in the carbon content calculation.</p>	USA, California
55	Initiative	Carbon Label of Carbon Trust	<p>The Carbon Trust was set up by UK Government in 2001 as an independent company; the Carbon Trust works with organizations to reduce their carbon emissions and also to foster development of commercial low carbon technologies.</p>	UK and worldwide
56	Initiative	Carbon Disclosure Project	<p>The Carbon Disclosure Project is an independent not-for-profit organization holding the largest database of primary corporate climate change information in the world.</p> <p>In 2007, The Climate Disclosure Standards Board (CDSB) has been created. It is a consortium of business and environmental organizations focused on the development of a global framework to facilitate the corporate disclosure of climate change-related data in mainstream reports</p>	Worldwide
57	Initiative	Climate Bonus	<p>The key purpose of the proposed project Climate Bonus is to assess the possibilities and effectiveness of a bonus system for households, which incites them to consume in such a way that greenhouse gas (GHG) emission are reduced and incites retailers to offer a product portfolio that advances the choice for low GHG solutions by households. In order to enable a properly functioning and credible bonus system the development of the underlying information system is indispensable.</p>	Finland
58	Initiative	Cities for Climate Protection (CCP) Campaign	<p>The International Council for Local Environmental Initiatives' (ICLEI) Cities for Climate Protection (CCP) Campaign enlists cities to adopt policies and implement measures to achieve quantifiable reductions in local greenhouse gas emissions, improve air quality and enhance urban liveability and sustainability. More than 650 local governments around the world participate in the CCP, integrating climate change mitigation into their decision-making processes. The campaign is based on an innovative performance framework structured around five milestones that local governments commit to undertake. The milestones allow local governments to understand how municipal decisions affect energy use and how these decisions can be used to mitigate global climate change while improving community quality of life.</p>	Worldwide
59	Initiative	Carbon Tax in Sweden	<p>A Carbon Tax was introduced in Sweden in 1991 with the reform of the energy taxation system.</p> <p>The tax is 150 \$ / tons carbon today but no tax is applied on fuels used for electricity production and 50% of the general level on fuels used in industry.</p>	Sweden
60	Initiative	"Japan as a low carbon society"	<p>This government initiative is based on a comprehensive action plan: definition of Japan's goals, development of cleantechs, system reforms, support for regional and citizens' initiatives as well as a carbon footprint project.</p>	Japan

Number	Type	Name	Description	Country/Region
61	Initiative	American Clean Energy and Security Act	<p>This is a comprehensive act containing the following sections:</p> <ul style="list-style-type: none"> - Cap-and-trade system - National energy efficiency and renewable electricity standard - Building energy efficiency and green building - Products and appliances - States - Federal Government - Green job training and development - Investment in clean energy deployment, energy efficiency, and research - Transportation - Smart grid and transmission planning <p>The section dealing with products and appliances includes a paragraph on "a Product Carbon Disclosure Program" directing the EPA "to conduct a feasibility study and report to Congress within 18 months of the bill's enactment regarding the establishment of a national initiative "for measuring, reporting, publicly disclosing, and labelling products or materials sold in the United States for their carbon content..." Within 36 months of the bill's enactment and following the above feasibility study, the Administrator must establish a voluntary national product carbon disclosure program, "which may involve a product carbon label with broad applicability to the wholesale and consumer markets....""</p>	USA
62	Initiative	Product Carbon Footprint Project (PCF Project)	<p>Together with the participating companies, the Pilot Project tested practical application of the current and evolving specifications for PCF assessment (ISO norms for Life-Cycle Assessment, and applicability of BSI PAS 2050). The methodology has been applied to specific products and services, in particular consumer products. A report has been prepared with the main lessons learned and it stimulated much of the international discussion on methodological issues in product carbon footprinting and carbon labelling; it was also the main basis for the German Government and The Federation of German Industries (BDI) guideline on product carbon footprinting (recently released).</p>	Germany

Note: This table only includes methodologies or political frameworks. Some other approaches aiming to help homogenizing PCF approaches are however under progress, supported by authoritative bodies (e.g.: Belgium worked with stakeholders on a memorandum entitled "Ecological footprint of products and services – Belgian position on the calculation of the ecological footprint of products in view of standardization and harmonization on European and international level") or directly by methodologies owners (e.g.: current works on ISO 14067, GhG Protocol and the review of PAS 2050 include inputs from other methodologies owners).

2. Selection of major methodologies and initiatives

Methodologies were analysed to identify the most interesting ones for further analysis. In order to do so, various analysis criteria were used and then gathered in the following meta-criteria:

- **Maturity and acceptance:** takes into account indicators like: methodology maturity, stakeholders' participation, number of products tested
- **Reliability and robustness:** takes into account parameters like: verification system, assumptions possibilities, scientific soundness, methodology transparency
- **Ease of use and cost:** takes into account (among others) the availability of documents and tools, the needs for training, the depth of the analysis
- **Consistency:** takes into account (among others) the consistency of the methodology with other schemes (PCF, LCA...), as well as the possibility to obtain consistent results between different users
- **Suitability for EU wide implementation:** takes into account (among others) the specificity of the methodology (geography, sector), the development process

In order to reduce the analysis scope, too close schemes were not both considered (e.g.: many methodologies were built on PAS 2050 or ISO 14040/44), except when management specificities were considered interesting, such as important links with governmental initiatives. However, schemes were chosen to give a representative view of the existing methodologies

In order to study sector-specific approaches, PCF methodologies from retailers were selected. Indeed, they were sufficiently advanced to enable methodological comparisons between their differentiated approaches. However, a methodology focused on food-industry (Climate certification system SE) has been also integrated in the analysis in order to have another possible sector-specific approach.

Labelling initiatives were also considered, even if a carbon footprint data was not provided to consumers, in order to understand the interest of this approach.

Thus, the term “major” does not mean that the selected methodologies and initiatives are the most advanced and interesting, but that they are considered as the most representative of existing schemes given the objectives of our analysis.

The table hereafter details the preliminary evaluation of the major methodologies and summarizes their main interests (see [Appendix 1](#) for the full detailed analysis of these methodologies).

- This is a qualitative assessment, a “High» scoring meaning that the methodology is considered efficient regarding the criterion, a “Low” scoring, on the contrary, stresses criteria not met by the methodologies.
- It is based on publicly available information (that is to say found on internet or in articles dealing with the methodologies) and this assessment has been then reviewed through the in-depth analysis of each methodology, detailed in the other parts of this report.

N°	Name	Country	Maturity / Acceptance	Reliability & robustness	Ease of use & Cost	Consistency	Suitability for EU wide initiatives	Interest
1	PAS 2050	UK	High This methodology has a good maturity and is used as a basis for other initiatives. (GhG Protocol, ISO 14047...)	Medium The methodology is very general, and then not so restrictive, but clear rules are specified to explain its use.	Medium Documentation is free but PAS 2050's implementation may be complex (based on LCA). Clear rules of calculation are detailed but several questions need to be resolved when implementing the system (e.g. scenario for use & end-of-life...).	High The project has been developed to be consistent with ISO 14040 and 14044.	High Some principles are open for debate and can then be adapted for a wide implementation.	Oldest methodology used as a basis for other ones. Numerous experiments.
2	GhG Protocol - Product Life Cycle Accounting and Reporting Standard	Worldwide	High The project is in progress but in the continuity of the GHG Corporate Standard. It has involved an important number of firms and organizations.	Medium The final reliability cannot be assessed at the moment (methodology under development) but a high maturity of the control process (Assurance from third party) can be noticed. Moreover, guidance for product comparisons and life cycle databases is to be developed.	Medium The methodology documentation is publicly available but its implementation may be complex (due to the wide scope, the high quality requirements and the significant commitment in terms of time and resources).	High The methodology is consistent with many recognized methodologies and provides good user guidance.	High It is supposed to apply to all kind of firms and sectors, and previous initiatives from the GhG Protocol have been well accepted.	- International consensus on this approach - Under development so it will integrate the latest international agreed position on specific issues

N°	Name	Country	Maturity / Acceptance	Reliability & robustness	Ease of use & Cost	Consistency	Suitability for EU wide initiatives	Interest
3	BP X30-323	France	High The project is in progress but has already involved an important number of firms.	Medium General principles have to be detailed in methodological guides specific to products categories.	Medium The process is mainly based on the use of the LCA norms; thus, the data collection needs an important effort. The availability of a free database for secondary data could enable to reduce related costs but uncertainties remain regarding the concrete implementation of the system. Guidelines are available on the webshop AFNOR (<100€). The cost of the guidelines application is depending on the level of details to be achieved.	High Specific methodologies should be consistent with other recognized methodologies (ISO 14040 and ISO 14044)	High It is not very restrictive and enclosed into a large scale mandatory policy. SME specificities will be taken into account. High level of business and consumers support given the current working structure (working groups by product categories), which could be an interesting management system to develop at EU level.	<ul style="list-style-type: none"> - Divided approach through a transversal guideline with Appendices detailing PCRs. - Multi-criteria approach - Relation with a large scale policy - Under development so it will integrate the latest international agreed position on specific issues - Availability of a free and reviewed database
4	ISO 14067 (General title: "Carbon Footprint of products", Part 1: "Quantification", Part 2: "Communication")	Worldwide	High This is a draft but it has already gone through various validation steps. Moreover, ISO standards usually have a high potential for acceptance.	Medium The methodology is based on other robust standards. Moreover, it requires verification (when communicated to consumers). However, it is still under development and its final robustness cannot be tested.	Medium The process is mainly based on the use of the LCA norms; thus, the data collection needs an important effort.	High It is based on 14040, 14044, 14020, 14025 and 14064.	High This standard has been thought for wide implementation. It is applicable to all kinds of firms and goods. A whole part is dedicated to communication issues. Carbon only.	<ul style="list-style-type: none"> - Standardization effort - Under development - Divided into two guidelines (one dedicated to calculation, the other one to communication requirements)
5	Korea PCF	Korea	Medium This approach is quite recent (2009) but some important industrial partners were already found.	High The process is based on recognized norms and designed to be reliable.	Low The process is designed to guide potential users. However, the implementation of the methodology seems to be complex.	High The process is based on recognized norms.	High This initiative is a concrete application of PCF principles and is embedded to a global approach (labelling).	<ul style="list-style-type: none"> - Inclusion of a global process led by the government - Important number of tests realized - Existence of a label

N°	Name	Country	Maturity / Acceptance	Reliability & robustness	Ease of use & Cost	Consistency	Suitability for EU wide initiatives	Interest
6	Carbon Footprint Program (Japan PCF)	Japan	Medium Quite recent, but good implication of companies (30 but 300 expected)	High Methodological principles insist on the reliability of the data; moreover, the external verification reinforces the reliability of the system which is built progressively.	Medium PCRs are developed to be adapted to each type of product and to enable an easy use. However, the global system seems to be quite complex.	High The project has been developed to be consistent with ISO standards.	High Principles developed are quite progressive and could be spread easily.	<ul style="list-style-type: none"> - Development of PCRs - Important verification process - Implementation of a global program (Japan as a low carbon society) - Existence of a label - Already tested
7	Sustainability Consortium / Wal-Mart sustainability index	USA	Medium Still young (not all the steps have been deployed). However, a global network has been built under the Sustainability consortium and suppliers from all over the world are involved through suppliers' questionnaires.	Medium Not really assessable yet; however, the elements provided by the Open IO website indicate that reliable sources of information have been used (US EPA...).	Medium Simplicity and ease of use seem to be of major importance. However, the project has been mainly developed using US data and methodologies.	Unknown Not assessable yet	Medium The system is not developed enough but its implementation system could be an important source of information for further developments (stakeholder involvement, etc)	<ul style="list-style-type: none"> - Global approach: suppliers evaluation & knowledge sharing, database building and development of an index - Project management - Implication of many suppliers (through Wal-Mart leadership) and other organisms (through the Sustainable Index Consortium) - Methodological background, to be compared to other retailers' schemes - Under development so it will integrate the latest international agreed position on specific issues
8	Carbon Index Casino	France	High It is very much marketing-oriented (consumers surveys, pedagogical approach)- It is in line with the French "Grenelle de l'Environnement" and supported by ADEME	Unknown Calculation details are not available publicly. But it is potentially reliable and robust given the implication of Bio Intelligence Services and ADEME.	High Economic cost must have been optimized as it deals with private labels products which are supposed to be low costs.	Unknown but potentially consistent with other methodologies.	Medium It is adapted to a wide implementation, with some adaptations (clear rules, regular data update...)	<ul style="list-style-type: none"> - Important experiment - Involvement of the whole supply chain - Methodological background, to be compared to other retailers' schemes (LCA approach with an important data collection from suppliers)

N°	Name	Country	Maturity / Acceptance	Reliability & robustness	Ease of use & Cost	Consistency	Suitability for EU wide initiatives	Interest
9	Greenext / Leclerc	France	Medium A great number of items has been covered during the test phase (20,000) but for the moment specific data regarding production and use are not integrated (only distribution).	Unknown	High Easiness and speed are important criteria for the choice of this "inverted pyramid" methodology.	Unknown	Medium It is a rather systematic system but still little return on experience.	Methodological background, to be compared to other retailers' schemes (limited data collection thanks to the use of private database and tool)
10	Climate certification system SE	Sweden	Medium Quite a young initiative	Unknown	High Easy to use, low cost methodology.	Low No reference to another methodology.	Medium The scope is limited in terms of products covered	<ul style="list-style-type: none"> - Focus on a specific sector - Existence of a label - Limited approach: producers have to evaluate product performance against some criteria and sector-specific best practices
11	Climatop	Switzerland	Medium Maturity and acceptance are considered high since analysis has to be performed according to ISO Standard 14044: 2006 which is an internationally recognized framework; however, the scheme itself is quite young	High Methodological principles insist on the reliability of the data; moreover, the external verification reinforces the reliability of the system	Low The process is mainly based on the use of the LCA norms. Thus, the data collection needs an important effort. Moreover, it requires the involvement of various LCA specialists.	High The process is based on recognized norms.	Low The system is based on the work of various LCA specialists; the cost and the implementation difficulties may be an obstacle to its development	<ul style="list-style-type: none"> - Existence of a label - Important verification scheme - Based on an LCA approach with comparison of environmental performance of 2 products

Note: Sustainability Consortium (Wal-Mart): in this report the methodology evaluated is the PCF methodology which will be developed by the Sustainability consortium, not the questionnaires sent by Wal-Mart to its suppliers. Wal-Mart initiative sets the beginning of the Sustainability consortium approach but PCF methodologies which will be used by Wal-Mart in the future will be based on Sustainability consortium work, which goes further.

Initiatives were studied less extensively but selected in order to complete the approach of methodologies. As so, initiatives selection was based on criteria like:

- Representativeness of initiatives,
- Links with existing methodologies,
- Links with global climate change policy,
- Inclusion of public and private initiatives,
- Management system able to support a wide scale implementation,
- Cooperation between stakeholders,
- ...

Initiatives selected are as follows:

N°	Name	Country	Interest
1	Ecocheck	Belgium	<ul style="list-style-type: none"> - Objectives integrate a purchasing power dimension ("keep the workers' purchasing power") while raising awareness on the environment - End consumer driven demand (pull strategy) - Multi-criteria: energy, water, transport, waste, ecodesign, respect for nature - Simple and easy to implement
2	Ecological Bonus-Malus	France	<ul style="list-style-type: none"> - High success among consumers - Mandatory - The development of such a policy is on study for other goods in France
3	The "Grenelle 2" Act	France	<ul style="list-style-type: none"> - Link with the methodology BP X30-323 - Mandatory
4	The Korean EDP Program	South-Korea	Global program whose relations with a carbon labelling methodology (Korea PCF) have to be further detailed.
5	Carbon Label for California	USA, California	Mandatory initiative with a hybrid LCA approach; little information is available.
6	Carbon Label of Carbon Trust	UK and worldwide	Global program whose relations with a carbon labelling methodology (PAS 2050) have to be further detailed.
7	Carbon Disclosure Project	Worldwide	<ul style="list-style-type: none"> - Global approach of climate change management - Fast development of the project
8	Climate Bonus	Finland	Integrates feedback from customers
9	Cities for Climate Protection (CCP) Campaign	Worldwide	<ul style="list-style-type: none"> - The protocol seems robust in so far as it is based on leading and recent methodologies (GHG, ISO 14064...) - It gives a good example of the articulation between a methodology and its political implementation.
10	Carbon Tax in Sweden	Sweden	<ul style="list-style-type: none"> - This initiative is quite old and usually considered as successful - It is a high maturity project implemented on a wide perimeter. Thus, it can allow us to measure the results (increased use of biomass for heating, more energy efficiency solutions...) and the limits of such a project
11	"Japan as a low carbon society"	Japan	<ul style="list-style-type: none"> - This is a governmental project aiming at changing the whole society - the carbon footprint part of this initiative is totally integrated in the project, with a strong methodology (Japan PCF)

Literature review

The preliminary analysis was conducted through an analysis of the public information available for each methodology or initiative. Thus, we could learn about the amount and type of information available for any user. This first step included a review of the information provided by the scheme sponsor but also information from third-parties like users, press reviews, etc.

Interviews

In order to validate / complete the information on specific points which were not / insufficiently covered by the literature review, interviews were organized with the scheme sponsor or methodology owner.

Other sources

Additional information was collected through European conferences on PCF in Germany (Berlin, March 2010) and France (Paris, June 2010).

D. Focus on the methodological options

This chapter aims at explaining what it means to choose a specific methodology, in terms of technical features and implementation system. Indeed, current methodologies are mainly characterized by:

- The calculation scheme used: complete LCA, simplified LCA, input/output approach, etc. and other technical options;
- The implementation system that frames the use of the methodology and the use of the results provided by its application.

Both elements imply to deal with elements which can be objectively assessed (e.g.: number of products tested) and others for which such an assessment is more difficult (e.g.: cut-off criteria). As so, methodological options were studied with different approaches

- For elements which are considered critical but which can not be assessed objectively, a comparison and synthesis of major methodologies' position is drawn. This analysis is made in the section [Calculation and technical features](#) of the present part of the report.
- For elements which can be assessed objectively, scenarios of implementation have been defined (See [Scenario Building](#)) and for each scenario, a scoring card has been prepared (Appendices [2](#) and [3](#)). Indeed, the interest of this study is to define implementation scenarios for the European Commission and to assess the appropriateness of existing methodologies for these implementation schemes; as so, even if some methodological elements can be assessed objectively, their interest for each scenario depends on the objective followed.

1. Calculation and technical features

The technical options of the methodologies can be analyzed through various technical features:

- Environmental issues covered
- Functional Unit
- Cut-off rules
- Use phase
- Data quality
- Allocation
- Uncertainty/sensitivity analysis
- Methodological assumptions
- GHG offset
- Partial reporting (not full life cycle)
- Land use change/Carbon storage
- Biogenic carbon accounting
- Review requirements

In the following paragraphs, we present the different technical options of the studied methodologies, according to these features and their implications. Other important issues on which the debate is recent and/or far for agreement are not detailed here like:

- Use of PCRs: should we consider PCRs as means to increase PCF reliability? Should we prefer other approaches like sectorial approach?
- Consideration of green electricity: should it be considered as an offset? Should we report it separately?

Environmental issues covered

This issue is of prior interest since covering various environmental issues enables to give a full picture of the environmental impacts related to products. This study focuses on carbon footprint but this criterion also aims at studying if further extension would be possible.

Product GHG Protocol	<ul style="list-style-type: none"> • Mono-criterion approach. This protocol is to create a standard for GHG emissions only. • Focus on Kyoto GhG but additional GhG can be added • GWPs time horizon: 100 years
ISO 14067	<ul style="list-style-type: none"> • Mono-criterion approach • Extension to other environmental impacts is optional • Kyoto GhG are highlighted but other GhG are recognized and listed • GWPs time horizon: 100 years
BP X30-323	<ul style="list-style-type: none"> • Multi-criteria approach • Other environmental impacts have to be studied to identify the relevant ones. The selection of relevant impacts is thought by product category. The project revised version proposes referent methodologies for the different impact indicators (ex: RECIPE 2008 for eutrophication and acidification, USEtox for water toxicity) • A large panel of GhG is considered (more than 50 according to the documentation). • GWPs time horizon: 100 years
PAS 2050	<ul style="list-style-type: none"> • Mono-criterion approach • A large panel of GhG is considered and listed in the standard • GWPs time horizon: 100 years
Climate certification system SE	<ul style="list-style-type: none"> • Multi-criteria approach • Analysis criteria are chosen to highlight specific environmental benefits of a solution and the calculations to be made by users are quite reduced. Thus, it seems complicated to enlarge the methodology as to enable the calculation of other impacts over the product life cycle. Specific questions and guidelines related to the most impacting phases for other impact categories should be added. • The certification is a climate certification but other environmental issues have been taken into account while developing the criteria. • Mainly focused on relevant GhG for farming activities (CO₂, CH₄, N₂O)
Japan PCF	<ul style="list-style-type: none"> • Mono-criterion approach (GHG emissions only) • Focus on Kyoto GhG • GWPs time horizon: 100 years
Korea PCF	<ul style="list-style-type: none"> • Mono-criterion approach • Focus on Kyoto GhG • GWPs time horizon: 100 years
Sustainability Consortium (Wal-Mart)	<ul style="list-style-type: none"> • Multi-criteria approach (for example, the I/O database being developed includes water consumption) • No information available regarding the GhG considered • I/O databases use Impact 2002+ methodology and indicates a GWPs time horizon of 500 years; it is foreseen to be reviewed
Carbon Index Casino	<ul style="list-style-type: none"> • Mono-criterion approach for footprint but waste recycling rates are indicated (current and potential) in order to encourage the consumer to reduce the CF sorting out correctly the packaging wastes. • The main database used (Bilan Carbone) is limited to GHG emissions; this database includes both Kyoto and non-Kyoto GhG • GWPs time horizon: 100 years
Climatop	<ul style="list-style-type: none"> • Multi-criteria approach • To obtain the label, the product has to get a lower score of Environmental Impact Points (Swiss method of ecological scarcity UBP 06) than its competitors. • No information about the GhG to be included nor GWP time horizon; application of LCA principles
Greenext (Leclerc)	<ul style="list-style-type: none"> • Mono-criterion approach for the moment, but the objective of the methodology is to be further extended to include other environmental impacts to fulfil the BP X30-323's requirements. • The main GHG sources are taken into account: CO₂, CH₄, N₂O, C_nH_mF_p, C_nF_{2n+2}, SF₆, some CFCs and liquid refrigerant. • GWPs time horizon: 100 years

As foreseen, methodologies are mainly focused on a mono-criterion approach even if other environmental impacts are mentioned:

- **Five methodologies are already including consideration to other environmental issues**, chosen by the methodology owner (Sustainability Consortium: the database developed to support the scheme (IO Database) includes water indicator, Carbon Index Casino: information about packaging waste potential recovery rate, etc.) or LCA approach (Climatop). Another aims to do so, depending on the evolution of the national context (Greenext).
- **Other mono-criterion methodologies use LCA principles**, so that an extension of the methodological scheme to other environmental impacts is theoretically possible, although it is not planned for the moment because it does not correspond to the methodology's objectives (focus on carbon footprint). For these methodologies, it would be necessary to increase focus on possible pollution transfers when comparing the carbon footprint of two products to avoid consumers' confusion between "low carbon products" and "environment-friendly products".

Regarding the calculation scheme used, methodologies are usually based on **Life Cycle Analysis (LCA) principles** but some methodologies can use a simplified approach (e.g. with a calculation limited to some steps of the life cycle). Thus, compliance with LCA principles has to be considered for further expansion of the methodologies. However, this means that, since LCA principles are generally a basis for methodologies elaboration, an enlargement of the methodology scope to other environmental impacts is theoretically possible. Moreover, a detailed data collection is carried out to calculate the carbon footprint, so that the activity data necessary to calculate the other impacts would be mostly available through the carbon footprint data collection.

The main impact of choosing to include other environmental impacts to the product footprint is the complexity increase of the elaboration process.

- **Some methodologies try to limit the scope of analysis by reducing the number of other indicators**: Sustainability Consortium with water (even if further development is foreseen), Carbon Index Casino with information on packaging waste. It has to be noticed that:
 - the studied indicators are not consistent between the two methodologies: water for the former, waste for the latter;
 - the level of treatment is different: calculation of an impact for Sustainability Consortium, information for Carbon Index Casino.

This shows that firms from a same sector can choose to deal with different information depending on their internal priorities. If actors from a same sector do not define a common list of indicators to be considered, this could mislead consumers regarding sectorial environmental issues in the case of a wide scale implementation. As so, specific attention should be paid to homogenizing the information communicated in a same sector.

- **Other methodologies analyze specific indicators by product category**. It can lead to define the indicators to be included (BP X30-323, with the PCRs) or not (Climatop, with a full LCA).

- For these methodologies, issues arise from
 - a) The methodology robustness when modelling other environmental impacts than climate change and
 - b) The availability of environmental factors for each specific case, even if an important work has been made on this subject, especially by the JRC.
 Indeed, there is a consensus on the way to model the impact on climate change due to the work of recognized institutions like the IPCC (Intergovernmental Panel on Climate Change) but for other impact categories, various approaches may exist and be debated among specialists, with a variable state of consensus (depending on the impact considered but also the aggregation state of the information (endpoint or midpoint)). Hence, specific work is done to increase the knowledge on these subjects.

It has to be noticed that **emissions factors are not always established on the same time basis** (GWP references; please refer to the section dedicated to comparative assertions). For example, using a GWP at 500 years gives more importance to substances with a higher persistence in the atmosphere than GWP at 100 years. This last timeline seems to be mostly used but may be not adapted for some product categories.

Moreover, the LCA approach requires having a deep knowledge of **results limitations**. As so, in the case of communication of environmental information to consumers, a specific work has to be performed as to ensure a correct interpretation of the information disclosed (for example, ISO works separate calculation aspects from communication requirements).

Finally, all methodologies do not include the same **scope of GhG gases** in the analysis:

- The majority of the methodologies focus on 6 Kyoto gases (CO₂, CH₄, N₂O, HFC, PFC, SF₆)
- Others are less exhaustive, like Climate certification system SE which limits its analysis to the main gases from agricultural activities (CO₂, CH₄, and N₂O).

This choice made by the methodology owner has an impact on the emission factors availability and on the comparison with other methodology results.

In the rest of the analysis, multi-criteria approach was not considered. Indeed, current methodologies are based on LCA principles and the methodology could be extended (more or less easily) to include other environmental impacts.

Advantages of covering other impacts	<ul style="list-style-type: none"> • More comprehensive approach • Avoid risk of environmental burden shifting • Less misleading for consumer (confusion between eco-friendly products and low carbon product)
Risks	<ul style="list-style-type: none"> • More complex approach • Increase of cost related to <ul style="list-style-type: none"> • the increase of specific data collection not collected for carbon footprint (water consumption...), • the methodological database to be built • the analysis time • etc. • Availability of methodological data (emission factors) for each and every case possible (some countries and/or sectors are particularly advanced but this is not the case of all)

Note: The case of **green electricity** has not been covered by this analysis. However, many discussions are under progress to understand the mechanisms behind this issue and to precise its handling (calculation methodology, separate reporting system, links with offsets...). In particular, considering this point should be associated with a specific analysis on the Electricity Directive concerning common rules for the internal market in electricity which obliges electricity producers to specify CO₂ emissions (Article 3 § 6) and the Directive on renewable energy sources providing a framework for tracing and certifying green energy (Article 15 “Guarantees of origin of electricity, heating and cooling produced from renewable energy sources”).

Functional Unit

The functional unit is the measurement unit to evaluate a service provided by the product. It enables to ensure that products will be compared on a sound and similar basis.

Product GHG Protocol	<ul style="list-style-type: none"> The Standard recognizes the need for consistent functional units among product categories. The following elements need to be addressed when defining the study's functional unit: quality of the product, service life, use Patterns, technical performance characteristics and maintenance requirements, end-of-life of the product (e.g. availability of recycling infrastructure and ultimate fate of material(s), components or subcomponents). Additional issues are detailed (for example, sector specific guidance to define a functional unit) and examples are provided
ISO 14067	<ul style="list-style-type: none"> <i>For the determination of the functions (performance characteristics) and the functional unit of a product, the relevant provisions of ISO 14044 shall apply for PCF studies. The scope of a PCF study shall clearly specify the functions of the system being studied. The functional unit shall be consistent with the goal and scope of the study. The primary purpose of a functional unit is to provide a reference to which the inputs and outputs are normalized (in a mathematical sense). Therefore the functional unit shall be clearly defined and measurable.</i> Additionally, the norm states that: <i>The use of a common functional unit as a basis supports the comparison of different product systems. Where a relevant PCR in accordance with ISO 14025 exists, and complies with the requirements of Part 1 of this International Standard, and is considered proper (e.g. for system boundaries, modularity, allocation, data quality etc.) by the organisation applying this International Standard for the quantification procedure in Part 1, further guidance of the use of functional units can be found in that PCR.</i>
BP X30-323	<p>The product category rules define the functional unit and the associated reference flows.</p> <p>Example of shoes category rules (validated):</p> <ul style="list-style-type: none"> functional unit: wear a pair shoes in a good state during one year, according to an adapted use reference flow: number of pair of shoes
PAS 2050	<p>The standard states that <i>"The functional unit is a quantified performance of a product system for use as a reference unit. The functional unit reflects the way a product is actually consumed by the end user (e.g. 250 ml of soft drink, 1000 hours light from a light bulb, one night stay)."</i></p> <p>Reference flow is, thus, not explicit for consumers since it can vary from a food product to another.</p>
Climate certification system SE	<p>The methodology does not use the concept of functional unit since it compares management possibilities</p>
Japan PCF	<ul style="list-style-type: none"> LCA concepts are the basis of the methodology. However, general principles do not indicate a definition of functional unit and reference flows, even if these concepts are used in the document (PCRs should define the functional unit; this definition is not always clear) <i>Quantification coverage shall be set so as to include processes that might fall within the range of a functional unit of a product but that cannot be ignored from the viewpoint of the contribution to total GHG emissions</i>
Korea PCF	<p>Calculation should be based on a product unit sold on the market. It can be adapted to refer to usual weight units (1 ton or 1 kg), it can be one-day's service or one service call for products that do not have a definite or clear form. If this functional unit is unclear for consumers, a separate functional unit can be used or additional information can be provided.</p>
Sustainability Consortium (Wal-Mart)	<p>The methodology will integrate the notion of functional unit but no information is available on the functional units selected.</p>
Carbon Index Casino	<p>The methodology does not explicitly refer to the notion of functional unit but aims to calculate PCF for "producing, processing, packaging, transporting and retailing 100g of products".</p>
Climatop	<p>The methodology does not explicitly refer to the notion of functional unit but it seems to be the current practice since ISO 14040 is the workbasis. Thus, this concept is used in some peer-reviews and the analysis made is audited to ensure compliance with ISO 14040 requirements. Some of the peer-reviews mention the definition of functional unit as a critical point to be reviewed. According to methodology owner, functional unit is determined by each product category</p>
Greenext (Leclerc)	<p>A functional unit is defined according to the works of sector-specific working groups (BP X30-323) for each product category. Carbon footprint for labelling is given per kg or per unit of sale</p>

Among the methodologies chosen, **using a functional unit is a common feature**: the majority of them use it or, when not explicitly mentioning it, claim to be consistent with LCA concepts. The exceptions are:

- Climate certification system SE: functional unit is used during the establishment of comparison criteria (LCA comparison) but a user does not have to use this concept since criteria are quite practical.
- Casino: functional unit concept is not explicitly mentioned in the documentation consulted, but the data displayed is related to a quantity of product sold and is thus consistent with approaches adopted by its suppliers (who use the concept of functional unit). This choice has been made to make easier the interpretation of the information by the consumer. Other retailers have quite the same approach.

Rules for defining the appropriate functional unit are not equally treated, depending on the documentation associated to each methodology:

- **Methodologies which do not develop specific PCRs-like documents recommend using existing ones or industry/sector references:**
 - Guidelines are provided to assess the functional unit consistency with the industry-specific situation.
 - PCRs-like documents or industry/sector references may have to fulfil specific requirements (e.g.: compliance with ISO 14025). This helps to increase the reliability of the process.
- **Methodologies developing PCRs-like documents** provide users with basic information in the core guidelines, and **further developments details should be defined in PCRs-like documents**.
 - Methodologies have to be supported by an appropriate **management structure** (working groups like in BP X30-323, Japan PCF...). Moreover, the methodologies studied have been developed by national public bodies; this ensures a consistent treatment of this issue over their country but leads to risk of inconsistency with other national methodologies.
 - The **existence of various PCRs for a similar product** is not addressed. The only exception is the ISO 14067-2 (Communication) which states that: *“Comparison of PCF is only possible if the PCF is quantified in accordance with the same PCR both for business to business and for business to consumer communication. Users of PCR should acknowledge that PCF developed according to PCR from different programmes may not be comparable.”*
 - This system increases the process’ burden but enables to ensure that the functional unit topic will be treated consistently in a product category.
- **Methodologies for which the functional unit is defined in each calculation**
 - It increases the results specificity but also the risks of inconsistencies between two products.

These approaches are quite consistent with the methodologies' objectives. A transparent definition of the functional unit is a key parameter to ensure the adequate interpretation and comparability of results. The level of transparency in the functional unit definition varies among methodologies. Indeed, finding an agreement between the stakeholders on the functional unit is generally a major difficulty in the methodology development because it has a direct impact on the final PCF result and on the relative environmental performance of products. If some industries have already agreed on a specific procedure to assess their product performance (e.g. washing powders), most of them did not. Thus, agreeing on the functional unit is often a time-consuming process for methodologies that support large stakeholders' involvement.

Advantages of using functional unit	<ul style="list-style-type: none"> • Commonly accepted approach • Responsibility for defining the functional unit is well established (in PCRs, in the calculation, etc.)
Risks	<ul style="list-style-type: none"> • Risk of inconsistency of functional units defined in different methodologies • Difficulties to agree on the definition of the functional unit

Cut-off rules

Cut-off criterion serves to have a clear framework for deciding of the inclusion or exclusion of processes in an analysis; it is generally a threshold on emissions or activity data which ensures that a sufficient part of these data has been included for providing users with a true picture of the product considered (e.g.: data collected should ensure that 95% of emissions are covered). Cut-off rules are also important to define an appropriate balance between results representativeness and data collection effort by users.

Product GHG Protocol	<p><i>Processes that are attributable to the function of the product shall be included in the boundary of the product system. These processes are directly connected over the product's life cycle by material or energy flows, from extraction and pre-processing of product components through to the product's end-of-life. These processes are referred to as foreground processes (...).</i></p> <p><i>Processes that are not directly attributable to the function of a product include facility operations, corporate activities, and capital goods. These are referred to as background processes (...)</i></p> <ul style="list-style-type: none"> • Capital goods shall be included in the product system if deemed significant for the studied product or product sector • Facility operations and corporate activities should be included in the product system where relevant <p><i>Significance shall be proven for capital goods using a qualitative or quantitative test.</i></p> <p><i>Quantitative significance involves estimating the environmental impact of an input; for the case of capital goods, if the type or quantity of goods is such that it has a negligible GHG impact on the inventory results, then capital goods may be excluded. Negligible is defined here as less than 1% of the total process or life cycle stage.</i></p>
ISO 14067	<ul style="list-style-type: none"> • Consistent cut-off criteria shall be defined during the goal and scope definition phase which allow the omission of certain processes of minor importance. • The total omitted emissions shall not exceed 5% compared to the total emissions from all processes within the defined system boundary • The mass criteria can be used for a first screening but does not exempt from checking that the omitted phases do not exceed 5% of the overall impact.
BP X30-323	<ul style="list-style-type: none"> • Entering materials / flows can be neglected until their cumulated mass or energy or environmental impact reaches more than 5% of the mass / energy / impact of the product system. The most restrictive criteria define the scope. • Decisions must be made to include entering materials that would increase the product system's impact by a fixed % (example: every entering material whose impact would increase the overall impact by more than 1% should be taken into account).
PAS 2050	<p><i>The assessment of GHG emissions shall include:</i></p> <ul style="list-style-type: none"> • <i>at least 95% of the likely life cycle emissions of the product unit</i> • <i>all sources of emissions likely to contribute more than 1% of the total emissions of the product unit</i> <p><i>When a single input accounts for more than 50% of the likely lifecycle GHG emissions of a product, the 95% threshold shall apply to the remaining GHG emissions associated with the likely life cycle GHG emissions of the product.</i></p>
Climate certification system SE	Not applicable; this concept is not used in the concrete calculations
Japan PCF	<ul style="list-style-type: none"> • <i>If the cut-off is considered, the cut-off level shall be lower than 5% against the total GHG emissions at each life-cycle stage of the product. The scope of the cut-off must be specified. The specific contents ad scope of cut-off are established in the PCRs, with due consideration given to fair and impartial discussions</i> • <i>Specific attention is paid to non-use periods of equipments and facilities (as to exclude it from the calculations if the GhG contribution is low)</i>
Korea PCF	There is no clear definition of cut-off criteria. However, the general guidelines state that <i>GhG emissions data from product life cycle phases that have little impact can be excluded in the calculation when exclusion of the data does not compromise comparability of data</i> and for specific issues, threshold are mentioned (e.g.: <i>collect upstream data for raw materials (...) that correspond to a cumulative mass contribution of the upper 95 percent</i>)
Sustainability Consortium (Wal-Mart)	Conventional 1% is currently being discussed
Carbon Index	No information available but Casino says they are defined.

Casino	
Climatop	Cut-off criteria are included according to ISO 14040 and PAS 2050
Greenext (Leclerc)	Apart from the elements of the inventory excluded by principle (commuting, capital goods, etc.), no cut off criterion is defined. Indeed, if specific data are unknown, the generic modules are used so that all the phases of the LCA are included.

The use of a cut-off criterion is not as common as the functional unit concept, even if it may be used in certain methodologies for which we did not find appropriate information. Two cut-off criteria are generally identified:

- **One for the physical unit or the flow considered:** it ensures the representativeness of the data collected against the whole activity related to the product
- **One for the global emissions:** it ensures a true representation of the emissions level. In particular, it implies to estimate an order of magnitude for non calculable emissions.

Depending on the methodologies, none, one or both thresholds are considered. The thresholds may also need to be reviewed in specific cases (e.g.: PAS 2050, when a single flow represents more than 50% of the GhG emissions).

An informal agreement seems to have risen about a threshold of **5% for both criteria**, but various methodologies use **1% for emissions** threshold. Reducing the level of emissions threshold increases the process burden since:

- Data collection should be sufficient as to cover almost all flows
- Data collection should be precise enough as to ensure a limited uncertainty
- Uncertainty assessment, even if not required, is necessary to ensure that cut-off criteria are respected

Moreover, it is generally acknowledged that gaining the last precision percents is highly time and cost-consuming. A very low threshold should be considered only in cases in which emissions are very distributed, since it may not change the emissions profile of the product and the identification of improvement possibilities.

Advantages of using cut-off	<ul style="list-style-type: none"> • A cut-off criterion ensures results' representativeness • Reducing the threshold value improves the results' precision
Risks	<ul style="list-style-type: none"> • Reducing the threshold value increases the process' burden • Cut-off criteria is not a widespread concept; it could be a risk in the case of a mandatory approach, where limitations like cut-off criteria could be a mean to reduce the process burden for SMEs

Use phase

The use phase covers the product use by final user; it is usually the life cycle step between its sale and its end-of-life (except transportations steps). It generally has a key role in the product's life span and therefore greatly affects the overall PCF results. However, in many cases the modelling of the use phase is a difficult task because products can be used in various and unknown ways. Data gathering is difficult and there is no guarantee that the information collected is representative of the real use of the product. Thus, scenarios are usually used to consider various use possibilities and it can lead to important variations in results.

Product GHG Protocol	<p>Life cycle stage</p> <p><i>The use stage begins when the consumer takes possession of the product and ends with the used product entering the end of life. For some products the use stage does not required energy or product emissions (i.e. a chair); for these products transportation from the storage facility to the use-location to the end-of-life location may be the major foreground processes. Typical foreground processes for distribution and use include: transportation to the use location and during use; storage at the use location; normal use; repair and maintenance occurring during the usage time; preparation of a product; transportation to end-of-life</i></p> <p>Data</p> <p>A specific section is dedicated to the use and end-of-life stages, with the following recommendations:</p> <ul style="list-style-type: none"> • when defining service life information, it should be verifiable and should refer to the intended use conditions of the product and be related to its functional performance • it is also good practice to undertake sensitivity analyses to assess the influence of use and end-of-life profile assumptions on the product's GHG emissions. Any deviations to use and end-of-life profiles taken from sector-specific guidance and published guidelines should also be assessed using sensitivity analysis, especially where the use and end-of-life stages comprises a significant portion of the product inventory <p>The difference between theoretical and real use conditions is also addressed.</p>
ISO 14067	<p>ISO 14067-1: a section is dedicated to use phase and scenarios</p> <p><i>The GHG emissions arising from the use stage of products shall be included in all CFP studies, and in partial CF studies if included in the scope. When the use stage is included within the scope of the assessment, all emissions arising from the use stage of the product during the product's assumed service life shall be included. Service life information shall be verifiable and it shall refer to the intended use conditions and to the related functional performance of the product. Where not otherwise justified, the determination of the use profile (i.e. the related scenarios and assumed service life for the use stage of products) shall be based on published technical information such as: PCRs, published international standards (...), published national guidelines (...); published industry guidelines.</i></p>
BP X30-323	<p>The use stage is included and a focus must be performed if its impact is dominant. The following information sources must be considered:</p> <ul style="list-style-type: none"> • harmonized standards if any • industry (factories, federations) recommendations (product stewardship) • consumer surveys • use conventions if a consensus is found in the working group <p>In the case of shoes PCR (validated), use phase is excluded.</p>
PAS 2050	<p>To calculate the emissions due to the use stage, the following sources are recommended by order of preference:</p> <ol style="list-style-type: none"> 1. Product Category Rules (PCRs) that specify a use phase for the product being assessed. PAS 2050 defines the PCR as offering a consistent, internationally accepted approach to defining a product's life cycle and refers to the PCR section of www.environdec.com. 2. International standards that specify (same as above) 3. National Standards that specify (same as above) 4. Published industry guidelines that specify (same as above)
Climate certification system SE	<p>Use stage is not considered</p>

Japan PCF	GHG emissions at the use/maintenance/control stage may be assumed to fall in a variety of cases that differ widely from one user to another, similarly to the distribution/sales stage. When preparing PCRs, therefore, a standard scenario is to be set up for calculating the GHG emissions at this stage. To set up the scenario, therefore, the organizations involved shall be allowed to participate in fair and impartial discussions. In addition, it is necessary to allow for a review of the scenario, such as for expansion or contraction of the quantification coverage
Korea PCF	<i>In order to calculate the GHG emissions associated with the use phase, collect energy use data following guideline described in Annex 3 (ex. product life, annual use time, motor power, and etc.) and emissions and waste data associated with the use phase, and apply appropriate product-by-product scenarios.</i>
Sustainability Consortium (Wal-Mart)	Use phase will be included IO Database: "Consumer Use" includes impacts from direct use of energy by products in their use phase. It does not include indirect energy use, such as the energy required to refrigerate milk, or wash clothes. Instead, that energy is assigned to the devices that are plugged in (refrigerators and washing machines in this case).
Carbon Index Casino	The use phase of the products is not accounted in the methodology except for the consumer's transport between home and shops.
Climatop	No guidance available on this issue. The analysis of the specific results documentation reveals that the use phase can be included (e.g. washing powder) or excluded (e.g. sugar cane); according to the methodology owner, it is included when reasonable
Greenext (Leclerc)	Data have been developed by Greenext experts from representative and reference data of French market.

Regarding use phase, the following issues can be assessed:

- **Inclusion of use phase**

- Difficulties to calculate impacts of the use phase are generally highlighted in methodological documentation.
- For methodologies which aim to have a certain level of standardization or to simplify the evaluation (Climate certification system SE, Carbon Index Casino), this phase is systematically excluded.
- The **common practice is however to require the inclusion of all life-cycle phases** in the calculation, as recommended by LCA standards (ISO 14040...). Methodologies usually states that exclusion is possible if justified, but this point may be discussed for product categories in which the use phase gathers the main part of the environmental impacts (e.g.: shampoo).

- **Definition**

- The **definition of use phase is rarely specified**, which can lead to uncertainties in the scope used (e.g.: transportation related to product use may be directly reported in the use phase or reported in another phase) and difficulties to compare methodologies. Product GhG Protocol is a good practice since it tries to define it.
- In general, guidelines require the inclusion of the use phase. However, use phase can be excluded in some specific cases, in particular; when emissions are considered non relevant, negligible, or too uncertain:
 - In the case of energy, use phase and end-of-life stages (combustion) can not be separated; thus, it is difficult to isolate the impact of use phase;
 - In case of food products, a high diversity of scenarios can be use to model the use phase (e.g. cooked vs. fresh vegetables) and related impacts can vary a lot: it is difficult to define the appropriate scenario to calculate a PCF for future disclosing to consumer.

A good practice is to set the inclusion of all life cycle stages as a principle and explain and justify the exceptions in the PCRs.

- **Scenarios**

When defining calculation rules for use phase, 3 parameters are commonly quoted:

- **Scenario sources:** methodologies usually ask users to identify relevant and recognized sources.
However, the credibility granted to sources depends on the methodologies. For example, BP X30-323 considers industry guidelines as one of the first sources to be used whereas it is the latest source to be used for PAS 2050. This difference is mainly due to the analysis approach, since BP X30-323 has more of an industry/market approach (reflected in the words used like “industry standard”, “customer”) whereas PAS 2050 has a mixed approach (e.g.: “international sources”, “national sources”). This in turn may be due to the management system used (sector-specific working groups with the objective of producing PCRs for a country for BP X30-323, global structure without objective of producing PCRs for PAS 2050).
It has also to be noticed that the difference between theoretical use and real use is only addressed by the Product GhG Protocol. It highlights the fact that scenarios are based on hypotheses of use that may not be realistic. For example, the clothing industry defines a product use period which is reduced compared to the real period of use for consumer, given that they integrate parameters which increase the renewal frequency of clothes, like fashion perception.
- **Records:** users are required to keep records of their hypotheses (even if they lead to exclude use phase); all information related to the calculation of use phase impacts should be justifiable and verifiable.
- **Validity of the results:** This point should be studied through general considerations regarding sensitivity / uncertainty assessments since the same demands apply. However, it is interesting to notice that the most recent methodologies insist on this subject (e.g.: Product GhG Protocol)

Note: indirect impacts on other products (e.g.: product insulation) could be considered in a second step of the analysis.

Advantages of including use phase	<ul style="list-style-type: none"> • Completeness of the scope • Depending on the product, use phase may be the most important contributor to life cycle emissions (e.g.: energy using products)
Risks	<ul style="list-style-type: none"> • High uncertainties regarding framing hypotheses for scenarios • Difference between theoretical use and real use

Data quality

Data quality is an important parameter to ensure the reliability of results, given the important amount of information to be collected.

Product GHG Protocol	<p>A data quality assessment shall be undertaken for all GHG emissions sources that cumulatively sum up to 75% of total product emissions, beginning with the largest emissions source.</p> <p>For all processes quantified using any primary data, a qualitative data quality assessment shall be undertaken based on technological, temporal and geographical representativeness, completeness, and precision. For processes that only used secondary data, the data quality assessment shall be undertaken based on technological, temporal and geographical representativeness.</p> <p>A scoring card is also provided to help this assessment.</p> <p>Methodological appropriateness and consistency also has to be considered as to evaluate data quality requirements</p>
ISO 14067	<ul style="list-style-type: none"> PCF studies should use data that reduce bias and uncertainty. Determination of the best quality data could be supported by a data scoring framework that allows the different attributes of data quality to be combined. The following areas should be considered for the determination of the data quality: a) time-related coverage b) geographical coverage c) technology coverage d) precision e) completeness f) representativeness g) consistency h) reproducibility i) sources of the data j) uncertainty of the information Where a study is intended to be used in comparative assertions intended to be disclosed to the public, the data quality requirements stated in a) to j) above shall be addressed. Since data collection may span several reporting locations and published references, measures should be taken to reach uniform and consistent understanding of the product systems to be modelled.
BP X30-323	<ul style="list-style-type: none"> Data should be of an acceptable quality and validated in compliance with PCR rules; for example, shampoo PCR (to be validated) gives details about elements to be verified PCRs should precise some data specificities
PAS 2050	<p>Data quality rules have been established on the basis of ISO 14044 requirements. The following indicators are said to be important to determine data quality and assess variability:</p> <p>a) Time-related coverage: age of data and the minimum length of time over which data are collected, data that are time-specific to the assessed product shall be preferred;</p> <p>b) Geographical specificity: geographical area from which data are collected (e.g. district, country, region), data that are geographically-specific to the assessed product shall be preferred;</p> <p>c) Technology coverage: whether the data relate to a specific technology or to a mix of technologies, data that are technology-specific to the assessed product shall be preferred;</p> <p>d) Accuracy of the information (e.g. data, models and assumptions), data that are most accurate shall be preferred;</p> <p>e) Precision: measure of the variability of the data values for each data expressed (e.g. variance), data that are more precise (i.e. has the lowest statistical variance) shall be preferred.</p> <p>f) Completeness: the percentage of data that are measured, and the degree to which the data represent the population of interest (is the sample size large enough, is the periodicity of measurement sufficient, etc.);</p> <p>g) Consistency: qualitative assessment of whether the selection of data is carried out uniformly in the various components of the analysis;</p> <p>h) Reproducibility: qualitative assessment of the extent to which information about the method and data values would allow an independent practitioner to reproduce the results reported in the study;</p> <p>i) Data sources, with reference to the primary or secondary nature of data.</p> <p>Additionally:</p> <ul style="list-style-type: none"> A minimum threshold for the proportion of primary data is being sought An order of preference in sources of secondary data is provided: partial GHG assessment information (data verified as being compliant with the PAS); peer review publications; competent sources (national government, official UN publications, publications by UN-supported organizations); other sources
Climate certification system SE	Specific requirements are expressed for some criteria but there is no common criterion enabling the data quality.
Japan PCF	<p><i>Data should enable to cover regional or temporal specificities.</i></p> <p><i>PCRs detail the data necessary for the calculation (e.g.: weight of potatoes transported...) and secondary data to be used are also specified but no additional information is available.</i></p>

Korea PCF	<p>In the case of upstream/downstream data, the following scale of preference is indicated:</p> <ul style="list-style-type: none"> • LCI data authorized by the government concerned • Industry average LCI data • Other LCI data <p>In the case of primary data, it is required that collected data reflect the site's normal conditions of operation.</p> <ul style="list-style-type: none"> • The protocol states that <i>"the latest one year of cumulative average data within the three years from the date of application for a CF label can be collected"</i> (some precisions are provided in the case of this approach is not possible) • Data representativeness should also be proved and secured (e.g.: requirements are provided about suppliers representativeness, with a representativeness threshold • Quality indicators should be evaluated and presented in order to evaluate the quality of data collected
Sustainability Consortium (Wal-Mart)	No information available
Carbon Index Casino	Information provided in the toolkit is subject to automatic consistency controls. No information publicly available. However, suppliers have to sign a commitment to deliver accurate data and Bio IS performs data quality checks.
Climatop	<p>No information publicly available but a methodology publication is in preparation. However, the methodology follows ISO 14040 requirements:</p> <ul style="list-style-type: none"> • "PCF studies should use data that reduce bias and uncertainty. Determination of the best quality data could be supported by a data scoring framework that allows the different attributes of data quality to be combined. The following areas should be considered for the determination of the data quality: a) time-related coverage b) geographical coverage c) technology coverage d) precision e) completeness f) representativeness g) consistency h) reproducibility i) sources of the data j) uncertainty of the information • Where a study is intended to be used in comparative assertions disclosed to the public, the data quality requirements stated in a) to j) above shall be addressed. • Since data collection may span several reporting locations and published references, measures should be taken to reach uniform and consistent understanding of the product systems to be modelled."
Greenext (Leclerc)	Control systems are set up to guarantee Greenext data quality

Quality requirements are expressed in the core of the methodology or in the related PCRs, depending on the documentation associated to the methodology. In the second case, data required are identified more precisely, which enables to provide users with more specific sources of information and to ensure a minimum level of quality.

Data sources are of course the main aspect to consider when dealing with this issue. It is generally required to use known sources (process data) or recognized sources (default value) but overall to **trace the data origin**. In some cases, a list of priority sources is provided in order to cover the case of data absence.

Distribution between primary and secondary data is also a topic often addressed when dealing with data quality requirements. Primary data enable to reduce the uncertainty due to the applicability of default values, but if data are collected without precaution, the verification of the completeness and the level of precision cannot be guaranteed.

In order to overtake this problem, methodologies often require **an assessment of data quality**. Best practices provide users with a list of key criteria to be verified and even a scoring card (e.g.: Product GhG Protocol). Most commonly, uncertainty assessment and sensitivity analysis against the most framing approximations are required.

Specific issues are particularly highlighted by some methodologies:

- **Regional representativeness** has a dedicated section in the Japan PCF documentation. However, for all methodologies, it is important to identify the good level of information as to ensure that the information is representative of the local context.
- **Temporal representativeness:** the Korea PCF considers the use of average data based on a 3-years period, whereas other methodologies use a one-year period but ask users to ensure that these data are representative of the usual activity. Another problem related to this issue is the update frequency of the data used, especially in the case of secondary data.

Additional issues have to be considered in further implementation scenarios:

- **Availability of data:** users of PCF methodologies usually face the dilemma between using accurate data and using available data. Indeed, when secondary data have to be used and do not depend on methodology user (e.g.: energy emission factor based on national factors), the data source is essential and specific information applying to the case of the user may be unavailable, leading to approximations. Even if efforts have been made to fill these gaps, many data are still missing. On the other hand, finding the most appropriate data is getting more difficult when the quantity of information available grows; thus, an appropriate and efficient searching system has to be set up.
- **Databases:** as detailed above, users have to clearly identify the source of information to be used. Various options could be considered, among others:
 - Using an unique database, which enables to:
 - Make people work together for defining the appropriate data;
 - Have a set of commonly agreed data on which management and verification could be easier (all tasks are done once for all and the system is centrally managed);
 - Provide user with a unique entry point for all its questions.

However, this approach also leads to methodological problems:

- The database manager would have to be clearly identified and the related funds too;
- The protocol for database update needs to be clear and to consider cases where the information would be out-of-date;
- The verification process for data would have to find a compromise between ensuring the data accuracy and making information quickly available;
- The case where data in the database are incorrect and are then spread among all the users should be considered, even if serious and strict protocols of data verification are set up;
- The case where information would not be available in the database should be properly addressed.
- Setting up stringent quality rules that each database wishing to be used for PCF applications should satisfy. The advantages of this solution are:
 - A greater flexibility of the system, since local databases could be used if compliant with the requirements. It could enable to fulfil gaps of other databases;

- Equal opportunities for current databases to remain competitive, since none of them would be preferred;
- Avoiding losing previous works: PCF calculated earlier could remain valid if – among other requirements – the database is recognized compliant with quality rules.

However, implementing such a system means:

- A workload transfer: in a scheme with a unique database, defining and validating the database content represents the main part of the process burden and this workload relies on methodology owners; on the contrary, in the case of a system with quality rules, the main process burden will be divided into:
 - 1) The definition of quality rules;
 - 2) The verification of databases compliance.

Of course, it also requires setting up appropriate management schemes (centralization of verification process or use of accredited bodies for example);
- Maintaining a diversity of databases that could add confusion for users (which database is the best for a given case?);
- A need for clear rules definitions. In particular, they should enable a choice between databases available for a given case when both comply with quality rules;
- Getting international agreement on these rules, which could slower make the process slower.

The second option is probably the most suitable for a quick implementation, given that existing methodologies evolve quickly and so do the databases.

Advantages of assessing quality	<ul style="list-style-type: none"> • Topic usually addressed in order to get an estimation of the uncertainty • Data quality helps to reduce bias in the analysis • Ensures the use of recent data
Risks	<ul style="list-style-type: none"> • Difficulties to ensure both data quality (use of recognized and verified sources) and representativeness (local context) • Availability of qualitative data

Allocation

Allocation (“partitioning the input or output flows of a process or a product system between the product system under study and one or more other product systems” according to ISO 14044) rules enable to determine the part of impacts related to a specific product when various are produced in a similar place, since it is quite difficult to distribute impacts when only consolidated data are available. A different allocation rule setting could change the conclusions of a comparative LCA. The ISO 14 040 gives some general indications to establish the allocations rules. Those indications are taken up in some studied methodologies (i.e. BP X30-323, ISO 14067). However they allow some freedom of interpretation. Therefore it is important that allocation rules are fixed through a transparent and participative process to ensure results acceptance and comparability, because choosing an allocation rule conditions the environmental impact distribution between economic actors from a same value chain (e.g.: economic or mass allocation of the livestock farming impacts between leather and meat).

Product GHG Protocol	<p>General principles:</p> <ul style="list-style-type: none"> When addressing common processes, users should avoid allocation, i.e. partitioning the input or output flows of a process or a product system between the product system under study and one or more other product systems. The allocation process shall adhere to the general accounting principles (...). The allocation process has a preference for decisions based on natural science, followed by those based on other scientific approaches (e.g., social or economic science). Value choices are the least preferred basis for allocation decisions. <p><i>If possible, an organization shall avoid allocation by using process subdivision or system expansion. If allocation is necessary, the company shall use: physical relationship, substitution allocation approach, value based allocation, value choices or assumptions; the solution is selected in accordance with the general principles for solving allocation problems. Specific guidelines are indicated for recycling process.</i></p>
ISO 14067	<ul style="list-style-type: none"> ISO 14067-1 reports the ISO 14044:2006: The inputs and outputs shall be allocated to the different products according to clearly stated procedures that shall be documented and explained together with the allocation procedure (...). Whenever several alternative allocation procedures seem applicable, a sensitivity analysis shall be conducted to illustrate the consequences of the departure from the selected approach. The allocation procedure in the document explains that, if necessary, the allocation should be made according to physical relationships first and if not possible according to other relations including economic relations. If outputs are partly waste and partly co-products, the ratio between these flows has to be determined to enable allocation to co-products. The inventory is based on material balances between input and output. Allocation procedures should therefore approximate as much as possible such fundamental input/output relationships and characteristics.
BP X30-323	<p>In the case of co products, allocation rules are defined in the PCR but the several methodologies are prioritized in the general guidelines:</p> <ul style="list-style-type: none"> specific allocation as far as distinction in the process is possible allocation based on physical ratios (mass, energy) substitution method (avoided impacts of the co product) allocation based on economic value <p><i>Allocation rules are established to allocate impacts due to the distribution phase. That allocation is based on the limiting factor among the volume, the mass, or the floor area occupied by the product.</i></p>
PAS 2050	<p><i>The preferred approach to allocation of emissions to co-products shall be, in order of preference:</i></p> <ol style="list-style-type: none"> <i>dividing the unit processes to be allocated into two or more sub-processes and collecting the input and output data related to these sub-processes; or</i> <i>expanding the product system to include additional functions related to the co-products where:</i> <ol style="list-style-type: none"> <i>a product which is displaced by one or more of the co-products of the process being considered can be identified; and</i> <i>the avoided GHG emissions associated with the displaced product represent the average emissions arising from the provision of the avoided product</i> <i>allocation in proportion to the economic value (the economic allocation is preferred to the mass allocation to encourage the best sustainability behaviour (give waste a value)</i>

Climate certification system SE	Allocation issue is not addressed
Japan PCF	The allocation method is to be established when preparing the PCR according to the product and process characteristics. Some examples are given in the guidelines in order to explain that allocation criteria should be adapted (weight as a basis for most of LCAs, monetary value for lightweight-high-value-added products, etc.).
Korea PCF	An allocation procedure is determined in the guidelines. It is based on weight but some specific cases are highlighted for which another unit can be used.
Sustainability Consortium (Wal-Mart)	No information available
Carbon Index Casino	Impacts of production site (energy consumptions): it is always specific to each factory and depends on its energy consumptions and the total weight of its production. Basically, energy consumptions are calculated for each CSU independently of its nature. But the precision of this assessment depends on the detail available from the supplier: if distinctions can be made between energy consumptions of its different production lines, calculation would be more precise. For distribution,: a first allocation of total GhG has been made based on revenue, ratio of scanned products,... to get GhG data per product for products in room temperature and cold temperature. Depending on the weight of the product, the value is calculated for 100g of product.(a calculation procedure study has been submitted to the ADEME and is not published due to sales confidential data from Casino)
Climatop	Allocation is made according to ISO 14040 recommendations. No more information available
Greenext (Leclerc)	Mass allocation

The allocation procedure usually described in carbon footprint methodologies is based on LCA principles. This shows that a consensus has been established on the importance of this subject.

Where addressed, the allocation procedure is not a closed proposal: it is often required to precise it in the PCRs-like document or during the calculation. The objective is to get an allocation procedure adapted to the product studied. Hence, the allocation system is often based on a physical flow of goods (like mass or energy).

It has to be noticed that **international oriented methodologies are quite cautious** with this issue:

- Product GhG Protocol states that “when addressing common processes, users should avoid allocation”; however, allocating possibilities remain valid under specific rules based on accounting principles;
- ISO 14067 recommends assessing the sensitivity related to the allocation procedure used.

The other methodologies suggest generic guidelines in order to help users but try to avoid formal engagements on this subject.

Advantages of using allocation procedure	<ul style="list-style-type: none"> • Consensus on the interest of this subject
Risks	<ul style="list-style-type: none"> • No consensus on allocation rules • Risk of inconsistency of allocation rules defined in different methodologies

Uncertainty/sensitivity analysis

This feature enables to assess the reliability of results and to put some results into perspective (e.g.: “performance of product A 10% better than the one of product B when the uncertainty is about 20 %”). It is important to clearly differentiate:

- **Uncertainty analysis:** analysis of the simultaneous variation of all parameters on their respective variability range
- **Sensitivity analysis:** analysis of the influence of a single parameter (or a set of parameters in the case of scenario analysis). It gives a determinist value for the LCA results based on a given change of one (or a couple) of parameters

Both analyses enable to understand the variability of results.

	Uncertainty assessment and management	Sensitivity analysis for the calculation
Product GHG Protocol	<p>Data</p> <p>The following principles are detailed in the standard:</p> <ul style="list-style-type: none"> • A data quality assessment shall be undertaken for all GHG emissions sources that cumulatively sum to 75% of total product emissions (...) • A statement regarding the overall methodology appropriateness and consistency of the inventory shall be made <p>Depending on the type of data (primary or secondary), details are provided regarding quality criteria to be assessed. Moreover, the standard details global data quality indicators to be analyzed. Useful guidelines for reducing the consolidating process burden are also provided as well as qualitative assessment guidelines for each indicator.</p> <p>General</p> <p>The uncertainty assessment and disclaimer are currently under development and will be updated in the next version of the draft standard in fall 2010.</p>	<p>The sensitivity analysis section is currently under development; however, some specific references to this kind of analysis have been made in other sections of the document; for example, "it is also good practice to undertake sensitivity analyses to assess the influence of use and end-of-life profile assumptions on the product's GHG emissions"</p>
ISO 14067	<p>The interpretation phase of a PCF study shall include the a quantitative or qualitative assessment of uncertainty, for example through the application of rounding rules or ranges</p>	<p>ISO 14067-1 reports ISO 14044:2006: <i>Reflecting the iterative nature of LCA, decisions regarding the data to be included shall be based on a sensitivity analysis to determine their significance, [...]. The initial system boundary shall be revised, as appropriate, in accordance with the cut-off criteria established in the definition of the scope. The results of this refining process and the sensitivity analysis shall be documented. The sensitivity analysis may result in</i></p> <ul style="list-style-type: none"> • exclusion of life cycle stages or unit processes when lack of significance can be shown by the sensitivity analysis, • exclusion of inputs and outputs that lack significance to the results of the study, or • inclusion of new unit processes inputs and outputs that are shown to be significant in the sensitivity analysis. <p>Moreover, whenever several alternative allocation procedures seem applicable, a sensitivity analysis shall be conducted to illustrate the consequences of the departure from the selected approach.</p>
BP X30-323	<p>Sector-specific working groups must perform an uncertainty analysis based on ISO 14040. In particular the analysis must ensure that the methodology cannot produce negative values.</p> <p>The shoe PCR (validated) does not make recommendations regarding uncertainty.</p>	<p>Sector-specific methodologies must make a sensitivity analysis based on ISO 14040 (PCRs)</p>

Uncertainty assessment and management		Sensitivity analysis for the calculation
PAS 2050	<ul style="list-style-type: none"> Checking uncertainty is not prescribed but recommended (optional). The Monte Carlo analysis is particularly recommended (it is a common uncertainty analysis method for LCAs, based on the study of results variation according to the variation of the main entry data) Where the emissions associated with the life cycle vary over time, data shall be collected over a sufficient period of time (at least one year of continuous availability) The reduction label granted by the Carbon Footprinting Company takes into account the uncertainty of the calculation to fix the emissions reduction target. 	Sensitivity analysis is recommended
Climate certification system SE	No specific information on uncertainty assessment. However, uncertainty analyses may have been performed during the definition of criteria allowing obtaining the label.	No sensitivity analysis required
Japan PCF	No specific information on uncertainty assessment. PCRs do not include such an analysis.	No sensitivity analysis required
Korea PCF	No specific information on uncertainty assessment required in the guidelines Some specific approximations are clearly authorized (e.g. <i>"the latest one year of cumulative average data within the three years from the date of application for a CF label can be collected"</i>)	No sensitivity analysis required in the guidelines
Sustainability Consortium (Wal-Mart)	No specific information on uncertainty assessment	No sensitivity analysis required
Carbon Index Casino	No specific information on uncertainty assessment.	No sensitivity analysis required
Climatop	The reviews mention that Climatop undertakes uncertainty assessments. A summary of the results of those assessments is accessible in Deutsch on the website for most of the products according to the methodology owner.	Sensitivity analysis is not always implemented: it is required when high uncertainty is observed. Some peer-reviews include references to such a practice (e.g. asparagus: "To conclude a sensitivity analysis, an additional scenario for air transport was calculated, where the data from Ecoinvent were modified in order to consider only the kerosene consumption from the additional weight.").
Greenext (Leclerc)	An uncertainty coefficient is given for the data. The overall uncertainty coefficient is calculated via a Monte Carlo analysis. Uncertainty is based on geographical, time, technological relevance of the data.	Sensitivity analyses are conducted and included in control system according to the methodology owner

This “global criterion” aims at evaluating the precision of results and two aspects have to be considered in the ideal case:

- **Uncertainty assessment and management;**
- **Sensitivity analysis.**

The first finding is that **sensitivity analysis is not expected as often as uncertainty assessment**. Sensitivity analyses are necessary when PCRs-like documents are prepared but it may be difficult to make them mandatory given the expertise required. The same goes for uncertainty management, which also requires a certain level of expertise.

Moreover, the **status of these analyses varies from a scheme to another** since in some cases (e.g.: PAS 2050), they are only recommended whereas in others (e.g.: BP X30-323) they are strictly required. This last case happens when a complete LCA approach has been undertaken, and when the deliverable of the analysis is not limited to a figure displayed on a product. This latest point is

particularly important because **for consumers-oriented labelling schemes, sensitivity and uncertainty analyses are limited** and even absent.

The case of the French initiative BP X30-323 is interesting because these analyses have to be undertaken by working groups preparing the PCRs-like documents and not by users. The advantage of this process is that methodological gaps are known and available before final calculation, and it reduces the burden for users (it is especially interesting for SMEs), but the underpinned question is the distribution of the uncertainty between methodology and activity data.

More generally, **methodologies are usually not very clear on the communication mode to be used for the results of these analyses**. They are associated with a global policy on carbon footprint communication developed by each methodology and depending on its objective (improvement for Product GhG Protocol or PAS 2050, communication to consumers for Korea PCF or BP X30-323).

Calculation rules to assess uncertainty and sensitivity of the results are not treated homogeneously among methodologies. The basic case is the supply of a list of checks to be performed and the best practice is to mention a precise rule, often the Monte-Carlo methodology. However, this last case is clearly experts-oriented, which limits the applicability of the process and increases costs and user burden.

The next step in the global process is the **uncertainty management** and the implementation of measures to reduce it. Regarding this issue, carbon footprint methodologies usually recommend to reduce the uncertainty without other precision.

It is possible to qualitatively assess uncertainty evaluation. This is particularly useful in cases for which obtaining a quantitative assessment is difficult.

Advantages of assessing uncertainty/sensitivity analysis	<ul style="list-style-type: none"> • Knowledge of results precision • Lead to reconsider performance improvement (comparison between benefits gained and uncertainty)
Risks	<ul style="list-style-type: none"> • Difficulties to assess uncertainty and sensitivity • Lack of completeness of the analysis • The communication framework is not clear, which generates difficulties, especially for consumer-oriented schemes • Increases the scheme's burden

Methodological assumptions

“Methodological assumptions” refers to the possibility of making hypotheses during the PCF calculation. The flexibility given in a carbon footprint methodology enables to calculate a specific carbon footprint and to improve product differentiation as well as to adapt a standard to its specific situation. However, the place given to assumptions limits the comparability of products since the methodological basis may be different.

Product GHG Protocol	<ul style="list-style-type: none"> • The Product GHG protocol states that sometimes assumptions are necessary due to the fact that no direct data are available. Anyway, it is necessary to disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used. Checks that assumptions and criteria for the selection of boundaries, base years, methods, activity data, emission factors, and other parameters are documented. • The Product GHG protocol also provides guidelines to use other reference/guideline to help companies make assumptions. • For example, in the case of a complicated and/or complex product for which there is no appropriate approved sector specific guidance and for which it may not be possible to meet all the requirements of this standard, simplifying assumptions, decisions and approaches may be adopted. However, it should be clearly stated that the standard requirements have not been met and that therefore the reporting GHG inventory is not in compliance with the GHG Protocol Product Standard. • Value choices are the least preferred basis for allocation decisions.
ISO 14067	<p>The protocol states that sometimes assumptions are needed. It is necessary to check that assumptions and criteria for the selection of boundaries, base years, methods, activity data, emission factors, and other parameters are documented.</p> <p>GWP values are clearly stated (100 years GWP according to the 4th assessment report of IPCC)</p>
BP X30-323	<p>To limit the extent of assumptions, an accurate frame is given for many of the choices to be made by the footprinting operator:</p> <ul style="list-style-type: none"> • allocation rules (possible methodologies are prioritized) • choice of the energy model (for the production, the consumption, by default) • criteria are proposed to assess the impact of transports (distance, transport type, fuels used, load factor) • use phase impact assessment (possible methodologies are prioritized) • end of life (little assumptions as national averages have to be used) • GWP are defined (annex B) according to the IPCC. <p>The PCR can reach a high level of accuracy which limits the extent of value choices (e.g.: the calculation of the reference flow in the shoe sector is based on standards designed to assess the resistance of the product).</p> <p>The principle of transparency should ensure that value choices are clearly stated and accessible at least to the verifier.</p>
PAS 2050	<p>PAS 2050 gives accurate recommendations to limit assumptions:</p> <ul style="list-style-type: none"> • Co-products' allocation (however, where the allocation to co-products is carried out by expanding the product system, the organization implementing the PAS shall record the assumptions made regarding the scope and emissions of the expanded product system). • System boundaries are defined with accuracy (raw materials, energy, capital goods, manufacturing, transport, storage, use phase, end of life, etc.) • which energy mix to choose for the use phase • emissions data for fuel, electricity and heat are well defined <p>Claims relating to the life cycle GHG emissions of products shall be supported by the publication of a "Product Emissions report" which provides context and explains the basis for the claim made (product process and boundaries, materials, weights and measures, emissions and carbon intensity). A clear reference should be made to a freely accessible website where this information can be found.</p>
Climate certification system SE	<p>Criteria thresholds, suggested best practices or other value choices are made based on non-explicit literature review; however, sources of information are quoted in the decision reports.</p>

Japan PCF	<ul style="list-style-type: none"> When scenarios are needed, the base scenario to be used (related to assumptions) is detailed in the PCR document that has to be approved. If another scenario is used, it has to be documented and justified. The same procedure seems to be followed with all types of assumptions. GWP values are clearly stated (100 years GWP according to the 2nd assessment report of IPCC) In case a supplier should be more important, its data can be used as another supplier's secondary data but with a ratio ensuring a true representation.
Korea PCF	<ul style="list-style-type: none"> It is recommended to apply assumption with great care and prudence to guarantee that the GHG emission assessment results are not under-estimated. No clear guideline for value choices for the electricity mix choice). Transportation distances are clearly stated GWP values are clearly stated (100 years GWP according to the 2nd assessment report of IPCC)
Sustainability Consortium (Wal-Mart)	<ul style="list-style-type: none"> Choices might be relatively limited since the assessment will be done on limited number of criteria. However the choices of those criteria might be based on value choices that could be questionable Methodology documentation is not available IO Database: <i>The climate change impacts are given in Carbon Dioxide equivalents (CO₂-eq), which were arrived at by converting various greenhouse gases into this reference gas via the IPCC 500a method</i>
Carbon Index Casino	<ul style="list-style-type: none"> Emissions factors used for transportation, packaging, and energy consumption have been validated by the ADEME and are quoted in a document which links the ADEME and Casino. Emissions factors for the calculation of the agricultural step impact (calculated by Bio IS) have been chosen by Bio IS taking into account their relevance for the considered product and the available data for this type of product. Emissions factors for the retailing calculation are linked to the Bilan Carbone realised by Casino (and revised by the ADEME) on the impact of its activity of retailer. Assumptions are not clearly stated, but the toolkit provided to the suppliers for data collection is designed to avoid the use of different assumptions
Climatop	<ul style="list-style-type: none"> Little information is available CO₂-equivalent (CO₂-eq): conversion factors according to table 4.1 of the IPCC report Climate Change 2001. The global warming potential with a 100 year time horizon (CO₂ equivalent) is considered.
Greenext (Leclerc)	<ul style="list-style-type: none"> Greenext systematically trains its customers with data collection guidance. Greenext engineers support customers in values choices. The software guides and assists customers for the specific data with data collection guidance.

Carbon footprint methodologies recognize a need of flexibility to make assumptions but, depending on the methodologies, **the framework limiting these assumptions is variable**. When trying to provide users with a more precise framework, standards integrate a clear list of data (e.g.: Korea PCF with transportation distances) or an explicit reference to recognized data (e.g.: global warming potentials).

However, differences between approaches may occur even when a consensus has been found on the source providing the reference data. Thus, methodologies usually recommend using **GWP from IPCC (Intergovernmental Panel on Climate Change) but these data vary depending on the report quoted**; for example, in the case of methane:

- ISO 14067 (100 years GWP according to the 4th assessment report of IPCC): GWP (CH₄) = 25,
- Japan PCF (100 years GWP according to the 2nd assessment report of IPCC): GWP (CH₄) = 21,

which means a variation of 19% between both approaches for this greenhouse gas. This may be due to the age of some standards.

Similarly, global warming potentials are usually considered with a 100 years horizon timeline but the current version of IO Database (Sustainability consortium) uses an LCA methodology based on a 500 years horizon timeline, which gives more importance to persistent gases. Since the methodology is under construction, it is a point to follow closely.

The latest point to be noted regarding this issue is that all **standards insist on the traceability of assumptions**. Users have to ensure that all assumptions are recorded and could be verified.

Advantages of using assumptions	<ul style="list-style-type: none"> • Simplification of the approach • Possibility to adapt a standard to the specific situation of the user
Risks	<ul style="list-style-type: none"> • Assumptions differing in the same product category if not detailed enough in the methodology documentation (PCRs-like documents) • Difficulties to provide a sufficient framework in the methodology guidelines • Difficulties to ensure a similar approach between protocols prepared with a different level of knowledge about Climate Change (more than 5 years will have elapsed between the PAS 2050 and the ISO 14067 releases, and many progresses have been made in this period)

GHG offset

GHG offsets are financial instruments aiming at reducing greenhouse gas emissions through a compensation of emissions. GHG offsets were introduced through carbon markets rules. GHG offsets are a means for firms to reduce their global carbon footprint, in particular when their own activities are highly GHG emissive.

Product GHG Protocol	This protocol is not intended to support the accounting of GHG emission offsets or claims of carbon neutrality. This standard focuses on emissions generated during a product's life cycle and does not address avoided emissions or actions taken to compensate for released emissions.
ISO 14067	ISO 14067 - 1 states that the PCF shall not include offsetting. However, a note indicates that <i>certain credits like removals, storage in sinks, etc. that are not offsets, can occur within (inside) the boundaries of the product system.</i>
BP X30-323	Carbon offsetting operations are not included in the product's carbon footprint assessment.
PAS 2050	GHG emissions offset mechanisms including voluntary offset schemes or nationally or internationally recognized offset mechanisms, but not only, shall not be used at any point in the product life cycle in order to claim reduction in the emissions associated with the product. This PAS is intended to reflect the GHG intensity of the production process prior to the implementation of external measures to offset GHG emissions. The use of an energy source that results in lower GHG emissions to the atmosphere and therefore achieves a lower emission factor, such as renewable electricity or conventional thermal generation with carbon capture and storage, is not a form of offsetting.
Climate certification system SE	Not applicable; this concept is not used in the concrete calculations
Japan PCF	In Japanese CFP guideline, the offsetting is recognized as an important issue because it targets GHG emissions. But technically, the offsetting often occurs out of the system boundaries and is not accounted for in the CFP number.
Korea PCF	No treatment of offsetting information. The standard states that <i>when making an emissions declaration, not only the emissions but also a GHG emissions reduction plan should be declared.</i>
Sustainability Consortium (Wal-Mart)	No information available
Carbon Index Casino	The PCF labelling is not linked to carbon offsetting.
Climatop	Offsetting is not taken into account.
Greenext (Leclerc)	Offsetting is not taken into account.

Few details are available about offsetting treatment but the approach is common for the studied methodologies which address this subject. Indeed, offsetting is considered as a second part of the analysis and a mean to reduce carbon footprint, but not relevant to represent the real activities' emissions.

Indeed, publishing a figure with an aggregated number of "real emissions" and offsets could be misleading for readers who would not be able to differentiate a low carbon product from a high carbon product for which offsetting measures have been implemented to reduce its carbon footprint disclosure.

Moreover, integrating offset in PCF could limit the efforts made to cut emissions, since some firms may be more easily willing to pay for offsets than investing for technological changes that would effectively reduce their emissions. It would also create trade distortions between SMEs and international firms given that SMEs have a reduced possibility to invest in offsets.

Thus, **offset should be excluded or calculated apart, based on other sources of methodological rules; and if calculated, it has to be presented apart** from the calculated emissions and not integrated in the results.

Advantages of using offset	<ul style="list-style-type: none"> • Similar approach for the studied methodologies: exclusion or calculation apart from the PCF calculation • Possibility to act even if technological change is limited
Risks	<ul style="list-style-type: none"> • Means for firms to reduce their disclosed global impact without real action on product life-cycle • Calculation methodologies not indicated (but it is not the aim of these standards) • Concept still subject to strong debate • May be preferred by emitters to investment in technological changes

Partial reporting (not full life cycle)

Partial reporting refers to the possibility of realizing an analysis limited to some stages of the life cycle. The interest of partial reporting is to enable focusing on some significant life cycle aspects but it has to be properly framed to avoid that two partial CF using the same wording in terms of life cycle stages do not have the same scope.

Product GHG Protocol	<i>The main point regarding this issue is the difference between cradle-to-gate and cradle-to-grave analyses. The second one has to be preferred (Companies shall perform full life cycle GHG inventories (cradle-to-grave) for all products when applicable) but a cradle-to-gate analysis could be used in some specific cases, like for intermediate products when the eventual fate is unknown: When justifying why a cradle-to-gate inventory is reported, a company should clearly disclose the cradle-to-gate nature of the inventory, and have assurance that their product meets the criteria of an intermediate product. For example, although general resins may be considered an intermediate good, if a company makes a certain resin that is only used in one product, then a cradle-to-grave inventory is required.</i>
ISO 14067	<p>In ISO/CD 14067-1 the principle of modularity is formulated as follows: “When conducting a partial CF study, according to the goal of the study, ensure that modules and processes can be integrated into the product system in accordance with a life cycle perspective”.</p> <p>According to the definition of system boundary: <i>The deletion of life cycle stages, processes, inputs or outputs is only permitted if it does not significantly change the overall conclusions of the study. Any decisions to omit life cycle stages, processes, inputs or outputs shall be clearly stated, and the reasons and implications for their omission shall be explained.</i></p> <p>The general rules are as follows:</p> <ul style="list-style-type: none"> • where the assessment of the carbon footprint of a product is communicated to consumers, the quantification of a PCF shall comprise all stages of the life cycle • For “supply chain business-to-business” use, a partial carbon footprint shall at the minimum represent the cradle-to-gate emissions arising from all stages, processes/modules up to the point where the product leaves the production site (gate). • For internal applications (e.g. internal business use, supply chain optimisation, design support, etc), a partial CF may be based on emissions arising from a restricted number of stages within the life cycle of the product. • For decision-making (e.g. design options), the whole life cycle shall be considered
BP X30-323	Life cycle prospective is intended, according to the goal of the calculation. Partial carbon footprints are not considered in the methodology (but some life cycle stages may be excluded from the study according to PCR rules) if they are negligible.
PAS 2050	<ul style="list-style-type: none"> • Life cycle perspective is intended • For example, PAS 2050 Guide’s case study on croissant shows high level of modularity <ul style="list-style-type: none"> ○ 6 categories of modules: Raw material cultivation and transport (wheat example), Raw material production (flour example), Croissant production, Distribution and retail, Consumer use, Disposal ○ each category is composed of several modules, example for "Distribution and retail": Transport to distribution centre, Storage, Transport to store, Retail)
Climate certification system SE	Partial carbon footprint is not possible: GhG emissions related to farm management are assessed but no LCA is clearly made.
Japan PCF	Modularity is authorized under specific requirements implied by the specificity of the product or the availability of information. Calculation coverage should be undertaken.
Korea PCF	The concept of modularity allows assessing which stages should be taken into account by type of product.
Sustainability Consortium (Wal-Mart)	It will be possible to modify one step of the life cycle in order to use more specific data for suppliers and deliver cradle-to-gate results adapted from a baseline model.
Carbon Index Casino	All life cycle stages are included (except use phase), so no modularity is possible.
Climatop	All life cycle stages are included (except use phase) so that no modularity seems possible
Greenext (Leclerc)	<ul style="list-style-type: none"> • Modularity is possible when working on eco-conception, supply chain optimization, etc. • For labelling purposes, modularity is avoided to ensure comparability of the results. If a new module is developed, it shall be added to all products and generic data shall be defined for all the products.

Partial carbon footprint is generally authorized but users should ensure that it would not lead to change external readers' conclusions. Appropriate justification should be provided in any case. The approach of Product GhG Protocol and ISO 14067 is quite the most precise since cradle-to-gate approach can be used only for intermediate products and cradle-to-grave approach is required when **dealing with consumers**. Other methodologies like PAS 2050 and BP X30-323 are more evasive about this subject because this issue has to be addressed when dealing specifically with a product (in PCRs-like documents for the French methodology, in calculation for the UK one); this can be explained by the fact that they are focused on communication to consumers and thus require a high level of product specificity.

Advantages of displaying partial reporting	<ul style="list-style-type: none"> • Simplification of the approach • Similar approaches are adopted by methodologies of the same type
Risks	<ul style="list-style-type: none"> • Lack of representativeness of the results • Lack of information regarding specific issues to be dealt with

Land use change / Carbon storage

“Land use and management influence a variety of ecosystem processes that affect greenhouse gas fluxes such as photosynthesis, respiration, decomposition, nitrification/denitrification, enteric fermentation, and combustion. These processes involve transformations of carbon and nitrogen that are driven by the biological (activity of microorganisms, plants, and animals) and physical processes (combustion, leaching, and run-off)”. (2006 IPCC Guidelines for National Greenhouse Gas Inventories)

A change in land use (e.g.: clearing of forests for agricultural use, including open burning of cleared biomass) can result in a modification of land’s capacities for carbon storage capacities and to what can be considered as a carbon release. In the specific case of a product, it could happen for example while extracting raw materials or when changing the manufacturing process (for using other supply systems). It takes particular importance for some product categories (e.g.: agriculture-related products).

It has to be noticed that, although conditions leading to land use change / carbon storage are not similarly nor formally defined by all methodologies, concepts are commonly understood. Among the definitions suggested by existing methodologies, following ones can be used (even if imperfect and not used in all methodologies):

- Land use change: change in the use or management of land by humans, which may lead to a change in land cover (ISO 14067)
- Carbon storage: retaining carbon of biogenic or atmospheric origin in a form other than as an atmospheric gas (PAS 2050).

This definition can be put together with the one provided by the IPCC for the word “Reservoir”: *“A component of the climate system, other than the atmosphere, which has the capacity to store, accumulate or release a substance of concern, for example, carbon, a greenhouse gas or a precursor. Oceans, soils and forests are examples of reservoirs of carbon. Pool is an equivalent term (note that the definition of pool often includes the atmosphere). The absolute quantity of the substance of concern held within a reservoir at a specified time is called the stock.”* (<http://www.ipcc.ch/pdf/glossary/ar4-wg1.pdf>, from the ISO 14067).

Product GHG Protocol	<ul style="list-style-type: none"> • Due to the uncertainty of the use phase of a product, carbon storage should not be included as a carbon credit in the GHG inventory; however, the carbon storage potential of a product should be reported separately, as identified in the reporting requirements. More guidance on carbon storage is under development, and will be included in the next version of the draft standard in fall 2010. • If land is used to cultivate biomass used in a land-based product, the GHG emission associated with land management and land use change shall be included in the product GHG inventory. Calculation details are described in an Annex. • Reference is made to IPCC definitions of land use.
ISO 14067	<ul style="list-style-type: none"> • Land use change: The GHG emissions occurring as a result of direct land use change shall be assessed in accordance with international recognized methods such as the IPCC Guidelines for National Greenhouse Gas Inventories. Indirect land use change shall be considered in future CF studies, once an internationally agreed procedure exists. • Soil carbon change: For products or product categories for which the carbon content of soils changes significantly, it should be included in the PCF and be quantified according to internationally agreed procedures, such as UNFCCC. More detailed methodological guidance and data may be available in a PCR or under other GHG programmes. • CO₂ emissions from the uptake, release, storage (combustion and others) of biomass carbon should be quantified separately. The uptake quantification should be justified and/or documented. • Carbon capture and storage (CCS): The impact of carbon capture and storage should be reflected in the PCF where

	<p>the operation of the carbon CCS has been separately and independently verified and reported.</p> <ul style="list-style-type: none"> Non-CO₂ emissions data for livestock and soils: The estimation of the non-CO₂ GHG emissions arising from livestock (e.g. N₂O), manure or soils shall use one of the following two approaches with reference to the data quality rules: <ul style="list-style-type: none"> a) the appropriate tier approach set out in the IPCC Guidelines for National Greenhouse Gas Inventories; or b) the IPCC tier approach used by the country in which the emissions were produced; <p>If a national approach is used, the data shall be supported by a peer reviewed study or similar scientific evidence.</p>
BP X30-323	<ul style="list-style-type: none"> Carbon storage is taken into account if the forest is managed in a sustainable way, according to the number of years the carbon is stocked relatively to 26 years. This methodological option is supposed to be revised in further versions of the standard. Land use change taken into account: the impact is calculated in accordance with the UNFCCC methodology <p>The rule governing carbon biomass storage accounting shall be kept up to date with international rules adopted in application of the UNFCCC Protocols.</p>
PAS 2050	<p>Carbon storage:</p> <ul style="list-style-type: none"> The weighted average carbon storage impact shall be included as a negative CO₂e value in the assessment of GHG emissions arising from the life cycle of the product. Products are eligible for a deduction of the stored carbon if: <ol style="list-style-type: none"> they are not for human or animal ingestion (not food or feed) more than 50% of the mass of carbon of biogenic origin in the product remains removed from the atmosphere for one year or more following production of the product the material containing the biogenic carbon is obtained from either: i) an input that is the result of human actions that cause its formation for the purpose of using it as an input to a process (e.g. managed forestry); or ii) a recycled or re-use input that contains material that is demonstrated to comply with point (i). <p>Land use change:</p> <ul style="list-style-type: none"> GHG emissions occurring as a result of direct land use change shall be assessed in accordance with the relevant sections of the IPCC Guidelines for National Greenhouse Gas Inventories. The assessment of the impact of land use change shall include all direct land use change occurring on or after 1 January 1990. The total GHG emissions arising from direct land use change shall be included in the GHG emissions of products arising from this land. 5% of the total emissions arising from the land use change shall be included in the GHG emissions of these products every year over the 20 years following the change in land use.
Climate certification system SE	<p>This issue is not formally addressed in the documents reviewed but scientific scan on which is based the analysis identified areas where methodology owner needed to focus (e.g.: soybean use in fodder, management of agricultural soils and especially peat/organogenic soils).</p> <p>Thus, rules related to general farm activities take into consideration the cultivation of organogenic soils <i>"Knowledge is currently being compiled about cultivation of organogenic soils in the field of climate impact. As we await the development of new knowledge, food crops, with the exception of ley crops, that are cultivated in organogenic soils cannot be labelled with the climate label. When such knowledge is available, it is possible that the cultivation of food crops in organogenic soils may be permitted on the condition that action is taken to reduce climate gas emissions."</i></p>
Japan PCF	<p>The section dedicated to the quantification of raw material acquisition stage states that: <i>Quantification does not have to include GHG emissions that discharge with new factory construction/new facility introduction and land use change, except when their contribution to total GHG emissions is clearly high. However consideration must be given to this issue according to international study. Issues regarding the carbon storage in wood material should be discussed according to the international trends.</i></p>
Korea PCF	<p>No information available on carbon storage or land use change in the guidelines.</p>
Sustainability Consortium (Wal-Mart)	<p>Not enough information to assess this point: land use is mentioned in some Excel datasheet used as a basis for the calculation but the treatment of this information is unclear.</p>
Carbon Index Casino	<p>No information available: it depends on the LCA publications used for the agricultural production phase</p>
Climatop	<p>According to methodology owner, carbon storage is not applicable and land use change is treated according to ISO 14040, PAS 2050 and Ecoinvent.</p>
Greenext (Leclerc)	<ul style="list-style-type: none"> Carbon storage: not tackled yet. Greenext will adopt BP X30-323 recommendations Land use change: the inclusion of land use change in emissions factors has not been checked

Both criteria are usually considered as important issues to be considered. However, the level of treatment and reporting system differs.

The common approach consists in calculating the impact of land use change and carbon storage but recent methodologies prefer to report it separately (Product GhG Protocol, ISO 14067) whereas older ones include these GhG emissions (PAS 2050: explicitly asked; Japan PCF: it is not clear whether all emissions sources and reductions should be consolidated in a single figure). The underpinned idea beyond separate reporting system is to give a full picture of the process with sources and reductions but avoiding misleading conclusions.

It is also interesting to notice that **methodologies address none of these issues or both of them**. However, when dealing with both issues, some standards recognize that a difference exists between knowledge about land use change and carbon storage so that the later is treated more lightly: reference is made to international discussions in progress without going further into calculation details (Japan PCF).

Finally, standards generally promote an **international approach** on these subjects, the majority of them quoting works from **IPCC and UNFCCC**. It is an important point to highlight since consistency should be ensured with other sustainable schemes used at European and World levels (REDD, sustainable schemes for biofuels, etc.). In particular, the **definition of land use change** (types of soils considered, type of changes...) and the **period to consider for a land use** have to be made more consistent (e.g.: PAS 2050 makes reference to January 1990 whereas the European Directive 2009/28/EC on the promotion of the use of energy from renewable sources refers to January 2008 for biofuels).

Advantages of including carbon storage and land use change	<ul style="list-style-type: none"> • This issue is commonly recognized as important • Global consensus regarding sources of information (IPCC, UNFCCC) • Growing consensus on a separate reporting system
Risks	<ul style="list-style-type: none"> • Issue still under investigation • Need for harmonization with other approaches

Biogenic carbon accounting

This criterion refers to the inclusion of biogenic carbon (ISO 14067: carbon which is contained in biomass), which can lead to a delayed release of GhG emissions.

Product GHG Protocol	<ul style="list-style-type: none"> Biogenic carbon emissions due to the combustion of renewable bio-based materials should not be included in the quantification of emissions. Biogenic carbon emissions due to combustion should be reported separately from the inventory results Biogenic emissions and removals from biomass (above ground and below ground), soil carbon, and dead organic matter should be considered when calculating land use change emissions
ISO 14067	<ul style="list-style-type: none"> CO₂ emissions and removals data and information for inclusion in the inventory shall be collected for each emission and removal source, i.e. each unit process that is included within the product system. GHG emissions and removals arising from biogenic carbon shall be reported separately. If biogenic CO₂ is included in the PCF it shall be reported separately. If biogenic CO₂ removals are reported then biogenic CO₂ emissions shall also be reported. The unit processes related with the cultivation and production of biomass shall be included in the product system.
BP X30-323	<ul style="list-style-type: none"> Only products that store carbon for a period of time longer than one year are considered as biogenic carbon storage If a product storing biogenic carbon is landfilled, the carbon is then considered as definitively stored
PAS 2050	<ul style="list-style-type: none"> Carbon dioxide arising from biogenic sources of carbon is assigned a GWP of zero in specific circumstances specified in the PAS. CO₂ emissions arising from biogenic carbon sources shall be excluded from the calculation of GHG emissions from the life cycle of products, except where the CO₂ arises from land use change Non-CO₂ emissions arising from both fossil and biogenic carbon sources shall be included in the calculation of GHG emissions from the life cycle of products. The GWP factor for non-CO₂ emissions originating from biogenic carbon sources shall be corrected to take into account the sequestration of the CO₂ that gave rise to the biogenic carbon source. <p>For products containing carbon of biogenic origin, the impact of carbon storage shall be included in the assessment of the life cycle GHG emissions of the product when:</p> <ol style="list-style-type: none"> the product is not for human or animal ingestion (i.e. not a food or feed); more than 50% of the mass of carbon of biogenic origin in the product remains removed from the atmosphere for one year or more following production of the product; and the material containing the biogenic carbon is obtained from either: <ol style="list-style-type: none"> an input that is the result of human actions that cause its formation for the purpose of using it as an input to a process (e.g. managed forestry); or a recycled or re-use input that contains material that is demonstrated to comply with point (i) above. <p>Following issues are also addressed:</p> <ul style="list-style-type: none"> Treatment of biogenic carbon at disposal Treatment of biogenic carbon in recycled material Treatment of CO₂ emissions arising from products containing biogenic carbon Treatment of non-CO₂ GHG emissions from products containing biogenic carbon Weighted average of stored biogenic carbon and atmospheric CO₂ taken up by products
Climate certification system SE	There was no mention of biogenic emissions in the documents consulted. However, given that this scheme focuses on the food industry, the issue is probably undertaken (e.g.: discussions about methane in the milk standard) and carbon & nitrogen management in the food chain is considered in the elaboration of criteria
Japan PCF	No available information
Korea PCF	No available information
Sustainability Consortium (Wal-Mart)	No available information
Carbon Index Casino	No available information
Climatop	Not taken into consideration
Greenext (Leclerc)	No available information

The availability of information regarding this issue is **quite limited** but current status of this topic is similar to that of carbon storage and land use change:

- **Recognition of the issue importance**
- **Will to calculate the related impact but to report it separately**

The level of details achieved is quite variable depending on the methodologies (for example, the PAS 2050 gives many details about each possible source of biogenic carbon).

It has to be highlighted that the importance of this issue depends on the category of products considered and is especially important for some of them like bioproducts or biofuels. In particular,

- It could help to understand and close the carbon balance over each phase of the life cycle;
- Such an approach may be necessary when considering a cradle-to-grave approach, as recommended by many methodologies;
- it could be a mean to compare two approaches for product manufacturing (for example, comparison between uses of bioplastics and plastics);

Moreover,

- The timescale chosen for GhG assessment could impact the consideration of biogenic carbon: a time-period of 100 years is generally accepted for calculating PCF but it can be not adapted to some product categories which may have a higher/shorter lifespan, or which are related to natural processes not assessable during this time-period.
- Choices made regarding biogenic carbon have to be consistent with the treatment of land use change / carbon storage since both issues may be linked. This is true inside a PCF methodology but consistency with other schemes (e.g.: REDD) has also to be verified.

However, some works are still being undertaken to detail how to consider this issue, and specific attention should be paid to the following issues if it is decided to include it in the calculation:

- Calculation rules: knowledge of biological processes is still progressing and calculation rules have to be detailed and updated regularly according to scientific progress.
- Traceability and clarity of calculation: carbon flows should be clearly defined and linked, for example through a “map” of carbon flow, and all information used in the calculation should be justified.
- Reporting system of information: it should be transparent and clear on what is reported and how, in order to avoid misleading conclusions.

Advantages of accounting biogenic carbon	<ul style="list-style-type: none"> • This issue is commonly recognized as important • Growing consensus on a separate reporting system
Risks	<ul style="list-style-type: none"> • Issue still under investigation

Review requirements

The objective of setting up a verification system is of course to guarantee the reliability of the information provided. The process can cover two fields of review: methodology and results. The table below gives information regarding both aspects to highlight the consistency of the global approach but remains mainly focused on the verification of results.

Product GHG Protocol	<ul style="list-style-type: none"> The standard uses the term of "assurance" and details the requirements and concepts behind this word (e.g.: reasonable/limited assurance, inherent/control/detection risks, materiality threshold). In order to state compliance with the Standard, the product GHG inventory shall be assured. Internal or external assurance is permissible. The assurance opinion shall be expressed in the form of either reasonable or limited assurance. The assurance opinion shall be presented with the inventory, including or accompanied by a clear statement identifying whether First or Third Party assurance has been obtained. It is possible to assure the entire product GHG inventory or specific parts of it, although the assurance providers should check that an assurance over a part of a product GHG inventory is meaningful to the user References are made to assurance criteria like ISAE 3000 or ISO 14065 and responsibilities sharing between the company and the assurance provider are clearly stated. Tips are also provided regarding how assurance providers should assess the suitability of the criteria and about technical skills and independence of assurance providers.
ISO 14067	<ul style="list-style-type: none"> In the frame of a PCF communication programme, the programme operator ensures the selection of competent independent verifiers and PCF review panel members and establishes a transparent procedure for the verification, including the scope of verification, details of the verification and how the verification is conducted. If results of a carbon footprint of a product study are to be communicated to the consumer, the communication including the report shall be verified by an independent, third party. The competency of the verifier shall be determined in accordance with one of the following standards: ISO 14066; ISO 14044; ISO 14025. Verification shall provide confirmation of the appropriateness of any PCR, when employed, and that the quantification has been conducted in accordance with the requirements of that PCR. The verification shall confirm that the carbon footprint of the product quantified in the report has been prepared on a life cycle basis and is in conformity with the requirements of this International Standard.
BP X30-323	<ul style="list-style-type: none"> The principle of transparency prevails for assumptions, data acquisition process, emission factors, assessment limitations. For each product category, rules define the data validation process. Shoes case study recommends companies to keep a file for each product reference. No detail is yet available on a possible procedure for external review of results.
PAS 2050	<p>The level of validation depends on the goals of the initiative:</p> <ul style="list-style-type: none"> certification is "advisable" for external communication of the footprint results and may be desirable in any case, to ensure decisions are made on the basis of correct information other party verification (non-accredited third parties) self-verification: if self-verification is chosen, it is recommended to follow the method outlined in BS EN ISO 140216.
Climate certification system SE	<p>The purpose of the audit is to ensure compliance with the rules. It also helps improvement works within the business. The audit must be performed within the framework of the certification process that forms the basis of the climate labelling system, by an independent certification company that is accredited for the standard in question as well as EN 45011.</p>
Japan PCF	<p>Two levels of verification exist:</p> <ol style="list-style-type: none"> 1. A verification process for verifying the company's calculated CFP result in the pilot project (ISO14025's 3rd party verification process. This is not shown on the guideline but of course necessary). It is called CFP verification panel. 2. A committee for discussing the future proper CFP verification scheme, which is written in the guideline. This is called verification scheme committee.
Korea PCF	<p>No detailed information on the verification process is available but numerous reviews by the certificate institute are necessary during the PCF labelling procedure.</p>
Sustainability Consortium (Wal-Mart)	<p>The global methodology will be evaluated by an external review, but no information about the verification of the CF calculations is available.</p>
Carbon Index Casino	<p>An external consultant audits a panel of suppliers every year to validate the data provided to Casino.</p>

Climatop	No detailed information on the verification process is available, except that calculation is reviewed by an external consultant. Peer reviews show the scope of verification by product and assess the calculation model and results regarding its plausibility.
Greenext (Leclerc)	<p>Ecopass carries out an annual audit of the environmental data management system. Ecopass developed a verification standard which includes recommendations from global management system standards (ISO 14001, ISO 9001), LCA referentials (ISO 14040 & ISO 14044) and other guidelines (BP X30-323, PAS 2050)</p> <p>Two themes assessed:</p> <ul style="list-style-type: none"> • methodology definition: overall definition, boundaries and data requirements, data collection, calculation and communication. • labelling and communication: data use charter (existence), respect of the data use charter <p>Overall 23 criteria are assessed.</p> <p>Among the criteria for data quality and management are: 1. elaboration of procedures ensuring accuracy, completeness, representativeness, reproducibility of the data and of the associated controls, 2. existence of an uncertainty index, 3. elaboration and update of general instructions for data elaboration and PCR, 4. elaboration of procedure to ensure consistency of data, 5. traceability of malfunctioning and action plans follow up.</p> <p>Ecopass standard is not yet available but should be published early 2011.</p>

The verification issue is addressed more or less directly by each methodology, which shows the importance to get another point of view on the calculation performed.

We observe different kinds of verification processes:

- Internal / external verification of results:** the choice to perform an internal or external verification is generally left to user. The requirement of verification's credibility increases with the level of communication chosen (e.g.: Product GhG Protocol requires external verification if data is communicated to consumer).

However, requirements about third-party verification are rare since only observed in the Japan PCF. Indeed, the objective of this project is to display PCF on products, so that such a system may be necessary to avoid fraud and trade distortion.

Of course, involving external verifiers increases the process' burden and cost but it may be necessary in cases where conclusions may be highly subject to discussions. In particular, schemes in which numerous PCFs have to be calculated do not have a strict view on this aspect (BP X30-323, Greenext, Sustainability Consortium).

Current international schemes provide examples of both approaches (mandatory or voluntary verification). The most widespread approach is a voluntary verification but an example of EU wide mandatory verification scheme is related to the EU Emissions Trading Scheme in which more than 11,500 installations are third-party audited every year.
- Requirements for verifiers:** performed by whether internal or external verifiers, the verification process should ensure an appropriate review. Independence, sufficient knowledge and technical background are common requirements for verifiers. Independent does not mean external since some methodologies give the possibility of internal verification if sufficient independence is proven. This point is particularly detailed in national schemes supported by public authorities and international schemes. Verifiers' skills can moreover be assessed against requirements of ISO 140XX norms or other criteria more related to assurance procedure. In this case, the availability of appropriate verifiers is a critical point for a wide-scale process.

It has to be noticed that PCF standards generally requires verifiers to be skilled and to prove it against specific verification or GhG standards, but the accreditation against the specific PCF

standard considered is almost not addressed. Such an issue could be important in case of mandatory schemes because:

- It will increase the process burden for the whole chain value (identification then contracting of the verifier, and realization of verification requirements)
- It could create tensions in the verification market, at least during the first years of the process:
 - There are generally a limited number of bodies accredited against a given standard, whereas the number of products to be verified may be highly important depending on the products targeted for mandatory verification.
 - Accreditation bodies will be highly solicited as to define the list of appropriate verifiers, although their current workload is already important.
- **Verification methodology:** this criterion includes various aspects: issues to be assessed, practical verification and level of verification.

Issues to be assessed are usually not listed, since verifiers should establish a verification plan adapted to the risks of each specific calculation. Moreover, key points to be verified are underpinned in each standard since supporting documents have been established to highlight the key points to stress during the calculation (e.g.: functional unit, allocation, etc.) and qualified verifiers are supposed to understand the main risks associated to each standard. For the same reasons, verification methodology is not described in details.

Regarding process burden, the Product GhG Protocol's approach is quite interesting since it deals with assurance levels. For verification processes leading to an assurance opinion, work-tasks are adapted to the level of confidence to be achieved. Moreover, verifiers have to follow strict verification rules and applying this system at a wide scale would be a good alternative to a complete and detailed verification. Such a system is already in use for the verification of non-financial data (e.g.: for firms covered by the New Economic Regulation law in France).

The latest point which is not addressed in current standards is the consequences to be drawn from verification conclusions; indeed, even if an improvement of the calculation is possible and probable, there is no specific requirement related to the use of verification conclusions.

Advantages of implementing a review	<ul style="list-style-type: none"> ● Recognized need for verification ● Flexibility of the current systems, adapted to the different drivers followed by firms
Risks	<ul style="list-style-type: none"> ● Process burden in case of a wide implementation ● Management of results

2. Implementation system

Regarding the implementation system,

- A single methodology can be used to achieve various objectives. For example, a “bonus-malus” system uses the same type of information than those used for providing consumers with a simple carbon index;
- A single objective can be achieved through various schemes. For example, the identification of the best products in a category can be made by comparing their carbon footprint figures over the whole life cycle, but also by comparing product performances on a limited number of specific criteria considered the most significant ones (then without getting the carbon footprint over the whole life cycle).

When assessing methodological options, it is important to consider scenarios rather than methodologies alone. A scenario is the combination of a methodology (calculation rules and guidelines enabling to evaluate a carbon footprint) and an initiative (political framework or organizational structure related to a carbon footprint action, with specific objectives).

Later on in the report, implementation characteristics such as the objective of the methodology, the data collection process, the type calculation method, the validation protocol of the methodology and of the CF results or the way the CF results are communicated to the consumer will be a key element to assess the methodologies’ suitability for policy scenarios’ implementation.

E. Scenario building

1. General objectives of PCF policies

The table below summarizes the main objectives that can be pursued when implementing a PCF policy. This list is based on the review of existing methodologies and initiatives. Scenarios have been built in order to address one or a combination of these objectives. Relevance of methodologies should be assessed in regards to the objectives targeted.

Targeted stakeholders	Objective
Companies	<ul style="list-style-type: none"> To get knowledge about PCF of products or product categories To allow businesses to assess and benchmark the environmental performance of their products and services To help companies identify solutions to improve the overall environmental performance of products throughout their life-cycle) To reach a standardization of PCF calculation and increase internal knowledge by companies of their products' environmental footprint To establish a harmonised base for procurement and incentives provided by the EU and its Member States To set minimum requirements for product environmental performance that need to be attained in order to be allowed on the Internal Market To set ambitious standards for product environmental performance on the internal market
Consumers	<ul style="list-style-type: none"> To enhance consumer knowledge about the impact of individual products and allow their comparison To enhance consumer knowledge about the impact of product categories and allow their comparison To provide markets with indication of highly performing products available on the market and to encourage the purchasing of low carbon products To discourage the purchasing of high carbon products To drive consumer purchases towards low carbon solutions/products
Retailers	<ul style="list-style-type: none"> To optimise supply chain To encourage retailers to raise the awareness of consumers at large and promote sustainable consumption To encourage retailers to decrease the carbon intensity of their sales (by increasing their offer of low carbon products, decreasing their price and communicating about them) To establish a harmonised base for communicating on product footprint
Environmental protection	<ul style="list-style-type: none"> To reduce greenhouse gas emissions of consumer goods through out their life-cycle To reduce other environmental impacts of consumer goods through out their life-cycle

In order to cover these objectives more or less extensively, the European Commission may implement various approaches that can focus on different aspects like methodology, communication or organization. These approaches can be considered as scenarios of implementation.

2. General description of the scenarios

A first analysis of the risks and benefits associated to the initiatives identified has been made, including considerations about the needs for a more or less restrictive framework, impacts on stakeholders, efficiency, etc. and led to define 5 main scenarios:

- **Scenario 0: business as usual.** The objective of this scenario is to identify the risks associated with the upholding of the European Commission's current position on carbon footprint (intervention limited to communication)
- **Scenario 1: Favouring the internal use of PCF by companies.** This scenario consists in implementing systems that makes easier for companies to work together for a better assessment of the PCF of their products and include these elements into their strategic choices.
- **Scenario 2: Encouraging communication to consumers.** This scenario covers all means of communication of carbon footprint information (both on-pack and off-pack), aiming at improving the consumers' knowledge of the footprint of the products they buy and ultimately diverting their purchases towards products with low PCF.
- **Scenario 3: Implementing market-based incentives.** This scenario comprises financial bonuses and taxes towards various actors (consumers, producers and retailers) that target the promotion of products with low PCF and/or taxation of high emitting products.
- **Scenario 4: Setting minimum requirements.** This scenario corresponds to the implementation of mandatory minimum requirements for producers in terms of ecodesign, in line with the Ecodesign Directive.

We detail these scenarios hereafter, describe how they can help reach some objectives and not others, explain their characteristics and acceptability, and analyze their methodological requirements in order to define the most suitable methodology for each one of them.

Sub-scenarios

A variation in the implementation framework of each of the scenarios would lead to a change in the methodology to be applied; that is the reason why we defined sub-scenarios, based on specific key criteria:

- Voluntary scheme vs. mandatory scheme
- Product analysis vs. Product Category analysis
- Other criteria depending of the scenario
 - Scenario 2: type of communication means (please see Annex 3):
 - Index: absolute value of the footprint (e.g.: Japan PCF)
 - Scale: level of footprint in comparison to other products (e.g.: Carbon Index Casino)
 - Reduction claim: targeted reduction (e.g.: Korea PCF)
 - Best in class label: recognition of best performing products (e.g.: Climatop)
 - Scenario 3: type of target: producers, retailers or consumers.
 - Scenario 4: responsible body: European Commission vs. Member States (with the support of the European Commission).

Each variation of criteria is a potential sub-scenario. However, as we explain further down, some options do not seem presently realistic or differentiating enough as to require a specific analysis. For example,

- Scenario 1 only considers a voluntary scheme because the objective “Favouring the use of PCF for management purposes” relies on firms will for improvement, and not on an obligation: a mandatory scheme would have been contrary to the scenario objective.
- Information provided by an index or a scale are different but are considered as relying on a similar methodological basis (that is to say briefly: being able to calculate a PCF in a quite precise way).

As so, only realistic and truly differentiating sub-scenarios were investigated.

Other criteria do not call for specific sub-scenarios, since they do not directly impact the methodology’s choice; however, they should be considered to ensure the methodology’s flexibility:

- Complete LCA vs. adjustive LCA,
- Mono-criterion (CO₂) vs. multi-criteria (CO₂ as well as other environmental impacts).

We detail the analysis of these criteria and the sub-scenarios hereafter.

Comparison of scenarios effects on global emissions

Scenarios have been chosen to illustrate various existing/possible schemes but also imply different leverage levels on global emissions.

Scenario	Effects on global emissions
Scenario 0: Business as usual	Although public policies already partially address PCF issue, the baseline scenario is considered as the less efficient regarding emissions reduction, as additional emissions savings depend on isolated initiatives (both from companies and consumers).
Scenario 1: Favouring the internal use of PCF by companies	<p>In this scenario, the European Commission provides non-financial incentives to favour the internal use of PCF by companies (e.g.: help for gathering stakeholders for working on a methodology development). The global effect on emissions depends on companies’ voluntary initiatives to improve their products’ carbon footprint.</p> <p>This scenario is potentially more efficient than scenario 0 because it helps businesses to assess and benchmark the environmental performance of their products and services and of alternative configurations, as well as share best practices experiences to decrease PCF and generate other gains (mainly economical) at an appropriate term.</p>

Scenario	Effects on global emissions
Scenario 2: Encouraging communication to consumers	The scenario 2 is considered as more efficient than scenario 1 because it does not only rely on firms' will for improvement but creates an indirect need for change. More precisely, by encouraging communication to consumers, the European Commission can improve the consumers' knowledge of the footprint of products bought, provide markets with indication of highly performing products available and ultimately diverting purchases towards products with low PCF. In this sense it helps to make environment a fundamental compass of the company decisions by providing consumers with the environmental impacts of products. However, rebound effect might significantly reduce the efficiency of such a scenario if implemented alone.
Scenario 3: Implementing market-based incentives	Market-based incentives are considered as efficient systems since they can lead more easily to technological/process improvements. Moreover, they give a greater incentive to the whole value chain since a firm can set higher requirements to its suppliers in order to fulfil its own expectations linked to the incentives. The risk of rebound effect can be significant if subsidies for lower CF products are implemented. The incentive needs to be set as to lower demand for high PCF products while avoiding the rebound effect to offset the emission savings. In this sense this scenario can be a tool to ensure that increased global consumption of polluting materials does not counterbalance individual environmental product performance.
Scenario 4: Setting minimum requirements	Setting minimum requirements should be considered as the best option for decreasing PCF. Indeed, it can lead to concrete changes of technologies and behaviours like scenario 3 but companies have no other choice than to comply with the requirements. The incentive lies in the exclusion of non compliant products.

Common features

Some interesting information valid for scenarios' implementation is common to all scenarios and is not repeated in each scenario description. Among those:

- **Cost reductions in the value chain:** according to Carbon Trust, the 20 companies that applied the PAS 2050 method have:
 - Uncovered the true drivers of carbon emissions across a product's life cycle,
 - Identified high-impact emission reduction – and cost savings – opportunities,
 - Strengthened relationships with their suppliers.

In particular, implementing a low emitting value chain can create cost reductions, in particular in terms of energy consumption and transportation. For example, regarding IT systems, by implementing a "green IT" strategy, companies could reduce CO₂ emissions by as much as 50% according to IBM– ranging from 15-20 percent for travel to up to 90 percent for

datacenters – with corresponding reductions in cost. Likewise, the optimization of sourcing or the improvement of energy efficiency of buildings can save both CO₂ and costs.

- **Environmental burden shifting:** focusing only on the carbon footprint of products might lead to an environmental burden shifting, since companies will be encouraged to decrease products' carbon footprint but not to reduce other impacts and might even increase them as a result of their effort to reduce the carbon footprint. For example, production could be implemented closer to the end-market, in order to reduce CO₂ emissions linked to transportation, but in an area where it decreases an existing high level of biodiversity.

These common effects are not repeated in each scenario description but have to be considered with attention given that scenario implementation may emphasize these effects if not appropriately managed.

3. Presentation of the limitations in the scenario building and analysis

For the purpose of scenario building, a set of criteria has been developed to assess “meta-criteria” like the robustness and reliability of methodologies, their ease of use and cost, etc. These criteria were chosen to evaluate how implementation options would impact the main features of the scenarios, with a sufficient level of detail as to enable a clear distinction of performances. For example, setting up a verification system would increase the reliability of the system but at the same time, it would also increase the cost of the project (especially in case of external verification) and its complexity (and then reduce its ease of use).

The criteria developed take into account the scenarios' specificities in order to evaluate methodologies in a given context, framed by the scenario.

This chapter aims at clarifying the limitations of the set of criteria chosen.

Study objective

This study mainly focuses on **methodology** aspects, to get a reliable value for product carbon footprint. **Communication** aspects have been studied because they frame some methodological aspects, but **no specific attention was paid to the rules to be applied for communicating information to consumers** since it requires a study on its own. Some additional information could be found in specific studies (e.g.: Ernst & Young: “Pistes pour un étiquetage environnemental lisible et efficace”; ANEC: “Requirements on Consumer Information about Product Carbon Footprint”).

Moreover, even if study's conclusions may help to understand possibilities of trade distortion related to the methodologies use, **a detailed analysis of trade and legal aspects is out of the scope** of the study, because such an analysis would require its own one. Additional elements could be found in documents like: the ‘Unfair Commercial Practices Directive’, the commission staff working document “guidance on the implementation/application of directive 2005/29/EC on unfair commercial practices” ([http://ec.europa.eu/consumers/rights/docs/Guidance UCP Directive en.pdf](http://ec.europa.eu/consumers/rights/docs/Guidance_UCP_Directive_en.pdf)) and the Guidelines for Making and Assessing Environmental Claims, based on ISO 14021

(http://ec.europa.eu/consumers/cons_safe/news/green/guidelines_en.pdf) (Source: Federal Public Service – Belgium).

Available information and maturity

A major limitation of this analysis is the **lack of detailed information on the methodologies**. Some of them are still under construction (e.g. Product GhG Protocol, Sustainability Consortium (Wal-Mart)), others that have been privately developed have scarce publicly available documentation (e.g. Greenext for Leclerc). Hence, the present study has been established on the basis of existing drafts for the majority of the methodologies, and the latest versions of the methodological documentation could cover some risks highlighted in the present document.

Besides, none **of the PCF methodologies has more than 5 years of implementation** record, which limits feedback comparison.

Finally, it has to be noticed that the European Commission has required a **simultaneous study dedicated to GhG reporting systems of organisms and firms**. The related report has been published too lately to include its findings in the present one, even if information from both studies is valuable for determining the appropriate policy framework. Indeed, refining organisms GhG reporting system can help to gather information for establishing future PCFs. Moreover, it must be mentioned that some of the methodologies highlighted clearly link both aspects (organizational / product) like the GhG Protocol which has published a draft of its “Scope 3 Accounting and reporting standard” at the same time than the draft of its “Product Life Cycle Accounting and Reporting Standard”.

Geographical & political context

Each methodology has been developed on the basis of a specific context. For example,

- Carbon Index Casino and Greenext (for Leclerc) have adopted two different approaches to comply with the possible French obligation on product labelling,
- Korea PCF and Japan PCF have been developed to fill a methodological gap necessary to answer the government’s ambitions in terms of climate change,
- ISO 14067 and Product GhG Protocol have been developed to create an international consensus on PCF methodologies and to overtake national specificities

The consequence of this context is that **all methodologies do not plan to fulfil the same objectives, and methodologies’ comparability is then limited by the integration of these specificities**.

Methodologies’ comparison

The comparison of methodologies is complex:

- The analysis does not only aim to compare methodologies but also to highlight interesting aspects in their approaches. For example, it is irrelevant to compare PAS 2050 to Sustainability Consortium (Wal-Mart) since the first one aims to calculate a carbon footprint whereas the second one is – in its current state – a tool to work with suppliers to evaluate their management of sustainability issues. However, Sustainability Consortium (Wal-Mart) aims to provide a wider approach in the future and enable to calculate product carbon footprint; it has also an interesting input regarding suppliers’ involvement. As a consequence, it can be noticed that **the range of methodologies considered is quite wide in order to**

overtake objectives differences and learn from the experience of all of them, but this diversity also limits the possibilities of comparison.

- Some criteria having an important impact on results cannot be marked; for example, the choice of a cut-off criteria at 5% (ISO 14067: *“the total omitted emissions shall not exceed 5% compared to the total emissions from all processes within the defined system boundary”*) or 1% (GhG Protocol: *“Negligible is defined here as less than 1% of the total process or life cycle stage.”*) cannot be scored as easily as the number of products assessed where quantitative data are available. Answers given to these criteria reveal a position and an objective of the methodology owner; in our example: a choice in the balance between ease of use and precision. **This type of criteria has been analyzed through a summary of existing methodologies positions and related consequences** (please refer to the section [Calculation and technical features](#)).
- **A difference should be made between a methodological guideline and its use in an implementation scheme.** For example,
 - A general framework like PAS 2050 aims to be flexible and avoids giving a step-by-step methodology like it can be found in some PCRs-like documents. As a consequence, it appears in our assessment as not sufficiently robust for product comparison since two different users can make different methodological choices, both being consistent with PAS 2050’s requirements. However, the Carbon Trust, actively supporting this standard, has implemented and managed a system which enables comparison and addresses more precise aspects of this methodology (Carbon label, communication guidelines...).
 - The same occurs with Greenext methodology for Leclerc: Greenext methodology has been developed by this private company and it was adapted for a specific use by Leclerc. This adaptation led to create some limitations in the application that seems to be absent from the original methodology; but this choice was made to answer specific needs from Leclerc.

Thus, it is important to keep in mind that an implementation scheme can either generate or suppress limitations due to the methodology; as so, the analysis made in this report focuses, as much as possible, on the current state of the methodologies and not on related implementation schemes.

- **Product differentiation inside a product category** is an important criterion since it frames products comparability. However, **the difficulty is to define a product category**, and in particular the level of differentiation of products (for example, is “meat” a product category or should we differentiate by types of meat? Should we consider “cars” as a product category or should we differentiate sedan cars from SUVs?). Our analysis does not intend to provide a clear definition of product category but tries to understand the position of methodologies on this point.

Thus, it is important to bear in mind that **methodologies that are assessed below are not always adapted to the scenario because of their own building process.**

Analysis criteria

Criteria used for the quantitative assessment of methodologies have been defined in order to provide an objective scoring with a limited range of marks (3 grades). A more detailed scoring card would have allowed a better differentiation between methodologies. However, it was deliberately decided to limit the scoring scale to 3 grades for all criteria, in order to avoid creating distortion in criteria importance. For example, ISO 14067, PAS 2050, Product GhG Protocol and BP X30-323 get the same grade for stakeholder diversity because all of them imply a broad involvement of stakeholders at national or international level. We could have differentiated national and international involvement which would have advantage ISO 14067 and Product GhG Protocol, but it would have created a 4th grade and increased the importance of this criterion inside the global scoring scale without justification.

Hence, **the quantitative results of the analysis results should be considered cautiously, and not isolated from their qualitative analysis.**

Burden shifting

Many methodologies use an LCA approach limited to carbon footprint issues, because

- Carbon footprint issue is the most mature for a wide implementation;
- Climate change takes benefits from an important media cover and could be an interesting opportunity to make people aware of what is sustainable consumption.

However, if not properly dealt with, focusing on product carbon footprint could lead to an effect opposite to the one expected:

- Misleading communication: consumers could confuse low carbon products and environment-friendly products,
- Carbon footprint may be not appropriate nor representative of global environmental footprint for certain product categories,
- Reduction efforts on carbon emissions could theoretically lead to an increase in other environmental impacts in some cases.

As a consequence, communication on the importance of carbon footprint should be cautious.

Various studies have analyzed these aspects (please refer to [Appendix 5](#)) and the main conclusion is that **carbon footprint can represent a good indicator of the overall environmental impact only for specific product categories**, mainly those considered as highly energy intensive and simple in terms of emission sources (no land use change, no biogenic emission, etc.).

Thus, the comparison of CF methodologies for the determination of the future position of the European Commission on this subject should take into account the **possibility of widening the environmental scope of the methodology to include environmental impacts other than climate change, and communication options will have to be analyzed closely.**

Rebound effect

The **final objective** of all investigated scenarios is to **reduce the overall environmental impact due to consumption**. Calculation and communication of **Product Carbon Footprint** can be a **tool** to achieve this objective; indeed by providing consumers with this information, PCF can help them make **environment a strategic compass for business decisions**, and therefore leads to enhanced **individual product GHG performance**.

However it should be highlighted that this environmental efficiency improvement does not guaranty the intended global environmental impact reduction of consumption. On the contrary, various studies on energy suggest that improving efficiency can result in economy-wide consumption increase⁶. **Individual product carbon footprint reduction can therefore results in a global GHG increase**. This phenomenon, known as the “**Rebound effect**” is an intrinsic limitation of the studied scenarios. If the final objective is to be reached, any product carbon footprint policy should thus be adequately **complemented with other measures** such as carbon/energy pricing implemented through taxation or efficient emissions trading scheme.

⁶ UK Energy Research Centre (October 2007) *The Rebound Effect: an assessment of the evidence for economy-wide energy savings from improved energy efficiency*.

<http://www.ukerc.ac.uk/Downloads/PDF/07/0710ReboundEffect/0710ReboundEffectReport.pdf>

4. Scenario 0: Business as usual

This chapter describes the risks associated to the business as usual, with the additional implementation of a policy limited to communication and reinforcement of existing Directives.

Objectives

This scenario considers maintaining the current position of the European Commission on PCF issues, with initiatives like (among others): participation to international discussions on this issue, involvement in think-tanks related to methodologies development (e.g.: ISO 14067), development of tools and databases (e.g.: ILCD).

In this scenario, it was considered that some additional efforts could be undertaken but would be limited, mainly to communication actions. These actions could contribute to promote existing initiatives by:

- Increasing the enforcement of the Eco-design Directive in Member States, regarding energy-using and energy-related products;
- Getting some companies differentiate their products through the Ecolabel or through their own initiative;
- Enhancing consumer knowledge about the environmental impact of products.

Scope

As for now, the scope of products and sectors for which carbon footprint issues are addressed through European policies is heterogeneous.

- Energy using or related products remain the most systematically addressed products, given that they were identified as the main contributors to climate change and that many works have been undertaken on/by energy intensive industries.
- Only a limited number of products categories are addressed through the Ecolabel. Working on consumer products could be the most efficient way to raise awareness among consumers regarding sustainable consumption.

A “business as usual” scenario for European Commission on PCF will not help to prevent the recent multiplication of “private” rules and labels. As a consequence:

- Among a same sector, different methodologies may be developed, leading to increased confusion for consumers and firms;
- Sectors may remain heterogeneously covered, depending on their willingness to work on this issue.

Acceptance by companies

Incentives to act

In this scenario, it is difficult to consider direct incentives to act (financial incentives for example) given the current action of European Commission regarding PCF. However, its involvement in the development of international schemes would highlight the importance of this issue and encourage firms to implement such initiatives. As so, it appears necessary to keep on communicating on EC involvement and actions.

Indirect effects of Ecodesign and Ecolabel Directives could be foreseen and encouraged. Thus, manufacturers should get increasingly involved through ecodesign requirements and solicitation from their retailers. They will in return get the whole supply chain involved too. Nevertheless this may remain limited to energy products and some consumer goods.

Cost and impact on market

It is considered that no major additional effort would be set up to make firms work on their PCF. Thus, this scenario would lead to continuity in what has been seen during the past few years: an increase in the number of existing methodologies and a low comparability between PCF calculated according to these methodologies, leading to confusion of market economic operators.

As a consequence, these voluntary initiatives put aside, working on PCF would mainly remain an indirect effect of existing initiatives like Ecolabel Directive.

Regarding cost impacts of keeping current European Commission policy on PCF,

- Cost impact for the European Commission would be very low since no additional major initiative would be launched;
- Costs for calculating and analyzing PCFs would remain difficult to read for firms, since few points of comparison are publicly available. Unitary cost for calculating a PCF would in any case be higher than in other scenarios;
- PCF-related costs for firms would probably not be reflected on product prices and, as a consequence, not transferred to final consumers.

Impact on innovation

Innovation would be limited to some products as for now, including products targeted by the Ecodesign Directive, top range products and products manufactured by firms engaged in sustainable production. Indeed, the lack of comparability in results calculated through different methodologies would not encourage a fair competition between producers.

Acceptance by consumers

Clarity

The growing number of PCF initiatives leads to an increased confusion for consumers regarding PCF because the meaning of the information communicated is not clearly framed (e.g.: PCF figure on packaging, labels) and references for comparison are still missing. As so, clarity and understandability for consumers is low with a lack of communication on the different labels and the environmental impacts of products (e.g.: they are not able to understand if a performance of 300 gCO₂ is good or not). In a business as usual scenario, there is a risk that this confusion would increase even more with the multiplication of initiatives and labels. Communication by retailers may become overwhelming.

As a consequence, the European Commission could focus on communicating on the meaning of carbon footprint, providing consumers with information like: environmental impact measurement, bases about CO₂ calculation, meaning of CO₂ equivalent, order of magnitude of PCF to consumers, etc.

Behaviour change

Behaviour changes will mostly remain the result of Ecodesign and Ecolabel Directives schemes. If there are too much confusion around green claims, consumers might have a rejection reaction over all “green” or “greener” products.

Environmental impacts

The decrease in overall CO₂ emissions should remain at the same pace. No drastic reduction should be expected. Other impacts may also decrease at a slow pace.

5. Scenario 1: Favouring the internal use of PCF by companies

a. Scenario description

The objective of this scenario is to implement systems that make it easier for companies to work together for a better assessment of the PCF of their products and include these elements into their strategic choices. This could be achieved at EU level by keeping on promoting networking and the setting up of stakeholder forums and maybe extending these activities to sectors currently not covered. These networks would allow defining commonly accepted PCF methodology/ies as well as sharing best practices. Stakeholders could thus define, on a voluntary basis, common rules for calculating PCFs and communicating them to consumers, without a stringent regulatory framework.

Objectives

The main objectives of this scenario target companies. They are the following:

- To get knowledge about PCF of products or product categories at EU level
- To reach a standardization of CO₂ emissions calculation and increase internal knowledge by companies of their PCF
- To encourage knowledge sharing about PCF reduction options
- To allow organizations understand how their decisions (purchasing choices for example) affect energy use and how these decisions can be used to mitigate global climate change
- To allow businesses to assess and benchmark the environmental performance of their products and services and of alternative configurations (and hence to improve the overall environmental performance of products throughout their life-cycle)
- To help companies identify solutions to reduce their carbon footprint
- To reduce PCF of products as well as other environmental impacts

Role of the European Commission and policy risks

Firms targeted through this scenario are those willing to calculate the PCF of their products but also groups of firms (e.g.: industry associations) aiming to develop a specific methodology adapted to their own concerns. These firms usually face the two following challenges:

- Finding the methodology that best meets the user needs in terms of consistency with objectives but also in terms of applicability to their sector;
- Using an appropriate management structure which enables firms to work together.

The European Commission could play the role of a facilitator for such initiatives and it could consist in providing guidance and means to develop a stakeholders forum that would work on defining a methodological framework for PCF calculation, as well as PCR-like guidance. It could also help to make consistent initiatives at EU level.

The European Commission being already working in that direction, this scenario would consist in enlarging the scope of sectors and stakeholders involved and avoiding firms that have the same issues to work separately within a same industry sectors. In particular, a gathering of international actors having worked on their PCF would be useful for learning from each experience (e.g.: in the retail sector: Tesco with the Carbon Trust and ERM (UK), Casino with Bio Intelligence Services (France), Leclerc with Greenext (France), Sustainability Consortium).

The forum's roadmap could be to:

- Identify key areas to be tackled and define the baseline of existing initiatives;
- Share best practices, extend the geographical coverage of existing initiatives and look to launch new initiatives if considered relevant or necessary (e.g.: setting up a structure to develop PCRs-like documents for the products having not been covered until now by existing methodologies);
- reflect on the choice of a methodology and the definition of a PCF calculation;
- report on progress of their actions on an individual basis.

If no common methodological framework can be defined and if no third party verification process is required, communication from companies that individually realize PCF assessments could be misleading for the consumers and leading to unfair competition. Hence, the European Commission should favour the emergence of a commonly agreed framework within this forum.

Risks associated to this scenario are limited, since companies will freely choose to participate in the project and the ad hoc network will endorse the responsibility of the results. The EC should however keep being involved in the debates closely to avoid supporting projects that do not follow its guidance in terms of consultation or that give birth to a PCF calculation that is not accurate enough.

Link with selected initiatives

Two knowledge sharing initiatives were analyzed during the previous phase:

- The Carbon Disclosure Project, chosen for the increasing involvement of companies in this voluntary process
- The Cities for Climate Protection (CCP) Campaign, chosen for the collaborative work at a territory scale.

However, none of these two initiatives was designed to provide companies with tools to measure and use their PCF internally. On the contrary, the Carbon Disclosure Project is based on the analysis of the communication by companies of their footprint. CCP Campaign is more about knowledge sharing; it is rather best practices oriented, and the technical support is limited to the measurement of infrastructures' impact.

Other initiatives developed at national level, such as the German PCF World Forum or the French ADEME-AFNOR platform also have been used to design this scenario.

Scope

Targeted stakeholders

Targeted stakeholders are mainly companies willing to calculate their PCF. However, since it deals with knowledge sharing, this scenario involves a wide range of stakeholders who can contribute to the knowledge building: companies, universities, NGOs, consulting firms, national public bodies, etc.

Targeted products/sector

All products and sectors can be covered.

To be specific enough and to favour an efficient knowledge sharing, the approach can be based on a territorial approach (importance of the local context) or a sectorial approach (importance of the sector specificities).

Other comments

By definition this is a voluntary initiative, with a continuous improvement process. Verification is not required as it is primarily an internal approach.

Sub-scenarios

Criteria used to highlight potential sub-scenarios for scenario 1 were:

- Voluntary scheme vs. mandatory scheme: scenario definition is based on a free participation of companies and experts. Hence, a mandatory approach does not seem appropriate, as explained previously.
- Product analysis vs. Product Category analysis: the calculated PCFs should be adapted to each product of a company in order to be useful and enable improvement. That is the reason why product category sub-scenarios were not studied.

Thus, for this scenario, only one sub-scenario was investigated: **the design and diffusion of a PCF assessment methodology for companies that would be used voluntarily to calculate PCF of individual products.**

Acceptance by companies

Incentives to act

The main incentive for companies to take part in such a projet is to better understand and improve the efficiency of their products and supply chain and eventually prepare themselves for a strengthening of national/EU regulation in this field. If they chose to use the PCF as a communication means, they may also take it as a way to differentiate from their competitors and gain a competitive advantage but expressed on a similar basis (which really highlights the product performance). More widely, the calculation and comparison of PCF does not only aim at assessing risk but also at managing carbon footprint by identifying the main carbon sources, setting ambitious though

achievable targets, within a certain timeframe, and implementing actions to achieve them. For example, CO₂ emissions reporting schemes, or the reporting system on environmental and social impacts of companies created a bottomline, according to which they set quantitative objectives and implemented measures to reduce the main impacts. The same could be true for PCF.

Cost and impact on market

The cost for companies is highly depending on the methodology chosen (level of complexity) and will be absorbed differently by companies (according to their size, income, etc). If the methodology is based on the use of mostly standard information, the cost can be limited. Moreover, some sectorial approaches have already been set up (e.g.: WBCSD – Cement Sustainability Initiative); relying on these existing structure could be a way to reduce cost and to increase scheme efficiency.

Impact on innovation

Existing similar initiatives show that it may encourage companies to innovate when they find out where their main carbon impacts are. The participating companies would be early movers towards low PCF in their industries and could thus better anticipate future more stringent regulation while offering innovative products to their consumers. It could be assumed that innovation will take increasing benefits from the growing number of companies willing to reduce their impact.

However, innovation possibilities may remain limited in a first approach: firms willing to work on this issue firstly focus on the easiest levers for PCF reduction (e.g.: reduction of manufacturing plant energy consumption), and the lack of competition does not encourage them to go further as to engage important innovative actions.

Impact on company image

The image of companies through product communication is not the primary objective of this scenario. However, participating to such an initiative could be a mean for firms to gain visibility on PCF. For example, GhG Protocol Initiative publishes the names of firms having participated to each step of the process on its website.

Acceptance by consumers

Clarity

As long as there is no frame for communication – since it is not the initial goal of this approach – , companies may choose to communicate anyway to consumers, in an eclectic and unclear way. However, a communication frame could ultimately be defined within the platform.

Behaviour change

Consumers could not be very receptive if communication is not framed or unexistent. Little behaviour change is then to be expected.

Impact on prices

The impact on prices is uncertain. Firms usually state that their voluntary works do not impact the price of the products sold but no specific analysis has been conducted to verify this point. However, it can be easily imagined that some companies may choose to impact the costs on products price, at least partially.

Environmental impacts

Since this initiative is strictly voluntary, with no market incentives, it is foreseen that the implementation of PCF assessment will spread rather slowly and therefore the impact reduction potential of this scenario should therefore be low to begin with.

Depending on the efficiency of the network set up to share knowledge regarding carbon footprint, it could serve as a basis to create a think-tank for emissions reductions or to create specific engagements, especially at a sector level (e.g.: Cement Sustainability Initiative, etc.).

The initiative could cover carbon emissions as well as other criteria, provided reliable assessment methodology were defined.

Overall cost

The cost of such an initiative would be the cost of developing a standardized methodology and database, spreading it and communicating about the stakes of PCF measurement. The cost may then be high at the beginning but decrease quickly, taking benefits from individual initiatives (if existing). Moreover, the cost for each participant is reduced compared to a scenario where each actor develops its own methodology. Finally, as discussed in the section above describing the acceptance by companies, the implementation of CO₂ reduction measures would help them save money.

EU wide implementation and link with existing EU regulations

There is no barrier to the implementation of a PCF network at EU level. Moreover, other local, national and EU platform experiences show that it is compliant with existing EU regulations. The participation of EU representatives in the project would ensure that EU standards and Directives are respected for the definition of the PCF calculation.

6. Scenario 2: Encouraging communication to consumers

a. Scenario description

This scenario covers the promotion of PCF communication in all forms (labels, carbon indexes, scales of performance, etc.) aiming at improving the consumers' knowledge of the footprint of the products they buy and ultimately diverting their purchases towards products with low PCF.

Objectives

This scenario is more ambitious than the scenario 1, since it assumes the availability of a PCF methodology (or validation of methodologies used by companies) and designs a way to communicate it to consumers.

The main objectives are the following:

- To get knowledge about PCF of products or product categories at EU level
- To establish a harmonised base for public procurement and incentives provided by the EU and its Member States
- To set ambitious norms on the internal market
- To reach a standardization of CO₂ emissions calculation and increase internal knowledge by companies of their PCF
- To encourage knowledge sharing about PCF reduction options
- To allow organizations understand how their decisions (purchasing...) affect energy use and how these decisions can be used to mitigate global climate change
- To allow businesses to assess and benchmark the environmental performance of their products and services and of alternative configurations (and hence to improve the overall environmental performance of products throughout their life-cycle)
- To help companies identify solutions to reduce their carbon footprint
- To enhance consumer knowledge about the impact of individual products or product categories and allow their comparison
- To provide markets with indication of highly performing products available on the market and to encourage the purchasing of low carbon products
- To focus people on low carbon solutions/products
- To reduce PCF of products as well as other environmental impacts

Role of the European Commission and policy risks

Communication to consumers can be encouraged through mandatory or voluntary initiative. In both cases, the role of EC would consist in developing a framework for the calculation and the communication of PCF, framework that could be used by any firm or institution willing to calculate PCFs.

The involvement of the EC would be much greater than for scenario 1. Indeed, depending on the product category, either the EC would recommend existing PCF calculation methodologies that include widely accepted PCRs, or it would organize the necessary stakeholder consultation to define consistent PCRs (see scenario 1).

Eventually, verification measures would have to be defined and implemented to ensure PCFs are correctly calculated and there is no abuse in the use of the label.

In the case of mandatory schemes, expectations from stakeholders as regards to the involvement of EC may be greater:

- The management structure associated to a mandatory scheme should be:
 - Sufficiently detailed and transparent so that everyone knows its own responsibilities but also responsibilities from other actors of the scheme;
 - Led by a recognized and powerful authority, so that acceptance could be maximized.
- Calculation methodology should be precise enough to support product comparability and differentiation inside a product category; indeed, since PCF information will be communicated, consumers will be able to perform a direct comparison between product performances. This objective is, of course, important for voluntary schemes but the diffusion of precise and non-biased PCF information is even more important in the case of mandatory schemes.
- Stakeholder panel should be wide enough as to ensure a balance in the choices made. Wide enough means that stakeholders involved in the process should be numerous and diverse in terms of activities, size, position on the value chain, etc.
- All possible difficulties encountered by users should be considered and tips provided to address them (e.g.: What should be done by a SME if primary data are missing? In case of mandatory verification of results, how to reduce the burden for firms?).

These elements are of course valid for voluntary initiative too, but it is foreseen that if the EC wants to spread a mandatory scheme, there will be greater expectations regarding the solutions provided by the EC to support it and help firms.

In a certain extent, some existing initiatives could be used as a basis for developing this scenario. This is particularly true for the Ecolabel Directive on which an important work has been done, for both improving it and communicating its meaning to consumers.

Link with selected initiatives

Four PCF communication initiatives were studied in an earlier phase of the study: the "Grenelle 2" Act, the Korea PCF label (in the frame of The Korean EDP Program), the Carbon label for California, the Carbon Label of Carbon Trust.

The observed initiatives are voluntary (a specific case is Grenelle 2: it was planned to be a mandatory scheme but this decision has been suspended and now depends on the experimentation phase results). However, in the cases studied, when the label is a unique national/regional one (Korea PCF label, Carbon label for California, Carbon Label of Carbon Trust), a verification is necessary prior to the inclusion of products.

Scope

Targeted stakeholders

The targeted stakeholders are companies (who release the communication) and consumers (who receive it). The implementation process from the choice of methodology to the diffusion of the initiative can last several years.

Targeted products/sectors

All product categories and sectors can be covered, as show the studied experiences:

- Consumer goods and transportation for the "Grenelle 2" Act (even if an experimentation phase has been set up to guarantee this aspect),
- Almost all goods for Korea PCF,
- All consumer goods for Carbon label for California and Carbon Label of Carbon Trust.

Sub-scenarios

The criteria used to define the sub-scenarios are the following:

- Voluntary scheme vs. mandatory scheme

All sub-scenarios related to voluntary approaches on products were kept. Reduction claims, indexes and scales were analyzed together because their methodological requirements are similar: they need a precise calculation of PCF enabling to differentiate products; differentiation level is linked to the scenario objective.

Mandatory best in class labels were not selected, since it seemed inappropriate for a public body to determine the best product, neither mandatory reduction claims which did not appear relevant to display on products. We only studied the case of a **mandatory index on product** (scale would be similar).

- Product analysis vs. Product Category analysis

Regarding product categories, best in class labels and reduction claims were considered irrelevant, if not contradictory with usual EU policies. Thus, a best in class approach based on product categories may lead to market distortion as well as shifts in environmental burdens (for example, red meat is known as more carbon intensive than fish so could be considered worse in a best in class approach based on product

categories; favouring fish could lead to a fall in red meat sells, as well as increase pressure on fish stocks).

Indexes or scales by product categories could be foreseen. However, the most complex analysis level is at product level since it requires more precise information. As so, in order to keep a limited number of scenarios to analyze, we focused on the most restrictive scenario, as we considered that a scheme fulfilling requirements for being able to calculate a PCF by product will automatically be adapted for calculating a PCF for a product category.

- Type of communication means
 - Best in class label, that grants a label to product with a smaller carbon footprint than a reference (e.g.: Climatop, Ecolabel), which could be for example the market average;
 - Reduction claim, that indicates a company commitment to reduce the PCF overtime (e.g.: Korea PCF);
 - Carbon indexes, that provides consumers with a quantitative assessment of the PCF (e.g.: Japan PCF);
 - Carbon scale that provides consumers with information on the relative PCF of products, similarly to the existing energy label of some energy-using products. (E.g. Casino carbon scale).

Therefore, methodologies were finally assessed for 3 sub-scenarios:

- **The voluntary best in class label**
- **The voluntary index or reduction claim**
- **The mandatory index**

Note: An intermediate scenario could be considered: voluntary scheme with a mandatory methodology. This case has not been analyzed, considering that it is a combination of 1) the voluntary index or reduction claim and 2) the mandatory index, and that both scenarios are analyzed. Indeed, firms will be free to subscribe to the scheme, like with current leading voluntary methodologies (e.g.: PAS 2050, Japan PCF). But since they would all use the same methodology, which would allow PCF comparisons, expectations from mandatory schemes should apply for the elaboration of the methodology. Indeed, as explained earlier, the main difference between voluntary and mandatory approach is the level of expectations from stakeholders as regards to the EC.

Acceptance by companies

Incentives to act

Current panorama of methodologies only relies on voluntary schemes where companies freely choose to participate in the initiatives. No public direct incentive (e.g.: financial incentive) has been detected for supporting such involvement. There is a strong incentive to differentiate from their competitors by being among the first to publish PCF information, hence improve their reputation to gain market shares and even new markets. In a mandatory scheme, disclosure of product performance is generalized and the driver of differentiation is much more limited.

Cost and impact on the market

These individual initiatives do not call for major organisational change in companies (even if some changes are of course foreseen, like to organize the data collection or the system's management), but their cost (footprint measurement and marketing) might be a burden, especially for SMEs. Indeed, the cost per product depends on the amount of information specific to the company required. SMEs may find difficulties to tackle with the costs of such an initiative if a lot of information has to be gathered.

In the case of a voluntary scheme, firms willing to analyze many products may benefit from an economy of scale but this would not be the case for SMEs which have less products to assess. If standard information is available, the cost can be limited, especially if communication of the PCF is not done on the packaging but through other means such as websites.

On the other hand, as described for scenario 1, the reduction of PCF would also generate cost savings.

This issue remains particularly important for mandatory schemes in which firms will not choose deliberately to perform such analyses. As so, the EC would have to help framing the scheme as to avoid trade distortions and a solution for limiting the impact of a mandatory scheme may be to introduce it progressively (by sector for example).

Regarding the impact on the market, available feedback is limited. According to Carbon Trust, the companies that have communicated their products' carbon footprints:

- Witnessed greater carbon -and cost- savings,
- Increased their product differentiation (44% of customers surveyed by Walkers stated the Carbon Trust Carbon Reduction Label used on the company's crisps makes them feel more positive about Walkers),
- Improved brand and reputation.

Impact on innovation

Encouraging communication to consumers could be a support for innovation if appropriately managed. More precisely, need for innovation generally does not occur in the first steps of the process but as an effect of targeting PCF reduction: firms usually start by calculating their PCF to identify their levers of action, then work on these aspects (which are usually sources of economic

savings too) and eventually innovate to reduce their PCF (through technological changes for example); of course, it can happen earlier in the process if there is no simple lever of improvement to implement.

An important driving force for firms to reduce their products PCF is their relative position on market (comparison of PCFs with similar products, as well as perception from other stakeholders of their brand and products image). For example, if a company whose products have a low PCF gains market shares thanks to a label, competitors having the same type of technology might be encouraged to innovate in order to offer products with lower PCFs. However, innovation will not necessarily occur: companies with the strongest marketing power could benefit from communicating on their products' environmental performance without seeking the best PCF and without innovating.

Positive effects on innovation will probably be greater in a mandatory scheme, taking into account that the “competition” effect would be stronger.

Impact on image

The initiatives being voluntary, the impact on the image of companies choosing to participate is positive. In the best case, it might allow them to differentiate from their competitors and gain market shares beyond the targeted products. Nevertheless, this impact does not necessarily results in an income rise, since other levers (e.g. price) are also at stake.

It has to be noticed that mandatory and voluntary schemes do not imply the same effects on image:

- A voluntary initiative will generally be perceived as a sign of a pro-active willingness to be an “environment-friendly” firm, with a stronger impact on consumers, even if the product is not the best-in-class of its category. It is a mean for positively supporting a product, also taking benefits from a lack on information of consumer (who can not compare all products' performances).
- In a mandatory scheme all products will have a label and it will therefore be more difficult for companies to differentiate from competitors and therefore to improve their image through PCF. It is expected that the impact of PCF will probably generate a “positive image differentiation” for companies that succeed in communicating more largely on environmental issues rather than on PCF only, as well as on companies that show best-in-class PCFs. It should act as a “negative differentiation” for products with higher PCF, and will have very little impact for other products.

Acceptance by consumers

Clarity

The clarity of communication can vary depending on the communication means chosen (eg.: label, index) and the additional information provided (e.g.: detailed information on website, comparison references).

Moreover, the multiplication of environmental communication within the past few years led to increased consumers confusion. Some attempts were made to reduce this confusion, even for pioneers in this topic (for instance, Carbon Trust choose to delete all quantitative information from the labels). But consumers do not always understand or find it hard to compare PCF between products.

A consistent methodology for calculating PCF at EU level and across product categories is necessary to set a sound basis for calculation and display clear information, but the fact that some independent initiatives already exist will not make this an easy task. A mandatory scheme would be a good solution to increase consumers awareness and acceptance about this issue as well as ensuring that similar information are provided by firms.

From the consumer's point of view, clear symbols that allow comparing products quickly are preferred. Indeed, the 2010 ANEC report on requirements on consumer information about PCF⁷ states that "the purchase decision is supported by an easy-to-make comparison of products" and that "private consumers desire environmental product information in the form of simple symbols, without detailed information and text sections." Similarly, according to the survey conducted in France by Ernst & Young in 2009⁸, technical labels with absolute values are rejected by consumers, who prefer labels that provided comparison means. Thus, scales and best in class labels should be favoured, rather than indexes.

Behaviour change

Since no financial incentive is offered (on the contrary, prices may increase for the products covered, especially in the case of a mandatory scheme), the impact on behaviour change could be random. For instance, in Korea, price turned out to be a stronger lever for sales than the PCF label. But several studies show that for a same price, consumers will favor the product with the lowest environmental impact. For instance, in a 2009 survey in Japan, 841 respondents were asked "do you purchase low PCF products, if there are two same category products". 11% answered "I will buy it even if it is more expensive" and 60% "I will buy it if it is the same price". Similarly, according to the Eurobarometer on Europeans' attitudes towards the issue of sustainable consumption and production (2009), "slightly more than 8 in 10 EU citizens felt that a product's impact on the environment is an important element when deciding which products to buy (34% "very important" and 49% "rather important"); only 4% said this is not important at all". The same study states that "almost half of EU citizens said that ecolabelling plays an important role in their purchasing decisions; the proportion saying this is important ranged from 22% in the Czech Republic to 64% in Greece."

Impact on prices

The cost of PCF measurement and modification of packaging (for those companies or schemes that choose on-pack communication) will most probably be, at least partly, passed through to customers,

⁷ *Requirements on Consumer Information about Product Carbon Footprint*, ANEC, the European consumer voice in standardization, February 26th, 2010

⁸ *Pistes pour un étiquetage environnemental lisible et efficace – Résultat d'enquête consommateur*, Ernst & Young, July 2009

unless PCFs are communicated on-pack only when packaging is to be changed for other reasons (it is the policy that Casino has chosen in order to avoid these additional costs). This additional cost and the related price increase would however be more certainly passed through in the case of a mandatory scheme, although it could vary depending on the means required to provide the PCF information to the consumer (a requirement to provide on-pack information would probably cost more than off-pack).

Published studies of existing schemes conclude that labelling cost is – at least partially – passed through to customers. As an example, in a paper on Labelling Genetically Modified (GM) Foods (2008)⁹, Alan McHughen, from the University of California stated that “various studies on label compliance costs have estimated an increase in GM food prices of at least 10 percent”. For the moment, the possibilities of compensating the analysis costs by the increase in market shares or by allocating the extra costs to other products in their portfolio does not appear clearly; this can be related to the absence of wide spread methodology which limits possibilities of comparison and, as a consequence, has a limited impact on purchasing decision.

Environmental impacts

The environmental impact of this scenario mainly depends on **the information communicated**, which frames the maximum level of emissions reduction that can be achieved. Indeed, if the information to be communicated corresponds to a higher level of expectations, firms will have to work harder to fulfil these requirements and the margin for PCF reduction may be greater, if appropriately managed. It is particularly true for best in class labels (for example, if obtaining the label is submitted to the achievement of quantitative objectives, its impact would be greater) but it is also true for PCF index (for example, an index could require to disclose the possibilities of reduction identified).

Similarly, consumers' choices between products depend on the information provided: does it allow comparability between products? Does it really favour the products with the smallest footprints? The level of information to be communicated (e.g.: PCF by product, by product category) influences the possibilities of comparison for consumers, and hence the possible shift in demand and the potential for environmental impacts reduction.

Another aspect is that current labelling schemes are usually based on voluntary initiatives, which means that firms involved are limited to those willing to progress. A mandatory scheme could be a mean to increase the environmental efficiency of this scenario by strongly increasing the number of firms concerned. It would also help to provide consumers with more references for establishing their purchasing decision and it would put more pressure on firms for improvement. At least, it would help to provide user with information for comparing products and set a sound context for preparing the next steps in behaviour changes.

⁹ *Labelling Genetically Modified (GM) Foods*, Alan McHughen, D. Phil. Biotechnology Specialist and Geneticist Department of Botany and Plant Sciences University of California, Riverside, June 22nd, 2008

However, in the case of consumers, other criteria may limit the environmental impact of the information provided; studies tend to conclude that product's price remains the most important element that drives consumer choices.

Overall Cost

Apart from the methodology development, the cost of this policy (measurement, and communication) would be endorsed by producers. Again, the implementation of CO₂ saving measures could also help companies identify cost savings possibilities. In the case of a mandatory scheme, depending on EC involvement in the scheme management, additional costs could be supported by the authoritative bodies.

EU wide implementation and link with existing EU regulations

Many examples of methodologies aiming at increasing consumer information are available and lead to think that an EU wide implementation of such a scenario could be possible:

- Examples of methodologies developed at national level, by public authorities: BP X30-323 in France, Japan PCF, Korea PCF;
- Examples of international institutions preparing a PCF methodology: ISO 14067, Product GhG Protocol;
- Examples of PCF methodologies adaptability all over the world: PAS 2050 has been used for developing other more specific methodologies (e.g.: Korea PCF).

Moreover, undergoing works from the European Commission DGs (DG Environment, JRC...) could provide support in such a scenario.

Nevertheless, implementing such a scenario with success depends on the consensus over the methodology and disclosure obligations. The main difficulties related to the scenario implementation would be to build over existing initiatives to avoid wasting former PCF works, and to find an appropriate management structure.

If implemented at EU level, there is no risk of non compliance with internal market policy. It adds new competition criteria to the existing ones (price, quality, etc.), thus it encourages increased competition. Nevertheless,

- Member States have different levels of maturity on PCF issues and implementing this scenario could advantage countries that have been working on these issues for few years and that may be able to set up an appropriate system quicker and cheaper other countries.
- Some countries could be disadvantaged for many years, in particular countries with a carbon-intensive energy mix (e.g. mix with a high percentage of coal), provided the national energy mix is a parameter in the PCF calculation; as so, products made in those countries would be disadvantaged for a long time since changing the energy mix is a slow process.

7. Scenario 3: Implementing market-based incentives

a. Scenario description

This scenario comprises financial bonuses and taxes towards various actors (consumers, producers and retailers) that target the promotion of products with low PCF and/or taxation of high emitting products.

A number of Member States are already, in compliance with the Treaty and State Aid rules, providing incentives for development and acquisition of energy and environmental performing products and “greening” their procurement practice to foster their uptake. However, the criteria that these products have to meet to benefit from incentives or public procurement can differ substantially from one country to another. This may result in fragmenting incentives in the Internal Market for the products concerned. Moreover, the potential of public procurement, equivalent to 16% of EU GDP, has only been marginally exploited.

In order to overcome this fragmentation, a harmonisation could be sought after at EU level, driven by the EC. It should of course consider national initiatives in order to be as compatible with existing approaches as possible.

Objectives

This scenario will clearly set quantitative targets, since the incentives and taxes will have to be defined according to a scale. Its main objectives are the following:

- To get knowledge about PCF of products or product categories at EU level
- To establish a harmonised base for public procurement and incentives provided by the EU and its Member States
- To set ambitious norms on the internal market
- To reach a standardization of CO₂ emissions calculation and increase internal knowledge by companies of their PCF
- To encourage knowledge sharing about PCF reduction options
- To allow organizations understand how their decisions (purchasing...) affect energy use and how these decisions can be used to mitigate global climate change
- To allow businesses to assess and benchmark the environmental performance of their products and services and of alternative configurations (and hence to improve the overall environmental performance of products throughout their life-cycle)
- To help companies identify solutions to reduce their carbon footprint
- To enhance consumer knowledge about the impact of individual products or product categories and allow their comparison
- To provide markets with indication of highly performing products available on the market and to encourage the purchasing of low carbon products
- To discourage the purchasing of high carbon products or to focus people on low carbon solutions/products, or to encourage retailers to decrease the carbon intensity of their sales

(by increasing their offer of low carbon products, decreasing their price and communicating about them)

- To reduce PCF of products as well as other environmental impacts

Role of the European Commission and policy risks

The role of EC would first consist in developing a framework for both calculation and communication of PCF. Like in scenario 2, this means that methodologies and PCRs would have to be chosen or even defined, depending on the product category.

The definition and implementation of incentives would however remain in the hands of Member States. Indeed, Member States would be free to choose whether, and in which form, to provide incentives to encourage the uptake of low-carbon products, while, when applicable, respecting the provisions of Community law, in particular State Aid rules.

Nevertheless, the European Commission could undertake a preliminary impact assessment for identifying one of the labelling classes as a level below which Member States would not be allowed to set incentives. This level would be set above the applicable community environmental requirements. This would apply to product groups for which there is evidence that the fragmentation of incentives may reduce their effectiveness. In principle, this level would correspond to the level for public procurement, which would magnify the impact of the measures. This level could be review to better balance tax and bonus in the case of a bonus/malus or to set more ambitious objectives.

Link with selected initiatives

4 initiatives to develop market-based incentives were studied: Ecocheck in Belgium, Ecological Bonus-Malus in France, Climate Bonus in Finland and Carbon Tax in Sweden.

Scope

Targeted stakeholders

Since we focused our analysis on market-based incentives, the main targets are consumers who will benefit from the incentive or pay the tax, and possibly retailers.

Targeted products/sectors

All consumer goods can be covered, as it is the case for Ecocheck, Climate Bonus and Carbon Tax. Only consumers goods in transportation and building are covered as for Bonus-Malus.

Other comments

- This scheme is mainly designed for being mandatory, like the Ecological Bonus-Malus and the Carbon Tax which are compulsory.

- Verification is also required when the process is complicated (Climate Bonus as based on LCA).

Sub-scenarios

The criteria used to define the sub-scenarios are the following:

- Voluntary scheme vs. mandatory scheme: voluntary schemes were not studied, since, once applied at country level, the incentive should be mandatory.
- Product analysis vs. Product Category analysis: an approach by product category could be considered, but since the most complex analysis is at product level, in order to keep a limited number of scenarios to analyze, we considered that a scheme fulfilling requirements for product will automatically be adapted for product category.
- Type of target: producers, retailers or consumers: this scenario is market based, so we did not consider a sub-scenario targeting producers, because such a scenario would be closer to scenario 4 (consisting in setting minimum requirements).

While grading the methodologies, **a single sub-scenario was studied for mandatory incentive to retailers and consumers based on individual products CF**, considering that the important point is the carbon footprint of the product sold. Whether the incentive is a tax or a bonus, and whether the cost/benefit is supported by the retailer or the consumer, the methodological requirements will not be modified (but of course, implementation burden and cost repartitions would be different).

Acceptance by companies

Incentives to act

Bonuses act as a demand driver which will in turn act as an incentive on the offer from companies which would take it as a marketing opportunity to address a changing market. When the bonus is granted to retailers, their negotiation power towards producers may lead to a high involvement of producers.

Taxes can act as an incentive on “green products” companies (encourage innovation, lower prices with volume effect thanks to the reorientation of the demand towards greener products which price differential would become lower compared to taxed products). Nevertheless, if the choice of products covered (Ecochecks, Climate Bonus) is given to companies (producers / retailers), they may choose to apply it only to a limited number of products.

Cost and impact on market

Past experiences tend to show a significant market sensitivity to ecological bonuses and taxes (e.g.: France with Bonus-Malus system on cars). Market shares can therefore be modified quickly, benefiting to companies that already have greener products in their portfolio.

Cost per product will not be impacted if LCA is not required (cars for example). In case of wide extension, the cost is highly depending on the methodology chosen (level of complexity) and will be absorbed differently by companies (according to their size, income, etc).

This initiative might generate competition issues. Indeed, final price is not only related to industry and distribution costs but “modified” according to criteria chosen outside of the concerned sector: it is a “non-business” modification of the market on which firms could have difficulties to catch up, depending on their internal development plan and the inertia of both technology and market.

Moreover, eligibility criteria can go against the choice widening. Indeed, if the market based incentives is motivated by a too restrictive scale of performances, consumer choices will be limited to a small range of products available on the market.

Impact on innovation

The implementation of this scenario could influence positively innovation on two aspects:

- **Green innovations become more profitable:** Firms are rewarded by an external party for the performance achieved (e.g.: bonus) but they can be rewarded by an increase in their market shares too, if performances are sufficient enough for affecting purchasing decisions.
- **Absence of innovation could lead to loose market shares:** Firms could be encouraged to invest in technological changes as to avoid producing goods which will not be purchased anymore by consumers, depending on competitors performance.

Moreover, market-based incentives usually work through a focus on product categories. This principle could be a mean to make economic operators from the whole value chain work together for reducing their global product carbon footprint:

- It could make the implementation of innovative solutions easier, ensuring their applicability all along the supply chain.
- It could be a motivation for firms to share their resources on a given subject. For example, pharmaceutical industries in France have worked together on plants carbon footprint (in the frame of the LEEM, their sectorial federation): the principle behind their work was that each company calculates the carbon footprint of one of its activities and shares its results with other companies, in order to understand the main issues of each manufacturing process they could have in common.
- It could enable to gain time in technological developments: if a firm A works with a supplier B for developing a technology enabling to reduce its product carbon footprint, the supplier B could use these works as a basis for future development for its other clients (in the respect of trade and competitiveness obligations).

The main obstacle for innovation in this scenario would be to define an inappropriate scale of criteria for differentiating products.

Impact on image

In terms of image, there is a very positive impact for products benefiting from the bonus. Negative impact on taxed products should act as an incentive for companies to adapt their products portfolio.

Acceptance by consumers

Clarity

The list of eligible products can vary over time and is not always clear for consumers (point of sale information should then be compulsory and regulated to avoid misleading communication).

Behaviour change

Bonuses and the increase of cheaper green products available are welcome from the consumer perspective and they can have great and quick impact on behaviour change. Even though taxes are not well perceived by consumers, they are very efficient regarding behaviour change when another greener alternative offer at affordable price is available (ex: biomass in Sweden instead of fuel. In Norway the absence of alternative solutions mainly lead to an additional revenue for the government without a clear demand shifting). The articulation of bonus and maluses seem to be a good way to encourage the offering of alternative solutions and make them affordable.

Impact on prices

Bonus and taxes directly impact the price but in a positive and regulated way, in so far as they will favour greener products (as opposed to labels whose implementation cost for producers might reflect on the price).

Environmental impacts

Shifting demand towards low emitting products on a large scale will undoubtedly have a positive impact on carbon emissions.

Taxes seem to be really working on overall emissions when cleaner alternative solution is available (Carbon Tax in Sweden). However there is a risk that bonuses lead to additional purchases instead of 'replacing' purchases. This is particularly true for consumer goods. As for initiatives like eco-checks, they could simply increase purchasing power and then increase the overall carbon footprint unless they are limited to energy savings products/solutions. These initiatives are extendable to other criteria than carbon (it is already the case of Ecocheck and Climate Bonus plans to do that in the future). Nevertheless, the complexity of calculation of indicators such a biodiversity can make it difficult to reach a low level of uncertainty (that is necessary when it deals with fiscality).

Overall cost

A tax would create a revenue for the public authority. However, we observed that Carbon Taxes were usually accompanied with a rebalance of the whole taxation system, in order to neutralize their impacts.

Bonuses, borne by the public authority, could represent a potentially important cost. It could be compensated if a malus is also implemented at the appropriate level. However, experience shows that the cost of the initiative could increase too quickly if the incentive is too “efficient”.

Costs for the EU should be mainly administrative as for designing a Directive and controlling its transcription and implementation by Member States.

EU wide implementation and compliance to EU regulations

The EU wide implementation might be complex. Indeed, general fiscal rules can be introduced by the EU (as for VAT) but concerning detailed rules, countries will remain independent.

Regarding the respect of trade policy, the case of foreign goods should be considered with attention to avoid relocation, but there is a risk that it could be considered as a form of protectionnism. In particular, system boundaries and related issues (transportation for example) should be studied with attention. (Moreover, this initiative could generate competition issues (price distortion). But in the same time, it might create more choice of green products.

8. Scenario 4: Setting minimum requirements

a. Scenario description

This scenario corresponds to the implementation of mandatory minimum requirements for producers in terms of PCF. It is inspired by the Ecodesign Directive 2009/125/EC and foresees a similar approach based on the PCF.

Objectives

This scenario comprises strong constraints put on producers to reduce their PCFs and the measurement of the footprint.

The objectives are then the following:

- To get knowledge about PCF of products or product categories at EU level
- To reach a standardization of CO₂ emissions calculation and increase internal knowledge by companies of their PCF
- To set ambitious norms on the internal market
- To allow organizations understand how their decisions (purchasing...) affect energy use and how these decisions can be used to mitigate global climate change
- To allow businesses to assess and benchmark the environmental performance of their products and services and of alternative configurations (and hence to improve the overall environmental performance of products throughout their life-cycle)
- To help companies identify solutions to reduce their carbon footprint
- To set minimum requirements that need to be attained by the product in order to be allowed on the Internal Market
- To reduce PCF of products as well as other environmental impacts

Role of the European Commission, policy risks and link with existing legislation

This scenario would be closely linked to the Ecodesign Directive. Indeed, this Directive provides rules for setting ecodesign requirements for energy-using products with the aim of limiting their environmental impact taking a life-cycle perspective, while ensuring their free movements within the internal market. While not directly introducing binding requirements for specific products, the Directive enables the Commission, assisted by a Committee, to enact implementing measures on specific products and their environmental aspects (such as energy consumption, waste generation, water consumption, extension of life-time) following impact assessment and consultation of interested parties.

The Directive also includes the communication of information to markets on best performing products, based on benchmarks of environmental performances. Regarding communication, a link

between the Eco-design Directive and Product labelling and Eco label directives is sought after: Product labelling under the Energy Labelling Directive and Eco label Regulation will be further developed and, following a review of the Eco design Directive in 2012, complemented as appropriate by an Eco-design Labelling Directive to provide consumers with information about the energy and/or environmental performance of products. This aspect is not studied within this scenario, since it was analysed in Scenario 2.

In this case, the role of the European Commission is of primary importance, since the minimum requirements would have to be defined by the EU, either within the frame of the Ecodesign Directive or through a new legislation. If the scenario is developed as an extension of the Ecodesign Directive, it should probably cover other environmental impacts than carbon emissions to be consistent with the current approach. The EU would also have to conduct an assessment study and engage discussions with stakeholders (like the Consultation Forum for the Ecodesign Directive) to help define implementing measures: calculation means, verification obligations, etc.

Scope

Targeted stakeholders

The targeted people are Companies who will have to implement ecodesign measures and consumers who will be given means to identify products with the lowest PCF.

Targeted products/sectors

All product categories and sectors can be covered. So far, the Directive covers all products using energy or linked to energy.

Other comments

- Minimum requirements are compulsory to get CE marking and be sold in the EU. Advanced benchmarks to provide markets with early indication of highly performing products available on the market are voluntary.
- Companies must implement credible monitoring and reporting systems (including independent inspections).

Sub-scenarios

This scenario is by essence mandatory.

The criteria used to define the sub-scenarios are the following:

- Product analysis vs. Product Category analysis: the product category analysis was considered irrelevant to establish 1) mandatory PCF assessment for internal purpose of individual products and 2) definition of specific mandatory requirements on measurable aspects of the product life cycle by product category (e.g. electricity consumption, raw material choice...).
- Implementation by the EU or Member States: the level of implementation (EU or Member States) will not impact the methodological requirements and their establishment process.

As a consequence, the sub-scenario studied consists in the **implementation of minimum requirements on individual products.**

Acceptance by companies

Incentives to act

Companies have no other choice than to comply with the requirements. The incentive lies in the exclusion of non compliant products.

Cost and impact on market

The withdrawal of some products on the market will create a shortfall for companies and the adaptation to the minimum requirements will introduce costs (research, acquisition of new machinery, development of new techniques and training of the workforce, modification of the supply chain, etc). However, if business federations take part in the forum consultation to give their insight on the requirements' definition, they will help define realistic and bearable requirements. The current legislation states that "Eco design requirements shall remain cost-effective."

Impact on innovation

This policy will encourage companies to innovate to meet the requirements first and then to be part of the highly performing products for some of them. Indeed, if requirements are restrictive enough, they could lead companies to switch to more environmentally efficient technologies. However, if requirements are too restrictive, the positive effect of the scenario will be lost.

Impact on image

It is foreseen that non-compliant products, which will eventually disappear from catalogues and shelves, may impact negatively the image of the company considered. However, it depends on the minimum requirements used: if they are too restrictive, too many products would be non-compliant and, even if this choice has been made to force technological changes, it could impact more negatively the scheme credibility than the product reputation.

Depending on the communication related to the product performance, highly performing products compliant with minimum requirements could be additionally much-valued, for example through a communication template disclosing the detailed performance of the product. This would lead to a positive impact in terms of image.

Acceptance by consumers

Clarity

So far, consumers easily perceived that highly performing energy related products would help them save energy and thus money, independently from minimal requirements. For other kind of products,

the impact on usage might be low. Clarity is not really an issue for this scenario, unless it is decided that exclusions of products have to be explained.

Behaviour change

Consumers are not the target of this approach. In fact, their behaviours will change mechanically, as products will be withdrawn from the market.

Impact on prices

Regarding energy and energy related products, the Ecodesign Directive states that it should not have an impact on consumers' affordability. However, if the adaptation is too costly for companies, they will transfer part of the costs to product prices. The least virtuous products that will be withdrawn from the market could in some cases also be the cheapest.

Environmental impacts

The reduction potential should be high as the minimum requirements are compulsory (for example, for the energy related products, the estimated annual energy saving are of 341 TWh by 2020).

Such a policy could have a positive impact on CO₂ emissions, but also on other environmental impacts, if the requirements cover several issues, as it is the case in the frame of the Ecodesign Directive. Indeed, the Directive suggests that minimum requirements will consider key environmental aspects over the life-cycle of the products. They will in particular take into account energy and resource use. Other issues, such as the need to reduce the use of hazardous materials and rare resources will be considered when appropriate.

Overall cost

The cost of this approach is the cost of the requirements' development (working groups, stakeholders' consultation, assessment tool, etc.) and the communication to companies. It may also add inspection costs (inspection of the CE marking may become more complex).

As far as companies are concerned, the implementation of CO₂ saving measures in order to comply with minimum requirements might represent a cost first, but could also create cost savings in the mid term, in particular by reducing the energy bill (more efficient machinery, energy efficient buildings, optimized sourcing, green IT, etc).

EU wide implementation and compliance to EU regulations

This approach could consist in the widening of the Eco-design Directive.

Non compliant goods will not be able to enter the market anymore. Nevertheless, as the requirements are the same for European goods and foreign ones, this is compliant with international trade rules.

As the Directive's main goal is to homogenize states legislations, it would of course be compliant with internal market rules. Free movement of goods will remain for compliant goods.

9. Impact of technical elements on the scenarios

In the table below, we assessed whether the technical features analysed in [Focus on the methodological options](#) the success of the scenario. If so, although they are not suitable criteria for a grading system, they will have to be considered qualitatively when evaluating which methodologies are the most relevant for each sub-scenario.

The following qualitative evaluation distinguishes 3 levels of importance for each criterion:

- High: important criterion to be considered for the scenario; precise guidelines have to be proposed to clearly frame user decisions regarding this issue;
- Medium: interesting criterion for the considered scenario; guidelines may be slightly more flexible but remain stringent enough as to avoid future risks;
- Low: no impact on the methodology on a first approach; however, issues related to this criterion have to be kept in mind for further development.

These criteria have been assessed to understand their implication and interest for each scenario.

	Scenarios						
	0 <i>Business as usual</i>	1 <i>Favouring the internal use of PCF by companies</i>	2a <i>Voluntary best-in-class label</i>	2b <i>Voluntary index or reduction label</i>	2c <i>Mandatory index</i>	3 <i>Implementing market-based incentives</i>	4 <i>Setting minimum requirements</i>
Environmental issues covered	Low No specific risk if LCA principles are followed, as to ensure a possible extension of the scheme	Low No specific risk if LCA principles are followed, as to ensure a possible extension of the scheme	Low No specific risk if LCA principles are followed, as to ensure a possible extension of the scheme	Low No specific risk if LCA principles are followed, as to ensure a possible extension of the scheme	Medium Being a mandatory scheme, requirements have to be consistent with other potential impacts	Medium Being a mandatory scheme, requirements have to be consistent with other potential impacts	Medium Being a mandatory scheme, requirements have to be consistent with other potential impacts
Functional Unit	Low to medium The risk level depends of the PCF use: if communicated to consumers, it is considered as medium since implicit comparisons can be made without ensuring a same scope of analysis; if not communicated, risk is lower because functional unit is defined to fulfil firm expectations	Low Risk is limited given that the main objective is to gather and share knowledge to define the methodology	High Ensure a definition that helps to compare products	Medium Ensure a definition that helps to compare products (the risk is however considered as lower than in scenarios 2a or 2c because the comparison process is less direct: in scenario 2a, it is made by the methodology owner and in the scenario 2c, consumer has more references to make the comparison)	High Ensure a definition that helps to compare products. Mandatory scheme.	Medium Ensure a definition that helps to compare products	High Mandatory scheme: it should fulfil higher expectations to ensure products comparability in a same category than voluntary schemes (higher spreading)

	Scenarios						
	0 <i>Business as usual</i>	1 <i>Favouring the internal use of PCF by companies</i>	2a <i>Voluntary best-in-class label</i>	2b <i>Voluntary index or reduction label</i>	2c <i>Mandatory index</i>	3 <i>Implementing market-based incentives</i>	4 <i>Setting minimum requirements</i>
Cut-off rules	Low to medium The same precautions as above apply	Low No specific risk is defined precisely	Low No specific risk is defined precisely	Low No specific risk is defined precisely	High Mandatory scheme: it should fulfil higher expectations to ensure products comparability in a same category than voluntary schemes (higher spreading)	Medium Risk regarding responsibility sharing	High Mandatory scheme: it should fulfil higher expectations to ensure products comparability in a same category than voluntary schemes (higher spreading)
Use phase	Low to Medium No specific risk if a clear decision is made regarding its exclusion	Low No risk in a first approach (decision to be taken inside the Working Groups)	Low to Medium No specific risk if a clear decision is made regarding its exclusion	Low to Medium No specific risk if a clear decision is made regarding its exclusion	Low to Medium No specific risk if a clear decision is made regarding its exclusion	Low to Medium No specific risk if a clear decision is made regarding its exclusion	High Should be included to avoid a transfer of pollution
Data quality	Low No specific risk in a first approach	Low No specific risk in a first approach; data quality requirements would have to be precisely defined by WGs	Medium Criteria to be considered since data uncertainty conditions ranking	Low No specific risk if data quality is evaluated and displayed with carbon footprint	Low No specific risk if data quality is evaluated and displayed with carbon footprint	Medium Criteria to be considered since data uncertainty conditions ranking	Medium Criteria to be considered since data uncertainty conditions qualitative requirements compliance
Allocation	Low No specific risk in a first approach	Low to Medium Criteria impacting responsibility sharing; however, it could be a point of discussion in WGs	Medium to High Interesting criteria impacting data precision; more important for this scenario because of the ranking impact	Low to Medium Interesting criteria impacting data precision	Medium to High Interesting criteria impacting data precision; more impact on this scenario because of the precision required	High Important criteria in term of responsibility sharing	High Important criteria in term of responsibility sharing
Uncertainty/sensitivity analysis	Low No specific risk; point of discussion of WGs	Low No specific risk; point of discussion of WGs	Low No specific risk if a minimum level of requirement has to be achieved	Low No specific risk if a minimum level of requirement has to be achieved	High Variability and uncertainty have to be known to ensure the respect of scenario requirements. However, a balance has to be found between this understanding and the implied process burden	Low No specific risk if a minimum level of requirement has to be achieved	High Variability and uncertainty have to be known to ensure the respect of scenario requirements. However, a balance has to be found between this understanding and the implied process burden

	Scenarios						
	0 <i>Business as usual</i>	1 <i>Favouring the internal use of PCF by companies</i>	2a <i>Voluntary best-in-class label</i>	2b <i>Voluntary index or reduction label</i>	2c <i>Mandatory index</i>	3 <i>Implementing market-based incentives</i>	4 <i>Setting minimum requirements</i>
Methodological assumptions	Low No specific risk; point of discussion of WGs	Low No specific risk; point of discussion of WGs	Low A balance should be found between the flexibility of the scheme and a limited possibility of framing assertions	Low A balance should be found between the flexibility of the scheme and a limited possibility of framing assertions	Medium A balance should be found between the flexibility of the scheme and a limited possibility of framing assertions	Low A balance should be found between the flexibility of the scheme and a limited possibility of framing assertions	Medium A balance should be found between the flexibility of the scheme and a limited possibility of framing assertions
GHG offset	Low No specific risk; point of discussion of WGs	Low No specific risk; point of discussion of WGs	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted
Partial reporting (not full life cycle)	Low No specific risk; point of discussion of WGs	Low No specific risk; point of discussion of WGs	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted	Low to Medium No specific risk if a common guideline is adopted	Medium No specific risk if a common guideline is adopted; higher risks in terms of responsibility sharing	High To be clearly framed as to avoid transfer pollution To be adapted to sector specificities
Land use change	Low No specific risk; point of discussion of WGs	Low No specific risk; point of discussion of WGs	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted
Carbon storage	Low No specific risk; point of discussion of WGs	Low No specific risk; point of discussion of WGs	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted
Biogenic carbon accounting	Low No specific risk; point of discussion of WGs	Low No specific risk; point of discussion of WGs	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted	Low No specific risk if a common guideline is adopted

	Scenarios						
	0 <i>Business as usual</i>	1 <i>Favouring the internal use of PCF by companies</i>	2a <i>Voluntary best-in-class label</i>	2b <i>Voluntary index or reduction label</i>	2c <i>Mandatory index</i>	3 <i>Implementing market-based incentives</i>	4 <i>Setting minimum requirements</i>
Review requirements	Low to medium The risk level depends of the PCF use: if communicated to consumers, it is considered as medium since implicit comparisons can be made without ensuring a same scope of analysis; if not communicated, risk is lower because functional unit is defined to fulfil firm expectations	Low No specific risk; point of discussion of WGs WGs progress should be periodically verified	Low to Medium A progressive verification can be adopted as to ensure that ranking is respected. Regular update should be foreseen	Low Current methodologies insist on this subject so the risk is limited. A verification scheme could be adapted, e.g.: - users follow methodologies requirements - a team of verifiers selected by the Commission could be involved if demanded by economic actors	Low to Medium 2 levels to be considered - verification that the index is present - verification of the calculation An intensive verification can be considered in the first case. For the second case, a progressive verification can be adopted (cf. proposal in scenario 4) Regular update should be foreseen	Low Current methodologies insist on this subject so the risk is limited. A verification scheme could be adapted, e.g.: - users follow methodologies requirements - a team of verifiers selected by the Commission could be involved if demanded by economic actors	High Has to be sufficiently evolved as to ensure requirements verification but adapted to reduce economic operators burden (e.g.: mandatory verification for a product sold over a threshold in terms of economic value plus random verification under this threshold plus verification of complaints) Regular update should be foreseen

10. Methodologies assessment

a. Methodological and system requirements

We defined methodology assessment criteria, based on each sub-scenario's requirements. Ideally, assessment should aim at measuring "meta-criteria" like robustness, ease of use... but such "meta-criteria" are not easily evaluated through a scoring card. For example,

- In terms of robustness, would it be better to have a scheme supported by many and diverse stakeholders but providing only generic guidelines, or a scheme supported by only few stakeholders but providing precise guidelines?
- In terms of governance, what is the best decision system between the ISO one (broad consultation with a voting mechanism for decisions making) and the GhG protocol one (WRI or WBCSD staff make final decisions), when both systems are quite efficient?

As so, in order to establish a sound and reliable basis of analysis, criteria have been chosen to be simple, objective and directly impacting the methodological options. Only criteria that could be scored have been used in the following assessment; but it has to be reminded that all these criteria contribute to one or more "meta-criteria"; for example, methodology validation or indicators related to methodology maturity help to increase schemes' robustness.

It is important to notice that

- **Other criteria that could be defined are not explicitly listed because they were redundant and would have given too much importance to some aspects.** For example, there is no specific indicator on secondary data because this aspect is evaluated indirectly through indicators related to primary data, database and default values.
- **The assessment is based on the information provided at the time of the analysis.** In particular, this implies that schemes under development
 - 1) May evolve significantly after the preparation of this report, which limits the validity of the assessment;
 - 2) May have been not tested intensively and have, as so, a risk of non-completion, even if this risk has guided our choice of major methodologies.
- **The assessment is focused on the appropriateness of a methodology for a given scenario in its current state.** As so, it tries to limit considerations like what would happen if all the good conditions were gathered, since
 - The objective of the study is also to understand if existing methodologies in their current states give the appropriate keys to gather these good conditions;
 - The evaluation of methodologies potential would be submitted to subjective evaluations.

As so, it is important to keep in mind that methodologies assessment is not only based on the following criteria but also consider other criteria that are not assessable easily (of which some have been highlighted previously).

Criteria used are as follows:

- **Management - Designed for fulfilling scenario objective:** This criterion assesses whether the methodology meets the scenarios' objectives. For example, for scenario 1, does it enable knowledge sharing and identification of internal improvement opportunities? For scenario 4, does it allow a precise calculation of PCF? ;
- **Management - Stakeholders diversity:** The diversity of stakeholders included in the development ensures the methodology compatibility with a large number of products. It is a means to allow a wide implementation of the process; the difference between public/not public consultations has not been considered as an independent criterion but is an element integrated in this evaluation;
- **Management - Involvement of public authorities:** The involvement of public authorities is an important parameter to enhance the credibility and the chance of success of the initiative, especially with the objective of an initiative undertaken at the EC level;
- **Management - Existence of specific working groups (by sector/industry/market/etc.):** Working groups can facilitate the communication between participants on specific issues and the elaboration of precise guidelines;
- **Management – International structure:** In order to promote internal PCF, it is important that the scheme has an international recognition in order to avoid distortion;
- **Methodology validation:** Stakeholders involvement in the validation process is a key criterion to ensure the methodology's acceptability; various types of validation can be undertaken (e.g.: peer-review, review in the process through a wide consultation) and the depth of validation depends on the methodology. This criteria remains as general as possible and is not limited to peer-review;
- **Methodology documentation availability:** The methodology documentation's accessibility affects the ability to judge its relative performance; this criteria deals with a detailed documentation explaining not only the basics but also enabling to run a PCF process upon it;
- **Methodology maturity - Number of products for which the methodology has been applied:** The number of products for which the methodology has been applied is a good indicator of the methodology's maturity;
- **Data collection - Possibility to use default values in absence of primary data:** This indicator evaluates the possibility of using alternative approaches when primary data are missing. Possibility of using default values may lead to a risk of misleading communication but is necessary in the case of mandatory approaches so that a PCF could be communicated (as required) even if data availability is low. Use of default values should however be limited and properly framed and communicated.
- **Data collection - Transparent description of the required primary data:** To ensure results comparability, required primary data should be clearly stated;
- **Data collection - Amount and detail of information required:** For mandatory approaches, user should have the possibility to assess its product CF through a limited amount of primary data; for voluntary approaches, increasing the number of specific data will increase PCF precision;
- **Data collection - Data quality rules:** this criteria is used to assess the requirements expressed by the standards against the quality of data collected;

- **Results - Expected product range of application:** The broader is the range of application, the higher might be the impacts of the initiative on global consumption and production patterns;
- **Results - Uncertainty assessment / sensitivity analysis:** It is necessary to ensure that both uncertainty and sensitivity of the results do not lead to misleading conclusions. It is however hardly possible to require each user to perform an uncertainty and sensitivity analysis;
- **Results - Level declared for product comparability:** In order to make the evolution of the carbon footprint easier, firms should be able to compare their performances to those of their competitors;
- **Results - Time scale validity of the CF assessment:** The market evolution should be taken into account to ensure that the label really promotes the best performing products;
- **Results - External critical review of the results:** An external critical review is important to ensure the robustness of the results;
- **Results - Transparent procedure to identify the best in class:** The identification of the "best in class" product requires a comparison with similar products;
- **Tools – Database:** A common database for all users of the methodology could help ensure results' comparability but guidelines for use should be sufficiently precise as to limit value choices. This indicator does not take into account the database management details (e.g.: update of the information, cost, etc.) and only considers if the scheme consider the possibility of using a common reference.
- **Tools – PCR-like documents:** PCRs-like documents are a good practice to ensure a sound and common evaluation basis for all products in a product category. They increase PCF comparability by describing the system boundaries, mandatory primary data, secondary data, etc. This includes real PCRs but also covers other possibilities like sectorial approaches.
- **Tools - Tool availability:** A free tool might enhance the number of performed CF calculations and therefore the possibility to build a data system riche enough to identify the "best in class" products.

Criteria weighting

Each criterion was weighted, in order to give more importance to the relevant criteria for implementing each scenario, as shown bellow (with a weight of 1 for each criteria, the number of criteria would have had more impact than their relevance). Additional explanation is given in [Appendix 3: Explanation of the weighting of the grading system](#).

The following table shows how criteria were weighted to adapt the methodologies' scoring to each scenario, from 1 to 3 with a growing importance.

This weighting has been done both "vertically" and "horizontally": it takes into account the comparison of criteria in a given scenario and also the comparison between scenarios. For example, in the case of "Data Collection – amount and detail of information required":

- Comparison between scenarios: the score of methodologies on the criterion "Data Collection – amount and detail of information required" has been considered more critical for mandatory scenarios (score 3) since it would involve a tremendous number of companies

and public authorities have to be particularly aware of the amount of work required in mandatory schemes;

- Comparison of criteria inside a scenario: for example, sub-scenario 2a (best-in class label) requires non-biased product differentiation. Primary data is therefore critical to establish the ranking; as so, the transparent description of the required primary data is considered more critical than the amount of data required.

Criterion	Scenario 1	Sub-scenario 2a	Sub-scenario 2b	Sub-scenario 2c	Scenario 3	Scenario 4
Management - Designed for fulfilling scenario objective	3	3	3	3	3	3
Management - Stakeholders diversity	3	2	1	2	2	2
Management - Involvement of public authorities	1	1	1	2	2	2
Management - Existence of specific working groups (by industry/market/etc.)	1	1		1	1	1
Management – International structure	1	1	1	1	1	1
Methodology validation	2	2	2	2	2	2
Methodology documentation availability	1	1	1	1	1	1
Methodology maturity - Number of products for which the methodology has been applied	1	1	1	1	1	1
Data collection - Possibility to use default values in the absence of primary data				2		2
Data collection - transparent description of the required primary data		3	2	3	3	3
Data collection - amount and detail of information required		2	2	3	3	3
Data collection - Data quality rules		2	2	2	2	2
Results - Expected product range of application	1	1	1	1	1	1
Results - Uncertainty assessment / sensitivity analysis		2	1	2	2	2
Results - Level declared for product comparability	1	2	1	2	2	2
Results - Time scale validity of the CF assessment		1			1	1
Results - External critical review of the results		2	1	2	2	2
Results - transparent procedure identify the best in class		3				
Tools – Database		1	1	1	1	1
Tools – PCR-like documents		2	1	3	3	3
Tools - Tool availability		1	1	2		2

This weighting system reflects the main issues considered and their importance for each scenario:

Issue	Scenario 1	Sub-scenario 2a	Sub-scenario 2b	Sub-scenario 2c	Scenario 3	Scenario 4
Data	0%	21%	26%	28%	24%	27%
Management	60%	24%	26%	25%	27%	24%
Methodology	27%	12%	17%	11%	12%	11%
Results	13%	32%	17%	19%	24%	22%
Tools	0%	12%	13%	17%	12%	16%

- Management structure is an important issue for all scenarios since the study is looking for appropriate methodologies for a EU-wide scale implementation; as so,
 - Inclusion of diverse and numerous stakeholders is expected;
 - Involvement of public authorities is also valued.

Moreover, the criterion assessing the consistency between methodology and scenario objectives is included in this issue and explains an important part of its weighting.

In the case of Scenario 1, this topic takes a specific weight since the main issue is to make firms work together for establishing and diffusing a methodology. This also explains why data and tools criteria are not included: this scenario is a necessary step for the methodology elaboration which will then propose such tools.
- The weight of “Methodology” is limited because main points of interest and risks for this topic are often not quantitatively assessable; related inputs are provided in the section [Focus on the methodological options](#).
- Criteria related to “Tools” assess the means for supporting the methodology implementation. Their weight has been adapted as to be able to compare general frameworks with detailed methodologies.
- Criteria on “Data” and “Results” have a variable weight which depends on the scenario objective.

Scoring

A score of 0 to 2 was defined for each methodology against each criterion in each sub-scenario (see [Appendix 2](#) for the detailed grading system).

A scoring of 0 does not mean that a methodology can not be adapted on a given criterion for such a scenario, but means that among the possibilities identified (and translated in a scoring scale), the scenario fulfils requirements corresponding to the mark 0 and not 1.

For example, the criteria “Management – Designed for fulfilling scenario objective” in sub-scenario 2a distinguishes:

0 – Absolute value for voluntary products

1 – Absolute value, possibility to give values to all products within a product category but without identifying the best product for the moment

2 – “Yes or no information”: best products get the label

In this case scoring 0 means that the current status of the methodology studied does not fit exactly the requirements for a best in class label, in particular in terms of product differentiations. But it

does not mean that the methodology is completely not adapted to the scenario. As so, general frameworks like ISO 14067, GhG Protocol or PAS 2050 which aim to remain flexible to be adapted to many products categories provide a limited framework for ensuring product comparison, even if – depending on the user – this comparability can be ensured. The difference with a mark of 1 relies on precise guidelines which limit the interpretation of the standard, like in PCRs-like documents for example, and as so help to compare products.

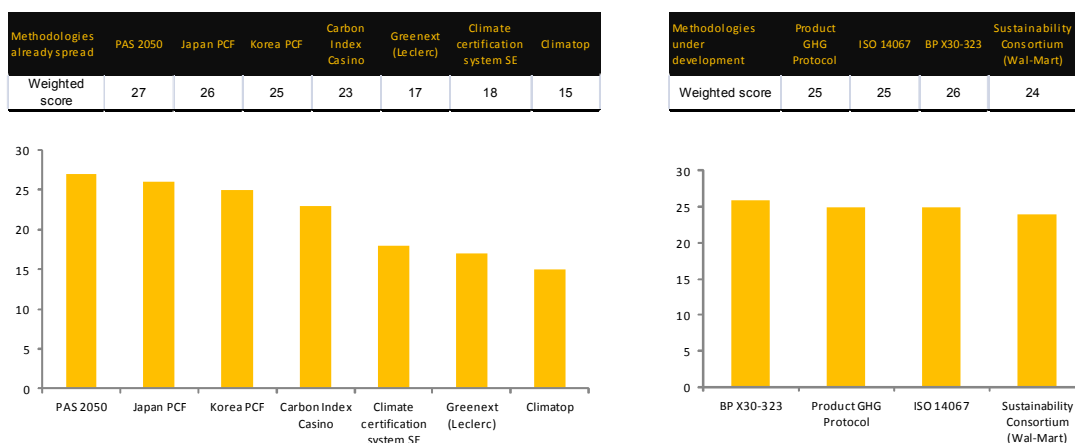
Moreover, it has been decided to limit the scale to 3 levels of performance for each indicator, even if a greater level of information could have been interesting; this choice has been made to limit the importance of each indicator in the final scoring and to avoid giving too much importance to some of them through a mathematical effect. For example, in the case of “stakeholder diversity”, the grade “2” does not enable to distinguish national from international consultation nor differences in the number of institutions consulted (e.g.: BP X30-323 was built through the consultation of more than 670 institutions), even if the acceptance of the initiative grows with the consultation panel.

b. Methodology assessment per sub-scenario

Below, we present the total weighted grades of the different methodologies for the various sub-scenarios (see [Appendix 4](#) for the detailed assessment).

Two groups of methodologies are identified in the following graphics: those already tested (on the left) and those in development / tests (on the right), for which assessment is mainly based on current versions of standards and are subject to changes.

Scenario 1: Favouring the internal use of Product Carbon Footprint (PCF) by companies



Two groups of methodologies can be identified: those above 20 points and those below.

Methodologies with a performance greater than 20 points have few differences and a weakness on a criterion is generally compensated by strengths on other criteria. Strengths of methodologies are mainly:

- Their **internal management structure**; indeed, the objective of this scenario is mainly an internal action from firms, and an appropriate management structure can help firms with the same issues (e.g. from similar sectors...) to progress more efficiently and quickly.

All can rely on the involvement of diverse and numerous stakeholders but methodologies under development have their management structure more specially adapted: this aspect has been particularly followed, as a consequence of the global need for a harmonized basis of work taking into account the feedback from older experiences:

- Product GhG Protocol and ISO 14067 take benefits from an international structure involving many and diverse stakeholders, which could be useful at a European level. Experienced methodologies may have included international stakeholders in their development but the international consultation process is more systematic and extended with WBCSD/WRI or ISO processes. This is also due to the learning from previous methodologies and to the attempt of creating a common framework for PCF. However, these methodologies aim to provide users with a general and flexible framework and their management structures gather stakeholders with diverse purposes and issues.
- BP X30-323 has a multi-stakeholder structure with product-specific working groups. It allows focusing on issues more specific to a product category. This is particularly interesting to enable methodological focuses and further works for improvement.
- Their **important experimentation based on a methodology designed for providing a reliable PCF value**. Of course, this parameter mainly impacts experienced methodologies.

Regarding criteria presented in the section [Calculation and technical features](#) (evaluated qualitatively), allocation was the only one identified as leading to a specific risk for this scenario. Methodologies identified in the group of major ones all deal with this aspect except Sustainability Consortium (Wal-Mart).

Conclusion

Various existing or in-development methodologies seem appropriate for helping firms to work internally on the reduction of their PCF.

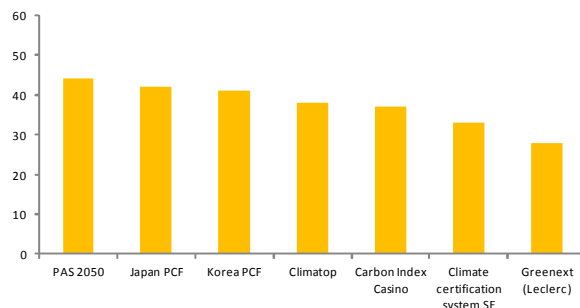
A widespread management structure involving many and diverse stakeholders – like for ISO 14067 or Product GhG Protocol – is an advantage for developing a European scheme. However, gathering so many actors could limit the precision of the developed methodology (in order to remain flexible and adaptable) and the interest for firms (working on general issues does not help to solve specific issues; this fact probably explains, for example, the increase of sectorial approaches).

A structure with various working groups – like in the BP X30-323 – that focuses on specific products' categories could be a solution for focusing on dedicated issues, and feedback from “older” methodologies could enable to progress more quickly.

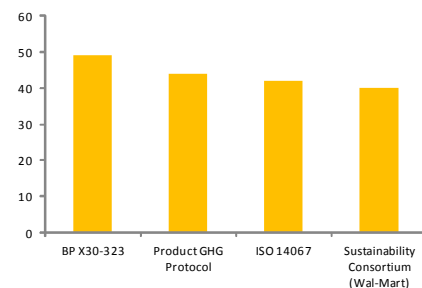
As such, an **extension of PAS 2050, ISO 14067, Product GhG Protocol or BP X30-323 structures seems to be the best solution for this scenario.**

Sub-scenario 2a: The voluntary best in class label

Methodologies already spread	PAS 2050	Japan PCF	Korea PCF	Carbon Index Casino	Greenext (Leclerc)	Climate certification system SE	Climatop
Weighted score	44	42	41	37	28	33	38



Methodologies under development	Product GHG Protocol	ISO 14067	BP X30-323	Sustainability Consortium (Wal-Mart)
Weighted score	44	42	49	40



The performance scale is wider for this sub-scenario, which is linked to the wider range of criteria considered. Three “groups” of methodologies can be identified

- BP X30-323, which clearly comes out as the best methodology for this scheme
- Methodologies with a performance between 40 and 45 points which are essentially general PCF calculation methodologies supported by public authorities and/or a wide range of stakeholders
- Other methodologies

Current initiatives which are similar to best in class labels schemes have better performances in this scenario than in others, which is quite logical given that they share the scenario’s objective and have set up a management and communication structure adapted for dealing with this issue. However, the assessment shows that they are not considered as the best options for various reasons:

- Climate certification system SE:
 - the development of this scheme is still running (in terms of products covered) and lacks maturity;
 - the methodology is not based on a systematic LCA but needs a preliminary work of identification of the criteria to be considered; it is however a choice from the

methodology owner to simplify the assessment process (it has to be reminded that the objective of this scenario is not to provide a PCF value, which explains this choice);

- it is limited to food-industry products;
- uncertainty management is unclear;
- Climatop: this scheme is, for the moment, considered not sufficiently transparent: it mainly relies on LCA principles for the calculation but its own rules (determination of reference product...) are not properly identified for an external reader.

Moreover, both schemes have been developed through a relatively limited participative process and rules for determining the best in class product could be further discussed for widening the scheme at a European level. Their current ranking shows however that they could be considered as good candidates for a wide scale implementation if these points are improved.

Other methodologies take benefits from:

- A wide involvement of stakeholders; like for scenario 1, a wide basis of actors would be an advantage for ensuring a good definition of “best in class” products and the acceptance of the scheme.
- A clearer and more transparent way of integrating primary data; this is particularly important for identifying the “best” products, since primary data would be a key for product differentiation.

Then, each methodology has its own interesting developments which enable a differentiation with others. The main strength of **BP X30-323** is its hybrid form: it aims at enabling PCF calculation like other methodologies (GhG Protocol, PAS 2050, etc.), but it is clearly designed to allow comparison between products by providing specific rules by product categories, which is a key concept for this scenario. It is also foreseen to offer a complete toolkit to help a wide use of this methodology like PCRs-like documents, calculation tool and database. Thus, it would be a good basis to build a best in class scenario.

However, it should be reminded that this methodology is currently under development (general guidelines are finalized but PCRs are under development) so there is no possibility for an immediate use, and it is still a national scheme that will need to be widen for a European implementation. Moreover, some other methodologies (ISO 14067, Product GhG Protocol, PAS 2050,...) developed to provide a calculation framework could be interesting bases for developing such a scenario; indeed, they were developed to remain flexible but a precise implementation system aiming at increasing product comparability by providing clearer rules by product categories could increase the appropriateness of such methodologies for this scenario.

Regarding technical criteria highlighted in [Calculation and technical features](#) and the position of BP X30-323:

- Functional unit definition should ensure product comparability; PCRs-like documents developed in BP X30-323 aims at achieving this goal.
- There is a risk about the use phase criterion since the referential is not clear on this subject. However, this issue may be treated efficiently in PCRs.
- Requirements are expressed regarding data quality, allocation process and review process. However, these points have to be detailed in PCRs.

Conclusion

The scores reveal the necessity of a precise and transparent definition of the LCA calculation rules for this scenario, and in particular a higher level of expectations regarding data.

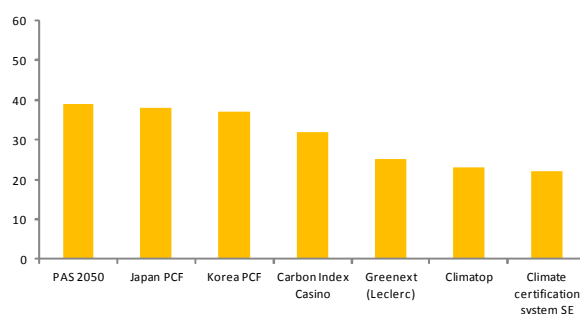
Current “best in class” methodologies (Climatop and Climate certification system SE) suffer from different weaknesses such as: the lack of transparency in calculation rules, not enough international participative process. Therefore, they do not obtain the highest scores, although their objectives are in line with those of the scenario.

Indeed, for this scenario, an ideal methodology would combine:

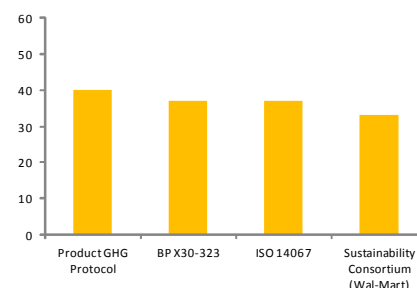
- A precise and transparent definition of the LCA calculation rules with a large involvement of the stakeholders in the production of LCA studies that would guide the definition of simple environmental criteria (BPX 30-323)
- A definition of simple environmental criteria (Climate certification system SE)
- A best in class labelling scheme (Climatop).

Sub-scenario 2b: The voluntary index or reduction claim

Methodologies already spread	PAS 2050	Japan PCF	Korea PCF	Carbon Index Casino	Greenext (Leclerc)	Climate certification system SE	Climatop
Weighted score	39	38	37	32	25	22	23



Methodologies under development	Product GHG Protocol	ISO 14067	BP X30-323	Sustainability Consortium (Wal-Mart)
Weighted score	40	37	37	33



Leading methodologies for this scenario are those

- Already developed and taking benefits from a wide experiment: PAS 2050, Korea PCF, Japan PCF;
- In development and supported by an important involvement of stakeholders: Product GhG Protocol, ISO 14067, and BP X 30-323.

This is consistent with the fact that current or under development methodologies mainly aims to provide a voluntary calculation framework for getting a PCF value. Moreover, the consistency of results between major methodologies for this scenario (more than 50% of the tested methodologies have between 36 and 40 points) is not surprising because many of them rely on the same basis: ISO 1404X norms, PAS 2050, etc. and refinements made (allocation rules, local specificities) have not been captured in the scoring card.

It has to be noticed that recent methodologies like Product GhG Protocol get similar or better grades than mature systems like PAS 2050 or Korea PCF because they cover points missing in these older schemes, and they take benefits from a wider stakeholder implication. In fact, it is the proof that the wide experiment of their predecessors has been taken into account in their elaboration.

Criteria detailed in [Calculation and technical features](#) are quite equally treated in each methodology:

- Product comparability is a point to reinforce because current schemes are not sufficiently solid on this subject, often by choice (providing a flexible framework instead of detailed calculation rules by product categories);
- Information sources for use phase have to be chosen carefully given that methodologies do not have the same approach on this subject. The same goes for allocation rules.

Conclusion

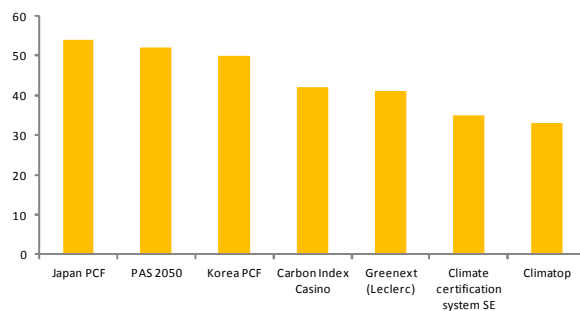
Current major schemes (Product GhG Protocol, PAS 2050, Korea PCF, BPX30-323, etc.) are appropriate for this scenario, as many of them rely on the same methodological basis. Two points are however of first importance for implementing such a scheme at a European level:

- **Consistency with other schemes:** in order to avoid “wasting” PCF already calculated by some users, a detailed gap analysis has to be performed with locally used methodologies to correct existing PCFs. As such, a specific work of comparing calculation for a same product with various methodologies could be performed. Regarding this issue, **PAS 2050** currently seems to be the best option for developing a common basis for comparison, since other methodologies often rely on it, and it is recognized as an important and reliable methodology. Worldwide methodologies which are being developed (**Product GhG Protocol** and **ISO 14067**) may be suitable options when finalized.

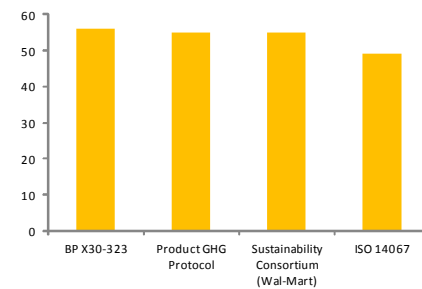
- Possibilities to highlight **the user's carbon footprint reduction engagement**: current schemes are not designed to highlight user engagement, except the **Korea PCF** which has 2 logos (one for PCF, one for low carbon products) and **PAS 2050** in the private Carbon Label of Carbon Trust.

Sub-scenario 2c: The mandatory index

Methodologies already spread	PAS 2050	Japan PCF	Korea PCF	Carbon Index Casino	Greenext (Leclerc)	Climate certification system SE	Climatop
Weighted score	52	54	50	42	41	35	33



Methodologies under development	Product GHG Protocol	ISO 14067	BP X30-323	Sustainability Consortium (Wal-Mart)
Weighted score	55	49	56	55



Three groups can be distinguished:

- Methodologies with a performance equal or greater than 45 points, which are general methodologies developed by or with international stakeholders and rely on a detailed calculation methodology.
- Middle-range methodologies (Greenext (Leclerc) and Carbon Index Casino), which suffers from a lack of support at an international level and are moreover developed more specifically for a sector.
- Other schemes, which are not specifically designed to provide a PCF index.

The first finding is that methodologies suitable for a voluntary index are also suitable for a mandatory index. There is no simple mean for distinguishing methodologies of the first group (score greater than 45 points), since each of them gains or loses points on specific criteria. For example, BP X30-323 is specifically designed to enable product comparability through its detailed calculation rules by product categories, which promotes this methodology in the case of a mandatory index (since consumer will automatically compare similar products inside a product category). This criterion disadvantages ISO 14067 which does not have the same objective but tries to provide a generic framework for calculation and, as a consequence, requires more works of adaptation to directly enable product comparison. On the opposite, it relies on a better international agreement.

As so, since no methodology got a “perfect scoring” and has points to strengthen, it can be understood that current schemes are not completely suitable for a mandatory implementation and are perfectible in order to get the best solution for this scenario.

Key observations are:

- Methodologies like BP X30-323 or Product GhG Protocol take benefits from their **reliable and complete approach**, as well as from their **management structures** which involve many stakeholders and for which greater acceptance are foreseen.
- Methodologies like Greenext (Leclerc) or Sustainability Consortium (Wal-Mart) need to **collect limited information**, which **could reduce the process’ burden**; this explains their progress in the ranking. However, it should be noticed that the difference in management structure (private scheme with limited involvement of stakeholders for Greenext (Leclerc), public scheme with higher involvement for Sustainability consortium (Wal-Mart)) leads to a high difference in the final ranking in favour of Sustainability consortium (Wal-Mart).
- Among the suitable methodologies for this scenario
 - BP X30-323 is a specific case since it was designed to be a mandatory scheme, which explains its ranking. However, this scheme is currently too weak on some key aspects for this scenario, like the external review of results (no information is given yet since it has to be determined in PCRs; then, it is impossible for the moment to know if the related burden will be suitable for implementation); moreover, its maturity is not sufficient to judge its implementation success: there is no experience feedback on its implementation and the French legislation has now planned a minimum one-year experimentation period prior to possible implementation.
 - Japan PCF is also an interesting alternative given that it is a scheme already implemented and supported by the Government. However, it is currently quite unclear about uncertainty evaluation, which could reduce product comparability.
 - Product GhG Protocol and Sustainability Consortium (Wal-Mart) are interesting initiatives but the implication of public authorities may be too limited for the moment.
- Methodologies which have been highlighted as suitable imply an **important verification and communication system**, which could slow down their progress in the frame of a wide-scale implementation.

Regarding quantitatively assessed criteria detailed in the section “[Calculation and technical features](#)”, no specific conclusion can be drawn given the diversity of approaches and the closeness of results. Specific attention should be paid to those criteria to strengthen current methodologies for a mandatory implementation.

Conclusion

A mandatory index scenario would require a methodology with:

- A precise and transparent definition of the LCA calculation rules that reaches a consensus among the stakeholders,
- A sufficient level of data collection requirements to ensure robust results that allow scientifically sound PCF comparisons,
- A data management system that could provide default values for all users affected by the mandatory scheme.

The studied methodologies, in their current state of development, do not fulfil all of these requirements and therefore are not yet mature enough for mandatory implementation. The development of PCR-like documents may be useful in the future for reaching an international agreement on criteria such as the functional unit, allocation rules, etc.

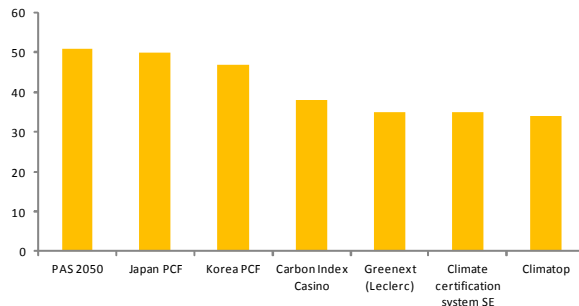
BP X30-323 slightly stands out but is still under development and we therefore lack insight to fully assess its applicability to a mandatory index scenario. The same applies for Product GhG Protocol and Sustainability Consortium (Wal-Mart).

Current schemes based on a governmental initiative (PAS 2050, BP X30-323, Japan PCF) may be suitable for further implementation. They should be improved taking into account experience from methodologies that have been able to:

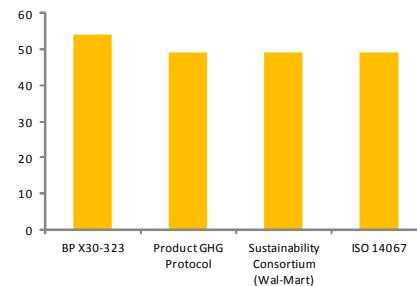
- Reduce the amount of information required (e.g. **Sustainability Consortium, Greenext**),
- Involve the stakeholders belonging to the same value chain and have them work together (e.g.: **Sustainability Consortium**) in order to have appropriate and accepted industry approaches.

Scenario 3: Implementing market-based incentives

Methodologies already spread	PAS 2050	Japan PCF	Korea PCF	Carbon Index Casino	Greenext (Leclerc)	Climate certification system SE	Climatop
Weighted score	51	50	47	38	35	35	34



Methodologies under development	Product GHG Protocol	ISO 14067	BP X30-323	Sustainability Consortium (Wal-Mart)
Weighted score	49	49	54	49



- Situation is quite the same than for sub-scenario 2c with a stronger differentiation between methodologies groups.
- The lead of BP X30-323 is partly due to the direct involvement of public bodies – useful for a mandatory scheme – and to its structure based on sector-specific working groups, which is a good basis to support market-based action.
- Product GhG Protocol performance is degraded due to these management aspects and also to the limited comparability of products: it is an important aspect for this scenario since a market-based action needs to clearly differentiate products, but this is not an objective of this scheme (which prefers giving accurate results through its adaptability to each specific case). The same occurs to some extent for Japan PCF for which uncertainty management is unclear and sector-specific structures are absent.
- PAS 2050 remains among the leaders thanks to its experience on the subject and its precise calculation rules.
- It has to be mentioned that Sustainability consortium (Wal-Mart) initiative is currently not totally suitable for a market-based incentive but it follows the same logic, since retailers put pressure on their suppliers to understand their environmental impacts. This network logic could be an interesting way to implement this scenario (and it reminds the importance and central role of retailers).

Regarding quantitatively assessed criteria detailed in the section “[Calculation and technical features](#)”, comments made for scenarios 2a and 2c apply, that is to say that BP X30-323’s implementation is currently uncertain and some methodological points have to be clarified.

Conclusion

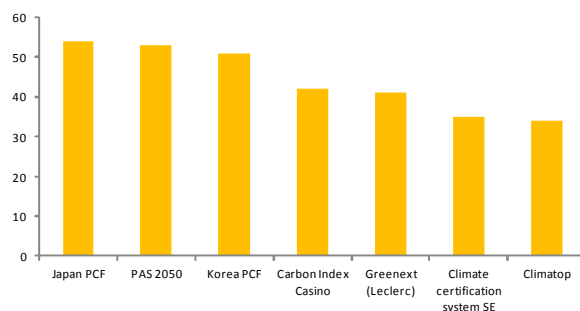
BP X30-323 seems to be slightly more efficient for this scenario than other PCF methodologies. This is partly due to:

- The direct involvement of public bodies in the methodology elaboration, which provides a good structure for mandatory schemes;
- The presence of working groups by industry to support the definition of the differentiating criteria, which is a good structure to support a market approach.

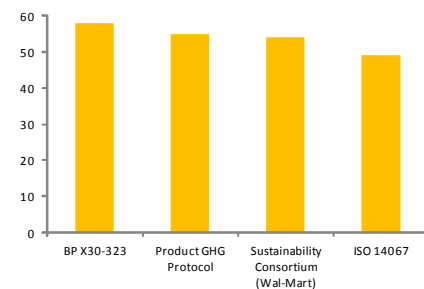
However, a market-based scheme may increase pressure on some economic operators of the value chain. For example, in the “meat” market, the allocation key chosen for the upstream impacts takes on particular importance: choosing an allocation rule based on weight could transfer an important part of these environmental impacts on the disposal fields (the carcass weighs more than the meat itself), whereas an allocation rule based on economic values mainly targets the meat producers. As such, it is important to promote a networking structure that involves the whole value chain in the methodology elaboration. This risk is currently not sufficiently mitigated and may lead to stress in the value chain; a networking structure like the one used in **Sustainability Consortium** could be a good source of mitigation.

Scenario 4: Setting minimum requirements

Methodologies already spread	PAS 2050	Japan PCF	Korea PCF	Carbon Index Casino	Greenext (Leclerc)	Climate certification system SE	Climatop
Weighted score	53	54	51	42	41	35	34



Methodologies under development	Product GHG Protocol	ISO 14067	BP X30-323	Sustainability Consortium (Wal-Mart)
Weighted score	55	49	58	54



Methodologies distribution is similar to other mandatory schemes. This is mainly due to the fact that defining minimum requirements will require being able to define quite precisely the range of products performances and to compare them. This clearly disadvantages schemes not aiming at comparing products but which could be as interesting as other schemes (e.g.: ISO 14067 for its international dimension and acceptance).

Score building for each scenario is similar to those considered in scenarios 2c and 3; thus, the observations regarding the results are still valid: each methodology has its own strengths but none of them can say that it got the “perfect” scoring, so the margin for improvement is still important. This is also true for criteria quantitatively assessed detailed in the section [“Calculation and technical features”](#) with a higher level of caution: many criteria are currently not subject to consensus so the level of risk is greater and even too great to implement such a scheme in these conditions.

Conclusion

The ranking is similar to the other mandatory scenarios (2c and 3). This is mainly due to the fact that defining minimum requirements requires being able to precisely define the range of products performances and to compare them.

The main conclusion of the assessment is that none of the schemes is perfectly suitable for such a scenario:

- Methodologies which could have the greatest acceptance (many and diverse stakeholders involved in the methodology elaboration, like the Product GhG Protocol) choose to develop a general approach by providing a flexible framework, which can be adapted to every product. As such, product comparability is not immediate because underlying assumptions made in each case have to be clarified.
- Methodologies targeting work by product category (like BP X30-323) provide detailed calculation rules and increase the product comparability, which is important in defining the requirements. Yet, these methodologies are currently not sufficiently widespread at an international level, even if they are included in current discussions.
- Methodologies which have been widely tested (like PAS 2050) provide an interesting basis for determining requirements since for some products, many PCF results are available. However, specific additional work has to be conducted to compare results on same products using different methodologies, in order to define appropriate requirements (insufficient basis of products assessed to build a scale of performance for each product).

Therefore, **it is not recommended to implement such a system for the moment.**

F. Conclusions

a. Main learnings

The current panorama of methodologies and initiatives for product carbon footprint is quite broad and quickly evolving, which has led firms, public bodies and other structures to develop their own methodologies to support their own needs. This may generate a loss of interest in PCF since consumers and other stakeholders are presented a plethora of information said to be comparable but in reality quite different in terms of their approaches, which leads to further confusion about this topic.

The European Commission has an important role to play because it is at the appropriate decision-making level to homogenise national approaches without being perceived as willing to take advantage of the process.

Main observations issued from the present study are that:

- **Many methodologies were built from the ISO 14040/14044 norms** which have been used for 10 years and can provide a complementary feedback to current PCF methodologies.
- **Very significant progresses have been made over the last two years** in developing PCF methodologies. The existing initiatives have already led to voluntary PCF labelling in many countries.
- **Some products categories have already been widely tested** throughout existing schemes, and **most consumer product categories could be tested within the next years** given current development of existing methodologies, while PCRs are being developed to support methodologies wider implementation.
- Experienced methodologies have shown a **good adaptability during past experimentation**.
- However, specific product footprint methodologies are quite **recent** (the oldest dates back to 2008) and **none of them has presently been tested over all product categories so as to conclude now their perfect suitability for a wide-scale implementation on consumer products**.
- **Current systems are presently not mature enough to implement a mandatory scheme**; indeed, none of the studied methodologies is currently commonly accepted, each methodology has its own strengths and weaknesses (which could be related to their objectives), and consensus on some critical methodological options (e.g. allocation rules, cut-off criteria) is not sufficient to provide a balance between PCF robustness and complexity/cost of implementation for users, enabling objective choices for consumers. This might be achieved by way of the harmonization efforts currently in progress, but also by way of an increase in detailed calculation rules which could be obtained through the development of PCR-like documents (PCRs or sectorial methodologies for example).
- Current methodologies still **lack precision on some critical aspects**: scenarios to be used for the use phase / end-of-life phase, cut-off criteria, land use, etc. Specific work should be undertaken on these subjects in order to provide users with an accepted framework.
- **Future European schemes will have to consider consistency with existing international initiatives** aiming to homogenise PCF methodologies (Product GhG Protocol, ISO 14067) and to take into account experience from their more mature predecessors (such as PAS 2050).

- The selection of the appropriate methodology to be applied at EU level should take into account the **possibility of widening the environmental scope of the methodology to include environmental impacts other than climate change**, as well as to ensure that the whole life cycle is considered in the analysis. Indeed, the idea of getting the full picture of environmental impacts is essential in order to ensure that a consumer is not misled and that efficient action for protecting the environment is undertaken. With this objective in mind, specific consideration should be paid to the respect of LCA principles that have been widely applied.

The appropriate scenario should fulfil, in the long term, the ultimate goal of such initiative: to reduce the global environmental impact of consumption. A relevant **action plan for the European Commission** could consist in:

- **Keeping on actively supporting current operations for homogenising PCF methodologies.** In particular, international methodologies with a general approach like ISO 14067 would be a good framework to promote: they provide a global framework for other methodologies and are developed within a widely accepted structure. This is useful for further international actions like those undertaken by the European Commission.
The European Commission could then facilitate the improvement of these general standards regarding aspects that are insufficiently precise; for example, it could help organizing discussions around the appropriate PCRs to be used in the framework provided by the selected methodology.
- **Once a global and commonly accepted framework is defined, undertaking a gap analysis with existing methodologies** in order to identify points to be covered and corrected.
- **Defining the level of ambition of the EU policy regarding PCF** (communication to consumers; market-based incentives; minimum requirements) and the corresponding timeframe. These three options could even be considered as **three implementation steps**. With this objective, the best compromise among the studied methodologies should be selected, in parallel with supporting homogenisation works.

b. Further developments

Some issues have not been investigated in the present study but would require additional analysis for further development of a policy related to product carbon footprint, as detailed in the section related to [study limitations](#):

- **Expectations of consumers regarding environmental labelling:** depending on the level of communication made to consumers, methodology options could be different. The present study focused on the impacts of these choices on methodologies (this explains for example the differentiation made between best-in-class labels and indexes) without taking position on the best options. Such a choice has been investigated in specific studies and should be taken into account in further developments.

- **Definition of product category:** depending on the definition of product category, the differentiation of products inside a product category is more or less easy, communication to consumers will be different, and pressure on some specific actor of value chains could increase (e.g.: case of meat).
- **Applicability of PCF to all product categories:** this study focused on product carbon footprint but the question should be raised if this indicator is relevant for all product categories; this issue is intimately linked with the topic of burden shifting.
- **Legal risks related to the integration of the PCF:** this study aimed to identify risks associated to methodological aspects of PCF; however, a deeper analysis could be performed to identify the legal consequences and risks of these areas identified.
- **Technical issues:** growing consideration is paid to some topics without getting a commonly approved view. Thus, the integration of renewable energy in firms policies is increasing but the valorisation of these elements in PCF methodologies is still under discussion (e.g.: green electricity). The same goes for land use change, carbon storage or biogenic carbon. Specific studies should be undertaken for supporting other international works on these issues.
- **Methodology strengthening:** in the past, PCRs have been identified as a mean to strengthen methodologies by providing clear rules by product categories; however, this process takes time and recent works put this practice in question, especially when compared with sectorial approaches.

Appendix 1: Detailed analysis of major methodologies and initiatives

Note: this appendix has been updated at the beginning of September 2010 according to information provided by the methodologies owners.

Analysis of methodologies GHG Protocol Product standard

General

General

Objective	The primary purpose of this standard is to support public disclosure of product life cycle GHG emissions to help users reduce these emissions by making informed choices about the products they design, manufacture, sell, purchase or use. The standard supports various business objectives e.g. identifying emission reduction opportunity along the product's supply chain, tracking improvements over time, understanding risk from life cycle GHG emissions in products, etc..
Type of protocol	Publicly available
Targets	<p>This standard is designed for companies and organizations of all sizes in all economic sectors.</p> <p>The methodology is under development and pilot testing with 40 companies took place from January through June 2010. Companies participating in the road testing represent 17 countries and more than 20 industry sectors.</p>

Structure

Sponsor / initiative structure	<ul style="list-style-type: none"> - The Greenhouse Gas Protocol Initiative is a multi-stakeholder partnership of businesses, non-governmental organizations (NGOs), governments, and others convened by the World Resources Institute (WRI), a U.S.-based environmental NGO, and the World Business Council for Sustainable Development (WBCSD), a Geneva-based coalition of nearly 200 international companies - The initiative structure is described in a specific document "GHG Protocol Initiative - Product and Supply Chain Accounting and Reporting Standard - Governance Plan & Terms of Reference".. It describes each structure involved in the process - The process is organized and managed by WRI and WBCSD. The Steering Committee (25 members) provide leadership to the direction of the standards, over 180 Technical Working Group members drafted the first draft standards, with input and approval from the Steering Committee. A larger Stakeholder Advisory Group of 1,400+ members also provided input through workshops or written feedback. Road Testing of the draft standards was conducted by 70 companies and their feedback and recommendations will be utilized to update the draft standards. In the case of problems to obtain a consensus, WRI/WBCSD will retain the authority to make the final decision. - The final standards will be made available by WRI/WBCSD
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Owner of the methodology	WRI/WBCSD GHG Protocol
Type of commitment	Voluntary
System manager	<p>No information on the structure to be set up since duties have to be done by "companies". An internal LCA expert or a close cooperation between an LCA expert and the company seem to be the best options because:</p> <ul style="list-style-type: none"> - the adaptation of the methodological framework requires knowledge of both company's process and LCA concepts (e.g.: mapping, definition of the functional unit). - the analysis phase is mainly based on LCA knowledge <p>Regarding other phases:</p> <ul style="list-style-type: none"> - Data collection: since primary data have to be preferred and suppliers can be engaged in the process, involving internal resources seems to be the best option, even if external resources are not prohibited. The protocol advise to balance cost, burden and data quality to get an optimized data collection. It also depends on the precision of the data collection framework and the business goal of the study. - Calculation: depending on the preparation (adaptation of the methodological basis), internal or external resources could be used. <p>Moreover, the standard gives tips to reduce the burden of such a study.</p>
<u>Stakeholder acceptance</u>	
Links with policy and regulation	<p>Product GHG protocol is currently under development.</p> <p>It is most intended to support voluntary GHG reporting but is likely to be supported by a number of voluntary and mandatory reporting programs. However, it might be assumed that other product carbon footprint methods would like to be in line with this GHG Protocol. It is designed as the Corporate GHG Protocol used by many existing GHG programs for their own accounting and reporting requirements:</p> <ul style="list-style-type: none"> - Voluntary GHG reduction programs - GHG registries - GHG trading programs
Links with authoritative bodies	<p>Some authorities are member of steering committee e.g. European Commission, Defra, US-EPA</p> <p>Some authorities are included as stakeholders in the process (UK Defra, US EPA and New Zealand Department of Agriculture,...)</p>
Other information	<p>The GHG protocol has been developed through a multi-stakeholder consultative process involving representatives of reporters and report-users from around the world, and it gets a good acceptance from major companies, NGOs and governments. The stakeholder advisory group has to provide feedback on the draft elements of the guidelines as they are produced through the working group process.</p>
<u>Methodological background</u>	
Link with other PCF projects	<p>Some work is currently being done as to harmonize GHG Protocol with PAS 2050 and ISO 14067. Other work is undertaken with other organizations, including Japan PCF, Joint Research Center, Carbon Disclosure Project, etc.</p>
Link with ISO standards	<p>The global standards ISO 14040s, ISO 14025 and ISO 14064s have been taken into account in the calculation method for carbon footprint. Specific work is undertaken as to ensure compliance with ISO 14067. WRI and WBCSD are liaison members of ISO TC207 and participate in ISO 14067 meetings. ISO 14067 Convenor is a member of the GHG Protocol Product</p>

	and Supply Chain Initiative Steering Committee.
Revision process for the methodology and the background data	<ul style="list-style-type: none"> - Methodology: no information available; other standards and tools from the GHG Protocol initiative are reviewed and updated on a non regular basis. - Application to a product: The data management plan is likely to be an evolving document that is updated as data quality improves, internal data collection and handling procedures are refined, calculation methodologies improve, product inventory responsibilities change within a company or the purpose of the product inventory changes (e.g., from an internally used account to a publicly disclosed account).
System management and implementation	
Tests already performed	
Number of products tested	Some products have been used for the road testing process by the companies participating (please see below)
Number of companies having made tests	44 companies have participated to the test phase of the protocol. Companies participating in the road testing represent 17 countries from every continent and more than 20 industry sectors.
Other information	
Required conditions for implementation	No specific conditions are indicated.
Economic aspects	<ul style="list-style-type: none"> - The protocol is freely available on the internet website. - The protocol lets the company choose the implementation process (e.g.: external or internal experts) but there is a need for internal resources to calculate GHG emissions, to individuate target emissions and implement quality plan. - External verification is not mandatory but is recommended to increase the credibility of the published inventory reports. <p>Implementation cost depends on the possibility for the firm to have internal experts; it can be reduced if only internal resources are used.</p>
Management burden	<p>No PCR is provided but PCRs may be used as secondary sources of information but precise information should be provided on the PCRs used. The application of general principles and the justification of the followed management approach have to be provided by the firm implementing the protocol.</p> <p>Thus, an important part of the management burden relies on users. Indeed, the protocol tries to be flexible and let the user adapts it to its specific case, even if the framework tries to be clear enough in order to lighten this burden.</p>
Development process of protocol	
Stakeholders involvement	<ul style="list-style-type: none"> - The steering committee is made of various technical experts chosen according to various aspects, stakeholder and geographic diversity being one of them. - Technical working groups also include experts from different organisms (governments, businesses, NGOs, etc.). - Finally, a stakeholder advisory group has to provide a feedback on the draft elements of the guidelines. Stakeholder workshops have been organized. - The pilot tests serie has been initiated in January 2010. Companies participating in the road testing represent 17 countries from every continent and more than 20 industry sectors.
Standardization level	The standard is currently under development; a test phase based on a first draft (dated of November 2009) has been conducted and the finalization of the document is currently undergoing.

	GHG protocols are usually internationally accepted.
Peer-review of underlying methodology	No independent review seems to be made but the inclusion of many stakeholders and technical experts and the importance given to consensus is an important element to ensure the methodology's reliability.

Implementation of protocol

Applicability

Goods and services mainly targeted	Any good or service. Some specific indications are included for services (use phase for example).
Additional efforts to expand the project	The standard is made to be flexible and, thus, applicable to all kinds of products or services. As a consequence, specific adaptations will have to be made for a real application. Many references to sectorial approaches are indicated in the protocol and are expected to begin to be developed in 2011 onwards.
Possibility of analysis / use of data	It is a very wide scheme so there is potentially broad possibilities of analysis (possibility of improvement analysis, identification and tracing of drivers, identification of cause-effect-chains,...). However, the protocol states that "The standard is sufficiently flexible to support GHG quantification and reporting for many different types of products . This flexibility, though, results in a standard that does not directly enable comparative assertions or product labelling. Comparative assertion refers to an environmental claim regarding the superiority or equivalence of one product versus a competing product that performs the same function. Valid assertions or labelling requires a greater degree of prescriptiveness than is provided in this standard. The Standard will include guidance on how programs, developers, and organization can apply additional constraints to the Standard requirements so that valid assertions and claims can be made. This section is currently under development."
Consideration of other environmental impacts	- Mono-criterion approach - The standard uses, among others, LCA principles; as so, it is theoretically compatible with the analysis of other environmental impacts but the standard focuses on only one impact category: climate change. The aim of this protocol is to create a standard for GHG emissions, only.

Principles

Life cycle perspective

Life cycle perspective	All the life cycle of a product should be included, but sometimes some exclusions are allowed. The list of stages considered is: - Raw material acquisition and preprocessing - Production - Product distribution and retail - Use - End of life Transport in each stage is also considered.
Modularity	The main point regarding this issue is the difference between cradle-to-gate and cradle-to-grave analyses. The second one has to be preferred (Companies shall perform full life cycle GHG inventories (cradle-to-grave) for all products when applicable) but a cradle-to-gate analysis could be used in some specific cases, like for intermediate products when the eventual fate is unknown: When justifying why a cradle-to-gate inventory is reported, a company should clearly disclose the cradle-to-gate nature of the inventory,

	and have assurance that their product meets the criteria of an intermediate product. For example, although general resins may be considered an intermediate good, if a company makes a certain resin that is only used in one product, then a cradle-to-grave inventory is required.
Functional unit	<p>The protocol states that the calculation of the GHG emissions need to be based on a functional unit.</p> <p>The following elements need to be addressed when defining the study's functional unit:</p> <ul style="list-style-type: none"> - Quality of the product. - Service life. - Use Patterns. - Technical performance characteristics and maintenance requirements. - End-of-life of the product (e.g. availability of recycling infrastructure and ultimate fate of material(s), components or subcomponents). <p>Additional issues are detailed (for example, Using Sector Specific Guidance to Define a Functional Unit) and examples are provided.</p>
<u>Criteria suitability</u>	
Consistency	The standard states that five accounting principles are intended to underpin all aspects of GHG accounting and reporting for products, and in particular: Use methodologies to allow for meaningful comparisons of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or other relevant factors in the time series.
Relevance	The standard states that five accounting principles are intended to underpin all aspects of GHG accounting and reporting for products, and in particular: Ensure the product GHG report serves the decision-making needs of all users identified within the report. Present information in the report in a way that is readily understandable by the intended users with a reasonable knowledge of GHG accounting and who are willing to study the information.
Completeness	<p>The standard states that five accounting principles are intended to underpin all aspects of GHG accounting and reporting for products, and in particular: Ensure that the GHG report covers all product life cycle emissions within the specified boundaries (including temporal), state clearly any life cycle stages or significant non-GHG environmental impacts that have been excluded and justify these exclusions.</p> <p>The following emission sources should not be included in the quantification of emissions:</p> <ul style="list-style-type: none"> - Emission credits due to the storage of carbon in a product. - Biogenic carbon emissions due to the combustion of renewable bio-based materials. - Purchased Offsets. - Avoided emissions due to consequential modelling assumptions. - Allocation of emissions due to recycling that cannot be justified or proved (i.e. assuming a product may be recycled when no recycling data exists).
Transparency	The standard states that five accounting principles are intended to underpin all aspects of GHG accounting and reporting for products, and in particular: Address and document all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the methodologies and data sources used. Clearly explain any estimates and avoid bias so that the report faithfully represents what it purports to represent.
Reproducibility	All data, assumptions, and other methodological choices should be

	documented to support the assurance process, provide transparency for report users, and to enable the reproduction of the inventory results.
Double-counting	Some specific issues have been raised: When a product's life cycle includes recycling, additional consideration may be necessary to insure that the inventory is as accurate as possible. Accuracy here includes consideration that 1) all applicable GHG emissions are accounted for, and 2) no GHG emissions are leaked or double counted into a subsequent product inventory as a result of recycling.
Scientific soundness	
Plausibility of the results	<p>The product standard identifies four business goals served by performing a product inventory:</p> <ul style="list-style-type: none"> - Identification of GHG reduction in the supply chain: definition of change scenarios. - Performance tracking of products over time: - Product differentiation in the market place - Supply chain engagement with suppliers and vendors to reduce emissions and improve efficiencies. <p>The analysis of the real objective of the study is the starting point for determining the process specificities and, as so, ensuring results specificities.</p>
Values choices	<p>The GHG product standard states that sometimes assumptions are necessary due to the fact that no direct data are available. Anyway, it is necessary to disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used. It checks that assumptions and criteria for selection of boundaries, base years, methods, activity data, emission factors, and other parameters are documented.</p> <p>The GHG protocol also provides guidelines to use the other reference/guideline to help companies make assumptions.</p> <p>For example, in the case of a complicated and/or complex product where there is no appropriate approved sector specific guidance and where it may not be possible to meet all the requirements of this standard, simplifying assumptions, decisions and approaches may be taken. However, it should be clearly stated that the standard requirements have not been met and therefore the reporting GHG inventory is not in compliance with the GHG Protocol Product Standard.</p> <p>Value choices are the least preferred basis for allocation decisions.</p>
Scope	
Functional unit	The standard provides the guidelines on how to define the functional unit and encourages the use of sector specific guide if there is any and it is in line with the protocol.
System boundary	<p>The GHG Product standard requires companies to create a process map, which is used to identify foreground and background processes. Companies shall include all "foreground and significant background processes" in the system boundary. Guidance is given on how to determine significance for background processes and identifying likely foreground processes in each life cycle stage. Companies shall conduct a cradle-to-grave assessment for all final products. Cradle-to-gate boundaries are allowable for intermediate products where the eventual fate is unknown. The standard needs more clarity and flexibility on when cradle-to-gate inventories are allowed.</p> <p>Note: a section of the document is dedicated to the accounting for losses; it is</p>

	currently under development.
Cut-off criteria	<p>Processes that are attributable to the function of the product shall be included in the boundary of the product system. These processes are directly connected over the product's life cycle by material or energy flows, from extraction and pre-processing of product components through to the product's end-of-life. These processes are referred to as foreground processes (...).</p> <p>Processes that are not directly attributable to the function of a product include facility operations, corporate activities, and capital goods. These are referred to as background processes (...)</p> <ul style="list-style-type: none"> - Capital goods shall be included in the product system if deemed significant for the studied product or product sector - Facility operations and corporate activities should be included in the product system where relevant <p>Significance shall be proven for capital goods using a qualitative or quantitative test.</p> <p>Quantitative significance involves estimating the environmental impact of an input; for the case of capital goods, if the type or quantity of goods is such that it has a negligible GHG impact on the inventory results, then capital goods may be excluded. Negligible is defined here as less than 1% of the total process or life cycle stage.</p>
Offsetting	<p>This protocol is not intended to support the accounting of GHG emission offsets or claims of carbon neutrality. This standard focuses on emissions generated during a product's life cycle and does not address avoided emissions or actions taken to compensate for released emissions.</p>
Allocation	<p>General principles</p> <ul style="list-style-type: none"> - When addressing common processes, users should avoid allocation, i. e. partitioning the input or output flows of a process or a product system between the product system under study and one or more other product systems. - The allocation process shall adhere to the general accounting principles (...). - The allocation process has a preference for decisions based on natural science, followed by those based on other scientific approaches (e.g., social or economic science). Value choices are the least preferred basis for allocation decisions. <p>If possible, an organization shall avoid allocation by using process subdivision or system expansion. If allocation is necessary, the company shall use: physical relationship, substitution allocation approach, value based allocation, value choices or assumptions; the solution is selected in accordance with the general principles for solving allocation problems. Specific guidelines are indicated for recycling process.</p> <p>Complexity</p> <p>Depending on the specific context of a particular complicated and/or complex product it is likely that simplified approaches may need to be taken to overcome these and other issues in order to make an assessment practical.</p> <p>Other</p> <p>A section is dedicated to the calculation of change Protocol adopts ISO 14044 for allocation approach</p>
Carbon storage/land use change	<p>Due to the uncertainty of the use phase of a product, carbon storage should not be included as a carbon credit in the GHG inventory; however, the carbon</p>

	<p>storage potential of a product should be reported separately, as identified in the reporting requirements.</p> <p>More guidance on carbon storage is under development, and will be included in the next version of the draft standard in fall 2010.</p> <p>If land is used to cultivate biomass for use in a land-based product, GHG emission associated with land management and land use change shall be included in the product GHG inventory. Calculation details are described in an Annex.</p> <p>Reference is made to IPPC definitions of land use</p>
Use stage	<p>Life cycle stage</p> <p>The use stage begins when the consumer takes possession of the product and ends with the used product entering the end of life. For some products the use stage does not required energy or product emissions (i.e. a chair); for these products transportation from the storage facility to the use-location to the end-of-life location may be the major foreground processes. Typical foreground processes for distribution and use include: transportation to the use location and during use; storage at the use location; normal use; repair and maintenance occurring during the usage time; preparation of a product; transportation to end-of-life</p> <p>Data</p> <p>A specific section is dedicated to the use and end-of-life stages, with the following recommendations:</p> <ul style="list-style-type: none"> - when defining service life information, it should be verifiable and should refer to the intended use conditions of the product and be related to its functional performance - it is also good practice to undertake sensitivity analyses to assess the influence of use and end-of-life profile assumptions on the product's GHG emissions. Any deviations to use and end-of-life profiles taken from sector-specific guidance and published guidelines should also be assessed using sensitivity analysis, especially where the use and end-of-life stages comprises a significant portion of the product inventory <p>The difference between theoretical and real use conditions is also addressed.</p>
End-of-life	<p>Life cycle stage</p> <p>The end-of-life stage boundary begins when the used product is ready for disposal, recycling, reuse, etc. and ends when the product is buried, returned to nature (combustion, deterioration), or transformed to be recycled or reused. Few cases exist where the use stage and end-of-life stage occur simultaneously (i.e., food products, energy). However, in these cases a company should still consider the end of life of any waste, including packaging, accumulated throughout the life cycle. Processes that occur as a result of the disposal are also included within the end of life stage. End-of-life foreground processes may include: Collection of end-of-life products and packages; Dismantling of components from end-of-life products; Shredding and sorting; Incineration and sorting of bottom ash; Landfilling, landfill maintenance, decomposition emissions; Transformation into recycled material, e. g. by re-melting.</p> <p>Special consideration is made to recycling and reuse issues.</p> <p>Data</p> <p>A specific section is dedicated to the use and end-of-life stages, with the following recommendations:</p> <ul style="list-style-type: none"> - when defining service life information, it should be verifiable and should

	<p>refer to the intended use conditions of the product and be related to its functional performance</p> <ul style="list-style-type: none"> - it is also good practice to undertake sensitivity analyses to assess the influence of use and end-of-life profile assumptions on the product's GHG emissions. Any deviations to use and end-of-life profiles taken from sector-specific guidance and published guidelines should also be assessed using sensitivity analysis, especially where the use and end-of-life stages comprises a significant portion of the product inventory <p>Additionally, specific consideration is made to waste management issues (e.g.: organic part)</p>
Data	
Data quality requirement	<ul style="list-style-type: none"> - A data quality assessment shall be undertaken for all GHG emissions sources that cumulatively sum up to 75% of total product emissions, beginning with the largest emissions source. - For all processes quantified using any primary data, a qualitative data quality assessment shall be undertaken based on technological, temporal and geographical representativeness, completeness, and precision. For processes that only used secondary data, the data quality assessment shall be undertaken based on technological, temporal and geographical representativeness. <p>The following indicators are used to assess the data quality:</p> <ul style="list-style-type: none"> - technological representativeness - temporal representativeness - geographical representativeness - completeness - precision <p>A scoring card is also provided to help this assessment.</p> <p>Methodological appropriateness and consistency also has to be considered as to evaluate data quality requirements</p>
Data collection	<p>The protocol provide the guideline on the data collection:</p> <ul style="list-style-type: none"> - Data collection should follow the GHG Protocol principles of accuracy, completeness, relevance, and transparency to ensure a true and fair account of a product GHG inventory. - The system boundary defines the processes and inputs that data is collected for. - Primary data shall be collected for all foreground processes and significant background processes under the financial or operational control of the company undertaking the product inventory. - Every effort should be made to collect good quality primary data from suppliers. - Comparing primary data to secondary data may be used to check the validity of the collected primary data. - Data should represent as closely as possible to the time, geography and technology of the relevant inputs/processes. - Time, expense and accuracy may need to be considered when collecting information. Therefore, more effort should be put in improving the accuracy of larger emission sources. <p>The protocol details the data collection process for primary and secondary data.</p> <p>The data collection process should always be guided by data quality considerations. In practice, the data used in a product inventory may be a mix</p>

	<p>of measured, calculated and estimated data from both primary and secondary data sources. However, the type of data does not provide an indication of the data's quality, so the appropriateness of each data source should be independently judged based on its quality.</p> <p>The protocol provides the user with a lot of information regarding data quality and how to evaluate it, in order to adapt the data collection to fulfil these requirements. However some clarifications remain to be made: how to identify a foreground process, on which data quality has to be assessed (activity data, emission factors), etc.</p>
Data validation	<p>An appendix is dedicated to implementation of data management plan detailing in particular data control activities</p> <p>The protocol also provide recommendation to the company which would like to calculate the GHG e.g. quality check. It is foreseen to have third party check or validate the report or inventory depend on the intended use from the company</p> <p>A quality management system should be set up to ensure the quality of the information at every level of the process. It should include generic quality checks both for data and processes, focusing on appropriately rigorous quality checks on data handling, documentation, and emission calculation activities (e.g., ensuring that correct unit conversions are used).</p>
Interpretation	
Uncertainty assessment	<p>The uncertainty assessment and disclaimer are currently under development and will be updated in the next version of the draft standard in fall 2010.</p>
Sensitivity analysis	<p>Sensitivity analysis section is currently under development; however, some specific references to this kind of analysis have been made in other sections of the document; for example, <i>"it is also good practice to undertake sensitivity analyses to assess the influence of use and end-of-life profile assumptions on the product's GHG emissions"</i></p>
Verification process	
<p>The standard uses the term of "assurance" and details the requirements and concepts behind this word (reasonable/limited assurance, inherent/control/detection risks, materiality threshold, etc.); in order to be in conformance with the Standard, the product GHG inventory shall be assured. Internal or external assurance is permissible. The assurance opinion shall be expressed in the form of either reasonable or limited assurance. When reporting a product GHG inventory, the assurance opinion shall also be presented, including or accompanied by a clear statement identifying whether First or Third Party assurance has been obtained. Where internal assurance providers are used, their relevant competencies and reasons for selecting them as assurance providers shall be disclosed in the product GHG inventory report or assurance statement.</p> <p>It is possible to assure the entire product GHG inventory or specific parts of it, although the assurance providers should need to satisfy themselves that assurance over a part of a product GHG inventory is meaningful to the user. References are made to usual assurance criteria like ISAE 3000 or ISO 14065 and responsibilities sharing between the company and the assurance provider are clearly stated. Assurance providers should assess the suitability of the criteria and in doing so should assess whether:</p> <ul style="list-style-type: none"> - all Standard requirements are included - the product system, boundaries and functional unit are clearly defined - assumptions and estimations made are appropriate in the circumstances - selection of primary and secondary data is appropriate and methodologies used are adequately disclosed (with references to external sources where applicable) - the attributional approach is used (unless sector-specific guidance is cited) - exclusions are reasonable in the context of the whole. 	
Communication	
Type of communication	<p>A company shall publicly disclose the GHG inventory in the form of both a</p>

	<p>summary and detailed report. Both reports shall be disclosed together and be easily accessible by the public. Thus, the final result of the carbon footprint is not considered as to be disclosed alone (without the methodological assumptions).</p> <p>The summary report shall include an introduction, the summary template, and process map, and a brief discussion on how the results will be used. Additional information should be given regarding the emissions reduction actions and specific issues (biogenic emissions, carbon storage, etc.). The detailed report includes the same aspects, with a higher level of details.</p>
Marketing/communication	<p>A company shall publicly disclose the GHG inventory in the form of both a summary and detailed report. Both reports shall be disclosed together and be easily accessible by the public.</p> <p>The summary report shall include an introduction, the summary template, and process map, and a brief discussion on how the results will be used. Additional information should be given regarding the emissions reduction actions and specific issues (biogenic emissions, carbon storage, etc.). The detailed report includes the same aspects, with a higher level of details. The summary report is designed to meet the needs of the general public, and the detailed report is designed to meet the needs of a GHG inventory/LCA practitioner.</p>

Compliance with ISO 14067 requirements

- Analyses to be performed are detailed more precisely in the GHG Protocol Product standard than in ISO 14067 which aims to provide generic guidelines on this subject.
- GHG Protocol indicates that a specific focus has to be made on allocation and recycling whereas ISO 14067 only focuses on allocation.
- ISO 14067 is more focused on the links with PCR in the disclosure than the GHG Protocol.
- ISO 14067 specifies that a verification by an independent third party has to be performed in case of disclosure for consumers, and verifier skills have to be determined in accordance with various standards (ISO 14066, 14044, 14025); GHG Protocol only recommends external verification. Moreover, a focus is made on confidentiality

Support implementation of protocol

Software/tools support

Type of tool	<p>For the moment, no tool has been developed.</p> <p>If this follows the same process than the Corporate Standard, specific sectorial/regional tools could be designed</p>
Cost of license	Tools should be free of charge

Method documentation

Availability and accessibility	Protocol draft is available on www.GHGprotocol.org , as well as other documentation (comments from stakeholders,...)
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Suitability for target audience

Experts	Standards about product GHG Protocol are under development. However, basic concepts are detailed in the draft standard
Non experts	Guidelines are complex, but understandable for the non-experts.
Sector-specific approach	<p>No requirement to develop PCR. The protocol provide only "use for existing PCR".</p> <p>Throughout the document, sector or category specific resources such as PCRs may be referenced as a secondary source of information beyond the standard to aid a company in making important inventory decisions.</p> <p>Additionally, in the reporting requirements a company is asked to disclose any sector or category specific literature that was used to complete the</p>

	inventory.
Data availability	
The primary data shall be collected for all foreground and significant background processes under the control of the reporting company. Primary or secondary data may be used for the remaining processes in the supply chain. The protocol will provide a list of life cycle database which can be used. GHG Protocol does not endorse any individual databases.	
Other means to support implementation	
No information is available	

Risks and benefits	
Risks	
Risk of no completion	<p>Very low risks of no completion since</p> <ul style="list-style-type: none"> - the project is in its final developments: the publication is forecast for spring 2011 and the pilot testing phase was completed in summer 2010. - there is a strong involvement of major companies and governments
Weaknesses of the project	<ul style="list-style-type: none"> - As it is a methodological framework, it provides general guidelines for products assessment and reporting, no specific information about product CF calculations are available. - Direct comparison of product is not possible unless all methodological elements are provided with the final results (detailed report for example).
Limitation / excluded areas	<ul style="list-style-type: none"> - Sectors/products: no restriction declared - Methodology / GHG sources: Valid assertions or labelling requires a greater degree of prescriptiveness than is provided in the standard. This standard is not intended to support the accounting of GHG emission offsets or claims of carbon neutrality.
Comparability between products based on methodology used	<p>Limited: The results are not meant as a platform for comparability to other products.</p> <p>Some comparisons in the approach and in the results could be considered if sufficient information is provided (detailed report for example), but it would be difficult to use it in a B2C approach based on labelling displayed on the product.</p>
Risk of misleading communication	<p>The report should be very technical, involving engineering and science, and of high quality. Thus, it could be difficult for a non-expert to understand the methodological underlying assumptions.</p>
Benefits	
Advantages of the project	<ul style="list-style-type: none"> - The GHG Protocol Corporate Standard for companies is broadly used, internationally known; this gives the GHG Protocol Product Standard a solid background - The partnership of WRI / WBCSD with governments and NGOs helps to ensure the acceptance of the project
Possible use of the results	<ul style="list-style-type: none"> - Identifying GHG reduction opportunities in the supply chain - Performance tracking - Product Differentiation - Supply chain engagement and better disclosure practices

Analysis of methodologies

ISO 14067

General

General

Objective	<p>ISO 14067 defines the carbon footprint of a product (CFP) as a parameter ("indicator result") which is calculated from the greenhouse gas emissions of a product during its full life cycle, including raw material acquisition, production, use and end-of-life operations. With this understanding, the standard is based on the LCA methodology as specified in ISO 14044.</p> <p>ISO 14067 gives also guidance for partial carbon footprint studies where certain stages/processes of the life cycle are omitted. However, in accordance with ISO 14025, a system on which a partial carbon footprint is based is understood as a module which helps to model a full life cycle.</p> <p>ISO 14067 is divided into 2 parts:</p> <ul style="list-style-type: none"> - ISO 14067-1 gives the quantification rules - ISO 14067-2 gives the communication rules as to ensure comparability, reliability and transparency of the communication of the data developed using ISO 14067-1 in reporting <p>However, a decision to merge the two parts into one document is pending.</p> <p>ISO 14067 is expected to benefit organizations, governments, project proponents and other customers worldwide by providing clarity and consistency for quantifying, monitoring, reporting and verifying the CFP. Specifically, the use of ISO 14067 could:</p> <ul style="list-style-type: none"> – enhance the credibility, consistency and transparency of the quantification and communication of product-level carbon footprinting; – promote continuous improvement by facilitating the evaluation of alternative product design and sourcing options, production and manufacturing methods, raw material choices and the selection of suppliers on the basis of a life cycle assessment using climate change as impact category; – facilitate the development and implementation of GHG management strategies and plans across product life-cycles as well as the detection of additional efficiencies along the supply chain; – facilitate the ability to track performance and progress in reducing GHG emissions; – enhance knowledge on the role of consumer behaviour in contributing to reductions in GHG emissions due to consumption; and – through public reporting, facilitate product selection by stakeholders, including consumers, on the basis of a life cycle assessment using climate change as impact category
Type of protocol	Non-governmental public scheme
Targets	<p>Companies and associated consultants which intend to work out carbon footprint studies related to products;</p> <p>Authorities which require carbon footprint studies related to products;</p> <p>Consumers and other decision makers who want to make informed decisions when selecting products</p> <p>No products are using this methodology yet (the methodology is under development)</p>

Structure	
Sponsor / initiative structure	ISO-TC207-SC7 and all ISO members
Owner of the methodology	ISO (the International Organization for Standardization)
Type of commitment	Voluntary
System manager	<p>There are two different tasks which may require two different system managers, namely</p> <ul style="list-style-type: none"> the elaboration of the carbon footprint study, including a final report, which is based on ISO 14067-1 the elaboration of special forms of carbon footprint communication which is based on ISO 14067-2 <p>No information on the structure to be set up</p> <ul style="list-style-type: none"> - Adaptation of the methodological framework: knowledge of both company's process and LCA concepts are required and many references are made to ISO 14044. An LCA expert seems to be necessary. - Data collection: requirements from the ISO 14044 apply. Since primary data have to be preferred, involving internal resources seems to be the best option. Depending on the framework issued from the first step, LCA expertise may be required to ensure compliance with ISO 14044 requirements - Calculation: depending on the preparation (adaptation of the methodological basis), internal or external resources could be used; LCA expert review seems to be useful for some specific issues (aircraft, specific sources of carbon, etc.) - Analysis: no information but depending on the level of details to be achieved, LCA expertise may be useful.
Stakeholder acceptance	
Links with policy and regulation	No information available
Links with authoritative bodies	High expectations from governments (standard is yet under development).
Other information	<p>The methodology is under development, but high acceptance is foreseen given the development process and the international recognition of the ISO</p> <p>The methodology is based on the LCA methodology as specified in ISO 14044. This standard is globally well accepted, e. g. the LCA methodology as specified by the ILCD builds on it.</p>
Methodological background	
Link with other PCF projects	Some information have been adapted from other PCF methodologies (e.g.: from PAS 2050). A close co-operation is established with the WRI/WBCSD, where a more detailed standard on the same subject is being worked out under the GHG Protocol initiative.
Link with ISO standards	<p>Links with ISO 14040, ISO 14044, ISO 14025, ISO 14020, ISO 14021 and 14064-1 exist</p> <p>In particular, the methodology builds on ISO 14044</p>
Revision process for the methodology and the background data	<ul style="list-style-type: none"> - Methodology: Within a carbon footprint study, the goal and scope can be revised at any time, when justified. <p>If a CFP programme has been designed, the CFP programme operator is responsible for the administration of a CFP communication programme and he must revise procedures and documents of related CFP communication programmes when necessary.</p> <p>According to the ISO rules, standards are revised if requested by the ISO members, typically 3-5 years after publication.</p>
System management and implementation	
Tests already performed	

Number of products tested	None - under development – draft. However, many products have undergone LCA studies based on the same methodology where climate change is an impact category among others
Number of companies having made tests	see above
Other information	
Required conditions for implementation	Standard can be used as a tool. No formal implementation procedure required
Economic aspects	Carbon footprint studies require significant internal/external resources This International Standard allows for significant synergies, especially for data acquisition and data management.
Management burden	The request of a customer, e. g. a retailer, to supply a carbon footprint study of the supplied product is a significant management burden for the supplier
Development process of protocol	
Stakeholders involvement	Stakeholders participate in the mirror groups of the ISO members, i. e. the national standards organizations. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.
Standardization level	In preparation through an international network of experts
Peer-review of underlying methodology	Reviewed by expert independent from the stakeholders on the methodology itself.

Implementation of protocol

Applicability

Goods and services mainly targeted	Any goods or service.
Additional efforts to expand the project	Not determined
Possibility of analysis / use of data	It is a very wide scheme so there is potentially broad possibilities of analysis (possibility of comparison of systems, improvement analysis, identification and tracing of drivers, identification of cause-effect-chains,...) Comparison of CFP is only possible if the CFP is quantified in accordance with the same PCR both for business to business and for business to consumer communication. Users of PCR should acknowledge that CFP developed according to PCR from different programmes may not be comparable. There are not enough guidelines for the treatment of emissions reduction.
Consideration of other environmental impacts	- Mono-criterion approach - Extension to other environmental impacts is allowed by: i/ the ISO framework which is not an organization linked to GHG policies ii/ the fact that ISO 14067 is mainly based on 14044 requirements which are compatible with the analysis of all kind of impacts

Principles

Life cycle perspective

Life cycle perspective	The unit processes resulting in the product system may for many products be grouped into life cycle stages, i.e. raw material acquisition, production, use and end-of-life operations. Partial carbon footprint and carbon footprint of intermediate products are allowed but not for communication to consumers and not for product comparison
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Modularity	<p>In ISO/CD 14067-1 the principle of modularity is formulated as follows: <i>“When conducting a partial CF study, according to the goal of the study, ensure that modules and processes can be integrated into the product system in accordance with a life cycle perspective”</i>.</p> <p>According to the definition of system boundary: The deletion of life cycle stages, processes, inputs or outputs is only permitted if it does not significantly change the overall conclusions of the study. Any decisions to omit life cycle stages, processes, inputs or outputs shall be clearly stated, and the reasons and implications for their omission shall be explained.</p> <p>The general rules are as follows:</p> <ul style="list-style-type: none"> - where the assessment of the carbon footprint of a product is communicated to consumers, the quantification of a CFP shall comprise all stages of the life cycle - For “supply chain business-to-business” use, a partial carbon footprint shall at the minimum represent the cradle-to-gate emissions arising from all stages, processes/modules up to the point where the product leaves the production site (gate). - For internal applications (e.g. internal business use, supply chain optimisation, design support, etc), a partial CF may be based on emissions arising from a restricted number of stages within the life cycle of the product. - For decision-making (e.g. design options), the whole life cycle shall be considered
Functional unit	<p>For the determination of the functions (performance characteristics) and the functional unit of a product, the relevant provisions of ISO 14044 shall apply for CFP studies.</p> <p>The scope of a CFP study shall clearly specify the functions of the system being studied. The functional unit shall be consistent with the goal and scope of the study. The primary purpose of a functional unit is to provide a reference to which the inputs and outputs are normalized (in a mathematical sense). Therefore the functional unit shall be clearly defined and measurable.</p>
<u>Criteria suitability</u>	
Consistency	<p>ISO 14067-1 states (par.4.8) consistency as a principle: <i>Apply assumptions, methods and data the same way throughout the CFP study to arrive at conclusions in accordance with the goal and scope definition</i></p> <p>Comparison of CFP is only possible if the CFP is quantified in accordance with the same PCR both for business to business and for business to consumer communication. Users of PCR should acknowledge that CFP developed according to PCR from different programmes may not be comparable</p> <p>The standard is quite unclear regarding PCR requirements (inconsistencies among the document):</p> <ul style="list-style-type: none"> - it is unclear whether PCR should apply to type II declarations - it is unclear whether PCR should apply to B2B communication such as B2C communication (inconsistencies in the document) <p>According to a recent study made by the Norwegian committee, the standard is not applicable at all without PCR (the use of a PCR should be mandatory for all applications of a CFP).</p>
Relevance	<p>ISO 14067-1 states (par.4.6) relevance as a principle: Select GHG sources and sinks, carbon storage, data and methods appropriate to the assessment of the GHG emissions and removals arising from products. Ensure the CFP</p>

	study and report serves the decision-making needs of all users identified within the report.
Completeness	<p>ISO 14067-1 states (par.4.7) completeness as a principle: Include all GHG sources, carbon storages and GHG sinks that provide a material contribution to the assessment of GHG emissions arising from products</p> <ul style="list-style-type: none"> - GHG emissions and removals arising from fossil carbon sources and biogenic carbon shall be reported separately. The unit processes related with the cultivation and production of biomass shall be included in the product system - The GHG emissions associated with the use of electricity in a life cycle of a product shall include emissions arising from the energy supply system, cradle to gate. Specific consideration is made to green electricity and to risks of double counting - Land use change / carbon storage: specific attention is paid to this issue - A multiplier for the additional radiative forcing shall be applied to the GWP of emissions arising from aircraft transport according to IPCC or other internationally agreed procedures. The factor applied should be transparent.
Transparency	ISO 14067-1 states (par.4.10) transparency as a principle: Due to the inherent complexity in CFP, transparency is an important guiding principle in executing CFPs, in order to ensure a proper interpretation of the results.
Reproducibility	Data quality requirements include reproducibility
Double-counting	<p>ISO 14067-1 states (par.4.11): Avoid double counting of emissions and removals in the same product system as a principle.</p> <p>The standard tackles the problem of double counting for electricity as follows: for electro intensive processes, when an electricity supplier can deliver a specific electricity product and guarantee that the product sale is not double counted, the GHG emissions for that electricity shall be used. The standard is not accurate on the calculation of the residual mix (default mix) in countries where some electricity is sold as "Guarantee of origin"</p>
Scientific soundness	
Plausibility of the results	<p>The scope of a CFP study shall be consistent with the goal of CFP study. In defining the scope of the study, the following items shall be considered and clearly described, taking into account the requirements and guidance given in the relevant chapters:</p> <ul style="list-style-type: none"> a) the functions of the product system; b) the functional unit; c) the product system to be studied; d) the system boundary; e) methods to address issues occurring with specific product categories, e.g. carbon storage, land use change, seasonality; f) data and data quality requirements; g) allocation procedures; h) assumptions, especially for the use stage; i) limitations of the study; j) reporting.
Values choices	The protocol states that sometimes assumptions are needed. It is necessary to check that assumptions and criteria for selection of boundaries, base years, methods, activity data, emission factors, and other parameters are documented.

	GWP values are clearly stated (100 years GWP according to the 4th assessment report of IPCC)
Scope	
Functional unit	Please refer to Functional unit sub-criteria. Additionally, the norm states that: The use of a common functional unit as a basis supports the comparison of different product systems. Where a relevant PCR in accordance with ISO 14025 exists, and complies with the requirements of Part 1 of this International Standard, and is considered proper (e.g. for system boundaries, modularity, allocation, data quality etc.) by the organisation applying this International Standard for the quantification procedure in Part 1, further guidance of the use of functional units can be found in that PCR.
System boundary	For the system boundary of CFP, the provisions of ISO 14044 shall apply for CFP studies: the selection of the system boundary shall be consistent with the goal of the study, the criteria used in establishing the system boundary shall be identified and explained. The PCR should give guidance on the processes to be included and the corresponding data requirements. A list of phases that can be excluded from the system boundaries (provided explanation is given) is proposed: human labour, administration, marketing and sales, private transport of employees, transport from point of sales to home. There is no specific recommendation regarding the inclusion of capital goods but according to the Norwegian committee, they make about 7% of the global impact in their case studies so they should be included.
Cut-off criteria	<ul style="list-style-type: none"> - Consistent cut-off criteria shall be defined during the goal and scope definition phase which allow the omission of certain processes of minor importance. - The total omitted emissions shall not exceed 5% compared to the total emissions from all processes within the defined system boundary - The mass criteria can be used for a first screening but does not exempt from checking that the omitted phases do not exceed 5% of the overall impact.
Offsetting	ISO 14067 - 1 states that: The CFP shall not include offsetting However, a note indicates that "certain credits like removals, storage in sinks, etc. that are not offsets, can occur within (inside) the boundaries of the product system"
Allocation	<p>Allocation</p> <p>About the allocation procedures, ISO 14067-1 reports the ISO 14044:2006: The inputs and outputs shall be allocated to the different products according to clearly stated procedures that shall be documented and explained together with the allocation procedure (...). Whenever several alternative allocation procedures seem applicable, a sensitivity analysis shall be conducted to illustrate the consequences of the departure from the selected approach. The allocation procedure in the document explains that, if necessary, the allocation should be made according to physical relationships first and if not possible according to other relations including economic relations. If outputs are partly waste and partly co-products, the ratio between these flows has to be determined to enable allocation to co-products.</p> <p>The inventory is based on material balances between input and output. Allocation procedures should therefore approximate as much as possible such fundamental input/output relationships and characteristics.</p>

	<p>Other</p> <p>A section is dedicated to the calculation of change</p>
Carbon storage/land use change	<p>Land use change: The GHG emissions occurring as a result of direct land use change shall be assessed in accordance with international recognized methods such as the IPCC Guidelines for National Greenhouse Gas Inventories. Indirect land use change shall be considered in future CF studies, once an internationally agreed procedure exists.</p> <p>Soil carbon change: For products or product categories where the carbon content of soils changes significantly, this should be included in the CFP and shall be quantified according to internationally agreed procedures, such as UNFCCC. More detailed methodological guidance and data may be available in a PCR or under other GHG programmes.</p> <p>CO₂ emissions from the uptake, release, storage (combustion and others) of biomass carbon should be quantified separately. The uptake quantification should be justified and/or documented.</p> <p>Carbon capture and storage (CCS): The impact of carbon capture and storage should be reflected in the CFP where the operation of the carbon CCS has been separately and independently verified and reported.</p> <p>Non-CO₂ emissions data for livestock and soils: The estimation of the non-CO₂ GHG emissions arising from livestock (e.g. N₂O), their manure or soils shall use one of the following two approaches with reference to the data quality rules:</p> <ul style="list-style-type: none"> a) the appropriate tier approach set out in the IPCC Guidelines for National Greenhouse Gas Inventories; or b) the IPCC tier approach employed by the country in which the emissions were produced; <p>If a national approach is used the data shall be verified by a peer reviewed study or similar scientific evidence.</p>
Use stage	<p>ISO 14067-1: a section is dedicated to use stage and scenario</p> <p>The GHG emissions arising from the use stage of products shall be included in all CFP studies, and in partial CF studies if included in the scope. When the use stage is included within the scope of the assessment, all emissions arising from the use stage of the product during the product's assumed service life shall be included. Service life information shall be verifiable and it shall refer to the intended use conditions and to the related functional performance of the product.</p> <p>Where not otherwise justified, the determination of the use profile (i.e. the related scenarios and assumed service life for the use stage of products) shall be based on published technical information such as: PCRs, published international standards (...), published national guidelines (...); published industry guidelines.</p>
End-of-life	<p>ISO 14067-1: The end-of-life stage begins when the used product is ready for disposal, recycling, reuse, etc. and ends when the product is returned to nature (combustion, deterioration), or is transformed to be recycled or reused. Processes that occur as a result of the disposal shall be included within the end-of-life stage. End-of-life processes may include: collection of end-of-life products and packages; dismantling of components from end-of-life products; shredding and sorting; incineration and sorting of bottom ash; preparation for reuse; landfilling, landfill maintenance, decomposition emissions such as methane; transformation into recycled material, e.g. by re-melting.</p> <p>For recycling allocation, i. e. the partition of the carbon footprint of the primary</p>

	material production between the system under study and the system which uses recycled material, the guidance given in ISO 14044 is adopted.
Data	
Data quality requirement	<p>PCF studies should use data that reduce bias and uncertainty. Determination of the best quality data could be supported by a data scoring framework that allows the different attributes of data quality to be combined. The following areas should be considered for the determination of the data quality: a) time-related coverage b) geographical coverage c) technology coverage d) precision e) completeness f) representativeness g) consistency h) reproducibility i) sources of the data j) uncertainty of the information</p> <p>Where a study is intended to be used in comparative assertions intended to be disclosed to the public, the data quality requirements stated in a) to j) above shall be addressed.</p> <p>Since data collection may span several reporting locations and published references, measures should be taken to reach uniform and consistent understanding of the product systems to be modelled.</p>
Data collection	<p>Primary data shall be collected for all individual processes under the financial or operational control of the organization undertaking the study, and shall be representative of the processes for which they are collected. Secondary process data shall be used for inputs where the collection of primary process data is not possible or practicable, and may include literature data, calculated data, estimates or other representative data.</p> <p>The qualitative and quantitative data for inclusion in the inventory shall be collected for each unit process that is included within the system boundary. The collected data, whether measured, calculated or estimated, are utilized to quantify the inputs and outputs of a unit process. When data have been collected from public sources, the source shall be referenced. For those data that may be significant for the conclusions of the study, details about the relevant data collection process, the time when data have been collected, and further information about data quality indicators shall be referenced. If such data do not meet the data quality requirements, this shall be stated</p> <p>Indicators to be verified during the data collection to ensure data quality are clearly stated.</p>
Data validation	ISO 14067-1 states that: A check on data validity shall be conducted during the process of data collection to confirm and provide evidence that the data quality requirements for the intended application have been fulfilled. Some tests to be performed (e.g.: mass balance) are suggested.
Interpretation	
Uncertainty assessment	The interpretation phase of a CFP study shall include the a quantitative or qualitative assessment of uncertainty, for example through the application of rounding rules or ranges
Sensitivity analysis	<p>ISO 14067-1 reports ISO 14044:2006: Reflecting the iterative nature of LCA, decisions regarding the data to be included shall be based on a sensitivity analysis to determine their significance, [...]. The initial system boundary shall be revised, as appropriate, in accordance with the cut-off criteria established in the definition of the scope. The results of this refining process and the sensitivity analysis shall be documented. The sensitivity analysis may result in</p> <ul style="list-style-type: none"> - exclusion of life cycle stages or unit processes when lack of significance can be shown by the sensitivity analysis, - exclusion of inputs and outputs that lack significance to the results of the

	<p>study, or</p> <ul style="list-style-type: none"> - inclusion of new unit processes, inputs and outputs that are shown to be significant in the sensitivity analysis. <p>Moreover, whenever several alternative allocation procedures seem applicable, a sensitivity analysis shall be conducted to illustrate the consequences of the departure from the selected approach.</p>
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Verification process

In the frame of a CFP communication programme, the programme operator ensure the selection of competent independent verifiers and PCF review panel members and establish a transparent procedure for the verification, including the scope of verification, details of the verification and how the verification is conducted.

If results of a carbon footprint of a product study, as reported according to ISO 14067-1, clause 7, are to be communicated to the consumer, the communication incl. the report shall be verified by an independent, third party. The competency of the verifier shall be determined in accordance with one of the following standards: ISO 14066; ISO 14044; ISO 14025.

Verification shall provide confirmation of the appropriateness of any PCR, when employed, and that the quantification has been conducted in accordance with the requirements of that PCR.

The verification shall confirm that the carbon footprint of the product quantified in the report has been prepared on a life cycle basis and is in conformity with the requirements of this International Standard.

Communication

Type of communication	<p>Communication of CFP may take the form of a self-declared environmental claim according to ISO 14021 or of an environmental product declaration according to ISO 14025. Another form of carbon footprint communication is performance tracking.</p> <p>"When an organization discloses information on the CFP to consumers it shall disclose the absolute emission levels of the product and information as described in ISO 14067-1, clause 7, explaining how these emissions were assessed e.g. on a homepage." Thus, the final figure of carbon footprint is not designed to be displayed alone.</p> <p>The standard addresses type II and type III environmental declaration.</p>
Marketing/communication	<p>ISO 14067 carbon labels are used for B2C and B2B communication.</p> <p>Communication requirements are detailed in ISO 14067-2 and depend on the type of communication made: self-declared environmental claim according to ISO 14021, environmental product declaration according to ISO 14025.</p>

Compliance with ISO 14067 requirements

Reporting section has been adapted from ISO 14044

Support implementation of protocol

Software/tools support

Type of tool	Not tool has been nor is planned to be developed
Cost of license	Not tool has been nor is planned to be developed

Method documentation

Availability and accessibility	ISO 14067-1 & 2 will be available for download on the ISO site; price is unknown
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Suitability for target audience

Experts	The document is an ISO standard so it has been discussed between people having various levels of technical knowledge. Accounting criteria are detailed as requirements for the methodology to be developed and specific attention
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	has been paid at the time of preparing this document to respect them in the standard too, with a clear definition of the terms (referred in other norms).
Non experts	At the beginning of the document, a glossary is provided so that the document can be understood by non-experts. However, the practical application of these guidelines may be difficult for a non-expert.
Sector-specific approach	<p>This ISO standard provides guidelines for Carbon Footprint Programmes so no PCR are foreseen by the Standard; however, the standard states that a PCRs shall be publicly available for a product group.</p> <p>ISO 14067-1: Where a relevant PCR in accordance with ISO 14025 exists, and complies with the requirements of Part 1 of this International Standard, and is considered proper (e.g. for system boundaries, modularity, allocation, data quality etc.) by the organisation applying this International Standard for the quantification procedure in Part 1, it shall be adopted.</p> <p>A section is dedicated to the use of PCR in the ISO 14067-2</p>
Data availability	
This ISO standard provides guidelines for Carbon Footprint Programmes so no specific data or tools are foreseen by the Standard.	
Other means to support implementation	
No information is available	

Risks and benefits

Risks

Risk of no completion	Very low risks of no completion are expected since ISO standard relies on a strong involvement of companies, academic world and governments
Weaknesses of the project	<p>As it is an ISO standard, it provides general guidelines and no specific information about product CF calculations are available. The Norwegian committee that carried out a case study of food products proposes the use of PCR to be mandatory, not only when communication to consumer is at stake.</p> <p>A specific Annex of ISO14067-1 details the limitations of CFP.</p>
Limitation / excluded areas	<ul style="list-style-type: none"> - Sectors: no restriction declared - Methodology / GHG sources: An Annex of ISO 14067-1 details the main limitations: focus on a single environmental issue and limitations of LCA methodology
Comparability between products based on methodology used	<p>Communication of CFP may take the form of a self-declared environmental claim according to ISO 14021 or of an environmental product declaration according to ISO 14025. comparison of CFP is only possible if the CFP is quantified in accordance with the same PCR both for business to business and for business to consumer communication. Users of PCR should acknowledge that CFP developed according to PCR from different programmes may not be comparable.</p> <p>The use of PCR to ensure comparability of the CFP is under discussion . Several countries point out that the standard is unclear regarding PCR requirements:</p> <ul style="list-style-type: none"> - it is unclear whether PCR should apply to type II declarations such as type III - it is unclear whether PCR should apply to B2B communication such as B2C communication (inconsistencies in the document) <p>According to the Norwegian committee, the use of a PCR should be mandatory for all applications of a CFP.</p>

Risk of misleading communication	<p>A specific part of the standard is dedicated to the communication requirements as to ensure that the information combine high quality of the information, transparency,... Specific attention is paid to the communication to consumer, with additional requirements to be respected and a higher level of verification</p> <p>The standard highlights that the disclosure of a single number (t CO₂) does not enable consumers to identify the best environmentally performing product and is therefore misleading.</p> <p>There is a remaining risk that uncertainties and limitations are not communicated properly.</p>
Benefits	
Advantages of the project	<ul style="list-style-type: none"> - ISO standards are internationally known and recognized - Guidelines are of high scientific quality - Guidelines allow consistency of the different CFP and is based on LCA norms which have been already tested - The framework allows the comparison between products - The standard reflects a consensus of about 40 nations world-wide, after significant efforts for consensus-finding: In five meetings, each of them lasting 3-4 days, about 5000 comments have been accommodated
Possible use of the results	<ul style="list-style-type: none"> - identifying possibilities of GHG reduction, based on a better understanding of the CFP - minimizing the costs related to CF communication, including data management and verification - avoiding misledading communication

Analysis of methodologies

BP X30-323

General

General

Objective	<p>The leading objective is the development of multicriteria environmental performance data (carbon + other impacts) for products in preparation for an information that shall support the consumer in its purchase decision. So the methodology:</p> <ul style="list-style-type: none"> - must allow comparisons between products from the same category (or between products from different categories if relevant), in the same purchasing place or in different purchasing places. - must lead a standardization of labelling practices with two objectives: cost and consideration of scientific knowledge. - must include CO₂ and a few other relevant impacts <p>The objective includes the development of product category rules besides the general guidelines.</p>
Type of protocol	Public protocol (access to the standard is not free but available on the website of the French standardization association, and the guidance is free)
Targets	<p>Companies of all sizes are targeted</p> <p>All consumer products (goods and services) are targeted.</p> <p>Working groups have been set up by sectors to develop product category rules like: food and feed, energy consuming devices, batteries, washing products/garden products/pesticides, hygiene & beauty, clothing/house textile/shoes, building products, furniture, leisure & entertainment, non electric tools, financial services. Other groups are also in discussion (e.g.: tobacco products).</p> <p>Two sectorial PCR show a high level of progress: shoes (validated) and shampoo (to be validated)</p>
Structure	
Sponsor / initiative structure	A platform has been set up to develop the global methodology and the PCR. It is steered by the ADEME (French EPA) inside AFNOR (French agency for standardization).
Owner of the methodology	AFNOR (French standardization association)
Type of commitment	The commitment could become mandatory but with no clear deadline for the moment
System manager	<p>No specific information on this subject</p> <ul style="list-style-type: none"> - Adaptation of the methodological framework: methodological general principles and PCRs have been established by working groups involving many stakeholders. These documents do not aim to be used by non-LCA experts. Internal or external resources can be used. - Data collection: primary data are preferred; thus, internal resources are necessary and, in the case of SMEs, a specific tool is being designed as to enable this type of firms to identify data to be collected without hiring LCA experts - Calculation: no requirement; in the case of SMEs, a specific tool is being designed as to enable this type of firms to identify data to be collected without hiring LCA experts - Analysis: PCRs have to be analyze the uncertainty of the process; no

	additional information is required from the users.
<u>Stakeholder acceptance</u>	
Links with policy and regulation	The government has announced its willing to turn into mandatory scheme but decision will be made after an experimental period of at least one year starting 1st of July 2011
Links with authoritative bodies	Initiative supported and financed by authoritative bodies
Other information	The standard has not been applied yet so that consumers and companies acceptance is not assessable. However, the broad inclusion of stakeholders in the development process (companies, trade associations, public authorities, trade unions, consumer and environmental associations) should ensure the acceptance of the methodology/label.
<u>Methodological background</u>	
Link with other PCF projects	No explicit reference to other methodology, but commonly accepted methodologies like PAS 2050 and GhG Protocol have been taken into account in the BP X30-323 preparation. The development of ISO 14067 is closely followed to ensure consistency between both methodologies.
Link with ISO standards	The environmental assessment is to rely on the following standards: ISO 14040:2006 (Environmental management - LCA - principles and guidelines) and ISO 14044:2006 (Environmental management - LCA - requirements and guidelines)
Revision process for the methodology and the background data	<ul style="list-style-type: none"> - Methodology: the standard states that: "It may be necessary to make changes to this guide to take into account the developments in European and International normative work and the recognised practices currently in place if they bear relevance to this guide.". Moreover, the general principles of the methodology have been adopted for a 12-months period. They are currently being revised. - Application to a product: The revision plan has to be fixed in the Product Category Rules (sectorial guidelines) <p>During the latest transverse working group, the following revision plan for sectorial referentials has been adopted:</p> <ul style="list-style-type: none"> - 1st revision: 3 years after the adoption - Next revisions: every 5 years
<u>System management and implementation</u>	
<u>Tests already performed</u>	
Number of products tested	<p>No application having lead to labelling yet.</p> <p>Product category rules have been developed in the hygiene sector for shampoos (almost completed) and shoes (to be validated). PCR for washing products shows significant progress.</p> <p>A convention has been signed between the MEEDDM (Department in charge of environmental policy) and the FCD (Federation of trade and retail companies) to experiment environmental labelling on 300 products as of 2008. This experiment is now finished and results have been presented to the transverse working group.</p>
Number of companies having made tests	<ul style="list-style-type: none"> - PCRs are developed based on pilot projects led by companies - Greenext (Leclerc - retailer) methodology is continuously improved as to take into account the latest developments of BP X30-323, even if some aspects have to be improved (transportation of consumers to the stores) - Décathlon (Sports retailing store) has experimented a multi-criteria labelling on some products in a limited number of stores)

Other information

Required conditions for implementation	Specialists of the environmental assessment, although some specific tools will be available for non-experts: - guidelines - ADEME tool for indicators calculation
Economic aspects	No assessment of the economic aspects but: - access to the methodology is not free but the cost is very low (60€ HT for the September 2009 version) - the product category rules must precise the data for which primary data are necessary considering that the cost shall be "acceptable" - a public secondary database will be set up (free access, available on the Internet) - a tool will be provided for free to the companies that will not develop their own tool
Management burden	General principles and specific guidelines by type of product (PCRs) are provided by the ADEME-AFNOR working groups, in order to make easier the application of the standard. Thus, the management burden is mainly supported by the methodology developers.
Development process of protocol	
Stakeholders involvement	The guidelines have been developed in a platform that gathered representatives of the companies, employees, public authorities, NGO/associations (ecological and consumers) The organization of the working groups has been given to each sector professional association
Standardization level	The general methodology document mentions that it could be modified to take into account the development of international and European standardization initiatives and the existing practices provided that they are relevant regarding the methodology applied.
Peer-review of underlying methodology	The broad implication of stakeholders in the development of the methodology leaves little place for an external peer review.

Implementation of protocol

Applicability

Goods and services mainly targeted	The standard is applicable to all basic consumables and services and covers stores, catalogues, websites. In particular (not exhaustive): - basic products: food and feed, energy consuming devices, batteries, washing products/garden products/pesticides, hygiene & beauty, clothing/house textile/shoes, building products, furniture, stationery sector, leisure, non electric tools, etc. - examples for services: water and energy supply, public transportation, dry-cleaner's, telephony, Internet (minute of communication) No working group for services yet (except financial services)
Additional efforts to expand the project	Working groups under development for financial services, cars/two-wheels, jewellery, music instruments.
Possibility of analysis / use of data	- product category rules (and general methodology) must be designed to ensure the comparability of information 1. between products of one category or if relevant between products of different categories, 2. inside one or different purchasing places - the labelling does not include information related to environmental impact

	reduction
Consideration of other environmental impacts	Multi-criteria approach: other environmental impacts have to be studied to identify the relevant ones. The selection of relevant impacts is thought by product category. The projected revised version proposes referent methodologies for the different impact indicators (e.g.: RECIPE 2008 for eutrophication and acidification, USETox for water toxicity)
Principles	
<u>Life cycle perspective</u>	
Life cycle perspective	<ul style="list-style-type: none"> - the methodology is based on the LCA standards: the environmental assessment must be performed in compliance with the principles of inclusion of an LCA. - product category rules may simplify the approach by excluding one or more phases of the LC (provided 95% of the impact is considered) - The shoe PCR (validated) includes: raw materials extraction, manufacturing of primary means, transportation to the manufacturing site, transportation (including if production is made in a foreign country), and end-of-life; animal farming and use are not included.
Modularity	Life cycle prospective is intended according to the goal of the study. Partial carbon footprints are not considered in the methodology (but some life cycle stages may be excluded from the study according to PCR rules) if they are negligible
Functional unit	The impact is related to a functional unit. The functional unit is to be defined in the specific product category rule.
<u>Criteria suitability</u>	
Consistency	<p>"The development of guidelines is performed aiming at a consistency between the methods recommended for the different PCR to ensure transparency to the consumer"</p> <p>The BP X30-323 specifies that the environmental labelling must allow the comparison between products of the same category and if relevant across product categories.</p>
Relevance	<ul style="list-style-type: none"> - principle of relevance: the methods must be revised in accordance with the latest public scientific report based on national and/or international knowledge - to ensure relevance of the methodology, many rules are defined per product category: relevant environmental impact, relevant indicators (methodologies are suggested to define an indicator for each category of impact) and accuracy, relevant allocation rules, relevant sharing between primary and secondary data, relevant temporal validity of the data, relevant validation methodology. - Example of shoe PCR (validated): the functional unit is declined in 4 reference flows according to physical characteristics of the product, various sizes have been considered, guidelines are suggested regarding seasonality, the PCF has to be updated after 5 years for the first labelling then every 10 years
Completeness	<p>All GHG gases are included (more than 50 gases). Exclusions and cut off rules are defined (in goal and scope definition) to ensure that all significant inputs are considered</p> <p>Based on general cut off rules, PCRs can narrow the assessment perimeter. For each product, at least two other environmental criteria will be assessed (e.g.: natural resources, waste)</p>
Transparency	The information related to the any environmental labelling must be accessible transparently and for free to anybody, in the appropriate conditions (report,

	website): assumptions, data collection methods, articulation between primary and secondary data, emission factors, limits of the assessment. However the shoe PCR lists a whole range of data whose communication to the consumer is not compulsory (manufacturing process and location, transportation means, reference flows, type of energy consumed, etc.). But these data must be stored to be accessible to the verifier.
Reproducibility	The principle of transparency applied to assumptions, data collection methods, emission factors and assessment limits shall ensure reproducibility of the results.
Double-counting	Green electricity purchased must not be taken into account: it is supposed to be included in the national electricity carbon intensity factor
Scientific soundness	
Plausibility of the results	At least two elements contribute to the plausibility of the results: <ul style="list-style-type: none"> - The development of specific sectorial guidelines with the PCR; - The secondary database is reviewed by a governance committee including sector specialists (sectorial unions, etc.), NGOs, administrations, experts so that the secondary data (validated by the ADEME) used are homogeneous.
Values choices	To limit the extent of assumptions, an accurate frame is given for many of the choices to be made by the footprinting operator: <ul style="list-style-type: none"> - allocation rules (possible methodologies are prioritized) - choice of the energy model (for the production, the consumption, by default) - criteria are proposed to assess the impact of transports (distance, transport type, fuels used, load factor) - use phase impact assessment (possible methodologies are prioritized) - end of life: little assumptions as national averages have to be used - GWP are defined (annex B) according to the IPCC. <p>The PCR can reach a high level of accuracy which limits the extent of value choices (e.g.: calculation of the reference flow in shoe sector based on standards designed to assess the resistance of the product).</p> <p>The principle of transparency should ensure that value choices are clearly stated and accessible at least to the verifier.</p>
Scope	
Functional unit	The product category rules define the functional unit and the associated reference flows. Example of shoes category rules (validated): <ul style="list-style-type: none"> - functional unit: wear a pair shoes in a good state during one year, according to an adapted use - reference flow: number of pair of shoes
System boundary	<ul style="list-style-type: none"> - the product system is defined in the methodological guides, based on the standards ISO 14040 and 14044. - system boundaries: INCLUDED = all GHG, carbon sunk in the product taken into account (according to the number of years it is stocked), change of land use, end of life (impact assessed) / NOT INCLUDED = carbon offsetting, R&D, commuting, environmental impact of the services associated with the product (advertising, marketing and sales), impact due to the buyer's of the product moving to the commercialization spot. - the methodology specifies that in case of promotions, the impact of the promotional product is to be included. <p>The PCR defines clearly the system boundary. For example, the shoe PCR draws a scheme of the product system excluding explicitly the breeding</p>

	phase.
Cut-off criteria	<ul style="list-style-type: none"> - Entering materials / flows can be neglected until their cumulated mass or energy or environmental impact reaches more than 5% of the mass / energy / impact of the product system. The most restrictive criteria defines the scope. - Decisions must be made to include entering materials that would increase the product system impact by a fixed % (example: every entering material whose impact would increase the overall impact by more than 1% should be taken into account).
Offsetting	Carbon offsetting operations are not included in the product's carbon footprint assessment.
Allocation	<p>In the case of co products, allocation rules are defined in the PCR but the several methodologies are prioritized in the general guidelines:</p> <ul style="list-style-type: none"> - specific allocation as far as distinction in the process is possible - allocation based on physical ratios (mass, energy) - substitution method (avoided impacts of the co product) - allocation based on economic value <p>Allocation rules are established to allocate impacts due to the distribution phase. That allocation is based on the limiting factor among the volume, the mass, or the floor area occupied by the product.</p>
Carbon storage/land use change	<ul style="list-style-type: none"> - carbon storage taken into account if forest managed in a sustainable way, according to the number of years the carbon is stocked relatively to 26 years. This methodological option is supposed to be revised in further versions of the standard. - land use change taken into account: impact calculated in accordance with the UNFCCC methodology <p>The rule governing carbon biomass storage accounting shall be kept up to date with international rules adopted in application of the United Nations Framework Convention on Climate Change Protocols.</p>
Use stage	<p>The use stage is included and a focus must be done if its impact is dominant. The following information sources must be considered:</p> <ul style="list-style-type: none"> - harmonized standards if any - industry (factories, federations) recommendations (product stewardship) - consumer surveys - use conventions if a consensus is found in the working group <p>In the case of shoes PCR (validated), use phase is excluded.</p>
End-of-life	<p>End of life is tackled with accuracy in the guidelines, with detailed calculation rules about materials impact and recycling in open- and closed-loop systems (compliant with PAS 2050).</p> <p>These guidelines are currently being reviewed.</p>
Data	
Data quality requirement	<ul style="list-style-type: none"> - Data should be of an acceptable quality and validated in compliance with PCR rules - PCRs should precise some data specificities
Data collection	<p>PCR determine the primary and secondary data to be collected.</p> <ul style="list-style-type: none"> - primary data in priority - if not available: secondary data from two sources: a public database developed by the ADEME (and including the EU data from ELCD), or other secondary sources after validation by the ADEME (based on an advice from a governance comity). <p>Concretely, a half-specific category of data is defined.</p>

	<p>Example of shoes PCR: all the primary, "half-specific" and secondary data to be collected are listed in the document. Averages are proposed for semi-specific and secondary data. No specific information on the collection process.</p> <p>Data to be used are clearly stated, as well as the alternative possibilities (e.g.: semi-specific data), which enables to increase the data quality.</p> <p>Data form examples are suggested to facilitate data collection (upstream transportation, internal transportation, process impacts).</p>
Data validation	<p>Data validation rules to be established in the PCR.</p> <p>To date, the shoe PCR validation rules only consists in a list of data to be accessible to the verifier.</p>
<u>Interpretation</u>	
Uncertainty assessment	<p>Sectorial working groups must make an uncertainty analysis based on ISO 14040. In particular the analysis must ensure that the methodology cannot produce negative values.</p> <p>The shoe PCR (validated) does not make recommendations regarding uncertainty.</p>
Sensitivity analysis	<p>Sectorial methodologies must make a sensitivity analysis based on ISO 14040 (PCRs)</p>
<u>Verification process</u>	
<p>The principle of transparency prevails for assumptions, data acquisition process, emission factors, assessment limitations.</p> <p>Each product category rules define the data validation process. Shoes case study recommends companies to keep a file for each product reference.</p> <p>No detail is yet available on a possible results external review procedure</p>	
<u>Communication</u>	
Type of communication	<p>Label to be worked out but the final objective of the calculation is to have a the environmental footprint of the product.</p> <p>A conformity claim with the BP X30-323 methodology cannot be written on the product itself. The conformity can be claimed in an institutional communication</p>
Marketing/communication	<p>Guidelines for communication will be developed in accordance with the ISO 1402X series of standards.</p>
<u>Compliance with ISO 14067 requirements</u>	
<p>Guidelines for communication will be developed in accordance with the ISO 1402X series of standards.</p>	

Support implementation of protocol

Software/tools support

Type of tool	<p>A tool will be provided by the ADEME to the companies that will not develop their own tool. The tool will rely on the secondary database developed by the ADEME that will ensure that all companies will use the same default data. It will also include the methodological rules (e.g.: scope, indicators) by product category.</p>
Cost of license	<p>Not defined yet but the licence might be partly free.</p>

Method documentation

Availability and accessibility	<p>- Standard available on the Internet, not free (60€ HT).</p>
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	- Referring to the need for transparency of the calculation methodology, the sectorial guidelines will probably be public and accessible at a similar price, unless it becomes mandatory; in this case, guidelines will be free.
Suitability for target audience	
Experts	According to the guide, the methodology shall be used by environmental assessment specialists. The restriction is consistent with the [complexity] of some part of the method (land use change, carbon storage, recycling considerations)
Non experts	A guidance document has been developed so that the methodological choices of the standard be more explicit.
Sector-specific approach	Sectorial guides are being developed within the same initiative. Some principles for PCR are specified in the general methodology
Data availability	
The public database developed by the ADEME will be free and accessible on the Internet. It will include the data from the EU base ELCD. The data are validated by the ADEME according to the opinion given by a governance comity. The comity checks that 1. data are representative (if not, they have to be precised according to the various processes) and 2. justified on a scientific basis.	
Other means to support implementation	
In order to facilitate implementation in SMEs, an Excel software tool is being developed to establish energy and material flows per product which are the inputs required for the national database.	

Risks and benefits

Risks

Risk of no completion	The risk of no completion is low. Indeed: - the general guidelines of calculations have been completed. Currently, PCR are under development in all working groups. Some sectors have made huge progress. - the legal framework supports the project (compulsory labelling in 2012)
Weaknesses of the project	- very little information on validation rules (common to all PCR) - comparability of products can not be assessed for the moment - no recommendation on communication aspects, but it is planned.
Limitation / excluded areas	- Sectors: limited to mass market products - Methodology / GHG sources: No limitation is specified by the methodology; however, some PCRs may include limits (e.g., exclusion of the use stage for the shoe PCR)
Comparability between products based on methodology used	Medium to high: PCRs aim to be precise enough to ensure products comparability; for the moment, there is not enough information to assess the global comparability
Risk of misleading communication	Guidelines for communication will be developed in accordance with the ISO 1402X series of standards, which require to respect some important principles (transparency,...)

Benefits

Advantages of the project	- Development of PCR covering all basic consumables to ensure sectorial applicability - Development of a public secondary database and of an application tool (free access) - Strong support from authoritative bodies
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	- Multicriteria approach (more relevant to assess environmental impact)
Possible use of the results	<p>The results can be used for benchmarking, and generally speaking to provide the consumer with an environmental criteria of choice between products.</p> <p>There are no specific guidelines to calculate footprint reduction.</p>

Analysis of methodologies

PAS 2050



General

General

Objective	<p>PAS 2050 has been designed to provide the following benefits:</p> <p>(a) For business:</p> <ul style="list-style-type: none"> - allows internal business assessment of existing supply chains (but it is not the purpose of this PAS to provide calculation of the differences in GHG emissions from using all alternate supply chain options (i.e. the analysis focuses on the process map for the most common supply chain used by a company for the product in question); - facilitates the evaluation of alternative product configurations, sourcing and manufacturing methods, and raw material choices; - provides a benchmark for ongoing business programmes aimed at reducing GHG emissions over time; and - allows for a comparison of products using a common, recognized and standardized approach to supply chain emissions assessment. <p>(b) For consumers:</p> <ul style="list-style-type: none"> - provides a common basis from which the results of embodied GHG emissions assessments can be reported and communicated to stakeholders, including consumers; and - provides an opportunity for greater consumer understanding of the GHG implications of purchasing decisions, and incentive to change purchasing decisions on the basis of this information. <p>However there is no formal or regulatory objective. Some additional structures have been set up to ensure the follow up of the process (labelling, etc.)</p>
Type of protocol	Public protocol standard, jointly sponsored by the Carbon Trust and the UK Department of Environment, Food and Rural Affairs, and published by the British Standards Institution
Targets	<p>No restriction ("companies of all sizes, and from all industries")</p> <p>All goods and services are targeted, and the method has been widely tested (among the case studies of the Carbon Label website: shampoo, fruit juice, clothing, financial services) .</p>
Structure	
Sponsor / initiative structure	<ul style="list-style-type: none"> - BSI was the project manager - The Carbon Trust was the Technical Author - A diversified Steering Group was established (UK Energy Research Centre, Defra, Confederation of British Industry, University of Surrey, etc.) - The Carbon Trust and Defra had joint sign-off of the final document <p>The proposed 2010 revision of the standard is expected to be sponsored by the UK government, and managed by the BSI. The Carbon Trust will participate in the Steering Group (practical experience in implementing PAS 2050 for products and supply chains in a wide range of countries)</p>
Owner of the methodology	BSI (British Standards Institution)
Type of commitment	Voluntary
System manager	No information on the structure to be set up, but the process has to follow LCA principles

	<ul style="list-style-type: none"> - Adaptation of the methodological framework: knowledge of both company's process and LCA concepts are required. An LCA expert seems to be necessary. - Data collection: involving internal resources seems to be the best option. Depending on the framework issued from the first step, LCA expertise may be required. - Calculation: depending on the preparation (adaptation of the methodological basis), internal or external resources could be used but LCA knowledge seems to be necessary - Analysis: no information but depending on the level of details to be achieved, LCA expertise may be useful. - In a large organisation internal participants could include representatives from senior management, environment/CSR, marketing/communications, production, procurement/supply chain, logistics, energy, finance/performance management, analysts who will lead the CFP calculation. - Many companies hire third-party consultants to perform the product carbon footprinting analysis. The decision depends on weighing internal resource availability and expertise against the costs of an internal provider.
<u>Stakeholder acceptance</u>	
Links with policy and regulation	No link to regulatory instruments, no regulatory sanctions/incentives expected (trade issues)
Links with authoritative bodies	Co-sponsored and signed-off by the Department for Environment, Food and Rural Affairs (Defra) Published by the BSI, independent national body responsible for preparing British standards [note: it is not to be regarded as a British standard]
Other information	<p>Stakeholders from the industry are broadly supporting the development of the scheme as more than 20 companies trialled the method testing the PAS on over 75 product types. Development of the standard included two rounds of international public consultation, and the formation of approximately 10 expert workgroups to inform content development.</p> <p>According to the document from the Carbon Trust "Product Carbon footprinting: the new business opportunity - Experience from leading companies", consumer reactions to the Carbon Reduction Label have been positive, with a strong preference for lower carbon products and even for any product with a carbon label.</p> <p>The PAS 2050 standard has been used more widely than by the Carbon Trust Footprinting Company (Carbon Label website).</p> <ul style="list-style-type: none"> - it has been downloaded over 20,000 times in more than 100 countries - it has been a key input to the WRI/WBCSD Product GHG Protocol - it is recognised as a key document in the development of ISO 14067 - it has been the basis of, or input to, numerous initiatives around the world.
<u>Methodological background</u>	
Link with other PCF projects	<ul style="list-style-type: none"> - The method is based on ISO 14044, ISO 14021, ISO 14048, IPCC 2006 guidelines for National GHG Inventories and IPCC 2007 Climate Change 2007. - The WRI/WBCSD Product Protocol method and PAS 2050 should align technically, and this is the aspiration. The Carbon Trust is one of the original members of the WRI/WBCSD Steering Group, and harmonization of standards has been one of the priorities of this involvement.
Link with ISO standards	PAS 2050 is based on the LCA normative references: "ISO 14040:2006: Environmental management - LCA - Principles and framework" and "ISO

	<p>14044:2006: Environmental management - LCA - Requirements and guidelines". However the PAS mentions that where the approach described in these standards is incompatible with the requirements of the PAS, the requirements of the PAS take precedence.</p> <p>The main point for which the PAS is not compliant with ISO 14044 is the allocation between products/by-products: the PAS favours economic allocation to encourage best behaviour (give waste a value).</p> <p>A Code of Good Practice for Product Greenhouse Gas Emissions and Reduction Claims has been published by the Carbon Trust. The Code is designed to comply fully with applicable elements of the nine principles specified in ISO 14020:2001 in relation to environmental declarations and labels.</p>
Revision process for the methodology and the background data	<p>- Method: BSI reserves the right to withdraw or amend this PAS on receipt of authoritative advice that it is appropriate to do so. This PAS will be reviewed at intervals not exceeding two years, and any amendments arising from the review will be published as an amended PAS. A consultation is expected to be launched (autumn 2010) to define the objectives and priorities of the revision which is expected for March 2011.</p> <p>- Application to a product: results obtained from the implementation of this PAS shall be valid for a maximum period of two years, except in case of important changes (e.g.: unplanned change leading to an increase of GhG emissions greater than 10% and experienced for more than three months, planned change leading, leading to an increase of GhG emissions greater than 5% and experienced for more than three months)</p>
<u>System management and implementation</u>	
<u>Tests already performed</u>	
Number of products tested	<p>- Prior to the publication of PAS 2050, draft versions of the standard were piloted with around 20 companies by the Carbon Trust</p> <p>- Following publication of PAS 2050, The Carbon Trust has already used the PAS 2050 with 200 product ranges. Moreover, PAS 2050 has been tested on 100 food products by the DEFRA</p> <p>- Some completed case studies are available on the Carbon Trust website: Boots, Continental Clothing, HBOS, Innocent, Tesco, Walkers.</p> <p>- The Carbon Trust website lists all the products with public available footprints (date of certification, company, product) [: http://www.carbon-label.com/business/productdirectory.htm]</p>
Number of companies having made tests	<p>The Carbon Trust website lists 21 companies considered as pioneers in carbon footprinting using PAS 2050.</p> <p>Over the past two years, the Carbon Trust Footprinting Company has carried out footprinting for over 3,000 products, working with 50 companies.</p>
<u>Other information</u>	
Required conditions for implementation	<p>"It has been assumed in the preparation of this PAS that the execution of its provisions will be entrusted to appropriately qualified and experienced people for whose use it has been produced."</p> <p>Note - Accreditation: The Carbon Trust has sponsored the development of an independent accreditation programme by the UK Accreditation Service (UKAS)</p> <p>- Through this programme, UKAS can accredit certification companies as being able to provide independent third party verification of product carbon footprint assessments carried out under PAS 2050</p>

	<ul style="list-style-type: none"> - PAS 2050 is the only product carbon footprinting programme in the world that can offer independent third party certification of the results - Currently, four certification bodies are accredited by UKAS against PAS 2050
Economic aspects	<ul style="list-style-type: none"> - Access to the method and its guidance is free. The Carbon Trust Footprinting Company (developed in parallel with the standard) provides consultancy, scoping of projects, and communication via the Carbon Reduction Label. The licence for the tool is 1350£. - According to the document from the Carbon Trust "Product Carbon footprinting: the new business opportunity - Experience from leading companies", the cost of footprinting varies considerably depending on the complexity of the product and its supply chain. Smaller companies can implement PAS 2050 themselves without hiring external consultants if they are concerned about costs, and then have their results verified, as Continental Clothing did. Costs can also be controlled and/or mitigated by the company's choice of product type and numbers. - The Carbon Trust has sponsored the UK Accreditation Service (UKAS) to develop an accreditation programme, through which accredited product carbon footprint certifiers are recognised in the UK and internationally, which will increase the availability of skilled certification bodies therefore fostering competitiveness in the sector - According to the same study: the cost per product is 25% lower if [5 products analysed, external consultants, B2C product] compared to [1 product analysed, external consultants, B2C product] and 90% lower if [4 products analysed, internal consultants, B2C product] compared to [1 product analysed, external consultants, B2C product]. - The initiative insists on the economic benefits for the companies which develop a carbon footprint: measuring CFP can help reduce costs (energy and waste efficiency measures, cost saving opportunities in the supply chain) and increase benefits (product differentiation and general brand enhancement)
Management burden	<p>The approach is quite similar to ISO 14067 (use of relevant PCR if it exists and has been established according to ISO 14025 requirements,...). The application burden depends on the existence of PCRs which defines more precisely LCA useful parameters (e.g.: functional unit)</p> <p>Thus, an important part of the management burden relies on users.</p>
Development process of protocol	
Stakeholders involvement	<p>Two opportunities for stakeholders consultation:</p> <ul style="list-style-type: none"> - A representative group of stakeholders, part of the Review Panel, was identified by the Steering Group, the Sponsors and invited by BSI to review the first draft of the PAS. It was considered as the "key stakeholders" group. The main purpose of this initial consultation was to gather and build on existing best practice by engaging with stakeholders with experience in the application of relevant methods. It included stakeholders in the UK and internationally. - The PAS Review Panel was a wide formation of organisations and individuals representing those stakeholder groups that may be affected by the implementation of the PAS, nominated by the PAS Steering Group, the Sponsors and BSI to comment on a PAS draft in writing ==> more than 700 organizations (UK and international) <p>In addition, the Carbon Trust sponsored around ten expert workgroups to</p>

	<p>consider different technical aspects of product carbon footprinting. These small groups included international representation, and output from the groups was fed into the Steering Group.</p> <p>A clear development process overview has been written so ensure the transparency of the decision-making.</p> <p>Besides, a broad stakeholders consultation is planned to be launched (Autumn 2011) to define the priorities and objectives of the revision of the PAS.</p>
Standardization level	<ul style="list-style-type: none"> - The PAS 2050 widely used at an international level - The Carbon Trust, Defra and BSI are committed to internationalising PAS 2050. To this end, PAS 2050 has become a seed document for two international standards development processes: (1) World Resources Institute and World Business Council on Sustainable Development's planned Product GHG Protocol; and (2) International Organization for Standardization's (ISO) plans to develop a new international standard. The Carbon Trust sits on the GHG Protocol Steering Committee, and participates in the UK delegation to ISO as an expert member. - The WRI/WBCSD Product Protocol method and PAS 2050 should align technically, and this is the aspiration. The Carbon Trust is one of the original members of the WRI/WBCSD Steering Group, and harmonization of standards has been one of the priorities of this involvement.
Peer-review of underlying methodology	<ul style="list-style-type: none"> - In the process of development, a review panel composed of more than 700 organizations was invited to comment on the draft in writing. - Defra sponsored methods review to inform the PAS on existing methods relevant to measuring GHG emissions across the life cycle of products

Implementation of protocol

Applicability

Goods and services mainly targeted	PAS 2050 is applicable to all goods and services
Additional efforts to expand the project	No specific effort is mentioned as the PAS 2050 is designed to be applicable to all goods and services
Possibility of analysis / use of data	<p>The method provides a common basis for the comparison and communication of results arising from its use. Moreover PAS 2050 is "appropriate for supply chain analysis as it provides a detailed understanding of the GHG implications of materials and products, and produces high-precision results".</p> <p>It is not the purpose of the PAS 2050 to provide:</p> <ul style="list-style-type: none"> - an in-depth understanding of GHG emissions from each raw material or individual process - identification of GHG emissions from activities that are not normally part of the supply chain process map - calculation of the differences in GHG emissions from using all alternate supply chain options (i.e. the analysis focuses on the process map for the most common supply chain used by a company for the product in question). This options analysis may be completed as a secondary step.
Consideration of other environmental impacts	<ul style="list-style-type: none"> - Mono-criterion approach - The standard uses, among others, LCA principles; as so, it is theoretically compatible with the analysis of other environmental impacts but the protocol and the Carbon Trust (sponsor and technical author) are GHG oriented only.

	Concretely, multicriteria approach development is not planned.
Principles	
<u>Life cycle perspective</u>	
Life cycle perspective	No stage of the life cycle is excluded by principle. See "Define product system and system boundary"
Modularity	<ul style="list-style-type: none"> - Life cycle perspective is intended - PAS 2050 specifically allows partial footprint assessment (cradle to gate), which supports the flow of carbon footprint information through supply chains. - For example, PAS 2050 Guide case study on the croissant shows high level of modularity (A. 6 categories of modules: Raw material cultivation and transport (wheat example), Raw material production (flour example), Croissant production, Distribution and retail, Consumer use, Disposal - B. each category composed of several modules, example for "Distribution and retail": Transport to distribution centre, Storage, Transport to store, Retail)
Functional unit	<p>The functional unit reflects the way a product is actually consumed by the end user (e.g. 250 mL of soft drink, 1000 hours light from a light bulb, one night stay) or used as an input by a B2 consumer.</p> <p>Reference flow is, as so, not explicit for consumers since it can vary from a food product to another.</p>
<u>Criteria suitability</u>	
Consistency	<p>Different product footprints are not truly comparable unless the same data sources, boundary conditions and other assumptions are used.</p> <p>The development of PCR to facilitate comparisons is not planned but "sector guidances" could be needed to clarify the boundaries and rules, and a first guidance should be published next month by the dairy sector (responsibility of the dairy sector and Carbon Trust Footprinting Company). These sector guidances would include, for example, specific allocation guidelines for (by)products (example: allocation milk/meat in a farm). Another aspect of difference is that sector guidances are modular for instance just accounting for the transport stage in many product lifecycles. Actually, the risk with national PCRs is that they are mainly dictated by the national large companies who might disadvantage other stakeholders in the supply chain and duplicate work internationally. A more international approach should be preferred with industry associations often taking a leading role in defining the clarification rules.</p>
Relevance	<ul style="list-style-type: none"> - when launching a footprinting initiative, the relevance of the comparisons done is a key question. Which comparisons are the most relevant ? : across product specifications ? Manufacturing process ? Packaging options ? Distribution methods ? - data relevance has to be assessed with accuracy: how specific is the declared reporting period ? how specific is it to the product's relevant geography? how specific is it to the product's relevant technologies and processes?
Completeness	Calculations carried in accordance with the PAS 2050 shall include all emissions within the system boundary that are likely to make a material contribution to the embodied GHG emissions. All GHG sources, carbon storage and GHG sinks are considered.
Transparency	Claims relating to the life cycle GHG emissions of products shall be supported by the publication of a "Product Emissions report" which provides context and explains the basis for the claim made (product process and

	boundaries, materials, weights and measures, emissions and carbon intensity). A clear reference should be done to a freely accessible website where this information is.
Reproducibility	"Where a verification programme is in place, sufficient data shall be provided to the verification body, in a format specified by the verifier, to enable calculations carried out by a certification body"
Double-counting	Renewable electricity-specific emission factors (vs. national grid averages) can only be used when this renewable energy has not already been counted in any other emission factor (i.e. incorporated into the national grid average). The main purpose of this rule is to ensure no double counting of renewable energy
Scientific soundness	
Plausibility of the results	A mass balance is recommended to ensure the equilibrium of the processes analysed.
Values choices	<p>The PAS gives accurate recommendations to limit assumptions:</p> <ul style="list-style-type: none"> - co-products allocation (however, where the allocation to co-products is carried out by expanding the product system, the organization implementing the PAS shall record the assumptions made regarding the scope and emissions of the expanded product system). - system boundaries are defined with accuracy (raw materials, energy, capital goods, manufacturing, transport, storage, use phase, end of life, etc.) - which energy mix to choose for the use phase - emissions data for fuel, electricity and heat are well defined <p>Claims relating to the life cycle GHG emissions of products shall be supported by the publication of a "Product Emissions report" which provides context and explains the basis for the claim made (product process and boundaries, materials, weights and measures, emissions and carbon intensity). A clear reference should be made to a freely accessible website where this information is.</p>
Scope	
Functional unit	The functional unit is a quantified performance of a product system for use as a reference unit. The functional unit reflects the way a product is actually consumed by the end user (e.g. 250 mL of soft drink, 1000 hours light from a light bulb, one night stay).
System boundary	<ul style="list-style-type: none"> - The system includes at a minimum: <ul style="list-style-type: none"> - extraction, growing and pre-processing of raw materials, including the production and manufacturing of packaging material - all manufacturing processes which are used to produce the final product - lighting and heating of factories, warehouses and retail stores - transport of raw materials and packaging materials, and intermediate products - storage of the product at the manufacturing plant, in a warehouse and transport of a product between these points - emissions from the in-use phase of the product - processes used in the disposal of the product, including recycling processes and emissions from waste - The system shall exclude: <ul style="list-style-type: none"> - GHG emissions from manufacture and ongoing maintenance of capital goods such as plant machinery, transport equipment, electricity generation plant, etc., used in the manufacture of the product

	<ul style="list-style-type: none"> - transport of employees to their normal place of work - human energy inputs to processes and/or pre-processing (e.g. fruit is picked by hand rather than by machinery) - transport of consumers to the point of sale
Cut-off criteria	<p>The assessment of GHG emissions shall include:</p> <ul style="list-style-type: none"> - at least 95% of the likely life cycle emissions of the product unit - all sources of emissions likely to contribute more than 1% of the total emissions of the product unit <p>When a single input accounts for more than 50% of the likely lifecycle GHG emissions of a product, the 95% threshold shall apply to the remaining GHG emissions associated with the likely life cycle GHG emissions of the product.</p>
Offsetting	<p>GHG emissions offset mechanisms, including but not limited to, voluntary offset schemes or nationally or internationally recognized offset mechanisms, shall not be used at any point in the life cycle of the product in order to claim reduction in the emissions associated with the product.</p> <p>It is the intention that this PAS reflects the GHG intensity of the production process prior to the implementation of external measures to offset GHG emissions. The use of an energy source that results in lower GHG emissions to the atmosphere and therefore achieves a lower emission factor, such as renewable electricity or conventional thermal generation with carbon capture and storage, is not a form of offsetting.</p>
Allocation	<p>The preferred approach to allocation of emissions to co-products shall be, in order of preference:</p> <ol style="list-style-type: none"> 1. dividing the unit processes to be allocated into two or more sub-processes and collecting the input and output data related to these sub-processes; or 2. expanding the product system to include additional functions related to the co-products where: <ol style="list-style-type: none"> i) a product which is displaced by one or more of the co-products of the process being considered can be identified; and ii) the avoided GHG emissions associated with the displaced product represent the average emissions arising from the provision of the avoided product 3. allocation in proportion to the economic value (the economic allocation is preferred to the mass allocation to encourage the best sustainability behaviour (give waste a value))
Carbon storage/land use change	<p>CARBON STORAGE</p> <ul style="list-style-type: none"> - The weighted average carbon storage impact shall be included as a negative CO₂e value in the assessment of GHG emissions arising from the life cycle of the product. - Products are eligible for a deduction of the stored carbon if: <ol style="list-style-type: none"> 1. not for human or animal ingestion (not food or feed) 2. more than 50% of the mass of carbon of biogenic origin in the product remains removed from the atmosphere for one year or more following production of the product 3. the material containing the biogenic carbon is obtained from either: i) an input that is the result of human actions that cause its formation for the purpose of using it as an input to a process (e.g. managed forestry); or ii) a recycled or re-use input that contains material that is demonstrated to comply with point (i). <p>LAND USE CHANGE</p> <ul style="list-style-type: none"> - GHG emissions occurring as a result of direct land use change shall be

	<p>assessed in accordance with the relevant sections of the IPCC Guidelines for National Greenhouse Gas Inventories.</p> <ul style="list-style-type: none"> - The assessment of the impact of land use change shall include all direct land use change occurring on or after 1 January 1990. - The total GHG emissions arising from direct land use change shall be included in the GHG emissions of products arising from this land. One-twentieth (5%) of the total emissions arising from the land use change shall be included in the GHG emissions of these products in each year over the 20 years following the change in land use.
Use stage	<p>To calculate the emissions due to the use stage, the following sources are recommended by order of preference:</p> <ol style="list-style-type: none"> 1. Product Category Rules (PCRs) that specify a use phase for the product being assessed. PAS 2050 defines the PCR as offering a consistent, internationally accepted approach to defining a product's life cycle and refers to the PCR section of www.environdec.com. 2. International standards that specify (same as above) 3. National Standards that specify (same as above) 4. Published industry guidelines that specify (same as above)
End-of-life	<p>Few recommendations are given concerning end of life.</p> <ul style="list-style-type: none"> - RECYCLING: Where the life cycle of a product includes a material input with recycled content originating from the same product system, the emissions arising from that material shall reflect the product specific recycle content and/or recycling rate. Concerning "open circuit recycling" (material recycled in another product system), the PAS refers to the standard ISO 14044:2006. - EMISSIONS ARISING FROM FINAL DISPOSAL PHASE OF PRODUCTS: Where emissions arising from the use phase of a product, or from its final disposal, occur after the first year following the formation of the product but within the 100-year assessment period, the impact of these emissions shall reflect the weighted average time the emissions are present in the atmosphere during the 100-year assessment period. <p>The revision of the PAS in 2010/2011 will give further consideration to recycling and end of life areas.</p>
Data	
Data quality requirement	<ul style="list-style-type: none"> -Data quality rules have been established on the basis of ISO 14044 requirements; The following indicators are said to be important to determine data quality and assess variability a) For time-related coverage: age of data and the minimum length of time over which data are collected, data that are time-specific to the product being assessed shall be preferred; b) For geographical specificity: geographical area from which data are collected (e.g. district, country, region), data that are geographically-specific to the product being assessed shall be preferred; c) For technology coverage: whether the data relate to a specific technology or a mix of technologies, data that are technology-specific to the product being assessed shall be preferred; d) For accuracy of the information (e.g. data, models and assumptions), data that are most accurate shall be preferred; e) For precision: measure of the variability of the data values for each data

	<p>expressed (e.g. variance), data that are more precise (i.e. has the lowest statistical variance) shall be preferred.</p> <p>f) completeness: the percentage of data that are measured, and the degree to which the data represent the population of interest (is the sample size large enough, is the periodicity of measurement sufficient, etc.);</p> <p>g) consistency: qualitative assessment of whether the selection of data is carried out uniformly in the various components of the analysis;</p> <p>h) reproducibility: qualitative assessment of the extent to which information about the method and data values would allow an independent practitioner to reproduce the results reported in the study;</p> <p>i) data sources, with reference to the primary or secondary nature of the data. Additionally:</p> <ul style="list-style-type: none"> - A minimum threshold for the proportion of primary data is being sought - An order of preference in sources of secondary data is provided: partial GHG assessment information (data verified as being compliant with the PAS); peer review publications; competent sources (national government, official UN publications, publications by UN-supported organizations); other sources
Data collection	<ul style="list-style-type: none"> - Data collection templates may be a useful method of formalising the data collection process helping to structure an interview with a supplier, ensure completeness, prioritise the likeliest/largest carbon reduction opportunities - Primary data shall be collected from those processes owned, operated or controlled by the organization implementing this PAS. The primary activity data requirement shall not apply to downstream emission sources. Where the organization implementing the PAS does not contribute 10% or more to the upstream GHG emissions of the product or input prior to its provision to another organization or the end-user, the primary activity data requirement shall apply to the emissions arising from those processes owned, operated or controlled by the first upstream supplier that does contribute 10% or more to the upstream GHG emissions of the product or input. The requirement to obtain primary activity data shall not apply where implementing the requirement would necessitate the physical measurement of the GHG emissions. Primary activity data can be collected across the supply chain either by an internal team or by a third party (e.g. consultants). - In some cases, secondary data may be preferable to enable consistency and comparability: global warming potentials, electricity emissions factors from various energy sources, fuel emissions per litre, transport emissions per vehicle type, waste emissions per kg, agriculture emissions from livestock and/or soils. Secondary data will come from the following sources by priority: 1. use of partial GHG assessment information as secondary data (data verified as being compliant with the PAS), 2. peer review publications, 3. competent sources (national government, official UN publications, publications by UN-supported organizations), 4. other sources <p>Specific requirements are stated to increase the data quality</p>
Data validation	<p>No specific data validation process. But all the sources of data must be assessed against quality criteria aforementioned (time-specific, geographical-specific, technology-specific data shall be preferred. Variability should be assessed)</p> <p>The level of validation depends on the goals of the initiative:</p> <ul style="list-style-type: none"> - certification is advisable for external communication of the footprint results and may be desirable in any case, to ensure decisions are made on the basis

	<p>of correct information</p> <ul style="list-style-type: none"> - other-party verification (non-accredited third parties) - self verification: if self-verification chosen, it is recommended to follow the method outlined in BS EN ISO 14021.
Interpretation	
Uncertainty assessment	<ul style="list-style-type: none"> - Checking uncertainty is not prescribed but recommended (optional). The Monte Carlo analysis is particularly recommended (it is a common uncertainty analysis method for LCAs, based on the study of results variation according to the variation of the main entry data) - Where the emissions associated with the life cycle vary over time, data shall be collected over a sufficient period of time (at least one year of continuous availability) - The reduction label granted by the Carbon Footprinting Company takes into account the uncertainty of the calculation to fix the emissions reduction target.
Sensitivity analysis	Sensitivity analysis is required
Verification process	
<p>The level of validation depends on the goals of the initiative:</p> <ul style="list-style-type: none"> - certification is "advisable" for external communication of the footprint results and may be desirable in any case, to ensure decisions are made on the basis of correct information - other-party verification (non-accredited third parties) - self verification: if self-verification chosen, it is recommended to follow the method outlined in BS EN ISO 140216. 	
Communication	
Type of communication	<p>Reminder: the PAS 2050 does not aim at developing guidelines related to communication. It focuses on footprinting methods. The initiative of the Carbon Trust to write a "Code of Good Practice for Product Greenhouse Gas Emissions and Reduction Claims" is independent from the PAS 2050 initiative even if it relies on the PAS 2050 document.</p> <p>A Carbon Reduction Label (examples: Tesco, Walkers) has been designed by the Carbon Trust Footprinting Company to show the total greenhouse gas emissions from every stage of the product's lifecycle, including production, transportation, preparation, use and disposal. The figure is given as their total CO₂ equivalent as is consistent with other recognised GHG reporting.</p> <p>The footprint can be disclosed via other media: point-of-sale information (Boots), website information (innocent, Halifax Web Saver Account), sales catalogue (Continental Clothing).</p> <p>Recent evolutions of the label states that it is not required any more to display the carbon footprint with the label (which is designed to show an engagement of the firm, not a performance)</p>
Marketing/communication	<p>To ensure understandability, the "Code of Good Practice for Product Greenhouse Gas Emissions and Reduction Claims" defines the standard unit of measurement, the functional unit, the result precision and rounding.</p> <p>Moreover it states that 'claims relating to a product's lifecycle GHG emissions shall be reported as a single figure encompassing the total emissions for the product per functional unit, taking into account of all the phases of the product's life cycle, and assessed in conformity with PAS 2050.</p> <p>Specific guidelines have been established for reduction claims (period of assessment, uncertainty, updates)</p> <p>The Code of good practice distinct the communication on product lifecycle GHG emissions and the communication on lifecycle GHG emissions</p>

	<p>reduction.</p> <p>The Carbon Reduction Label of the Carbon Trust Footprinting Company includes: the footprint drawing, a commitment by the producer to reduce emissions – or lose accreditation, the Carbon-Label.com web address so consumers can find out more information. In option: the footprint calculated, an educational element explaining how the footprint is created, product comparison information between different items produced by the same company and within the same category, customer action tips (how to reduce its carbon footprint according to the use: in the home, at work, waste and recycling, etc.)</p>
<u>Compliance with ISO 14067 requirements</u>	
<p>A Code of Good Practice for Product Greenhouse Gas Emissions and Reduction Claims has been published by the Carbon Trust (it is not part of the PAS 2050). The Code is designed to comply fully with applicable elements of the nine principles specified in ISO 14020:2001 in relation to environmental declarations and labels.</p>	

Support implementation of protocol

Software/tools support

Type of tool	<p>The Carbon Trust (independently from PAS 2050 initiative but based on PAS 2050 method) has developed a specific tool: FootprintExpert™ which is a fully integrated Excel package. It includes:</p> <ul style="list-style-type: none"> - A comprehensive Guide to footprinting with Footprint Expert™, with advice and best practice from our expert team within the Carbon Trust. - Calculators to generate outputs for key common elements of the value chain, e.g. transport or refrigeration. - Model Framework, which you can use to help develop your product carbon footprint models. - Reference data including continuously updated country-specific emissions factors for processes and commodities, and other data for your product footprint. - Registry of product carbon footprints certified by the Carbon Trust.
Cost of license	<p>Commercial licence: 1350 £ (cost recovery) Footprint Expert™ cost around 1600 euros for a two users license</p>

Method documentation

Availability and accessibility	<p>The PAS 2050 method and guide are free and easily accessible on the sites of</p> <ul style="list-style-type: none"> - BSI: http://www.bsigroup.com/en/Standards-and-Publications/How-we-can-help-you/Professional-Standards-Service/PAS-2050/ - Carbon Trust Footprinting Company: http://www.carbon-label.com
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Suitability for target audience

Experts	The method is understandable by non experts.
Non experts	A guide has been elaborated for non-experts.
Sector-specific approach	<p>The guide recommends to go the website of the EPD system (www.environdec.com) to get sectorial rules.</p> <p>The development of PCR to enable comparisons is not planned but "sector guidances" (less information than in a PCR) may be published under the responsibility of the industries. The approach of the PAS is to develop accurate general guidelines so as not to leave too much flexibility in the choices and assumptions of the different sectors (the risk with national PCR</p>

	is the influence of domestic large companies in their definition. That's why PCR initiatives, if any, must be launched at an international level).
Data availability	
<ul style="list-style-type: none"> - the ILCD will be mentioned as secondary data source in a further version of the methodology - The Carbon Trust FootprintExpert™ includes a database. 	
Other means to support implementation	
<p>Support associated to PAS 2050 is mainly provided by the Carbon Trust Footprinting Company.</p> <p>The Carbon Trust FootprintExpert™ also includes pre configured calculators e.g transport, an MS excel based footprinting template and over 300 pages of additional guidance</p>	

Risks and benefits	
Risks	
Risk of no completion	<ul style="list-style-type: none"> - project viable as first versions of the standard have already been published. Moreover, it is used and adapted by several organisms (WRI/WBCSD, etc.) to create specific methodologies. - the project is supported by public authorities (Defra) and large companies - it has already found an application in a label initiative (supported by the Carbon Trust) which has a strong public visibility
Weaknesses of the project	<ul style="list-style-type: none"> - The project has not developed a secondary database and does not make reference to any existing database for the direct use of the methodology (however, a commercial tool can be bought which includes this type of information) - End-of-life guidelines should be improved (recycling) - The project has not developed a secondary database, like other LCA standards. However, the Carbon Trust Footprinting Company, along with other data suppliers, has worked to generate PAS-compliant data. The project does not make reference to any existing database for the direct use of the method (however, a commercial tool can be bought which includes this type of information) to prevent PAS 2050 from providing misleading information (e.g. specific databases may be strong on data for one type of materials, and weak on other materials or processes; specifying databases could lead to commercial benefit).
Limitation / excluded areas	<ul style="list-style-type: none"> - Sectors: no restriction declared - Methodology / GHG sources: No limitation is specified
Comparability between products based on methodology used	<p>Comparability is considered medium, since comparability is not the main objective of the analysis, even if it is possible; in this case, final labelling aims to enable product comparability: products which have been tested displayed the carbon footprint figures and the Code of Good Practice for Communication "requires organisations to report publicly the absolute emission levels of the product(s), and to disclose supporting information explaining how these emissions were assessed to facilitate comparisons by others.". However, labelling issues are evolving and, for example, carbon footprint figure is no longer mandatory for disclosure on the product.</p> <p>According to The Carbon Trust, PAS 2050 provides greater comparability between product footprints than is achievable under existing LCA standards, by clarifying key aspects of the assessment such as its scope, GWP data to be used, inclusion of land use change emissions, etc.</p>
Risk of misleading communication	To ensure that the communication is not misleading, the "Code of Good Practice for Product Greenhouse Gas Emissions and Reduction Claims"

	<p>recommends that the claims based on the product's life cycle GHG emissions shall be limited to GHG emissions and shall not imply broader environmental impacts. Moreover claims shall not confuse low carbon emissions with reductions in carbon emissions.</p> <p>As to the Carbon Reduction Label, the elements included make the risk of misleading low.</p>
Benefits	
Advantages of the project	<ul style="list-style-type: none"> - Among the recognized methods, PAS 2050 is the oldest one; thus, many cases studies are available to attest to its applicability. It is considered as a "mother" methodology in more recent initiatives. Moreover, various studies have identified its strengths and weaknesses (e.g.: omission) and proposed solutions to improve it. - Alongside the PAS, the Carbon Trust published a Code of Good Practice for communication and reduction guidance. In addition, the Carbon Trust Footprinting Company has developed guidelines, tools and databases for assist companies implementing PAS 2050 (the Footprint Expert tool with database) - The methodology is expected to be revised in 2011 to include 1. recent evolution of knowledge, 2. harmonized concepts with other international projects
Possible use of the results	<ul style="list-style-type: none"> - revealing carbon footprint and reduction opportunities (after footprint, innocent switched to 100% recycled plastic bottles, it realised a 20% reduction in materials – and therefore cost – and reduced carbon emissions from the bottle manufacturing process by 55%; HBOS' experience revealed that paper communications to account holders and the helpdesk contributed the bulk of its Web Saver account's emissions. This allowed it to focus efforts on reducing paper usage) - cost savings (HBOS and Walkers: both found ways to reduce energy costs; Continental clothing: has been able to save costs relative to competitors due to its use of renewable energy in India, which protects them against fuel price volatility)

Analysis of methodologies

Climate certification system SE

General

General

Objective	<p>The goal of the project is to create a certification system, which will reduce the negative climate effects in food production by giving consumers a chance to make a conscious climate choices as well as strengthening the competitiveness of the food producers.</p> <p>Note: this project is not based on a carbon footprint scheme; its interests lie in 4 aspects:</p> <ul style="list-style-type: none"> - the exclusion of carbon footprint criteria for the final notation - the inclusion of non-environmental criteria - its focus on the whole food chain, not only the primary production - its focus on the certification scheme rather than the label itself. <p>Rules are developed according to the analysis of impacts reduction possibilities offered by technologies and practice, provided by scientists.</p>
Type of protocol	Private scheme (guidelines publicly available)
Targets	<p>Anyone with a company operating in the production and distribution of food</p> <p>Limited applicability at this stage, opening up for imports during 2011. (Swedish and imported products).</p> <p>Food products.</p> <p>For the moment following guidelines are available: beef meat, pork meat, chicken, eggs, milk, and animal feed production as well as transports. Packaging, processing, lamb and chicken will be available from oct 5th.</p>
<u>Structure</u>	
Sponsor / initiative structure	The two major certification bodies, KRAV and Swedish Seal (Svenskt Sigill), have developed this climate certification for food. Other partners are: Lantmännen, Federation of Swedish Farmers, Milko (one of Sweden's largest dairy companies producing milk), Skånemejerier (dairy company, about as big as Milko), Scan (of northern Europe's largest food industries within meat).
Owner of the methodology	KRAV and Swedish Seal (Svenskt Sigill)
Type of commitment	Voluntary
System manager	<p>No information on the structure to be set up</p> <ul style="list-style-type: none"> - adaptation of the methodological framework: not required since the company has to fulfil specific requirements - data collection: experts may be required given the type of firms targeted and the precision of data required - calculation: experts may be required given the type of firms targeted and the type of calculation to be made - analysis: experts may be required given the type of firms targeted and the type of analysis to be performed - verification: it is required that an independent third-party performed a quality certification before applying to the label. <p>Rules are addressed to the responsible for the member business</p>
<u>Stakeholder acceptance</u>	
Links with policy and regulation	No incentives for the moment. Strong contribution from development funds issued by the government through the Swedish Board of Agriculture.

Links with authoritative bodies	Strong contribution from development funds issued by the government through the Swedish Board of Agriculture. Project developed by the two key organisms issuing standards for food production
Other information	High acceptance is foreseen. According to press reports (Spiegel-online of 7th Nov. 2009) the climate label increased the sale of Max burgers by 20 percent. Experts are cited to expect a 50 percent reduction of GHG emissions in the Swedish food industry, if the population would switch to climate friendly alimentation. The labelling initiative maintains that 60 percent of consumers would like to see a climate label on products. Reduction in climate impact varies between food categories and the certification system gives no signal to the consumer about the magnitude of improvements made.
Methodological background	
Link with other PCF projects	The climate certification can only be used in combination with another certification scheme (criteria are specified in the standard) that certifies components of sustainable food production. It does not aim to be a carbon footprint scheme because in the early screening of information regarding PCF for agricultural products, it was found that knowledge was not sufficient regarding carbon accounting for land use, nitrogen management in the soil and organogenic soils.
Link with ISO standards	No declared compliance with standards ISO
Revision process for the methodology and the background data	- Methodology: no information, but given its principle (comparison to best practices), it may be reviewed periodically - Application to a product: The methodology requires surveillance check and improvements proposals. No information about time plan are provided.
System management and implementation	
Tests already performed	
Number of products tested	The first climate certified products will be presented on June 15th and these are: milk from a small dairy north of Uppsala as well as tomatoes from a greenhouse production. These products are available in shops, mainly in Uppsala (the milk) and the Stockholm region (the tomatoes).
Number of companies having made tests	At this stage, all Swedish greenhouses with organic production of tomatoes and cucumbers are in the certification process. As well as the small dairy cooperative, a greenhouse with leafy vegetables and Sweden's major producer of frozen spinach.
Other information	
Required conditions for implementation	The climate certification can only be used in combination with another certification scheme (criteria are specified in the standard; quality certificate posing fundamental demands in the areas of environmental protection, animal welfare and social welfare) that certifies components of sustainable food production. In order to have this label external third verification is mandatory. The certification body has to be independent and accredited against 1) the standard 2) EN 45011.
Economic aspects	Need for Investment for internal/external resources to calculate GHG emissions, to respect recommendations and rules and implement quality plan and for independent verification. Auditors have also to follow trainings to be informed of the context update.
Management burden	PCR concept is not used in this initiative. Methodology developers have made an important effort to identify the main sources of environmental impacts but

	the main burden now relies on firms which want to apply for this label.
Development process of protocol	
Stakeholders involvement	Stakeholders are involved into the development of standards: authorities, advisors, certification bodies, trade and processing businesses, packaging businesses, Swedish universities, organisations of producers as well as producers themselves.
Standardization level	The label is under construction and not all agricultural aspects are covered for the moment. There is no information about an international extension of the project, which is focused on Swedish specificities. Criteria for imported products are under development and will be launched during 2011.
Peer-review of underlying methodology	The project's circulating documents will be open for all to comment on. External stakeholders could be authorities (including SWEDAC), farmers, researchers, NGOs, consumers organisations, etc. During the time for circulating documents, an open hearing was held for discussion. Review by expert independent from stakeholders is not mandatory.

Implementation of protocol

Applicability

Goods and services mainly targeted	Food product: Fishery, crop production, milk, meat Their study includes general farm activities
Additional efforts to expand the project	Some standards are still under development, e.g. lamb meat, and the development of standards is planned for other kinds of food products.
Possibility of analysis / use of data	The project mainly aims to compare a site practice to best practices for the sector. Data collection and methodology enable Improvement analysis and Identification and tracing of drivers.
Consideration of other environmental impacts	<ul style="list-style-type: none"> - Multi-criteria approach - Analysis criteria are chosen to highlight specific environmental benefits of a solution and the calculations to be made by users are quite reduced. Thus, it seems complicated to enlarge the methodology as to enable the calculation of other impacts over the product life cycle. Specific questions and guidelines related to the most impacting phases for other impact categories should be added. - The certification is a climate certification but other environmental issues have been taken into account while developing the criteria.

Principles

Life cycle perspective

Life cycle perspective	The rules cover general farm activities, agricultural and greenhouse production of crops, milk production, animal production, fisheries and certain transport operations. End of life and use phase excluded. Comparison of the possible ways to reduce the GhG emissions is based on LCA data and IPCC information.
Modularity	Partial carbon footprint is not possible: GhG emissions of possible ways of farm management are assessed but no LCA is clearly made.
Functional unit	The methodology does not use the concept of Functional Unit since it compares management possibilities

Criteria suitability

Consistency	As no figures related to GHG are provided to the consumer, it does not enable meaningful comparison in GHG information. It can show the
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	consumer which products within a category are the best from a climate point of view. However, this analysis is based on comparison between GhG emissions which are available in decision reports on the initiative website.
Relevance	The methodology provides guidelines for specific categories of products, based on a deep analysis of market status and practice. These guidelines are probably not directly adaptable to other kinds of food products (as coffee, chocolate, pastry and more elaborated food products) since they refer to specific issues of each agricultural activity. However, an extension to other product is considered (there will be a strategy for that developed during late 2010).
Completeness	The methodology provides guidelines to reduce carbon footprint of one product taking into account the most impacting phases of the life cycle of a food. GhG sources are not all treated (for example, milk criteria are based on the analysis of CO ₂ , CH ₄ and N ₂ O)
Transparency	The reviewer has access to all underlying data on request in context of the review process. Criteria choice is clearly stated in the decision reports. A specific effort is made on this aspect.
Reproducibility	The label does not give a figure for CO ₂ emissions. No calculation process is clearly defined and only guidelines are provided. It is therefore not possible for an external reader to recalculate the CFP. However, the certification process guarantees standard treatment of all customers for the certification.
Double-counting	The rules of the certification system are not formulated in a way which can be misleading and lead to double counting; however, it is not proved that double counting can be avoided in the calculations by the members.
Scientific soundness	
Plausibility of the results	This point can not be assessed since it has to be performed by each member and is not available. Moreover, the certification does not give a figure for CO ₂ emissions so there is no mean to assess the results plausibility without being involved in the process. Guidelines are too general and criteria are as follows: fossil fuel may not be used for heating pig houses, the plant nutrient content of the manure must be determined, you must conduct an energy analysis at farm level of energy consumption for the farm's processes and activities
Values choices	This item can not be assessed. Criteria thresholds, suggested best practices or other value choices are made based on non-explicit literature review; however, sources of information are quoted in the decision reports.
Scope	
Functional unit	Not applicable; this concept is not used in the concrete calculations
System boundary	The certification system covers the entire production chain for a product, up to the store. This means that it certifies the primary on-farm production, the food processing, packaging and transports. Use phase and end of life excluded for the moment.
Cut-off criteria	Not applicable; this concept is not used in the concrete calculations
Offsetting	Not applicable; this concept is not used in the concrete calculations
Allocation	Allocation issue is not addressed
Carbon storage/land use change	This issue is not formally addressed in the documents reviewed but scientific scan on which is based the analysis identified areas where methodology

	owner needed to focus (e.g.: soybean use in fodder, management of agricultural soils and especially peat/organogenic soils). Thus, rules related to general farm activities take into consideration the cultivation of organogenic soils. Knowledge is currently being compiled about cultivation of organogenic soils in the field of climate impact. As the scheme awaits the development of new knowledge, food crops, with the exception of ley crops, that are cultivated in organogenic soils cannot be labelled with the climate label. When such knowledge is available, it is possible that the cultivation of food crops in organogenic soils may be permitted on the condition that action is taken to reduce climate gas emissions.
Use stage	Use stage is not considered
End-of-life	Not considered
Data	
Data quality requirement	Specific requirements are expressed for some criteria but there is no common criterion enabling the data quality.
Data collection	For each phase, guidelines state which data has to be considered and collected. It reduces the possibilities of misunderstanding and, thus, increase the data quality.
Data validation	No information is available on this subject. However, - it is a requirement that the company has third-party certification of the business that places fundamental demands in the areas of environmental protection, animal welfare and social welfare - the label attribution is submitted to an audit which has to verify the compliance with label criteria, which includes calculation. To a certain extent limited by the audit tasks, it is considered that data could be validated.
Interpretation	
Uncertainty assessment	No specific information on uncertainty assessment However, uncertainty analyses may have been performed during the definition of criteria for obtaining the label.
Sensitivity analysis	No sensitivity analysis required
Verification process	
The purpose of the audit is to insure compliance with the rules. It is also an aid to improvement work within the business. The audit must be performed within the framework of the certification process that forms the basis of the climate labelling system, by an independent certification company that is accredited for the standard in question as well as EN 45011.	
Communication	
Type of communication	Label Type I, for more visibility/promotion. (label without figure)
Marketing/communication	Label principles are easy to understand Decision reports supporting the criteria choices are more technical
Compliance with ISO 14067 requirements	
<p>- The methodology is not in line with ISO 14044 or 14067. In fact this is not the aim of the methodology that is not a carbon footprint scheme. The climate certification can only be used in combination with another certification scheme that certifies components of sustainable food production. Two examples of existing standards are KRAV or IP Sigill, specification of what is demanded of other such systems is stated in the criteria for the climate certification scheme.</p> <p>- As no information about CO₂ figures is provided, communication is not in line with ISO 14044 and 14067. Anna Richert 'climate expert working on Food Labelling) says: "The certification scheme is similar to ISO schemes since it demands continuous improvements, however, we have not developed it as a part of the ISO certification."</p>	

Support implementation of protocol

Software/tools support

Type of tool	No tool is provided yet (a set of leaflets as a support for farmers/producers and auditors is under development).
Cost of license	No tool is provided.

Method documentation

Availability and accessibility	Guidelines are available in Swedish and English. Two kind of documents are available: - a "standard for reducing climate impact in the production and distribution of food" which details the initiative context, general rules and specific rules for some agricultural activities - various reports detailing the process of criteria definition by kind of agricultural activity
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Suitability for target audience

Experts	Criteria have been chosen through research works of sector experts. Various possibilities of reducing GhG emissions have been analyzed. However, the application of guidelines may be difficult since it involves various complex calculation.
Non experts	Guidelines are for non-experts too
Sector-specific approach	Guidelines are specific for the following products: milk, beef, poultry, eggs, pig meat, animal feed. Other guidelines for lamb meat are foreseen. These guidelines are those detailing the criteria definition.

Data availability

Not applicable

Other means to support implementation

No other documents to support implementation are available.

Risks and benefits

Risks

Risk of no completion	Medium risk: the project has been joined by several major food and agriculture companies, the Swedish climate certification initiative has become the first comprehensive and country wide policy of its kind in Europe but it is yet partly under development
Weaknesses of the project	- For the moment there is no figure of CO ₂ -emissions on the packaging - The whole life-cycle phases is not considered (use phase and end of life excluded)
Limitation / excluded areas	- Sectors: limited to food products - Methodology / GHG sources: carbon issue is only considered through the calculation of reduction actions impacts, in the decision support for criteria report, and an important research work has to be performed for each product group in order to determine the references
Comparability between products based on methodology used	Limited: As no figures related to GHG are provided to the consumer, it does not enable meaningful comparison in GHG information. This is compliant with the aim of the project (identification of best practices), for which the comparison is not visible for the consumer
Risk of misleading	Medium risk. The CFP labelling is reviewed by a third-party but the consumer

communication	does not know which are the CO ₂ emissions related to the food product (maybe difficulty in interpretation of results and comparison of products)
Benefits	
Advantages of the project	<ul style="list-style-type: none"> - Specific for the food sector - Information simple and understandable - Inclusion of other standards - Link with research for the climate change impact reduction
Possible use of the results	Reduction of footprint, benchmarking with other products of same category; it discloses which products within a category are best from a climate point of view.

Analysis of methodologies

Japan PCF



General

General

Objective	<ul style="list-style-type: none"> - Provide reliable information about product's GHG emissions to the consumers and promote the purchase of products that emit less GHG - Increase the interest to GHG emissions issues and drive the consumers to decrease their emissions - Drive companies to decrease the impacts of their products and give them the information necessary to do it in an efficient way - Enable a general optimization through the supply chains
Type of protocol	Public scheme (national guidelines)
Targets	<p>All companies (not specified if SMEs, medium or large companies) that produces consumer goods or services.</p> <p>PCRs (in development/approved):</p> <ul style="list-style-type: none"> - Food and beverages: agricultural products, manufactured food and beverages - Work: office material, furniture and uniforms - Materials and packaging: paper, paper/plastic/glass/metal containers - Chemicals: laundry detergents, organic liquid fertilizer - Services: waste incineration, office services, reuse service of lead batteries - Other: tableware, electronic and electric goods, industrial printing materials <p>CFP labelled products: agricultural products, laundry detergents and others</p>

Structure

Sponsor / initiative structure	<p>The CFP is a governmental initiative, lead by four ministries. In June 2008, two study groups, comprised of experts and intellectuals, were established. They are, "Study Group for Development and Promotion of CFP Program" and "Study Group on Rules for Calculation, Labelling and Evaluation of CO₂ (GHG) Emissions". The main purposes of these groups are as follows:</p> <ol style="list-style-type: none"> 1. Development of CFP scheme <ol style="list-style-type: none"> (1) Rule development: Updating guidelines about calculation and labelling by Study group on CFP rule development / Study of verification scheme by Study group on CFP verification scheme (2) PCR / CFP labelling case-studies: PCR and CFP development by companies and industrial associations reviewed by PCR committee and CFP verification committee (3) CFP implementation support program: Support draft PCR development and Support CFP calculation (4) CFP regional meeting (5) Consumer awareness survey 2. CFP data collection and development <ol style="list-style-type: none"> (1) Data development in Japan, mainly by using statistics data and literature data (2) Data collection in Asian countries through case-studies
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	<p>(3) Data verification: Development of verification criteria and</p> <p>(4) Scheme / Verification of collected data</p> <p>(4) Release of database commonly used for CFP implementation</p> <p>(5) Global partnership promotion in database holders and</p> <p>Developers: International database workshop</p>
Owner of the methodology	Japanese government
Type of commitment	Voluntary
System manager	<p>No information on the structure to be set up</p> <ul style="list-style-type: none"> - Adaptation of the methodological framework: PCRs are being developed but those which have been validated are quite precise as to be applied directly, included by non-experts (even if LCA knowledge would be preferable) - Data collection: PCRs are being developed but those which have been validated are quite precise in the list of data to be collected, included by non-experts (even if LCA knowledge would be preferable) - Calculation: experts may be required given the type of firms targeted and the type of calculation to be made - Analysis: no reference is made to the analysis step of the process
Stakeholder acceptance	
Links with policy and regulation	The CFP is a governmental initiative and take place in a general willingness to decrease the GHG emissions at the national level ("Action Plan for Achieving a Low-carbon Society" dated July 2008). The government aims to make visible to the consumer the GHG emissions associated with goods. The CFP takes part to the visualization strategy. Emissions target also drives companies to decrease their GHG emissions and the PCF can help them to act efficiently.
Links with authoritative bodies	The CFP is a governmental initiative conducted by 4 ministries. It has therefore a governmental support from the beginning.
Other information	Acceptance seems to be good (the annual forums organized join a lot of people from various sectors).
Methodological background	
Link with other PCF projects	The CFP is said to be compatible with the other methodologies that are also in line with ISO 14040-44 and 14025.
Link with ISO standards	<p>TS Q0010 (i.e. technical specification "General principles for the assessment and labelling of Carbon Footprint of Products") is developed in line with existing ISO international standards, ISO 14040 series & ISO 14025. It is intended to be conform with ISO 14067.</p> <p>Japanese experts are also involved in the ISO/TC207/SC7/WG2 activities (working on ISO 14067).</p> <p>According to the methodology website, "Japan has been and will be proactively making contribution to the discussions at ISO and other relevant activities concerning international standardization of issues related to CFP" through its "ISO CFP Mirror Committee" which consists of intellectuals, 26 industrial circles, consumer groups, accreditation bodies, certification bodies and government officials. It discusses and reviews Japanese policies for international standardization based on the CFP Pilot Project outcomes, and proactively contributes to the discussions at ISO concerning international standardization of issues related to CFP."</p>
Revision process for the methodology and the background data	<ul style="list-style-type: none"> - Methodology: The approved PCR will expire at the end of the CFP Calculation and Labelling Pilot Program (Scheduled until March 31, 2012). If approved PCR is revised by the expiration date, however, the revised PCR shall be valid.

	- A Japanese Industrial Standard (JIS) will be build up based on ISO 14067 in the future.
System management and implementation	
Tests already performed	
Number of products tested	In FY 2009, 45 PCRs were established (3 are under revision), 92 products were verified and 9 products were on the market.
Number of companies having made tests	In FY 2009, over 300 companies were involved in this project.
Other information	
Required conditions for implementation	There is a procedure to follow in order to have the CFP label on a product: - Registration for a draft PCR development plan - PCR approval by the PCR committee - CFP calculation and verification by the CFP verification committee The CFP label can be used since the permission is granted.
Economic aspects	Investment is probably necessary for internal/external resources for the establishment of the PCR document and the data collection and calculation of the CFP. Specific consideration is made to the balance between the program reliability and efficiency (especially through third-party verification) and the cost for organizations.
Management burden	The general guideline, database and PCR certification and CFP verification process were developed under the national pilot project. Discussion at several committees and public comments for proposals were made. Companies are required to develop PCRs for their related product category with programme holders support.
Development process of protocol	
Stakeholders involvement	The CFP is a governmental initiative, leaded by four ministries. Over 300 companies (retailer and manufacturers) are involved in the Carbon Footprint System Implementation/Dissemination project and all companies can participate to the pilot project. The Guidelines on the carbon footprint system and the Standards for establishing product category rules (PCR) elaboration have taken into account the opinion of business and consumers (the public comments collected have been reported to the group responsible of the elaboration of these documents). The public comments have been heard for the general guideline, the PCR or the label design.
Standardization level	Technical Specification (former step of national standard) for CFP in progress Japan is committed to ISO discussion regarding CFP at the ISO/TC207/SC7/WG2. The mirror committee (bringing together 30 industrial associations) is a Japanese discussion group that corresponds to the ISO discussion one.
Peer-review of underlying methodology	The general guidelines and the other documents are discussed and reviewed regularly by the Rule.

Implementation of protocol

Applicability

Goods and services mainly targeted	All products and services
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Additional efforts to expand the project	PCR should be made for each type of product in order to have a methodology which could be applicable.
Possibility of analysis / use of data	Complete data collection and methodology that enable large possibilities of analysis (for instance: comparison between products, monitoring, impacts and risks identification and reduction).
Consideration of other environmental impacts	<ul style="list-style-type: none"> - Mono-criterion approach (GHG emissions only) - Carbon is the centre of the political initiative and no extension is planned according to data publicly available. - Considering the detailed data collection carried out to calculate the carbon footprint, it seems that an enlargement to other impact categories could be implemented without too much difficulty. The main requirement for this enlargement would be to complete the database with other impact categories.

Principles

Life cycle perspective

Life cycle perspective	<p>All stages are included.</p> <p>Quantification shall basically be made on the entire life cycle (raw material acquisition, production, distribution, use/maintenance control, disposal/recycling).</p> <p>But: It can be assumed that some stages will involve cases where it is extremely difficult to either execute quantification or gather data from other companies. Therefore, it is necessary to take a flexible approach according to the characteristics of individual products. In this sense, the quantification coverage for each of the abovementioned stages shall be defined in the "Product Category Rules" together with the reason/grounds for why a certain stage or part of a stage should be approved for omission, while taking into consideration the trend in international discussions. (...) To proceed with such an approach, and at the same time avoid any confusion on the part of the consumer, communication should be implemented so that the boundary of quantification coverage can be easily identified. However, constant efforts should be made to ensure that the excluded calculation coverage would be eventually included in the future.</p>
Modularity	Modularity is authorized under specific requirements implied by the specificity of the product or the availability of information. A calculation coverage should be undertaken.
Functional unit	<p>Quantification coverage shall be set so as to include processes that might fall within the range of a functional unit of a product but that cannot be ignored from the viewpoint of the contribution to total GHG emissions.</p> <p>PCRs should define the functional unit; this definition is not always clear</p>

Criteria suitability

Consistency	It is one of the objective of this initiative
Relevance	<p>The methodology is elastic and it seems that carbon storage or GHG sinks could be taken into account in the PCRs if necessary.</p> <p>Biogenic carbon is not accounted in the calculations (considered as neutral and not included in calculations)</p>
Completeness	<p>Kyoto protocol's GhG emissions (second assessment report) have to be calculated.</p> <p>Specific attention is paid to</p> <ul style="list-style-type: none"> - regional differences/seasonal variations - biomass (biogenic carbon not included in calculations)

	- recycling and reuse
Transparency	<ul style="list-style-type: none"> - The detailed required data are specified in the PCRs available on the initiative website. - The database is available on the same website in Japanese. - The results per life cycle phase for the products labelled is also shown on the website. - Reviewer has access to the calculations to obtain the CFP label - Products sold in store display the CF data
Reproducibility	The PCR procedure and the database are published on the website but the primary data are not available: they correspond to company's confidential data. It is therefore not possible to recalculate the CFP.
Double-counting	There are directives to avoid double-counting in the recycling or reuse phases. The impacts and gains related to these activities have to be accounted for in the raw material phase and not in the end-of-life phase.
Scientific soundness	
Plausibility of the results	The PCR have to be followed (common databases, base scenarios, etc.) and a review is required to obtain the label. These procedures are 2 guarantees for plausibility of results. The protocol states that <i>"Ideally, common data should be used for the emission factors. In the case of using an emission factor other than that from common data for any quantification, the organization must verify that such emission factor is reasonable."</i>
Values choices	<p>When scenarios are needed, the base scenario to be used (related to assumptions) is detailed in the PCR document that has to be approved. If another scenario is used, it has to be documented and justified. The same procedure seems to be followed with all types of assumptions.</p> <p>GWP values are clearly stated (100 years GWP according to the 2nd assessment report of IPCC)</p> <p>When a supplier is highly majority, its data can be used as another supplier's secondary data but with a ratio ensuring a true representation.</p>
Scope	
Functional unit	LCA concepts are the basis of the methodology. The unit of calculation (functional unit) and unit of labeling need to be defined on the corresponding PCR.
System boundary	<ul style="list-style-type: none"> - Raw material acquisition - Production - Distribution - Use/maintenance control - Disposal/recycling <p>Organizations should define the quantification coverage for each stage using the system boundary concept</p>
Cut-off criteria	If the cut-off is considered, the cut-off level shall be lower than 5% against the total GHG emissions of the product. The scope of the cut-off must be specified. The specific contents and scope of cut-off are established in the PCRs, with due consideration given to fair and impartial discussions. Specific attention is paid to non-use periods of equipments and facilities (as to exclude it from the calculations if the GHG contribution is low)
Offsetting	In Japanese CFP guideline, the offsetting is recognized as an important issue because it targets GHG emissions. But technically, the offsetting often occurs out of the system boundaries and is not accounted for in the CFP number.
Allocation	The allocation method is to be established when preparing the PCR

	<p>according to the product and process characteristics.</p> <p>Some examples are given in the guidelines in order to explain that allocation criteria should be adapted (weight as a basis for most of LCAs, monetary value for lightweight-high-value-added products, etc.).</p>
Carbon storage/land use change	<p>The section dedicated to the quantification of Raw material acquisition stage states that: Quantification does not have to include GHG emissions that discharge with new factory construction/new facility introduction and land use change, except when their contribution to total GHG emissions is clearly high. However consideration must be given to this issue according to international study. Issues regarding the carbon storage in wood material should be discussed according to the international trends.</p>
Use stage	<p>GHG emissions at the use/maintenance control stage may be assumed to fall in a variety of cases that differ widely from one user to another, similarly to the distribution/sales stage. When preparing PCRs, therefore, a standard scenario is to be set up for calculating the GHG emissions at this stage. (...) To set up the scenario, therefore, the organizations involved shall be allowed to participate in fair and impartial discussions. In addition, it is necessary to allow for a review of the scenario, such as for expansion or contraction of the quantification coverage</p>
End-of-life	<p>No standard scenario is specified but it seems it is detailed in the PCRs, as for use scenarios.</p> <p>Specific attention is paid to biomass.</p> <p>Recycling criteria: All GHG emissions from the recycling preparation process (e.g., collection, pre-treatment) have to be categorized under recycling materials at the end-of-life. With regard to the recycling effect, the indirect impact of recycling must not be taken into account so as to avoid emissions being counted twice. However, the indirect impact at the disposal/recycling stage (downstream process) may be provided as additional information.</p> <p>Reuse criteria: All GHG emissions from the reuse process (e.g., collection, cleaning) are categorized under reuse products at the raw material acquisition stage or production stage. With regard to the reuse effect, the indirect impact of reuse of materials must not be taken into account so as to avoid emissions being counted twice. However, indirect impact at the disposal/recycling stage (downstream process) may be provided as additional information</p>
Data	
Data quality requirement	<p>Data should enable to cover regional or temporal specificities.</p> <p>PCRs detail the data necessary for the calculation (e.g.: weight of potatoes transported,...) and secondary data to be used are also specified.</p>
Data collection	<p>For calculating GHG emissions, primary data should be preferred and the use of secondary data should be limited only to cases where it is difficult to obtain primary data. If none of these approaches is possible, it is necessary to consider a flexible approach for adopting approximate or estimated data, with its reasonableness carefully assessed in advance based on product characteristics.</p> <p>With regard to the collection of primary data, the following items have to be identified.</p> <ul style="list-style-type: none"> a) Stages and coverage of data to be collected b) Place of collection (e.g. domestically, abroad, factories) c) Collection period (e.g. year, season, month) <p>The secondary data to be used if necessary are detailed in the PCR</p>

	documents. When secondary data is used, the source has to be clarified. Data to be collected or to be used are clearly identified in PCRs, which enable to increase data quality by reducing the approximation possibilities.
Data validation	No specific validation for the inventory is specified in the guideline but the final review to obtain the PCF reviews surely also the inventory data. Verification is conducted for common secondary data based on the pre-determined criteria for common secondary data
Interpretation	
Uncertainty assessment	No specific information on uncertainty assessment. PCRs do not include such an analysis.
Sensitivity analysis	No sensitivity analysis required
Verification process	
Two levels of verification exist: 1. A verification process for verifying the company's calculated CFP result in the pilot project (ISO14025's 3rd party verification process. This is not shown on the guideline but of course necessary). It is called CFP verification panel. 2. A committee for discussing the future proper CFP verification scheme, which is written in the guideline. This is called verification scheme committee.	
Communication	
Type of communication	CFP Label type III
Marketing/communication	CFP label is simple (value of CO ₂ -eq of the product and an average value for this type of product). Initiative website explains that <i>"to ensure that consumers understand the actual meaning of CFP, awareness-raising activities are desirable, such as the publication and distribution of guidebooks"</i> .
Compliance with ISO 14067 requirements	
Willingness to be in line with ISO 14020s, 14040, 14044 and 14067.	

Support implementation of protocol

Software/tools support

Type of tool	Simple calculation tool is being provided according to methodology owner
Cost of license	It is not decided if it will be a paid service after the pilot project.

Method documentation

Availability and accessibility	Good availability of the information but some documents are, for the moment, only available in Japanese (e.g. database)
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Suitability for target audience

Experts	PCR approved are suitable for technical experts since all assumptions have to be traceable.
Non experts	The website gives information for non-experts (explanation of what is carbon footprint, importance of this issue, initiative,...)
Sector-specific approach	At the moment, only 45 specific PCR have been approved and available on http://www.cfp-japan.jp/calculate/authorize/pcr.php (Japanese only) Some of them are available in English on http://www.cfp-japan.jp/english/pcr/pcrs.html . It is planned to have all information translated into English eventually.

Data availability

The PCRs approved documents give a lot of detailed information on the data required to calculate the CFP. The database (common secondary data) is available on the website (www.cfp-japan.jp) but only in Japanese. This

tentative database was created under the supervision of the National Institute of Advanced Industrial Science and Technology (AIST) and verified by the GHG Emission Factors Review Committee. This committee consists of third-party intellectuals. A revision of this database is under progress

Other means to support implementation

There are several supporting activities destined to companies that develop PCR or calculate CFP. The details on these activities are given on the website (in Japanese).

Risks and benefits

Risks

Risk of no completion	<p>Low risk.</p> <p>The CFP is a governmental initiative, lead by four ministries (Ministry of Economy, Trade and Industry, Ministry of Agriculture, Forestry and Fisheries, Ministry of Land, infrastructure, Transport and Tourism and the Ministry of the Environment)</p> <p>An annual forum is organized, joining manufacturers, retailers and consumers.</p> <p>State: expansion of trial products, distribution in the market, refinement of guidelines (project for 2009 and 2010).</p>
Weaknesses of the project	<ul style="list-style-type: none"> - The calculation are not publicly available - The methodology can be elastic and that can drive to results that are not always comparable - PCRs have to be developed in order to have a methodology practically useful.
Limitation / excluded areas	<ul style="list-style-type: none"> - Sectors: no restriction is declared - Methodology / GHG sources: biogenic carbon not included in calculations (no GHG emissions during biomass combustion)
Comparability between products based on methodology used	<p>Medium: The comparability is possible if the procedure and all recommendations are followed. The only barrier to comparison can be if one product does not consider the whole life cycle (because of a lack of data) but it is recommended that eventually the whole life cycle of products have to be considered.</p>
Risk of misleading communication	<p>Low risk since the CFP labelling is reviewed by a third-party and the general procedure has to be documented and to follow specific requirements for communication</p>

Benefits

Advantages of the project	<ul style="list-style-type: none"> - Accurate and complete data (detailed data to be collected and on the whole life-cycle) - Methodology usable for all products and services - Wide scope governmental initiative - Willingness to be in line with international practices and the ISO 14067 - Same general guideline for all type of products and services (good comparability between products and large panel) - Willingness to drive to a reduction of impact giving useful information to the producer and the consumer
Possible use of the results	<p>Reduction of footprint, benchmarking, communication and marketing</p> <p>Both businesses and consumers are targeted through the global approach of carbon issue</p>

Analysis of methodologies

Korea PCF



General

General

Objective	Promote a consumer-led purchasing pattern of low carbon goods and to encourage enterprises to develop technologies towards low-carbon goods, thus ultimately contributing to the international efforts to reduce greenhouse gases.
Type of protocol	Public scheme
Targets	<p>All companies</p> <p>The following types of products have been tested:</p> <ul style="list-style-type: none"> - Non-durable goods (148) - Energy-non-using durable goods (13) - Production goods (15) - Service (10) - Energy-using durable goods (37)

Structure

Sponsor / initiative structure	The Korea PCF and Carbon footprint label ("Cool label") are governmental initiatives lead by the Ministry of Environment, the Korea Environmental Industry & Technology Institute and the Korea Environment Preservation Association.
Owner of the methodology	Acceptance seems to be good. Already 223 products labelled.
Type of commitment	<p>Voluntary certification system (but marketing action: image, promotion)</p> <p>2 types of label: Carbon footprint certification label and low carbon product certificate</p>
System manager	<p>No information on the structure to be set up</p> <ul style="list-style-type: none"> - Adaptation of the methodological framework: the methodological framework is quite complex and has been adapted from usual LCA concepts. LCA expertise seems to be necessary - Data collection: internal resources may be used but LCA experts support seems to be preferable - Calculation: experts may be required given the type of calculation to be made - Analysis: no reference is made to the analysis step of the process - An audit and review system is foreseen (KEITI is in charge of this review)

Stakeholder acceptance

Links with policy and regulation	<p>The Korea PCF and Carbon footprint label ("Cool label") are governmental initiatives lead by the Ministry of Environment, the Korea Environmental Industry & Technology Institute and the Korea Environment Preservation Association.</p> <p>Its benefits are promotion and marketing of the products labelled but also the recommendation for government awards related to climate change and the inclusion of "low carbon product certificate" goods in government-led procurement.</p> <p><u>Regulations related to the Carbon footprint labelling Certificate (Notification No. 2009-10, Ministry of Environment, Korea)</u></p>
Links with authoritative bodies	The PCF and Carbon footprint label ("Cool label") are governmental

	initiatives. They have therefore a governmental support from the beginning.
Other information	Acceptance seems to be good. Already 223 products labelled after one year of implementation.
Methodological background	
Link with other PCF projects	Korea EDP common standard, GHG protocol and IPCC reports have been taken into account in the calculation method for this methodology.
Link with ISO standards	The global standards ISO 14040s, ISO 14025 and ISO 14064s as well as PAS 2050, Korea EDP common standard and finally GHG protocol and IPCC reports have been taken into account in the calculation method for carbon footprint.
Revision process for the methodology and the background data	<ul style="list-style-type: none"> - Methodology: no information but since the compliance with other important standards (ISO norms, GhG Protocol,...) is a basis of this standard, it should be reviewed on the same basis. - Application to a product: The Carbon Footprint Label requires annual surveillance check
System management and implementation	
Tests already performed	
Number of products tested	<ul style="list-style-type: none"> - Non-durable goods (125) - Energy-non-using durable goods (13) - Production goods (13) - Service (7) - Energy-using durable goods (23)
Number of companies having made tests	Around 40 companies
Other information	
Required conditions for implementation	<p>There is a specific procedure to be followed to obtain the label, in two steps.</p> <p>Required documents:</p> <ul style="list-style-type: none"> - Carbon footprint labelling certificate application and background documents - Greenhouse gas reduction plan
Economic aspects	Investment is probably necessary for internal/external resources for the establishment of the product carbon footprint.
Management burden	<p>The main part of the process is undertaken by the developers, with the creation of general guidelines, the development of a supporting database, the management of PCRs development.</p> <p>However, firms are involved in the development of PCRs for which they have to apply, and the label attribution is submitted to a quite important process (various validations)</p>
Development process of protocol	
Stakeholders involvement	Industries and consumers can ask for system improvement to the General Authority (Ministry of Environment)
Standardization level	National standard for PCF in progress
Peer-review of underlying methodology	Various reviews are performed during the certification process

Implementation of protocol

Applicability

Goods and services mainly targeted	All goods and services excluding agricultural, fishery, livestock and forest products goods. The pharmaceutical products, medical equipments and exported goods are also excluded.
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Additional efforts to expand the project	No information is available
Possibility of analysis / use of data	Complete data collection and methodology that enable large possibilities of analysis (for instance: comparison between products, monitoring, impacts and risks identification and reduction).
Consideration of other environmental impacts	<ul style="list-style-type: none"> - Mono-criterion approach - The Korea PCF is an initiative of the KEITI which also undertakes wider programs related to Environmental Declaration of Products and LCI database so extension of the approach to other environmental impacts seems to be possible - As to methodology aspects, considering the detailed data collection carried out to calculate the carbon footprint, it seems that an enlargement to other impact categories could be implemented without too much difficulty.
Principles	
<u>Life cycle perspective</u>	
Life cycle perspective	<p>Production goods, services: resource production, raw material production, production</p> <p>Energy non-using durable goods, non-durable goods: resource production, raw material production, production, waste</p> <p>Energy using durable goods: resource production, production, use, waste</p>
Modularity	This concept of modularity is a basis for the stages to be taken into account by type of product
Functional unit	Calculation should be based on a product unit sold on the market. It can be adapted to refer to usual weight units (1 ton or 1 kg), it can be one-day's service or one service call for products that do not have a definite or clear form. If this functional unit is unclear for consumers, a separate functional unit can be used or additional information can be provided.
<u>Criteria suitability</u>	
Consistency	General guidelines for product GHG emissions must be applied in consistent manner in order to allow comparisons of GHG emissions associated with different products.
Relevance	The methodology is designed to evaluate most of the products and services but no PCR is available and there is no information on the possibility to include carbon storage or GHG sinks in the guidelines. Specific attention is paid to biomass in combustion and waste.
Completeness	Kyoto GHG emissions have to be calculated. All GHGs generated within the predefined system boundary must be included.
Transparency	GHG information based on concrete data should be provided to allow the users to make sound decisions.
Reproducibility	Only general guidelines are available on the website and no PCR. The PCR would assure a good reproducibility but are not available.
Double-counting	Recommendation is done to avoid double counting if some energy or water is produced on-site (manufacture). No clear recommendation is done to avoid double counting of the avoided impacts related to the recycling.
<u>Scientific soundness</u>	
Plausibility of the results	There is a common database and a review is required to obtain the label. These procedures are 2 guarantees for plausibility of results. On the other hand, no PCR is available (i.e. no base scenarios, no typical assumptions) that could assure a better plausibility of the results.

Values choices	<p>It is recommended to apply assumption with great care and prudence to guarantee that the GHG emission assessment results are not under-estimated.</p> <p>No clear guideline for value choices for the electricity mix choice).</p> <p>Transportation distances are clearly stated</p> <p>GWP values are clearly stated (100 years GWP according to the 2nd assessment report of IPCC)</p>
Scope	
Functional unit	<p>Required The calculation of the GHG emissions for a product should be based on per-unit basis as treated in the market. If the product unit is difficult to be defined, that sales unit of the product (examples: one car, one television set) should be used as the product unit. If products that are subjected to the identical production processes come out to the market in different shapes, sizes, or amounts depending on users' demands, units such as 1 kg or 1 ton should be used accordingly. The unit can be either one-day's service or one service call for service products that do not have a definite or clear-cut sales unit. When the functional unit of a product is unclear or it is deemed necessary to facilitates consumers' understanding, a separate definition of functional unit can be used for the product concerned, or additional information can be provided.</p>
System boundary	<p>System boundaries are depends on the product category:</p> <p>Class 1 includes production goods, non-durable goods, energy-non-using durable Goods, and service</p> <ul style="list-style-type: none"> - For products and services, the process to gather raw materials, the 1st raw material production process and the product manufacturing process should be included. - For durable goods that do not use energy and non-durable goods, the process to gather raw materials, the 1st raw material production process, the product manufacturing process and the product disposal process should be included. <p>Class 2 includes energy-using durable goods and target products of EuP regulation fall into this category.</p> <ul style="list-style-type: none"> - For energy-consuming durable goods, the process to gather raw materials, the product manufacturing process, the product use process and the disposal process should be included. <p>If the goods submitted for certification are energy-consuming durable goods but lack a use scenario, the certifying authority will review the necessity of scenario development. If a scenario is deemed necessary, a working group will be organized with the related people to develop the required process.</p>
Cut-off criteria	<p>There is no clear definition of cut-off criteria. However, the general guidelines state that "GhG emissions data from product life cycle phases that have little impact can be excluded in the calculation when exclusion of the data does not compromise comparability of data" and for specific issues, threshold are mentioned (e.g.: "collect upstream data for raw materials (...) that correspond to a cumulative mass contribution of the upper 95 percent")</p>
Offsetting	<p>No treatment of offsetting information.</p> <p>The standard states that "when making en emissions declaration, not only the emissions but also a GhG emissions reduction plan should be declared"</p>
Allocation	<p>An allocation procedure is determined in the guidelines. It is based on weight but some specific cases are highlighted for which another unit can be used.</p>

Carbon storage/land use change	No information available on carbon storage or land use change in the guidelines.
Use stage	In order to calculate the GHG emissions associated with the use phase, collect energy use data following guideline described in Annex 3 (ex. product life, annual use time, motor power, and etc.) and emissions and waste data associated with the use phase, and apply appropriate product-by-product scenarios.
End-of-life	The guideline distinguish products/materials that are subject to mandatory recycling from others and give information to build the end-of-life scenarios. End-of-life is not considered for all-kind of products, which could be justified (services)
Data	
Data quality requirement	<p>In the case of upstream/downstream data, the following scale of preference is indicated:</p> <ul style="list-style-type: none"> - LCI data authorized by the government concerned - Industry average LCI data - Other LCI data <p>In the case of primary data, it is required that collected data reflect site's normal conditions of operation.</p> <ul style="list-style-type: none"> - The protocol states that "the latest one year of cumulative average data within the three years from the date of application for a CF label can be collected" (some precisions are provided in the case of this approach is not possible) - Data representativeness should also be proved and secured (e.g.: requirements are provided about suppliers representativeness, with a threshold of representativeness) - Quality indicators should be evaluated and presented in order to evaluate the quality of data collected
Data collection	<p>It is specified that primary data have to be collected primarily and secondary data have to be used only if primary data are missing.</p> <p>Data to be collected at each life-cycle stage are well detailed and even listed in the guidelines as well as the data quality requirements.</p> <p>Data to be collected or to be used are clearly identified in PCRs, which enable to increase data quality by reducing the approximation possibilities.</p>
Data validation	No specific validation for the inventory is specified in the guideline but the final review to obtain the PCF reviews surely also the inventory data.
Interpretation	
Uncertainty assessment	<p>No specific information on uncertainty assessment required in the guidelines</p> <p>Some specific approximations are clearly authorized (e.g. "the latest one year of cumulative average data within the three years from the date of application for a CF label can be collected")</p>
Sensitivity analysis	No sensitivity analysis required in the guidelines
Verification process	
No detailed information on the verification process is available but numerous reviews by the certificate institute are necessary during the PCF labelling procedure.	
Communication	
Type of communication	"Carbon footprint label ("Cool label")" type I (GHG total emissions and

	reduction targets; carbon footprint figure is displayed)
Marketing/communication	The Carbon footprint label ("Cool label") and the website information are easily understandable by a wide public.

Compliance with ISO 14067 requirements

The PCR are not available: no information on assumptions, scenarios and specific data to be collected (in relation to the product studied). But the Guidelines for carbon footprint of products give general requirements for data collection and calculations and some recommendations for communications that are in line with ISO 14067 (draft). The guidelines are also in conformity with ISO 14025, 14040 series and 14064 (To ensure compatibility with international effort on policies regarding product life cycle GHG emissions, the development of Guidelines Set I reflected the requirements specified in the Corporate Accounting and Reporting Standard by the World Business Council for Sustainable Development (WBCSD), ISO 14025, ISO 14040 series, and ISO 14064 series).

Support implementation of protocol

Software/tools support

Type of tool	No tool is provided.
Cost of license	No tool is provided. A PCF toolkit is in development. It will be free of charge within this year. Training programs exist too.

Method documentation

Availability and accessibility	General guidelines on PCF are available freely; it is the same for specific guidelines on: - products that do not use energy when in use - products that use energy when in use - energy use by energy-using products PCRs are not available publicly
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Suitability for target audience

Experts	There are no specific and precise guideline (e.g. PCR). The available guideline for carbon footprint is not totally complete and detailed.
Non experts	The website gives information for non-experts
Sector-specific approach	No PCR available on the website. However, generic guidelines are available for: - products that do not use energy when in use - products that use energy when in use - energy use by energy-using products

Data availability

Database is available online with the results of specific products analyses. Background data: only some table with transport distances are available in the Guidelines for carbon footprint of products.

Other means to support implementation

It seems that trainings for companies that participates in the pilot certification exist.

Risks and benefits

Risks

Risk of no completion	Low risk: the Korea PCF and Cool (CO2 Low) label are governmental initiatives leaded by the Ministry of Environment, the Korea Environmental Industry & Technology Institute and the Korea Environment Preservation Association. An important number of products have already tested the approach.
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Weaknesses of the project	<ul style="list-style-type: none"> - The carbon footprint does not consider the whole life-cycle phases - PCRs are not available publicly - Scenarios and assumptions made for each product labelled are not available (on the website): no detailed report per product - The carbon footprint procedure is not applicable to all products (agricultural, fishery, livestock and forest products as well as pharmaceutical products and medical equipments are excluded)
Limitation / excluded areas	<ul style="list-style-type: none"> - Sectors: All goods and services excluding agricultural, fishery, and livestock goods and medical equipment. - Methodology / GHG sources: Power generation systems, natural gas and tap water are subject to ECP guidelines requirements. Products of which inclusion in the scope is likely to cause confusion on the part of consumers may also be excluded. Exported goods are also excluded. The whole life cycle is not considered
Comparability between products based on methodology used	<p>Medium: If the guidelines are followed properly, the comparison between products is possible.</p> <p>General guidelines for product GHG emissions must be applied in consistent manner in order to allow comparisons of GHG emissions associated with different products.</p>
Risk of misleading communication	Some information (scenarios used, assumptions, etc., i.e. PCR documents) are not available and can lead to difficulties in interpretation of results and comparison of products.
Benefits	
Advantages of the project	<ul style="list-style-type: none"> - The carbon footprint procedure is applicable to both products and services - The label is simple and understandable - Wide scope governmental initiative
Possible use of the results	<p>Communication to consumers of present GHG emissions or of GHG emissions decrease.</p> <p>Reduction of footprint.</p>

Analysis of methodologies

Sustainability Consortium (Wal-Mart)

General

General

Objective	<p>The project was originally launched by a group of Consumer Goods companies, including Wal-Mart, with the final objective to establish a scientifically grounded system to characterize the environmental and social impacts associated with the production of consumer goods.</p> <p>Wal-Mart questionnaire aims to assess suppliers on 4 subjects:</p> <ul style="list-style-type: none"> - Energy and Climate - Natural resources - Material efficiency - People and Community <p>It is a first attempt to assess their engagement on sustainability, but it is not directly linked to the Sustainability Consortium initiative.</p> <p>The sustainability consortium goal is to "develop transparent methodologies, tools and strategies to drive a new generation of products and supply networks that address environmental, social and economic imperatives."</p>
Type of protocol	<p>Private scheme.</p> <p>Wal-Mart initiated the project with its own suppliers but the objective is to create a global framework. Thus, a consortium has been created and is administered by Arizona State University and the University of Arkansas. It is a voluntary and private standard development with now the support of:</p> <ul style="list-style-type: none"> - 60 companies (including 6 retailers plus L'Oréal, BASF, HP, Dell, Unilever, KPMG, Intel, 3M, Toshiba) - NGO: WWF, BSR, and GS1 <p>The companies are funding the project (funding members)</p> <p>"The Sustainability Consortium is an independent organization of diverse global participants who work collaboratively to build a scientific foundation that drives innovation to improve consumer product sustainability through all stages of a product's life cycle."</p>
Targets	<p>All company sizes are concerned, most of the companies that joined the consortium are multinationals</p> <p>No restriction specified on the products to be analyzed. Current sectors mentioned in the documents:</p> <p>Electronics</p> <ul style="list-style-type: none"> - Laptops, desktops, & monitors - TVs <p>Food, Beverage & Agriculture</p> <ul style="list-style-type: none"> - Strawberry Yogurt - Orange Juice - Wheat Breakfast cereal <p>Home & Personal Care</p> <ul style="list-style-type: none"> - Detergent - Air Freshener - Surface Cleaner - Cleaning Aid - Shampoo

	<p>- Face Make Up</p> <p>The most advanced product categories are presently: breakfast cereals, juice, yogurt, laptop computers and laundry detergent</p>
Structure	
Sponsor / initiative structure	Wal-Mart has initiated the project with the Arizona State University and the University of Arkansas. One coordinator has been hired per sector by the sustainability consortium which is funded by the company members. No further details available on the financial aspects
Owner of the methodology	Open methodology developed in collaboration by various US universities (for the consortium)
Type of commitment	<p>Voluntary</p> <p>However, Wal-Mart has involved many of its suppliers in this project; in the project FAQ, Wal-Mart states that "It's not mandatory. This is an opportunity for you to show how your company's practices stand out amongst Wal-Mart's 60,000 suppliers. Leaders in sustainability deserve merit."</p>
System manager	<p>- Adaptation of the methodological framework: prepared by the methodology developers as to design an open database available for any firm</p> <p>- Data collection: planned to be done by the retailers' suppliers themselves (no need for an accredited consultant);</p> <p>- Calculation: under development but the calculation process is designed to be used by any firm on the basis of the database information</p> <p>- Analysis: to be determined</p>
Stakeholder acceptance	
Links with policy and regulation	Wal-Mart initiated the project, while the methodology is being developed by universities in collaboration with the companies. No strong governmental support has been identified. However, EPA and DEFRA are both observers in the group.
Links with authoritative bodies	For the consortium, steering committee consisting of founding members as well as leaders from government and NGO
Other information	Good acceptance from major companies, no information for consumers and other companies
Methodological background	
Link with other PCF projects	The questionnaire sent by Wal-Mart is in line with the Carbon Disclosure Project. The future Wal-Mart sustainability index will be based on the sustainability consortium output. The methodology is not yet finished but the baseline values will be based on a "hybrid" combination of existing LCI databases and Input / Output economical data base (statistics from the Bureau of Economic Analysis of the US Dept. of Commerce).
Link with ISO standards	The methodology will be based on a life cycle perspective, no further details available except the will to be in conformity with the ISO 14020 (Environmental labels and declarations - General principles). The final methodology that will be used is intended to be generally consistent with the GHG Product Protocol, PAS 2050 and ISO 14067
Revision process for the methodology and the background data	<p>- Methodology: no information. LCI data will be revised as updates to databases become available. IO Database update is limited by the availability of I/O analysis (published every 5 years) but some of the calculation parameters could be updated on a more frequent basis</p> <p>- Application to a product: no information (under development)</p>
System management and implementation	
Tests already performed	

Number of products tested	Sustainability Consortium is currently piloting 5 products, and expect to begin to test the process on a product in April of 2011
Number of companies having made tests	None, 60 companies joined the consortium
<u>Other information</u>	
Required conditions for implementation	Nothing specified; for the Wal-Mart questionnaire, questions dealing with climate change are about GhG measurement so a good practice would be to have performed such an analysis
Economic aspects	No data available for the initial investments. Investments for suppliers would probably be proportional to the precision level of the assessment: the baseline value would not require any investment whereas the detailed LCA would require some.
Management burden	Methodological basis is managed by developers; in particular, the development of the database from input/output analysis is made by the methodology developers. Thus, an important part of the burden is undertaken by the methodology developers
Development process of protocol	
Stakeholders involvement	University partnerships: Harvard, MIT, UC Berkeley, Duke, Tec de Monterrey, New Hampshire, Cambridge, Hunyang (Korea), UC Santa Barbara Engagement of NGO and Political entities: Gs1, UNEP, EPA, Department of Agriculture, Department of Energy, DEFRA, etc.
Standardization level	In preparation: Database under development based on best available process LCI data as well as Environmental Input / Output data. Given the large scale of the project, the goal of the Sustainability consortium is to built a standard to be used at an international level: "Finally, we would like to work towards an international model that accounts for the trade flows between countries."
Peer-review of underlying methodology	The methodology will freely available and developed in collaboration with major US universities. The IO Database will be peer reviewed. IO Database methodology has been validated through a comparison with 1998 US IO database; among the 430 sectors available for comparison, 175 were thought to match well enough to be compared. Additional crosscheck have been performed. Tests are available on IO Database website.

Implementation of protocol

Applicability

Goods and services mainly targeted	No limitation mentioned
Additional efforts to expand the project	No information available given the range of products targeted.
Possibility of analysis / use of data	The tool that will be provided is intended to enable: <ul style="list-style-type: none"> - Contribution (Hotspot) Analysis: contribution to product environmental impacts - Comparison Analysis: Compare processes to see who has a better life-cycle environmental profile (comparing potential suppliers, or in benchmarking your processes against an industry average) - Publish Cradle-to-Gate Results (for customers calculation)
Consideration of other environmental impacts	<ul style="list-style-type: none"> - Multi-criteria approach - Pilot phase focused on GHG emissions, water use, and primary energy use. The full implementation will examine a more comprehensive list of impacts, to

	<p>be determined by a panel of academic and industry representatives</p> <ul style="list-style-type: none"> - The hybrid approach is intended to provide the most accurate and comprehensive data available. The IO dataset provides life cycle information on greenhouse gas emissions and water. Impact 2002 damage indicators (Resource Depletion, Human Health, and Ecosystem Damage) are also available. This IO database would be a novelty and the lack of hindsight might lead to high uncertainties for those new environmental impact categories, hence the hybrid approach. Ultimately it is planned that consumers could get information on social performance of products
Principles	
<u>Life cycle perspective</u>	
Life cycle perspective	<p>The life cycle perspective is intended to be adopted: "from raw materials to disposal". However, on the open IO website, the available charts do not show any impact for the products end of life. The following steps are displayed:</p> <ul style="list-style-type: none"> - inputs: material, service, energy + transportation - direct operations (production) - distribution (wholesaling, retailing) - consumer use <p>The end-of-life will be further added with processes from existing LCI databases.</p>
Modularity	It will be possible to modify one step of the life cycle in order to use more specific data for suppliers and deliver cradle-to-gate results adapted from a baseline model.
Functional unit	The methodology will integrate the notion of functional unit but no information is available on the functional units selected
<u>Criteria suitability</u>	
Consistency	The use of both Input/Output database and LCI database might affect result consistency
Relevance	GhG sources: CO ₂ , CH ₄ , N ₂ O and other sources (SF ₆ , CF ₄ , C ₂ F ₆ , C ₃ F ₈ , C ₄ F ₈ , HFCs, HCFC-22, NF ₃)
Completeness	The inclusion of carbon storage / sinks is not clear; data are mainly based on the "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005"
Transparency	There is a will to make the methodology easily accessible and transparent
Reproducibility	Good reproducibility of the results since the calculation will be based on a baseline assessment and on a list of simple criteria
Double-counting	No information available but the methodology is common and has been reviewed.
<u>Scientific soundness</u>	
Plausibility of the results	Guidelines on data collection not available yet. Common data base limit the risk of inconsistency in the environmental factors
Values choices	<p>No information available. Choices might be relatively limited since the assessment will be done on limited number of criteria. However the choices of those criteria might be based on value choices that could be questionable</p> <p>Methodology documentation not available</p> <p>IO Database: "The climate change impacts are given in Carbon Dioxide equivalents (CO₂-eq), which were arrived at by converting various greenhouse gases into this reference gas via the IPCC 500a method"</p>
<u>Scope</u>	
Functional unit	No information on the functional unit used in the calculation.

System boundary	<p>Wal-Mart: According to Wal-Mart FAQ, Question 3 (Greenhouse Gas Emissions) specifically requests Scope 1 & 2 Emissions. For Questions 5 and 7, please report totals even if you are using contract factories. Aggregate all factories to give the totals. For example, if 100% of your toys are assembled by a contractor, these facilities need to report to you their totals. A general guideline for these responses is to set the bar high, ensure you've got over 95% of your production covered and do not get caught up in details around instances that may only marginally effect the answer.</p> <p>Hybrid Database: scope is a cradle-to-gate approach; the IO Database website give detailed information about each step of the life cycle.</p>
Cut-off criteria	Conventional 1% is currently being discussed
Offsetting	Under discussion
Allocation	Under discussion
Carbon storage/land use change	Not enough information to assess this point: land use is mentioned in some Excel datasheet used as a basis for the calculation but the treatment of this information is unclear.
Use stage	<p>Use phase will be included</p> <p>IO Database: <i>"Consumer Use" includes impacts from direct use of energy by products in their use phase. It does not include indirect energy use, such as the energy required to refrigerate milk, or wash clothes. Instead, that energy is assigned to the devices that are plugged in (refrigerators and washing machines in this case).</i></p>
End-of-life	Presently not included in the open IO Database, but the final product assessment will include the end of life.
Data	
Data quality requirement	No information available
Data collection	The data to collect will be limited to a few pre-defined sustainability performance drivers. The assessment of a product will consist of a modification of a baseline LCA assessment based on those criteria. The data collection will be done through an internet based tool. The possibility to do a complete LCA will also be available in order to avoid any restriction to innovation.
Data validation	<p>For the Wal-Mart questionnaire, official Wal-Mart says "Responses to this questionnaire will be accepted in good faith, relying on the integrity of the supplier. Violation of that good faith will be considered very serious by Wal-Mart."</p> <p>The Sustainability Consortium has launched an "Auditing and Assurance" working group to focus on this issue.</p> <p>IO Database: a data crosscheck has been performed.</p>
Interpretation	
Uncertainty assessment	No specific information on uncertainty assessment
Sensitivity analysis	No sensitivity analysis required, but will play a large part in identifying sustainability performance drivers.
Verification process	
The global methodology will be evaluated by an external review, but no information is available on the verification on the CF calculations	
Communication	
Type of communication	Potentially type III. No detailed information on the way the CF will be communicated: the sustainability consortium is setting the calculation rules, but the way the CF is communicated might differ from a retailer to another.

Marketing/communication	When it will be fully implemented, suppliers, retailers, and consumers will be able to access to the PCF results
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Compliance with ISO 14067 requirements

No detail about its compliance with ISO 14044 or 14067, but, according to the methodology owner, the methodology will be consistent to the extent possible with PAS2050, WRI, and ISO 14067. The Sustainability Consortium will not create a competing protocol, but has been urging all groups towards a single, consistent PCF methodology.

Support implementation of protocol

Software/tools support

Type of tool	IT tools are planned to be developed under the consortium supervision. First delivery of beta IT systems is scheduled to December 2010. It will be made of: - " at least 3 tools that enable companies to report based on sustainability measurement and reporting standard" - " a federated set of data pools and standard used to securely exchange static company specific product information between organizations and supply chains" (no detailed information available on those tools) A database ("Open IO") with the carbon footprint of 3000 products has been developed in 2008. It is related to the "brick" level of the GS1 global product classification (see http://www.gs1.org/gdsn/gpc)
Cost of license	Apparently the tools might be free of charge

Method documentation

Availability and accessibility	Open IO data base
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Suitability for target audience

Experts	No guidelines available
Non experts	Not applicable
Sector-specific approach	Specific guides by sectors are foreseen

Data availability

The ultimate database will be a hybrid combination of best available data from process, IO, and other data sources. "The database in development called "open IO" is based on economical analysis. The open IO is working towards an international model that accounts for the trade flows between countries. But currently, the model is based on US conditions (meaning that it is assumed products imported from China are produced with similar technology as in the United States).

Other means to support implementation

NA, For the Wal-Mart questionnaires "merchandising teams will be trained in how to identify inaccuracies, and if you have concerns that inaccurate information has been provided"

Risks and benefits

Risks

Risk of no completion	Good probability of completion, strong involvement of major companies and universities, this should be balanced by the fact the methodology is still under development
Weaknesses of the project	- Potentially high uncertainties related to the Input / output database - Risk of biased sustainable criteria selection for the product categories - New approach: no previous experience
Limitation / excluded areas	- Sectors: The approach is based on a hybrid approach with a goal of product differentiation.; The IO database will be used to plug any data

	gaps from existing LCI databases- Methodology / GHG sources (IO Database): "the database enables cradle-to-gate greenhouse gas estimation for approximately 3000 products, as described by the "brick" level of Global Product Classification (GPC) codes". Methodology has been developed on the basis of US information and data are displayed by 2002 USD. Currently, the Open IO model is based on US conditions meaning that it is assumed products imported from China are produced with similar technology as in the United States." Regional specific information will be used when available
Comparability between products based on methodology used	The comparability between products might be relatively high compared to other CF methodologies. Indeed, the calculation would be done based on a single data base, on a limited number of criteria ("sustainability performance drivers"). This should be balanced by the fact that some products might be evaluated by a classical LCA approach if a producer thinks that its product performs better
Risk of misleading communication	No sufficient information to assess this point
Benefits	
Advantages of the project	<ul style="list-style-type: none"> - A comprehensive approach: data base construction, IT systems freely available, literature review for each sector - Involvement of universities - Quick scaling and cost effective approach: a "SMRS" (sustainability measurement and reporting standard) is under construction. It will include: product category selection, baseline model and variations: a list of variation within the Brick (around 3000 categories), and the associated baseline score for each variation for each reporting category will be provided. Besides a list of common (positive and negative) sustainability related attributes and their estimated effect in each reporting category will be developed so that each specific product could be assessed. 3 levels of precisions will be possible for each product: a baseline value, a baseline value adapted according a limited number of environmental criteria, a detailed complete LCA
Possible use of the results	Potentially: benchmarking, reduction of footprint, etc. One of the objective is to improve supply chain sustainability

Analysis of methodologies

Carbon Index Casino / Bio Intelligence Service



General

General

Objective	Informing consumers of the environmental impact of the products they consume daily and helping them to act ecologically through clear, relevant information enabling them to become players in their consumption. Creating a new level of competition between the products manufacturers on an environmental measure in order to motivate them to do better choices for the ingredients and packaging in the products.
Type of protocol	Private scheme: CASINO + consulting firm (BIO Intelligence Service). The French EPA (ADEME) provided its financial support during the first steps of the methodology development (in 2007)
Targets	The Casino Group is a multinational with 26,7 billion euros sales, located in 9 countries, with 10 000 retailers and 200 000 staff members. The initiative has been developed by Casino for the carbon footprint labelling for its products (Casino products (branded as "Casino") and is only valid in metropolitan France due to the retail impacts considered. Several other brands wanted to develop the Carbon index on their products, but the other french retailers did not accept to give information about their own impacts.

Structure

Sponsor / initiative structure	Casino
Owner of the methodology	Casino / BIO Intelligence Service
Type of commitment	Voluntary
System manager	<ul style="list-style-type: none"> - adaptation of the methodological framework: there is no adaptation since a brand new methodology has been prepared by an external consultant (Bio Intelligence Service did the study). The specific methodology built for the retailer is based on a simplified LCA approach - data collection: managed by the retailer and Bio IS - calculation: partly made by the external consultant, partly made through the tool developed by the external consultant on the basis of information provided by suppliers and partly made and finalized by the retailer - analysis: a critical analysis of the data provided by the supplier is made and environmental improvement proposals are made to the suppliers - control and verification: made ponctually by the external consultant and systematically by the retailer (data consistency).

Stakeholder acceptance

Links with policy and regulation	No link with regulatory instruments - no regulatory sanctions/incentives. However, as for other PCF projects, the French Environmental Agency (ADEME) gave a technical and financial support. Casino specifies that the CF is calculated from databases that have been validated by ADEME (including the "Bilan Carbone" database). Casino has participated via the ADEME to the discussion on the French Grenelle in order to show that a CF label is possible.
Links with authoritative bodies	In a press release, Casino also mentions the support of the Environment Ministry in addition to the support of ADEME. The ADEME has not participated directly in the methodology elaboration but has progressively

	reviewed the methodology during its design.
Other information	Reasonably good acceptance by the consumers and suppliers - suppliers have been involved in the process - consumers have been surveyed regarding their communication expectations - the project is supported by the French EPA
<u>Methodological background</u>	
Link with other PCF projects	The methodology is not totally in line with the French BP X30- 323 (this is mainly due to the fact that the Casino voluntary initiative began in 2006 and the BP X30-323 redaction in 2009). For instance, it only accounts for GHG emissions. About the use phase, the Casino index only takes into the transport of the consumer from the retailer to its home, but BP X30-323 recommends to take into account the use phase without this transport part. However, the methodology owner provides information regarding its scheme to other PCF methodologies owners (Japan PCF) and participates to the discussions of the ADEME-AFNOR platform on product labelling.
Link with ISO standards	No declared compliance with other framework
Revision process for the methodology and the background data	- Methodology: There is no specific revision plan. The Carbon Index will be replaced by a scheme compliant with BPX 30-323 in order to be in phase with the french regulations. - Application to a product: CF information are displayed / changed on the products when Casino decides to change the packaging graphism for another reason (the index should not be a additional source of emissions) and at least reviewed every two years. However, in cases where the PCF evolves, an update on product packaging is not always performed and website information is the only one updated
<u>System management and implementation</u>	
<u>Tests already performed</u>	
Number of products tested	Until now, 500 products are available with the "indice carbone" in the 8 000 Casino shops. More products have been tested (755 calculations have been made) but all these information are not disclosed due to the suppression of products for market reasons, and time between the calculation and the packaging printing, end stock of products and old packaging.
Number of companies having made tests	Casino carbon index is only available on Casino's own products, and Casino is the only company which uses the different parts of the methodology and calculates the value of the definitive Carbone Index. But the project has involved 185 direct suppliers of Casino who used the methodology to provide the necessary data.
<u>Other information</u>	
Required conditions for implementation	An important work has to be performed with the suppliers as to collect the primary necessary data for each product individually.
Economic aspects	The project has been funded by the ADEME and Casino during the first year for the methodology research. It is now fully funded by Casino.
Management burden	The methodology has been established by Bio IS and validated by the ADEME, but the application of this methodology implies solicitation of the retailer's suppliers, which is managed by the retailer.
<u>Development process of protocol</u>	
Stakeholders involvement	Stakeholders in the development process or in its review (ADEME, French Ministry of environment, industrials, NGOs). A presentation of the new labelling system was done for the 500 Casino suppliers in June 2008, and

	consumers have been surveyed regarding the intermediate and final labelling.
Standardization level	<p>No detailed publication of the methodology used, even if basic elements are available on the website and the detailed methodology is available under a confidentiality agreement.</p> <p>185 industrials used this methodology for collecting data for calculating their environmental impacts, which shows a good level of understandability and should be considered as a good step for standardization. But the methodology has to be more transparent in order to be considered with a high level of standardization.</p> <p>The main characterization factors used are the one from the "Bilan Carbone" (ADEME). For the agricultural production characterization factors, Bio IS uses LCA literature data. No further details are available.</p>
Peer-review of underlying methodology	The methodology has been established by Bio IS and validated by the ADEME.

Implementation of protocol

Applicability

Goods and services mainly targeted	<p>All packaged products could be targeted . An other experiment has been made on a tee-shirt.but until now, Casino has only experimented the methodology on food and plastic bags in order to concentrate the labelled products in the food shop linears.</p> <p>Services are excluded</p>
Additional efforts to expand the project	<p>The expansion of the Casino methodology on other brands is restraint by the lack of available information from other french retailers.</p> <p>The expansion of the methodology to other type of products may require some efforts since the methodology has been designed specifically for the products targeted.</p> <p>Some international parts of Casino Group are working on an adaptation of the Carbon index in their country.</p>
Possibility of analysis / use of data	<p>For all the products, similar rules are applied and comparison/product differentiation is possible.</p> <p>The methodology applied also enables to identify PCF variation over time or according to real or simulated evolution: alteration in the supply of one ingredient, change in packaging...</p> <p>The retailer provides its suppliers with comparative analysis and tips to reduce their carbon footprints. Since the beginning of 2010, 8 products have reduced their carbon footprint as a consequence of Casino solicitations (more products have reduced their carbon footprint but only due to choices made by the industrials without the help of Casino team).</p>
Consideration of other environmental impacts	Mono-criterion approach for footprint but waste recycling rates are indicated (current and potential) in order to encourage the consumer to reduce the CF sorting out correctly the packaging wastes.

Principles

Life cycle perspective

Life cycle perspective	<p>All the life cycle stages are included except the use phase in the consumer's home (cooking, cleaning the plates, etc.) as the methodology owner considered that there was too much uncertainty on use phase scenarios.</p> <p>Steps included are:</p> <ul style="list-style-type: none"> - agricultural stages - product manufacturing
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	<ul style="list-style-type: none"> - transport, from fields to Casino's warehouses - packaging, from raw material extraction to recycling - distribution, from Casino warehouse to consumers' home
Modularity	All life cycle stages included (except use phase) so no modularity is possible
Functional unit	The methodology does not explicitly refer to the notion of functional unit but aims to calculate PCF for "producing, processing, packaging, transporting and retailing 100g of products".
<u>Criteria suitability</u>	
Consistency	<p>This methodology is only used by Casino so there is no possibility of meaningful comparison with other schemes. Comparison between labelled products is possible through the ruler and the carbon labelling, on the basis of variation in recipes, packaging, suppliers...</p> <p>However, methodology owner indicates that its objective is to educate consumers. Similar information from other brands is not available for comparison.</p>
Relevance	The analysis has been specifically adapted to the distribution sector (impact of product temperature, transport scheme, suppliers turnover, timings for products launches...) on the basis of LCA principles
Completeness	<p>All life cycle stages included (except use phase).</p> <p>Primary data are mainly used. If primary data are not available, the carbon index is not calculated.</p>
Transparency	Methodological elements are not publicly available but are available under a confidentiality agreement. The methodology guidelines are not gathered in a single document and a complete overview of the methodology requires to consult various sources (toolkit for suppliers, Bio IS,...).
Reproducibility	Reproducibility is considered as good given the current scheme which is centrally managed by Casino and Bio IS (which helps to ensure that the same assumptions are made inside a product category)
Double-counting	The emission factors are chosen in order to prevent any double counting. Perimeters linked to each data collection is precised; moreover, since the methodology management is centralized, risks of errors is reduced (Casino and Bio IS are aware of the main risks related to their methodology and also perform consistency checks). If an emission factor includes a part of the life cycle realised by the industrial in contact with Casino, the calculation would not be made in order to prevent double-counting.
<u>Scientific soundness</u>	
Plausibility of the results	The elements available show that some efforts have been made to manage calculating a carbon footprint as to display it in the predefined format
Values choices	<p>Emissions factors used for transportation, packaging, and energy consumption have been validated by the ADEME and are quoted in a document which links the ADEME and Casino. Emissions factors for the calculation of the agricultural step impact (calculated by Bio IS) have been chosen by Bio IS taking into account their relevance for the considered product and the available data for this type of product.</p> <p>Emissions factors for the retailing calculation are linked to the Bilan Carbone realised by Casino (and revised by the ADEME) on the impact of its activity of retailer.</p> <p>Assumptions are not clearly stated, but the toolkit provided to the suppliers for data collection is designed to avoid the use of different assumptions</p>
<u>Scope</u>	

Functional unit	For food products, carbon footprint is calculated for 100 g of product.
System boundary	<ul style="list-style-type: none"> – Production stages i.e. agricultural in the case of food products – Product manufacturing – Transport, from the field to Casino warehouses – Packaging, from raw material extraction to recycling – Distribution, from Casino warehouses to the consumer's home
Cut-off criteria	No information available but Casino says they are defined.
Offsetting	The PCF labelling is not linked to carbon offsetting.
Allocation	<p>Impacts of production site (energy consumptions): it is always specific to each factory and depends on its energy consumptions and the total weight of its production. Basically, energy consumptions are calculated for each CSU independently of its nature. But the precision of this assessment depends on the detail available from the supplier: if distinctions can be made between energy consumptions of its different production lines, calculation would be more precised.</p> <p>For distribution,: a first allocation of total GhG has been made based on revenue, ratio of scanned products,... to get GhG data per product for products in room temperature and cold temperature. Depending on the weight of the product, the value is calculated for 100g of product.(a calculation procedure study has been submitted to the ADEME and is not published due to sales confidential data from Casino)</p>
Carbon storage/land use change	It depends on the LCA publications used for the agricultural production phase.
Use stage	The use phase of the products is not accounted in the methodology except for the consumer's transport between home and shops.
End-of-life	For packaging: average scenario (incineration, recycling and land filling), on the basis of studies from Eco-emballages.
<u>Data</u>	
Data quality requirement	<p>Information provided in the toolkit are subject to automatic consistency controls.No information publicly available</p> <p>However, suppliers have to sign a commitment to deliver accurate data and Bio IS performs data quality checks.</p>
Data collection	<p>Bio Intelligence Service developed a tool to collect the data from the suppliers regarding:</p> <ul style="list-style-type: none"> - the composition of the product - its packaging - the supply of the raw materials (ingredients and packaging) - energy consumption in the factory <p>The data collection is done directly by the suppliers who send the aggregated results to Casino and Bio IS to avoid confidentiality issues</p> <p>In this case consistency between data quality requirements and data collection process can not be assessed</p>
Data validation	Bio IS assess the plausibility of the results through expert knowledge and audit the production site to verify the data when asked by Casino
<u>Interpretation</u>	
Uncertainty assessment	No specific information on uncertainty assessment.
Sensitivity analysis	No sensitivity analysis required
<u>Verification process</u>	
An external consultant audits a panel of suppliers every year to validate the data provided to Casino.	
<u>Communication</u>	

Type of communication	Type III label (carbon footprint figure is displayed with other information about recycling,...) Designed to be implemented on the packaging of the product but also on a website with additional information
Marketing/communication	The protocol is meant to be clearly understood by the consumers and quantified consumers tests have been realized in February 2010. TV reports, leaflets and website are ways used to communicate to the consumer about the Carbon Index.
<u>Compliance with ISO 14067 requirements</u>	
No information available	

Support implementation of protocol

Software/tools support

Type of tool	Data collection Excel® tool for Casino suppliers (internal software)
Cost of license	Free

Method documentation

Availability and accessibility	The Casino supplier tool goes with an instruction which provides guidelines aiming to make easier its use and a hotline is also available for supporting suppliers in the calculation. No guideline is publicly available for the other industrials; however, under a confidentiality agreement, it is possible to get access to it. Casino is also involved in the working groups of ADEME-AFNOR on the implementation of environmental labelling, and made presentations of its methodology in an international scale.
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Suitability for target audience

Experts	Methodological elements are currently not gathered in a single document but are available under a confidentiality agreement. The experts are not the target audience of Casino which communicate mainly to the consumers.
Non experts	On Casino website, the main concepts to understand the carbon labelling are explained to the consumers, and parts of the methodology are described at the level of a non-expert point of view. For more information, it is possible to contact the "Consumer Service" with a free phone-number. The Carbon index team would answer to the questions.
Sector-specific approach	No specific guides have been made but all products are evaluated in the same way according to the current methodology in order to allow comparability.

Data availability

Bio IS mentions that most of the data comes from the "Bilan Carbone" database from ADEME. This database is however limited and no detail is available on the other data used (e.g.: agricultural data managed by Bio IS directly).

Other means to support implementation

A methodological guide is given to the suppliers to help them in the data collection. No document to support implementation is publicly available without being in contact directly with the Casino Carbon Index team.
Additional initiatives have been launched in shops in order to communicate to the consumers on this issue thanks to games, leaflets, linear shops,... and some TV reports on national free channels.

Risks and benefits

Risks

Risk of no completion	The methodology has already been applied to more than 755 food products (and 500 of them are available in shops in October 2010). The current Casino PCF will be suppressed once the french government will have taken a final decision regarding the mandatory environmental displaying scheme and its related methodology.
Weaknesses of the project	Lack of transparency in the methodology (not available publicly, even if available under a confidentiality agreement) due to the fact that it is a private methodology.
Limitation / excluded areas	- Sectors: the methodology is designed for products sold by Casino - Methodology / GHG sources: the use phase is not considered except the transport of the consumer between home and shops. (in order to have the possibility to compare in shop- and web- shopping)
Comparability between products based on methodology used	Medium: Comparability between products calculated through the methodology is good but the comparability between brands is not possible for the moment.
Risk of misleading communication	NA

Benefits

Advantages of the project	<ul style="list-style-type: none"> - It is the first French carbon footprinting initiative - PCF precisions are provided on the web for each product - Carbon footprinting assessment is accessible to the consumers, at home and away from home - Methodology has been already tested on many products - Casino initiative was used as a reference during the Grenelle discussions on product labelling - Suppliers education to put the internal process in place to collect environmental data
Possible use of the results	<p>The results are made to be understood by the consumers. The Casino Carbon Footprint is shown as a green leaf with a carbon index value on the facing of the packaging.</p> <p>An additionnal green ruler is available at the back of the packaging enabling consumers to rate the product's environmental impact on a graduated scale which the following absolute ranges for position: 0 to 100, 100 to 200, 200 to 400, 400 to 800, 800 to 1600, 1600 to 3200, greater than 3200; these ranges give of Gauss curve of products distribution by position.</p>

Analysis of methodologies

Climatop



General

General

Objective	<p>Climatop is a best in class label. Climatop aims at "providing the necessary basis for consumers' decision making, in order to facilitate the efforts of them to countervail climate change" but also be an "incitement of producers to participate in a competition that leads towards more climate protective production methods".</p> <p>"A product or a service approved with [Climatop] carbon label has to cause significantly lower CO₂ emissions during its life cycle compared to relevant products or services of the same category" and shall not have a poorer eco-performance than other products.</p>
Type of protocol	Private scheme: Climatop is an NGO located in Zurich.
Targets	<p>All company sizes are targeted (producers and retailers)</p> <p>Large range of products: hair sprays, washing powder, batteries, asparagus, sugar, etc. The only restrictions in terms of product groups are those judged as doubtful ecologically, socially or ethically; for example, ethically doubtful offers are:</p> <ul style="list-style-type: none"> - Production and sale of animal products that violate animal protection law - Production and sale of weapons - Production and sale of tobacco and smoking goods - Production and sale of goods and services that directly support the production and usage of nuclear technology

Structure

Sponsor / initiative structure	It has been funded by "myclimate" and "Ökozentrum Langenbruck". Myclimate is a Swiss non-profit foundation working on voluntary carbon offsetting measures. Ökozentrum Langenbruck is a Centre of competence in sustainable development (education and technology transfer).
Owner of the methodology	There is not any specific "methodology". The label belongs to Climatop, and the vast majority of the product LCA are done by "my climate"
Type of commitment	Voluntary
System manager	<p>A free preliminary evaluation on the part of Climatop determines if the product fulfils the environmental and social standards and if the product is of relevance for the climate. Afterwards, undergoes an LCA and is compared "with a relevant group of alternative products". The complete balance is reviewed by an independent office</p> <ul style="list-style-type: none"> - data collection: involving internal resources is preferable but the support of external/internal LCA expert may be useful - calculation: to be made by an LCA expert - analysis: to be made by an LCA expert - review: performed by an external LCA expert company

Stakeholder acceptance

Links with policy and regulation	No explicit link with public policy and regulatory instruments
Links with authoritative bodies	No endorsement from authoritative bodies found
Other information	No detailed data available. The first consumer survey is planned for 2010; 7 firms are said to be clients

Methodological background

Link with other PCF projects	No declared compatibility with other carbon footprinting initiative. Link with The studies are based on ISO norms but some times refer to PAS 2050 if needed. Climatop participates to the PCF World Forum. In collaboration with LCA agencies in GB, Japan, Chile, NL and Germany, Climatop conducts a comparative study to assess the way different interpretations of the ISO norms can give different LCA results despite similar primary data.
Link with ISO standards	Declared compliance with ISO 14040
Revision process for the methodology and the background data	<ul style="list-style-type: none"> - Methodology: Stakeholder dialog with myclimate and Ökozentrum Langenbruck - Application to a product: A certified product can use the label for two years. Afterwards, a recertification is necessary to extend the validity.

System management and implementation

Tests already performed

Number of products tested	Close to 500 products calculated. 49 products labelled corresponding to more than 100 articles and 21 product categories have been assessed (September 2010)
Number of companies having made tests	Climatop has been collaborating on product basis with about 19 producers

Other information

Required conditions for implementation	<p>No required conditions in terms of training. The Climatop label can be attributed to the product if CO₂ Emissions are “significantly i.e. generally 20%” lower than comparable products:</p> <ul style="list-style-type: none"> - Several products per class may be labelled - Product comparison may include only company wide products (internal comparison) or products of various companies (trans company comparison) <p>In addition, the product has to fulfil several other requirements regarding environmental and social standards.</p> <p>There is no external guideline regarding the choice of the comparison reference (there is an internal guideline: functional unit must represent costumers use of the product category). However the fact sheets available on the web site mention that:</p> <ul style="list-style-type: none"> - in the case of a shopping bag, synthetic material was compared to paper - in the case of hand dryer, 6 ways of drying hands have been tested (hand dryer, paper towels, etc.) - in the case of potting soil, 5 types of products have been tested <p>Thus, this part of the process does not seems to be very framed.</p>
Economic aspects	<p>Investment is necessary</p> <ol style="list-style-type: none"> 1) for the establishment of the product carbon footprint 2) for its verification 3) for getting the right to use the Climatop label. <p>For this last point the cost of the licence fee varies.</p>
Management burden	Climatop is managing the label attribution as well as the whole process (in particular, organization of the verification process by a third-party). Firms have to establish that their products are more environment-friendly and, thus, have to perform various LCAs, which is the main part of the methodology burden.
<u>Development process of protocol</u>	
Stakeholders involvement	Stakeholders: myclimate and Ökozentrum Langenbruck (NGOs) involved
Standardization level	Low level of standardization: no detailed methodological document available and no information is available regarding further expansion of the

	methodology. No detailed methodology available to externals, internal document available. A methodological document is planned to be published in 2010
Peer-review of underlying methodology	The methodology in itself is not peer-reviewed. The product LCA is reviewed by an independent organism. Reviews are done by Carbotech, Empa and Ernst Basler + Partner.

Implementation of protocol

Applicability

Goods and services mainly targeted	The Climatop scheme is intended to be applied to all good and service categories. However, in its guidelines, Climatop mentions a list criteria that would prevent to get the label (type of criteria: ecological, social, ethical)
Additional efforts to expand the project	The label is theoretically applicable to all kind of products; however, firms have to ask for their products to be assessed.
Possibility of analysis / use of data	Climatop only refers to LCA methodology (ISO 14 040) therefore there is potentially broad possibilities of analysis
Consideration of other environmental impacts	Multi-criterion approach: to obtain the label, the product has to get a lower score of Environmental Impact Points (Swiss method of ecological scarcity UBP 06) than its competitors.

Principles

Life cycle perspective

Life cycle perspective	All stages of the life cycle included. (NB The methodology also includes other impact categories than climate change. They use the Ecological Scarcity Approach UBP. Thus, the Climatop label is awarded if the product generates at least: - significantly i.e. generally 20 % less green house gases - not poorer ecological performance than compared)
Modularity	All life cycle stages are included (except use phase) so that no modularity seems possible
Functional unit	The methodology does not explicitly refer to the notion of functional unit but it seems to be the current practice since ISO 14040 is the workbasis.

Criteria suitability

Consistency	Potentially yes, but lack of transparency. Attempt to ensure transparency available through fact sheets and peer review. The way those "comparable products" are selected is vague which can result in a lack of consistency
Relevance	No information available; however, this point should be analyzed through the final review
Completeness	Electricity from renewable sources is taken into account in the assessment, if it is generated in a direct connection to the product production facilities (e.g. company owned hydropower plant) or if eco-electricity is used which demonstrably leads to the advancement of renewable energy (e.g. nature made star), normally UCTE is used.
Transparency	Lack of transparency: no explicit methodology rules available even if a publication is foreseen. No detailed report available for confidentiality reasons. Results are published in fact sheets and related LCA review documents are available.
Reproducibility	Low reproducibility given the very limited access to the relevant data (confidentiality issues).
Double-counting	Not applicable

Scientific soundness

Plausibility of the results	The goal of the studies is to compare a product with other comparable products. External review verifies plausibility of the results.
Values choices	No methodology available Little information is available CO ₂ -equivalent (CO ₂ -eq): conversion factors according to table 4.1 of the IPPC report Climate Change 2001 (2007 for new products) The global warming potential with a 100 year time horizon (CO ₂ equivalent) is considered.

Scope

Functional unit	The methodology does not explicitly refer to the notion of functional unit but it seems to be the current practice since ISO 14040 is the workbasis. Thus, this concept is used in some peer-reviews and the analysis made is audited to ensure compliance with ISO 14040 requirements. Some of the peer-reviews mention the definition of functional unit as a critical point to be reviewed. According to methodology owner, functional unit is determined by each product category
System boundary	same as above
Cut-off criteria	Cut-off criteria are included according to ISO 14040 and PAS 2050
Offsetting	Offsetting is not taken into account.
Allocation	Allocation is made according to ISO 14040 recommendations. No more information available
Carbon storage/land use change	Carbon storage: not applicable Land use change: according to ISO 14040, PAS 2050 and ecoinvent.
Use stage	Use stage included when reasonable.
End-of-life	Always included

Data

Data quality requirement	No information publicly available but a methodology publication is in preparation. However, the methodology follows ISO 14040 requirements: <ul style="list-style-type: none"> • "PCF studies should use data that reduce bias and uncertainty. Determination of the best quality data could be supported by a data scoring framework that allows the different attributes of data quality to be combined. The following areas should be considered for the determination of the data quality: a) time-related coverage b) geographical coverage c) technology coverage d) precision e) completeness f) representativeness g) consistency h) reproducibility i) sources of the data j) uncertainty of the information • Where a study is intended to be used in comparative assertions disclosed to the public, the data quality requirements stated in a) to j) above shall be addressed. • Since data collection may span several reporting locations and published references, measures should be taken to reach uniform and consistent understanding of the product systems to be modelled."
Data collection	"primary data is gathered at the producer's and is complemented with data from the internationally acknowledged database Ecoinvent" Consistency between data quality requirements and data collection process can not be assessed
Data validation	"The calculations are performed by an independent engineering bureau and are reviewed (independent third party review) by another independent organization, according to ISO 14040"

Interpretation

Uncertainty assessment	The reviews mention that Climatop undertakes uncertainty assessments. A summary of the results of those assessments is accessible in Deutsch on the website for most of the products according to the methodology owner.
Sensitivity analysis	Sensitivity analysis is not always implemented: it is required when high uncertainty is observed Some peer-reviews include references to such a practice (e.g. asparagus: "To conclude a sensitivity analysis, an additional scenario for air transport was calculated, where the data from Ecoinvent were modified in order to consider only the kerosene consumption from the additional weight.").

Verification process

No detailed information on the verification process is available, except that calculation is reviewed by an external consultancy. Peer reviews show the scope of verification by product and assess the calculation model and results regarding its plausibility.

Communication

Type of communication	Type III label (no carbon footprint figure) The emissions related to the product life cycle are not displayed on the packaging, but the product is labelled «approved by Climatop»
Marketing/communication	Climatop provides a wide range of communication supports for labelled product: report, fact sheet, leaflets, press release, web site, trade faire and technical congresses presentation. For the consumer the information is simple: the presence of the label is the sign that the product is friendlier to the environment than the other similar products. The key arguments of Climatop regarding their communication strategy are: "- Positive - No figures - Easy to understand - Focused on climate"

Compliance with ISO 14067 requirements

No methodological publication available

Support implementation of protocol

Software/tools support

Type of tool	No tool is provided.
Cost of license	No tool is provided.

Method documentation

Availability and accessibility	No guideline available
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Suitability for target audience

Experts	Internal guideline available. Expert must be university graduate and experienced in LCA calculation.
Non experts	The global process is well explained on the internet website of Climatop; however, methodological aspects are not detailed
Sector-specific approach	No specific guides are available.

Data availability

The background data used is "Ecoinvent" data base: a very transparent and documented data base, widely used in the LCA community

Other means to support implementation

No other documents to support implementation are available.

Risks and benefits

Risks

Risk of no completion	Rather good project viability: already implemented on 49 products (21 product categories), endorsement of the largest Swiss retailer: MIGROS.
Weaknesses of the project	<ul style="list-style-type: none"> - lack of transparency of the CF assessment - limited scale of the scheme: a limited number of products have been labelled (10-15% of analyzed products)
Limitation / excluded areas	<ul style="list-style-type: none"> - Sectors: no restriction declared - Methodology / GHG sources: no limitation identified <p>However, exclusion criteria are specified on the basis of management means. Are excluded:</p> <ul style="list-style-type: none"> - Ecologically doubtful offers: Environmental law in force at the production site shall not be violated. If local legislation appears to be insufficient, EU law is applied. Products and services are excluded if causing a direct loss of biodiversity; Persistent Organic Pollutants (POP), according to the Stockholm Convention; non-sustainable forestry (e.g. without the aim of a certification by the Forest Stewardship Council, FSC); non-sustainable fishery (e.g. without the aim of a certification by the Marine Stewardship Council, MSC). - Socially critical offers: Labour law in force at the production site shall not be violated. If this legislation appears to be insufficient, EU law is applied. Products and services related to the following socially critical aspects are excluded: Violation of human rights according to the UN Universal Declaration of Human Rights; Child labour according to the UN Convention on the Rights of the Child; Working conditions that lead to high accident rates; Mass layoffs without plans for social compensation. - Ethically doubtful offers: Products related to the following ethically doubtful aspects are excluded: Production and sale of animal products that violate animal protection law. The Swiss animal legislation is the relevant basis; Production and sale of weapons; Production and sale of tobacco and smoking goods; Production and sale of goods and services that directly support the production and usage of nuclear technology. <p>Thus, a deeper knowledge of the firm applying for the label is necessary.</p>
Comparability between products based on methodology used	Limited: The main argument that would lead to consider a good comparability is the fact that the CF are evaluated by a single organism (Climatop) and that the label is designed to highlight climate-friendly products. The assessment of the comparability is however limited due to the lack of transparency, the impossibility for the public to get a clear view on the GHG emissions of the product (only on the homepage), and to the case-by-case approach for the identification of good practice.
Risk of misleading communication	<p>Risk of misleading information in the sense that:</p> <ul style="list-style-type: none"> - there is a lack of transparency in the methodology used - there is a limited stakeholder participation to define key issues such as the functional unit, the products to be compared with, the system boundaries, etc. - it is a best in class label (information given to the consumer), even if more information is available on the fact sheets on the web site

Benefits

Advantages of the project	- A clear message given to the consumer through the Climatop label: "this
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	<p>product is more environmentally friendly than the others" (i.e. it generates at significantly less GHG than its competitors)</p> <ul style="list-style-type: none"> - The label is oriented to show a GhG emissions reduction and not only a CF - Assessment of other environmental impacts than climate change
Possible use of the results	<p>Reduction of footprint, benchmarking, communication and marketing.</p> <p>When a product is significantly i.e. generally 20% less impacting than its competitors, it can be labelled as "Climatop".</p>

Analysis of methodologies Greenext (Leclerc)



General

General

Objective	<p>The objectives of the initiative are to develop an "industrialized " approach of LCA that</p> <ul style="list-style-type: none"> - allows a rapid and massive development of the information given to the consumers, the retailers and the industrials. - supports a change of the consumption behaviour towards more responsibility - contributes to base the development of the range of products of a company on the customer information and relationship - provides the actors of supply chain with simple tools to manage their improvement levers
Type of protocol	Private protocol
Targets	<p>Actors of the supply chain of mass-market products: producers, industry and retailers</p> <p>Companies of all sizes, SME's included.</p> <p>Two range of products:</p> <ul style="list-style-type: none"> - food - household products, perfumes, hygiene and beauty <p>DIY (Do-it-yourself) sector under development</p>

Structure

Sponsor / initiative structure	<ul style="list-style-type: none"> - Leclerc - Greenext SA (private company) - ADEME (French Environment and Energy Management Agency) - Région Nord-Pas-de-Calais - OSEO <p>Other firms have been involved in the development of Greenext, like:</p> <ul style="list-style-type: none"> - Energies Demain (specialist of energy planification) - IRI Symphony Group, one of world leading provider of consumer product good markets data (strategic partnership)
Owner of the methodology	Greenext SA
Type of commitment	Voluntary
System manager	<ul style="list-style-type: none"> - Adaptation of the methodological framework: managed by Greenext - Data collection: managed by Greenext, performed by retailers or industrials - Calculation: managed by Greenext - Analysis: managed by Greenext (and IRI Symphony Group when required)

Stakeholder acceptance

Links with policy and regulation	Greenext is involved in the ADEME/AFNOR platform since its creation in 2008 and is an active contributor of the platform discussions, in order to follow the development of this scheme and to adapt its methodology. There is however no formal link with regulatory instrument.
Links with authoritative bodies	The project is supported by the ADEME and regional authorities. Moreover, on the basis of its own database, Greenext is providing the ADEME and MEEDDM (french environmental Ministry) the carbon footprint of 500.000

	mass market products distributed in France, in order to evaluate the carbon footprint of french households.
Other information	Greenext has been awarded for its contribution to a green digital growth by french authoritative bodies.
<u>Methodological background</u>	
Link with other PCF projects	<p>Greenext updates its approach according to the decisions taken in the French ADEME-AFNOR platform that is developing BP X30-323.</p> <p>Actually, Greenext does not aim at developing a specific methodology with a protocol: it relies on existing carbon footprinting methodology (BP X30-323 in priority) and offers an information management system solution to systematize the calculation.</p> <p>The approach followed is subject to an annual audit based on a referential developed by Ecopass (ECOCERT Group – official accredited certification body) which includes requirements from BP X30-323, ISO 14040 and 14044, and PAS 2050.</p>
Link with ISO standards	<p>The approach followed is subject to an audit based on a referential developed by Ecopass. Ecopass referential is said to include recommendations from ISO 14040 and 14044, management systems ISO 14001 and ISO 9001. This standard will be published early 2011.</p> <p>According to the audit statement, the level of confidence is satisfactory and enable to emit an attestation with qualifications on Greenext's management system of environmental data; the qualifications are related to the following points:</p> <ul style="list-style-type: none"> - the youth of the system does not enable to evaluate its efficiency, even if the management system answer globally to the requirements of the environmental labelling recognition scheme. - the evaluation of the external communication has not been performed completely and would need to be further developed
Revision process for the methodology and the background data	<ul style="list-style-type: none"> - Methodology: It is reviewed to be compliant with the latest development of BP X30-323, ISO 14040 and 14044, management systems ISO 14001, ISO 9001 and PAS 2050. - Application to a product: Greenext SA guarantees the data for one year with a continuous update of the data.
<u>System management and implementation</u>	
<u>Tests already performed</u>	
Number of products tested	<p>The carbon labelling of 30 to 50 000 products. have been already tested in 3 Leclerc supermarkets since early 2008. These data come from the Greenext labelling database including 500.000 mass market products that are distributed in France.</p> <p>A higher number of products has been analyzed with specific primary data from industrials and retailers for private improvement initiatives.</p>
Number of companies having made tests	About 50 companies have tested Greenext solutions.
<u>Other information</u>	
Required conditions for implementation	The methodology is implemented by "experts" only (people working for Greenext); a training session is proposed to new customers (data entry).
Economic aspects	According to Greenext, the cost of implementation is much lower than for conventionnal LCA thanks to the systematized approach. However, there is no possibility for the user to calculate PCFs without paying a fee (sliding scale of fees are applied, depending on quantities ordered) The broad deployment

	of the solution in three supermarkets tends to confirm the relatively low cost of implementation.
Management burden	The methodology is developed by Greenext. Thus, Greenext manages the methodological framework, the database supporting the calculation, the internet application for the methodological use,...As so, burden for user is limited.
Development process of protocol	
Stakeholders involvement	Stakeholders involvement in the development of the methodology is limited due to the required level of confidentiality. A technical and financial support has been provided by the ADEME and consumers association for the pilot implementation in three supermarkets (Leclerc labelling scheme).
Standardization level	Greenext employees are part of the working groups for BP X30-323. The Greenext approach is continuously adapted according to BP X30-323 developments.
Peer-review of underlying methodology	A peer review of the methodology by an LCA expert is included in the process of certification by Ecopass. The review statement is not publicly available.

Implementation of protocol

Applicability

Goods and services mainly targeted	To date, the methodology is applicable to food products; household products, perfumes, beauty and hygiene products. The calculation process may be adaptable to many sectors, chosen according to business opportunities (mainly consuming products)
Additional efforts to expand the project	"Do-it-yourself" products are under development.
Possibility of analysis / use of data	<ul style="list-style-type: none"> - Macroeconomics studies <p>When an accurate level of specific data is provided:</p> <ul style="list-style-type: none"> - Comparison of different product systems - Consumer information - Environmental diagnosis and support for ecodesign <p>The frame is developed to include all LCA stages so that accurate analyses can be made if specific data are provided. Uncertainty calculation allows to compare improvement policies.</p> <p>The specific approach chosen by Leclerc in its labelling project is not designed to compare brands within a product system or to calculate emission reductions. No guideline has been developed to give a frame to emissions reduction calculation.</p> <p>Greenext's system seems flexible enough to give these possibilities in other frames.</p>
Consideration of other environmental impacts	<ul style="list-style-type: none"> - Mono-criterion approach (CO₂ eq.) - The other environmental impacts will be included to fulfil BP X30-323 requirements when they will be defined by the AFNOR-ADEME platform - Multicriteria analyses have already been carried out for specific studies according to the methodology owner

Principles

Life cycle perspective

Life cycle perspective	<p>The methodology is based on LCA standards: the environmental assessment is performed in compliance with the principles of inclusion of an LCA: raw material and packaging acquisition, production, use, end of life, transportation all along the life of the product.</p> <p>Following emissions sources are not included:</p> <ul style="list-style-type: none"> - commuting of employees; - GHG emissions from manufacturing and ongoing maintenance of capital goods <p>Transport of consumers to the point of sale is not directly included, according to the platform AFNOR-ADEME recommendations, but the data could be communicated apart.</p>
Modularity	<p>Modularity is possible when working on ecodesign, supply chain optimization, etc.</p> <p>For labelling purposes, modularity is avoided to ensure comparability of the results. If a new module is developed, it shall be added to all products and generic data shall be defined for all the products.</p>
Functional unit	<p>A functional unit is defined according to the works of sectorial working groups (BP X30-323). The result is disclosed as referring to the functional unit and to the UVC (Consumer Selling Unit)</p>
<u>Criteria suitability</u>	
Consistency	<p>The approach chosen by Leclerc enables comparisons across product systems but is not designed to compare brands inside one product system. More specific comparisons (between supply chains, between various product conceptions) are possible when specific data are provided, but the framework of this use has to be detailed.</p>
Relevance	<ul style="list-style-type: none"> - Land use change accountability is not taken into account, due to the lack of available and homogeneous data - Data relevance is assessed through an uncertainty coefficient. Criteria of relevance: time applicability, geographical applicability, technological applicability.
Completeness	<p>The other environmental impacts will be included in order to fulfill BP X30-323 requirements when they are defined. It is a single criterion methodology: carbon only.</p> <p>The main GHG sources are taken into account: CO₂, CH₄, N₂O, CnHmFp, CnF2n+2, SF₆, some CFCs and liquid refrigerant.</p> <p>Carbon storage matters have not been encountered yet (food, household products, perfumes, hygiene products not concerned) but the decision of the BP X30-323 platform will be applied.</p> <p>Land use change aspects are currently not taken into account.</p>
Transparency	<ul style="list-style-type: none"> - Reviewer is supposed to have access to all the information (methodology, database, assumptions, etc.). All the information is electronically filed (calculation process automatized) - Because of the required level of confidentiality (patent right), there is very little transparency on the methodology and quality of the database for non reviewers. However, an external audit is performed on a regular basis
Reproducibility	<p>Reproducibility of the result is ensured by the total automatization of the calculation and by the electronic filing of all the calculations.</p>
Double-counting	<p>No information is available - waiting for the BP X30 – 323 requirements.</p>
<u>Scientific soundness</u>	
Plausibility of the results	<p>Several elements are put in place to avoid results to be not plausible: uncertainty management, alerts and auto-controls, double checks of</p>

	calculation,...
Values choices	Greenext systematically trains its customers with a data collection guidance. Greenext's engineers support customers in values choices. The software guides and assists customers for the specific data with data collection guidance.
<u>Scope</u>	
Functional unit	The functional unit is defined and adapted to the product category The carbon footprint for labelling is given per kg or per unit of sale.
System boundary	Principles of inclusion of an LCA: raw material and packaging acquisition, production, use, end of life, transportation all along the life of the product. Are not included: * commuting of employees * GHG emissions from manufacture and ongoing maintenance of capital goods Transport of consumers to the point of sale is not directly included (following the recommendations of BP X30-323), the data may be communicated apart.
Cut-off criteria	Apart from the elements of the inventory excluded by principle (commuting, capital goods, etc.), no cut off criterion is defined. Indeed, if specific data are unknown, the generic modules are used so that all the phases of the LCA are included.
Offsetting	Offsetting is not taken into account
Allocation	Mass allocation
Carbon storage/land use change	- Carbon storage: not tackled yet. Greenext will adopt BP X30-323 recommendations - Land use change: the inclusion of land use change in emissions factors has not been checked
Use stage	Data have been developed by Greenext experts from representative and reference data of french market.
End-of-life	National statistics are used for end-of-life.
<u>Data</u>	
Data quality requirement	According to the methodology owner, a program of alerts and controls is systematically applied to offer accurate data and a program of continuous improvement takes place in the center of the data management; both programs are audited
Data collection	-The proportion of specific data vs. generic data is not formally defined even if it could be adapted to the final use of data through Greenext expertise - Greenext guarantees the result of the footprint for one year. It recommends the footprint to be recalculated at least every year using updated data. The database is partially updated every month. - Generic data are included in the database.
Data validation	Control systems are set up. Greenext: - validates generic data through comparisons - is alerted when specific data are very different from generic data - is alerted when the crossing of EAN characteristics with generic data generates inconsistent results During the data collection, various parameters are said to be verified: temporality, geography, scope, technology, fidelity, representativeness, consistency, source, uncertainty, etc. Each new dataset is integrated with its uncertainty according to the pedigree matrix by Weidema method.
<u>Interpretation</u>	

Uncertainty assessment	An uncertainty coefficient is given for the data. The overall uncertainty coefficient is calculated via a Monte Carlo analysis. Uncertainty is based on geographical, time, technological relevance of the data.
Sensitivity analysis	Sensitivity analyses are conducted and included in control system according to the methodology owner
Verification process	
<p>Ecopass carries out an annual audit of the environmental data management system. Ecopass developed a verification standard which includes recommendations from global management system standards (ISO 14001, ISO 9001), LCA referentials (ISO 14040 & ISO 14044) and other guidelines (BP X30-323, PAS 2050)</p> <p>Two themes assessed:</p> <ul style="list-style-type: none"> - methodology definition: overall definition, boundaries and data requirements, data collection, calculation and communication. - labelling and communication: data use charter (existence), respect of the data use charter <p>Overall 23 criteria are assessed.</p> <p>Among the criteria for data quality and management are: 1. elaboration of procedures ensuring accuracy, completeness, representativeness, reproducibility of the data and of the associated controls, 2. existence of an uncertainty index, 3. elaboration and update of general instructions for data elaboration and PCR, 4. elaboration of procedure to ensure consistency of data, 5. traceability of malfunctioning and action plans follow up.</p> <p>Ecopass standard is not yet available but should be published early 2011.</p>	
Communication	
Type of communication	<p>A labelling experiment has been carried out by Leclerc supermarkets. Three elements were communicated:</p> <ul style="list-style-type: none"> - CO₂ footprint per kg - CO₂ footprint per unit sold - CO₂ footprint of the consumer basket: the sum of PCF of all purchased goods is printed on the receipt.
Marketing/communication	No information provided
Compliance with ISO 14067 requirements	
No information provided – waiting for the standard publication.	

Support implementation of protocol

Software/tools support

Type of tool	A 'User friendly' software with high level of automatization is said to be developed for data collection and results delivery.
Cost of license	The tool is property of Greenext (intellectual property)

Method documentation

Availability and accessibility	Low availability (confidential)
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Suitability for target audience

Experts	Applicable to Greenext employees, partners and accredited certification body (when working with Greenext).
Non experts	<p>Greenext provides documentation to its customers about LCA approach, scope, use of the data, use of the software etc.; these documents are not available otherwise</p> <p>In the Leclerc labeling project, Leclerc provided educational information to consumers, based on Greenext documentation.</p>
Sector-specific approach	No information available

Data availability

EAN database: 500 000 mass market products carbon footprint are registered and characterized (packaging, quantity, typical use phase)

Other means to support implementation

Greenext's Engineers in charge of a customer is at his disposal for any advice or expertise required. Training sessions for clients (to improve the quality of specific data, the appropriate use of the results, etc.)

Risks and benefits

Risks

Risk of no completion	The company has been set up based on the approach developed; it has 18 employees (May 2010).
Weaknesses of the project	<p>In Leclerc's labelling project:</p> <ul style="list-style-type: none"> - lack of transparency in the methodology and data sources although accessible for a third party verification body - the comparability of footprints is limited by the low level of specific data systematically required. <p>The flexibility of Greenext solutions seems to be able to reduce this weakness if specific data are provided, even if implementation framework has to be detailed</p>
Limitation / excluded areas	<ul style="list-style-type: none"> - Sectors: services are not included - Methodology / GHG sources: no information available.
Comparability between products based on methodology used	In Leclerc's labelling project, limited: the approach is designed to compare product categories but not to compare brands within a product system or to calculate emission reductions (no guideline has been developed to give a frame to emissions reduction calculation: conditions, etc.).
Risk of misleading communication	<p>Current experiment with Leclerc has begun with non-specific data (data representing the French market) for next getting more precise (inclusion of store characteristics, packaging specificities,...). Impacts due to product origins and transportation means will be included progressively.</p> <p>In particular, this approach does not take into account efforts (from retailers or consumers) to reduce their carbon footprint. It also means that</p> <ol style="list-style-type: none"> 1) this evolution in the scope could be confusing if not properly explained 2) comparison with products from another retailer could be difficult

Benefits

Advantages of the project	<ul style="list-style-type: none"> - Reduced investment and time required compared to a conventional LCA - Global measure of 500 000 mass market products carbon footprint. Provides basic data which can be used as reference data. - Annual external audit on data management system by a third verification body
Possible use of the results	<ul style="list-style-type: none"> - Macroeconomics studies <p>When an accurate level of specific data is provided:</p> <ul style="list-style-type: none"> - Comparison of different product systems - Consumer information - Environmental diagnostic and support for ecodesign

Analysis of initiatives

Ecocheck (Belgium)

General	
Country/Region	Belgium
Date	2009-2010 (the system will be carried on during 2 years and then evaluated at the end of 2010. These 2 years will act as a test for further extension).
General Description	Free attribution of specific checks dedicated to buy ecological products (similar to meal pass or meal vouchers) by the company to its employees. The total sum of eco-checks cannot be more than 250 euros per employee and per year. The maximum amount of a single check is 10 euros.
Objectives	To increase consumers' purchasing power while raising awareness on the environment.
Actors	
Sponsor of the initiative	The Belgian government is the sponsor of the initiative. Nevertheless, the role played by the government seems to be limited to the financial participation through free revenue and social taxes on eco-checks.
Responsible body	It takes the form of a collective labour agreement by sector and has to be validated by the company. It is totally based on labor talks and the government can intervene only in case of big disorder, and no national body was identified.
Targeted people	Belgian consumers / workforce are the main target, since they benefit from the eco-checks.
Scope	
Geographical scale (local/national/international)	This is a national initiative in Belgium.
Sectors/product categories covered	Eligible categories of products are chosen by social partners, but the general logic is to include products that allow: <ul style="list-style-type: none"> - energy savings - water savings - sustainable transportation - waste prevention - ecodesign - respect for nature
Issues covered (GhG, energy efficiency, other...)	See above: many environmental aspects are covered.
Level of obligation (mandatory/voluntary)	The approach is voluntary at company level.
Inclusion/exclusion criteria	There are no explicit criteria, but as for example, products allowing energy savings are: <ul style="list-style-type: none"> - products and services for which the federal state offers a tax reduction regarding energy savings - products and services for which one of the regions offers regional subsidy - products intended to housing isolation - energy saving light bulbs, TL light bulbs and LED lighting - electric devices exclusively functioning thanks to solar power or manually produced power

	Moreover, eco-labelled products can also be bought with eco-checks.
<u>Methodology</u>	
Link to an existing EU legislation (Ecolabel or Energy labelling)	It seems to be consistent with EU legislation on Ecolabel and Energy labelling
Methodology used/link to an identified methodology	This initiative does not require the use of a carbon footprint methodology.
Incentives	As a pull driven device, eco-checks are incentives by themselves (they directly increase the demand from end user).
Sanctions	N/A. This initiative does not comprise any sanctions.
<u>Reporting and disclosure</u>	
Reporting and controls (declaration, verification)	There is no verification that the products sold by retailers enter into the defined categories.
Disclosure obligations and practices	There is no disclosure obligation. In practice, some retailers communicate about the products in catalogues/leaflets or in the shelving. Communication is not framed so there may be some abuse. There is no label on products to provide point of sale information.
<u>Results</u>	
Results measurement mode	The performance indicators are the following: <ul style="list-style-type: none"> - Number of companies and employees using eco-checks - Number of retailers accepting eco-checks - Sales growth of concerned products (compared to same category when relevant) - Growth of demand for ecolabels
Achievements so far	<ul style="list-style-type: none"> - In 2009, 53% of SMEs provided their employees with eco-checks. - 75% of the employees and workers think that eco-checks are a good or an excellent initiative compared to 50% for employers. - A growth of the demand for ecolabels has been noticed since the implementation of eco-checks. Actually eco-checks act as an advertising for ecolabels.
Limits regarding the definition of the initiatives	<ul style="list-style-type: none"> - The total sum of eco-checks cannot be more than 250 euros. Thus, it represents a limited percentage of overall consumption. - As the decision is made by sectors, there is a big heterogeneity of the results among sectors (90% of SMEs in printing sector versus 6% in chemistry). This is due to the fact that some sectors preferred to grant salary rises or other advantages to their employees: when asked, two thirds of consumers prefer to get bonuses than eco-checks. - It is not compulsory for retailers to accept eco-checks (payment delay is a constraint for many retailers that are used to be paid immediately).
Difficulties of implementation	<ul style="list-style-type: none"> - The list of concerned products is hard to remember and has to be updated every year. Thus, only 40% of employees/workers are aware of what they can buy with those checks. Eco-checks could have been exclusively dedicated to eco-labelled products, but the limited choice would have curbed the wide implementation of such an initiative. - Printing and distribution costs can slow down the adoption of such a voluntary initiative. In fact, higher prices are applied than for meal vouchers (due to limited scale economy). Thus, for SMEs the system can be particularly costly. - Some collective agreements give the possibility to companies to replace

	eco-checks by meal vouchers.
Replicability	The initiative relies on collective agreements similar to those regarding meal vouchers. Hence, there are no technical or legal barriers to the replication in other countries and to a wider range of products and services. However, the initiative lacks a clear and unique definition of the products covered to be properly extended. Moreover, in countries where fringe benefits are not widely adopted, it will be hard to grant eco-checks instead of pay rises.
Cost of the initiative	The employee does not contribute to the financing of eco-checks. Thus, cost is divided into two parts: <ul style="list-style-type: none"> - the amount upon the employer - the amount upon the state (eco-checks are free of revenue and social taxes) The total cost includes the printing and distribution of the checks (by specialized companies such as Sodexho and Accor). We are expecting some more information from our contacts in the organism "Conseil National du Travail"

Sources of information/useful links

[http://www.cnt-nar.be/CCT-ORIG/cct-098%20\(20.02.2009\).pdf](http://www.cnt-nar.be/CCT-ORIG/cct-098%20(20.02.2009).pdf)

Interview with Mr Denis Pohl, responsible for the implementation of eco-labelling in Belgium.

Les chèques-repas ne font plus l'unanimité, April 22nd, 2010, Trends

<http://www.ecocheques.be/>

<http://www.accorservices.be/FR/HumanResources/EcoCheque/Pages/Default.aspx>

53% des PME ont octroyé en 2009 des éco-chèques à leurs collaborateurs, February 22nd, 2010, Agence Belga

Les travailleurs positifs quant aux éco-chèques, March 11th, 2010, Agence Belga

Vrai ou faux succès pour les éco-chèques, October 15th, 2009, Trends

Analysis of initiatives

Ecological Bonus-Malus

General	
Country/Region	France
Date	December 2007
General Description	French Law providing cash bonus to consumers for buying cars emitting less than 130 gCO ₂ /km and maluses for cars emitting more than 160 g CO ₂ /km.
Objectives	<ul style="list-style-type: none"> - To Encourage the purchase of low carbon emissions cars instead of highly polluting ones - To decrease overall cars emissions as a final goal
Actors	
Sponsor of the initiative	The French Government
Responsible body	The CNASEA is in charge of the bonus malus implementation. It investigated 685000 bonus cases in 2008.
Targeted people	French population/consumers are the targetted people since the price of the cars they purchase is impacted by the Ecological Bonus-Malus initiative.
Scope	
Geographical scale (local/national/international)	This is a national initiative in France.
Sectors/product categories covered	Diesel, petrol and electric cars (except commercial vehicles) are covered by the system.
Issues covered (GhG, energy efficiency, other...)	GhG gases, and CO ₂ in particular are covered by the system.
Level of obligation (mandatory/voluntary)	This is a mandatory system implemented through a law.
Inclusion/exclusion criteria	<p>As of january 2010 the scale of the system is the following:</p> <ul style="list-style-type: none"> - Taxes from €200 to €2600 € for cars emitting over 156gCO₂/km - Bonuses from 100 € to 1000 € for cars emitting less than 125gCO₂/km - A specific bonus of €5000 for cars emitting less than 60gCO₂/km
Methodology	
Link to an existing EU legislation (Ecolabel or Energy labelling)	<p>The Ecological Bonus-Malus initiative derives from the 1999 voluntary agreement not to run over 140 gCO₂/km in 2008 (transposition in French law in 2002).</p> <p>The 1999/94/CE Directive related to the availability for the consumers of the information concerning the fuel consumption and CO₂ emissions during the commercialization of new individual cars is also addressed.</p>
Methodology used/link to an identified methodology	<p>Attribution is based on the CO₂ emissions category to which cars belong:</p> <ul style="list-style-type: none"> - less than 60 g CO₂/km => 5 000 € bonus - between 61 and 95 g CO₂/km => 1 000 € bonus - between 96 and 115 g CO₂/km => 500 € bonus - between 116 and 125 g CO₂/km => 100 € bonus - between 126 and 155 g CO₂/km => no bonus / no malus - between 156 and 160 g CO₂/km => 200 € malus - between 161 and 195 g CO₂/km => 750 € malus - between 196 and 245 g CO₂/km => 1 600 € malus - more than 245 g CO₂/km => 2 600 € malus

	This scale was initially designed to significantly reduce CO ₂ emissions while being self-financed, maluses compensating bonuses.
Incentives	The bonus is the incentive to buy less emitting cars (see scale above).
Sanctions	The malus is the financial “sanction” for buying very polluting cars (see scale above).
Reporting and disclosure	
Reporting and controls (declaration, verification)	A yearly declaration of the malus tax to the French tax organisation is compulsory. Emissions data are provided by constructors (related to normalized consumptions) whose cars are probated.
Disclosure obligations and practices	There are no disclosure obligations. Car dealers deduce the amount of the bonus when they sell cars, however, they can refuse to do so. Then the buyer should directly ask the CNASEA for the bonus. Car manufacturers have to disclose emissions levels and make the ADEME guide (containing bonus/malus amount per car) available for consultation in their points of sale. Moreover, the ADEME website allows to search for a specific car emissions and bonus/malus.
Results	
Results measurement mode	The success of the Ecological Bonus-Malus can be evaluated through the study of: - Percentage of cars sold with bonus among the total number of cars sold - Total car emissions - Net cost for the state - CAFE index (average emissions per car sold)
Achievements so far	An average reduction of 9 gCO ₂ /km per new vehicle has been observed. France now stands below the EU 140gCO ₂ /km target. A 14 points increase in low emitting cars sold in 2008 (market share shifted from 30 to 44% of the total) and a 9 points decrease in high emitting cars (from 23 to 14%). Ecological Bonus-Malus may have allowed a stabilization of the market (-0,7% between 2007 and 2008) when compared with Germany (-1,8%), Italy (-13,4%) and the UK (-11,3%). The Ecological Bonus-Malus initiative may have been one of the reasons for the general price reduction.
Limits regarding the definition of the initiatives	According to the National Assembly Report released in september 2009: with cars consuming less fuel, users tend to drive more (longer distances) which results in more congestion, cars accidents and overall CO ₂ emissions.
Difficulties of implementation	The initiative has been so successful that it has costed more than anticipated. However, the scale has been reviewed in 2010 in order to better balance bonuses and maluses.
Replicability	The initiative is replicable. Some studies have been performed to extend it to other types of products in France. The 64th engagement of the Grenelle de l'Environnement calls for such a deployment. Outside France, the replicability depends on the existence of product carbon footprint disclosure availability and obligations.
Cost of the initiative	The National Assembly report gives an amount of 214 millions euros of deficit as for the end of 2008. In the same report, the financial law of 2009 predicted a deficit of 161 millions euros for 2009.

Sources of information/useful links

<http://vosdroits.service-public.fr/F18132.xhtml>

<http://www.developpement-durable.gouv.fr/>

Factiva

Consommation conventionnelle de carburant et émissions de gaz carbonique des véhicules particuliers vendus en France, ADEME, 2010

Rapport de l'Assemblée nationale sur le bonus-malus et la prime à la casse, septembre 2010:

http://www.assemblee-nationale.fr/13/rap-info/i1934.asp#P420_30981

Rapport sur les véhicules particuliers en France, ADEME, 2010

Analysis of initiatives

The "Grenelle 2" Act

General	
Country/Region	France
Date	2008-2010
General Description	<p>The "Grenelle I" law voted in august 2009 states that " the consumer must have access to a sincere, factual and comprehensive environmental information on products and their packaging.</p> <p>The "Grenelle 2" Act, currently at final draft stage, introduces from July 1st 2011 an "experimentation" (trial) period of at least one year to "progressively inform consumers, by marking, labeling, display or any appropriate process, on the carbon equivalent content of products and their packaging, as well as the consumption of natural resources or impact on natural environments that are attributable to these products during their life cycle"</p> <p>The type of display will be later defined.</p>
Objectives	<ul style="list-style-type: none"> - To introduce new criteria in consumers' purchasing decision - To make manufacturers increase their knowledge about their products' environmental footprint and detect potentials for reduction
Actors	
Sponsor of the initiative	The French Government
Responsible body	<p>Once the law is adopted, the government will be responsible for its application.</p> <p>The responsibilities of the different economic actors will be defined after the experimentation starting July 2011.</p>
Targeted people	The French consumers are targetted by the initiative, in so far as it aims at increasing their knowledge and leading their consumption habits towards more environmentally friendly products.
Scope	
Geographical scale (local/national/international)	This is a national initiative in France.
Sectors/product categories covered	Consumer goods and transportation services are covered by the law. Product categories will be defined after the experimentation.
Issues covered (GhG, energy efficiency, other...)	Not only GhG, but also natural resources, and the impact on natural environment are covered.
Level of obligation (mandatory/voluntary)	The initiative will be under experimentation starting 1st of July 2011 for at least one year. Conclusions will be drawn after this experimentation and the State Concil will then eventually decide on its wider application.
Inclusion/exclusion criteria	The inclusion/Exclusion criteria are to be defined by the different working groups for each product category.
Methodology	
Link to an existing EU legislation (Ecolabel or Energy labelling)	The "Grenelle 2" Act is a law with a wide spectrum that adresses several EU Directives including EU legislation on EcoLabel, Ecodesign and Energy labelling.
Methodology used/link to an identified methodology	The methodological framework used for product labelling is BP X30-323.
Incentives	The use of incentives is not planned for the moment

Sanctions	The definition of sanctions has not been mentioned so far.
Reporting and disclosure	
Reporting and controls (declaration, verification)	No specification is given about the verification of product labelling.
Disclosure obligations and practices	The disclosure obligations are not stringent, since product environmental footprint should be disclosed through labelling or any marking.
Results	
Results measurement mode	<p>The performance indicators of the The "Grenelle 2" Act regarding PCF could be:</p> <ul style="list-style-type: none"> - the number of product categories and products covered by a footprint calculation protocol - the average reduction of footprint per product category observed after X years of labelling - the growth of 'more environmentally friendly' products sales.
Achievements so far	<p>670 organisations (companies, trade associations, public authorities, trade unions, consumer and environmental associations) represented by more than 1000 experts have been involved in the development process of the methodology (BP X30-323 + PCR).</p> <p>Most PCR are presently being under construction through working groups set up for the following sectors: food and feed, energy consuming devices, batteries, washing products/garden products/pesticides, hygiene & beauty, clothing/house textile/shoes, building products, furniture, stationery sector, leisure, non electric tools.</p> <p>The objective is to make it progressive and to ease its implementation by SMEs.</p>
Limits regarding the definition of the initiatives	<p>The labelling initiative started in may 2008 with the ADEME platform. Labelling was initially supposed to be mandatory starting 01/01/2011 but has been changed into an "experimentation" (not yet defined) starting 07/2011 for at least one year. Most PCRs and tools for implementation (guide, public database, public software for footprint calculation, specific tools for SMEs) are not ready yet.</p>
Difficulties of implementation	<ul style="list-style-type: none"> - Definition of indicators other than CO₂ and associated calculation methods for each product category raises many methodological issues for which there is not always a consensus. - Building a comprehensive public database for products will be long as a lot of data is currently missing - SMEs may find it hard to face the complexity and costs of such an initiative, although the specificities of very small companies are to be taken into account and specific tools for calculating products footprints being developed. - Although PCR have already been developed for shampoos and shoes, the initiative requires to define a very large number of PCR not yet started
Replicability	<p>Although the feasibility of a mandatory labelling scheme is currently being challenged, the way the methodology and the PCRs are being developed through a very large consensus among all stakeholders and the resulting methodological guidelines (general and per product category) could be replicable in other EU countries, at is has been developed in connection to other mature initiatives like PAS 2050. Provided that the experimentation phase is successful in France and PCR are defined for most product categories.</p>

Cost of the initiative	<p>The cost will depend on the level of details required for the life cycle analysis. This is currently under discussion for each product category through working groups.</p> <p>The responsibility (between producers or retailers) for producing and providing product footprint information to consumers is not yet defined .</p>

Sources of information/useful links

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<http://www.terra-economica.info/Grenelle-2-les-reculs.9993.html>

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2009 Review of the European Union Strategy for Sustainable Development, February 18, 2010.

Analysis of initiatives

The Korea PCF label (in the frame of the Korean EDP Program)

General	
Country/Region	South-Korea
Date	The first step of the initiative was launched in February 2009, following a 9-months pilot phase. The second step is planned for launching in early 2011.
General Description	<p>This initiative is a two-step process comprising a carbon footprint emission label (step 1) and a low carbon product label (step 2). Actually, the carbon label has to be obtained first and can be upgraded to a low carbon label.</p> <p>This new label has not been introduced from scratch but is the result of a process that started 10 years ago:</p> <ul style="list-style-type: none"> - Construction of national LCI database (Dec. 1998) - Operation of Korea Type III labeling, also called Korean EDP program which evaluates natural resources used and environmental pollutants discharged (Feb. 2001) - Pilot project for carbon labeling (May ~ Dec., 2008) - Launching of Korea Carbon footprint labeling (Feb. 2009)
Objectives	To promote a purchasing pattern of low carbon goods and to encourage enterprises to develop low-carbon goods, thus contributing to the international efforts to reduce greenhouse gases.
Actors	
Sponsor of the initiative	<p>The carbon footprint labeling system is supervised by the Ministry of Environment and operated by Korea Environmental Industry & Technology Institute (KEITI).</p> <p>The funding for the period 2009-2011 is endorsed by the UK SPF (strategic program fund) and the ministry of environment.</p> <p>KEITI provides funding and support for exporting of ecoproducts overseas.</p>
Responsible body	<p>The general authority is the Ministry of Environment, that is in charge of promotion/education, approval and system improvement requests.</p> <p>KEITI is in charge of the development of product category rules and of certification (reception and treatment of applications).</p> <p>The KEPA (Korea Environment Preservation Association) is in charge of the development of the program for certificate judges.</p>
Targeted people	The targetted people are Korean consumers at first and then the population of main countries importing Korean goods.
Scope	
Geographical scale (local/national/international)	This is a national initiative so far, but an agreement has already been concluded with the UK to allow Korean low carbon certificate products when exported to the UK to benefit from the Carbon trust reduction label.
Sectors/product categories covered	All products and goods, with the exception of agricultural products, fishery and livestock products, forest products, pharmaceutical products and medical equipment are covered by the label.
Issues covered (GhG, energy efficiency, other...)	Greenhouse gases included in the Carbon footprint labelling calculation are carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), hydro fluoro carbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF ₆).
Level of obligation (mandatory/voluntary)	The labelling is voluntary.

Inclusion/exclusion criteria	<p>There are 3 types of product category rules (PCRs) for measuring product carbon footprint.</p> <ul style="list-style-type: none"> - Class1: for general product categories: production goods, durable goods that do not use energy, nondurable goods, and service => All products in Class 1 should not include CO₂ emission in use phase. Production goods and service in Class 1 should not include CO₂ emission in end-of life phase. - Class2: Energy-using durable goods => All products in Class 2 should not include CO₂ emission of raw material production phase. - Class3: the applicant can suggest a detailed use scenario of consumer per energy using product if its product is not covered yet.
Methodology	
Link to an existing EU legislation (Ecolabel or Energy labelling)	EU regulations are not applicable in Korea.
Methodology used/link to an identified methodology	<p>The label is linked to specific product category rules (described in a document called 'Guidelines for carbon footprint of products').</p> <p>It is largely based on PAS 2050 (ISO 14067 in the future).</p>
Incentives	<p>There are several incentives:</p> <ul style="list-style-type: none"> - Promotion when goods are sold at large stores that participate in the Carbon footprint labelling Certificate program - Promotion of certified goods through monthly newsletter and other advertisement media - Recommendation for government awards related to climate change - Inclusion of 'low carbon product certificate' goods in government-led procurement
Sanctions	This initiative does not call for any sanctions.
Reporting and disclosure	
Reporting and controls (declaration, verification)	<p>Companies requesting a Carbon Footprint Labeling Certificate should submit the application form and a report of product carbon footprint results in accordance with defined product category rules.</p> <p>Auditing of the declaration made by the applicant company is part of the certification process.</p> <p>Two surveillance checks are conducted during certificate period. A follow up is performed at least once a year.</p>
Disclosure obligations and practices	<p>All products covered bear a label.</p> <p>There is a contract between the Ministry of Environment and 3 major retailers for promoting Korea carbon footprint labeling. (E-Mart, Tesco and Lotte-Mart). Moreover, certified goods are promoted through monthly newsletter and other advertisement media.</p> <p>However, according to E-mart, labels are not visible enough.</p>
Results	
Results measurement mode	<p>The success of the initiative can be measured through:</p> <ul style="list-style-type: none"> - The number of participating companies - The number of certified products - The reductions in CO₂-eq emissions for low carbon certified products - The sales growth of certified products
Achievements so far	<p>181 products have been certified so far.</p> <p>In 2010, KEITI will check ten items to see if the labelling has led to reductions.</p>
Limits regarding the definition of the initiatives	The coexistence of two labels with a similar aspect can be source of confusion.

	The reduction label seems to be based on reduction targets rather than achievements.
Difficulties of implementation	<p>-According to a retailer (E-Mart), the increase in sales of labelled products during the promotion phase has not sustained after the end of the promotion.</p> <p>-Too few players are involved, which might distort competition and drive consumers away from the labelled products. Moreover, the range of certified products is not wide and diverse enough and does not cover some essential goods. For instance, at E-Mart, only 145 stock-keeping units have the carbon emission label. Out of that 145, 55 SKUs, more than one-third of the products with carbon emission labels are private brand products."</p> <p>-The complexity of the collection of data and calculation of the footprint is also questioned.</p>
Replicability	The certification methodology is in accordance with international standards. Moreover, this label has been designed taking into account export of Korean goods, so that it is already visible in the UK. Thus, there are no apparent legal barriers to the replication of the label. Nevertheless, administrative organisation and procedures are quite heavy, which might question its replicability.
Cost of the initiative	The certification process is very demanding for companies and appears to be costly. Especially, concerning the low carbon label that induces sometimes to change manufacturing methods in order to reach CO ₂ emissions reduction. Thus, companies are expecting more promotion from KEITI to counterbalance the certification cost: "To make carbon emission labels a flourishing market, we need to encourage customers to buy the products with the labels. But there isn't enough of a budget for a large promotion such as TV commercials" says Kim Ik, senior researcher on carbon labeling at KEITI.

Sources of information/useful links

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 Asiana to Display Carbon Footprint, December 18th 2008, Korea Times
http://www.delkor.ec.europa.eu/home/newsevents/events/document_files/Session5/Session5_Ik_Kim.pdf
http://www.ftis.org.tw/active/download/1_6.pdf
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<http://www.carbontrust.co.uk/news/news/press-centre/2009/Pages/carbon-trust-work-with-korea.aspx>
<http://www.businessgreen.com/business-green/news/2252922/south-korea-adopt-global-carbon>
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Analysis of initiatives

Cities for Climate Protection (CCP) Campaign

General	
Country/Region	Worldwide
Date	1993
General Description	<p>The Cities for Climate Protection (CCP) Campaign was launched by the International Council for Local Environmental Initiatives' (ICLEI), a non profit organization, to enlist cities to adopt policies and implement measures to achieve quantifiable reductions in local greenhouse gas emissions, improve air quality and enhance urban liveability and sustainability.</p> <p>The campaign is structured around five milestones:</p> <ul style="list-style-type: none"> - to establish a base year emissions inventory and forecast for the community and corporate sector - to set a community and corporate emissions reduction goal - to develop and adopt a greenhouse reduction strategy local action plan - to implement the local action plan - to monitor and report on implementation of local action plan measures that local governments commit to undertake with the help of ICLEI. <p>It does not specifically target product footprint.</p>
Objectives	<p>To allow local governments to understand how municipal decisions affect energy use and how these decisions can be used to mitigate global climate change while improving community quality of life.</p> <p>This program also relies on the need for a standardization of local government emissions inventory.</p>
Actors	
Sponsor of the initiative	The sponsor is the International Council for Local Environmental Initiatives' (ICLEI), the first local government network that has been accredited as an observer organization to the Intergovernmental Panel on Climate Change (IPCC).
Responsible body	The ICLEI is in charge of helping local governments implement the campaign.
Targeted people	Cities and local governments are the target of the CCP campaign.
Scope	
Geographical scale (local/national/international)	The initiative is international.
Sectors/product categories covered	All products, services and infrastructure used by the city, its citizens and companies are covered.
Issues covered (GhG, energy efficiency, other...)	Since the aim is to tackle climate change, the issues covered are GhG emissions.
Level of obligation (mandatory/voluntary)	This is a voluntary approach.
Inclusion/exclusion criteria	There are no inclusion or exclusion criteria.
Methodology	
Link to an existing EU legislation (Ecolabel or Energy labelling)	The CCP campaign does not refer to a specific european legislation.
Methodology used/link to an	Cities should use the International Local Government GHG Emissions

identified methodology	Analysis Protocol (IEAP) for their emissions assessment. In 2009, the first version of this protocol was developed that followed principles previously adapted by the WRI/WBCSD GHG Protocol.
Incentives	Cities can offer rebates or tax-credits as incentives.
Sanctions	We can imagine that cities are free to implement taxes, although this was not specified in the various reports studied.
<u>Reporting and disclosure</u>	
Reporting and controls (declaration, verification)	The fifth milestone of the CCP campaign is about reporting on implementation of local action plan measures.
Disclosure obligations and practices	The ECLEI issues periodic newsletters and reports that highlight local initiatives, as well as relevant national and international developments, to reduce greenhouse gas emissions.
<u>Results</u>	
Results measurement mode	the following indicators can be used to report on the success of the CCP campaign: <ul style="list-style-type: none"> - the number of local governments taking part in the program - the GhG emissions reduction reached thanks to the program
Achievements so far	<ul style="list-style-type: none"> - According to the ECLEI, "following the rapid dissemination in the US, Australia and Europe in early 1990s, the CCP Campaign was considered as a leading tool in initiating urban GHG mitigation actions in many developing countries in South Asia, Latin America and Africa in late 1990s." - "As of 2009 the CCP Campaign has grown to involve more than 1000 local governments worldwide that are integrating climate change mitigation into their decision-making processes." - According to a research study made by the Journal of the American Planning Association in 2008 on all American states with planning documents on climate change, 18 US cities with populations of over 500000 that are members of the CCP campaign and selected innovative smaller cities that are members of the CCP campaign: "the kinds of measures most often being implemented related to greening public vehicle fleets, improving the energy efficiency of public buildings, and establishing renewable portfolio requirements for utilities".
Limits regarding the definition of the initiatives	<ul style="list-style-type: none"> - emissions-reduction goals vary widely, many proposed actions are voluntary, few resources have been allocated, and implementation of most measures has not yet taken place. - most plans do not address adaptation to a changing climate. - leaving states and localities to- act on their own would risk creating a patchwork quilt of responses that would be confusing to the public and leave many areas with relatively weak policies. - The CCP campaign is an ambitious project but in practice cities focus much on public material and buildings.
Difficulties of implementation	<p>According to the research study mentioned above, proposed measures are globally inadequate: lack of revised building codes, air travel emissions not mentioned, funding sources are not substantial, lack of use of policy mechanisms (Carbon Taxes as for example).</p> <p>The same research finds that most plans do not mention specific needs for funding, and local governments have been unwilling to put their own money into climate change programs.</p>

Replicability	The program has been designed for a wide implementation. It is applicable worldwide. However, the choice of actions to be implemented and priority impacts are made locally by local governments. It is not ment to be implemented at a national -let alone European- level and there is no harmonized approach.
Cost of the initiative	As for example, in Australia, the program costs \$4 million a year to the federal government, covering 200 to 300 local governments. Nevertheless, these costs represent just a part of the financing.

Sources of information/useful links

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 Journal of the American Planning Association, State and Municipal Climate Change Plans, October 1st 2008
 Step in the right direction: Top award for reaching international milestone, July 8th 2009, Liverpool Leader
http://www.iclei.org/fileadmin/user_upload/documents/Global/Programs/CCP/CCP_Reports/ICLEI_TheBirthofCCP_1993.pdf
 Cleaner cities plan off to a capital start, November 21st 1997, The Australian
 KALAMUNDA Shire has achieved another milestone in the Cities for Climate Protection program, october 16, 2007, Midland Kalamunda Reporter

Analysis of initiatives

Carbon Tax in Sweden

General	
Country/Region	Sweden
Date	1991
General Description	<p>The Carbon Tax was introduced in Sweden in 1991 as part of a general reform of the taxation system.</p> <p>It has been implemented in parallel with cuts in income taxes (with a focus on low incomes). Starting 2007, environmental tax increases for households and firms has been compensated by cuts in taxes on labour, in order to increase labour supply and employment.</p>
Objectives	To make polluting more expensive and to focus people on finding energy-efficient solutions.
Actors	
Sponsor of the initiative	The Swedish Government is the sponsor of the initiative.
Responsible body	The Swedish Government (legislation) and the National Tax Board (tax collection)
Targeted people	Swedish consumers (households and companies) are the target.
Scope	
Geographical scale (local/national/international)	The Carbon Tax is a national initiative within the framework of the current EU Energy Taxation Directive.
Sectors/product categories covered	As a general rule, the tax is paid on all fuels except bioenergy and peat, although several user groups are wholly or partly exempt: a lower tax level is applied for fuels used for heating purposes in industry, agriculture and heat produced in combined heat and power plants to secure the competitiveness of certain sectors being subject to international competition.
Issues covered (GhG, energy efficiency, other...)	The Carbon Tax covers GhG.
Level of obligation (mandatory/voluntary)	The tax is mandatory.
Inclusion/exclusion criteria	<p>Full CO₂ tax is paid in transport, space heating and non-CHP heat generation. Industry enjoys a 79 percent reduction compared to what households pay. This percentage will be reduced to 70 percent in 2011 and to 40 percent in 2015</p> <p>There is also a cap linked to the turnover, which affects a small number of companies. The cap will be tightened in 2011 and abolished in 2015. (Energy intensive industry or agricultural company gets a reduction of part of the CO₂ tax above 0.8 % of the sales value. Reduction of excess amount to ensure that only 24 % of excess tax amount is paid.)</p> <p>From 2011, all industrial installations within the EU ETS will not pay any CO₂ tax. However, an energy tax (equal to 0.024 SEK/KWh = equal to the present EU minimum tax rate for heating gas oil) will be levied on all consumption of fossil heating fuels by industry, within as well as outside the EU ETS.</p>
Methodology	
Link to an existing EU legislation (Ecolabel or Energy labelling)	This initiative is linked to the EU legislation related to Kyoto commitments and the EU minimum tax rates for fossil fuels.

Methodology used/link to an identified methodology	The tax is levied on the amount of fossil fuel used. The tax rates on different fuels are calculated according to average carbon emissions from each fuel. There is thus no need to measure actual emissions from the consumption of the fuels for tax purposes.
Incentives	Incentives for investments in renewable energy and energy efficiency.
Sanctions	The tax corresponds to 103 euros / ton CO ₂ as of January 2010 for households and service. It is 22 euros outside EU ETS, 15 euros within EU ETS for sectors subject to international competition and carbon leakage (industry, agriculture and CHP), in 2010. Exchange rate used is 1 euro = 10.189 SEK (official rate 1 October 2009).
Reporting and disclosure	
Reporting and controls (declaration, verification)	The tax payers report their amounts of fossil fuel consumed when making their tax declaration. The tax payers are normally large industrial companies and distributors of fuel.
Disclosure obligations and practices	The tax is levied on the amount of fossil fuel used or sold. These amounts are checked by regular audits by the Tax Authority. The tax rates on different fuels are calculated according to average carbon emissions from each fuel. There is thus no need to measure actual emissions from the consumption of the fuels for tax purposes
Results	
Results measurement mode	The succes of the tax can be measured through the overall GhG emissions reduction.
Achievements so far	<p>- At the beginning of the 2000's, an OCDE study has shown that the main results of this tax are:</p> <p>*An increased use of biomass for heating. (50% of the energy supply to the Swedish district heating systems then and 70% planned for 2007). Moreover, the demand for biomass has encouraged innovation which has led to price reductions on these fuels.</p> <p>*The use of more energy efficiency solutions</p> <p>- "Between 1990 and 2006 Sweden cut its carbon emissions by 9%. The Swedish environment minister considers that "carbon emissions would have been 20% higher without the Carbon Tax". In particular, the Carbon Tax allowed a reduction in transportation emissions (essentially linked with individual cars)</p> <p>- Within the EU, Sweden has among the lowest CO₂ emissions (6.7 tonne per inhabitant vs an average of 9.3) and fossil fuel consumption (35% of gross inland consumption vs an average of 79 %).</p>
Limits regarding the definition of the initiatives	<p>- According to the OCDE study cited above, the impact on the Swedish industry has probably been rather limited for three reasons:</p> <p>1) the Carbon Tax on industry is only 50% of the general level (now other percentage, see above)</p> <p>2) only a relatively small fraction (30%) of the energy supply to industry was fossil fuel-based when the tax was introduced;</p> <p>3) for most industrial companies the energy cost is a relatively small fraction of the total cost and has therefore low priority.</p> <p>(On the other hand, during the period 1990 – 2007 there has been a 9 percent reduction in the total Swedish CO₂ emissions and at the same time an economic growth of +48 percent)</p> <p>- The reduction in GhG emissions is not totally linked to the Carbon Tax.</p>

	<p>Deindustrialization is also an important factor.</p> <ul style="list-style-type: none"> - In 2007, oil accounted "for 96% of the revenues from the CO₂ tax, although it produces less than three-quarters of CO₂ emissions from fuel combustion." - There is a risk of carbon leakage: industries could choose to move their production outside Sweden, should the tax increase.
Difficulties of implementation	<ul style="list-style-type: none"> - The challenge was to implement this taxation system without damaging Swedish companies international competitiveness and thus Swedish employment. A two levels of carbon taxation system was chosen: a high tax level for households and service and a lower level for industry. This has proved to be a succesful method, making it possible to significantly increase the general carbon tax level from 24 euros in 1991 to 103 euro in 2010. - The Swedish Ministry of Finance considers that "aid schemes may be necessary for limited time, to ensure that real options are available for households and firms. "
Replicability	<p>This kind of tax has been implemented in other countries such as Denmark, Finland, Norway and recently Ireland. Nevertheless, each tax is designed locally regarding the country's specificities (Sweden is much less In some countries, the idea of a tax (without incentives) might simply not be acceptable. It is being discussed within the EU to implement a mandatory carbon tax for sectors outside the EU ETS as part of a revision of the present Energy Taxation Directive. Outside Europe, British Columbia and India has introduced carbon taxation and Vietnam and Indonesia are planning such a tax for 2011. Far-reaching discussions are taking place in France, Japan and China.</p>
Cost of the initiative	<p>The Carbon Tax brought to the state 2.56 billion euros in 2009.</p> <p>During the period 2007-2009, environmental taxes increased by €0,5 billion whereas taxes on labour decreased by €7 billion..</p> <p>Since the principal aim of a CO₂ tax is to steer away from the use of fossil fuels, revenue losses can be expected as energy use becomes less fossil fuel intensive and more energy efficient.</p>

Sources of information/useful links

<http://www.oecd.org/dataoecd/25/0/2108273.pdf>
<http://www.guardian.co.uk/environment/2008/apr/29/climatechange.carbonemissions>
<http://www.carbontax.org/progress/where-carbon-is-taxed/>
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 Documents provided by our contact in the Swedish Ministry of Finance:
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 Swedish CO₂ tax Description Fioul version REV.doc
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Analysis of initiatives

Carbon Label of Carbon Trust

General	
Country/Region	UK and worldwide
Date	Since 2007 as a label, since 2001 as an organism (Carbon Trust)
General Description	This label provides companies with a certified, consistent and comparable way to display their products' footprints, along with their commitment to reduce those footprints over time.
Objectives	<ul style="list-style-type: none"> - To increase consumer awareness by influencing usual purchasing criteria (price, promotion, etc...) - To push companies to enter into a process of rapid (2 years) product emissions reduction while maximizing the economic return of such a process.
Actors	
Sponsor of the initiative	The Carbon Label has been developed by the Carbon Trust which was set up by the UK Government (DEFRA) in 2001 as a not for profit independent company.
Responsible body	<p>It is managed through the Carbon Trust Footprinting Company, a commercial subsidiary of the Carbon Trust.</p> <p>Over 70 leading companies have tested the standard calculation method (PAS 2050), used the certification baseline Footprint Expert TM and informed the development of the communications and reduction framework (Carbon Reduction Label) with the Carbon Trust Footprinting Company</p>
Targeted people	The targeted populations are consumers and producers all over the world.
Scope	
Geographical scale (local/national/international)	It was a national initiative at first but is now international (launched in the UK, the US, Australia and planned to be launched in Asia too).
Sectors/product categories covered	All products and services are covered (both BtoC and BtoB).
Issues covered (GhG, energy efficiency, other...)	The impacts of products measured are GhG.
Level of obligation (mandatory/voluntary)	This is a voluntary initiative.
Inclusion/exclusion criteria	The inclusion and exclusion criteria are that of the PAS 2050 methodology (see correspondent analysis).
Methodology	
Link to an existing EU legislation (Ecolabel or Energy labelling)	This initiative is consistent with EU legislation on Ecolabel, Ecodesign and Energy labelling
Methodology used/link to an identified methodology	The PCF methodology used is the PAS 2050 with a 2-year reporting period. Companies have to prove that they reached a material reduction on the labelled product (reduction appreciated regarding uncertainty which calculation is required by PAS 2050). Companies that have reduced their product emissions by more than 5% in any two year reporting period may choose to bank a proportion of that emission reduction.

Incentives	To keep its label for two additional years, the company has to prove after each two years cycle that it actually managed to reduce the carbon footprint of the labelled product.
Sanctions	As this is a voluntary initiative, no sanctions are planned beyond withdrawing the label from the product if reduction is not achieved.
Reporting and disclosure	
Reporting and controls (declaration, verification)	The certification of compliance with PAS 2050 is granted by the CLC. Every 2 years, companies have to prove that they reached a material reduction - within the bounds of uncertainty - on their labelled products. The reduction verification has to be made by an organism accredited in conformity with ISO 14065 and which has certification to PAS 2050 and the Carbon Trust Code of Good Practice. As for now, reductions have been certified by Carbon Trust subsidiaries. The Carbon Trust is working with the UK Accreditation Service (UKAS) to build a pool of accredited product carbon footprint certifiers.
Disclosure obligations and practices	<p>PAS 2050 does not require any communication of the results.</p> <p>"However organisations "may make public declarations of their commitments to reduce product GHG emissions when they can demonstrate that their commitment is robust, in conformity with the requirements" and "may make public claims about achieved reductions of their products' GHG emissions at any time after reduction has been achieved."</p> <p>The carbon label allows using the following communication means (besides labelling):</p> <ul style="list-style-type: none"> - Point of Sale material - Websites belonging to the product manufacturer or service provider - Online reseller product catalogues (products) and online directories (services) - Advertising, mail packs, product brochures, catalogues, business cards, local directories and other sales materials - Product manuals – where carbon-reducing usage advice can be explained. <p>It can include (optional):</p> <ul style="list-style-type: none"> - an explanation of the footprint - a comparison to footprints of alternative products in the category - tips for consumers on how they can reduce the product's emissions by changing the way they use it. The Carbon Trust also sponsored a Code of Good Practice for Product GHG Emissions and Reduction <p>Claims with the Energy Saving Trust to set a standard for companies who want to communicate their product carbon footprints and make claims about emission reductions.</p> <p>Display of the number on the label is optional but if a label is used, the number must be published somewhere in the public domain.</p>
Results	
Results measurement mode	<p>The results can be measured thanks to the following indicators:</p> <ul style="list-style-type: none"> - Number of companies using the Carbon reduction label - Number of products covered by the label - Consumer demand for carbon footprint information - Overall emissions reductions linked to the label and associated cost savings
Achievements so far	<p>According to Carbon Trust, the 70+ companies they have worked with that applied the PAS 2050 method have:</p> <ul style="list-style-type: none"> - uncovered the true drivers of carbon emissions across a product's life cycle. - identified high-impact emission reduction – and cost savings – opportunities.

	<ul style="list-style-type: none"> - strengthened supplier relationships. - developed better business and management practices in general. <p>According to Carbon Trust, the companies that have communicated their products' carbon footprints:</p> <ul style="list-style-type: none"> - witnessed greater carbon -and cost- savings - increased their product differentiation (44% of customers surveyed by Walkers stated the Carbon Trust Carbon Reduction Label used on the company's crisps makes them feel more positive about Walkers) - improved brand and reputation <p>Moreover, the two years deadline for reduction creates a sort of "urgency" over the supply chain which induces the creation of programs and cooperation between the companies and their suppliers. "The Label includes a reduction element whereby the company is committed to further reduce the carbon footprint over the following two years. If the commitment is not met, the company will no longer be able to use the label."</p> <p>Concerning quantitative results, more than 65 brands and 5000 individual product lines have received the label as of April 2010.</p> <p>Many big worldwide companies (Dyson, PepsiCo, etc.) are using the footprint on some of their product lines.</p>
Limits regarding the definition of the initiatives	<ul style="list-style-type: none"> - The display of the carbon footprint measurement and benchmark is optional since August 2009. Thus, this doesn't allow the comparability of products but only informs the customers about the reduction commitment This decision can be considered as a "tacit admission that the figure does have little meaning to the average consumer". Concerning the comparability of products among a same category, the Carbon Trust argues that the decision is first based on price level and that different price levels would have different footprint levels. Since the decision has been made, most of new labelled products do not display the footprint figure whereas most of products that had been labelled when the display was compulsory are still showing the figure on their packs. Although the 2 year commitment is globally a very good one, the spread of the label may be slowed down by this constraint. Moreover, by not setting a fixed reduction target, but only the minimum reduction measurable, it seeks not to penalize products that are already environmentally friendly (according to Carbon Trust); but this can be misleading for consumers regarding products that are already environmentally friendly but are not looking for the label obtaining.
Difficulties of implementation	<p>The label doesn't specify the percentage of reduction to be reached.</p> <p>Moreover, the reduction possibilities may vary from one product to another based upon the individual economic circumstances of the companies involved</p>
Replicability	<p>It aims to become an international standard and then it is designed for a wide implementation (it has already been exported in South Korea, Australia and planned for China). As these experiences are quite recent, it is too early to draw any conclusion about them.</p>
Cost of the initiative	<p>According to Carbon Trust, the cost of footprinting varies. Smaller companies can implement PAS 2050 themselves without hiring external consultants, and then have their results verified.</p> <p>Carbon Trust has set a chart showing that cost per product can be decreased of 90% between the footprinting of a single product made by external consultants and the footprinting of products made by internal resources or</p>

	significantly increasing the number of products covered by a single footprinting project. Following good practice measurement and the pre configured calculators in the Footprint Expert TM baseline is also indicated as a way to simplify the footprinting and reduce its cost.
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Sources of information/useful links
http://www.carbon-label.com/ http://www.carbon-label.com/casestudies/Opportunity.pdf CEMEX First to Launch Responsibly Sourced, Carbon Labelled Cement, 7 avril 2010, Business Wire CO ₂ reduction label rethink, By Gemma Charles, 5 août 2009, Marketing Get to grips with the carbon agenda, 30 septembre 2009, Marketing Code of Good Practice for Product Greenhouse Gas Emissions and Reduction Claims: Guidance to support the robust communication of product carbon footprints, October 2008 Interview with Robin Dickinson, Senior International Project manager at Carbon Trust

Analysis of initiatives

Carbon Label for California

General	
Country/Region	USA, California
Date	Initiated in 2006, a bill has been proposed in 2008 and is pending approval as of March 2010.
General Description	It is a California state bill (the Carbon Labeling Act of 2009) for the development and implementation of a program of voluntary assessment, verification, and standardized labeling of the carbon footprint of consumer products sold in the state
Objectives	- To direct purchase decisions toward a preference for low-carbon products
Actors	
Sponsor of the initiative	Legislative initiative (Carbon labeling Act of 2009).
Responsible body	The Assembly bill was authored by Assembly member Ira Ruskin (D-Redwood City) and is promoted by the Carbon Label California Group (www.carbonlabelca.org), which has primarily received funding from Silicon Valley philanthropist Noel Perry. The choice of which measurement protocol to use is made by The California Air Resources Board (CARB), also called the State Board, that will also deal with the implementation of the program.
Targeted people	This initiative targets both the Californian population/consumers and Californian companies.
Scope	
Geographical scale (local/national/international)	The Carbon Label for California will be implemented at state level.
Sectors/product categories covered	The products covered are consumers goods. http://www.carbonlabelca.org/6.html for details
Issues covered (GhG, energy efficiency, other...)	The label covers GhG.
Level of obligation (mandatory/voluntary)	The labelling of products will be voluntary.
Inclusion/exclusion criteria	The Amendment text specifies that "life cycle includes a consumer product's emissions boundaries such as raw material extraction, production, processing or manufacturing, transportation, distribution, storing, consumer use, and disposal." Nevertheless, it plans that "the state board may vary these boundaries, or exclude a boundary, by product category as it deems reasonable and necessary".
Methodology	
Link to an existing EU legislation (Ecolabel or Energy labelling)	EU regulations are not applicable in California.
Methodology used/link to an identified methodology	The methodology is still open. It will be based on the LCA approach but could be hybrid with EIO approach. It is currently under development by the CARB

	<p>and Berkley University.</p> <p>It will be based on a cradle-to-market methodology that relies on readily available industry-wide secondary data for many inputs for the production process and company-specific primary data for the California-based portions of the manufacturing process: A hybrid LCA combines the practicality of EIO-LCAs and the specificity of process LCAs by relying on company measurements of energy use and national averages of embedded carbon for purchased inputs. Companies can utilize information they already track to develop the information contained in a label. If manufacturers believe that their suppliers are less carbon intensive than the national average, documentation can be developed, and this information can be substituted to the national average data in the carbon content calculation.</p>
Incentives	The text does not allude to incentives.
Sanctions	The initiative being voluntary, there are no sanctions.
<u>Reporting and disclosure</u>	
Reporting and controls (declaration, verification)	<ul style="list-style-type: none"> - The third-party certifier would be CARB (the state board) - The Amendment text plans that the state board may adopt standardized criteria for third-party verification of the carbon footprint or develop an alternative means of ensuring compliance with the protocols adopted.
Disclosure obligations and practices	<ul style="list-style-type: none"> - The label will take the form of a standardized labelling communication on whether a product has a lower carbon footprint than the average comparable product available in the state. The communication can also be made through advertising and internet. - The state board may develop protocols for communicating: <ol style="list-style-type: none"> (1) The average greenhouse gas emissions in a consumer product category in order to allow consumers to compare across categories. (2) Whether a consumer product has a lower carbon footprint than the average comparable consumer product available in that category. (3) A specific carbon footprint score that delineates the range of error produced by the protocols.
<u>Results</u>	
Results measurement mode	<p>The success of the label will be measured through:</p> <ul style="list-style-type: none"> - the number of corporations that will determine, reduce and finally publicize their product's carbon emissions - the number of covered products - the growth of low carbon products sales
Achievements so far	It is still pending approval. No forecasts are available.
Limits regarding the definition of the initiatives	<ul style="list-style-type: none"> - In additions to cost measurement, advertising cost may create a gap between companies that can afford for implementing efficient advertising tools (big companies) and SMEs. - Moreover there is a risk of greenwashing (the tool would be reduced to a marketing means) if advertising is not framed.
Difficulties of implementation	This will depend on the methodology adopted and disclosure obligations.
Replicability	This will depend on the success of the initiative in California. Nevertheless, it seems to be designed for a wide implementation.
Cost of the initiative	According to the Amendement text, in order to minimize costs for manufacturers or distributors, the state board shall consider aligning any protocols with other carbon labeling standards.

	Consumer product manufacturers will be responsible for all costs related to the review and validation of carbon label information required by the state board.
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Sources of information/useful links
http://www.nixonpeabody.com/publications_detail3.asp?ID=2228 http://aw-climatechange.blogspot.com/2009/06/can-carbon-footprint-label-make.html http://www.leginfo.ca.gov/pub/09-10/bill/asm/ab_0001-0050/ab_19_bill_20090504_amended_asm_v98.pdf

Analysis of initiatives

Carbon Disclosure Project

General	
Country/Region	The organization is headquartered in the UK but has offices in other countries around the world (e.g. Tokyo and Berlin) and operates in most of the major economies worldwide.
Date	2000
General Description	The Carbon Disclosure Project (CDP) operates the only global climate change reporting system. 2,500 organizations in some 60 countries now measure and disclose their greenhouse gas emissions and climate change strategies through CDP, in order that they can set reduction targets and make performance improvements. The data is made available for use by a wide audience including institutional investors, corporations, policymakers and their advisors, public sector organizations, government bodies, academics and the public.
Objectives	CDP aims to encourage corporate disclosure of climate change-related and to accelerate solutions to climate change by putting relevant information at the heart of business, policy and investment decisions
Actors	
Sponsor of the initiative	<p>The Carbon Disclosure Project is an independent not-for-profit organization holding the largest database of primary corporate climate change information in the world.</p> <p>CDP is a member of the Board and Secretariat to the Climate Disclosure Standards Board (CDSB). It is a consortium of business and environmental organizations focused on the development of a global framework to facilitate the corporate disclosure of climate change-related data in mainstream reports. CDP partners with 10 organizations around the world to increase its global reach. CDP also works extensively with strategic partners including Bank of America-Merrill Lynch, PricewaterhouseCoopers, Bloomberg, SAP, Microsoft and Accenture.</p>
Responsible body	<p>The Carbon Disclosure Project (CDP) gathers an extensive network of partner organizations and global collaboration with corporations, governments and NGOs.</p> <p>CDP collects the climate change information of companies on behalf of two main groups:</p> <ul style="list-style-type: none"> - Investment Market: 475 institutional investors controlling \$55 trillion in assets under management request disclosure from listed companies in whom they invest. - Purchasing Organizations: 55 global purchasing organizations from the public and private sectors that request disclosure from their suppliers. <p>A project of measurement of supply chain emissions has been conducted together with big corporations such as Wal-Mart, PepsiCo... (see next initiative)</p>
Targeted people	This project targets a lot of stakeholders: institutional investors, corporations, public sector organizations, government bodies, academics and the public.
Scope	
Geographical scale	The CDP is an international initiative (it operates in most of the major economies worldwide).

(local/national/international)	
Sectors/product categories covered	All products and sectors are covered by the project.
Issues covered (GhG, energy efficiency, other...)	The CDP gathers information about GHG accounting, as well as climate change-related governance, strategy, communications, and perception of risks and opportunities.
Level of obligation (mandatory/voluntary)	It is a voluntary initiative.
Inclusion/exclusion criteria	There are no exclusion criteria. CDP approaches publicly listed companies and encourages them to respond. CDP also accepts responses from non-listed companies. While these are not currently included in country reports, the responses are available on the CDP website if respondents choose to make them public.
Methodology	
Link to an existing EU legislation (Ecolabel or Energy labelling)	The initiative does not aim at satisfying an EU regulation, however, it is consistent with the EU legislation on CO ₂ quotas. Companies have room to explain any involvement in the EU ETS.
Methodology used/link to an identified methodology	A specific Rating Methodology was developed with PwC.
Incentives	The Carbon Disclosure and Performance indexes rank companies and can act as an incentive.
Sanctions	There are no sanctions for non participants since the initiative is voluntary. However, non-respondents may experience negative reputational effects if they do not respond to the information request.
Reporting and disclosure	
Reporting and controls (declaration, verification)	The CDP does not implement verification requirement of the information disclosed by companies. Nevertheless, if responses include material errors, "reasonable attempts will be made to clarify matters directly with responding companies". Responding companies are asked whether or not they verify their emissions, and are invited to submit their certificates of verification as attachments to their responses.
Disclosure obligations and practices	Disclosure and communication through the CDP index is the core subject of this project.
Results	
Results measurement mode	The level of disclosure can be assessed thanks to: <ul style="list-style-type: none"> - Companies response rate - Number of companies having publically available information - Number of disclosing companies - Number of companies having their emissions verified - Number of companies reporting on GHG emissions in their annual corporate reporting - Number of companies disclosing their emissions reduction targets - Number of companies disclosing forecasts - Level of disclosed emissions - Level of detail "on the activities being undertaken by the largest corporations around climate change mitigation and adaptation" => A certain number of the criteria above allow some companies to be part of

	<p>the Carbon Disclosure Leadership Index (CDLI).</p> <p>The performance of companies can be measured using the performance score assessing "actions taken by companies to manage their response to, and reduce their contribution to, climate change" (it will be integrated into the CDLI next year).</p>
Achievements so far	<p>Thanks to a growing interest of companies in the knowledge sharing CDP allows, measurement indicators are improving every year, in particular:</p> <ul style="list-style-type: none"> - The CDP acts on behalf of 534 institutional investors, holding \$64 trillion in assets under management and some 60 purchasing organizations such as Cadbury, PepsiCo and Wal-Mart - According to CDP, since the CDP sent out the first request for climate change information in 2003, the number of disclosing companies has grown tenfold (from 235 in 2003 to 2456 in 2009) and the quality and quantity of data has increased.. The overall Global 500 response rate for CDP 2009 is 82% (409), up from 77%(383) last year. The response rate from the BRIC countries has doubled since 2008 to 44% (16 out of 36), including a 100% response rate from Brazil. - CDP data is increasingly integrated into mainstream financial analysis
Limits regarding the definition of the initiatives	<ul style="list-style-type: none"> - The initiative is focused on communication and commitments and not on results even if a pilot performance score assessment has been introduced in 2009 and CPLI is focused on actions to mitigate climate change and not on the actual footprint.
Difficulties of implementation	<p>The Carbon disclosure project seems to be "cut-out" for big companies. As for example, the questions about dialogue with authorities, the existence of a committee dedicated to climate change and data verification discriminate between big companies and SMEs. The initiative has been recently adapted to be more adapted to SMEs issues.</p>
Replicability	<p>It is already well spread over big companies. However, criteria (disclosure in annual report, verification of GhG emissions) seem ambitious for the majority of SMEs.</p>
Cost of the initiative	<p>There is no information about the global cost of the initiative. Disclosure and actions' costs are supported by companies.</p>

Sources of information/useful links

<https://www.cdprojectc.net/en-US/WhatWeDo/Pages/overview.aspx>
 CDP 2010 rating methodology (to be found in <https://www.cdprojectc.net/en-US/Results/Pages/leadership-index.aspx>)
https://www.cdprojectc.net/CDPResults/CDP_2009_Global_500_Report_with_Industry_Snapshots.pdf
<https://www.cdprojectc.net/en-US/WhatWeDo/Pages/PepsiCo-shared-learning-process.aspx>
<https://www.cdprojectc.net/en-US/WhatWeDo/Pages/Case-Study-Wal-Mart.aspx>
http://www.axa.com/lib/axa/uploads/docsdd/AXA_SBF120_Report2008_VFb.pdf
<https://www.cdprojectc.net/en-US/Respond/Documents/2010%20webinars/CDP%20Intro.pdf>

Analysis of initiatives

Carbon Disclosure Project (focus on the supply chain program)

General	
Country/Region	The organization is based in the UK
Date	2000
General Description	<p>See CDP initiative description for general information about the project. The global process for supply chain disclosure provides a standardized methodology and tools for companies to help them extend their disclosure to supply chain.</p> <p>This process is as follow:</p> <p>January - March: Preparation period for members compiling supplier lists</p> <p>April 1st: Supply Chain information request (questionnaire) issued to suppliers chosen by member purchasing organizations</p> <p>July 31st: Deadline for companies to respond to questionnaire</p> <p>January: Communication of findings</p> <p>September: Members gain access to reporting tools on supplier responses.</p> <p>January: Communication of findings in the form of Public Reports and Member Specific Reports</p>
Objectives	<p>To drive action on climate change amongst both purchasing companies and their suppliers.</p> <p>Companies' reasons for joining the program include to better understand how their suppliers are addressing climate change, manage climate change risk in the supply chain and collaborate with other members and suppliers to reduce their greenhouse gas emissions.</p>
Actors	
Sponsor of the initiative	The Carbon Disclosure Project is an independent not-for-profit organization holding the largest database of primary corporate climate change information in the world.
Responsible body	Over 50 companies currently work with the CDP on their corporate supply chains. They are all large multinational corporations like, PepsiCo, L'Oréal, Unilever...
Targeted people	This project targets a lot of stakeholders: institutional investors, corporations' procurement functions, public sector organizations, government bodies, academics and the public.
Scope	
Geographical scale (local/national/international)	The CDP is an international initiative (it operates in most of the major economies worldwide).
Sectors/product categories covered	All products and sectors are covered by the project.
Issues covered (GhG, energy efficiency, other...)	The CDP gathers information about GhG, Climate Change Risks & Opportunities, Corporate Governance, Emissions Reduction Activities, and External Communication.
Level of obligation (mandatory/voluntary)	It is a voluntary initiative.
Inclusion/exclusion criteria	There are no exclusion criteria.

Methodology	
Link to an existing EU legislation (Ecolabel or Energy labelling)	The initiative does not aim at satisfying an EU regulation, however, it is consistent with the future legislation on CO ₂ labeling. Suppliers are asked to apportion their emissions to their customers' operations.
Methodology used/link to an identified methodology	Member companies receive a customized dashboard report that highlights the performance of their suppliers against an agreed scoring metric. The metric takes account of awareness, ambition, reporting and implementation practices. The dashboard also highlights leading supplier practices.
Incentives	The existing communication on participating companies can act as an incentive. Some members' Sustainable Procurement Scorecards include CDP Supply Chain as a metric and they can maintain or win contracts on the basis their response to certain questions.
Sanctions	There are no sanctions for non participants since the initiative is voluntary. Some members' Sustainable Procurement Scorecards include CDP Supply Chain as a metric and they can lose contracts on the basis their response to certain questions.
Reporting and disclosure	
Reporting and controls (declaration, verification)	The CDP does not implement verification requirement of the information disclosed by companies. Nevertheless, if responses include material errors, "reasonable attempts will be made to clarify matters directly with responding companies". Companies are asked whether they have verified their data.
Disclosure obligations and practices	Disclosure and communication through the CDP questionnaire is the core subject of this project.
Results	
Results measurement mode	<p>The following indicators can help measure the results of the initiative:</p> <ul style="list-style-type: none"> - Number of member companies (currently 57) - Members' suppliers response rate - Percentage of members that have established a strategy to engage with suppliers on carbon related issues. Percentage of companies that have incorporated CDP Supply Chain into sustainable procurement policy/practices. - Percentage of members that expect to ban some suppliers in the future for failing to meet the carbon management criteria they set (or those that intend to develop contracts which require improved carbon management) - Percentage of members' suppliers reporting Scope 1, scope 2 and scope 3 emissions - Percentage of members' suppliers that have an incentive scheme, reduction plan. - Percentage of members working on joint emissions reduction initiatives with suppliers.
Achievements so far	<p>According to CDP, in 2009, 44 Member companies reached out to 1402 of their Suppliers, and 710 (51%) responded to the request. 56% of Members state that in the future they expect to deselect suppliers for failing to meet formal carbon management criteria, compared to just 6% today.</p> <p>Members cite several reasons for measuring supply chain emissions, the four most important being:</p> <ul style="list-style-type: none"> - Increased customer interest

	<ul style="list-style-type: none"> - Risks facing Suppliers that ultimately threaten sourcing activities - Increased public, investor and stakeholder pressure - Joint process improvement to improve collaboration and efficiency, reduce carbon emissions and ultimately generate cost savings for members and suppliers.
Limits regarding the definition of the initiatives	<ul style="list-style-type: none"> - So far, only a small number of companies have extensive knowledge about the availability of green products for their major spend categories, and most members do not currently have the tools they need to track their suppliers' performance appropriately, according to CDP.. - There is a gap between members and suppliers, according to CDP: *Only 38% of suppliers currently have carbon reduction targets in place compared to 82% of the members. *62% of suppliers still do not have any targets in place *Only 8% of suppliers currently report Scope 3 emissions
Difficulties of implementation	It is difficult to commit all suppliers, and especially small companies to mitigate their emissions engage their own suppliers.
Replicability	The initiative is ment to be spread over a great number of companies and their suppliers.
Cost of the initiative	There is no information about the global cost of such an initiative. Disclosure and actions' costs are supported by companies. The member companies pay membership fees to CDP to manage this process for them.

Sources of information/useful links

https://www.cdprojetc.net/en-US/Programmes/Documents/CDPSupplyChain_2010_Brochure_UK.pdf
https://www.cdprojetc.net/CDPResults/CDP-Supply-Chain-Report_2010.pdf

Analysis of initiatives

Climate Bonus

General	
Country/Region	Finland
Date	Project dates: 01.01.2008 to 30.04.2009.
General Description	<p>The project Climate Bonus consists of a pre-study about the combined use of:</p> <ul style="list-style-type: none"> - verified carbon footprints (possibly visualised through labels) - personalised monitoring and feedback services to households regarding the greenhouse gas intensities of their purchases, - a reward system (bonuses) for consumers who manage to reduce the embodied emissions (Rewards for successful reductions and extra bonus for purchases of new low emission products) - a secondary reward system for retailers that successfully reduce the emission intensity of their sales. The monitoring and reporting system would be accessible online by households.
Objectives	<ul style="list-style-type: none"> - To assess the possibilities and effectiveness of a bonus system which incites households to consume in such a way that greenhouse gas (GHG) emission are reduced and incites retailers to offer a product portfolio that advances the choice for low GHG solutions. - To develop an underlying information system.
Actors	
Sponsor of the initiative	<p>The research team is made of a partnership between:</p> <ul style="list-style-type: none"> - Government Institute Economic Research (VATT; coordinator) - Technical Research Centre of Finland (VTT) - MTT Agrifood Research - Finnish Environment Institute (SYKE) - National Consumer Research Centre (KTK) <p>TEKES (National Technology and Innovation funding organization) is the main funder.</p>
Responsible body	<p>The project gathers the following actors:</p> <ul style="list-style-type: none"> - 5 Finnish partners (please refer to the previous cell). - 5 companies - 3 UK/NL institutes/universities - 1000 consumers who took part in the research
Targeted people	The targetted people are Finnish customers, businesses and retailers.
Scope	
Geographical scale (local/national/international)	The Climate Bonus is a national initiative for the moment but there is ambition to make it global (The final report claims that "Next to this market size effect also the existence of international supply chains are a reason to pursue international co-operation and common approaches for carbon footprints").
Sectors/product categories covered	The products covered are consumer goods (principal product areas are home energy, transport fuels & services and food).
Issues covered (GhG, energy efficiency, other...)	The issues covered depend on the product (CO ₂ as for energy products, most of GhG but not necessarily all of them for food). In the long run, it may be extended to other issues such as acidification or water footprint.
Level of obligation (mandatory/voluntary)	Participation to the program is voluntary for both households and retailers for the moment.

Inclusion/exclusion criteria	It is based on LCA, so the whole life cycle is taken into account.
<u>Methodology</u>	
Link to an existing EU legislation (Ecolabel or Energy labelling)	This initiative will allow a response to the EC (05.06.2009) Decisions of the European Parliament and the Council 'on the effort of Member States to reduce their greenhouse gas emissions to meet the Communities' greenhouse gas emissions commitments up to 2020'
Methodology used/link to an identified methodology	<ul style="list-style-type: none"> - It is a pre-study that links both marketing and carbon methodologies research. The marketing part of the research integrates customers feedback whereas the methodology defines 4 levels of data generation approach, each one related to defined applications. - During the study, a pilot version of the online greenhouse gas (GHG) emission monitoring and reporting system was tested by thirty-five households, enabling them to monitor the cumulative emissions associated with their consumption over a period of four weeks. [...] Households were then asked to use the online accounting system to monitor the accumulating emissions.
Incentives	This initiative is based on a bonus system for consumers and retailers.
Sanctions	No sanctions are planned.
<u>Reporting and disclosure</u>	
Reporting and controls (declaration, verification)	The verification of emission data and claimed emissions reduction is required both at company and supply chain levels and by a 3 rd party licenced certifier.. Nevertheless, the verification implementation mode is not defined yet. As for the verification of declarations made by consumers, the researchers of Climate Bonus are working on fininding solutions.
Disclosure obligations and practices	The communication system is still under development.
<u>Results</u>	
Results measurement mode	<p>The results of this initiative car be measured through:</p> <ul style="list-style-type: none"> - The number of consumers and retailers that joined the system - The amount of bonus granted.
Achievements so far	<p>According to the final report of the research study, the households that participated in the pilot project found the system interesting and useful. The majority were satisfied with the capability of the system to inform them about the GHG emissions associated with their household consumption.</p> <p>The researchers have concluded that there are three sets of factors that will determine the effectiveness of the Climate Bonus system. They are:</p> <ul style="list-style-type: none"> - the accuracy, comprehensiveness and tractability of the recorded emissions per product chain, product group etc - the appeal, user-friendliness and motivation effect of the monitoring and feedback service for consumers - the deployment strategy for the system.
Limits regarding the definition of the initiatives	Some of the 35 households that took part of the experimentation considered that the unreliability of the underlying data, and inadequate product coverage, critically undermined the credibility and usefulness of the system.
Difficulties of implementation	<p>Most of the 35 households found the system difficult to use and experienced technical difficulties with it at one stage or another. Therefore, userfriendliness is of major importance.</p> <p>The willingness to participate should rise when retailers manage to get a</p>

	larger choice of low emission products (as for now retailers are interested in the initiative but only for a part of their products) The first pilot did not allow a clear understanding of the parallel use of various information channels and its implications for influencing consumer choice.
Replicability	It has been thought for a wide and international implementation.
Cost of the initiative	The cost would be significant if in case of a national implementation but would allow to get the cost-effects per products down to absorbable levels. With a scenario of 15/20% emissions reduction on foodstuff for 2/3 of the households, 2 to 3 million ton CO ₂ could be saved which represent €50 to 75 million per year (taking the EU ETS reference price).

Sources of information/useful links

http://extranet.vatt.fi/climatebonus/publications/2332%2031%2007_CLIMATE%20BONUS%20-%20Final_Report_kv_valmis090422.pdf
http://www.vatt.fi/file/vatt_publication_pdf/t143_5.pdf
<http://www.nzte.govt.nz/explore-export-markets/market-research-by-industry/Food-and-beverage/Documents/FandB-sustain-Nether-Nordics-July-2009.pdf>

Analysis of initiatives

"Japan as a low carbon society"

General	
Country/Region	Japan
Date	June 2008 (pilot project launched in 2009). Nevertheless, research started in 2004.
General Description	<p>On June 9th 2008, Japanese Prime Minister Fukuda released his new vision "Towards a Japan Low-Carbon Society (LCS)". The vision consists of following components:</p> <ul style="list-style-type: none"> - transition from a fossil fuel dependent industrialized society to a LCS for a sustainable future - stepping forward with great confidence as transition to LCS will bring opportunity for new businesses and Japan's traditional wisdom provided notion to live in harmony with nature such as "Mottainai" - setting up a long-term goal to reduce 80% CO₂ emissions by 2050 - peaking out emission level by next 10-20 years to achieve long-term goal - implementing following four actions: <ul style="list-style-type: none"> i) development of innovative technology and diffusion of existing technologies ii) set up institutions such as emission trading, tax reform to change social and economic structure into a LCS iii) measures from local governments such as producing locally and consuming locally iv) behavioural change. <p>The initiative is accompanied by a budget bill. A bill designated to combat global warming is being voted (as of March 2010). A carbon trading framework is still under development (as of March 2010)</p>
Objectives	<ul style="list-style-type: none"> - To change the whole Japanese society towards a low carbon one - To support Japan's long-term target for 80% lower greenhouse-gas emissions, compared with 1990 level by 2050."
Actors	
Sponsor of the initiative	The Ministry of Economy, Trade and Industry (METI) is the sponsor of the initiative.
Responsible body	<ul style="list-style-type: none"> - The Center for Low Carbon Society Strategy, newly set up by the Japan Science and Technology Agency, is to take the lead in a roadmap toward 2020 and 2050 that spans industry, technology and society, for the realization of a low-carbon society in Japan. Its initial mission is for 10 years; it is to come up with a basic strategic framework and vision during fiscal 2010 and to begin working in fiscal 2011 to materialize a low-carbon society. - Local governments in Japan are supposed to draw up action plans to reduce greenhouse-gas emissions for the attainment of a "low-carbon society," using a manual compiled by the Ministry of the Environment. - Some other ministries take part in this initiative, such as the science ministry which presented a policy that "aimed at creating a low-carbon society featuring the use of solar energy at school facilities and development of energy-saving technologies."
Targeted people	The whole Japanese society is covered by the initiative.
Scope	

Geographical scale (local/national/international)	This is a national initiative.
Sectors/product categories covered	All sectors and products are covered.
Issues covered (GhG, energy efficiency, other...)	The issues addressed are GhG.
Level of obligation (mandatory/voluntary)	Mandatory
Inclusion/exclusion criteria	The government wants nuclear energy to play a big part in cutting emissions.
Methodology	
Link to an existing EU legislation (Ecolabel or Energy labelling)	EU regulations are not applicable in Japan.
Methodology used/link to an identified methodology	The carbon footprint part of this initiative is totally integrated with a strong dedicated methodology (Japan PCF).
Incentives	Not mentioned yet
Sanctions	Not mentioned yet
Reporting and disclosure	
Reporting and controls (declaration, verification)	Not mentioned yet
Disclosure obligations and practices	Not mentioned yet. Nevertheless, according to a research conducted in 2008, the government should promote "measures for public investment based on long-term perspectives and leading incentives for private investment."
Results	
Results measurement mode	The success of the programme can be measured thanks to the percentage of cut in GhG emissions compared to 2005.
Achievements so far	<p>The bill has not been voted yet.</p> <p>According to the research study conducted in 2008 by the National Institute for Environmental Studies, Estimated reduction rates of sectoral energy demand (relative to the 2000 value) are:</p> <ul style="list-style-type: none"> • Industrial sector: reduction of 30-40% due to structural changes and introduction of energy-saving technologies. • Passenger transportation sector: reduction of 80% due to proper land use, improvement in energy efficiency and carbon intensity. • Freight transportation sector: reduction of 50% due to better logistics management and improvements in the energy efficiency of vehicles. • Household sector: reduction of 40-50% due to rebuilding and diffusion of high-insulated houses and introduction of energy-saving house appliances. • Commercial sector: reduction of 40% due to renovation and rebuilding with high-insulated building and introduction of energy-saving office devices.
Limits regarding the definition of the initiatives	- As Japan only uses 60% of its nuclear capacity, the reduction efforts may be too much focused on nuclear and to the detriment of renewable energy.
Difficulties of implementation	- Opposition from industry could slow progress (Tokyo Electric Power Co. (Tepco) and Nippon Steel Corp., two of the nation's biggest emitters of

	<p>greenhouse gases, as well as seven other groups were not happy with the bill.)</p> <p>- According to a research study conducted in August 2009 by the National Institute for Environmental Studies:</p> <ul style="list-style-type: none"> * Technologies have „learning-by-doing“ effects * If actions are delayed, „learning-by-doing“ effects may not work sufficiently, resulting in the increase of the total investment required to achieve a low-carbon society. * The future technological development has several uncertainties. If the development of a dominant technology at this moment falls behind schedule, it will not be able to be spread as expected and CO₂ emission target will not be achieved.
Replicability	<p>It seems to be designed for the Japanese specificities (the underlying goal seems to be recovering Japanese technological leadership of the 80's). A great nuclear potential is one of these specificities.</p>
Cost of the initiative	<p>Japan's Prime Minister Aso considers that achieving the medium-term goal of 15% carbon emissions reduction (between 2005 and 2020) requires some 76,000 yen (700 euros) in additional costs per year for a household (due to highest manufacturing costs impacted on prices).</p> <p>A study conducted in 2008 showed that "the annual direct cost related to a CO₂emission reduction of 70% by 2050 would range between JPY 7.0 and 9.9 trillion (between 70 and 90 billion euros), which would account for around 1% of the estimated GDP in 2050."</p>

Sources of information/useful links

<http://2050.nies.go.jp/>

http://2050.nies.go.jp/material/20090814_japanroadmap_e.pdf

New Center to Draw Up Strategy for Low-carbon Society, February 1st 2010, Japan Chemical Web

Japan will pursue low carbon society ahead of the world, said Prime Minister Aso, September 30th 2008, Electric Daily News

Municipalities to Draw Up Action Plans for Low-carbon Society, 23 avril 2009, Japan Chemical Web

Japan Faces Long Road to Low-Carbon Society, June 29th 2009, General Economic news

Panel seeks 'revolution' to realize low-carbon society, March 18th 2009, Kyodo News

Ministry compiles policy to create low-carbon society, August 11th 2009, Kyodo News

First step for serious emission cuts, March 16th 2010, The Japan Times

Climate change deal only angers emitters, March 15th 2010, Nikkei Weekly

http://2050.nies.go.jp/material/2050_LCS_Scenarios_Actions_English_080715.pdf

Appendix 2: Detailed grading system

This scoring system has been established by comparing current schemes practices and scenarios requirements, in order to get a proper scale enabling to distinguish methodologies' performances regarding these requirements.

Note: the system is based on a 3-grades range; when only 2 possibilities of scoring have been identified, the cell contains "-".

Detailed grading system for Scenario 1: Favouring the internal use of PCF by companies

Criteria	Comment on criteria	Scoring		
		0	1	2
Management - Designed for fulfilling scenario objective	The scenario requires the calculation of the CF within the working groups	-	No numerical value available	Numerical value available
Management - Existence of specific working groups (sector-specific...)	Working groups can facilitate the communication between participants on specific issues	No working group identified	A WG on basics	Specific WGs
Management - Stakeholders diversity	The diversity of stakeholders included in the development ensures the methodology compatibility with a large number of products. It is a means to allow a wide implementation of the process	No external organism involved	Limited participation of stakeholders (in number or tasks)	Broad consultation, both in number and diversity, at national or international level: firms, public authorities, consumers, NGOs...
Management - Involvement of public authorities	The involvement of public authorities is an important parameter to enhance the credibility and the chance of success of the initiative	Public bodies are not involved in the program	Public bodies have a limited involvement (e.g.: verification of methodology...)	Public bodies are actively supporting the program (e.g.: involvement in the methodology preparation)
Methodology validation	Stakeholders' involvement in the validation process is a key criterion to ensure the methodology's acceptability. If stakeholders are diverse and numerous, consultation process will ensure a certain level of validation (even if -scientifically speaking - it is not as efficient as a peer review)	No review of the methodology	Review by one or two external organisms when the methodology is developed	Review is ensured through a broad involvement of diverse stakeholders in the elaboration process (consultation...)
Methodology documentation availability	The methodology documentation's accessibility affects the ability to judge its relative performance	No methodological documentation available	Little methodological documentation available (documentation not sufficient to perform a calculation according to it)	Detailed methodological documentation freely available
Methodology maturity - Number of products for which the methodology has been applied	The number of products for which the methodology has been applied is a good indicator of the methodology's maturity	None	Less than 50	More than 50

Criteria	Comment on criteria	Scoring		
		0	1	2
Results - Expected product range of application	The broader is the range of application, the higher might be the impacts of the initiative on global consumption and production patterns	Single or 2 product categories	A few products categories excluded	No declared product category restriction
Results - Level declared for product comparability	In order to make the evolution of the carbon footprint easier, firms should be able to compare their performances to those of their competitors	No declared comparability	Declared comparability with some restrictions	Declared comparability
Management - international structure	In order to promote internal PCF, it is important that the scheme has an international recognition in order to avoid distortion	Local management structure with possibilities of widening	National management structure with punctual international interactions	International management structure

Detailed grading system for Sub-scenario 2a: The voluntary best in class label

Criteria	Comment on criteria	Scoring		
		0	1	2
Management - Designed for fulfilling scenario objective	In this scenario the information given to the consumer should be a "yes or no" information: either the product has the label or it does not. Methodologies that allow to give a CF index for every product are closer to a best in class approach since they gives the possibility for the consumer to compare all similar products, especially if they are mandatory	Absolute value for voluntary products	Absolute value, possibility to give values to all products within a product category but without identifying the best product for the moment	"Yes or no information": best products get the label
Management - Involvement of public authorities	The involvement of public authorities is an important parameter to enhance the credibility and the chance of success of the initiative	Public bodies are not involved in the program	Public bodies have a limited involvement (e.g.: verification of methodology...)	Public bodies are actively supporting the program (e.g.: involvement in the methodology preparation)
Management - Existence of specific working groups (sector-specific...)	Working groups can facilitate the communication between participants on specific issues	No working group identified	A WG on basics	Specific WGs
Management - Stakeholders diversity	The diversity of stakeholders included in the development ensures the methodology compatibility with a large number of products. It is a means to allow a wide implementation of the process	No external organism involved	Limited participation of stakeholders (in number or tasks)	Broad consultation, both in number and diversity, at national or international level: firms, public authorities, consumers, NGOs...
Methodology validation	Stakeholders' involvement in the validation process is a key criterion to ensure the methodology's acceptability. If stakeholders are diverse and numerous, consultation process will ensure a certain level of validation (even if -scientifically speaking - it is not as efficient as a peer review)	No review of the methodology	Review by one or two external organisms when the methodology is developed	Review is ensured through a broad involvement of diverse stakeholders in the elaboration process (consultation...)
Methodology documentation availability	The methodology documentation's accessibility affects the ability to judge its relative performance	No methodological documentation available	Little methodological documentation available (documentation not sufficient to perform a calculation according to it)	Detailed methodological documentation freely available
Methodology maturity - Number of products for which the methodology has been applied	The number of products for which the methodology has been applied is a good indicator of the methodology's maturity	None	Less than 50	More than 50
Data collection - transparent description of the required primary data	To ensure results comparability, required primary data should be clearly stated	-	No transparent description of the required primary data	Transparent description of the required primary data

Criteria	Comment on criteria	Scoring		
		0	1	2
Data collection - amount and detail of information required	It is a voluntary approach. Increasing the number of primary data will increase the PCF precision	No information	Limited amount of information required (primary data)	Detailed data collection required
Data collection - data quality rules	This criteria is used to ensure that the most appropriate data is used in PCF assessment, which reduces bias and uncertainty	No data quality rules	Limited guidelines: - data quality verification is only required - analysis cover a limited scope of issues - guidelines for assessing these issues are not detailed	Precise guidelines for assessing data quality on various topics
Results - transparent procedure to identify the best in class	The identification of the "best in class" product requires a comparison with similar products. This criterion assesses if the procedure exists, not if this procedure is sufficiently reliable (assessment of this issue in other criteria)	No mandatory comparison with products having the same functional unit	Mandatory comparison with products having the same functional unit	Mandatory comparison with products having the same functional unit with a clear and transparent procedure to define the comparison scenarios
Results - Expected product range of application	The broader is the range of application, the higher might be the impacts of the initiative on global consumption and production patterns	Single or 2 product categories	A few products categories excluded	No declared product category restriction
Results - External critical review of the results	An external critical review is necessary to ensure the robustness of the results	-	No external critical review of the results required (in the case of communication to consumers) / Information not available yet	External critical review of the results required (in the case of communication to consumers)
Results - Time scale validity of the CF assessment	The market evolution should be taken into account to ensure that the label really promotes the best performing products	No information	Defined validity of the CF assessment - no product category specific	Defined validity of the CF assessment - product category specific
Results - Level declared for product comparability	In order to make the evolution of the carbon footprint easier, firms should be able to compare their performances to those of their competitors	No declared comparability	Declared comparability with some restrictions	Declared comparability
Results - Uncertainty assessment / sensitivity analysis	It is necessary to ensure that the uncertainty and sensitivity of the results do not lead to misleading conclusions. It is however hardly possible to require each user to perform an uncertainty and sensitivity analysis.	Neither is mentioned	At least one of the 2 analyses is mentioned	Both are required
Tools - PCR-like documents	PCRs are important to ensure an evaluation basis for all products in a product category. They increase PCF comparability by describing the system boundaries, mandatory primary data, secondary data, etc	No mention of PCR	Recommendation to use existing PCR when primary data is not available (not developed within the initiative)	Detailed PCR available or to be developed within the methodology

Criteria	Comment on criteria	Scoring		
		0	1	2
Tools - Database	A common database for all users of the methodology is a key element to ensure results' comparability, if guidelines for use are sufficiently precise as to limit value choices. Indeed, the existence and the competition of different database should be maintained but the conformity with ILCD Handbook requirements would ensure a certain level of coherence between the databases, and depending on the sector, different databases might be used within a PCF methodology framework. Moreover, in order to compare the PCF of two products, making sure that the same EF is used for a same physical flow is a key element to ensure results comparability.	No information about possible database	- Recommendation of use of existing databases - Recommendation of use of specific database with a non-limited or unknown cost	Recommendation of use of specific free database
Management - international structure	In order to promote this scenario, it is important that the scheme has an international recognition in order to avoid distortion; this is particularly true if aiming a EU-wide implementation	Local management structure with possibilities of widening	National management structure with punctual international interactions	International management structure
Tools - Tool availability	A free tool might enhance the number of performed CF calculations and therefore the possibility to build a data system riche enough to identify the "best in class" products	No tool for producers	Tool available (producer is charged or no decision taken on this aspect)	Free tool for producer

Detailed grading system for Sub-scenario 2b: The voluntary index or reduction claim

Criteria	Comment on criteria	Scoring		
		0	1	2
Management - Designed for fulfilling scenario objective	This scenario requires index and improvement of the producer's communication to the consumers	-	No carbon index published to the consumer	Carbon index available to the consumer
Management - Stakeholders diversity	The diversity of stakeholders included in the development ensures the methodology compatibility with a large number of products. It is a means to allow a wide implementation of the process	No external organism involved	Limited number of stakeholders	Broad consultation at national or international level: firms, public authorities, consumers, NGOs...
Methodology documentation availability	The methodology documentation accessibility affect the capacity to judge its relative performance	No methodological documentation available	Little methodological documentation available (documentation not sufficient to perform a calculation according to it)	Detailed methodological documentation freely available
Methodology validation	Stakeholders' involvement in the validation process is a key criterion to ensure the methodology's acceptability. If stakeholders are diverse and numerous, consultation process will ensure a certain level of validation (even if -scientifically speaking - it is not as efficient as a peer review)	No review of the methodology	Review by one or two external organisms when the methodology is developed	Review is ensured through a broad involvement of diverse stakeholders in the elaboration process (consultation...)
Methodology maturity - Number of products for which the methodology has been applied	The number of products for which the methodology has been applied is a good indicator of the methodology's maturity	None	Less than 50	More than 50
Data collection - transparent description of the required primary data	To ensure results comparability, required primary data should be clearly stated	-	No transparent description of the required primary data	Transparent description of the required primary data
Data collection - amount and detail of information required	It is a voluntary approach. Increasing the number of specific data will increase the PCF precision	No details	Limited amount of information required (primary data)	Detailed data collection required
Data collection - data quality rules	This criteria is used to ensure that the most appropriate data is used in PCF assessment, which reduces bias and uncertainty	No data quality rules	Limited guidelines: - data quality verification is only required - analysis cover a limited scope of issues - guidelines for assessing these issues are not detailed	Precise guidelines for assessing data quality on various topics
Results - Expected product range of application	The broader is the range of application, the higher might be the impacts of the initiative on global consumption and production patterns	Single or 2 product categories	A few products categories excluded	No declared product category restriction

Criteria	Comment on criteria	Scoring		
		0	1	2
Results - External critical review of the results	An external critical review is necessary to ensure the robustness of the results	-	No external critical review of the results required (in the case of communication to consumers) / Information not available yet	External critical review of the results required (in the case of communication to consumers)
Results - Uncertainty assessment / sensitivity analysis	It is necessary to ensure that the uncertainty and sensitivity of the results do not lead to misleading conclusions. It is however hardly possible to require each user to perform an uncertainty and sensitivity analysis.	Neither is mentioned	At least one of the 2 analyses is mentioned	Both are required
Results - Level declared for product comparability	In order to make the evolution of the carbon footprint easier, firms should be able to compare their performances to those of their competitors	No declared comparability	Declared comparability with some restrictions	Declared comparability
Tools - Database	A common database for all users of the methodology is a key element to ensure results' comparability, if guidelines for use are sufficiently precise as to limit value choices. Indeed, the existence and the competition of different database should be maintained but the conformity with ILCD Handbook requirements would ensure a certain level of coherence between the databases, and depending on the sector, different databases might be used within a PCF methodology framework. Moreover, in order to compare the PCF of two products, making sure that the same EF is used for a same physical flow is a key element to ensure results comparability.	No information about possible database	- Recommendation of use of existing databases - Recommendation of use of specific database with a non-limited or unknown cost	Recommendation of use of specific free database
Tools - Tool availability	A free tool might enhance the number of performed CF calculations and therefore the possibility to build a data system rich enough to identify the "best in class" products	No tool for producers	Tool available (producer is charged or no decision taken on this aspect)	Free tool for producer
Management - international structure	In order to promote internal PCF, it is important that the scheme has an international recognition in order to avoid distortion	Local management structure with possibilities of widening	National management structure with punctual international interactions	International management structure
Management - Involvement of public authorities	The involvement of public authorities is an important parameter to enhance the credibility and the chance of success of the initiative	Public bodies are not involved in the program	Public bodies have a limited involvement (e.g.: verification of methodology...)	Public bodies are actively supporting the program (e.g.: involvement in the methodology preparation)

Criteria	Comment on criteria	Scoring		
		0	1	2
Tools - PCR-like documents	PCRs are important to ensure an evaluation basis for all products in a product category. They increase PCF comparability by describing the system boundaries, mandatory primary data, secondary data, etc	No mention of PCR	Recommendation to use existing PCR when primary data is not available (not developed within the initiative)	Detailed PCR available or to be developed within the methodology

Detailed grading system for Sub-scenario 2c: The mandatory index

Criteria	Comment on criteria	Scoring		
		0	1	2
Management - Designed for fulfilling scenario objective	The scenario requires the calculation of the CF	-	No numerical value available	Numerical value available
Management - Existence of specific working groups (sector-specific...)	Working groups can facilitate the communication between participants on specific issues	No working group identified	A WG on basics	Specific WGs
Management - Stakeholders diversity	The diversity of stakeholders included in the development ensures the methodology compatibility with a large number of products. It is a means to allow a wide implementation of the process	No external organism involved	Limited number of stakeholders	Broad consultation at national or international level: firms, public authorities, consumers, NGOs...
Management - Involvement of public authorities	The involvement of public authorities is an important parameter to enhance the credibility and the chance of success of the initiative	Public bodies are not involved in the program	Public bodies have a limited involvement (e.g.: verification of methodology...)	Public bodies are actively supporting the program (e.g.: involvement in the methodology preparation)
Methodology validation	Stakeholders' involvement in the validation process is a key criterion to ensure the methodology's acceptability. If stakeholders are diverse and numerous, consultation process will ensure a certain level of validation (even if - scientifically speaking - it is not as efficient as a peer review)	No review of the methodology	Review by one or two external organisms when the methodology is developed	Review is ensured through a broad involvement of diverse stakeholders in the elaboration process (consultation...)
Methodology documentation availability	The methodology documentation's accessibility affects the ability to judge its relative performance	No methodological documentation available	Little methodological documentation available (documentation not sufficient to perform a calculation according to it)	Detailed methodological documentation freely available
Methodology maturity - Number of products for which the methodology has been applied	The number of products for which the methodology has been applied is a good indicator of the methodology's maturity	None	Less than 50	More than 50
Data collection - Possibility to use default values in the absence of primary data	For mandatory approaches, the methodology should facilitate the carbon footprint assessment and ensure that every producer can do the calculation (even in case of low data accessibility)	No default value proposed when primary data is missing	Default values proposed when primary data is missing / no default value for the whole PCF	Default PCF value proposed
Data collection - amount and detail of information required	For mandatory approaches, the user should have the possibility to assess its product CF through a limited amount of primary data	No details	Detailed data collection required	Limited amount of information required (primary data)
Data collection - transparent description of the required primary data	To ensure results comparability, required primary data should be clearly stated	-	No transparent description of the required primary data	Transparent description of the required primary data

Criteria	Comment on criteria	Scoring		
		0	1	2
Data collection - data quality rules	This criteria is used to ensure that the most appropriate data is used in PCF assessment, which reduces bias and uncertainty	No data quality rules	Limited guidelines: - data quality verification is only required - analysis cover a limited scope of issues - guidelines for assessing these issues are not detailed	Precise guidelines for assessing data quality on various topics
Results - Expected product range of application	The broader is the range of application, the higher might be the impacts of the initiative on global consumption and production patterns	Single or 2 product categories	A few products categories excluded	No declared product category restriction
Results - Uncertainty assessment / sensitivity analysis	It is necessary to ensure that the uncertainty and sensitivity of the results do not lead to misleading conclusions. It is however hardly possible to require each user to perform an uncertainty and sensitivity analysis.	Neither is mentioned	At least one of the 2 analyses is mentioned for the definition of the methodological rules / data requirements	Both are required for the definition of the methodological rules
Results - Level declared for product comparability	In order to make the evolution of the carbon footprint easier, firms should be able to compare their performances to those of their competitors	No declared comparability	Declared comparability with some restrictions	Declared comparability
Results - External critical review of the results	An external critical review is necessary to ensure the robustness of the results	-	No external critical review of the results required (in the case of communication to consumers) / Information not available yet	External critical review of the results required (in the case of communication to consumers)
Tools - Database	A common database for all users of the methodology is a key element to ensure results' comparability, if guidelines for use are sufficiently precise as to limit value choices. Indeed, the existence and the competition of different database should be maintained but the conformity with ILCD Handbook requirements would ensure a certain level of coherence between the databases, and depending on the sector, different databases might be used within a PCF methodology framework. Moreover, in order to compare the PCF of two products, making sure that the same EF is used for a same physical flow is a key element to ensure results comparability.	No information about possible database	- Recommendation of use of existing databases - Recommendation of use of specific database with a non-limited or unknown cost	Recommendation of use of specific free database
Management - international structure	In order to promote internal PCF, it is important that the scheme has an international recognition in order to avoid distortion	Local management structure with possibilities of widening	National management structure with punctual international interactions	International management structure

Criteria	Comment on criteria	Scoring		
		0	1	2
Tools - PCR-like documents	PCRs are important to ensure an evaluation basis for all products in a product category. They increase PCF comparability by describing the system boundaries, mandatory primary data, secondary data, etc	No mention of PCR	Recommendation to use existing PCR when primary data is not available (not developed within the initiative)	Detailed PCR available or to be developed within the methodology
Tools - Tool availability	A free tool might enhance the number of performed CF calculations and therefore the possibility to build a data system rich enough to identify the “best in class” products	No tool for producers	Tool available (producer is charged or no decision taken on this aspect)	Free tool for producer

Detailed grading system for Scenario 3: Implementing market-based incentives

Criteria	Comment on criteria	Scoring		
		0	1	2
Management - Designed for fulfilling scenario objective	The objective is to have a footprint to calculate incentives	-	No numerical value available	Numerical value available
Management - Existence of specific working groups (sector-specific...)	Working groups can facilitate the communication between participants on specific issues	No working group identified	A WG on basics	Specific WGs
Management - Stakeholders diversity	The involvement of public authorities is an important parameter to enhance the credibility and the chance of success of the initiative	No external organism involved	Limited number of stakeholders	Broad consultation at national or international level: firms, public authorities, consumers, NGOs...
Management - Involvement of public authorities	The involvement of public authorities is an important parameter to enhance the credibility and the chance of success of the initiative	Public bodies are not involved in the program	Public bodies have a limited involvement (e.g.: verification of methodology...)	Public bodies are actively supporting the program (e.g.: involvement in the methodology preparation)
Methodology validation	Stakeholders' involvement in the validation process is a key criterion to ensure the methodology's acceptability. If stakeholders are diverse and numerous, consultation process will ensure a certain level of validation (even if -scientifically speaking - it is not as efficient as a peer review)	No review of the methodology	Review by one or two external organisms when the methodology is developed	Review is ensured through a broad involvement of diverse stakeholders in the elaboration process (consultation...)
Methodology documentation availability	The methodology documentation's accessibility affects the ability to judge its relative performance	No methodological documentation available	Little methodological documentation available (documentation not sufficient to perform a calculation according to it)	Detailed methodological documentation freely available
Methodology maturity - Number of products for which the methodology has been applied	The number of products for which the methodology has been applied is a good indicator of the methodology's maturity	None	Less than 50	More than 50
Management - international structure	In order to promote internal PCF, it is important that the scheme has an international recognition in order to avoid distortion	Local management structure with possibilities of widening	National management structure with punctual international interactions	International management structure
Data collection - transparent description of the required primary data	To ensure results comparability, required primary data should be clearly stated	-	No transparent description of the required primary data	Transparent description of the required primary data
Data collection - amount and detail of information required	For mandatory approaches, the user should have the possibility to assess its product CF through a limited amount of primary data	No information	Detailed data collection required	Limited amount of information required (primary data)

Criteria	Comment on criteria	Scoring		
		0	1	2
Data collection - data quality rules	This criteria is used to ensure that the most appropriate data is used in PCF assessment, which reduces bias and uncertainty	No data quality rules	Limited guidelines: - data quality verification is only required - analysis cover a limited scope of issues - guidelines for assessing these issues are not detailed	Precise guidelines for assessing data quality on various topics
Results - Expected product range of application	The broader is the range of application, the higher might be the impacts of the initiative on global consumption and production patterns	Single or 2 product categories	A few products categories excluded	No declared product category restriction
Results - External critical review of the results	An external critical review is necessary to ensure the robustness of the results	-	No external critical review of the results required (in the case of communication to consumers) / Information not available yet	External critical review of the results required (in the case of communication to consumers)
Results - Time scale validity of the CF assessment	The market evolution should be taken into account to ensure that the label really promotes the best performing products	No information	Defined validity of the CF assessment - no product category specific	Defined validity of the CF assessment - product category specific
Results - Level declared for product comparability	In order to make the evolution of the carbon footprint easier, firms should be able to compare their performances to those of their competitors	No declared comparability	Declared comparability with some restrictions	Declared comparability
Results - Uncertainty assessment / sensitivity analysis	It is necessary to ensure that the uncertainty and sensitivity of the results do not lead to misleading conclusions. It is however hardly possible to require each user to perform an uncertainty and sensitivity analysis.	Neither is mentioned	At least one of the 2 analyses is mentioned	Both are required
Tools - PCR-like documents	PCRs are important to ensure an evaluation basis for all products in a product category. They increase PCF comparability by describing the system boundaries, mandatory primary data, secondary data, etc	No mention of PCR	Recommendation to use existing PCR when primary data is not available (not developed within the initiative)	Detailed PCR available or to be developed within the methodology

Criteria	Comment on criteria	Scoring		
		0	1	2
Tools - Database	A common database for all users of the methodology is a key element to ensure results' comparability, if guidelines for use are sufficiently precise as to limit value choices. Indeed, the existence and the competition of different database should be maintained but the conformity with ILCD Handbook requirements would ensure a certain level of coherence between the databases, and depending on the sector, different databases might be used within a PCF methodology framework. Moreover, in order to compare the PCF of two products, making sure that the same EF is used for a same physical flow is a key element to ensure results comparability.	No information about possible database	<ul style="list-style-type: none"> - Recommendation of use of existing databases - Recommendation of use of specific database with a non-limited or unknown cost 	Recommendation of use of specific free database

Detailed grading system for Scenario 4: Setting minimum requirements

Criteria	Comment on criteria	Scoring		
		0	1	2
Management - Designed for fulfilling scenario objective	The objective is to have a footprint to assess whether companies are above or below minimum requirements	-	No numerical value available	Numerical value available
Management - Existence of specific working groups (sector-specific...)	Working groups can facilitate the communication between participants on specific issues	No working group identified	A WG on basics	Specific WGs
Management - Stakeholders diversity	The diversity of stakeholders included in the development ensures the methodology compatibility with a large number of products. It is a means to allow a wide implementation of the process	No external organism involved	Limited number of stakeholders	Broad consultation at national or international level: firms, public authorities, consumers, NGOs...
Management - Involvement of public authorities	The involvement of public authorities is an important parameter to enhance the credibility and the chance of success of the initiative	Public bodies are not involved in the program	Public bodies endorse the methodology (e.g.: verification of methodology...)	Public bodies are actively supporting the program (e.g.: involvement in the methodology preparation)
Methodology validation	Stakeholders' involvement in the validation process is a key criterion to ensure the methodology's acceptability. If stakeholders are diverse and numerous, consultation process will ensure a certain level of validation (even if - scientifically speaking - it is not as efficient as a peer review)	No review of the methodology	Review by one or two external organisms when the methodology is developed	Review is ensured through a broad involvement of diverse stakeholders in the elaboration process (consultation...)
Methodology documentation availability	The methodology documentation's accessibility affects the ability to judge its relative performance	No methodological documentation available	Little methodological documentation available (documentation not sufficient to perform a calculation according to it)	Detailed methodological documentation freely available
Methodology maturity - Number of products for which the methodology has been applied	The number of products for which the methodology has been applied is a good indicator of the methodology's maturity	None	Less than 50	More than 50
Data collection - Possibility to use default values in the absence of primary data	For mandatory approaches, the methodology should facilitate the carbon footprint assessment and ensure that every producer can do the calculation (even in case of low data accessibility)	No default value proposed when primary data is missing	Default values proposed when primary data is missing / no default value for the whole PCF	Default PCF value proposed

Criteria	Comment on criteria	Scoring		
		0	1	2
Data collection - amount and detail of information required	For mandatory approaches, the user should have the possibility to assess its product CF through a limited amount of primary data	No details	Detailed data collection required	Limited amount of information required (primary data)
Data collection - transparent description of the required primary data	To ensure results comparability, required primary data should be clearly stated	-	No transparent description of the required primary data	Transparent description of the required primary data
Data collection - data quality rules	This criteria is used to ensure that the most appropriate data is used in PCF assessment, which reduces bias and uncertainty	No data quality rules	Limited guidelines: - data quality verification is only required - analysis cover a limited scope of issues - guidelines for assessing these issues are not detailed	Precise guidelines for assessing data quality on various topics
Results - Expected product range of application	The broader is the range of application, the higher might be the impacts of the initiative on global consumption and production patterns	Single or 2 product categories	A few products categories excluded	No declared product category restriction
Results - Uncertainty assessment / sensitivity analysis	It is necessary to ensure that the uncertainty and sensitivity of the results do not lead to misleading conclusions. It is however hardly possible to require each user to perform an uncertainty and sensitivity analysis.	Neither is mentioned	At least one of the 2 analyses is mentioned for the definition of the methodological rules / data requirements	Both are required for the definition of the methodological rules
Results - Time scale validity of the CF assessment	The market evolution should be taken into account to ensure that the label really promotes the best performing products	No information	Defined validity of the CF assessment - no product category specific	Defined validity of the CF assessment - product category specific
Results - Level declared for product comparability	In order to make the evolution of the carbon footprint easier, firms should be able to compare their performances to those of their competitors	No declared comparability	Declared comparability with some restrictions	Declared comparability
Results - External critical review of the results	An external critical review is necessary to ensure the robustness of the results	-	No external critical review of the results required (in the case of communication to consumers) / Information not available yet	External critical review of the results required (in the case of communication to consumers)
Tools - Database	A common database for all users of the methodology is a key element to ensure results comparability	No information about possible database	- Recommendation of use of existing databases - Recommendation of use of specific database with a non-limited or unknown cost	Recommendation of use of specific free database

Criteria	Comment on criteria	Scoring		
		0	1	2
Management - international structure	In order to promote internal PCF, it is important that the scheme has an international recognition in order to avoid distortion	Local management structure with possibilities of widening	National management structure with punctual international interactions	International management structure
Tools - PCR-like documents	PCRs are important to ensure an evaluation basis for all products in a product category. They increase PCF comparability by describing the system boundaries, mandatory primary data, secondary data, etc	No mention of PCR	Recommendation to use existing PCR when primary data is not available (not developed within the initiative)	Detailed PCR available or to be developed within the methodology
Tools - Tool availability	A free tool might enhance the number of performed CF calculations and therefore the possibility to build a data system rich enough to identify the “best in class” products	No tool for producers	Tool available (producer is charged or no decision taken on this aspect)	Free tool for producer

Appendix 3: Explanation of the weighting of the grading system

Each criterion was weighted, in order to give more importance to the relevant criteria for each scenario, as shown below (with a weight of 1 for each criteria, the number of criteria would have had more impact than their relevance).

The following table shows how criteria were weighted to adapt the methodologies' scoring to each scenario, from 1 to 3 with a growing importance.

This weighting has been done both “vertically” and “horizontally”: it takes into account the comparison of criteria in a given scenario and also the comparison between scenarios. For example, in the case of “Data Collection – amount and detail of information required”:

- Comparison between scenarios: the score of methodologies on the criterion “Data Collection – amount and detail of information required” has been considered more critical for mandatory scenarios (score 3) since public authorities have to be particularly aware of the amount of work required in mandatory schemes;
- Comparison of criteria inside a scenario: for example, scenario 2a (best-in class label) requires non-biased product differentiation. Primary data is therefore critical to establish the ranking; as so, the transparent description of the required primary data is considered more critical than the amount of data required.

Scenario	1	2a	2b	2c	3	4	Comments
Data collection - amount and detail of information required		2	2	3	3	3	The weight is slightly higher for scenarios 2c, 3, and 4 because mandatory schemes may limit the amount of information to be collected in order to reduce the process burden in the case of a wide implementation (SMEs, etc.)
Data collection - Possibility to use default values in the absence of primary data				2		2	The absence of primary data is an important risk in case of mandatory scenarios (especially for SMEs). Default values may be a means to cover this risk.
Data collection - transparent description of the required primary data		3	2	3	3	3	The weight is slightly higher for scenarios in which a higher degree of specificity is required as to enable product differentiation (which may be a requirement from the scenario (2a, 3 & 4) or implied by its implementation (2c)
Data collection – Data quality rules		2	2	2	2	2	Scoring independent from scenario (except scenario 1 which is more dedicated to the methodology elaboration)
Management - Designed for fulfilling scenario objective	3	3	3	3	3	3	This criterion is an evaluation of the consistency between the methodology and the scenario's objectives. It is of major importance for all scenarios.
Management - Existence of specific working groups (sector-specific...)	1	1		1	1	1	Working groups are useful when a broad consultation of economic operators is required (definition of minimum requirements, criteria for defining the best in class or bonus/malus scheme). In the case of voluntary index, it is not necessary (e.g.: some firms have developed their own methodology). In the case of mandatory index, it would be an advantage to ensure scheme acceptance
Management - international structure	1	1	1	1	1	1	No weighting differences between the scenarios. An international structure would be of the greatest interest for supporting EU implementation
Management - Involvement of public authorities	1	1	1	2	2	2	Involvement of public authorities is required for mandatory schemes. For other schemes, such an involvement would be interesting for public bodies but it is not required.
Management - Stakeholders diversity	3	2	1	2	2	2	Stakeholder diversity is an interesting criterion for all scenarios. Its weight is lower for the voluntary index because such an initiative could be developed on a limited part of the market with a small number of economic actors.
Methodology documentation availability	1	1	1	1	1	1	Criterion which ensures the transparency of the process. No weighting difference
Methodology maturity - Number of products for which the methodology has been applied	1	1	1	1	1	1	No weighting difference between the scenarios.
Methodology validation	2	2	2	2	2	2	No weighting difference between the scenarios.
Results - Expected product range of application	1	1	1	1	1	1	No weighting difference between the scenarios.
Results - External critical review of the results		2	1	2	2	2	Important criteria for schemes in which comparison is possible; such critical review of results would be difficult to implement if mandatory, even if experience shows that European mandatory schemes could implement such review (EuP, WEEE, REACH...). In the case of internal PCF, the objective is an internal work so results may be not communicated to external parties. In the case of voluntary index, experience shows that results may be published without external review (even if a critical review would be better).

Scenario	1	2a	2b	2c	3	4	Comments
Results - Level declared for product comparability	1	2	1	2	2	2	Important criteria for schemes in which comparison is required (2a, 3 & 4) or probable (mandatory index). In the case of internal PCF, comparability with competitors may be useful in order to progress on product performances. In the case of voluntary index, experience shows that comparability between products may be reduced without preventing results to be published.
Results - Time scale validity of the CF assessment		1			1	1	Time scale validity of the results is an important aspect for scenarios implying a direct comparison of products and a regular update of the market performance knowledge.
Results - Transparent procedure to identify the best in class		3					This is a key criterion for the best in class scenario.
Results - Uncertainty assessment / sensitivity analysis		2	1	2	2	2	Important criteria for schemes in which comparison is required (2a, 3 & 4) or probable (mandatory index). In the case of internal PCF, users should know the variability of their results but since results are not displayed, uncertainty management is left to users. In the case of voluntary index, experience shows that comparability between products may be reduced without preventing results to be published; as so, uncertainty management rules may be more evasive
Tools - Database		1	1	1	1	1	Internal PCF scenario is based on knowledge sharing; as so, this criteria may be an objective of the think-tank but not a requirement
Tools - PCR-like documents		2	1	3	3	3	Internal PCF scenario is based on knowledge sharing; as so, this criterion may be an objective of the think-tank but not a requirement. PCRs-like documents are not necessary in the case of voluntary index since experience shows that certain flexibility is required. In other cases, these documents are considered important to ensure the comparability of results; this requirement is especially important in the scenarios 2c, 3 and 4 because of the mandatory aspect of these scenarios.
Tools - Tool availability		1	1	2		2	Internal PCF scenario is based on knowledge sharing; as so, this criterion may be an objective of the think-tank but not a requirement. Market based incentive may not function with the design of a tool (case of Ecodesign directive). Importance of this criterion for other schemes is more important as to ensure an easier implementation for SMEs.

Appendix 4: Detailed assessment of methodologies

Note: Best practices have been highlighted; when a practice is common between various schemes, the name of these schemes has not been quoted

Detailed assessment for Scenario 1: Favouring the internal use of Product Carbon Footprint (PCF) by companies

Criteria	Product GHG Protocol	ISO 14067	BP X30-323	PAS 2050	Food labelling SE	Methodology	Japan PCF	Korea PCF	Sustainability Consortium (Wal-mart)	Carbon Index Casino	Climatop	Greenext (Leclerc)	Best practices
Management - Designed for fulfilling scenario objective	2 Numerical value available	2 Numerical value available	2 Numerical value available	2 Numerical value available	1 No calculated CF	2 Numerical value available	2 Numerical value available	2 Numerical value available	2 No numerical value currently available. However, the methodology is meant to provide the users with a numerical value	2 Numerical value available	2 No numerical value published but numerical value available (the CF is not communicated to the consumer)	2 Numerical value available	Numerical value available
Management - Existence of specific working groups (sectorial,...)	1 Existence of a unique working group	1 Existence of a unique working group	2 Existence of specific working groups by product categories	2 Numerous specific working groups were established to ensure expert communication and input into specific sectorial (e.g. agriculture, services, etc) and method development (e.g data quality, recycling, etc) issues	0 Not designed for a working groups structure	1 Existence of a unique working group	1 Existence of a unique working group	1 Existence of a unique working group	1 Existence of a unique working group	1 Existence of a working group dedicated inside Casino	0 Not designed for a working groups structure	0 Not designed for a working groups structure	- BP X30-323: sectorial working groups built at national level - GHG Protocol / ISO 14067: transversal working group enabling works at an international level The best system would be a combination of both approaches (sectorial working groups at an international level).
Management - Stakeholders diversity	2 Involvement of international stakeholders, no restriction on participants	2 Involvement of international stakeholders; only experts participate	2 Involvement of national stakeholders, no restriction on participants	2 Involvement of international stakeholders, even if the methodology has been initially proposed by Carbon Trust	2 Involvement of KRAV and Swedish Seal (Svenskt Sigtill) with several major Swedish food companies (Milko, Lantmännen, the Federation of Swedish Farmers, Scan and Skåne mejeri), some Swedish universities and the Swedish government	2 Initiative managed by national government. Stakeholders included in the methodology development	2 Initiative managed by national government. Stakeholders included in the methodology development	2 Involvement of stakeholders (universities, NGO, retailers, producers, EPA) in the development process	2 The French EPA supported the project, and several food companies, NGOs and consumers participated in the project	1 Limited (myclimate and Okozentrum Langenbruck (NGOs)), even if the application of ISO 14040 requirements take benefits from an indirect stakeholders involvement	1 Limited to French EPA and local public bodies, even if other private firms are working with Greenext	1 Limited to French EPA and local public bodies, even if other private firms are working with Greenext	Involvement of representatives from various sectors at an international level (GHG Protocol, ISO 14067)
Management - Involvement of public authorities	1 Some public authorities are involved as stakeholders (UK Defra, US EPA and department of Agriculture,...)	1 Public bodies are following the methodology development	2 Public bodies are involved in the methodology development	2 The Carbon Trust and Defra were joint sponsors of the development of the method, which was overseen by the British Standards Institute	1 The Swedish Board of Agriculture is part of the steering group	2 Initiative supported and sponsored by the authorities	2 Initiative supported and sponsored by the authorities	1 The Steering Committee is declared to include representatives from governments	1 Methodology reviewed by the French EPA, and additional validation steps with the French EPA made during the methodology elaboration	0 No link with authoritative bodies	1 The project is supported by ADEME and regional bodies, but the methodology has been developed by an external party	1 National public bodies involved in the methodology development and implementation (BP X30-323, Korean PCF, Japan PCF)	
Methodology validation	2 Broad involvement of the stakeholders in the elaboration process at an international level	2 Broad involvement of the stakeholders in the elaboration process at an international level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	1 Methodology reviewed by the French environmental agency (ADEME)	0 The methodology in itself is not peer-reviewed. However the product LCA is reviewed by an independent organism. However, Climatop's methodology is based on ISO 14040 and it could be considered that it takes benefits from works made for elaborating this norm.	1 Methodology reviewed by the French environmental agency (ADEME) and ECOPASS	Broad involvement of stakeholders in the review and in the elaboration process
Methodology documentation availability	2 Detailed methodological documentation available	2 Detailed methodological documentation available	2 Detailed methodological documentation available	2 Detailed methodological documentation available	1 little methodological documentation available, guidelines still under development	2 Detailed methodological documentation available	1 Some general methodological documentation available	1 Documentation is available but since the methodology is not finalised major aspects are still missing	1 Only a brief description of the methodology is available on the Casino website. Detailed documentation is available on demand and under a confidentiality agreement	0 The documentation available does not gives indication on key aspects of the LCA : primary data, allocation rules, detailed description of the system boundaries, etc. These elements rely on ISO 14040 requirements. Additional elements to be published	0 The documentation available does not gives indication on key aspects of the LCA : primary data, allocation rules, detailed description of the system boundaries, etc.	0 Detailed methodological documentation available on the Internet	
Methodology maturity - Number of products for which the methodology has been applied	1 Road testing has been performed	0 No product has been assessed yet	0 No product has been assessed yet	2 More than 50 products have been assessed	1 Less than 50 products have been assessed	1 Less than 50 products have been assessed	2 More than 50 products have been assessed	0 No product has been assessed yet	2 More than 50 products have been assessed	2 More than 50 products have been assessed	2 More than 50 products have been assessed	2 More than 50 products have been assessed	More than 50 products in various products categories
Results - Expected product range of application	2 No declared product category restriction. However working groups have identified that the methodology might not be easily used for certain product categories	2 No declared product category restriction	1 No declared product category restriction for mass market products	2 No declared product category restriction	0 Only concerns food products	2 No declared product category restriction	1 Agricultural, fishery, livestock and forest products goods are excluded, as well as pharmaceutical products, medical equipments and exported goods.	2 No declared product category restriction	1 Targeting mass market product like national scheme	2 No declared product category restriction	1 Targeting mass market product like national scheme	1 No product category restrictions	No product category restrictions
Results - Level declared for product comparability	0 Not designed for comparative assertions or product labelling	1 The application of this standard supports comparison under specific requirements	2 Made for comparison	0 Not designed to compare products	2 The methodology is meant to distinguish and thus compare high CF products and low CF products.	1 The PCF is displayed on the products and restriction to comparability is mentioned	1 The PCF is displayed on the products and restriction to comparability is mentioned	2 The methodology is designed in such a way that every product could get a CF index so that consumers can compare the PCF	2 The methodology is designed in such a way that every product could get a CF index so that consumers can compare the PCF	2 The goal of the methodology is to identify the best products so to compare PCF	2 The methodology owners claim that the PCF can be compared	2 Results comparability is based on many aspects (system boundaries, environmental factors, allocation rules, etc.). A transparent methodology development procedure and detailed PCRs are crucial elements to give credit to comparability claims	
Management - international structure	2 Gathers international economic operators	2 Gathers international economic operators	1 Initiative led at a national level, with possible participation of international structures	0 Initiative led at a national level, with possible participation of international structures	0 National initiative; no information about international parties involved	1 Initiative led at a national level, with possible participation of international structures	1 Initiative led at a national level, with possible participation of international structures	1 Mainly US structure with high interactions at international level; includes US EPA (observer) but also universities and multinational firms	1 Initiative managed nationally	0 Local initiative	0 Private initiative targeting consistency with national framework	0 International structure	

Detailed assessment for Sub-scenario 2a: The voluntary best in class label

Criteria	Product GHG Protocol	ISO 14067	BP X30-323	PAS 2050	Climate certification system SE	Methodology	Japan PCF	Korea PCF	Sustainability Consortium (Wai-mart)	Carbon Index Casino	Climatop	Greenext (Leclerc)	Best practice
Management - Designed for fulfilling scenario objective	0 No mandatory communication procedure: even if a PCF is available, it should be reported with a detailed documentation which is not compatible with a label (in its current form)	0 No mandatory communication procedure: even if a PCF is available, it should be reported with a detailed documentation which is not compatible with a label (in its current form)	1 The objective of the French initiative is to enable an environmental consumer choice, so it is meant that all products get an absolute value: process is designed to be mandatory (even if this last aspect has to be confirmed)	0 Voluntary procedure. The methodology is not designed to force the producers to evaluate their CF and thus to ensure they can all easily access to the required information	2 Best products get the label	0 Voluntary procedure. The methodology is not designed to force the producers to evaluate their CF and thus to ensure they can all easily access to the required information	0 Voluntary procedure. The methodology is not designed to force the producers to evaluate their CF and thus to ensure they can all easily access to the required information	1 The methodology is designed in such a way that every product could get a CF index	1 The methodology is said to be designed to ensure that all producers (not only Casino product producers) can evaluate their CF, even if it has not been made because other retailers did not want to. Inside a product category, value displayed show that product differentiation is possible.	2 In order to get the Climatop label, the product has to be compared with similar other products and should have a 20% lower CF	1 The methodology is not designed to ensure that all products within a CF index: level of precision depends on the objective of the calculation	1 "Yes or no information": best products get the label	
Data collection - data quality rules	2 A section is dedicated to data quality assessment and examples of analysis grid are provided	2 Specific indicators are detailed in a dedicated section	1 Non-primary data are listed with appropriate sources to be used. Precision of the data used has to be evaluated	2 Data quality rules are described in a dedicated section	0 Process not transparent on this point	1 Precise data quality rules in PCRs regarding regional representativity....	1 Precise data quality rules in terms of oldness and representativity	1 No information currently available	1 No information available publicly, even if tests are realized to assess data quality	1 No information specific to the methodology; however, requirements from LCA norms seem to be applied	1 No information available publicly, even if tests are realized to assess data quality	1 Detailed list of points to assess and examples of analysis grids	
Management - Involvement of public authorities	1 Some public authorities are involved as stakeholders (UK Defra, US EPA and department of Agriculture,...)	1 Public bodies are following the methodology development	2 Public bodies are involved in the methodology development	2 The Carbon Trust and Defra were joint sponsors of the development of the method, which was overseen by the British Standards Institute	1 The Swedish Board of Agriculture is part of the steering group	2 Initiative supported and sponsored by the authorities	2 Initiative supported and sponsored by the authorities	1 The Steering Committee is declared to include representatives from governments	1 Methodology reviewed by the French EPA, and additional validation steps with the French EPA made during the methodology elaboration	0 No link with authoritative bodies	1 The project is supported by ADEME and regional bodies, but the methodology has been developed by an external party	1 National public bodies involved in the methodology development and implementation (BP X30-323, Korean PCF, Japan PCF)	
Management - Existence of specific working groups (sectorial,...)	1 Existence of a unique working group	1 Existence of a unique working group	2 Existence of specific working groups by product categories	2 Numerous specific working groups were established to ensure expert communication and input into specific sectorial (e.g. agriculture, services, etc) and method development (e.g. data quality, recycling, etc) issues	0 Not designed for a working groups structure	1 Existence of a unique working group	1 Existence of a unique working group	1 Existence of a unique working group	1 Existence of a working group dedicated inside Casino	0 Not designed for a working groups structure	0 Not designed for a working groups structure	0 The best system would be a combination of both approaches (sectorial working groups at an international level)	
Management - Stakeholders diversity	2 Involvement of international stakeholders, no restriction on participants	2 Involvement of international stakeholders; only experts participate	2 Involvement of national stakeholders, no restriction on participants	2 Involvement of international stakeholders, even if the methodology has been initially proposed by Carbon Trust	2 Involvement of KRAV and Swedish Seal (Svenskt Sigtill) with several major Swedish food companies (Milkö, Lantmännen, the Federation of Swedish Farmers, Scan and Skåne mejerier), some Swedish universities and the Swedish government	2 Initiative managed by national government. Stakeholders included in the methodology development	2 Initiative managed by national government. Stakeholders included in the methodology development	2 Involvement of stakeholders (universities, NGO, retailers, producers, EPA) in the development process	2 The French EPA supported the project, and several food companies, NGOs and consumers participated in the project	1 Limited (myclimate and Ökozentrum Langerbrück (NGOs), even if the application of ISO 14040 requirements take benefits from an indirect stakeholders involvement	1 Limited to French EPA and local public bodies, even if other private firms are working with Greenext	1 Involvement of representatives from various sectors at an international level (GHG Protocol, ISO 14067)	
Methodology validation	2 Broad involvement of the stakeholders in the elaboration process at an international level	2 Broad involvement of the stakeholders in the elaboration process at an international level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Methodology reviewed by the French environmental agency (ADEME)	1 The methodology in itself is not peer-reviewed. However the product LCA is reviewed by an independent organism. However, Climatop's methodology is based on ISO 14040 and it could be considered that it takes benefits from works made for elaborating this norm.	1 Methodology reviewed by the French environmental agency (ADEME) and ECOPASS	1 Broad involvement of stakeholders in the review and in the elaboration process	
Methodology documentation availability	2 Detailed methodological documentation available	2 Detailed methodological documentation available	2 Detailed methodological documentation available	2 Detailed methodological documentation available	1 little methodological documentation available, guidelines still under development	2 Detailed methodological documentation available	1 Some general methodological documentation available	1 Documentation is available but since the methodology is not finalised major aspects are still missing	1 Only a brief description of the methodology is available on the Casino website. Detailed documentation is available on demand and under a confidentiality agreement	0 The documentation available does not give indication on key aspects of the LCA : primary data, allocation rules, detailed description of the system boundaries, etc. These elements rely on ISO 14040 requirements. Additional elements to be published	0 The documentation available does not give indication on key aspects of the LCA : primary data, allocation rules, detailed description of the system boundaries, etc.	1 Detailed methodological documentation available on the Internet	
Methodology maturity Number of products for which the methodology has been applied	1 Road testing has been performed	0 No product has been assessed yet	0 No product has been assessed yet, even if pilot projects have been initiated	2 More than 50 products have been assessed	1 Less than 50 products have been assessed	1 Less than 50 products have been assessed	2 More than 50 products have been assessed	0 No product has been assessed yet	2 More than 50 products have been assessed	2 More than 50 products have been assessed	2 More than 50 products have been assessed	2 More than 50 products have been assessed	
Data collection - transparent description of the required primary data	2 Specific requirements are expressed. Secondary data use is limited to certain cases (verifications,...). However, the scheme is not designed to compare products	2 Secondary process data shall be used for inputs where the collection of primary process data is not possible, and may include literature data, calculated data, estimates or other representative data.	2 PCRs detail the cases in which secondary data may be used; it excludes all the important contributors to emissions	2 Secondary data are said to be mainly used for electricity emissions factors, GWP,... A priority order is also given	2 Definition of the required elements to get the label	2 The secondary data to be used if necessary are detailed in the PCR documents. When secondary data is used, the source has to be clarified.	2 Secondary data has to be used only if primary data is not available	2 The definition of the required primary data is not yet available but it is planned	2 Primary data used in the calculation are clearly identified in the supplier tool as well as in the related documentation	1 No transparent definition of the required primary data	1 No transparent definition of the required primary data	1 Required primary data should be clearly stated	
Data collection - amount and detail of information required	2 Detailed data collection required	2 Detailed data collection required	2 Detailed data collection required	2 Detailed data collection required	1 A limited number of information is required (the scheme does not require a full LCA and has identified specific criteria to fulfil)	2 Detailed data collection required	2 Detailed data collection required	1 Product assessment based on a limited number of environmental criteria. However, the user might also have the possibility to do its own detailed impact assessment	2 Detailed data collection required	2 Detailed data collection required	1 A limited amount of primary data is required to assess the CF, even if it can be adapted according to the objective of the process	1 Detailed data collection required	

Criteria	Methodology											
	Product GHG Protocol	ISO 14067	BP X30-323	PAS 2050	Climate certification system SE	Japan PCF	Korea PCF	Sustainability Consortium (Wal-mart)	Carbon Index Casino	Climatop	Greenext (Leclerc)	Best practice
Results - transparent procedure to identify the best in class	0 No mandatory comparison with products having the same functional unit	0 No mandatory comparison with products having the same functional unit	0 The goal of the initiative is to help consumers identify environmentally friendly products but no comparison procedure has been defined to identify the "best in class"	0 No mandatory comparison with products having the same functional unit	0 The criteria are defined in order to select the best products relatively to current practices. However there is no LCA based CF comparison between products that can receive the labels and those that do not respect the criteria	0 No mandatory comparison with products having the same functional unit	0 No mandatory comparison with products having the same functional unit	0 In this scheme all products sold in a super market could get a CF. However some of them might receive a database CF. No comparison procedure has been defined to identify the "best in class"	0 No mandatory comparison with products having the same functional unit	1 Mandatory comparison with products having the same functional unit	0 In this scheme all products sold in a super market of a product category get a CF. However some of them might receive a database CF. No comparison procedure has been defined to identify the "best in class"	0 Until now no initiative delivers clear and transparent procedures to define the comparison scenarios. Therefore none of them got a grade of 2
Results - Expected product range of application	2 No declared product category restriction. However working groups have identified that the methodology might not be easily used for certain product categories	2 No declared product category restriction	1 No declared product category restriction for mass market products	2 No declared product category restriction	0 Only concerns food products	2 No declared product category restriction	1 Agricultural, fishery, livestock and forest products goods are excluded, as well as pharmaceutical products, medical equipments and exported goods.	2 No declared product category restriction	1 Targeting mass market product like national scheme	2 No declared product category restriction	1 Targeting mass market product like national scheme	0 No product category restrictions
Results - External critical review of the results	2 External critical review when the results are communicated to the consumers	2 External critical review when the results are communicated to the consumers	1 No yet defined	2 External critical review when the results are communicated to the consumers	2 The Food SE labelling can only be used in combination with another certification scheme that certifies components of sustainable food production and for which external verification is mandatory.	2 External critical review when the results are communicated to the consumers	2 External critical review when the results are communicated to the consumers	1 No yet defined	1 No external critical review of the results	2 External critical review	1 No external critical review of the results	0 External critical review of the results required
Results - Time scale validity of the CF assessment	0 No information available	0 No information available	2 A validity time will be defined for each product category	1 2 years validity, unless significant changes appear	0 No information available	0 No information available	1 Annual surveillance check	0 No information available	0 CF is updated when packaging is renewed; if PCF changes before packaging renewal, it is updated on the internet website. However, there is no formal deadline for PCF recalculation	1 Recertification required after 2 years	0 Greenext SA guarantees the data for one year but no specific revision procedure is described	0 Defined validity of the CF assessment - product category specific
Results - Level declared for product comparability	0 Not designed for comparative assertions or product labelling	1 The application of this standard supports comparison under specific requirements	2 Made for comparison	0 Not designed to compare products	2 The methodology is meant to distinguish and thus compare high CF products and low CF products.	1 The PCF is displayed on the products and restriction to comparability is mentioned	1 The PCF is displayed on the products and restriction to comparability is mentioned	2 The methodology is designed in such a way that every product could get a CF index so that consumers can compare the PCF	2 The methodology is designed in such a way that every product could get a CF index so that consumers can compare the PCF	2 The goal of the methodology is to identify the best products so to compare PCF	2 The methodology owners claim that the PCF can be compared	0 Results comparability is based on many aspects (system boundaries, environmental factors, allocation rules, etc.). A transparent methodology development procedure and detailed PCRs are crucial elements to give credit to comparability claims
Results - Uncertainty assessment / sensitivity analysis	2 Both are required	2 Both are required	2 Both are required	1 Analysis are recommended but not required	0 No requirement	0 No requirement	0 No requirement	0 Few information available except "data explicitly acknowledges and reports uncertainty in a standardized way"	0 No requirement	2 Uncertainty assessment is required and sensitivity analysis is required when a high uncertainty is observed.	1 An uncertainty coefficient is given for the data. The overall uncertainty coefficient is calculated via a Monte Carlo analysis.	0 Requirement of both an uncertainty assessment and a sensitivity analysis (GhG Protocol, ISO 14067)
Tools - PCR-like documents	1 PCRs can be used as a secondary source of information; this choice should be documented	1 Publicly available PCRs developed in accordance with ISO 14025 can be used	2 Sectorial working groups are developing specific PCRs	1 Specific attention is paid to the use of PCRs (development at an international level,...)	0 No use of PCR, even if the approach is adapted to specific fields of the food industry	2 PCRs are developed specifically within the frame of the methodology	1 No clear information on PCRs. General guidelines are available for energy using or no energy using product categories.	2 Specific PCRs are under development	0 No PCRs, even if the scheme claims that they follow the recommendations of the BP X30-323 PCRs	0 No PCRs.	0 No PCRs, even if the scheme claims that they follow the recommendations of the BP X30-323 PCRs	0 Detailed PCRs available, in line with the methodology, with a large stakeholder involvement
Tools - Database	1 The protocol will provide the user with a list of databases which can be used (Appendix D)	0 No requirement - no specific information about this issue	1 Public database developed by ADEME, which will include ELCD data; cost is not determined	1 In the first version of the PAS2050, the choice is left to the user, and a ranking of databases to be used is provided. The ELCD will be mentioned as a secondary source of information in the future version	0 No information. The process does not seem to imply the use of a LCA database	2 A free database is being developed	2 A database is being developed	2 A specific database is being developed level, currently free for consultation	1 Most data comes from the ADEME's Bilan Carbone methodology, but the remaining ones are not published by the methodology owner	1 Ecoinvent	1 Two specific databases used in the development of Greenext methodology	0 Reference to a specific database
Management - international structure	2 Gathers international economic operators	2 Gathers international economic operators	1 Initiative led at a national level, with possible participation of international structures	1 Initiative led at a national level, with possible participation of international structures	0 National initiative; no information about international parties involved	1 Initiative led at a national level, with possible participation of international structures	1 Initiative led at a national level, with possible participation of international structures	1 Mainly US structure with high interactions at international level, includes US EPA (observer) but also universities and multinational firms	1 Initiative managed nationally	0 Local initiative	0 Private initiative targeting consistency with national framework	0 International structure
Tools - Tool availability	2 Tools will be developed after the publication and finalization of the standards	0 No tool to assess the CF of their products has been designed for producers in this initiative	1 ADEME will develop a tool that might be free for producers or at least at a reduced price	1 Footprint Expert™ cost around 1600 euros for a two users license	0 No tool to assess the CF of their products has been designed for producers in this initiative	1 Calculation tools available for free during the pilot project. It is not decided if it will be a paid service after the pilot project.	2 A PCF toolkit is in development. It will be free of charge within this year. Training programs exist too.	1 Tools are under development. No indication is given on its price but it will most probably not be free	2 A tool is provided to the producers for free	0 No tool to assess the CF of their products has been designed for producers in this initiative	1 No tool to assess independently the CF of their products has been designed for producers in this initiative	0 Free tool for producers

Detailed assessment for Sub-scenario 2b: The voluntary index or reduction claim

Criteria	Methodology												Best practices
	Product GHG Protocol	ISO 14067	BP X30-323	PAS 2050	Climate certification system SE	Japan PCF	Korea PCF	Sustainability Consortium (Wal-mart)	Carbon Index Casino	Climateop	Greenext (Leclerc)		
Management - Designed for fulfilling scenario objective	2 Carbon index available to the consumer	2 Carbon index available to the consumer	2 Carbon index available to the consumer	2 Carbon index available to the consumer A complementary measure has been set up with the carbon label as to show producers engagement (Carbon Trust)	1 No carbon index published to the consumer	2 Carbon index available to the consumer	2 Enable to highlight the producer's improvement + Carbon index available to the consumer	2 Carbon index foreseen to be available to the consumer	2 Carbon index available to the consumer	2 No carbon index published to the consumer	2 In this scheme all products from a product category get a CF. However some of them might receive a database CF. No comparison procedure has been defined to identify the "best in class"	Schemes that enable to highlight the producer's improvement + Carbon index available to the consumer	
Management - Stakeholders diversity	2 Involvement of international stakeholders, no restriction on participants	2 Involvement of international stakeholders; only experts participate	2 Involvement of national stakeholders, no restriction on participants	2 Involvement of international stakeholders, even if the methodology has been initially proposed by Carbon Trust	2 Involvement of KRAV and Swedish Seal (Svenskt Sigill) with several major Swedish food companies (Milk, Lantmännen, the Federation of Swedish Farmers, Scan and SkåneMejerier), some Swedish universities and the Swedish government	2 Initiative managed by national government. Stakeholders included in the methodology development	2 Initiative managed by national government. Stakeholders included in the methodology development	2 Involvement of stakeholders (universities, NGO, retailers, producers, EPA) in the development process	2 The French EPA supported the project, and several food companies, NGOs and consumers participated in the project	1 Limited (myclimate and Ökozentrum Langenbruck (NGOs)), even if the application of ISO 14040 requirements take benefits from an indirect stakeholders involvement	1 Limited to French EPA and local public bodies, even if other private firms are working with Greenext	Involvement of representatives from various sectors at an international level (GHG Protocol, ISO 14067)	
Methodology documentation availability	2 Detailed methodological documentation available	2 Detailed methodological documentation available	2 Detailed methodological documentation available	2 Detailed methodological documentation available	1 little methodological documentation available, guidelines still under development	2 Detailed methodological documentation available	1 Some general methodological documentation available	1 Documentation is available but since the methodology is not finalised major aspects are still missing	1 Only a brief description of the methodology is available on the Casino website. Detailed documentation is available on demand and under a confidentiality agreement	0 The documentation available does not give indication on key aspects of the LCA : primary data, allocation rules, detailed description of the system boundaries, etc. These elements rely on ISO 14040 requirements. Additional elements to be published	0 The documentation available does not give indication on key aspects of the LCA : primary data, allocation rules, detailed description of the system boundaries, etc.	Detailed methodological documentation available on the Internet	
Methodology validation	2 Broad involvement of the stakeholders in the elaboration process at an international level	2 Broad involvement of the stakeholders in the elaboration process at an international level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	1 Methodology reviewed by the French environmental agency (ADEME)	0 The methodology in itself is not peer-reviewed. However the product LCA is reviewed by an independent organism. However, Climateop's methodology is based on ISO 14040 and it could be considered that it takes benefits from works made for elaborating this norm.	1 Methodology reviewed by the French environmental agency (ADEME) and ECOPASS	Broad involvement of stakeholders in the review and in the elaboration process	
Methodology maturity - Number of products for which the methodology has been applied	1 Road testing has been performed	0 No product has been assessed yet	0 No product has been assessed yet, even if pilot projects have been initiated	2 More than 50 products have been assessed	1 Less than 50 products have been assessed	1 Less than 50 products have been assessed	2 More than 50 products have been assessed	0 No product has been assessed yet	2 More than 50 products have been assessed	2 More than 50 products have been assessed	2 More than 50 products have been assessed	More than 50 products in various products categories	
Data collection - transparent description of the required primary data	2 Specific requirements are expressed. Secondary data use is limited to certain cases (verifications,...). However, the scheme is not designed to compare products	2 Secondary process data shall be used for inputs where the collection of primary process data is not possible, and may include literature data, calculated data, estimates or other representative data.	2 PCRs detail the cases in which secondary data may be used; it excludes all the important contributors to emissions	2 Secondary data are said to be mainly used for electricity emissions factors, GWP,...A priority order is also given	2 Definition of the required elements to get the label	2 The secondary data to be used if necessary are detailed in the PCR documents. When secondary data is used, the source has to be clarified.	2 Secondary data has to be used only if primary data is not available	2 The definition of the required primary data is not yet available but it is planned	2 Primary data used in the calculation are clearly identified in the supplier tool as well as in the related documentation	1 No transparent definition of the required primary data	1 No transparent definition of the required primary data	Required primary data should be clearly stated	
Data collection - amount and detail of information required	2 Detailed data collection required	2 Detailed data collection required	2 Detailed data collection required	2 Detailed data collection required	1 A limited number of information is required (the scheme does not require a full LCA and has identified specific criteria to fulfil)	2 Detailed data collection required	2 Detailed data collection required	1 Product assessment based on a limited number of environmental criteria. However, the user might also have the possibility to do its own detailed impact assessment	2 Detailed data collection required	2 Detailed data collection required	1 A limited amount of primary data is required to assess the CF, even if it can be adapted according to the objective of the process	Detailed data requirements	
Results - Expected product range of application	2 No declared product category restriction. However working groups have identified that the methodology might not be easily used for certain product categories	2 No declared product category restriction	1 No declared product category restriction for mass market products	2 No declared product category restriction	0 Only concerns food products	2 No declared product category restriction	1 Agricultural, fishery, livestock and forest products goods are excluded, as well as pharmaceutical products, medical equipments and exported goods.	2 No declared product category restriction	1 Targeting mass market product like national scheme	2 No declared product category restriction	1 Targeting mass market product like national scheme	No product category restrictions	

Criteria	Methodology												Best practices
	Product GHG Protocol	ISO 14067	BP X30-323	PAS 2050	Climate certification system SE	Japan PCF	Korea PCF	Sustainability Consortium (Wal-mart)	Carbon Index Casino	Climatop	Greenext (Leclerc)		
Results - External critical review of the results	2 External critical review when the results are communicated to the consumers	2 External critical review when the results are communicated to the consumers	1 No yet defined	2 External critical review when the results are communicated to the consumers	2 The Food SE labelling can only be used in combination with another certification scheme that certifies components of sustainable food production and for which external verification is mandatory.	2 External critical review when the results are communicated to the consumers	2 External critical review when the results are communicated to the consumers	1 No yet defined	1 No external critical review of the results	2 External critical review	1 No external critical review of the results	External critical review of the results required	
Data collection - data quality rules	2 A section is dedicated to data quality assessment and examples of analysis grid are provided	2 Specific indicators are detailed in a dedicated section	1 Non-primary data are listed with appropriate sources to be used. Precision of the data used has to be evaluated	2 Data quality rules are described in a dedicated section	0 Process not transparent on this point	1 Precise data quality rules in PCRs regarding regional representativity....	1 Precise data quality rules in terms of oldness and representativity	0 No information currently available	1 No information available publicly, even if tests are realized to assess data quality	1 No information specific to the methodology; however, requirements from LCA norms seem to be applied	1 No information available publicly, even if tests are realized to assess data quality	Detailed list of points to assess and examples of analysis grids	
Results - Uncertainty assessment / sensitivity analysis	2 Both are required	2 Both are required	2 Both are required	1 Analyses are recommended but not required	0 No requirement	0 No requirement	0 No requirement	0 Few information available except "data explicitly acknowledges and reports uncertainty in a standardized way"	0 No requirement	2 Uncertainty assessment is required and sensitivity analysis is required when a high uncertainty is observed.	1 An uncertainty coefficient is given for the data. The overall uncertainty coefficient is calculated via a Monte Carlo analysis.	Requirement of both an uncertainty assessment and a sensitivity analysis (GhG Protocol, ISO 14067)	
Results - Level declared for product comparability	0 Not designed for comparative assertions or product labelling	1 The application of this standard supports comparison under specific requirements	2 Made for comparison	0 Not designed to compare products	2 The methodology is meant to distinguish and thus compare high CF products and low CF products.	1 The PCF is displayed on the products and restriction to comparability is mentioned	1 The PCF is displayed on the products and restriction to comparability is mentioned	2 The methodology is designed in such a way that every product could get a CF index so that consumers can compare the PCF	2 The methodology is designed in such a way that every product could get a CF index so that consumers can compare the PCF	2 The goal of the methodology is to identify the best products so to compare PCF	2 The methodology owners claim that the PCF can be compared	Results comparability is based on many aspects (system boundaries, environmental factors, allocation rules, etc.). A transparent methodology development procedure and detailed PCRs are crucial elements to give credit to comparability claims	
Tools - Database	1 The protocol will provide the user with a list of databases which can be used (Appendix D)	0 No requirement - no specific information about this issue	1 Public database developed by ADEME, which will include ELCD data; cost is not determined	1 In the first version of the PAS2050, the choice is left to the user, and a ranking of databases to be used is provided. The ELCD will be mentioned as a secondary source of information in the future version	0 No information. The process does not seem to imply the use of a LCA database	2 A free database is being developed	2 A database is being developed	2 A specific database is being developed and currently free for consultation	1 Most data comes from the ADEME's Bilan Carbone methodology, but the remaining ones are not published by the methodology owner	1 Ecoinvent	1 Two specific databases used in the development of Greenext methodology	Reference to a specific database	
Tools - Tool availability	2 Tools will be developed after the publication and finalization of the standards	0 No tool to assess the CF of their products has been designed for producers in this initiative	1 ADEME will develop a tool that might be free for producers or at least at a reduced price	1 Footprint Expert™ cost around 1600 euros for a two users license	0 No tool to assess the CF of their products has been designed for producers in this initiative	1 Calculation tools available for free during the pilot project. It is not decided if it will be a paid service after the pilot project.	2 A PCF toolkit is in development. It will be free of charge within this year. Training programs exist too.	2 Tools are under development. No indication is given on its price but it will most probably not be free	2 A tool is provided to the producers for free	0 No tool to assess the CF of their products has been designed for producers in this initiative	1 No tool to assess independently the CF of their products has been designed for producers in this initiative	Free tool for producers	
Management - international structure	2 Gathers international economic operators	2 Gathers international economic operators	1 Initiative led at a national level, with possible participation of international structures	1 Initiative led at a national level, with possible participation of international structures	0 National initiative; no information about international parties involved	1 Initiative led at a national level, with possible participation of international structures	1 Initiative led at a national level, with possible participation of international structures	1 Mainly US structure with high interactions at international level; includes US EPA (observer) but also universities and multinational firms	1 Initiative managed nationally	0 Local initiative	0 Private initiative targeting consistency with national framework	International structure	
Management - Involvement of public authorities	1 Some public authorities are involved as stakeholders (UK Defra, US EPA and department of Agriculture,...)	1 Public bodies are following the methodology development	2 Public bodies are involved in the methodology development	2 The Carbon Trust and Defra were joint sponsors of the development of the method, which was overseen by the British Standards Institute	1 The Swedish Board of Agriculture is part of the steering group	2 Initiative supported and sponsored by the authorities	2 Initiative supported and sponsored by the authorities	1 The Steering Committee is declared to include representatives from governments	1 Methodology reviewed by the French EPA, and additional validation steps with the French EPA made during the methodology elaboration	0 No link with authoritative bodies	1 The project is supported by ADEME and regional bodies, but the methodology has been developed by an external party	National public bodies involved in the methodology development and implementation (BP X30-323, Korean PCF, Japan PCF)	
Tools - PCR-like documents	1 PCRs can be used as a secondary source of information; this choice should be documented	1 Publicly available PCRs developed in accordance with ISO 14025 can be used	2 Sectorial working groups are developing specific PCRs	1 Specific attention is paid to the use of PCRs (development at an international level,...)	0 No use of PCR, even if the approach is adapted to specific fields of the food industry	2 PCRs are developed specifically within the frame of the methodology	1 No clear information on PCRs. General guidelines are available for energy using or no energy using product categories.	2 Specific PCRs are under development	0 No PCRs, even if the scheme claims that they follow the recommendations of the BP X30-323 PCRs	0 No PCRs.	0 No PCRs, even if the scheme claims that they follow the recommendations of the BP X30-323 PCRs	Detailed PCRs available, in line with the methodology with a large stakeholder involvement	

Detailed assessment for Sub-scenario 2c: The mandatory index

Criteria	Product GHG Protocol	ISO 14067	BP X30-323	PAS 2050	Climate certification system SE	Methodology Japan PCF	Korea PCF	Sustainability Consortium (Walmart)	Carbon Index Casino	Climateop	Greenext (Leclerc)	Best practice
Management - Designed for fulfilling scenario objective	2 Numerical value available	2 Numerical value available	2 Numerical value available	2 Numerical value available	1 No calculated CF	2 Numerical value available	2 Numerical value available	2 No numerical value currently available. However, the methodology is meant to provide the users with a numerical value	2 Numerical value available	2 No numerical value published but numerical value available (the CF is not communicated to the consumer)	2 Numerical value available	Numerical value available
Management - Existence of a specific working groups (sectorial,...)	1 Existence of a unique working group	1 Existence of a unique working group	2 Existence of specific working groups by product categories	2 Numerous specific working groups were established to ensure expert communication and input into specific sectorial (e.g. agriculture, services, etc) and method development (e.g. data quality, recycling, etc) issues	0 Not designed for a working groups structure	1 Existence of a unique working group	1 Existence of a unique working group	1 Existence of a unique working group	1 Existence of a working group dedicated inside Casino	0 Not designed for a working groups structure	0 Not designed for a working groups structure	- BP X30-323: sectorial working groups built at national level - GHG Protocol / ISO 14067: transversal working group enabling works at an international level The best system would be a combination of both approaches (sectorial working groups at an international level)
Management - Stakeholders diversity	2 Involvement of international stakeholders, no restriction on participants	2 Involvement of international stakeholders; only experts participate	2 Involvement of national stakeholders, no restriction on participants	2 Involvement of international stakeholders, even if the methodology has been initially proposed by Carbon Trust	2 Involvement of KRAV and Swedish Seal (Svenskt Sigtill) with several major Swedish food companies (Milk, Lantmännen, the Federation of Swedish Farmers, Scan and Skanemejerier), some Swedish universities and the Swedish government	2 Initiative managed by national government. Stakeholders included in the methodology development	2 Initiative managed by national government. Stakeholders included in the methodology development	2 Involvement of stakeholders (universities, NGO, retailers, producers, EPA) in the development process	2 The French EPA supported the project, and several food companies, NGOs and consumers participated in the project	1 Limited (myclimate and Okozentrum Langenbruck (NGOs)), even if the application of ISO 14040 requirements take benefits from an indirect stakeholders involvement	1 Limited to French EPA and local public bodies, even if other private firms are working with Greenext	Involvement of representatives from various sectors at an international level (GHG Protocol, ISO 14067)
Management - Involvement of public authorities	1 Some public authorities are involved as stakeholders (UK Defra, US EPA and department of Agriculture,...)	1 Public bodies are following the methodology development	2 Public bodies are involved in the methodology development	2 The Carbon Trust and Defra were joint sponsors of the development of the method, which was overseen by the British Standards Institute	1 The Swedish Board of Agriculture is part of the steering group	2 Initiative supported and sponsored by the authorities	2 Initiative supported and sponsored by the authorities	1 The Steering Committee is declared to include representatives from governments	2 Methodology reviewed by the French EPA, and additional validation steps with the French EPA made during the methodology elaboration	0 No link with authoritative bodies	1 The project is supported by ADEME and regional bodies, but the methodology has been developed by an external party	National public bodies involved in the methodology development and implementation (BP X30-323, Korean PCF, Japan PCF)
Methodology validation	2 Broad involvement of the stakeholders in the elaboration process at an international level	2 Broad involvement of the stakeholders in the elaboration process at an international level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	2 Broad involvement of the stakeholders in the elaboration process at a national level	1 Methodology reviewed by the French environmental agency (ADEME)	0 The methodology in itself is not peer-reviewed. However the product LCA is reviewed by an independent organism. However, Climateop's methodology is based on ISO 14040 and it could be considered that it takes benefits from works made for elaborating this norm.	1 Methodology reviewed by the French environmental agency (ADEME) and ECOPASS	Broad involvement of stakeholders in the review and in the elaboration process
Methodology documentation availability	2 Detailed methodological documentation available	2 Detailed methodological documentation available	2 Detailed methodological documentation available	2 Detailed methodological documentation available	1 little methodological documentation available, guidelines still under development	2 Detailed methodological documentation available	1 Some general methodological documentation available	1 Documentation is available but since the methodology is not finalised major aspects are still missing	1 Only a brief description of the methodology is available on the Casino website. Detailed documentation is available on demand and under a confidentiality agreement	0 The documentation available does not gives indication on key aspects of the LCA : primary data, allocation rules, detailed description of the system boundaries, etc. These elements rely on ISO 14040 requirements. Additional elements to be published	0 The documentation available does not gives indication on key aspects of the LCA : primary data, allocation rules, detailed description of the system boundaries, etc.	Detailed methodological documentation available on the Internet
Methodology maturity - Number of products for which the methodology has been applied	1 Road testing has been performed	0 No product has been assessed yet	0 No product has been assessed yet, even if pilot projects have been initiated	2 More than 50 products have been assessed	1 Less than 50 products have been assessed	1 Less than 50 products have been assessed	2 More than 50 products have been assessed	0 No product has been assessed yet	2 More than 50 products have been assessed	2 More than 50 products have been assessed	2 More than 50 products have been assessed	More than 50 products in various products categories
Data collection - Possibility to use default values in the absence of primary data	1 Use of secondary data is framed and a list of useful database should be added to the final version of the protocol	0 No default PCF value proposed	1 The database under development might include default value for each product category concerned by the scheme	0 No default PCF value proposed	0 No quantitative PCF calculated	1 Secondary data are detailed in PCRs	0 No default value proposed	2 Default values are proposed for the products (Open IO database)	0 No default PCF value proposed	0 No default PCF value proposed	2 Default values are proposed for the products	For mandatory schemes, a set of default values should be available to cover the absence of primary data; however, its use should be limited to a ensure the representativeness of the results
Data collection - amount and detail of information required	1 Detailed data collection required	1 Detailed data collection required	1 Detailed data collection required	1 Detailed data collection required	2 A limited number of information is required the scheme does not require a full LCA and has identified specific criteria to fulfil	1 Detailed data collection required	1 Detailed data collection required	2 Product assessment based on a limited number of environmental criteria (though users might also have the possibility of do its own detailed impact assessment)	1 Detailed data collection required	1 Detailed data collection required	2 A limited amount of primary data is required to assess the CF, even if it can be adapted according to the objective of the process	Limited amount of information required with the possibility to do a more detailed analysis (methodological rules should ensure the compatibility of the different approaches)

Criteria	Product GHG Protocol	ISO 14067	BP X30-323	PAS 2050	Climate certification system SE	Methodology Japan PCF	Korea PCF	Sustainability Consortium (Wai-mart)	Carbon Index Casino	Climatop	Greenext (Lederer)	Best practice
Data collection - data quality rules	A section is dedicated to data quality assessment and examples of analysis grid are provided	Specific indicators are detailed in a dedicated section	Non-primary data are listed with appropriate sources to be used. Precision of the data used has to be evaluated	Data quality rules are described in a dedicated section	Process not transparent on this point	Precise data quality rules in PCRs regarding regional representativity....	Precise data quality rules in terms of oldness and representativity	No information currently available	No information available publicly, even if tests are realized to assess data quality	No information specific to the methodology; however, requirements from LCA norms seem to be applied	No information available publicly, even if tests are realized to assess data quality	Detailed list of points to assess and examples of analysis grids
Data collection - transparent description of the required primary data	Specific requirements are expressed. Secondary data use is limited to certain cases (verifications, ...). However, the scheme is not designed to compare products	Secondary process data shall be used for inputs where the collection of primary process data is not possible, and may include literature data, calculated data, estimates or other representative data.	PCRs detail the cases in which secondary data may be used; it excludes all the important contributors to emissions	Secondary data are said to be mainly used for electricity emissions factors, GWP... A priority order is also given	Definition of the required elements to get the label	The secondary data to be used if necessary are detailed in the PCR documents. When secondary data is used, the source has to be clarified.	Secondary data has to be used only if primary data is not available	The definition of the required primary data is not yet available but it is planned	Primary data used in the calculation are clearly identified in the supplier tool as well as in the related documentation	No transparent definition of the required primary data	No transparent definition of the required primary data	Required primary data should be clearly stated
Results - External critical review of the results	External critical review when the results are communicated to the consumers	External critical review when the results are communicated to the consumers	No yet defined	External critical review when the results are communicated to the consumers	the Food SE labelling can only be used in combination with another certification scheme that certifies components of sustainable food production and for which external verification is mandatory.	External critical review when the results are communicated to the consumers	External critical review when the results are communicated to the consumers	No yet defined	No external critical review of the results	External critical review	No external critical review of the results	External critical review of the results required
Results - Expected product range of application	No declared product category restriction. However working groups have identified that the methodology might not be easily used for certain product categories	No declared product category restriction	No declared product category restriction for mass market products	No declared product category restriction	Only concerns food products	No declared product category restriction	Agricultural, fishery, livestock and forest products goods are excluded, as well as pharmaceutical products, medical equipments and exported goods.	No declared product category restriction	Targeting mass market product like national scheme	No declared product category restriction	Targeting mass market product like national scheme	No product category restrictions
Results - Uncertainty assessment / sensitivity analysis	Both are required	Both are required	Both are required	Analysis are recommended but not required	No requirement	No requirement	No requirement	Few information available except "data explicitly acknowledges and reports uncertainty in a standardized way"	No requirement	Uncertainty assessment is required and sensitivity analysis is required when a high uncertainty is observed.	An uncertainty coefficient is given for the data. The overall uncertainty coefficient is calculated via a Monte Carlo analysis.	Requirement of both an uncertainty assessment and a sensitivity analysis (GHG Protocol, ISO 14067)
Results - Level declared for product comparability	Not designed for comparative assertions or product labelling	The application of this standard supports comparison under specific requirements	Made for comparison	Not designed to compare products	The methodology is meant to distinguish and thus compare high CF products and low CF products.	The methodology is displayed on the products and restriction to comparability is mentioned	The PCF is displayed on the products and restriction to comparability is mentioned	The methodology is designed in such a way that every product could get a CF index so that consumers can compare the PCF.	The methodology is designed in such a way that every product could get a CF index so that consumers can compare the PCF.	The goal of the methodology is to identify the best products so to compare PCF	The methodology owners claim that the PCF can be compared	Results comparability is based on many aspects (system boundaries, environmental factors, allocation rules, etc.). A transparent methodology development procedure and detailed PCRs are crucial elements to give credit to comparability claims
Tools - Database	The protocol will provide the user with a list of databases which can be used (Appendix D)	No requirement - no specific information about this issue	Public database developed by ADEME, which will include ELCD data; cost is not determined	In the first version of the PAS2050, the choice is left to the user, and a ranking of databases to be used is provided. The ELCD will be mentioned as a secondary source of information in the future version	No information. The process does not seem to imply the use of a LCA database	A free database is being developed	A database is being developed	A specific database is being developed and currently free for consultation	Most data comes from the ADEME's Bilan Carbone methodology, but the remaining ones are not published by the methodology owner	Ecoinvent	Two specific databases used in the development of Greenext methodology	Reference to a specific database
Management - international structure	Gathers international economic operators	Gathers international economic operators	Initiative led at a national level, with possible participation of international structures	Initiative led at a national level, with possible participation of international structures	National initiative; no information about international parties involved	Initiative led at a national level, with possible participation of international structures	Initiative led at a national level, with possible participation of international structures	Mainly US structure with high interactions at international level; includes US EPA (observer) but also universities and multinational firms	Initiative managed nationally	Local initiative	Private initiative targeting consistency with national framework	International structure
Tools - PCR-like documents	PCRs can be used as a secondary source of information; this choice should be documented	Publicly available PCRs developed in accordance with ISO 14025 can be used	Sectorial working groups are developing specific PCRs	Specific attention is paid to the use of PCRs (development at an international level,...)	No use of PCR, even if the approach is adapted to specific fields of the food industry	PCRs are developed specifically within the frame of the methodology	No clear information on PCRs. General guidelines are available for energy using or no energy using product categories.	Specific PCRs are under development	No PCRs, even if the scheme claims that they follow the recommendations of the BP X30-323 PCRs	No PCRs.	No PCRs, even if the scheme claims that they follow the recommendations of the BP X30-323 PCRs	Detailed PCRs available, in line with the methodology, with a large stakeholder involvement
Tools - Tool availability	Tools will be developed after the publication and finalization of the standards	No tool to assess the CF of their products has been designed for producers in this initiative	ADEME will develop a tool that might be free for producers or at least at a reduced price	Footprint Expert™ cost around 1600 euros for a two users license	No tool to assess the CF of their products has been designed for producers in this initiative	Calculation tools available for free during the pilot project. It is not decided if it will be a paid service after the pilot project.	A PCF toolkit is in development. It will be free of charge within this year. Training programs exist too.	Tools are under development. No indication is given on its price but it will most probably not be free	A tool is provided to the producers for free	No tool to assess the CF of their products has been designed for producers in this initiative	No tool to assess independently the CF of their products has been designed for producers in this initiative	Free tool for producers

Detailed assessment for Scenario 3: Implementing market-based incentives

Criteria	Methodology												Best practices												
	Product GHG Protocol	ISO 14067	BP X30-323	PAS 2050	Climate certification system SE	Japan PCF	Korea PCF	Sustainability Consortium (Wal-mart)	Carbon Index Casino	Climatop	Greenext (Leclerc)														
Management - Designed for fulfilling scenario objective	2	Numerical value available	2	Numerical value available	2	Numerical value available	1	No calculated CF	2	Numerical value available	2	Numerical value available	2	Numerical value available	Numerical value available										
Management - Existence of specific working groups (sectorial,...)	1	Existence of a unique working group	1	Existence of a unique working group	2	Existence of specific working groups by product categories	2	Numerous specific working groups were established to ensure expert communication and input into specific sectoral (e.g. agriculture, services, etc) and method development (e.g data quality, recycling, etc) issues	0	Not designed for a working groups structure	1	Existence of a unique working group	1	Existence of a unique working group	1	Existence of a working group dedicated inside Casino	0	Not designed for a working groups structure	0	Not designed for a working groups structure	- BP X30-323: sectorial working groups built at national level - GHG Protocol / ISO 14067: transversal working group enabling works at an international level The best system would be a combination of both approaches (sectorial working groups at an international level)				
Management - Stakeholders diversity	2	Involvement of international stakeholders, no restriction on participants	2	Involvement of international stakeholders; only experts partipate	2	Involvement of national stakeholders, no restriction on participants	2	Involvement of international stakeholders, even if the methodology has been initially proposed by Carbon Trust	2	Involvement of KRAV and Swedish Seal (Svenskt Sigtill) with several major Swedish food companies (Milko, Lantmännen, the Federation of Swedish Farmers, Scan and Skånemejerien), some Swedish universities and the Swedish government	2	Initiative managed by national government. Stakeholders included in the methodology development	2	Initiative managed by national government. Stakeholders included in the methodology development	2	Involvement of stakeholders (universities, NGO, retailers, producers, EPA) in the development process	2	The French EPA supported the project, and several food companies, NGOs and consumers participated in the project	1	Limited (myclimate and Ökozentrum Langenbruck (NGOs)), even if the application of ISO 14040 requirements take benefits from an indirect stakeholders involvement	1	Limited to French EPA and local public bodies, even if other private firms are working with Greenext	Involvement of representatives from various sectors at an international level (GHG Protocol, ISO 14067)		
Management - Involvement of public authorities	1	Some public authorities are involved as stakeholders (UK Defra, US EPA and department of Agriculture,...)	2	Public bodies are following the methodology development	2	Public bodies are involved in the methodology development	2	The Carbon Trust and Defra were joint sponsors of the development of the method, which was overseen by the British Standards Institute	1	The Swedish Board of Agriculture is part of the steering group	2	Initiative supported and sponsored by the authorities	2	Initiative supported and sponsored by the authorities	1	The Steering Committee is declared to include representatives from governments	1	Methodology reviewed by the French EPA, and additional validation steps with the French EPA made during the methodology elaboration	0	No link with authoritative bodies	1	The project is supported by ADEME and regional bodies, but the methodology has been developed by an external party	National public bodies involved in the methodology development and implementation (BP X30-323, Korean PCF, Japan PCF)		
Methodology validation	2	Broad involvement of the stakeholders in the elaboration process at an international level	2	Broad involvement of the stakeholders in the elaboration process at an international level	2	Broad involvement of the stakeholders in the elaboration process at a national level	2	Broad involvement of the stakeholders in the elaboration process at a national level	2	Broad involvement of the stakeholders in the elaboration process at a national level	2	Broad involvement of the stakeholders in the elaboration process at a national level	2	Broad involvement of the stakeholders in the elaboration process at a national level	2	Broad involvement of the stakeholders in the elaboration process at a national level	2	Broad involvement of the stakeholders in the elaboration process at a national level	1	Methodology reviewed by the French environmental agency (ADEME)	0	The methodology in itself is not peer-reviewed. However the product LCA is reviewed by an independent organism. However, Climatop's methodology is based on ISO 14040 and it could be considered that it takes benefits from works made for elaborating this norm.	1	Methodology reviewed by the French environmental agency (ADEME) and ECOPASS	Broad involvement of stakeholders in the review and in the elaboration process
Methodology documentation availability	2	Detailed methodological documentation available	2	Detailed methodological documentation available	2	Detailed methodological documentation available	1	little methodological documentation available, guidelines still under development	2	Detailed methodological documentation available	1	Some general methodological documentation available	1	Documentation is available but since the methodology is not finalised major aspects are still missing	1	Only a brief description of the methodology is available on the Casino website. Detailed documentation is available on demand and under a confidentiality agreement	0	The documentation available does not gives indication on key aspects of the LCA : primary data, allocation rules, detailed description of the system boundaries, etc. These elements rely on ISO 14040 requirements. Additional elements to be published	0	The documentation available does not gives indication on key aspects of the LCA : primary data, allocation rules, detailed description of the system boundaries, etc.	0	Detailed methodological documentation available on the Internet			
Methodology maturity - Number of products for which the methodology has been applied	1	Road testing has been performed	0	No product has been assessed yet	0	No product has been assessed yet, even if pilot projects have been initiated	2	More than 50 products have been assessed	1	Less than 50 products have been assessed	1	Less than 50 products have been assessed	2	More than 50 products have been assessed	0	No product has been assessed yet	2	More than 50 products have been assessed	2	More than 50 products have been assessed	2	More than 50 products have been assessed	More than 50 products in various products categories		
Management - international structure	2	Gathers international economic operators	2	Gathers international economic operators	1	Initiative led at a national level, with possible participation of international structures	1	Initiative led at a national level, with possible participation of international structures	0	National initiative; no information about international parties involved	1	Initiative led at a national level, with possible participation of international structures	1	Initiative led at a national level, with possible participation of international structures	1	Mainly US structure with high interactions at international level; includes US EPA (observer) but also universities and multinational firms	1	Initiative managed nationally	0	Local initiative	0	Private initiative targeting consistency with national framework	International structure		
Data collection - data quality rules	2	A section is dedicated to data quality assessment and examples of analysis grid are provided	2	Specific indicators are detailed in a dedicated section	2	Non-primary data are listed with appropriate sources to be used. Precision of the data used has to be evaluated	2	Data quality rules are described in a dedicated section	0	Process not transparent on this point	1	Precise data quality rules in PCRs regarding regional representativity....	1	Precise data quality rules in terms of oldness and representativity	1	No information currently available	1	No information available publicly, even if tests are realized to assess data quality	1	No information specific to the methodology; however, requirements from LCA norms seem to be applied	1	No information available publicly, even if tests are realized to assess data quality	Detailed list of points to assess and examples of analysis grids		

Criteria	Methodology												
	Product GHG Protocol	ISO 14067	BP X30-323	PAS 2050	Climate certification system SE	Japan PCF	Korea PCF	Sustainability Consortium (Wal-mart)	Carbon Index Casino	Climatop	Greenext (Leclerc)	Best practices	
Data collection - transparent description of the required primary data	2 Specific requirements are expressed. Secondary data use is limited to certain cases (verifications,...). However, the scheme is not designed to compare products	2 Secondary process data shall be used for inputs where the collection of primary process data is not possible, and may include literature data, calculated data, estimates or other representative data.	2 PCRs detail the cases in which secondary data may be used; it excludes all the important contributors to emissions	2 Secondary data are said to be mainly used for electricity emissions factors, GWP,...A priority order is also given	2 Definition of the required elements to get the label	2 The secondary data to be used if necessary are detailed in the PCR documents. When secondary data is used, the source has to be clarified.	2 Secondary data has to be used only if primary data is not available	2 The definition of the required primary data is not yet available but it is planned	2 Primary data used in the calculation are clearly identified in the supplier tool as well as in the related documentation	1 No transparent definition of the required primary data	1 No transparent definition of the required primary data	Required primary data should be clearly stated	
Data collection - amount and detail of information required	1 Detailed data collection required	1 Detailed data collection required	1 Detailed data collection required	1 Detailed data collection required	2 A limited number of information is required (the scheme does not require a full LCA and has identified specific criteria to fulfil)	1 Detailed data collection required	1 Detailed data collection required	2 Product assessment based on a limited number of environmental criteria. However, the user might also have the possibility to do its own detailed impact assessment	1 Detailed data collection required	1 Detailed data collection required	2 A limited amount of primary data is required to assess the CF, even if it can be adapted according to the objective of the process	Limited amount of information required with the possibility to do a more detailed analysis (methodological rules should ensure the compatibility of the different approaches)	
Results - Expected product range of application	2 No declared product category restriction. However working groups have identified that the methodology might not be easily used for certain product categories	2 No declared product category restriction	1 No declared product category restriction for mass market products	2 No declared product category restriction	0 Only concerns food products	2 No declared product category restriction	1 Agricultural, fishery, livestock and forest products goods are excluded, as well as pharmaceutical products, medical equipments and exported goods.	2 No declared product category restriction	1 Targeting mass market product like national scheme	2 No declared product category restriction	1 Targeting mass market product like national scheme	No product category restrictions	
Results - External critical review of the results	2 External critical review when the results are communicated to the consumers	2 External critical review when the results are communicated to the consumers	1 No yet defined	2 External critical review when the results are communicated to the consumers	2 the Food SE labelling can only be used in combination with another certification scheme that certifies components of sustainable food production and for which external verification is mandatory.	2 External critical review when the results are communicated to the consumers	2 External critical review when the results are communicated to the consumers	1 No yet defined	1 No external critical review of the results	2 External critical review	1 No external critical review of the results	External critical review of the results required	
Results - Time scale validity of the CF assessment	0 No information available	0 No information available	2 A validity time will be defined for each product category	1 2 years validity, unless significant changes appear	0 No information available	0 No information available	1 Annual surveillance check	0 No information available	0 CF is updated when packaging is renewed; if PCF changes before packaging renewal, it is updated on the internet website. However, there is no formal deadline for PCF recalculation	1 Recertification required after 2 years	0 Greenext SA guarantees the data for one year but no specific revision procedure is described	Defined validity of the CF assessment - product category specific	
Results - Level declared for product comparability	0 Not designed for comparative assertions or product labelling	1 The application of this standard supports comparison under specific requirements	2 Made for comparison	0 Not designed to compare products	2 The methodology is meant to distinguish and thus compare high CF products and low CF products.	1 The PCF is displayed on the products and restriction to comparability is mentioned	1 The PCF is displayed on the products and restriction to comparability is mentioned	2 The methodology is designed in such a way that every product could get a CF index so that consumers can compare the PCF	2 The methodology is designed in such a way that every product could get a CF index so that consumers can compare the PCF	2 The goal of the methodology is to identify the best products so to compare PCF	2 The methodology owners claim that the PCF can be compared	Results comparability is based on many aspects (system boundaries, environmental factors, allocation rules, etc.). A transparent methodology development procedure and detailed PCRs are crucial elements to give credit to comparability claims	
Results - Uncertainty assessment / sensitivity analysis	2 Both are required	2 Both are required	2 Both are required	1 Analysis are recommended but not required	0 No requirement	0 No requirement	0 No requirement	0 Few information available except "data explicitly acknowledges and reports uncertainty in a standardized way"	0 No requirement	2 Uncertainty assessment is required and sensitivity analysis is required when a high uncertainty is observed.	1 An uncertainty coefficient is given for the data. The overall uncertainty coefficient is calculated via a Monte Carlo analysis.	Requirement of both an uncertainty assessment and a sensitivity analysis (GHG Protocol, ISO 14067)	
Tools - PCR-like documents	1 PCRs can be used as a secondary source of information; this choice should be documented	1 Publicly available PCRs developed in accordance with ISO 14025 can be used	2 Sectorial working groups are developing specific PCRs	1 Specific attention is paid to the use of PCRs (development at an international level,...)	0 No use of PCR, even if the approach is adapted to specific fields of the food industry	2 PCRs are developed specifically within the frame of the methodology	1 No clear information on PCRs. General guidelines are available for energy using or no energy using product categories.	2 Specific PCRs are under development	0 No PCRs, even if the scheme claims that they follow the recommendations of the BP X30-323 PCRs	0 No PCRs.	0 No PCRs, even if the scheme claims that they follow the recommendations of the BP X30-323 PCRs	Detailed PCRs available, in line with the methodology, with a large stakeholder involvement	
Tools - Database	1 The protocol will provide the user with a list of databases which can be used (Appendix D)	0 No requirement - no specific information about this issue	1 Public database developed by ADEME, which will include ELCD data; cost is not determined	1 In the first version of the PAS2050, the choice is left to the user, and a ranking of databases to be used is provided. The ELCD will be mentioned as a secondary source of information in the future version	0 No information. The process does not seem to imply the use of a LCA database	2 A free database is being developed	2 A database is being developed	2 A specific database is being developed and currently free for consultation	1 Most data comes from the ADEME's Bilan Carbone methodology, but the remaining ones are not published by the methodology owner	1 Ecoinvent	1 Two specific databases used in the development of Greenext methodology	Reference to a specific database	

Detailed assessment for Scenario 4: Setting minimum requirements

Criteria	Methodology												Best practices										
	Product GHG Protocol	ISO 14067	BP X30-323	PAS 2050	Climate certification system SE	Japan PCF	Korea PCF	Sustainability Consortium (Wal-mart)	Carbon Index Casino	Climatop	Greenext (Leclerc)												
Management - Designed for fulfilling scenario objective	2	Numerical value available	2	Numerical value available	2	Numerical value available	1	No calculated CF	2	Numerical value available	2	No numerical value currently available. However, the methodology is meant to provide the users with a numerical value	2	Numerical value available	2	No numerical value published but numerical value available (the CF is not communicated to the consumer)	2	Numerical value available	Numerical value available				
Management - Existence of specific working groups (sectorial,...)	1	Existence of a unique working group	1	Existence of a unique working group	2	Existence of specific working groups by product categories	2	Numerous specific working groups were established to ensure expert communication and input into specific sectorial (e.g. agriculture, services, etc) and method development (e.g data quality, recycling, etc) issues	0	Not designed for a working groups structure	1	Existence of a unique working group	1	Existence of a unique working group	2	Existence of specific working groups by product categories	1	Existence of a working group dedicated inside Casino	0	Not designed for a working groups structure	0	Not designed for a working groups structure	- BP X30-323: sectorial working groups built at national level - GHG Protocol / ISO 14067: transversal working group enabling works at an international level The best system would be a combination of both approaches (sectorial working groups at an international level)
Management - Stakeholders diversity	2	Involvement of international stakeholders, no restriction on participants	2	Involvement of international stakeholders; only experts partipate	2	Involvement of national stakeholders, no restriction on participants	2	Involvement of international stakeholders, even if the methodology has been initially proposed by Carbon Trust	2	Involvement of KRAV and Swedish Seal (Svenskt Sigtill) with several major Swedish food companies (Milko, Lantmännen, the Federation of Swedish Farmers, Scan and Skåne mejerier), some Swedish universities and the Swedish government	2	Initiative managed by national government. Stakeholders included in the methodology development	2	Initiative managed by national government. Stakeholders included in the methodology development	2	Involvement of stakeholders (universities, NGO, retailers, producers, EPA) in the development process	2	The French EPA supported the project, and several food companies, NGOs and consumers participated in the project	1	Limited (myclimate and Okozentrum Langenbruck (NGOs)), even if the application of ISO 14040 requirements take benefits from an indirect stakeholders involvement	1	Limited to French EPA and local public bodies, even if other private firms are working with Greenext	Involvement of representatives from various sectors at an international level (GHG Protocol, ISO 14067)
Management - Involvement of public authorities	1	Some public authorities are involved as stakeholders (UK Defra, US EPA and department of Agriculture,...)	1	Public bodies are following the methodology development	2	Public bodies are involved in the methodology development	2	The Carbon Trust and Defra were joint sponsors of the development of the method, which was overseen by the British Standards Institute	1	The Swedish Board of Agriculture is part of the steering group	2	Initiative supported and sponsored by the authorities	2	Initiative supported and sponsored by the authorities	1	The Steering Committee is declared to include representatives from governments	1	Methodology reviewed by the French EPA, and additional validation steps with the French EPA made during the methodology elaboration	0	No link with authoritative bodies	1	The project is supported by ADEME and regional bodies, but the methodology has been developed by an external party	National public bodies involved in the methodology development and implementation (BP X30-323, Korean PCF, Japan PCF)
Methodology validation	2	Broad involvement of the stakeholders in the elaboration process at an international level	2	Broad involvement of the stakeholders in the elaboration process at an international level	2	Broad involvement of the stakeholders in the elaboration process at a national level	2	Broad involvement of the stakeholders in the elaboration process at a national level	2	Broad involvement of the stakeholders in the elaboration process at a national level	2	Broad involvement of the stakeholders in the elaboration process at a national level	2	Broad involvement of the stakeholders in the elaboration process at a national level	1	Existence of a unique working group	1	Methodology reviewed by the French environmental agency (ADEME)	0	The methodology in itself is not peer-reviewed. However the product LCA is reviewed by an independent organism. However, Climatop's methodology is based on ISO 14040 and it could be considered that it takes benefits from works made for elaborating this norm.	1	Methodology reviewed by the French environmental agency (ADEME) and ECOPASS	Broad involvement of stakeholders in the review and in the elaboration process
Methodology documentation availability	2	Detailed methodological documentation available	2	Detailed methodological documentation available	2	Detailed methodological documentation available	1	little methodological documentation available, guidelines still under development	2	Detailed methodological documentation available	1	Some general methodological documentation available	1	Documentation is available but since the methodology is not finalised major aspects are still missing	1	Documentation is available but since the methodology is not finalised major aspects are still missing	1	Only a brief description of the methodology is available on the Casino website. Detailed documentation is available on demand and under a confidentiality agreement	0	The documentation available does not gives indication on key aspects of the LCA : primary data, allocation rules, detailed description of the system boundaries, etc. These elements rely on ISO 14040 requirements. Additional elements to be published	0	The documentation available does not gives indication on key aspects of the LCA : primary data, allocation rules, detailed description of the system boundaries, etc.	Detailed methodological documentation available on the Internet
Methodology maturity - Number of products for which the methodology has been applied	1	Road testing has been performed	0	No product has been assessed yet	0	No product has been assessed yet, even if pilot projects have been initiated	2	More than 50 products have been assessed	1	Less than 50 products have been assessed	1	Less than 50 products have been assessed	2	More than 50 products have been assessed	0	No product has been assessed yet	2	More than 50 products have been assessed	2	More than 50 products have been assessed	2	More than 50 products have been assessed	More than 50 products in various products categories
Data collection - Possibility to use default values in the absence of primary data	1	Use of secondary data is framed and a list of useful database should be added to the final version of the protocol	0	No default PCF value proposed	1	The database under development might include default value for each product category concerned by the scheme	0	No default PCF value proposed	0	No quantitative PCF calculated	1	Secondary data are detailed in PCRs	0	No default value proposed	2	Default values are proposed for the products (Open IO database)	0	No default PCF value proposed	0	No default PCF value proposed	2	Default values are proposed for the products	For mandatory schemes, a set of default values should be available to cover the absence of primary data; however, its use should be limited a to ensure the representativeness of the results

Criteria	Product GHG Protocol	ISO 14067	BP X30-323	PAS 2050	Climate certification system SE	Japan PCF	Korea PCF	Sustainability Consortium (Wal-mart)	Carbon Index Casno	Climatop	Greenext (Leclerc)	Best practices
Data collection - amount and detail of information required	1 Detailed data collection required	1 Detailed data collection required	1 Detailed data collection required	1 Detailed data collection required	2 A limited number of information is required (the scheme does not require a full LCA and has identified specific criteria to fulfil)	1 Detailed data collection required	1 Detailed data collection required	1 Product assessment based on a limited number of environmental criteria (though users might also have the possibility of do its own detailed impact assessment)	1 Detailed data collection required	1 Detailed data collection required	2 A limited amount of primary data is required to assess the CF, even if it can be adapted according to the objective of the process	Limited amount of information required with the possibility to do a more detailed analysis (methodological rules should ensure the compatibility of the different approaches)
Results - External critical review of the results	2 External critical review when the results are communicated to the consumers	2 External critical review when the results are communicated to the consumers	1 No yet defined	2 External critical review when the results are communicated to the consumers	2 the Food SE labelling can only be used in combination with another certification scheme that certifies components of sustainable food production and for which external verification is mandatory.	2 External critical review when the results are communicated to the consumers	2 External critical review when the results are communicated to the consumers	1 No yet defined	1 No external critical review of the results	2 External critical review	1 No external critical review of the results	External critical review of the results required
Data collection - data quality rules	2 A section is dedicated to data quality assessment and examples of analysis grid are provided	2 Specific indicators are detailed in a dedicated section	1 Non-primary data are listed with appropriate sources to be used. Precision of the data used has to be evaluated	2 Data quality rules are described in a dedicated section	0 Process not transparent on this point	2 Precise data quality rules in PCRs regarding regional representativity....	2 Precise data quality rules in terms of robustness and representativity	1 No information currently available	1 No information available publicly, even if tests are realized to assess data quality	1 No information specific to the methodology; however, requirements from LCA norms seem to be applied	1 No information available publicly, even if tests are realized to assess data quality	Detailed list of points to assess and examples of analysis grids
Data collection - transparent description of the required primary data	2 Specific requirements are expressed. Secondary data use is limited to certain cases (verifications...).	2 Secondary process data shall be used for inputs where the collection of primary process data is not possible, and may include literature data, calculated data, estimates or other representative data.	2 PCRs detail the cases in which secondary data may be used; it excludes all the important contributions to emissions	2 Secondary data are used to be mainly used for electricity emissions factors, GWP... A priority order is also given	2 Definition of the required elements to get the label	2 The secondary data to be used if necessary are detailed in the PCR documents. When secondary data is used, the source has to be clarified.	2 Secondary data has to be used only if primary data is not available	2 The definition of the required primary data is not yet available but it is planned	2 Primary data used in the calculation are clearly identified in the supplier tool as well as in the related documentation	1 No transparent definition of the required primary data	1 No transparent definition of the required primary data	Required primary data should be clearly stated
Results - Expected product range of application	2 No declared product category restriction. However working groups have identified that the methodology might not be easily used for certain product categories	2 No declared product category restriction	1 No declared product category restriction for mass market products	2 No declared product category restriction	0 Only concerns food products	2 No declared product category restriction	2 Agricultural, fishery, livestock and forest products goods are excluded, as well as pharmaceutical products, medical equipments and exported goods.	2 No declared product category restriction	1 Targeting mass market product like national scheme	2 No declared product category restriction	1 Targeting mass market product like national scheme	No product category restrictions
Results - Uncertainty assessment / sensitivity analysis	2 Both are required	2 Both are required	2 Both are required	1 Analysis are recommended but not required	0 No requirement	0 No requirement	0 No requirement	0 Few information available except "data explicitly acknowledge and reports uncertainty in a standardized way"	0 No requirement	2 Uncertainty assessment is required and sensitivity analysis is required when a high uncertainty is observed.	1 An uncertainty coefficient is given for the data. The overall uncertainty coefficient is calculated via a Monte Carlo analysis.	Requirement of both an uncertainty assessment and a sensitivity analysis (GHG Protocol, ISO 14067)
Results - Time scale validity of the CF assessment	0 No information available	0 No information available	2 A validity time will be defined for each product category	2 2 years validity, unless significant changes appear	0 No information available	0 No information available	0 Annual surveillance check	0 No information available	0 CF is updated when packaging is renewed; if PCF changes before packaging renewal, it is updated on the internet website. However, there is no formal deadline for PCF recalculation	1 Recertification required after 2 years	0 Greenext SA guarantees the data for one year but no specific revision procedure is described	Defined validity of the CF assessment - product category specific
Results - Level declared for product comparability	0 Not designed for comparative assertions or product labelling	2 The application of this standard supports comparison under specific requirements	2 Made for comparison	0 Not designed to compare products	2 The methodology is meant to distinguish and thus compare high CF products and low CF products.	2 The PCF is displayed on the products and restriction to comparability is mentioned	2 The PCF is displayed on the products and restriction to comparability is mentioned	2 The methodology is designed in such a way that every product could get a CF index so that consumers can compare the PCF	2 The methodology is designed in such a way that every product could get a CF index so that consumers can compare the PCF	2 The goal of the methodology is to identify the best products so to compare PCF	2 The methodology owners claim that the PCF can be compared	Results comparability is based on many aspects (system boundaries, environmental factors, allocation rules, etc.) A transparent methodology development procedure and detailed PCRs are crucial elements to give credit to comparability claims
Tools - Database	1 The protocol will provide the user with a list of databases which can be used (Appendix D)	0 No requirement - no specific information about this issue	1 Public database developed by ADEME, which will include ELCD data; cost is not determined	0 In the first version of the PAS2050, the choice is left to the user, and a ranking of databases to be used is provided. The ELCD will be mentioned as a secondary source of information in the future version	0 No information. The process does not seem to imply the use of a LCA database	2 A free database is being developed	2 A database is being developed	2 A specific database is being developed and currently free for consultation	1 Most data comes from the ADEME's Bilan Carbone methodology, but the remaining ones are not published by the methodology owner	1 Ecoliment	1 Two specific databases used in the development of Greenext methodology	Reference to a specific database
Management - International structure	2 Gathers international economic operators	2 Gathers international economic operators	1 Initiative led at a national level, with possible participation of international structures	0 Initiative led at a national level, with possible participation of international structures	0 National initiative; no information about international parties involved	1 Initiative led at a national level, with possible participation of international structures	1 Initiative led at a national level, with possible participation of international structures	1 Mainly US structure with high interactions at international level; includes US EPA (observer) but also universities and multinational firms	1 Initiative managed nationally	0 Local initiative	0 Private initiative targeting consistency with national framework	International structure
Tools - PCR-like documents	2 PCRs can be used as a secondary source of information; this choice should be documented	2 Publicly available PCRs developed in accordance with ISO 14025 can be used	2 Sectorial working groups are developing specific PCRs	0 Specific attention is paid to the use of PCRs (development at an international level...)	0 No use of PCR, even if the approach is adapted to specific fields of the food industry	2 PCRs are developed specifically within the frame of the methodology	2 No clear information on PCRs. General guidelines are available for energy using or no energy using product categories.	2 Specific PCRs are under development	0 No PCRs, even if the scheme claims that they follow the recommendations of the BP X30-323 PCRs	0 No PCRs.	0 No PCRs, even if the scheme claims that they follow the recommendations of the BP X30-323 PCRs	Detailed PCR available in line with the methodology with a large stakeholder involvement
Tools - Tool availability	2 Tools will be developed after the publication and validation of the standards	0 No tool to assess the CF of their products has been designed for producers in this initiative	1 ADEME will develop a tool that might be free for producers or at least at a reduced price	0 Footprint Expert™ might be free for two users license	0 No tool to assess the CF of their products has been designed for producers in this initiative	2 Calculation tools available for free during the pilot project. It is not decided if it will be a paid service after the pilot project.	2 A PCF toolkit is in development. It will be free of charge within this year. Training programs exist too.	2 Tools are under development. No indication is given on its price but it will most probably not be free	2 A tool is provided to the producers for free	0 No tool to assess the CF of their products has been designed for producers in this initiative	1 No tool to assess independently the CF of their products has been designed for producers in this initiative	Free tool for producers

Appendix 5: Complements on burden shifting

This annex aims at presenting various existing studies regarding environmental burden shifting:

The suitability of carbon footprint to be representative of the whole environmental burden - quantitative comparison between carbon footprint and life cycle assessments (LCA), Alexis Laurent's thesis (Technical University of Denmark, 2009)

The main results of this analysis were that:

- *“carbon footprint turns out to be very close to the more comprehensive assessment of global warming used in LCA, as little difference in the obtained results for both methods occurs. However, a great care must be taken when handling cases where non-methane volatile organic compounds show high predominance in the inventory; those substances are not included in a carbon footprint as not part of the six GHG of the Kyoto Protocol.”*
- *“when testing a broad number of products/services, climate change appeared in most cases to be (largely) dominated by one or several other impacts, mainly toxicity-related ones. Typically, between one and two orders of magnitude were observed for ecotoxicity in aquatic ecosystems.”*

These results have to be considered with attention since some methodological biases in the analysis were identified:

- contributing substances in the toxicity-related impacts are mainly governed by metals, which were not all included in the normalization,
- probable lack of comprehensiveness in the inventories used for defining the Eco-invent processes and for calculating the normalization references,
- discrepancies between methodological tools on some specific impacts evaluation (terrestrial ecotoxicity for example) leading to the impossibility to draw consistent conclusions,
- specific uncertainties of each methodology considered

Final conclusion is that ***“in most cases, carbon footprint results cannot be used as representative of the whole environmental burden”*** and that ***“a product/service integrating efforts to get low contribution to climate change might still be associated with residual toxicity-related impacts and therefore might not deserve a “green” mark, which it would have undoubtedly gained if only carbon footprint results were considered”*** (renewable energies for example).

This study finally states that the intensive use of CF may distort the meaning of CF indicator to public opinion and that CF results have to be put into perspective within the whole environmental burden in order to avoid confusion between “low carbon” and “environmental friendly” products”.

Environmental product indicators and benchmarks in the context of environmental labels and declarations (ANEC, 2010)

The ANEC analyzed consumers' position regarding environmental labels and declarations. In particular, the comparison between CO₂ indicators and environmental indicators was performed (specifically energy indicators). Main conclusions are as follows:

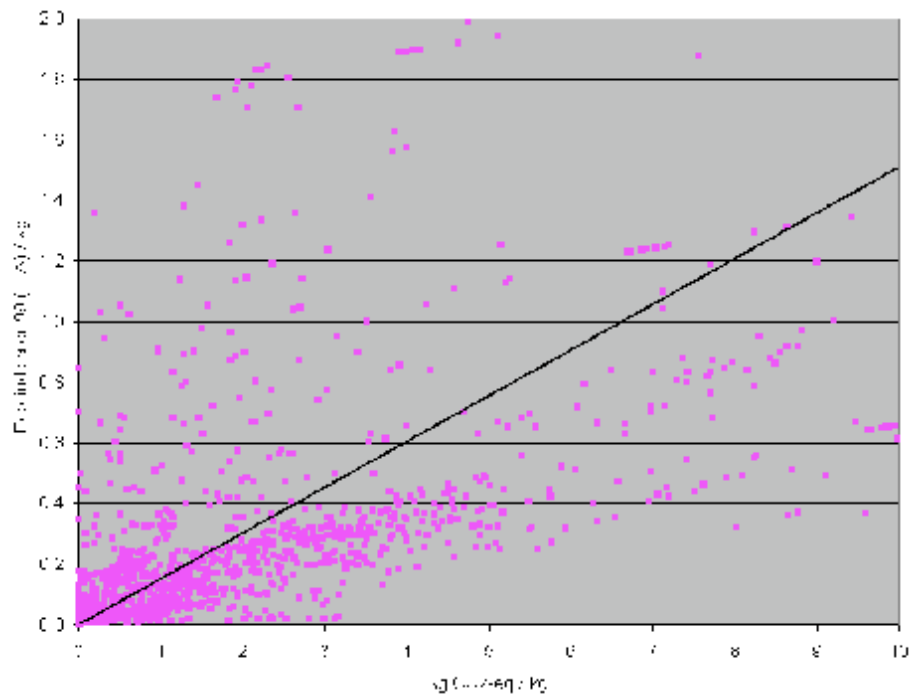
- CO₂ emissions indicators are more understandable while dealing with greenhouse gases emissions than energy consumption indicators, and more able to provoke a shift in behaviours (use of green energy, etc.). Moreover, since CO₂ indicators are quite new, the risk of misleading comparisons with other orders of magnitude is limited
- A strong CO₂-focus leaves out other environmental impacts of energy generation; this is particularly true for energy-production with nuclear power and even hydro-dams. A balance should be found between the need for precise data as to promote the use of CO₂-extensive energy production systems and the shunning of neglecting other important environmental impacts.
- *“Every European country features its own characteristic electricity-mix. If product carbon footprints are calculated using national average data for the use phase of electric and electronic equipment, CO₂-product-values would be different for each EU-country. In this case, thresholds for the EU Ecolabel and the EU Energy Label would have to be negotiated separately in each member country. The use of European average data would solve this problem.”*
- LCA is difficult to use to obtain a product differentiation given the assumptions to be made in the methodological preparation and the size of product categories. Methodologies based on this approach will face the same limitation.
- The study provides the example of the Scandinavian paper industry which has made significant efficiency gains over the past few years. Now, *“paper from primary pulp can – on an energy and CO₂ bases – compete with recycling paper. Nevertheless, recycling paper has still manifold environmental benefits, ranging from a better use of resources, fewer impacts on biodiversity and reduced land consumption.”*

The study finally states that ***“Carbon footprint should not be used as standalone product information but shall be combined with information on environmentally sound use and disposal as well as information on other environmental impacts.”***

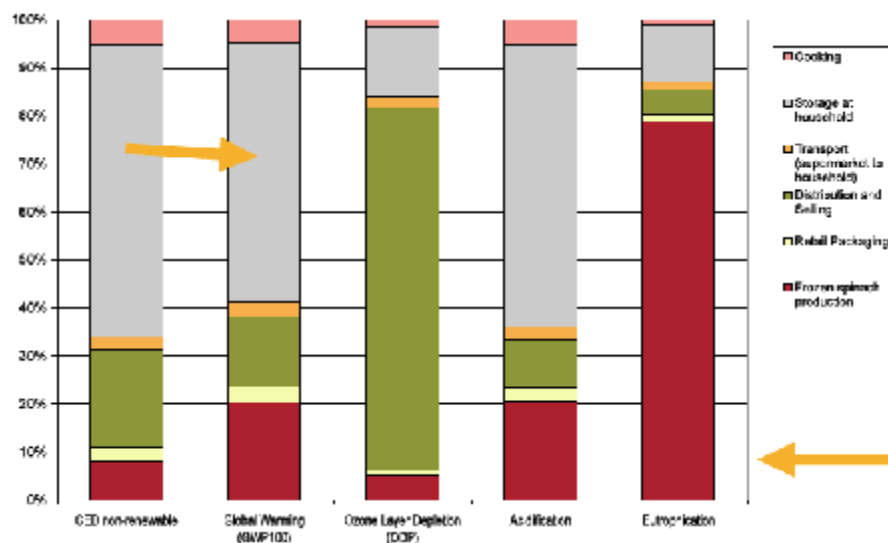
Can a carbon footprint give a good picture on environmental impacts? Presentation made by Dr. Niels Jungbluth (ESU-services GmbH, Uster) for the Swiss Discussion Forum LCA (2009)

Note: Dr. Niels Jungbluth is in the editorial board of the “Int. Journal of LCA”. He works as a special expert for several organizations e.g. Deutsche Bundesstiftung Umwelt, United Nations Framework Convention on Climate Change UNFCCC, CEN TC 383 standard (GHG accounting on biofuels), UNEP-SETAC life cycle initiative, Swiss law on tax exemption for biofuels.

The following graph shows the lack of correlation between the overall environmental impact (Eco-indicator) and greenhouse gases emissions for some materials on the basis of Eco-invent database:



The example of spinach is also provided to show that the influence of the distribution of life cycle steps depends on the type of indicator studied:



This is particularly important when defining the scope of life cycle steps to be considered.

This presentation also highlights that differentiation between responsibilities of distributor and consumer is necessary, and to achieve this goal, a clear definition of the functional unit is necessary

Other inputs

Various articles have been published on this subject. Main interesting inputs from these articles have been extracted and are here quoted.

“Is Cumulative Fossil Energy Demand a Useful Indicator for the Environmental Performance of Products?” – Article from VOL. 40, NO. 3, 2006 / ENVIRONMENTAL SCIENCE & TECHNOLOGY (American Chemical society)

This article studies the relationship between Cumulative Energy Demand (CED) and other environmental impacts for 1218 products divided into the following categories: energy production, material production, transport and waste treatment.

- *“for all product groups but waste treatment, the fossil CED correlates well with most impact categories, such as global warming, resource depletion, acidification, eutrophication, tropospheric ozone formation, ozone depletion, and human toxicity (explained variance between 46% and 100%).”*
- *“the usefulness of fossil CED as a stand-alone indicator for environmental impact is limited by the large uncertainty in the product-specific fossil CED-based impact scores (larger than a factor of 10 for the majority of the impact categories; 95% confidence interval). A major reason for this high uncertainty is non-fossil energy related emissions and land use, such as landfill leachates, radionuclide emissions, and land use in agriculture and forestry.”*

The main conclusion to be kept from this analysis is that the carbon footprint and CED are highly related for the following product categories: energy production, material production and transport. Given the conclusions proposed for CED, it can be guessed that **carbon footprint can be considered as a good indicator of global environmental impacts except when non-fossil energy related emissions are important**, since it increases the uncertainty.

“Cumulative Energy demand as predictor for the environmental burden of commodity production” – Article from VOL. 44, NO. 6, 2010 / ENVIRONMENTAL SCIENCE & TECHNOLOGY (American Chemical Society)

This article analyzes the possibility of using Cumulative Energy Demand (CED) as an indicator of other environmental impacts. Its applicability is assessed for 498 commodities (metals, glass, paper and cardboard, organic and inorganic chemicals, agricultural products, construction materials, and plastics) and for 6 environmental impacts (ecological footprint, cumulative energy extraction, climate footprint, ecoscarcity, environmental priority strategy and ecoindicator).

It concludes that *“all impact assessment methods investigated often provide converging results, in spite of the different philosophies behind these methodologies. Fossil energy use is identified by all methodologies as the most important driver of environmental burden of the majority of the commodities included, with the main exception of agricultural products”* due to the effect of biomass, land use, etc.

“The importance of Carbon footprint estimation boundaries” – Article from VOL. 42, NO. 16, 2008 / ENVIRONMENTAL SCIENCE & TECHNOLOGY (American chemical society)

This article mainly focuses on activity reporting and relation with input/output approach.

- **The term “Carbon footprint” is not really framed and covers a large scope of practices** since for a same product or activities, scope can vary and greenhouse gases covered too.
- **Carbon footprint’s representativeness depends on the type of product considered and the scope boundaries:**
 - Nearly two-thirds of all economic sectors providing goods and services (323 of the 491 industries) would have less than 25% of their total carbon footprint represented

by Tiers 1 and 2. The 10% of sectors that would have most of their footprint (80%) represented by Tiers 1 and 2 are well-known sources such as power generation, cement manufacturing, and the transportation sectors (air, truck, rail, and water).

- Others sectors are less advanced on this subject, because they are not recognized as energy intensive consumer. For example, choosing an assessment on scope 1 & 2 would only gather 6% of emissions of the book publishing sector since main emissions in the life cycle come from product manufacturing and final distribution.
- **Carbon footprint boundaries should be adapted to the goal to be achieved** (e.g.: difficulties to integrate scope 3 emissions for a management strategy) but it could be interesting to widen it as much as possible in order to take benefits from other **indirect levers** (work on supply chain, modification of consumer demand...).
- Another problem to be addressed is the **responsibility sharing**, especially in the case of product carbon footprint.
- *“In developing broad measures of carbon footprints, **international trade should also be included**. With growing international freight and greater production in countries with less stringent environmental regulations and higher carbon intensities, total carbon footprints should reflect the emissions due to transport and overseas production”*

Note: for this article,

- Tier 1 gathers direct emissions from company operations,
- Tier 2 those from energy inputs to company operations,
- Tier 3 gathers other indirect sources without a clear definition; an extension to include the entire supply chain (cradle-to-gate approach) is proposed as well as a Tier-4 which includes the whole life cycle (delivery, use, end-of-life...).

Appendix 6: Bibliography

This document details the main sources of information consulted for selected methodologies; additional information were also obtained from methodologies owner and other experts of this issue.

Other information sources have been consulted but are not detailed below like: cases studies and PCRs, press communicates, environmental reports from non-listed methodologies, documentation related to the Eco-design and Ecolabel European Directives, presentations made during the 3rd Product Carbon Footprint Forum (Berlin, March 2010), documentation associated with databases, etc.

Burden shifting references are detailed in the related Appendix.

GhG Protocol

From GhG Protocol Initiative:

- Product Life Cycle Accounting and Reporting Standard (November 2009)
- Technical Working Group Update Webinar (April 2010)
- Governance Plan & Terms of Reference
- Summary of the Product Standard Road Testing Workshop (May 2010)

Website: <http://www.ghgprotocol.org/standards/product-and-supply-chain-standard>

Contact: Ms Andrea Brown (WBCSD)

ISO 14067

Successive drafts for working groups have been consulted, as well as the list of comments issued from worldwide WGs. The latest documents used were those edited in May 2010; as so, discussions having occurred in July 2010 could not be included.

Contact: Mr Kurt Buxmann

BP X30-323

From methodology owners (ADEME, MEEDDM...):

- BP X30-323 and related documentation (guidelines...)
- Guide de lecture de l'annexe méthodologique du BP X 30-323
- Draft documents from working groups as well as related presentations

Website: <http://affichage-environnemental.afnor.org/>

Contacts: Mr Sylvain Chevassus (MEEDDM); Ms Christine Cros (ADEME)

PAS 2050

From BSI, Defra and Carbon Trust:

- PAS 2050: 2008
- Guide to PAS 2050
- Footprint Expert™ presentation
- Code of Good Practice for Product Greenhouse Gas Emissions and Reduction Claims
- Methods review to support the PAS for the calculation of the embodied greenhouse gas emissions of goods and services (February 2008; Defra, Stockholm Environment Institute and University of Minnesota)

Website: <http://www.bsigroup.com/en/Standards-and-Publications/How-we-can-help-you/Professional-Standards-Service/PAS-2050/>

Contacts: Mr Robin Dickinson and Mr Graham Sinden (Carbon Trust); Ms Maureen Nowak (Defra)

Climate certification system SE

From methodology owner:

- Climate certification for the food chain – launch of a Swedish initiative (November 2009)
- Standard for reducing climate impact in the production and distribution of food (2009)

Website: <http://www.klimatmarkningen.se/>

Contact: Ms Anna Richert (Klimatexpert Svenskt Sigill)

Japan CFP

From JEMAI

- Draft of Japanese Technical Specification “General principles for the assessment and labelling of Carbon Footprint of Products”
- Draft of 2nd Edition of Japanese Technical Specification “General principles for the assessment and labelling of Carbon Footprint of Products” (TS Q0010)

Website: <http://www.cfp-japan.jp/english/>

Contact: Ms Asami Miyake (JEMAI)

Korea PCF

From KEITI

- Guidelines on Korea Product Carbon Footprint (February 2010)

Website: <http://www.edp.or.kr/carbon/english/main/main.asp>

Contacts: Mr Gyu-Soo Joe (KEITI) and Mr Jun-Hyuk Hur (KEITI)

Sustainability Consortium (Walmart)

- Supplier Sustainability Assessment: 15 Questions for Suppliers (Walmart)
- Open Input-Output documentation (November 2008; Sylvatica)
- Supplier Sustainability Assessment (presentation made by Walmart)
- Sustainable Product Index: Fact Sheet (Walmart)
- Sustainability Supplier Assessment FAQs (Walmart)

Websites

- Walmart: <http://walmartstores.com/Sustainability/9292.aspx>
- Sustainability Consortium: <http://www.sustainabilityconsortium.org/about>
- Open IO: <http://openio.walton.uark.edu/>

Contacts: Mr Marcello Manca (UL Environment Inc.), Mr Jonathan Johnson (University of Arkansas) and Mr Jeff Rice (University of Arkansas)

Casino

- (confidential documentation)

Website: http://www.produits-casino.fr/developpement-durable/dd_indice-carbone-demarche.html

Contact: Ms Corinne Mercadie (Casino); Mr Sehen Ratsimbazafy (Bio Intelligence Services)

Climatop

- Granting the Authorization to Use the Climatop Label, Environmental and Social Standards of the Trademark (Climatop)

Website

- www.climatop.ch

- <http://www.migros.ch/FR/Supermarche/Engagement/Climatop/Seiten/Climatop.aspx>

Contact: Mr David Wettstein (My Climate) and Mr Fabian Kohler (Climatop)

Greenext (Leclerc)

- Calcul et analyse de l'impact environnemental des produits de consommation (May 2010; presentation by Greenext)

Website: <http://www.greenext.eu/>

Contacts: Ms Caroline Alazard (Greenext)

Other methodologies / initiatives

Reports / Presentations

- AIM® position paper - product carbon footprinting and product carbon footprint labels (January 2010; AIM)
- Requirements on Consumer Information about Product Carbon Footprint (February 2010; ANEC)
- Evaluation of Environmental Product Declaration Schemes (September 2002; ERM)
- Climate Bonus - Combining carbon footprinting, monitoring, feedback, and rewards (Climate Bonus)
- Etiquetage Caisses d'Épargne (Presentation made in March 2009 at Agrion)
- Etiquetage développement durable des produits d'épargne - Retours de tests consommateurs (June 2009; Utopies)
- Pistes pour un étiquetage environnemental lisible et efficace – Résultat d'enquête consommateur (July 2009; Ernst & Young)
- Etude Affichage des performances environnementales pour les mobiles SFR (CODDE; February 2010)
- Carbon footprint and labelling – Experience from Thai Food Industry (various authors)
- The L.E.K. Consulting Carbon Footprint Report 2007 (2007, LEK Consulting)
- Methodology summary of the Climate Conscious Assessment (October 2007; The Climate CO2nservancy)
- General Reporting Protocol (May 2008; The Climate Registry)
- A presentation for Consulting Organizations preparing to use CarbonCounted's CarbonConnect System for GHG Projects with their Clients (Carbon Counted)
- CarbonFree™ Product Certification Carbon Footprint Protocol (versions July 2007 and March 2010; Carbonfund.org)
- Beverage Industry Sector Guidance for Greenhouse Gas Emissions Reporting (January 2010; Beverage Industry Environmental Roundtable)
- Methods for Life Cycle Inventory of a product – Synthesis (2003; Sangwon Suh, Gjalt Huppes)

- Towards an international harmonized method of calculating and reporting transport GHG emissions at firm level (Altimed Consulting)
- Curbing Your Climate Impact (2007; Seattle Climate Partnership)
- Les réflexes verts: une première campagne co-concue entre équipes MKG, COMM et DD (Orange)
- Etiquetage environnemental et bilan CO₂ des produits – Agenda of Agrion meeting with presentation of subjects to be discussed (March 2009)

Websites

- Green Leaf Mark - <http://www.intertek.com/green/certification/>
- Descours & Cabaud: <http://www.pei-france.com>
- Economic input-output life cycle assessment (Carnegie Mellon Institute): <http://www.eiolca.net/>
- PCF Pilot Project: <http://www.pcf-projekt.de/main/at-a-glance/>