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**GLOBAL FORUM ON TRADE**  
**TRADE AND CLIMATE CHANGE**

Paris, 9 and 10 June 2009

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***COUNTING CARBON IN THE MARKETPLACE:  
PART I – OVERVIEW PAPER***

*by*

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\* The views expressed in this study are those of the author and do not necessarily reflect those of the OECD or of any of its Member governments.

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## COUNTING CARBON IN THE MARKETPLACE: PART I – OVERVIEW PAPER

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### Executive Summary

Concern over climate change has stimulated interest in estimating the total amount of greenhouse gasses (GHG) produced during the different stages in the “life cycle” of goods and services — i.e. their production, processing, transportation, sale, use and disposal. The outcome of these calculations are often referred to as “product carbon footprints” (PCFs), where “carbon footprint” is the total amount of GHGs produced for a given activity and “product” is any good or service that is marketed. PCFs are thus distinct from GHG assessments performed at the level of projects, corporations, supply chains, municipalities, nations or individuals.

This paper discusses the rationale, context, coverage and characteristics of emerging voluntary standards and schemes that estimate and designate PCFs for internationally traded products.

Product carbon footprinting is currently dominated by private standards and by certification schemes operated by small for-profit and not-for-profit consultancy companies and in a few cases by large retailers and manufacturers. Government support to PCF schemes and standards has been limited so far. The exceptions are the PAS 2050 standard, the development of which was supported by the UK Department for Environment, Food and Rural Affairs (Defra); Japan's pilot Carbon Footprint Scheme, launched in April 2009; and the assistance provided by the French Agence de l'Environnement et de la Maîtrise de l'Energie (ADEME) in the development of a scheme operated by the food retailer Casino. At the international level, PCF standards are being developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD-WRI), through its Greenhouse Gas Protocol; and by the International Office for Standardization.

We estimate that globally there were only 15 to 20 PCF schemes as of April 2009. The study provides detailed information on 12 operational schemes, and some information on a further three. All of these schemes have been established within the last two years. Considering the sometimes high costs and technical challenges of PCF, it is therefore no surprise that only a small number of certified carbon-footprinted products so far have found their way onto retail-outlet shelves. While some schemes report strong interest in PCF from producers and retailers, and are expanding their clientele and product range, we could not identify any clear trends in these respects.

The investigated schemes display large differences in scale and product coverage, type of claim made and (where applicable) certification offered, GHG assessment methods, communication approaches, and levels and means of verification and transparency. A range of factors may account for this diversity, such as differences in ambition, technical competence and access to external support; differences in economic resources; different country and business contexts; and the absence of a dominant PCF standard.

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Meanwhile, consumers show some interest in PCF information and seem to indicate that they would probably prefer carbon-labelled products and firms over others, other things being equal. It is also likely that a minority are, or would be, willing to pay a price premium for products with significantly lower footprints than like ones, not much different from organic price premium. But consumers are also sceptical about the credibility of the “climate-friendly” claims made by retailers and manufacturers and show a preference for third-party verification. This contrasts with the relatively weak verification systems currently used in PCF. All this indicates that there are limits to the direct commercial benefits from PCF in terms of increased sales, as opposed to benefits related to cost reductions and to compliance with future climate-change legislation.

We have also examined, although somewhat superficially, factors that help assess the potential effects of PCF on international trade. First, the lack of an international PCF standard could favour producers based in countries with national public standards (so far only the UK), with trusted and workable private standards, or with well-functioning, non-proprietary scheme operators (Canada, Germany, the United Kingdom and the United States). In this regard, only one scheme, the Carbon Labelling Company, operates internationally. Second, PCF calculation and certification is expensive and demanding on human resources (for data provision and effective communication of the PCF). This tends to favour large and resourceful producers, who may benefit from significant economies of scale (a low cost of certification per product sold). This could exclude most companies in developing countries. Third, and unexpectedly perhaps, no bias was found in the way the GHG assessments treated long-distance transport relative to other emission sources, although we did not investigate this aspect in depth, and only one scheme highlights the distance travelled by the product (along with other “sustainability” criteria). Finally, the GHG assessment method of the potentially influential PAS 2050 standard, by excluding emissions associated with capital plant, has an in-built bias against relatively labour-intensive production systems, which are typical of developing countries. Other schemes and standards may also contain such biases, in principle or in practice, but more in-depth research is needed to document this.

In sum, although PCF, because it is based on LCA, is likely to have a higher degree of credibility with consumers than any other sort of claim made by operators in relation to the climate-change attributes of products, is also difficult and costly to perform and its impact on sales remains unclear. Moreover, measurement of GHG emissions at a corporate level probably provides more accessible opportunities for corporate cost savings than PCF. Therefore, whatever its implications for developing countries in principle, its adoption seems likely to remain limited and therefore its impacts on trade and development seem unlikely to be substantial – at least in the short-to-medium term.

## I. Introduction

1. Concern over climate change has stimulated interest in estimating the total amount of greenhouse gasses (GHG) produced during the different stages in the “life cycle” of goods and services — i.e. their production, processing, transportation, sale, use and disposal (Brenton et al., 2008; Brenton et al., 2008; Øresund Food Network, 2008). In this paper we refer to the outcome of these calculations as product carbon footprints (PCFs), where “carbon footprint” is the total amount of GHGs produced for a given activity and “product” is any good or service that is marketed. PCFs are thus distinct from GHG assessments performed at the level of projects, corporations, supply chains, municipalities, nations or individuals.

2. A PCF like other GHG assessments is expressed in terms of its global warming potential (GWP). GWP embraces the impact of different GHGs (CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub>, O<sub>3</sub>, etc.) on global warming and the GWP of all GHGs are expressed in terms of the impact on global warming of the equivalent weight (usually in grams or kilograms) of CO<sub>2</sub>-equivalent (CO<sub>2</sub>e).<sup>3</sup> After summing up all the GHGs produced at each stage in the life of the product, the PCF can then be expressed as grams or kilograms of CO<sub>2</sub>e per unit of product. For example, the carbon footprint of a 330 ml can of Coke that has been purchased, refrigerated, consumed and then recycled by a consumer in the UK is 170 g CO<sub>2</sub>e.<sup>4</sup> We emphasize however that very different footprint values for the same product and country can be obtained, depending on the databases and calculation methods used (Kejun et al., 2008).

3. The development of public and international PCF standards is at a very early stage. The first with the ambition to cover a wide range of diverse products, PAS 2050, was published in October 2008 by the British Standards Institute and the Carbon Trust, while the International Organisation for Standardization only started to develop a “carbon footprint of products” standard (ISO/NP 14067-1/2) in late 2008.<sup>5</sup> The World Resources Institute and the World Business Council on Sustainable Development, authors of the widely recognised and used Greenhouse Gas Protocol for project and corporate level GHG assessments, started to develop its Product and Supply Chain GHG Accounting and Reporting Standard in September 2008. This new standard, expected to be published in May 2010, will include guidelines on both product life-cycle accounting and calculation and reporting of corporate ‘Scope 3’ emissions (corporations’ indirect emissions, other than those already counted under ‘Scope 2’, which refers to emissions from generation of bought-in energy).<sup>6</sup> In Japan in June 2008 the Ministry of Economy, Trade and Industry initiated the development of a voluntary PCF scheme. A trial project period commenced in April 2009 and will cover 57 different products (Ikezuki, 2009). Finally, the EU is drawing up a regulation for biofuels that will include requirements relating to biofuel PCF (see Case Study), while California has proposed a Low Carbon Fuel Standard which from 2011 will require companies to lower the overall carbon intensity of their various fuels at a rate that will increase every year until 2020, or else buy credits from companies that sell cleaner fuels.<sup>7</sup>

4. This paper is primarily concerned with private PCF schemes and standards, which — with the notable exception of standards and regulations pertaining to transport fuels — have developed at a faster

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<sup>3</sup> This is because the GWP of 1 kg of a GHG varies between the different GHGs. For example, the impact of 1 kg of CH<sub>4</sub> (methane) on global warming is equivalent to 25 kg of CO<sub>2</sub>.

<sup>4</sup> Source: <http://www.cokecorporateresponsibility.co.uk/carbontrust/product-carbon-footprints.html>

<sup>5</sup> Source: [http://www.iso.org/iso/iso\\_catalogue/catalogue\\_tc/catalogue\\_detail.htm?csnumber=43278](http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=43278)

<sup>6</sup> Source: <http://www.ghgprotocol.org/standards/product-and-supply-chain-standard>

<sup>7</sup> Source: <http://www.latimes.com/news/opinion/la-ed-lowcarbon20-2009apr20,0,1679884.story>

pace than the public ones. A number of private certification schemes have emerged in the last couple of years that offer retailers and manufacturers methodology and expertise to footprint their products, as well in some cases procedures for verifying and certifying or labelling PCF assertions. The majority of these schemes are operated by private (for-profit or not-for-profit) consultants, while a few have been developed by manufacturers or retailers. In the absence of any dominant public or international standards for PCF, all these schemes except one, which uses the PAS 2050 standard, can be regarded as supplying *de facto* private standards.

5. In light of these observations, the aim of this paper is to provide an overview of existing PCF schemes and standards that can help inform the discussion of research priorities, policy options and public investments in this area. Section II briefly discusses the business and environmental rationales of PCF as well as the possible risks and biases. This is followed, in Section III by a discussion of the life-cycle analysis (LCA) methods and international (ISO) standards that PCF may draw on. Based on a global survey of 12 private PCF schemes, we then examine in Section IV some salient characteristics of PCF as carried out in practice, including the geographical and product coverage; the combination of PCF with other sustainability criteria; the approaches, methods and costs involved; the kind of certification offered; and the communication of the PCF information to consumers. This is followed by a section (V) considering how consumers perceive and respond to PCF. A final section (VI) concludes.

## **II. Why carbon footprinting?**

6. It has been estimated that the consumable goods and appliances that the average consumer in the UK buys and uses account for 20% of her total carbon emissions (not counting the energy to run them), of which food and non-alcoholic drinks, at 9%, comprise the largest category (Carbon Trust, 2006).<sup>8</sup> It is therefore worth investigating if and how influencing consumers' purchasing decisions through the provision of information about the global warming impact of different products can contribute to climate-change mitigation.

7. Surveys in several OECD countries suggest that consumers are increasingly interested in information about the climate impact of products, while they also indicate that many other factors besides a low-carbon footprint determine what products end up in the shopping basket, and that consumers are generally sceptical about retailers' and manufacturers' "climate friendly" claims (see below). As this paper will show, some retailers and manufacturers have responded to these trends in consumer interests and behaviour by calculating and displaying carbon footprints for a small number of products. In most cases these initiatives were not launched with the primary purpose of increasing market share of the product itself through improved differentiation, but more as part of a general effort to demonstrate commitment to climate-change mitigation to consumers, and to lawmakers planning to introduce strict regulatory measures (e.g. in the UK), or as part of broader corporate social responsibility policies.

8. Calculating the carbon footprints of products can also help companies reduce GHG emissions at the levels of the corporation and the supply chain by identifying major emission sources as well as ways to achieve reductions relatively quickly and cheaply. Indeed, investing in reducing carbon footprints may give positive returns through significant energy-cost savings.

9. On the other hand, PCF if adopted at a large scale could have significant cost and (negative) demand effects on producers and exporters in different parts of the world, including in developing countries (Edwards-Jones et al., 2008). Research on the governance of global value chains for food

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<sup>8</sup> The categories are: food and non-alcoholic drink; other personal effects; household appliances; furnishings and other household; clothing and footwear; alcohol and tobacco; and books and newspapers.

products shows that retailers and other “lead firms” located near consumers to a large extent define product quality standards and at the same time are able to push the cost of complying with these increasingly demanding standards (along with other performance requirements) down the supply chain to producers (Gibbon and Ponte, 2005). There is also a risk that PCF schemes and standards, if not carefully designed, may involve discriminatory practices that affect competitiveness and trade (Brenton et al., 2008; Kasterine and Vanzetti, 2009). This is particularly clear where special emphasis is placed on transport, for example by using life cycle analysis only for this part of the product life cycle. This will of course tend to favour domestic producers over more distant ones (Bolwig, 2008).

### III. Methodological issues in product carbon footprinting

10. Life Cycle Analysis or Assessment (LCA) is the basic method used in carbon footprinting. LCA “studies the environmental aspects and potential impacts throughout a product’s life cycle (i.e. cradle-to-grave) from raw material acquisition through production, use and disposal” (ISO, 2006). Several methodological issues related to LCA stand out in the present context. First, there is no single LCA method that is universally agreed upon and therefore no agreement on PCF calculation methods. Second, different definitions of the boundary of the LCA, in terms of which life cycle stages, emission sources and GHGs are considered, will produce very different results (Büsser et al., 2008). Sensitivity analysis is therefore of key importance. Third, there is a lack of comprehensive data for LCA, data reliability is questionable, and several data bases with different data specifications (e.g. in terms of reference units) are often needed to perform an LCA. Fourth, carbon footprints are rarely accompanied by detailed methodological accounts (or by the results of sensitivity analyses, if performed at all). They are therefore difficult to assess by third parties or to compare with the footprints of like products. Fifth, relatively few analysts have so far acquired the skills to carry out hybrid methods that combine environmental input-output with LCA, which are the best option for product-level GHG assessments, as discussed below. Sixth, the inherent complexity and lack of exactness of carbon footprint analyses contrasts with the need to communicate the results in a simple, clear and unambiguous way to consumers.

11. There is a vast literature on LCA methodology, which we cannot review here, including a dedicated journal, the *International Journal of Life Cycle Assessment*. The remainder of this section is mainly extracted from Wiedmann and Minx (2007), who discuss the different (methodologies of) LCA-based approaches to calculating the carbon footprints of products or activities. They observe that the task of carbon footprinting can be approached from two different directions: bottom-up or top-down. Process Analysis (PA) is a bottom-up method, which has been developed to understand the environmental impacts of individual products (or processes) from “cradle to grave”. The bottom-up nature of PA-LCAs means that they suffer from a system boundary problem so that only on-site, mostly first-order impacts are considered. PA-based LCAs are also not suitable for the assessment of carbon footprints for entities such as households or industrial sectors (Ibid).

12. Environmental Input-Output (EIO) analysis is a top-down approach and provides an alternative to process-based LCAs (Ibid). Input-output tables are economic accounts representing all activities at the meso (sector) level. In combination with environmental data they can be used to estimate carbon footprints in a comprehensive and robust way, taking into account all higher-order impacts and setting the whole economic system as boundary. But environmental IO analysis is less suitable for assessing micro systems such as products, as it assumes homogeneity of prices, outputs and their carbon emissions at the sector level. A big advantage of IO-based approaches, however, is that they require much less time and labour to perform once the model is in place, than do bottom-up process-based approaches

13. These considerations lead Wiedmann and Minx (2007) to propose a hybrid-EIO-LCA approach to the assessment of micro systems such as individual products or services, which integrates the PA and IO methodologies. In this approach, on-site, first- and second-order process data on environmental impacts is

collected for the product or service system under study, while higher-order requirements are covered by IO analysis, drawing on generalised tools, such as the Bottomline tool ([www.bottomline3.co.uk](http://www.bottomline3.co.uk)). Yet they also observe that while such hybrid assessments are considered state-of-the art in economic ecological modelling, the literature and models are still relatively new and few are able to carry them out in practice. This situation is likely to improve fast in developed countries, but the capacity of most developing countries to carry out hybrid-EIO-LCA is likely to remain limited.

14. There is scant discussion in the PCF literature about the possible biases against developing countries imparted by using one type of methodology rather than another. This revolves substantially around the issue of where system boundaries are set. Generally, the more direct and indirect inputs to the PCF that are considered, the fewer biases there should be against developing countries. Excluding for example emissions from the manufacture of capital goods used to produce footprinted products, as in PAS 2050, could impart a bias against labour-intensive industrial production systems. This discussion parallels that of the implications of excluding ‘other indirect’ or Scope 3 emissions from corporate footprints (see next section).

#### **IV. Overview of carbon footprinting standards and schemes**

##### ***ISO environmental standards and carbon footprinting***

15. Since 1997 ISO has published a number of standards that are relevant to carbon footprinting. This process is ongoing: in 2008 the organization announced that its Technical Committee 207 had begun a work programme on carbon footprinting of products (ISO, 2008).

16. The first ISO standards in this area to be issued were the ISO 14040 series dealing with LCA, which describe the procedures that should be followed in conducting LCAs. They were consolidated into two revised standards in 2006, without substantial change. A second standard is ISO 14025 (2000) on “Environmental labels and Declarations – Type III Environmental Declarations”. This recommends the functional unit approach in communication of LCA results - as opposed to reporting mass or volume, which are considered as insufficient to allow comparison. This group of standards was adopted against a background wherein several approaches to LCA had been developed over the previous two decades. There was a resulting danger that, as the method became more widely used, its results thus would be incommensurate and lack credibility.

17. ISO 14064 (2006-07) has a somewhat different focus. This group of standards is concerned not with the measurement of the overall environmental impact of the production, consumption and disposal of specific products or services over an unspecified time period, but with corporate and “project”-level GHG emissions within annual time frames. The immediate background is the emergence of a number of emission “cap and trade” programmes or schemes, each with similar though different approaches to emission measurement and validation.<sup>9</sup> The wider background is the probable adoption of a mandatory scheme in the United States and the probable integration of the United States and other large emitters into the Kyoto process. These developments have the potential to create a huge global market in emission credits<sup>10</sup> and to stimulate a substantial number of new offsetting projects in developing countries, under the

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<sup>9</sup> Under this concept, ceilings are established for total emissions by covered emitters. Emitters are then assigned some proportion of allowable emissions, and must then reduce their actual emissions to those assigned to them, or acquire offsets that will cover the difference. Offsets can be purchased on a special market from other regulated emitters who reduce their emissions over and above target, or acquired through arrangements with unregistered emitters, or earned through carbon sequestration.

<sup>10</sup> It is estimated that the US market alone will be worth USD 300 billion (Gray and Edens, 2008).

Clean Development Mechanism. In this context, these standards aim at facilitating a harmonized system for organisation- and project-level carbon accounting.

18. Although a Working Group that contained experts from 45 countries drew up IS 14064 over a four-year period, most of its elements appear to be derived from a single source, the Greenhouse Gas Protocol (hereafter GHG-P), launched in 1997 by the World Resources Institute and the World Business Council on Sustainable Development and revised in 2000 to include a corporate accounting and reporting protocol. Comparisons of the two standards (McGray, 2003; Spanangle, 2003) agree that their main differences are that (i) GHG-P, unlike ISO 14064, provides detailed guidance notes and calculation tools, while (ii) ISO 14064, unlike GHG-P, covers verification.

19. ISO 14064-1 deals with corporate GHG accounting while ISO 14064-2 deals with project accounting. ISO 14064-3 deals with validation and verification of GHG plans and accounts and ISO 14065 deals with the accreditation of bodies that carry out third party validation or verification.<sup>11</sup> In all cases, the standards only lay down a series of managerial steps that shall be followed in planning, executing and monitoring activity. Specific actions to be taken at each step, for example the choice of methodologies for quantifying emissions or how to determine the skills of verifiers, remain at the discretion of the corporation or whatever regulatory authority manages a scheme. In this sense there is a strong resemblance to the ISO 14000 and ISO 9000 series of standards.

20. The standards have been criticized in some quarters for lack of prescription in what are construed as key areas. For example, with respect to corporate GHG accounting (ISO 14064-1), managers are required to identify the boundaries of the emissions that they will quantify. It is stated, that in doing so, they shall include direct emissions from activities of the corporation and indirect emissions from the generation of electricity consumed by the corporation (Scopes 1 and 2 respectively in the GHG-P) and that they shall “consider” the inclusion of other indirect emissions (the GHG-P’s Scope 3). The standard’s main objective here is to establish transparency in respect of what is being measured, rather than to require that all emissions be considered.<sup>12</sup>

21. Perhaps the part of ISO 14064 that will prove most relevant to whatever ISO standards are eventually developed for carbon footprinting are the provisions on verification in 14064-3. These state that a verification plan shall be formulated which sets out objectives, a data collection approach, a sampling plan, a schedule for performing tests, and a system for maintaining test records and other relevant documents.<sup>13</sup> In respect of “objectives”, verifiers shall not only consider where to draw system boundaries (see above) but also be transparent as to whether they are requiring “reasonable” or only “limited” assurance. Finally there are a series of requirements concerning the competence and experience of verifiers. “Competences” are defined in terms of a list of suggested – but not mandatory – skills (rather than specific qualifications), while “experience” is defined in terms both of relevant work experience and attendance at training events and seminars. Examples of suggested skills include knowledge of legal rules, knowledge of the sector, knowledge of emission quantification, knowledge of monitoring methodologies, knowledge of GHG data auditing, and knowledge of risk assessment or verification techniques.

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<sup>11</sup> ISO 14064-3 uses the term validation in relation to project plans and verification in relation to claims about GHG emissions.

<sup>12</sup> According to Braunschweig (n.d.) the standard here reflects a misleadingly narrow interpretation of managerial responsibility. “Typically, many organisational decision responsibilities are hidden in the ‘other indirect emissions’ category.”

<sup>13</sup> “Process documentation” and “Communication and reporting documentation”.

### *Characteristics of some product carbon footprinting schemes*

22. A review of documents and websites was carried out for this study, resulting in the identification of 30 schemes worldwide that take either a product or a supply-chain approach, or both, to carbon footprinting, as opposed to the more common company and project levels GHG assessments. The schemes are listed in Annex 2. From this list we were able to positively identify 15 schemes worldwide which have carried out carbon footprints for products (as opposed to for supply chains) and that are operational in the sense that at least one product carbon footprinted by the scheme is being retailed.<sup>14</sup> Of these we surveyed 12 schemes, while three schemes (Bilan CO<sub>2</sub>, Greenice and Carbon Action Plan) were excluded due to time constraints or to difficulties in obtaining critical information. The survey was carried out by the authors during March and April 2009. Data collection was assisted by a questionnaire (Annex 3), filled in by the scheme operator or by the authors through interviews with scheme staff, or by the authors based on a review of website documentation. The cases where website information alone was used were ones where scheme operators failed to respond to the questionnaire. The remainder of this section reports the results of the survey of 12 PCF schemes.

### *Background and context*

23. Table 1 shows selected characteristics of the surveyed PCF schemes. All schemes were launched during 2007 or 2008. They were typically developed over 1–1½ years, which is a short time when considering the many technical problems involved in PCF; most operators were thus still developing their methodologies as of April 2009. The surveyed schemes cover the Canada, the EU Switzerland and the United States. With the exception of the Carbon Labelling Company, all operate only in their home markets. Additional PCF schemes are also being developed in Australia, China, Japan, Korea, Sweden and Thailand, but these were not included in the survey due to their lack of application in practice.

24. Half of the schemes are operated by not-for-profit consultancy companies and environmental organisations, and two by for-profit consultants. The remaining four are user-operated, proprietary schemes operated by, respectively, a retailer, a bioethanol importer, and two clothing and footwear manufacturers (i.e. the companies themselves assess and label the products they manufacture or sell). External funds contributed to the establishment of at least five of the schemes, of which two received support from public environmental agencies in their respective countries.

### *Inclusion of additional sustainability criteria in product assessments*

25. Seven schemes limited their product assessments to GHG emissions, while four included one or more other environmental criteria, including chemical use, resource consumption, use of organic production methods, recycling, distance travelled, or an indicator for “total environmental impact”. The former group were all operated by (for-profit or not-for-profit) consultants specialising in climate change issues, while the latter were typically proprietary schemes of manufacturers or retailers, for which PCF was part of broader corporate social responsibility strategies, including corporate-level emission reductions. In one instance, the Verified Sustainable Ethanol Initiative, PCF was combined with a range of environmental and social criteria, with the broader aims of “shifting the entire Brazilian ethanol industry towards more sustainable production” (against a background of widespread critique of this industry) as well as of “expedit(ing) the development of international regulations for sustainable biofuels.” Many of the users of

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<sup>14</sup> Because they were not yet operational, the review did not include the ISO and GHG Protocol product-level standards discussed earlier as well as a number of country-level PCF schemes, including: Climate Labelling for Food, ICA pilot project, METI Carbon Footprint System, Cool (CO<sub>2</sub>) Label, and Carbon Label Promotion Committee.

the schemes operated by consultants clearly also applied PCF as part of a broader CSR strategy, but we did not collect detailed information on this aspect (the survey was carried out at the level of schemes rather than users). It is clear, however, that for companies such as Casino, Tesco and Patagonia, PCF was a minor part of their climate-change-related CSR activities.

### *Product type, volume and origin*

26. Five schemes offer PCF for all goods and services, while the rest limit themselves to specific product types (food and drinks, clothes, footwear, and biofuel) according to the product specialisation of the scheme operator. It was not possible to make a complete inventory of all products certified by the 12 schemes. It is clear that, though agricultural value chains have received the most attention, PCF has by no means been limited to food and drinks, for which GHG LCAs are relatively simple, but has also been done for a diverse range of more complex manufactured goods (e.g. cell phones) and services (e.g. savings accounts), which are more demanding in terms of data and methods.

27. The largest scheme by far in terms of number of products is the Carbon Reduction Label, operated by the Carbon Labelling Company (part of Carbon Trust) in the UK, which since 2007 has certified more than 2000 (?) products for (?) clients. The 11 remaining schemes have together calculated the carbon footprint for around 200 products, ranging in number from 1 to 70. Not all these footprints have been publicized, however. For example, Climatop performed GHG LCA studies for 70 products in order to label 10 “carbon champions” within 9 product groups, while AB Agri GHG Modelling has not published the carbon footprints that were calculated for dairy products.

28. It was not possible to enumerate all users of the schemes. PAS 2050 is used by, for example, Coca Cola Great Britain, PepsiCo (Tropicana brand juices) and Continental Clothing, while a number of companies targeting or based in the German market, such as Voelkel GmbH (juice) and Platanera Rio Sixaola (bananas), have certified products to the Stop Climate Change standard.<sup>15</sup> In the United States, Certified CarbonFree has certified a total of 44 products for, among others, Motorola (cell phone), Monarch Beverages (energy drinks), Tandus (carpeting) and GBS Enterprises (mattresses).

29. The small numbers of products that have been footprinted to date reflect the youthfulness of the schemes, the costs and technical challenges involved in PCF, and continued uncertainty among users about the benefits of PCF (see below). Thus most users have only footprinted a small share of their product range, and often on a pilot basis. For example, the French retailer Casino have labelled only 33 out of a planned 3000 own-brand staple food and drink products under its Indice Carbone Casino scheme; the UK retailer Tesco is selling 20 footprinted products on a pilot basis using the Carbon Reduction Label<sup>16</sup>; while 10 products sold by Migros, the largest retailer in Switzerland, have received the Approved by Climatop label. At the other end of the scale, Marshalls (UK) has published the footprints of all its 503 domestic landscaping products, using the Carbon Reduction Label. In general, when comparing the numbers of footprinted products today with earlier statements made by users it is clear that many have fallen short of their initial targets.

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<sup>15</sup> A list of products certified to the PAS 2050 can be found at <http://www.carbon-label.com/business/productdirectory.htm>; companies certified to the Stop Climate Change standard are listed at <http://www.stop-climate-change.de/en/Mitglieder.htm>; and products certified by Climatop are displayed at <http://www.climatop.ch/index.php?l=d&p=products>.

<sup>16</sup> Source:  
[http://www.tescopl.com/plc/corporate\\_responsibility/caring\\_environment/climate\\_change/empowering\\_customers/carbon\\_labelling/](http://www.tescopl.com/plc/corporate_responsibility/caring_environment/climate_change/empowering_customers/carbon_labelling/)

30. Seven schemes offer carbon footprinting for all products irrespective of their country of origin, while three schemes only assess domestically produced products. One scheme (for fuel ethanol) only applies to producers in Brazil, while one scheme did not provide information on country of origin. Hence no strong bias against imported products was found in terms of this factor.

### *Carbon footprinting approaches and data*

31. Poor access to technical documentation, as far it exists, as well as the limited scope of this study, prevents a comprehensive comparison of the scope and methodological rigour of the PCFs performed by the schemes. In lieu of a full technical evaluation, we discuss some key aspects of the PCF approaches used by the schemes.

### *Publication of methods and assessment results*

32. Regarding the transparency of the assessments, six schemes – Carbon Reduction Label, Climate Conscious Label, Stop Climate Change, Certified CarbonFree, Carbon Connect and Verified Sustainable Ethanol Initiative use a written document (standard or description of methodology) published on their websites to guide the product-level GHG emission assessments, but it should be noted that the quality and completeness of this type of documentation differs greatly. The Approved by Climatop scheme takes another approach to transparency by publishing the results of their assessments as well as the peer review reports of these. This does not necessarily mean that the other schemes apply less rigorous or comprehensive methodologies, only that these are less accessible to the public.

### *Use of recognised standards for life-cycle analysis*

33. All schemes relied on life-cycle analysis (LCA) for PCF calculations. The measurement methodology of most schemes related, in one way or another, to recognised international or national standards for LCA-based GHG accounting. Six schemes referred to the ISO 14044, ISO 14064 or the WRI-WBCSD Greenhouse Gas Protocol (discussed above), without necessarily following these to the letter. Two schemes were certified to PAS 2050 of the British Standards Institute, which “builds on existing methods established through BS EN ISO 14040 and BS EN ISO 14044 by specifying requirements for the assessment of the life cycle GHG emissions of products” ([www.bsigroup.com](http://www.bsigroup.com)), and a third scheme will use PAS 2050 for the further development of its methodology. Finally, Indice Carbone Casino builds on the *Bilan Carbone* methodology for corporate GHG accounting, developed by the French l’Agence de l’Environnement et de la Maîtrise de l’Energie (ADEME), and which also follows ISO 14064 in several respects (ADEME, 2007, p.85).

34. As discussed above, it is noteworthy that both the *Bilan Carbone* and the ISO standards are concerned with corporate or project-level GHG emissions, or both, rather than product-level ones. Moreover, ISO 14064 is mainly concerned with the transparency and management of GHG accounting and so it does not specify which methods to use for quantifying emissions or which emission sources or greenhouse gasses to include. The PAS 2050 standard, on the other hand, is specifically designed for product-level GHG accounting and has very detailed methodological specifications. But this standard was only published in October 2008 and so was not widely used at the time of the survey.

### *Scope of GHG emission assessments*

35. Regarding the scope of the PCFs, nine schemes claimed to include GHG emissions from all stages in the product life cycle in the footprint calculation, while two schemes focused on the production stage and one let the scope depend on the client’s preferences. However, “all stages” clearly meant different things to the different schemes. As noted above, emissions from the production of capital goods is omitted in the otherwise comprehensive PAS 2050 methodology used by the Carbon Reduction Label,

while the similarly ambitious Stop Climate Change methodology includes this source but chooses to disregard the “transport of the product to the consumer’s house” stage. But most schemes were less explicit about how they set the boundaries of their GHG assessments, preventing a meaningful comparison across schemes, and some claimed not to have omitted any stages in the life cycle in their calculations - although this is clearly almost impossible in practice. A lack of consistent and transparent boundary setting obviously constrains the assessment and comparison of the carbon footprints of different products, especially among products footprinted by different schemes. For example, including the domestic use phase significantly affects the footprint of coffee; the brewing stage thus accounts for about 70% of the total CO<sub>2</sub>e emissions from a cup of black coffee and considerably more if the user does not behave in an economic way when brewing (Büsser et al., 2008).

36. Another important methodological choice is which GHGs to include in the assessments. This question was not explored in detail by the survey, but most schemes appear to include all the major GHGs, while one explicitly limits itself to considering only CO<sub>2</sub>.

#### *Data sources and quality*

37. A key aspect affecting the validity of a PCF is data quality. An indicator for good data quality is the use of primary activity data in the calculation of energy and raw material use at the different stages in a product’s life cycle, in addition to secondary data sources (from data bases and literature). All schemes claim to use both types of data sources, and cite a number of European and US LCA databases, but it was beyond the scope of this study to assess the “appropriateness” of the choice of data sources in each case. A few of the publicised standards used by the schemes are explicit on the use of primary and secondary data. For example, the PAS 2050:2008 states that “primary activity data shall be collected from those processes owned, operated or controlled by the organization implementing the PAS...The primary activity data shall not apply to downstream emission sources” (p. 17). The CarbonCounted Standard 1.2 is more flexible, stating that “Initially, we will use an 80/20 practical approach to determining the footprint. If some data is not available, we should state this and provide a reasonable estimate for its contribution” (item 2.10).

#### *Scheme scope and kinds of certification offered*

38. Besides the calculation of PCFs, ten schemes require meeting one or more additional climate-change related criteria. The most common is a commitment to reduce the overall carbon footprint at either the product or corporate level. The proprietary schemes operated by Timberland, Patagonia and Casino France all include reduction commitments at the corporate level, although these are often stated in a very general way. Common to these schemes is also that PCF seems to be (still) a minor element in their climate-related CSR activities. Commitments to reducing PCF over a specified time period are embodied in five schemes. Two schemes use economic incentives to encourage – rather than require – such reductions. One, Certified CarbonFree, offers financial incentives for users who can prove reductions of more than 10% per year. In the other, Approved by Climatop, a product is certified as a “carbon champion” if its carbon footprint is 20% or below than that of 6 – 7 like products (within a given category) with which it is compared. Because certification must be renewed every two years, comparison between products in this scheme allegedly encourages producers to reduce their emissions.<sup>17</sup>

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<sup>17</sup> Comparing the carbon footprint with that of like products is an option in the display or labelling technology offered by at least two other schemes – the Carbon Reduction Label and the Climate Conscious Label. It is unclear if displaying such comparative information is meant to directly incentivise users to reduce product footprints, rather than indirectly through consumer behaviour.

39. Secondly, product endorsement in two schemes requires the footprint to be lower than a “baseline” value: In the Verified Sustainable Ethanol Initiative, the “field-to-wheel” emissions of the ethanol has to be 85% lower than the “well-to-wheel” emissions from petrol, while Approved by Climatop only certifies a few “carbon champions” within each product category, as just mentioned.

40. Thirdly, two schemes — Certified CarbonFree and Stop Climate Change — require carbon neutrality at product level to be achieved through carbon offsetting. The latter scheme has formulated detailed minimum standards for projects that qualify as offsets, while the former is silent on this aspect. Altogether, the surveyed schemes show great variation in the actual content of their requirements. It is not possible to judge from this overview which general approach is “better” from a climate-change perspective; rather the diversity found points to opportunities for cross-learning and the need for work to identify “best practices” suitable for different kinds of operators, users and countries. This level of diversity is not unusual during the first few years when standards emerge in a new area. Later diversity may become reduced through natural selection and pressures for harmonization.

*Does the transportation stage get special treatment?*

41. GHG emissions from the transportation of goods across long distances have been the subject of much debate in recent years, and in this context some retailers, standard-setting bodies and Northern farmer advocacy groups launched various initiatives to measure, label, restrict or “green” the transportation of especially food (Bolwig, 2008; AEA, 2005, Kasterine and Vanzetti, 2008).<sup>18</sup> The authors have argued elsewhere (Gibbon and Bolwig, 2007; Bolwig, op.cit;) that a narrow focus on emissions from transportation, as opposed to considering all stages in the product life cycle, may discriminate against exporting nations, especially poor countries that are often located distant from OECD markets and moreover typically have less access to high-volume shipping systems that are usually more energy efficient.<sup>19</sup> At the same time, a number of LCA studies show that favouring locally produced goods does not guarantee a reduction in GHG emissions. This is due to the fact that producers in distant locations may be more carbon efficient than those nearby, and that this gain may outweigh the higher emissions from transportation (Edwards-Jones et al., 2008). It has also been observed that the mode of transport — sea, air, road, rail — as well as the transport technology used within each mode can significantly influence the size of a PCF (Michaelowa and Krause, 2000). In this regard, the relatively high carbon efficiency of sea freight can in some cases be an advantage for distant producers. For example, transporting broccoli 12,000 kilometres from Ecuador to Sweden by boat produces only 40% of the emissions of trucking broccoli 3,200 kilometres across Europe from Spain (Angervall et al., 2006).

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<sup>18</sup> An example is Wal-Mart’s “Food Miles Calculator, which allows our buyers to enter information on each supplier and product, determine product pickup locations and select which of our 38 food distribution centres the product will reach. With this information, the calculator computes the total food miles, which the buyer can use when making buying decisions.” (Source: [http://instoresnow.walmart.com/food-article\\_ektid44214.aspx](http://instoresnow.walmart.com/food-article_ektid44214.aspx)).

<sup>19</sup> For example, the capacities of container ships serving West Africa range between 2,000 and 3,000 containers, while those landing at the major ports in the EU, the US and East Asia have a tonnage from 8,000 to 12,000 containers (personal communication with Morten Nielsen, SAFE Shipping). Moreover, the low level of development of rail transport in many developing regions, especially in Africa, means higher dependence on road transport, which is less carbon efficient. Africa also has a relatively large proportion of land-locked regions. Finally, less reliable and more expensive sea freight systems in poor countries, combined with sometimes low and variable export volumes, mean higher dependence on air freight for certain products, especially fresh produce (Gibbon and Bolwig, 2007).

42. All surveyed schemes except one<sup>20</sup> include the transport stage in the calculation of the PCF, up to at least the stage of wholesale and in most cases up to the retail outlet, while some also include transport to the consumer's house. Assuming that the calculation methods in these cases also take account of the different modes of transport used (which is relatively easy to do), this suggests that the schemes at least do not under-estimate emissions from transportation or disregard especially climate-unfriendly modes of transportation such as air freight and diesel-based trucking.<sup>21</sup> The survey also asked whether a scheme placed special emphasis on transport-related GHG emissions. Only one scheme, Patagonia's footprint chronicles, appears to do this, by displaying information on the website on the distance (in km) travelled by the product from the stage of raw material to garment delivery at the company's Nevada distribution centre. It is noteworthy that a draft version of the Indice Carbone Casino label highlighted, as the only source, GHG emissions from transport, while the version finally used shows emissions from all stages in the life cycle.<sup>22</sup> We can thus conclude from this that the design and methods adopted by the schemes generally do not discriminate against products originating in distant countries. We underline however that the users of the schemes themselves may still decide to focus on reducing emissions from transportation through other climate-change initiatives, which may disadvantage certain exporting nations. For example, in 2008, Tesco "continued to use our "By Air" sticker in the UK to identify airfreighted products and have achieved our target of limiting airfreighted produce to under 1% of the products we sell, with a bias towards products from developing countries"<sup>23</sup> (these stickers were eventually removed, in 2009).

#### *Conformity assessment*

43. In all the schemes examined, the product GHG assessments are carried out by the scheme's own staff or by (other) consultants hired by the users or scheme operators to do so. The schemes can be divided according firstly, to whether any independent verification is (required to be) performed of these calculations, and secondly who is supposed to perform this verification where it is required.

44. No verification appears to be performed of the PCF assertions used by the proprietary Footprint Chronicle, Green Index Rating, Carbonlabels.org, Climate Conscious Label and Indice Carbone Casino schemes, although in the last of these cases the general footprinting methodology has been validated by a public agency (ADEME). Nor does there seem to be an independent stage of verification in the Carbon Connect, Certified CarbonFree and Verified Sustainable Ethanol Initiative schemes, although in all three of these cases calculations have to be performed by consultants or companies independent of the standard setter and specified in a list.

45. A system of independent (third-party) verification, i.e., one where consultants or companies independent of those making the calculations perform a check of these calculations, is required in the case of the Stop Climate Change, Approved by Climatop and AB Agri GHG Modelling, as well as in the "third-party certification" and "other-party verification" options offered by the Carbon Reduction Label.

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<sup>20</sup> A second scheme, AB Agri GHG Modelling, does not consider emissions from the wholesale and retail distribution of the product (dairy) because the scheme is focused at the farm level.

<sup>21</sup> It was outside the scope of the study to qualify this statement through examining possible biases caused by the choice of emission factors for different transport modes or the accuracy with which distance travelled with different determined transport modes and technologies is determined in each case.

<sup>22</sup> This development is mirrored in the evolution of the KRAV-Svenskt Sigill Climate Labelling of Food standard (see Case Study 1).

<sup>23</sup> Source:  
[http://www.tescopl.com/plc/corporate\\_responsibility/caring\\_environment/climate\\_change/empowering\\_customers/carbon\\_labelling/](http://www.tescopl.com/plc/corporate_responsibility/caring_environment/climate_change/empowering_customers/carbon_labelling/)

However, the Carbon Reduction Label also offers “self-verification” as a less demanding (and costly) certification option.

46. Systems of accrediting consultants or companies qualified to carry out both original calculations and verifications of them generally lack transparency. In the case of the Stop Climate Change and Verified Sustainable Ethanol Initiative approved consultants or companies are ISO 14065 accredited, although in neither case is it clear that this is a requirement.

#### *Costs of life-cycle analyses and certification*

47. GHG life-cycle assessments are generally believed to be very expensive to perform, but little reliable information exists on this important issue. The survey therefore asked scheme operators to estimate the cost of calculating the footprint of one product. We received comprehensive answers from only two schemes. The first one observed that LCAs for “typical” agricultural products cost between € 2 500 and € 6 000 to perform, depending on the size of the company. The annual adjustments of the LCAs cost considerably less. According to the experience of the second scheme, which certifies both food and manufactured products, LCAs cost USD 5 000–USD 15 000 but can cost as much as USD 70 000 or more, depending on the complexity of the product and its supply chain. One scheme operator also observed that calculating the footprint of the first products in a given category, or for a given company and supply chain, naturally is more expensive than subsequent ones, as the client (and the scheme operator) is progressing along a learning curve. In this regard, the costs of future assessments and audits can be lowered by building the LCA data models in a modular way, which would allow for future flexibility in calculations and the inclusion of new data.

48. The survey did not systematically ask about the cost of verification, but some information was nevertheless obtained. In one scheme certification costs between € 1 500 and € 5 000 per product, while another observed that the annual certification of the PCFs costs typically USD 100–USD 250 for small to medium-sized businesses where this only requires a documentary review, and USD 1 000–USD 5 000 for larger businesses that require on-site audits. The above brief discussion suggests the need for further research into the costs of compliance and certification to PCF standards.

#### *Communication of product carbon information*

49. The survey revealed great variation in the way the schemes and its users chose to communicate through text and graphics the product carbon information related to the certification. All schemes offer a carbon label or mark as a proof of certification, often in the form of a seal carrying a logo and the name of the scheme or the organisation operating it (Annex 5 shows some examples). In seven schemes, the label also shows the actual value of the PCF, expressed in CO<sub>2</sub>e per unit of product, while in one case — the Green Index rating — the footprint is placed on a scale from 1 to 10 (where 1 denotes <2.5 kg and 10 denotes >100 kg per pair of shoe). Two schemes show both the CO<sub>2</sub>e value and its position on a scale. Some of the labels display additional information relating to the certification on the packaging; for example, the Carbon Reduction Label reads “we have committed to reduce this carbon footprint” while the Indice Carbone Casino label states that “Casino s’engage pour l’environnement en collaboration avec ses fournisseurs pour réduire ses émissions de gaz à effet de serre” (“Casino works for the environment in collaboration with its suppliers to reduce its GHG emissions”). Both these labels also carry a brief explanation of what a PCF is. Other labels for display on packaging carry simpler but not less powerful messages, such as “certified carbon free” (Certified CarbonFree), “climate friendly” (Stop Climate Change) or “verified sustainable” (Verified Sustainable Ethanol Initiative). In most cases, the more complex information associated with the certification is displayed on websites (see URLs in Annex 2) and in some cases also in the store. A few users choose not to publicise any specific carbon information, such

as Sainsbury's Dairy Development Group applying the AB Agri Greenhouse Gas Modelling scheme, instead using it for internal purposes only.

## **V. Consumer perceptions of and reactions to product carbon footprinting**

50. At least six studies of UK consumers, two of Swedish consumers, one of US consumers and one of UK and US consumers jointly have been carried out on climate-change issues since 2006. Almost all deal with the climate-change impacts of food. No recent studies of German or French consumers on this issue could be traced on the internet.

51. Most of these studies deal with consumer decision-making, such as overall determinants of purchase decisions, decisions concerning choice of retailer, and decisions concerning willingness to pay a premium. A number also or instead deal with consumers' perceptions of retailers and manufacturers, in relation to their overall credibility on environmental issues, whether they provide enough information in the climate area, and whether the information that they do provide is trustworthy. A few studies also cover consumers' views on how GHG emissions from products should be labelled.

52. The studies mostly take the form of reports on survey results. In a majority of cases these were obtained during so-called "omnibus" surveys by market-research companies, i.e. surveys covering a variety of unrelated topics. In most cases the sample size was between one thousand and three thousand respondents. A few focus group studies have also been reported.

53. The main conclusions can be summarized as follows. UK consumers are largely sceptical about the overall environmental and climate convictions of manufacturers and retailers. They, and Swedish consumers, are also interested in obtaining more information from manufacturers and retailers on the climate impact of specific products. However, neither in the US or the UK do they trust business to report this information accurately. Hence, they would prefer statements and claims in this area to be verified independently.

54. While there is interest among consumers in obtaining relevant information in this area, climate-change concerns are unlikely to become a major driver of most consumers' buying decisions relative to factors such as price and food safety. All other things being equal (especially price), businesses that carry out carbon labelling and products that are carbon labelled are likely to be preferred over comparable business and products that do not or are not. But if they were required to pay more than 20% more for a product with a significantly lower PCF than a comparable one, less than 10% of UK and US consumers, and 27.5% of Swedish ones, would do so. These figures are considerably higher than the market shares represented, for example, by organic food sales, which on average also command a premium of roughly 20%. Notable in this context is that the proportion of UK consumers reporting regular purchase of organic food is three times higher than the actual share of organic sales in total food sales.

55. Only very limited *ex post* information is available on consumers' reactions to products that have been PCF labelled. Timberland publishes quarterly information, direct or indirect, on sales of its Green Index labelled products. This label has been applied to eight of Timberland's models within the Mios sandal and Outdoor Performance ranges. Sales of labelled products declined sharply during 2008, although according to Timberland this was mainly an effect of the phase out of the Mios range. It is not clear whether labelling positively affected the Mios range of shoes at an earlier stage.<sup>24</sup>

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<sup>24</sup> Source: Timberland CSR Quarterly Reports, Quarters 3 and 4 2008: Product Data. At <http://www.justmeans.com/usercontent/companydocs/docs/company-docs/1229713191.pdf> (Q3) and [.../1238577936.pdf](http://www.justmeans.com/usercontent/companydocs/docs/company-docs/1238577936.pdf) (Q4).

56. The surveys show no consistent response on the type of carbon labelling consumers would prefer. All the results are reported in more detail in Annex 4.

## **VI. Discussion and conclusion**

57. This paper has discussed the rationale, context, coverage and characteristics of emerging product carbon footprint schemes and standards, and has reported on how consumers perceive carbon footprinting and labelling and companies' climate change policies in general. We found that PCF is dominated by private certification schemes operated by small for-profit and not-for-profit consultancy companies and in a few cases by large retailers and manufacturers. All schemes have been established within the last two years and we estimate that globally there are only 15 to 20 schemes operational as of April 2009, of which we provide detailed information on 12 and some information on a further three. Considering the sometimes high costs and technical challenges of PCF, it is therefore no surprise that only a small number of certified carbon footprinted products so far have found their way to retail outlets. While some schemes report strong interest in PCF from producers and retailers, and are expanding their clientele and product range, we could not identify any clear trends in these respects.

58. The investigated schemes display large differences in scale and product coverage, type of claim made and (where applicable) certification offered, GHG assessment methods, communication approaches, and levels and means of verification and transparency. A range of factors may account for this diversity: differences in ambition, technical competence and access to external support; differences in economic resources; different country and business contexts; and the absence of a dominant PCF standard.

59. Meanwhile, consumers show some interest in PCF information and would probably prefer carbon-labelled products and firms over others, other things being equal. It is also likely that a minority are, or would be, willing to pay a price premium for products with significantly lower footprints than like ones, not much different from organic price premium. But consumers are also sceptical about the credibility of the "climate-friendly" claims made by retailers and manufacturers and show a preference for third-party verification. This contrasts with the relatively weak verification systems currently used in PCF. All this indicates that there are limits to the direct commercial benefits from PCF in terms of increased sales, as opposed to benefits related to cost reductions and to compliance with future climate-change legislation.

60. National governments and international organisations have so far played a very minor role in the development of PCF standards<sup>25</sup> or in the establishment of PCF certification schemes. The exception is the UK Department for Environment, Food and Rural Affairs (Defra), which supported the development of the first public PCF standard (the PAS 2050) as well as helped establish the organisation (the Carbon Trust) which has already certified a relatively large number of products to this standard. On a smaller scale, the French *Agence de l'Environnement et de la Maîtrise de l'Energie* (ADEME) has assisted the development of a scheme operated by the retailer Casino, based on its elaborate methodology for corporate GHG accounting. Finally, the Japanese government launched a PCF pilot project in April 2009. The international standards relating to carbon footprinting at the corporate and project levels are the WBCSD-WRI Greenhouse Gas Protocol and the ISO 14040 and 14064 standards series. These two organisations commenced work to develop PCF standards in recent months. It is unclear how exactly these two processes will relate to each other and to PAS 2050, but there are obviously considerable opportunities for co-ordination.

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<sup>25</sup> Again, the notable exception is standards based on the life-cycle emissions of transport fuels, especially biofuels.

61. We have also examined, although somewhat superficially, factors that help assess the potential effects of PCF on international trade. First, the lack of an international PCF standard could favour producers based in countries with national public standards (so far only the UK), with trusted and workable private standards, or with well-functioning, non-proprietary scheme operators (Canada, Germany, the United Kingdom and the United States). In this regard, only one scheme, the Carbon Labelling Company, operates internationally. Second, PCF calculation and certification is expensive and demanding on human resources (for data provision and effective communication of the PCF). This tends to favour large and resourceful producers, who may benefit from significant economies of scale (low cost of certification per product sold). This could exclude most companies in developing countries. Third, and unexpectedly perhaps, no bias was found in the way the GHG assessments treated long-distance transport relative to other emission sources, although we did not investigate this aspect in depth, and only one scheme highlights the distance travelled by the product (along with other “sustainability” criteria). Finally, the GHG assessment method of the potentially influential PAS 2050 standard has an in-built bias against relatively labour-intensive production systems, which are typical of developing countries. Other schemes and standards may also contain such biases, in principle or in practice, but more in-depth research is needed to document this.

62. In sum, although PCF, because it is based on LCA, is likely to have a higher degree of credibility with consumers than any other sort of claim made by operators in relation to the climate change attributes of products, is also difficult and costly to perform and its impact on sales remains unclear. Moreover, measurement of GHG emissions at a corporate level probably provides more accessible opportunities for corporate cost savings than PCF. Therefore, whatever its implications for developing countries in principle, its adoption seems likely to remain limited and therefore its impacts on trade and development seem unlikely to be substantial – at least in the short-to-medium term.

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### **Additional materials**

- ANNEX 1. Characteristics of surveyed product carbon footprinting schemes (as of April 2009)
- ANNEX 2. List of product or supply-chain focused carbon accounting schemes and standards
- ANNEX 3. Survey questionnaire
- ANNEX 4. Consumer survey material on carbon labelling
- ANNEX 5. Examples of product carbon footprinting labels and logos

**ANNEX 1. CHARACTERISTICS OF SURVEYED PRODUCT CARBON FOOTPRINTING SCHEMES (AS OF APRIL 2009)**

**Table A.**

No.	Scheme	Country	Operator or Certifier	Operator type <sup>a</sup>	Year launched	No. of labelled products	Products types that certification is offered for	External funding for scheme development?
1.	AB Agri GHG Modelling	UK	AB Agri	FP Consultant	2008	1	Dairy (will expand to wider product range)	?
2.	Approved by Climatop	Switzerland	Climatop	NFP Consultant	2008	10 (70 were assessed)	All goods and services	No
3.	Carbon Connect	Canada	The Carbon Counted	NFP Consultant	2007	22	?	Anonymous philanthropic
4.	Carbon Reduction Label	UK	Carbon Labelling Company (Carbon Trust)	NFP Consultant	2008	> 2000 (?)	All goods and services	Defra (UK government)
5.	Carbonlabels.org	Canada	Conscious Brands	FP Consultant	2008	1	All foods	Zerofootprint (a group of companies)
6.	Certified CarbonFree	US	Carbonfund.org	NFP Consultant	2007	44	All goods and services	No
7.	Climate Conscious Label	US	The Climate Conservancy	NFP Consultant	2008	2	All goods and services	Stanford University
8.	Footprint Chronicles	US	Patagonia	Manufacturer	2007	14	clothing and footwear	?
9.	Green Index rating	US	Timberland	Manufacturer	2007	8 models	footwear	?
10.	Indice Carbone Casino	France	Casino France	Retailer	2008	33	Own-brand food and drink products.	ADEME (government)

No.	Scheme	Country	Operator or Certifier	Operator type <sup>a</sup>	Year launched	No. of labelled products	Products types that certification is offered for	External funding for scheme development?
11.	Stop Climate Change	Germany	AGRA-TEG	NFP Consultant	2007	11	All goods and services (focus on food)	No
12.	Verified Sustainable Ethanol Initiative	Sweden	SEKAB	Importer and wholesaler	2008	1	Ethanol	?

Notes: <sup>a</sup> NFP = not for profit. FP = for profit.

**Table B.**

No.	Scheme	Use of additional, non-carbon, criteria?	Product carbon neutrality through off sets?	GHG reduction commitments?	Kind of label offered?	Method of verification?	Method of accreditation of certifier?	Display of carbon information?
1.	AB Agri GHG Modelling	No	No	Yes	<i>Commitment:</i> Reduction	Independent third-party (Carbon Trust)	Operator accredits itself to certify.	Up to customer (Dairy footprints not displayed)
2.	Approved by Climatop	Yes (see text)	No	Yes (relative to the footprint of competing products)	<i>Seal:</i> Top runner (> 20% less CO <sub>2</sub> e than like products) <i>Additional information</i> on website about calculations, verification, advice on use, etc.	Independent third-party (operator hires other company to peer review the CFs it has calculated)	Operator selects the peer reviewer	Packaging, Website
3.	Carbon Connect	No	No	No	Declaration: g CO <sub>2</sub> e	Second-party (operator uses 8 different companies to calculate or verify the CFs)	Operator accredits the certifier.	Packaging, Website, Store

No.	Scheme	Use of additional, non-carbon, criteria?	Product carbon neutrality through off sets?	GHG reduction commitments?	Kind of label offered?	Method of verification?	Method of accreditation of certifier?	Display of carbon information?
4.	Carbon Reduction Label	No	No	Yes	<i>Declaration:</i> g CO2e <i>Commitment:</i> Reduction <i>Seal:</i> endorsement by the Carbon Trust <i>Optional:</i> comparison with like products, consumer action tips, explanation, etc.	Three options: 1) Independent third-party, accredited to PAS 2050. 2) Other party, who can demonstrate compliance with recognized ISO or BS standards 3) Self-verification, through application of BS ISO 14021	Operator accredits itself or another certifier, depending on method of verification used. Operator is part of UK Accreditation Service process	Packaging, Shelf Website, Not displayed
5.	Carbonlabels.org	No	No	Yes	<i>Declaration:</i> g CO2e	Second-party (Operator or its partner Zerofootprint verifies)	Operator accredits itself or Zerofootprint to certify.	Packaging, Website
6.	Certified CarbonFree	No	Mandatory	Encouraged through financial incentives	<i>Seal:</i> Off setting	Second party (operator decides which consultants can make the CF assessments)	Operator accredits itself to certify.	Packaging, Website Shelf
7.	Climate Conscious Label	No	No	No	<i>Scale:</i> g CO2e per dollar, relative to other products <i>Seal:</i> Meeting criteria	Second-party (Operator verifies)	Operator accredits itself to certify.	Packaging

No.	Scheme	Use of additional, non-carbon, criteria?	Product carbon neutrality through off sets?	GHG reduction commitments?	Kind of label offered?	Method of verification?	Method of accreditation of certifier?	Display of carbon information?
8.	Footprint Chronicles	Information also provided about energy use, waste and distance travelled.	No	Yes	<i>Declaration:</i> g CO2e emitted <i>Additional information:</i> CO2 compared to weight of product, information on distance travelled, waste generated and energy used.	Self-verification (Operator verifies the footprints of own products; no particular method mentioned)	Not applicable (no use of certifier).	Website
9.	Green Index rating	Overall GI rating is an average of three ratings: carbon footprint, chemical use and resource consumption.	No	Yes (corporate level)	<i>Declaration:</i> Scale (0 – 10 rating, where 1 denotes < 2.50 kg and 10 = >100 kg CO2e per pair of shoe).	Self-verification (Operator verifies the CFs of own products; no particular method mentioned)	Not applicable (no use of certifier).	Packaging
10.	Indice Carbone Casino	Yes (percentage of packaging that is and can be recycled)	No	Yes (corporate level; verification method is unclear)	<i>Declaration:</i> g CO2e, scale <i>Commitment:</i> Reduction (at corporate level)	Self-verification (Operator verifies the CFs of own products, calculated by a consultant)	Not applicable (no use of certifier, but ADEME has validated the general methodology applied by the scheme).	Packaging, Website
11.	Stop Climate Change	No	Mandatory	Yes	<i>Seal:</i> Meeting criteria (carbon neutral), off setting <i>Commitment:</i> Reduction	Independent third-party (Operator uses 3 different certification bodies)	Operator accredits the certifiers, all of which are ISO 14065 certified. Operator also reviews and trains the certifiers annually.	Packaging, Shelf Website, Not displayed

No.	Scheme	Use of additional, non-carbon, criteria?	Product carbon neutrality through off sets?	GHG reduction commitments?	Kind of label offered?	Method of verification?	Method of accreditation of certifier?	Display of carbon information?
12.	Verified Sustainable Ethanol Initiative	Yes (rainforest protection, other ecological impacts, child labour, worker conditions)	No	Yes (relative to fixed baseline of 85% of fossil fuels).	<i>Seal</i> : Meeting criteria ('verified sustainable')	Second-party (Operator hires international QA company to validate and verify the CFs)	Operator accredits the certifier (SGS Int.). The certifier used is ISO 14065 certified.	Website Fuel distribution trucks

**Table C.**

No.	Scheme	Stages of the product life cycle included?	Omitted stages in life cycle?	Special emphasis on transport-related emissions?	Measurement methodology?	Use of primary activity data?	Use of published standard?
1.	AB Agri GHG Modelling	All stages of dairy production (including electricity, manure storage, machinery and fuel)	Transport, distribution and sale (scope is production level)	No	Based on PAS 2050 / Carbon Trust methodology	Yes	No (but certified to PAS 2050)
2.	Approved by Climatop	Entire cycle, from production to disposal	None	No	LCA according to ISO 14040 Ecoinvent database GHG according to IPCC 2001 Ecological scarcity model	Yes – hybrid EIO-LCA approach	No (but very transparent, published assessments)
3.	Carbon Connect	All stages, but depends on client's preferences	Depends on client's preferences	No	CarbonConnect method. Total energy used or total material consumed in production, converted into CO2 equivalents according to IPCC's GWP coefficients. An 80/20 practical approach is adopted.	Yes	Yes

No.	Scheme	Stages of the product life cycle included?	Omitted stages in life cycle?	Special emphasis on transport-related emissions?	Measurement methodology?	Use of primary activity data?	Use of published standard?
4.	Carbon Reduction Label	All stages, including the use phase	Human inputs, Transport to consumers, Animal transport, Production of capital goods Immaterial sources (less than 1% of total)	No	PAS 2050 (authored by the Carbon Trust, which owns the Carbon Reduction Label, for the British Standards Institute).	Yes –for all processes owned, controlled or operated by the implementer of the PAS 2050.	Yes (PAS 2050)
5.	Carbonlabels.org	All stages	None	No	Zerofootprint (1 <sup>st</sup> phase) PAS 2050 (2 <sup>nd</sup> planned phase)	Yes	No
6.	Certified CarbonFree	From production to transport to user Product dependent: product use and disposal Optional: capital goods and management operations related to production/logistics	None (see ‘optional’)	Yes (includes all transport activities up to the shelf in the CF calculation)	Own Protocol in conjunction with one of the following: PAS 2050, ISO 14044, WBCSD-WRI corporate level, Bilan Carbon (ADEME)	Yes	Yes
7.	Climate Conscious Label	Full life cycle: raw materials to final disposal	None	No	Process-specific LCA	Yes	Yes
8.	Footprint Chronicles	Raw material to central US distribution centre, but only for the primary material.	Emissions from production of secondary materials (e.g. linings and trimmings) and natural rubber extraction and processing.  Feedstock energy value of the primary material, e.g. energy content of polyester.	The ‘chronicle’ for each style or product has information on distance travelled	LCA-based using suppliers’ reporting of energy use and energy source. US Department of Energy conversion protocols GHG-P website	Yes	No

No.	Scheme	Stages of the product life cycle included?	Omitted stages in life cycle?	Special emphasis on transport-related emissions?	Measurement methodology?	Use of primary activity data?	Use of published standard?
9.	Green Index rating	Raw material production and shoe production	Possibly, all stages except raw material and shoe production are omitted from the product-level calculations.	Transport appears to be ignored in product footprint calculations, but not in corporate level GHG emission calculations.	Corporate: GHG-P calculator tool Corporate Transport: methodology developed by Clean Cargo working group Product-level: GaBi, commercial software (PE International)	No (?)	No
10.	Indice Carbone Casino	All stages from production to distribution to consumer's house	?	No (but a draft version of the label highlighted the GHG emissions from transport)	? (developed with support from ADEME – Bilan Carbon, and Bio Intelligence Service)	Yes	No
11.	Stop Climate Change	All stages (includes production of capital goods and transport of workers in all stages)	Transport of product to consumer's house	No	Own methodology, based on ISO 14064 as far as applicable.	Yes	Yes (in 3 languages)
12.	Verified Sustainable Ethanol Initiative	All stages: from cultivation to transportation (details not known)	?	No	Based on the UK Renewable Transport Fuel Obligation (RTFO) principles.	?	Yes (but not very detailed)

## ANNEX 2. LIST OF PRODUCT OR SUPPLY-CHAIN FOCUSED CARBON ACCOUNTING SCHEMES AND STANDARDS <sup>1</sup>

Name of scheme	Operator	Partners and 'stakeholders'	Level of implementation	Methodological basis	Web site
AB Agri Greenhouse Gas Modelling	AB Agri (Associated British Agriculture), part of Associated British Foods plc.	Carbon Trust Sainsbury's Dairy Development Group Kingshay Farming Trust PRJ Associate	Product (dairy) Farm	Own methodology compliant with PAS 2050 and certified by Carbon Trust.	<a href="http://www.abagri.com/page2.cfm?pageid=1791">http://www.abagri.com/page2.cfm?pageid=1791</a> <a href="http://www.abagri.com/Nimoi/sites/abagri/resources/CarbonTrustBrochure_1st%20ed.pdf">http://www.abagri.com/Nimoi/sites/abagri/resources/CarbonTrustBrochure_1st%20ed.pdf</a> <a href="http://www.sddg.co.uk/">http://www.sddg.co.uk/</a>
Air freight consultation	Soil Association	Licensees	Product (organic food). Monitoring use of air freight	Not applicable	<a href="http://www.soilassociation.org/airfreight">http://www.soilassociation.org/airfreight</a>
Air freight restriction	Biosuisse	Licensees	Product (organic food). Ban on certification of airfreighted imports (with exceptions)	Not applicable	<a href="http://www.biosuisse.ch/en/biosuisseimportpolicy.php">http://www.biosuisse.ch/en/biosuisseimportpolicy.php</a>
Approved by Climatop	Climatop (Switzerland) Myclimate Migros	Migros is currently the only user of the scheme, but it is open to others.	Product	LCA ( <a href="http://www.ecoinvent.org">www.ecoinvent.org</a> database)	<a href="http://www.climatop.ch/">http://www.climatop.ch/</a> <a href="http://www.migros.ch/FR/A_propos_de_Migros/Durabilite/Produits_labels/Declaration_CO2/Seiten/Apercu.aspx">http://www.migros.ch/FR/A_propos_de_Migros/Durabilite/Produits_labels/Declaration_CO2/Seiten/Apercu.aspx</a>
Bilan CO <sub>2</sub> (J'économise ma planète)	E. Leclerc	Greenext Energies Demain	Product (on tabs)	Not published	<a href="http://www.map-news.com/focus/le-bilan-carbone-au-gout-du-jour.html">http://www.map-news.com/focus/le-bilan-carbone-au-gout-du-jour.html</a>
Carbon Action Plan (CAP)	Zenith International Ltd	NSF International (not-for-profit certifier) Trucost Ltd (research)	Product (beverages)	Not published.	<a href="http://www.trucost.com/pressreleases/CAP.html">http://www.trucost.com/pressreleases/CAP.html</a>  (the CAP website does not exist)
Carbon Label Promotion Committee	Thailand greenhouse gas management organisation (TGO)	Thailand Environment Institute Other government agencies	Product (Not operational)	UNFCCC/CDM (GHG accounting limited to production stage)	<a href="http://www.tgo.or.th/english/">http://www.tgo.or.th/english/</a>

Name of scheme	Operator	Partners and 'stakeholders'	Level of implementation	Methodological basis	Web site
Carbon Reduction Label	Carbon Trust	BSI	Product Company	PAS 2050	<a href="http://www.carbontrust.co.uk/default.ct">http://www.carbontrust.co.uk/default.ct</a>
Carbon Scorecards	Wal-Mart	?	Suppliers	Not published	No information found on the Wal-Mart website.
CarbonCounted™ Standard	CarbonCounted Carbon Footprint Solutions	11 consulting partners Advisory Team	Product	Own method 'aligned in practical manner with GHG Protocol and ISO 14064' and subject to annual reviews.	<a href="http://www.carboncounted.com">www.carboncounted.com</a> <a href="http://www.carboncounted.com/downloads/CarbonCounted_Standard.pdf">http://www.carboncounted.com/downloads/CarbonCounted_Standard.pdf</a>
Carbonlabels.org	Conscious Brands	International organisations and NGOs. 10 Pilot Clients	Product	Builds on PAS 2050	www.carbonlabels.org
Certified Carbonfree	Carbon Fund (Washington, US)	Edinburgh Centre for Carbon Management (ECCM) Technical Advisory Group.	Product	Product Life-Cycle Assessment (LCA)	<a href="http://www.carbonfund.org/products">http://www.carbonfund.org/products</a>
Climate Conscious Carbon Label	The Climate Conservancy (US)	Advisory Board of Stanford University scientists	Product	Full LCA (own methodology until international one is established)	<a href="http://www.climateconservancy.org/">http://www.climateconservancy.org/</a>
Climate Labelling of Food	KRAV Svenskt Sigill Kvalitetssystem AB	Swedish food companies and Swedish Board of Agriculture (SJV).	Product (focus on production methods)	Original standards proposal was partly LCA-based. Now under further development	<a href="http://www.klimatmarkningen.se/in-english/">http://www.klimatmarkningen.se/in-english/</a>
Cool (CO <sub>2</sub> ) Label	Korea Eco-Products Institute	Korean government	Product (Not operational)	TOTAL (Tool for Type III labelling and LCA), based on LCA and PAS 2050.	<a href="http://www.koeco.or.kr/eng/index.asp">http://www.koeco.or.kr/eng/index.asp</a> .
Eco Options	The Home Depot	?	Unclear if carbon footprint analysis is used.	Not published	<a href="http://www6.homedepot.com/ecoptions/">http://www6.homedepot.com/ecoptions/</a>
Footprint Chronicles™	Patagonia	Bluesign Technologies (data)	Product	LCA	<a href="http://www.patagonia.com/web/us/footprint/index.jsp">http://www.patagonia.com/web/us/footprint/index.jsp</a> <a href="http://www.thecleanestline.com/footprint_chronicles/index.html">http://www.thecleanestline.com/footprint_chronicles/index.html</a>
German Product Carbon Footprint Project	Product Carbon Footprint Project	10 German companies; WWF Institute for Applied Ecology; Potsdam Institute for Climate Impact Research THEMA1	Product (Not operational)	Work towards an international standard methodology for PCF measurement in 2010 or 2011.	<a href="http://www.pcf-projekt.de">www.pcf-projekt.de</a> <sup>2</sup>

Name of scheme	Operator	Partners and 'stakeholders'	Level of implementation	Methodological basis	Web site
GHG Protocol Product and Supply Chain Accounting and Reporting Standard	World Resources Institute & World Business Council for Sustainable Development	Members of Technical Working Groups 'Pilot Testers'	Product, Supply chain (Not operational)	Own methodology	<a href="http://www.ghgprotocol.org/standards/product-and-supply-chain-standard#usermessage3a">http://www.ghgprotocol.org/standards/product-and-supply-chain-standard#usermessage3a</a>
Green Index™ rating	Timberland	GreenNet Clean Air-Cool Planet (CACP) The Climate Group	Product	Based partly on LCAs performed using GaBi ( <a href="http://www.gabi-software.com">www.gabi-software.com</a> ).	<a href="http://www.timberland.com/corp/index.jsp?page=csr_green_index">http://www.timberland.com/corp/index.jsp?page=csr_green_index</a>
Greenice ISA Methodology for Carbon Footprints	Greenice R&D and Sustainability consultants	Centre of Integrated Sustainability Analysis, University of Sydney	Company Supply Chain Project Product (but no label)	Own "ISA Methodology" based on Input-Output Analysis and compliant with ISO 14044.	www.greenice.com.au
ICA (title not yet determined)	ICA Group (Swedish retailer).	Swedish Institute for Food and Biotechnology (SIK).	Product (food) (pilot project to analyze 100 own-brand food products. Not yet operational)	?	<a href="http://www.ica.se/file_archive/pdf/2008_ICA_Annualreport_ENG_final.pdf">http://www.ica.se/file_archive/pdf/2008_ICA_Annualreport_ENG_final.pdf</a> (ICA Annual Report 2008).
Indice Carbone Casino	Casino France	K Développement Durable Bio Intelligence Service ADEME (l'Agence de l'Environnement et de la Maîtrise de l'Energie) for validation and support.	Product	Method developed by ADEME WRI GHG Protocol ISO 14064	<a href="http://www.groupe-casino.fr/legroupe/?sr=99&amp;id_article=172&amp;lang=fr">http://www.groupe-casino.fr/legroupe/?sr=99&amp;id_article=172&amp;lang=fr</a> <a href="http://www.produits-casino.fr/spip.php?page=developpement_durable_infos_produits&amp;debut_article=15#pagination_articles">http://www.produits-casino.fr/spip.php?page=developpement_durable_infos_produits&amp;debut_article=15#pagination_articles</a>
ISO Carbon Footprint of Products (ISO/NP 14067-1/2)	International Organisation for Standardization	National standards organisations, expert members of technical committee	Product (standard) (Not operational)	To be developed between January 2009 and May 2010.	<a href="http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=43278">http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=43278</a>
Méthode Bilan Carbone®	ADEME (l'Agence de l'Environnement et de la Maîtrise de l'Energie)	?	Corporate Supply Chain	Own methodology	<a href="http://www2.ademe.fr/servlet/KBaseShow?sort=-1&amp;cid=15729&amp;m=3&amp;catid=15730">http://www2.ademe.fr/servlet/KBaseShow?sort=-1&amp;cid=15729&amp;m=3&amp;catid=15730</a>
METI Carbon Footprint System	Ministry of Economy, Trade and Industry (METI) (Japan)	Japan Environmental Management Association for Industry (JEMAI) Ministries of Environment & Agriculture University of Tokyo British Standards and the Carbon Trust	Product (Not operational)	"Guidelines on the Carbon Footprint System" & "Standards for Establishing Product Category Rules"	<a href="http://www.meti.go.jp/english/press/data/nBackIssue20080731_03.html">http://www.meti.go.jp/english/press/data/nBackIssue20080731_03.html</a>
PAS 2050	British Standards Institute	Carbon Trust and Defra	Product	Own methodology	<a href="http://www.bsi-global.com/en/Standards-and-Publications/How-we-can-help-you/Professional-Standards-Service/PAS-2050/">http://www.bsi-global.com/en/Standards-and-Publications/How-we-can-help-you/Professional-Standards-Service/PAS-2050/</a>

Name of scheme	Operator	Partners and 'stakeholders'	Level of implementation	Methodological basis	Web site
Stop Climate Change	AGRA-TEG GmbH	University of Göttingen Independent Governing Board	Product (food) Company	Company specific, builds on ISO 14064	<a href="http://www.stop-climate-change.de/en/">http://www.stop-climate-change.de/en/</a>
UNEP Life Cycle Management	UNEP	Danish Standards	Supply chain Company	GHG Reduction Management tool	<a href="http://www.unep.org/pdf/dtic/DTI0889PA.pdf">http://www.unep.org/pdf/dtic/DTI0889PA.pdf</a>
Verified Sustainable Ethanol Initiative	SEKAB Biofuels and Chemicals (Sweden)	Ethanol producers and sugar cane industry (UNICA) in Brasil. BioAlcohol Fuel Foundation SGS Group (auditor)	Product (ethanol only)	Field-to-wheel (LCA) RTFO principles	<a href="http://www.sustainableethanolinitiative.com">www.sustainableethanolinitiative.com</a>

**Notes:** <sup>1</sup> The list includes only manufacturers who are using their own 'in-house' carbon footprinting standard/scheme, and not those that have adopted product carbon footprinting using schemes/standards operated by other organizations (e.g. PAS 2050, Stop Climate Change, Climatop). <sup>2</sup> Some large schemes were identified but **not** included in the table because they focused at neither the product nor the supply chain levels: a) The Carbon Disclosure Project (<http://www.cdproject.net>), a large scheme led by an UK company; b) The Voluntary Carbon Standard by the Climate Group ([www.theclimategroup.org](http://www.theclimategroup.org)), which is a standard for carbon off-set projects; c) The Carbon Footprint Approved System (<http://www.carbonfootprint.com/carbonfootprintapproved.html>) by Carbon Footprint Ltd, which is implemented at the company level; d) The CarbonNeutral Company (<http://www.carbonneutral.com>) is using the Carbon Neutral Protocol (<http://www.carbonneutral.com/uploadedfiles/TCNC%20Protocol%202008.pdf>) and is implemented at the company, event and project levels.

**ANNEX 3. QUESTIONNAIRE FOR CHARACTERISATION OF PRODUCT CARBON FOOTPRINTING (PCF) SCHEMES**

*Risø National Laboratory for Sustainable Energy, Technical University of Denmark (sibo@risoe.dtu.dk)  
Danish Institute for International Studies (pgi@diis.dk)*

<b>Question</b>	<b>Answer</b>
Name of scheme	
Name of operator / responsible body	
Country where scheme is based	
Type of operator?	<input type="checkbox"/> National government agency <input type="checkbox"/> Intergovernmental org./agency <input type="checkbox"/> For-profit consultant/certifier <input type="checkbox"/> Not-for profit <input type="checkbox"/> Retailer / wholesaler <input type="checkbox"/> <i>Other:</i>
Does the scheme involve calculation of GHG emissions for goods and/or services (is it a genuine PCF scheme)?	<input type="checkbox"/> No <input type="checkbox"/> Yes
What is the specific aim of the scheme?	
What is the broader context of the scheme (i.e. business or societal – strategies or goals which the scheme will contribute to)?	
When did the development of the scheme start?	
What motivated you to develop the scheme?	
What companies, organisations and government agencies were involved in developing the scheme?	
What kinds of experts did you draw on?	

Question	Answer		
Does the scheme include criteria not related to GHG emissions (other environment, social, etc)?	<input type="checkbox"/> No <input type="checkbox"/> Yes		
<i>If yes, which criteria?</i>			
What is the current situation or stage of the scheme?	<input type="checkbox"/> Under development, no pilots completed <input type="checkbox"/> Under development, at least one pilot completed <input type="checkbox"/> Fully operational <input type="checkbox"/> <i>Other:</i>		
What are the 'property rights' of the scheme?	<input type="checkbox"/> Proprietary of the end user (not accessible to others) <input type="checkbox"/> Accessible to more than one end user <input type="checkbox"/> <i>Other:</i>		
What kinds of products is carbon footprinting offered for?	<input type="checkbox"/> Organic food only <input type="checkbox"/> All foods <input type="checkbox"/> All goods and services <input type="checkbox"/> <i>Other:</i>		
What product destinations (country of origin) is carbon footprinting offered for?	<input type="checkbox"/> All countries of origin <input type="checkbox"/> Only domestically produced products <input type="checkbox"/> <i>Other:</i>		
Which products have been approved /certified /labelled to date under the scheme?			
How many products have been approved/certified/labelled?			
How many additional products are currently being assessed under the scheme ('in the pipe line')?			
How many firms have applied the scheme (certified at least one product on a pilot or permanent basis)?			
Is a PCF mark/label offered?	<input type="checkbox"/> No <input type="checkbox"/> Yes		
<i>If yes, what kind(s) of mark/label?</i>	<input type="checkbox"/> Declaration <input type="checkbox"/> g CO2 eq. <input type="checkbox"/> Scale <input type="checkbox"/> <i>Other:</i>	<input type="checkbox"/> Seal <input type="checkbox"/> Meeting criteria <input type="checkbox"/> Top runner <input type="checkbox"/> Off setting	<input type="checkbox"/> Commitment <input type="checkbox"/> Reduction <input type="checkbox"/> <i>Other:</i>
	Other comments:		

Question	Answer
How/where is the carbon footprint information displayed?	<input type="checkbox"/> Packaging <input type="checkbox"/> Shelf / point-of-sale <input type="checkbox"/> Website <input type="checkbox"/> Not for display, but for internal use <input type="checkbox"/> <i>Other:</i>
What elements does the label/mark show?	<input type="checkbox"/> Certification body <input type="checkbox"/> Comparison (with other products) <input type="checkbox"/> Claim (specify): <input type="checkbox"/> Rating <input type="checkbox"/> Achieved reduction <input type="checkbox"/> Explanation <input type="checkbox"/> <i>Other:</i>
GHG reduction commitments are:	<input type="checkbox"/> Mandatory <input type="checkbox"/> Optional <input type="checkbox"/> Not part of the scheme <input type="checkbox"/> <i>Other:</i>
Have producers and other suppliers been asked to reduce the GHG emissions?	<input type="checkbox"/> No <input type="checkbox"/> Yes
<i>If yes, which specifically?</i>	
What measurement methodology (ies) is used to estimate the carbon footprint?	
Who provides technical assistance (LCA studies, verification etc)?	
What stages of the product life cycle (supply chain) is covered?	
What GHG emission sources are omitted (if any)?	
Do you put special emphasis on transport-related GHG emissions?	<input type="checkbox"/> No <input type="checkbox"/> Yes
<i>If yes, why and how?</i>	
From where do the data come (tick one or more option)?	<input type="checkbox"/> Primary activity data <input type="checkbox"/> Secondary data <input type="checkbox"/> Database/source(s):  <input type="checkbox"/> <i>Other:</i>
Have producers provided data for the carbon footprinting?	<input type="checkbox"/> No <input type="checkbox"/> Yes
Who pays for the carbon footprint assessments (LCA studies)?	

Question	Answer
Who pays for the verification or certification?	
Did you obtain external funding to help develop the scheme?	<input type="checkbox"/> No <input type="checkbox"/> Yes
<i>If yes, who provided this funding?</i>	
What is the estimated cost of calculating the carbon footprint of one product (by example)?	
Who is deemed qualified to validate and verify the GHG assertions?	
How is accreditation of the certifiers done?	<input type="checkbox"/> The scheme accredits the certifiers itself. <input type="checkbox"/> Certifiers must be accredited by an independent accreditation body. <input type="checkbox"/> <i>Other:</i>
What have been the reactions to the scheme from:	
<i>Consumers?</i>	
<i>Consumer groups?</i>	
<i>Producers &amp; other suppliers?</i>	
<i>Retailers?</i>	
<i>Government agencies?</i>	
<i>Environmental groups?</i>	
<i>Standard setting bodies?</i>	
<i>Employees?</i>	
Please add any additional comments or observations you may have.	

## ANNEX 4. CONSUMER SURVEY MATERIAL ON CARBON LABELING

### Businesses

#### *Business performance on environment and climate issues*

‘Satisfied with the industry’s efforts to reduce its environmental impact’, 17%. ‘Dissatisfied with the industry’s impact in reducing environmental impact’, 24%. ‘The industry could do better on reducing its environmental impact’, 29%. (EDS, own survey, **UK**)

#### *Provision of information*

About 56.3% of US and 64.4% of UK respondents want companies to provide more product-based information on climate impacts. (Accountability & CI, own survey **US-UK**).

‘When making a buying decision would you value information in the form of a product CL?’ Yes, 56% ‘No’, 27% ‘Don’t know’, 17% (LEK, own survey, **UK**).

‘59% of consumers want to know more about the climate change impacts of the everyday products that they buy’. (Berry, Crossley and Jewell, own survey, **UK**)

‘Would it be a good or a bad thing if there was a climate label that informed you which products were produced with low GHG emissions?’ ‘Very good idea’, 65%, ‘Quite a good idea’, 28% (Naturvårdverket, own survey, **SE**)

#### *Trust of information provided by business on climate change issues*

‘Do you trust information on climate change issues from retailers and manufacturers?’ (UK and US combined) ‘A lot’, 9% ‘A little’, 46% ‘Not very or not at all’, 45%. (Accountability & CI, own survey **US-UK**).

‘How credible are the green claims made by retailers and manufacturers from whom you buy?’ ‘Not very or not at all’, 57%. (LEK, own survey, **UK**)

63% of US and 76.8% of UK respondents stated that, where businesses made climate change claims, these should be verified by independent parties. (Accountability & CI, own survey **US-UK**).

### Consumer choices

#### *‘Hierarchies of need’ in buying decisions*

Consumers’ informational priorities in relation to fresh and processed foods: price took clear preference, followed by food safety (in form of use-by dates) and whether the product was subject to a promotion (e.g., ‘buy one get one free’). Country of origin/locally produced was prioritised next, followed by nutritional and environmental claims (about equal). (EDS, own survey, **UK**)

Even for 'green' consumers, consideration of these issues...was subsequent to price in purchase decisions. (Vision21, own focus groups **UK**)

### ***Choice of retailer and climate change issues***

48.5% of US and 51.6% of UK respondents agreed with a statement that 'they would rather do business with companies willing to reduce their contribution to climate change'. (Accountability & CI, own survey)

66% stated they prefer to buy from businesses that work to reduce climate change impacts. (Naturvårdverket, own survey, **SE**)

### ***Carbon Labels and purchasing decisions***

59% of 'concerned consumers' and 41% of non-concerned consumers said that they would be more likely to buy a product if it carried a CL.' (Upham and Bleda, own survey, **UK**)

Over half of those participating thought that a carbon label would make some difference to their shopping decisions, although the great majority of these said it would make only 'a little' difference. (Vision21, own focus groups, **UK**)

'If you had reliable information on the CF of a product...would you...' 'Switch to a product at the same price with a lower CF, 44%', 'Pay more for a product with a smaller CF', 14%, 'Do nothing' 17%. (LEK, own survey, **UK**)

'How much extra cost per year would you incur to minimize your (shopping) CF?' 'None', 40%, '<£20', 16%, '£20-£50', 20%, '>£50', 7%. (LEK, own survey, **UK**)

'Pilots reveal no clear impact on shoppers' behaviour' (Aitken, no source cited, **UK**).

'Consumers overwhelmingly said that they would not be willing to pay a premium for carbon labeled products – even those who said they might pay a little more for ethically-sourced, local or organic products.' (Upham and Bleda, reporting PepsiCo focus groups, **UK**)

'Would you buy carbon labeled products?' 'Yes, if there was a 5-10% price increase (only)', 9% 'Yes, but only if there was no price increase', 44%, 'No', 25% 'Don't know', 22%. (Pirog & Rasmussen, own survey, **US**)

'What would you pay for a product that had a PCF 50% lower than another in the same category?' 'I'd pay less', 8% 'I'd only pay the same amount', 54% 'I'd pay 10% more', 29% 'I'd pay 20% more', 5% 'I'd pay 30% more', 2%. (Pirog & Rasmussen, own survey, **US**)

'How often would you choose climate labeled food if this was possible?' 'Always', 16%, 'Often', 57%, 'Sometimes', 20%, 'Never', 5%. (Toivonen, own survey, **SE**)

'32% would certainly pay 5% more for a product from a business they knew was working to reduce GHG emissions, and 48% would probably pay more'. (Naturvårdverket, own survey, **SE**)

'How much extra would you be willing to pay for climate labeled food?' 'Nothing, 10%. '10%', 40%, '20%', 22.5%, '30% or more', 5%, 'Don't know', 15%.(Toivonen, own survey, **SE**)

### *Carbon Label Design*

Labels stating PCF in grams were considered unhelpful since they required the consumer to find and review other products before making a decision. A traffic light system would avoid this problem. (Vision21, own focus groups, **UK**)

The most popular format with consumers would be traffic lights or a low carbon stamp. 'Our research showed a mismatch between the information that consumers want and what they are likely to get through the Carbon Trust approach.' (Berry, Crossley and Jewell, own focus groups, **UK**)

72% said that they thought that, on a CF label, the number of grams CO<sub>2</sub>e should be stated.' (Upham and Bleda, reporting Boots Advantage Cardholders' survey, **UK**)

ANNEX 5. EXAMPLES OF PRODUCT CARBON FOOTPRINTING LABELS AND LOGOS

Scheme	Label/Logo				
Certified CarbonFree					
Carbon Reduction Label	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td data-bbox="687 741 1054 1256" style="text-align: center; vertical-align: middle;"> <p><b>working with the Carbon Trust</b></p>  <p><b>per xxxx</b></p> </td> <td data-bbox="1058 741 1390 1099"> <p>The carbon footprint of this product is xxxx per (functional unit). This is the total carbon dioxide (CO2) and other greenhouse gases emitted during its life, including production, use and disposal</p> </td> </tr> <tr> <td data-bbox="687 1261 1054 1346"> <p>We have committed to reduce this carbon footprint</p> </td> <td data-bbox="1058 1104 1390 1346"> <p>This compares to the carbon footprint of xxxx which is xxxx per (functional unit)</p> <p>You can reduce this carbon footprint by xxxx</p> </td> </tr> </table>	<p><b>working with the Carbon Trust</b></p>  <p><b>per xxxx</b></p>	<p>The carbon footprint of this product is xxxx per (functional unit). This is the total carbon dioxide (CO2) and other greenhouse gases emitted during its life, including production, use and disposal</p>	<p>We have committed to reduce this carbon footprint</p>	<p>This compares to the carbon footprint of xxxx which is xxxx per (functional unit)</p> <p>You can reduce this carbon footprint by xxxx</p>
<p><b>working with the Carbon Trust</b></p>  <p><b>per xxxx</b></p>	<p>The carbon footprint of this product is xxxx per (functional unit). This is the total carbon dioxide (CO2) and other greenhouse gases emitted during its life, including production, use and disposal</p>				
<p>We have committed to reduce this carbon footprint</p>	<p>This compares to the carbon footprint of xxxx which is xxxx per (functional unit)</p> <p>You can reduce this carbon footprint by xxxx</p>				
Green Index rating					
Carbonlabels.org					

Scheme	Label/Logo
Carbon Connect	
Approved by Climatop	
Stop Climate Change	
L'Indice Carbone Casino	
Verified Sustainable Ethanol Initiative	