

# **Code of Good Practice for Product Greenhouse Gas Emissions and Reduction Claims**

Guidance to support the robust communication  
of product carbon footprints



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The Carbon Trust is an independent company set up by the UK Government in 2001 in response to the threat of climate change. Its mission is to accelerate the move to a low carbon economy by working with business and the public sector to reduce carbon emissions and develop commercial low carbon technologies.

The Code of Good Practice for product greenhouse gas (GHG) emissions and reduction claims has been developed by the Carbon Trust and Energy Saving Trust to promote the reduction of product life cycle GHG emissions.

This Code has been developed in parallel to PAS 2050, a new standard for assessing carbon footprints of products. *PAS 2050 – specification for the assessment of the life cycle greenhouse gas emissions of goods and services* – was co-sponsored by the Carbon Trust and the UK department for Environment, Food and Rural Affairs (Defra), and published by the British Standards Institution.

This Code is freely and publicly available for use by any organisation with an interest in measuring and reducing product life cycle greenhouse gas emissions, regardless of the format used (e.g. literature, adverts or product labels).

To download a copy, and for more information on The Carbon Trust or this Code, please visit The Carbon Trust website at: [www.carbontrust.co.uk](http://www.carbontrust.co.uk).

# Introduction

## i. Aims of this Code

This Code of Good Practice for Product Greenhouse Gas (GHG) Emissions and Reduction Claims (the Code) supports the communication and reduction of product life cycle GHG emissions. To achieve this, claims made under this Code must be accurate, verifiable, relevant and not be misleading.

The Code provides a robust structure for reporting the life cycle GHG emissions of products, or a reduction in these emissions, to internal or external stakeholders. This is achieved by helping organisations to communicate their products' life cycle GHG emissions and/or emission reductions, assessed in conformity with PAS 2050, in a robust and clear manner, and on a consistent basis. Product GHG emissions and reduction information may be used by companies, consumers and other stakeholders to make business and purchasing decisions.

**Note 1:** "Product" means both goods and services.

**Note 2:** "Product GHG emission" means the GHG emissions arising from the life cycle of the product.

## ii. Applicability of this Code

This Code has been developed by the Carbon Trust and the Energy Saving Trust to be used by organisations operating at any stage of the supply chain, anywhere in the world. Application of this Code requires assessment of the product's life cycle GHG emissions in conformity with the specifications in BSI PAS 2050:2008 – *Specification for the assessment of the life cycle greenhouse gas emissions of goods and services*.

**Note:** Compliance with this Code alone does not entitle companies to use the Carbon Trust or the Energy Saving Trust name or logo in any way in association with claims, labels or other company communications about their GHG emissions.

## iii. Scope of this Code

This Code provides companies, consumers and other stakeholders with guidance on how to:

- Communicate the life cycle GHG emissions of products clearly, credibly, on a consistent and comparable basis, and with sufficient supporting information.
- Support claims relating to reductions in life cycle GHG emissions associated with a specific product over time.

The life cycle GHG emissions of products determined by using PAS 2050, and changes in these emissions over time, do not provide an indicator of the full environmental impact of providing and using these goods or services, and do not:

- Relate to social, economic and environmental impacts arising from the provision of products other than those relating to GHG emissions.
- Infer wider benefits in relation to non-GHG emissions, acidification, eutrophication, toxicity, biodiversity, labour standards or other social, economic and environmental impacts.
- Infer the wider environmental performance of a company.

It is not currently possible to set relative reduction performance targets across different products. However, it is anticipated that PAS 2050 and this Code will accelerate the development of consistent information on product life cycle GHG emissions and reductions which, over time, could be used for such purposes.

## iv. Background

### Why focus on reducing product greenhouse gas emissions?

Moving to a low carbon economy in order to mitigate climate change will require fundamental changes to the way that organisations deliver goods and services. This Code is part of the Carbon Trust's initiative to encourage organisations to reduce emissions across their supply chains by providing robust, clear and consistent information of their products' life cycle GHG emissions and their reduction. Such information can be used by businesses, consumers and other stakeholders to make informed business and purchasing decisions.

The standards and guidance developed to support organisations seeking to assess and reduce their product GHG emissions are set out in two core documents:

- The *BSI British Standards PAS 2050:2008 - Specification for the assessment of the life cycle greenhouse gas emissions of goods and services (PAS 2050)*, which provides a common approach for the assessment of the life cycle greenhouse gas emissions of goods and services.

- This *Code of Good Practice for Product GHG Emissions and Reduction Claims*, which sets out the requirements for organisations making consistent and credible claims regarding their products' emissions and emissions reductions, as assessed using PAS 2050.

PAS 2050 is a stand-alone standard, co-sponsored by the Carbon Trust and Defra, and published by the British Standards Institution (BSI). While PAS 2050 provides a common basis for the assessment of product GHG emissions, it does not include any requirements for either the communication of this emissions assessment, or the assessment of emission reduction over time. The requirements for organisations wishing to assess and declare their product emissions and/or reductions are set out in this Code which, while a standalone document, builds upon the requirements of PAS 2050. For more information about the BSI PAS 2050, see: [www.bsi-global.com/PAS2050](http://www.bsi-global.com/PAS2050).

This initiative is complementary to other work that organisations may carry out to reduce their corporate climate impacts. It is desirable that organisations will focus their product GHG emissions reduction efforts on those goods and services with high potential for change, for example products:

- With high life cycle GHG emissions, and where the opportunity for reductions could be significant.
- With high emissions arising from the way customers use products, and where product information can help individuals reduce emissions.
- Where there is a high variability in GHG emissions within a product category, i.e. lower-carbon choices can have a significant impact.

## v. Challenges and general approach

This Code recognises, and aims to address, a number of challenges associated with claims regarding GHG emissions and/or emissions reduction associated with products. In particular, this Code addresses:

- a. The conflict between rewarding improvement and rewarding absolute performance.
- b. The challenge of comparability.
- c. The trade-off between simplicity and completeness.

### A. Rewarding improvement and rewarding absolute performance

Organisations assessing the GHG emissions of their products could claim that they have reduced the GHG emissions of a product, or they could claim that the product has low GHG emissions. There are challenges associated with both types of claim.

The challenge of 'reduction' claims is that they do not inform customers about the absolute level of emissions. A product claiming major reductions in its GHG emissions may still have higher emissions than a similar product whose GHG emissions were lower to begin with. The challenge facing 'low emission' claims is that there is a lack of sufficiently consistent information available to clearly define 'low', together with uncertainty over which other products should be used in the comparison to determine 'low' and 'high'.

This Code addresses this challenge by requiring that where an organisation makes claims about the reduction in emissions of their product, it shall also declare information about the absolute levels of emissions associated with that product.

This approach recognises actions taken by organisations to reduce the GHG emissions associated with their products, whilst simultaneously making information available which, over the longer term, will allow customers to distinguish between 'low' and 'high' GHG emissions products.

## B. The challenge of comparability

Historically, there has not been sufficient comparable information to allow comparisons of product emissions to be made. Similarly, it has not been possible to set relative reduction performance targets based on emissions of other products, nor on reduction achievements.

This Code requires organisations to report publicly the absolute emission levels of the product(s), and to disclose supporting information explaining how these emissions were assessed to facilitate comparisons by others.

This approach aims to support the development of robust, consistent and readily accessible data which over time will enable comparison of product GHG emissions both within and between product categories.

## C. The trade-off between simplicity and completeness

The evaluation of product GHG emissions can be complex, and decisions have to be made about both the scope of the assessment and the presentation of the results. Some effort is required to gain stakeholder acceptance in relation to claims about GHG emissions.

Any organisation aiming to communicate messages about the GHG emissions of products, or a reduction in those emissions over time, has to contend with this complexity, and the consequent need for customer understanding.

Increasing the amount of information associated with a claim may increase the level of confusion, and fail to inform customers. However, failing to acknowledge this inherent complexity may lead to the perception that a company is making incomplete or even misleading claims.

The approach taken in this Code is to recognise that on-product or 'point of sale' material will often be simplified, in order to be informative to customers. However, this simplicity must be backed up with a high level of transparency through the disclosure of detailed information, in order to avoid customer misinformation.

This Code adopts a 'principle based approach' to address these challenges. The Code is structured in six sections:

- Section 1 lays out the principles that guide any claims related to product life cycle GHG emissions and reductions.
- Section 2 sets out the requirements for organisations communicating product life cycle GHG emissions.
- Section 3 covers the requirements for organisations communicating product life cycle GHG emissions reductions. This section includes the requirements for an organisation to demonstrate that robust emissions reductions have been achieved.
- Section 4 specifies requirements for the provision of supporting information in the form of a Product Emissions Report for products on which claims are made.
- Finally sections 5 and 6 contain a glossary and list of references respectively.

### Development process

This Code was developed by the Carbon Trust and the Energy Saving Trust in association with Arup Consulting, OneWorldStandards Ltd and the Pacific Institute, and with technical support from E4tech. The process was overseen by an independent Steering Group. Details of the development process, governance and Steering Group membership are set out in Appendix 2.

# 1. Principles for claims about product life cycle GHG emissions and reductions

This Code has taken into account existing frameworks on environmental declarations and labels, including ISO 14021 on self-declared environmental claims and the UK Government's Green Claims Code. This Code is designed to comply fully with applicable elements of the nine principles specified in ISO 14020:2001 in relation to environmental declarations and labels, together with a tenth principle regarding the requirement for claims to support effective decision-making. These principles are presented below.

**Principle 1:** Environmental labels and declarations shall be accurate, verifiable, relevant and not misleading. For the purpose of this Code, this means:

**a) Claims shall be accurate**

Assessments of product life cycle GHG emissions and/or reductions shall be based on full conformity with PAS 2050.

**b) Claims shall be verifiable**

Declarations of conformity with this Code shall only be made by organisations whose conformity has been verified by an independent third party organisation that has been accredited in conformity with ISO 14065 and which has certification to PAS 2050 and this Code within its scope.

**c) Claims shall be relevant**

Product claims about GHG emissions and reductions shall be specific to the product about which the claim is made.

**d) Claims shall not be misleading**

Claims based on the product's life cycle GHG emissions shall be limited to GHG emissions and shall not imply broader environmental impacts (e.g. water, waste, resource efficiency).

Claims shall not confuse low carbon emissions with reductions in carbon emissions.

**Note 1:** For example, organisations in conformity with this Code shall not make generic claims that a product is 'environmentally friendly' or 'better for the environment'.

**Note 2:** For example, a claim that a product is a 'low carbon product' because the manufacturer has reduced its product life cycle emissions would be misleading unless the manufacturer could present evidence that the product's absolute levels of emissions were low compared to other equivalent products in the market, using the same method of measurement.

**Principle 2:** Procedures and requirements for environmental labels and declarations shall not be prepared, adopted, or applied with a view to, or with the effect of, creating unnecessary obstacles to international trade.

**Principle 3:** Environmental labels and declarations shall be based on scientific methods that are sufficiently thorough and comprehensive to support the claim, and that produces results that are accurate and reproducible.

**Principle 4:** Information concerning the procedures, methods, and any criteria used to support environmental labels and declarations, shall be available and provided upon request to interested parties. All claims shall be substantiated by the publication of supporting information as specified in Section 4 of this Code.

**Principle 5:** The development of environmental labels and declarations shall take into consideration all relevant aspects of the life cycle of the product, in conformity with PAS 2050.

**Principle 6:** Environmental labels and declarations shall not inhibit innovation which maintains or has the potential to improve environmental performance.

**Principle 7:** Any administrative requirements or information demands related to environmental labels and declarations shall be limited to those necessary to establish conformance with applicable criteria and standards of the labels or declarations.

**Principle 8:** The process of developing environmental labels and declarations should include an open, participatory consultation with interested parties. Reasonable efforts should be made to achieve consensus throughout the process.

**Principle 9:** Information on the environmental aspects of products and services relevant to an environmental label or declaration shall be available to purchasers and potential purchasers from the party making the environmental label or declaration.

**Principle 10:** Claims about product GHG emissions and reductions shall support effective decision-making, i.e. claims shall help companies, consumers and other stakeholders make choices which will be effective in reducing GHG emissions over time.

(Adapted from ISO 14020:2001)

## 2. Communicating product life cycle GHG emissions

### 2.1 Declaring overall emissions

Claims relating to a product's life cycle GHG emissions shall be reported as a single figure encompassing the total emissions for the product per functional unit, taking account of all the phases of the product's life cycle, and assessed in conformity with PAS 2050.

### 2.2 Declaring emissions for specific phases of the life cycle or multiple PAS 2050 results

Companies may also report:

- Emissions for individual phases of a products life cycle.
- Results based on different scenarios for a products sourcing, manufacturing, distribution, use or disposal.
- Different results assessed at different points in time (e.g. before and after reduction); provided the overall most recent result is also disclosed, in conformity with clause 2.1.

**Note:** For example organisations can make the following claims:

- The life cycle GHG emissions of this product is 50gCO<sub>2</sub>e per functional unit, and 80% of these emissions are associated with the use and disposal of this product.
- The life cycle GHG emissions of this product are 50gCO<sub>2</sub>e per functional unit. Eighty percent of these emissions are associated with the use and disposal of this product. These emissions can be reduced by 10gCO<sub>2</sub>e per functional unit by line drying rather than tumble drying.

### 2.3 Units of measurement

#### 2.3.1 Standard unit of measurement

Product life cycle GHG emissions shall be reported as a mass of carbon dioxide equivalent (CO<sub>2</sub>e), as defined in PAS 2050.

**Note:** The units used should be consistent with the norm for the sector or the country where the claim is being communicated e.g. grams or kilograms in EU, pounds in USA.

#### 2.3.2 Functional unit

The life cycle GHG emissions for the product shall be specified per functional unit. For services, or for goods delivering a service, emissions shall be specified per unit of service provided.

**Note:** Example

- Product X has GHG emissions of 10gCO<sub>2</sub>e per 100g unit.
- Service Y has GHG emissions of 500gCO<sub>2</sub>e per day.

#### 2.3.3 Product unit

A company may report a product's life cycle GHG emissions on a product unit basis, provided that the result based on a functional unit is also presented.

**Note:** Example

- Product X has life cycle GHG emissions of 10gCO<sub>2</sub>e per 100g unit, or 50gCO<sub>2</sub>e for the whole pack.

### 2.4 Result precision and rounding

There may be uncertainty in the assessment of product GHG emissions. The reported emissions per functional unit (FU) shall be rounded according to the following rules:

Life cycle GHG emissions per functional unit (CO <sub>2</sub> e/FU)	Round to nearest
>10g, <=20g	1g
>20g, <=40g	2g
>40g, <=100g	5g
>100g, <=200g	10g
>200g, <=400g	20g
>400g, <=1000g	50g
>1.0kg, <=2.0kg	0.1kg
>2.0kg, <=4.0kg	0.2kg
>4.0kg, <=10kg	0.5kg
etc	etc

Rounding is to be applied to the final GHG emission assessment that is to be communicated, not during the calculation of the emission assessment.

**Note 1:** For example, a product whose overall emissions are presented in its Product Emissions Report as being 58gCO<sub>2</sub>e per 100g unit would be referred to as emitting 60gCO<sub>2</sub>e per 100g unit when communicated. An annual reduction of 6.5gCO<sub>2</sub>e per 100g would be rounded up to 7g for communication purposes. An annual reduction of 1.16gCO<sub>2</sub>e per 100g (i.e. 2%) would be reported as a reduction of 1.2gCO<sub>2</sub>e per 100g for communication purposes.

**Note 2:** The bands are set such that the maximum change to a reported result occurring due to rounding is the same for each functional unit range.

**Note 3:** Rounding rules will be subject to review as more evidence of uncertainty is gained through the implementation of this Code.

### 2.5 Up to date assessment

Declarations of emissions shall be based on assessments in conformity with PAS 2050 that have taken place within the last two years.

## 3. Communicating product life cycle GHG emissions reductions

### 3.1 Requirements for reductions achieved

Organisations may make public declarations relating to achieved reductions in product life cycle GHG emissions when the requirements described in this section have been met, i.e.:

- Emissions reductions are proved in conformity with the requirements in Section 3.1.1.
- Banking of emissions is in conformity with Section 3.1.2.
- Claims conform to the requirements of Section 3.1.3.

#### 3.1.1 Proof of emissions reduction achievements

Organisations may make public declarations relating to achieved reductions in product life cycle GHG emissions when they can demonstrate that these emissions have decreased between two assessments carried out in conformity with PAS 2050 and independently verified. The reduction refers to the total GHG emissions of the product, and may have accrued at any point in the life cycle of the product. The declarations need to be updated at least every two years.

Reduction claims in conformity with this Code shall only be used for comparison of the same product over time i.e. a product which is sold as the same product. Where a product has been withdrawn from the market, and replaced by a similar product, a reduction claim shall not be made by comparing the emissions of the retired product with those of the new product.

##### 3.1.1.1 Reduction of emissions of products with variable emissions

Where the GHG emissions associated with the life cycle of a product vary over time (e.g. seasonal products), reductions in emissions shall be calculated by comparing average emissions over equivalent time periods (e.g. emissions over one year) at the beginning and end of the reporting period.

**Note:** For example, if apple juice was made from one type of apple in the winter and another in the summer, but presented to consumers as an identical product throughout the year, an emissions reduction for the apple juice would be calculated by comparing the average emissions over the year at the beginning and end of the reporting period.

##### 3.1.1.2 Period of assessment

The maximum period over which any reduction in GHG emissions from products is assessed shall be two years. Organisations may choose to claim reductions over shorter time periods.

**Note:** If an unforeseeable event occurs that forces a temporary change in the supply chain that impacts upon the lifecycle GHG emissions (e.g. flooding in one country forces a change in sourcing of agricultural product), a company may choose to wait until the period of temporary change is over to re-assess its life cycle GHG emissions, i.e. until their sourcing has returned to its previous state. The maximum extension allowed is one year, i.e. compliance with this Code could be extended to a maximum of three years in this case before a new PAS 2050 assessment is required. For the purpose of this Code 'temporary change' is defined as that with duration of less than one year.

##### 3.1.1.3 Updating the baseline due to changes in PAS 2050 or data quality

Organisations shall use the most recent version of PAS 2050 to assess reductions in GHG emissions over the reporting period. This ensures both consistency of the assessment across the reduction period, and that measurement is in accordance with the most recent PAS 2050 version.

Organisations shall use consistent sets of data to assess their emissions when measuring reduction.

**Note:** For example, an organisation may be able to provide more accurate or specific data in the assessment of their most recent emissions at the end of the two year reporting period than the ones they used to assess the initial baseline, such as newly determined primary data (data from their process) or more specific secondary data (for example, data on the exact type of material used, rather than the material class as a whole). Where this is the case, the same data shall also be used to update the baseline calculations.

##### 3.1.1.4 Unclear quantitative results

In cases where the quantitative assessment of the emissions reduction subject to the claim is unclear, the company shall identify, and disclose to the verifier, the specific actions underpinning the emissions reduction claim. These include changes in processes or inputs.

**Note:** For example, where the emissions factor for a process or input is subject to uncertainty, evidence of reduction of the underlying activity shall be disclosed to verifiers to support conformity.

### 3.1.2 Banking reduction achievements

Organisations which have reduced their product emissions by more than 5% in any two year reporting period may choose to bank a proportion of that emission reduction. Banked emission reductions may contribute to emission reductions in subsequent reporting cycles. Banking can occur for a maximum of six years (i.e. three reporting cycles) following the year in which the banked reduction occurred. Any banked reduction shall be offset by any increases in the underlying emissions due to other factors. The assessment of the emissions reductions needs to conform to PAS 2050.

See 3.10 on requirements for declaring banked reductions.

**Note:** For example, a company may make a major investment in a power plant or step-change in its production process that reduces its product life cycle emissions by 12% from the baseline. A company could decide to make claims over a maximum period of six years (i.e. an average of 2% reduction per year), provided there are no other increases in life cycle emissions over that 6-year period. If, two years later, emissions assessed according to PAS 2050 show to have increased by 2% due to other factors (over the reduced baseline), the net effect will be to allow the company to claim 6% over the next four years (rather than the 8% that had been banked).

### 3.1.3 Communication of emission reductions

Organisations may make public claims about achieved reductions of their products' GHG emissions at any time after reduction has been achieved, as evidenced by conformity with the requirements laid out in Sections 3.1.1 and 3.1.2, provided the following requirements have been met.

#### 3.1.3.1 Form

Declarations shall contain the product carbon emissions assessed in conformity with PAS 2050, the emissions reduction expressed in absolute and/or percentage terms and the year of baseline comparison. All measures shall be expressed in terms of functional unit, in conformity with the requirements of Section 2 of this Code.

**Note:** For example, 'The carbon footprint of this product is 50gCO<sub>2</sub>e per [functional unit]. We reduced this footprint by 10gCO<sub>2</sub>e per [functional unit] between 2008 and 2012.'

### 3.1.3.2 Declaring banked reductions

Banked emissions that have been calculated in accordance with Section 3.1.2 can be declared in their totality in each reporting period clearly stating the baseline year, provided net emissions of the product remain lower than the initial baseline and are reported net of any increase in emissions occurred during the reporting period due other factors. The latest emissions according to PAS 2050 shall be declared and updated every two years.

**Note:** For example, if a company achieved emissions reductions of 20% (20gCO<sub>2</sub>e/Functional Unit) in 2010 it can choose to bank these reductions until 2016 if it so wishes. Provided the product's emissions do not increase over the reporting period due to other factors, the company may choose to declare "We have reduced the life cycle GHG emissions of this product by 20% since 2010" in 2012, 2014 and 2016. If the emissions of the product increased by 8% in 2013 (over the reduced baseline), the company could declare in 2012: "We have reduced the life cycle GHG emissions by 20% since 2010" but in 2014 they can only declare "We have reduced the life cycle GHG emissions by 12% since 2010".

## 3.2 Requirements for unquantified reduction commitments

Organisations may make public declarations regarding unquantified commitments to reduce product life cycle GHG emissions when the requirements described in this section (Section 3.2) have been met, i.e.:

- Robust emissions reductions commitments are proved in conformity with the requirements in Section 3.2.1.
- Claims conform to the requirements of Section 3.2.2.

### 3.2.1 Proof of emissions reduction commitment

Organisations may make public declarations of their commitments to reduce product GHG emissions when they can demonstrate that their commitment is robust, in conformity with the requirements in this section.

#### 3.2.1.1 Baseline assessment

A baseline assessment of the product's life cycle GHG emissions has been completed in conformity with the specifications of PAS 2050, independently verified.

### 3.2.1.2 Plans to reduce

The company has a plan of actions to reduce their product emissions. An overview of these actions to reduce emissions shall be disclosed for verification purposes.

## 3.2.2 Communication of unquantified reduction commitments

Organisations may make public claims about commitments to reduce their products' GHG emissions when the commitment conforms to the requirements laid out in Section 3.2.1, provided the following requirements have been met.

### 3.2.2.1 Form

Declarations shall contain the baseline carbon emissions assessed in conformity with PAS 2050, and an explicit commitment to reduce the product's emissions during a specified time period that shall not be longer than two years, in conformity with the requirements in Section 3.1.1.2. The specific year when compliance is expected shall be stated at the point where the claim is being made and/or within the complementary information disclosed in the Product Emissions Report (see Section 4 of this Code). No quantified declarations of future reduction commitments shall be made.

**Note:** For example, a company can claim "We are committed to reducing the life cycle GHG emissions of Product X by 20YY".

However, a company cannot claim "We are committed to reducing the life cycle GHG emissions of Product X by Z%/Z g by 20YY".

## 3.3 Failure to comply

### 3.3.1 Quantified reduction not achieved

In the event that a company fails to achieve quantified reductions during a reporting period (two years) in conformity with the requirements in Section 3.1, the company is no longer compliant with the reduction proof requirements of this Code in relation to that product. In this case, claims regarding emissions reduction or emissions reductions commitments of that product shall not be made until emissions reduction has been achieved.

### 3.3.2 Declaration of reduction achievements after previous failure

If, after failing to comply with this Code during one reporting period (two years) for a particular product, an organisation subsequently achieves a reduction in the next (two year) reporting period, the company may declare their reduction achievement again. In this case, the organisation may choose to compare current emissions with the previous lowest baseline.

**Note:** For example, if an organisation reduces the life cycle GHG emissions of product X by 4% between 2010 and 2012 but no further reductions are then made until 2016, the organisation can make reduction claims in 2012 but not in 2014. If 2016, a further 3% reduction has occurred since 2012, the claim in 2016 can be either "The GHG emissions of product X is 100g/functional unit. We have reduced these emissions by 7% since 2010" or "The GHG emissions of product X is 100g/functional unit. We have decreased these emissions by 3% since 2014".

### 3.3.3 Failure due to 'Force Majeure'

Organisations that fail to achieve reduction solely due to a *force majeure* event may normalise the baseline emission assessment to remove the impacts of *force majeure* and assess the reduction comparing with the normalised baseline.

For the purposes of this document *force majeure* events include fire, flood, earthquake, storm, hurricane or other natural disaster (including pests and diseases), war, invasion, act of foreign enemies, hostilities (whether war is declared or not), civil war, rebellion, revolution, insurrection, military or usurped power or confiscation, terrorist activities, government sanction, blockage, embargo, interruption or failure of energy suppliers.

**Note 1:** For example, if a company's manufacturing site for a particular product suffered major flooding which resulted in manufacturing being switched to a less efficient plant, which increased its product life cycle GHG emissions, the company could re-assess its baseline to take this into account. In this case both the baseline and the new result after the two year period assessments would use the most recent (less efficient) manufacturing data. If the net result of these assessments showed that life cycle GHG emissions had reduced over the two year period then the company would remain in conformity with this Code.

**Note 2:** Weather can affect the baseline for numerous products, in particular in agriculture. Extreme weather or other events could be considered as *force majeure* on a case by case basis by the verifiers, in agreement with the accreditation body. An extreme event is defined as that falling outside the normal historical range used to assess the emissions arising from the product; refer to PAS 2050 for further information on data requirements.

## 4. Supporting information: The Product Emissions Report

**Note:** Appendix 1 provides a template that may be used as the basis for the Product Emissions Report prepared in conformity with the requirements of this Code.

### 4.1 Scope of the Product Emissions Report

Claims relating to the life cycle GHG emissions of products shall be supported by the publication of a 'Product Emissions Report' which provides context and explains the basis for the claim being made. The Product Emissions Report may cover one or more products. Where more than one product is covered, the report only needs to cover common references to several products once, and detail the information that is specific to each individual product.

The Product Emissions Report shall provide an overview of the method, assumptions, limitations and results of the assessment for the product(s) it covers. The Report shall be of sufficient detail to allow the reader to understand the complexities and trade-offs inherent in the assessment of the life cycle GHG emissions of products following the requirements described below.

### 4.2 Background information

The Product Emissions Report shall provide the following introductory information:

- a. The name of the company producing or providing the product(s).
- b. The specifications and/or other documents against which the company has been assessed for conformity (e.g. the title, number and date of the versions of the BSI PAS 2050, and Code of Good Practice for product GHG emissions and reductions claims).
- c. The name of the body/bodies that have verified the company's conformity with the requirements of PAS 2050 and with the requirements of this Code.
- d. The year for which the assessment results remain valid (i.e. two years from the date of the most recent assessment).

### 4.3 Company policy

The Product Emissions Report shall specify the company policy and strategy in relation to climate change, including:

- a. A public statement/ policy identifying how climate change is relevant to its business activities in terms of risks (regulatory, physical, reputational) and opportunities.
- b. A summary of the company's strategy to manage carbon across the company as a whole.
- c. A summary of the company's objectives/targets for the reduction of GHG emissions across the company as a whole.

**Note:** Reference to the company's publicly available, completed Carbon Disclosure Project (CDP5) Greenhouse Gas Emissions Questionnaire (2007) would satisfy the requirements specified in clause 4.3.

### 4.4 Product emissions declarations: supporting information

For each product covered by the Product Emissions Report, the following information shall be provided:

- a. The specific product(s) for which life cycle GHG emissions are reported (e.g. Brand X washing powder; Z Hotel accommodation).
- b. The quantitative results of the most recent verified PAS 2050 assessment(s).
- c. The date(s) of the emission assessment.

## 4.5 Product emissions reduction claims: supporting information

Organisations making claims regarding life cycle GHG emission reductions of their products shall include the following information in the Product Related Emissions Report:

- a. The specific product(s) for which life cycle GHG emissions are reported.
- b. The baseline emissions figure as assessed before the reduction took place, and the subsequent most recent emissions figure assessed after the reduction took place (as specified in 4.4).
- c. The dates when both the baseline emissions and most recent emissions results on which the reduction claim is based were assessed.
- d. The emissions reduction achieved expressed in absolute and/or percentage format.
- e. The time period over which the reduction took place.
- f. Explanation of banked results shall be disclosed by organisations making claims based on banked savings.
- g. Explanation of baseline updates shall be disclosed by organisations when the original baseline figure has been revised to reflect changes in PAS 2050 versions or data. In these cases the Product Emissions Report shall include the original baseline emissions figure, the revised baseline figure (using the new or updated information), and the latest emissions results after reductions have taken place (also based on the new or updated information). The Product Emissions Report shall also include an explanation of the changes in the baseline.
- h. Explanation of impacts of force majeure shall be disclosed by organisations who wish to claim reductions taking account of 'force majeure' events (as defined in Section 3.3.3 of this Code). In these cases, the Product Emissions Report shall include all the original baseline emissions figure, the revised baseline figure (normalised taking into account the impact of the force majeure event), and the latest emissions results after reductions have taken place. The Product Emissions Report shall also include an explanation of the force majeure event.

## 4.6 Boundaries and data: supporting information

Claims regarding both product emissions and reductions shall be supported by the following information:

- a. A description of the boundaries of the emissions assessment for the product and the basis for the boundary decisions for the product and for its use profile.

**Note 1:** PAS 2050 identifies two potential sources for defining the boundaries for the assessment of life cycle GHG emissions: i) the boundaries specified in a relevant Product Category Rule (PCR), or ii) where a PCR does not exist for the product the default boundaries described in the PAS 2050. The Product Emissions Report shall refer to the source used for the PAS 2050 assessment, and when they have not used a PCR, define broadly the boundaries for the specific product under analysis.

- b. The sources of secondary data which have been used for the assessment, including the sources of conversion factors.

**Note 2:** This specification requires that the sources of data shall be disclosed, not the data itself. Sources shall be declared that cover all the material sources of emissions, i.e. 95% of the total estimated product emissions.

## 4.7 Disclaimer about uncertainty of results

The Product Emissions Report shall include a disclaimer regarding the level of uncertainty associated with the reported emissions results. The disclaimer could take the form of a qualitative statement regarding the uncertainty of the results, or a quantitative assessment of uncertainty if available.

**Note:** For example, an organisation could use this disclaimer about the uncertainty of the results: “The emissions figures provided in this report have been assessed in conformity with the requirements of the PAS 2050, using the primary and secondary sources of data specified in this report. Based on the PAS 2050 we believe that our assessment has identified 95% of the likely GHG emissions associated with the full life cycle of the product(s) covered in this report. However, readers should be aware that even primary sources of data are subject to uncertainty and variation over time. The figures given in this report should be considered as our best estimates, based on reasonable costs of evaluation”.

## 4.8 Location of supporting information

### 4.8.1 Reference to supporting information

All claims described in Sections 2 and 3 of this Code shall include a clear reference to a freely accessible website where the additional supporting information specified in this Section 4 is available.

**Note:** For example “The carbon footprint of this product is 50g CO<sub>2</sub>e per [functional unit]. See [www.ourcarbonfootprint.com](http://www.ourcarbonfootprint.com) for more information”.

### 4.8.2 Location of reference to supporting information

In the case of product on-pack information, if the reference to supporting information is not included on the pack itself (e.g. due to lack of space), the information shall be provided by other visible means at the point of sale or other communication vehicles for the product.

## 5. Glossary

**Note:** All definitions are taken from BSI PAS 2050 unless explicitly stated otherwise.

### Banking of GHG emissions savings

Crediting of GHG emission reductions to a future year or compliance period.

### Baseline

Initial assessment of product life cycle GHG emissions, against which future reduction targets and reductions are measured.

### Carbon dioxide equivalent (CO<sub>2</sub>e)

Unit for comparing the radiative forcing of a GHG to carbon dioxide.

(ISO 14064-1:2006, 2.19)

**Note:** Greenhouse gases, other than CO<sub>2</sub>, are converted to their carbon dioxide equivalent value on the basis of their per unit radiative forcing using 100-year global warming potentials defined by the Intergovernmental Panel on Climate Change (IPCC).

### Carbon footprint

The total set of GHG emissions caused directly and indirectly by an individual, organisation, event or product.

### Claim

Information appearing on a product, its packaging, or in related literature or advertising material, relating to its environmental aspects. It can take the form of text, symbols, or graphics.

**Note:** A straight piece of advice to consumers of the product – for example, about care in its use or disposal – is not regarded as a claim. But such advice should still give consumers relevant information on which they can realistically act.

(UK Department of Trade and Industry Green Claims Code, June 2000)

### Customer

Buyer of goods and services.

### Declaration

Claim in relation to some aspect of a product or service.

**Note:** A declaration may take the form of a statement, symbol or graphic on a product or package label, in product literature, in technical bulletins, in advertising or in publicity, amongst other things.

(Adapted from ISO 14020:2001 definition of an 'environmental declaration')

### Force majeure

Extraordinary event(s) or circumstance(s) beyond the control of the parties, including fire, flood, earthquake, storm, hurricane or other natural disaster (including pests and diseases), war, invasion, act of foreign enemies, hostilities (whether war is declared or not), civil war, rebellion, revolution, insurrection, military or usurped power or confiscation, terrorist activities, government sanction, blockage, embargo, interruption or failure of energy suppliers.

### Functional unit

Quantified performance of a product for use as a reference unit.

(ISO 14044:2006, 3.20)

### Greenhouse gases (GHGs)

Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds.

(PAS 2050:2008, 3.26)

### Life cycle

Consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to final disposal.

(ISO 14040:2006, 3.1)

### **Life cycle GHG emissions**

Sum of greenhouse gas emissions resulting from all stages of the life cycle of a product and within the specified system boundaries of the product.

(PAS 2050:2008, 3.3.2)

### **Primary activity data**

Quantitative measurement of activity from a product's life cycle that, when multiplied by an emission factor, determines the GHG emissions arising from a process.

(PAS 2050:2008, 3.36)

### **Product**

Any good or service.

(Adapted from ISO 14040:2006, 3.9)

### **Product category**

Group of products that can fulfil equivalent functions.

(ISO 14025:2006, 3.12)

### **Secondary data**

Data obtained from sources other than direct measurement of the processes included in the life cycle of the product.

(PAS 2050:2008, 3.43)

### **Unit process**

Smallest portion of a life cycle for which data are analysed when performing a life cycle assessment.

(PAS 2050:2008, 3.45)

### **Use phase**

that part of the life cycle of a product that occurs between the first arrival of the product at the consumer and the end of life of the product.

(PAS 2050:2008, 3.47)

## 6. References

### Normative references

PAS 2050: 2008 *Specification for the assessment of the life cycle greenhouse gas emissions of goods and services.*

### Informative references

Carbon Disclosure Project (CDP5) *Greenhouse Gas Emissions Questionnaire* (2007).

Global Framework for Climate Risk Disclosure: *a statement of investor expectations for comprehensive corporate disclosure* (October 2006).

Green Claims Code, Revised (2000) UK Department for Environment Transport and the Region and Department for Trade and Industry.

ISO 14020: 2001 *Environmental labels and declarations – General principles.*

ISO 14021:2000 *Environmental labels and declarations – Self declared environmental claims.*

ISO 14025:2006 *Environmental labels and declarations – Type III environmental declarations – Principles and procedures.*

ISO 14044:2006 *Environmental management - Life cycle assessment – Requirements and guidelines.*

ISO 14064-1:2006 *Greenhouse gases – Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.*

ISO 14064-2: 2006 *Greenhouse gases – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements.*

ISO 14065:2007 *Greenhouse gases – Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition.*

# Appendix 1

## Product Emissions Report template

### Introduction

This report presents [verified] information about the Company A in-store trial to assess the GHG emissions of its croissants range. It provides information on Company A's overall strategy for climate change mitigation and that specific to the croissants line assessed in conformity to PAS 2050.

This report conforms to the requirements for public disclosure of the life cycle GHG emissions of products laid out in the 'Code of Good Practice for product GHG emissions and reductions'. It aims to provide the basis to allow consistent information for product GHG emissions and reduction, assessed in conformity with PAS 2050.

### 1. Background information

1.1	<b>Name of company:</b> Company A
1.4	<b>Specifications and/or other documents against which the company has been assessed for conformity</b> (e.g. the title, number and date of the versions of BSI Publicly Available Specification): i. PAS 2050:2008 ii. Code of Good Practice for product GHG emissions claims: 2008
1.5	<b>Name and Accreditation Reference of the independent, third party verifier:</b> The Carbon Label Company, a wholly-owned subsidiary of the Carbon Trust, Accreditation Reference – e.g. Accreditation body 0001
1.6	<b>Date of Verification:</b> 6th July 2008

### 2. Company policy in relation to climate change:

2.1	<p><b>Company policy and strategy</b></p> <p><i>NOTE: the policy and strategy statement shall include at least the following:</i></p> <p>a. A public statement/ policy identifying climate change as being relevant to its business activities. b. A summary of the company's strategy to manage carbon emissions across the company. c. A summary of the company's target(s) to reduce GHG emissions across the company as a whole.</p> <p><b>Company A public position (from 2008 Corporate Social Responsibility Review):</b></p> <p>Our policy is to integrate environmental sustainability concerns into our core business strategy and practices.</p> <p>Our climate change strategic goal is to reduce our direct emissions by 50% from 2000 levels by 2010 and to help employees and customers to reduce their carbon footprints. Specific targets include:</p> <ul style="list-style-type: none"> <li>• Reduce our energy use by 30% vs. 2000 levels by 2010.</li> <li>• Cut our employees' business travel by 20% from 2000 levels by 2010.</li> <li>• Assess the life cycle GHG emissions of at least 50% of our product categories by mid-2009.</li> <li>• Invest £5M during 2008 in engagement programmes to help our consumers and employees identify and implement actions to reduce further the GHG emissions resulting from our activities.</li> </ul> <p>Further information can be found in the Company A 2008 Corporate Social Responsibility Review: <a href="http://www.companya.com/csrreview08/">http://www.companya.com/csrreview08/</a>.</p>
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### 3. Product emissions declarations: Supporting information

Product reference number: 1

3.1	<b>Product(s) assessed in conformity with PAS 2050 on which claims are made:</b> Company A 12-pack butter croissants	
3.2	<b>Product emissions: Full life cycle GHG emissions for the product</b> <i>(most recent quantitative result of the assessment reported as a single figure, and taking account of all the phases of the product's life cycle, in compliance with the specification of the PAS 2050<sup>1,2,3,4</sup>)</i> Raw materials: Manufacturing: Distribution/ retail: Consumer use: Disposal:	1,100g per pack  550g 300g 60g 40g 170g
3.3	<b>Optional: GHG emissions for individual phases of a product's life cycle</b>	n/a
3.4	<b>Optional: GHG emissions results based on different scenarios of life cycle management</b>	n/a
3.5	<b>Date of assessment for results specified in 3.2 - 3.4 (above)</b>	30th July 2008

### 4. Product emissions reduction: Supporting information

4.1	<b>Product(s) assessed in conformity with PAS 2050 on which claims are made:</b> Company A 12-pack butter croissants	
4.2	<b>Baseline emissions</b> <i>(Baseline assessment on which the reduction claim is being made by comparing it with the most recent assessment reported in 3.2 - above)</i>	1,150g per pack
4.3	<b>Date of assessments of baseline stated in 4.1 (above)</b>	2nd Feb. 2008
4.4	<b>Claimed GHG emission reduction for the product</b> <i>(expressed in absolute and/or percentage terms comparing baseline (4.1 - above) to current (3.2 - above))</i>	4%
4.5	<b>Time over which reduction has taken place:</b>	Feb – July 2008
<b>Description of drivers of reduction claims</b>		
4.6	<b>Description of the high-level actions that have been implemented, or which are planned to be implemented, to reduce the life cycle GHG emissions of the product(s) listed in this report:</b>  <ul style="list-style-type: none"> <li>• Action 1: Implement reduction initiatives covering the Company A direct carbon footprint (described in section 2.1 in 2008 Corporate Social Responsibility Review), which has a knock-on impact on the carbon footprint of each of Company A's products (underway).</li> <li>• Action 2: To work with raw materials suppliers to promote the development of low- or alternative-fertiliser wheat agriculture techniques (underway).</li> <li>• Action 3: To work with raw material manufacturers to promote the use of renewable energy sources to power production facilities (future initiative).</li> </ul>	
4.7	<b>Explanation of banked results:</b> N/A	
4.8	<b>Explanation of baseline updates:</b> The baseline has been updated from the initial assessment in February to adjust to the use of more accurate primary data regarding flour milling. This has reduced our initial baseline assessment from 1,500g/pack (stated in our report dated in February 2nd 2008) to the normalised result: 1,150 g/pack, reported here.	
4.10	<b>Explanation of impact of force majeure:</b> N/A	

<sup>1</sup> Figures for GHG emissions shall be specified as mass of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) as defined by PAS 2050.

<sup>2</sup> The product-related life cycle GHG emissions for the product shall be specified per functional unit of the product. For services, or for goods delivering a service (e.g. a light bulb delivering the service of supplying light) emissions should be specified as mass of CO<sub>2</sub>e per unit of service provided.

<sup>3</sup> A company may report a product's life cycle GHG emissions on a product unit basis provided that the result based on a functional unit is also presented.

<sup>4</sup> See paragraph 2.4 of the Code for rules about rounding of reported emissions figures.

## 5. Boundaries and data: Supporting information

5.1 Product reference Number(s)	5.2 Emissions assessment boundaries and the basis for the boundary decisions <i>(PCR or PAS specifications)</i>	5.3 Sources of secondary data which have been used for the assessment
<b>Product reference 1:</b> Company A 12-pack butter croissants	PAS 2050 rules used to specify boundaries. Specific boundaries and categorisations are described below.	<b>General: Standard emissions factors and general inputs:</b> <ul style="list-style-type: none"> <li>Company A and supplier primary data.</li> <li>Carbon Label Company Emissions Factor Database v6.0, drawing on ecoinvent data v1.3, Dukes Digest 2006, International Energy Agency 2004, IPCC 2001 and Defra 2007, Continuing Survey of Road Goods Transport.</li> </ul>
	<b>1 Raw materials</b> include wheat farming (fertiliser production, transport and application), flour milling, and other ingredients' and packaging materials' production and transport to bakery.	<b>Raw materials</b> <ul style="list-style-type: none"> <li>Company A primary data, for transport, flour milling, and packaging materials.</li> <li>Ecoinvent data v1.3, for wheat farming and other ingredients.</li> <li>Carbon Label Company Emissions Factor Database v6.0.</li> </ul>
	<b>2 Manufacturing</b> includes mixing and baking croissants; packaging.	<b>Production</b> <ul style="list-style-type: none"> <li>Company A primary data for all activity data.</li> <li>Carbon Label Company Emissions Factor Database v6.0.</li> </ul>
	<b>3 Distribution</b> and retail includes transport to distribution centre, storage at the distribution centre, distribution to stores, storage and display at stores.	<b>Distribution:</b> <ul style="list-style-type: none"> <li>Company A primary data.</li> <li>Carbon Label Company Emissions Factor Database v6.0.</li> <li><a href="http://www.infoplease.com/atlas/calculate-distance.html">http://www.infoplease.com/atlas/calculate-distance.html</a>.</li> </ul> <b>Retail Store:</b> <ul style="list-style-type: none"> <li>Retailer B primary data.</li> <li>Carbon Label Company Emissions Factor Database v6.0.</li> </ul>
	<b>4. Use</b> includes consumer storage (freezing) and consumption (re-heating).	<b>Use:</b> <ul style="list-style-type: none"> <li>Company A secondary data, based on research amongst consumers use patterns of their product, conducted between 1st January and 31st December 2007.</li> <li>Carbon Label Company Emissions Factor Database v6.0.</li> </ul>
	<b>5. Disposal</b> includes transport to landfill and decomposition of waste and plastic packaging.	<b>Disposal:</b> Carbon Label Company Landfill Emissions Model, using: <ul style="list-style-type: none"> <li><a href="http://www.defra.gov.uk/ENVIRONMENT/WASTE/topics/packaging/faq.htm">http://www.defra.gov.uk/ENVIRONMENT/WASTE/topics/packaging/faq.htm</a>.</li> <li>Micales J. A., Skog K. E. (1997): The Decomposition of Forest Products in Landfills. International Biodeterioration and Biodegradation, Elsevier, Vol. 39, No. 2-3, p. 145-158.</li> <li>Ecoinvent data v1.3: Sanitary Landfill model.</li> <li>Ecoinvent report No. 13 – part III Table 6.2.</li> <li>Zimmermann P., Doka G., Huber F., Labhardt A., Menard M. (1996): Ökoinventare von Entsorgungsprozessen, Grundlagen zur Integration der Entsorgung in Ökobilanzen. ESU-Reihe, 1/96, Zürich: Institut für Energietechnik, ETH Zurich.</li> <li>BUWAL (2001): Energieproduktion aus Abfällen 1990-2000, Stand 27.12.2001. BUWAL, Berne, Switzerland.</li> <li>Engineeringtoolbox.com.</li> </ul>

## 6. Disclaimer about uncertainty of results

The emissions figures provided in this report have been calculated in accordance with the requirements of the PAS 2050 method, using the primary and secondary sources of data specified above. Based on the PAS 2050 method of assessment we believe that our assessment has identified 95% of the likely GHG emissions associated with the full life cycle of the product(s) covered in this report. However, readers should be aware that even primary sources of data are estimates and are subject to variation over time, and the figures given in this report should be considered as our best estimates, based on reasonable cost of evaluation.

## Appendix 2

# Development process and governance

The Code of Good Practice for Product GHG Emissions and Reduction Claims (the Code) was developed by the Carbon Trust and the Energy Savings Trust, with the support of Arup, OneWorldStandards and the Pacific Institute, and with technical support from E4tech.

The Carbon Trust is a member of the ISEAL<sup>5</sup> Alliance, and followed the guidance of the ISEAL Code of Good Practice for Setting Social and Environmental Standards ('the ISEAL Code') in the development of this Code.

In particular, the development process aimed to:

- Ensure that there was broad participation in the development of the Code by the full range of interested parties.
- Be fully transparent in relation to governance, procedures, participation, comments resolution and decision-making.
- Strive for consensus on the Code final content among a balance of the interested parties.

The development process was approved and overseen throughout by a multi-stakeholder 'Reduction and Communication Steering Group' with representation from Government, businesses, industry, NGO and academia of (see table below).

The first draft of the Code was released to the public and to a specialist working group for consultation on 3 March 2008. After analysis of the comments and discussion with the Reduction and Communication Steering Group a second draft was released for public consultation on 20 May 2008. After a period of public review and comment the draft was finalised and approved by the Reduction and Communication Steering Group in September 2008, and by the Carbon Trust Board of Directors in October 2008.

Full details of the development process and the comments submitted are available from the Carbon Trust on request.

Name	Affiliation
Prof. Jim Skea (Chair)	Research Director, UK Energy Research Centre
Terence Illott	Deputy Director Environment, Business and Consumer Division, UK Department for the Environment, Food and Rural Affairs
Dr Paul Jefferiss	Carbon Trust Board member <sup>6</sup>
Prof. Roland Clift	Distinguished Professor of Environmental Technology, University of Surrey
Mark Kenber	Policy Director, The Climate Group
Dr. Sally Uren	Director of Business, Forum for the Future (represented by Dan Crossley and Tom Berry)
Prof. Jacquie Burgess	Professor of Environmental Risk, University of East Anglia
Lucy Yates	Senior Policy Advocate, National Consumer Council
Nick Monger-Godfrey	Head of Corporate Social Responsibility, John Lewis Partnerships
Karen Galloway	Marketing Manager for Seafish Industry Authority
Adrian Arnold	Head of Partner Marketing, Energy Saving Trust (EST)
Nigel Dickie	Director, Corporate and Government Affairs, Heinz UK and Ireland
Stephen Reeson	Energy Manager, Food and Drink Federation

<sup>5</sup> The International Social and Environmental Accreditation and Labelling (ISEAL) Alliance is an association of leading voluntary international standard-setting and conformity assessment organisations that focus on social and environmental issues. Members include the Forestry Stewardship Council, Fairtrade Labelling Organisation and Social Accountability International, amongst others. The ISEAL Code of Good Practice is the international reference for setting credible voluntary social and environmental standards. It is referenced by a range of governmental and inter-governmental guidelines as the measure of credibility for voluntary social and environmental standards. See [www.isealliance.org](http://www.isealliance.org) for more information.

<sup>6</sup> Acting as independent advisor for the purpose of this Code's development.



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