CARBON TRUST

Product Carbon Footprint Protocol

Required data and documentation to achieve product carbon footprint certification in preparation for communication and labelling.

Part 1: Requirements for Certification

The Carbon Trust

About the Carbon Trust

The Carbon Trust is an independent company established in 2001. Its mission is to accelerate the move to a sustainable low carbon economy by working with business, the public sector, and investors.

The Carbon Trust carries out a wide range of activities, including working directly with business to reduce greenhouse gas emissions, explaining the strategic implications of climate change and investing in new technologies and businesses that will help to tackle climate change.

Foreword

Product Carbon Footprint Certification

The Product Carbon Footprint Protocol (PF Protocol) builds on the experience of the Carbon Trust product carbon footprint certification programme in establishing requirements for greenhouse gas (GHG) emission measurement, management and reduction.

The PF Protocol delivers clear requirements and guidance for organisations seeking to measure and reduce their product's emissions, and is provided in two parts:

- Part 1: sets the minimum requirements for footprint certification; and
- Part 2: establishes requirements for communication and labelling.

Part 1 defines what activity or types of decisions need to be made by a verification body. These rules define how these decisions are to be taken.

This PF Protocol is available for use by organisations and programme operators to support their continuing efforts to reduce GHG emissions from the lifecycle of their products.

About the Carbon Label

Everything we buy, produce and use has a carbon footprint. The carbon footprint of a good or service is the total carbon dioxide (CO_2) and other greenhouse gases emitted during its life. It includes production, use and disposal.

Devised by the Carbon Trust, the Carbon Label[1] is a way for companies to show they have measured and/or reduced the carbon footprint of a good or service.

[1] Use of the Carbon Label logo, or other claims of conformance is restricted to those organisations that have achieved certification of their product's carbon footprint by Carbon Trust Certification or its accredited and licensed certification partners.

1 Introduction

Climate change is a major challenge facing the world, and our success in mitigating climate change will be largely determined by our ability to reduce future greenhouse gas emissions in our supply chains. Organisations at all stages in the value chain have the opportunity to contribute to this mitigation, firstly by understanding their contribution to global GHG emissions, and secondly by using this information to guide action to reduce emissions.

1.1 The Product Carbon Footprint Protocol

The Product Carbon Footprint (PF) Protocol provides a summary of criteria for the communication of product-level GHG measurement and reduction against a recognised standard. The PF Protocol provides requirements regarding the interpretation of product footprint standards (Part 1), and options and requirements for organisations seeking to publically communicate footprints and/or label products (Part 2). Definitions for key terms used in this Protocol are provided in the Appendix.

1.1.1 Part 1: Certification

This document, Part 1 of the PF Protocol, specifies the minimum requirements for product emissions calculation, including product definition, required data, reduction assessment and presentation of the results. Implementation of the requirements in Part 1 of the Protocol supports robust and transparent footprint communication, management and reduction over time. Not all aspects of the Protocol may apply for less comprehensive calculation and communication.

Part 1 of the PF Protocol builds on the work of ISO, PAS 2050 (supported and maintain by DEFRA and BSI) and the GHG Protocol Product Standard, convened by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). See section 6 References for additional details.

1.1.2 Part 2: Communication

Part 2 of the PF Protocol builds on the requirements specified in Part 1, establishing clear requirements for the Carbon Label and communication of GHG emissions performance.

1.2 Relationship between Carbon Trust Carbon Labels and the PF Protocol

Use of a Carbon Trust Carbon Label is dependent upon the PF Protocol (including both

Part 1 and Part 2) as the basis of demonstrating conformity with international standards and clear communication of the results. Obtaining a Carbon Trust Carbon Label requires activities in two key areas detailed in the PF Protocol:

- Carbon footprint[2] measurement
- Provision of suitable supporting information

Organisations submitting product footprints that are assessed as complying with the requirements of the Protocol and successfully certified by a third party may apply to the programme operator for use of the Carbon Trust Carbon Label[3].

1.3 Working with Carbon Trust Certification

In order to obtain certification for product footprints organisations must agree to Carbon Trust Certification terms, conditions and verification process. The important output from this process will be a verification statement and/or certification letter which outlines the results of the exercise and organisation's communication rights.

1.4 Part 1 of the PF Protocol is organised in five sections

1. Introduction
2. Defining products
3. Data requirements
4. Calculating reductions
5. Managing and preparing the results

[2] The term 'carbon footprint' is used to refer to emissions of GHG emissions expressed in carbon dioxide equivalent.
[3] Use of the Carbon Label logo, or other claims of conformance is restricted to those organisations that have achieved certification of their product's carbon footprint by Carbon Trust Certification or its accredited and licensed certification partners.

2 Defining products

The data gathered and the meaning of footprint results critically depend upon defining the product. Existing standards in this area are vague, either using a simple definition such as "any goods or service" or not directly addressing the question at all.

A good or service may be a valid product if it both verifiably exists as an entity and can be defined by a distinct form of reference unit for its production (e.g. per Kg), or as a functional unit for its use (e.g. per serving size). A reference unit may reflect a physical property of the product or conform to a recognised industry metric.

Valid functional units consider "use" from the perspective of the end user. A functional unit must therefore capture the form and function of a product as it is intended to be used.

In addition, product development cycles may be an important factor for defining valid footprints for communication. The development cycles in table 1 are currently recognised. Not all of these are associated with footprints valid for public communication (see section 3.2 for more details).

Table 1 – Product development cycles

Product	Description
On-market	This applies to any existing, identifiable product that has been on the market for at least a year[4].
Prototype	New products not yet in full production.
New product	Recently (or soon-to-be) launched products with limited production data.
Short life-span product	Products that are replaced quickly (e.g. in less than 2 years[5]).
Product replacement	Reduction assessment: A new product that specifically replaced an old one.
Product change	Reduction assessment: A product undergoing incremental change.
Services	A defined range of activities and physical goods that a customer pays for.

[4] Normal footprint assessment period defined by PAS 2050: 2011

[5] Footprint validity period defined by PAS 2050: 2011

3 Data requirements

A critical element of a footprint calculation, management and communication programme is defining necessary and sufficient data. Too much detail may be expensive and difficult to manage, too little may limit the usefulness of the process.

3.1 Scope

Product footprints of goods cover life cycle boundaries of three broad types, as summarised in figure 1.

Figure 1 – Summary of footprint boundary options

Cradle-to-Grave (sometimes known as Business-to-Consumer):

Cradle to Gate (sometimes known as Business to Business):

Gate to Gate:

3.1.1 Choosing a Boundary

The typical boundary for public communication is Cradle-to-Grave (see figure 1). This boundary must be used for on-pack communication to consumers.

Organisations may alternatively define the product boundary as completing at a "gate", when the life cycle is limited part way through the production process. Typically, this happens when the recipient of the product after this "gate" conforms to all of the following:

- Is a separate entity;
- Transforms the product in some way; and
- Is not the end user.

A business may therefore be either another link in the supply chain, transforming products, or the end user. The term "business to business" is therefore confusing and not used in this Protocol.

Within a Cradle-to-Gate boundary, transport away from the footprinting organisation must be included if the organisation owns, operates or controls the transport activity.

In conjunction with either a cradle to grave or gate footprint, it is possible to communicate an organisation's specific emissions contribution via a gate to gate footprint.

The applicable boundary for a service product corresponds to the activities and physical goods that a customer pays for.

3.1.2 Allocation Methodologies

We require the use of physical (e.g. mass-based, transaction activity or economic allocation as summarised in table 2.

Table 2 – Allocation rules and usage

Allocation Method	When to choose each method
Physical (goods)	If there is a clear functional similarity between goods produced and a physical relationship between the amount of goods being produced in facilities and the amount of energy required to do so. This may for example be based on product mass, volume or stoichiometric process data.
Activity (services)	Alternatively, it may be more suitable to consider the number of transactions or processes involved with the delivery of the range of services.
Economic (goods or services)	If there is no clear functional similarity between output products and no clear physical or activity reason for relating products with emissions then economic value should be used.

3.2 Primary Data

The specific amount of primary data that is required is defined within the product footprint standards themselves. This protocol clarifies these requirements by addressing the age and definition of what is considered primary data in the first place.

Primary data representing a product footprint must represent a period of time that ends no more than 15 months from the start of certification. Specifically, this means that the following must be completed prior to 15 months after the last day of the data collection period:

- A certification contract is signed by both parties;
- The footprint calculations have been made available for certification; and
- The client has formally requested commencement of certification.

Primary data is activity data (e.g. amount of electricity) that is contained by a company's primary data scope. Specifically, this includes amounts of anything that is used or transformed by the company during creation of their final product. Transformation may entail, for example; assembly, injection moulding, agricultural processing, chemical processing and mixing.

Primary data availability also relates to the type of product being footprinted and subsequent claims as introduced in section 2 and detailed in table 3.

3.3 Product Category or Supplementary Rules

Product footprint standards enable the use of additionally defined, publically available rules. The aim of these rules (e.g. supplementary or product category rules to be applied as per section 2.3 in Part 2) is to promote consistency and comparability between footprints for similar products sold by different companies. A continuing communication programme must therefore ensure that these rules are themselves used consistently, to retain historical comparability.

Publically communicated footprints within a Carbon Trust communication programme must at the least always be equivalent to the (material) assumptions, methodology choices and data provided by Footprint Expert™ supplementary rules.

3.4 Materiality

An important set of requirements governs the amount of data required, its quality and general conformity with the applicable product footprint standard. These are critical factors that determine the meaning of footprints, plus the cost of creating and maintaining them.

In this context, "materiality" relates to the contribution a source of emissions makes to the overall footprint. We require that data quality and materiality be assessed, that appropriate quality data is used and that consistency quality of public footprints is maintained.

Current product footprint standards define criteria for materiality and assessing data quality but do not provide clear guidance on how to apply them for a given communication goal. Likewise, decision making about the conformity of specific primary or secondary data to a product footprint standard is not clearly defined. The following sections define our data quality and related conformity requirements.

Table 3 – Product data requirements and communication options

Product	Primary Data Requirement	Communication Options
On-market	Data representative of 1 year's production and use is available.	Measurement and reduction assessment.
Prototype	Highest available quality proxy data.	Not suitable for labelling but other options are available.
New product	Available production data must be demonstrably representative of 1 year's production and use.	Measurement and reduction assessment. May require re-calculation of footprints following commencement of full production.
Short life-span product	For reduction assessment, replacement products must have an identical functional unit and perform product replacement or change as below.	Measurement and reduction assessment.
Product replacement	Equivalent functional unit, clear product transition (which may not be complete at assessment time). Primary data requirements are the same as new products.	Measurement and reduction assessment.
Product change	No clear product replacement. Primary data requirements are the same as new products.	A separate footprint must be calculated, leading to possible comparison claims (see Part 2 section 3.1).
Services	Data representative of 1 year's activities and goods as paid for by the consumer.	Measurement and reduction assessment.

3.4.1 Data Quality for Quantification and Reduction Claims

A source of emissions is normally made up of an amount of something multiplied by an emission factor:

$$Emissions = Activity\ Data \times Emission\ Factor$$

Activity Data may be primary or secondary data (e.g. annual energy usage), whilst *Emission Factors* (EFs) are almost always secondary data (e.g. a national natural gas supply and combustion emissions).

The intrinsic quality of the *Emissions* is a factor of *Activity Data* and *Emission Factor* quality. Attributes such as accuracy, precision, completeness, consistency, reproducibility, data source and compliance are inherent to the *Emissions*. Attributes such as age (or

applicable time period), geography or technology are related to the application of the *Emissions* to a particular product.

The required level of data quality is a factor of the overall share of the footprint that emissions contribute. For public communication and use of the Carbon Label, this PF Protocol defines the data quality bands summarised in table 4.

Table 4 – Data quality bands

Required quality score	Cumulative contribution to final footprint
Good	Top 70%
Medium	Next 25%
Low	Final 5%

The data quality tool provided by the Footprint Expert™ software provides detailed definitions of data quality criteria and scores. It also contains a template for generating data quality scores suitable for quantified public claims.

3.4.2 Conformity and Materiality

During the certification process, some non-conformities may not have a material impact on the final footprint. Corrective action is not mandatory where it can be demonstrated that the impact of such non-conformities on the final product footprint number is less than +/-1% per non-conformity and the aggregate impact of all non-conformities does not materially affect the final footprint (i.e. cumulative impact of no more than +/- 5%). See Part 2 section 2.2 for information on the disclosure of final footprints.

Note that meta-standards (e.g. for carbon neutrality) may apply additional requirements.

3.5 Project Scale

Footprints may be calculated in a variety of ways, in order to maximise clarity and data management options whilst minimising complexity and cost. We recognise four broad methods for calculating and managing product footprints (more than one may be used in conjunction).

3.5.1 Country-specific Footprints

The most specific cradle-to-gate or -grave product footprint may be defined in terms of the emissions specific to the distribution, retail, use and end-of-life in a particular country (as applicable). An individual product sold in several countries will therefore gain a number of footprints.

3.5.2 Single SKU Calculations

Typically, a product will be defined by a company as a single Stock Keeping Unit (SKU). Each product may receive a single footprint, which is applicable for cradle-to-gate boundaries or when downstream cradle-to-grave emissions cover a single country or are averaged. Downstream averaging should be done on a sales-weighted basis.

If large numbers of cradle-to-gate footprints are calculated as part of a complex supply chain (e.g. farms supplying a supermarket) then sampling may be used to generate a representative average cradle to gate footprint. The specific extent and type of sampling required depends upon the product in question but general random sampling or stratified random sampling may be used.

3.5.3 Grouped SKUs

The following rules must be applied if companies wish to merge the footprints of similar products, so measuring just one

footprint represents a group of SKUs and so reduce complexity:

- Each product must be able to use the same functional unit;
- Each product must be subject to equivalent ownership and control by the footprinting organisation; and,
- The supply chain of each product must be demonstrably materially similar.

3.5.4 Model Certification

An efficient way to generate large numbers of footprints is to create large-scale data management and calculation systems. Companies may use these systems to generate product footprints using both quantitative and qualitative decision making frameworks. The former is closely related to the requirements outlined in section 3.5.2. The latter will typically result in a data and quality management system which creates and maintains system scope, calculations, reports, quality management processes, data collection and data quality assessment.

4 Calculating reductions

A central aim of this Protocol is to define how to achieve measurable footprint reduction. This section describes our requirements for determining achieved reductions of the same product over time.

In order to determine if a reduction has been achieved by products over time, the simple process in figure 2 must be followed.

Products suitable for reduction analysis are defined in section 3.2 whilst suitable calculation methodologies are defined in sections 3.5.1 to 3.5.3.

The following sections describe the key elements of this process. A central theme is the maintenance of consistency – it is only possible to meaningfully compare two footprints if they were created using equivalent use of standards, methodology and data.

Note that consistency is not intended to be the same as accuracy regarding actual GHG emissions, which are typically estimated using secondary emission factors.
The change in a consistent footprint is simply the difference between the new and re-baselined footprints (as defined in section 4.1.3).

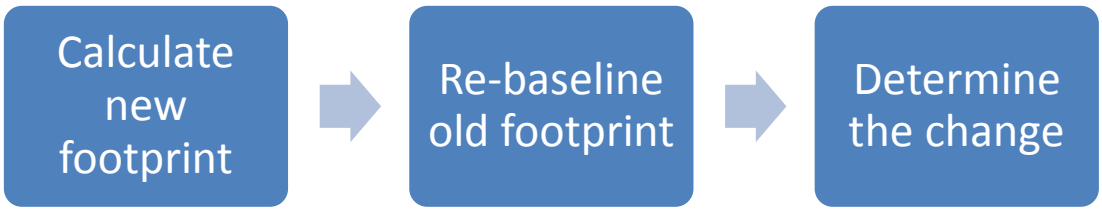
4.1.1 Mitigation and Footprint Reduction Boundaries

Consequential allocation and offsetting must not be used for calculating footprints that organisations intend to reduce. These activities are separate and unrelated mitigation actions.

4.1.2 Pre-requisites for Calculating Reductions

The same product over time should be the target for a reduction calculation. A claim involving a new product that replaces an obsolete model is instead subject to a comparison claim (see table 3 regarding "Product Change"). It is therefore necessary to demonstrate that the product is not subject

Figure 2 – Determining reductions



to replacement – otherwise a comparison claim is applicable, please see Part 2 section 3.

A reduction claim must be made within the applicable re-certification period, a maximum of two years from the initial certification date.

Any comparison can only be made between data representing footprints over a maximum two year period.

The new footprint must use primary data less than 15 months old.

See section 5.4 for a summary of relevant time periods.

4.1.3 Re-baselining

In order to enable a valid reduction calculation, organisations must use equivalent footprints. That is, all the earlier footprint's methodology and secondary data must be updated (re-baselined) to bring them into equivalence with the new calculation. The following must be updated:

Secondary data: The most recent secondary data (activity data and emissions factors) must always be applied to both the re-baselined and new models. This is to avoid the situation where a company is being penalised or rewarded for changes to a system for which they have no control (e.g. change in grid emissions factor over time).

Calculation methodology: The methodology applied in both the models should be identical

Assumptions and exclusions: The assumptions and exclusions must be identical between the new and old models.

Economic Allocation: Prices are considered as methodology rather than activity data – shifts in market values cannot be used as a reason for a carbon footprint reduction or increase. Therefore, the prices applicable to the most recent year should be applied to calculation of economic allocation for both the re-baselined model and new model.

Improved Data Quality: If data quality has increased or decreased, the newer data must be used in the re-baselined footprint.

Note 1: The drive to create comparable results that enable meaningful reduction comparisons is in conflict with the common principle within product footprint standards of data quality improvement. For example, if new better quality data is used to calculate future footprints and improve the relevance of organisation's information, this may not be comparable to the original data. Care should be taken when managing this tension as it may remove options to demonstrate quantified reductions. See Part 2 section 4.1 for ways to manage this.

Note 2: Banked emission reductions (Part 2 section 4.2.2) may apply over multiple years and it may therefore be necessary to re-baseline more than one footprint calculation.

5 Managing and preparing the results

Part 2 of this Protocol provides full details regarding communicating footprint results. Product footprint standards require specific information covering defined timescales to be prepared for public disclosure and our requirements follow.

5.1 Preparing for certification

The company is responsible for providing documentation adequate for demonstrating compliance with the footprint standard. The documentation must be sufficiently clear and transparent to enable certification decision making.

A Carbon Label may be achieved using any of the available product carbon footprint standards[6]. In the case of material inconsistency between the standards (see section 3.4.2), the most conservative approach across the standards will be taken, in order to maintain comparability for all users of the Label.

5.2 Inventory Reporting

An inventory report as defined by Chapter 13 of the GHG Protocol Product Life Cycle Accounting and Reporting Standard must be prepared and made available on request to support public claims.

5.3 Communicating Reductions

Absolute or percentage reductions may be disclosed.

Claims regarding qualitative reductions and supporting information are dealt with in Part 2, section 4.1.

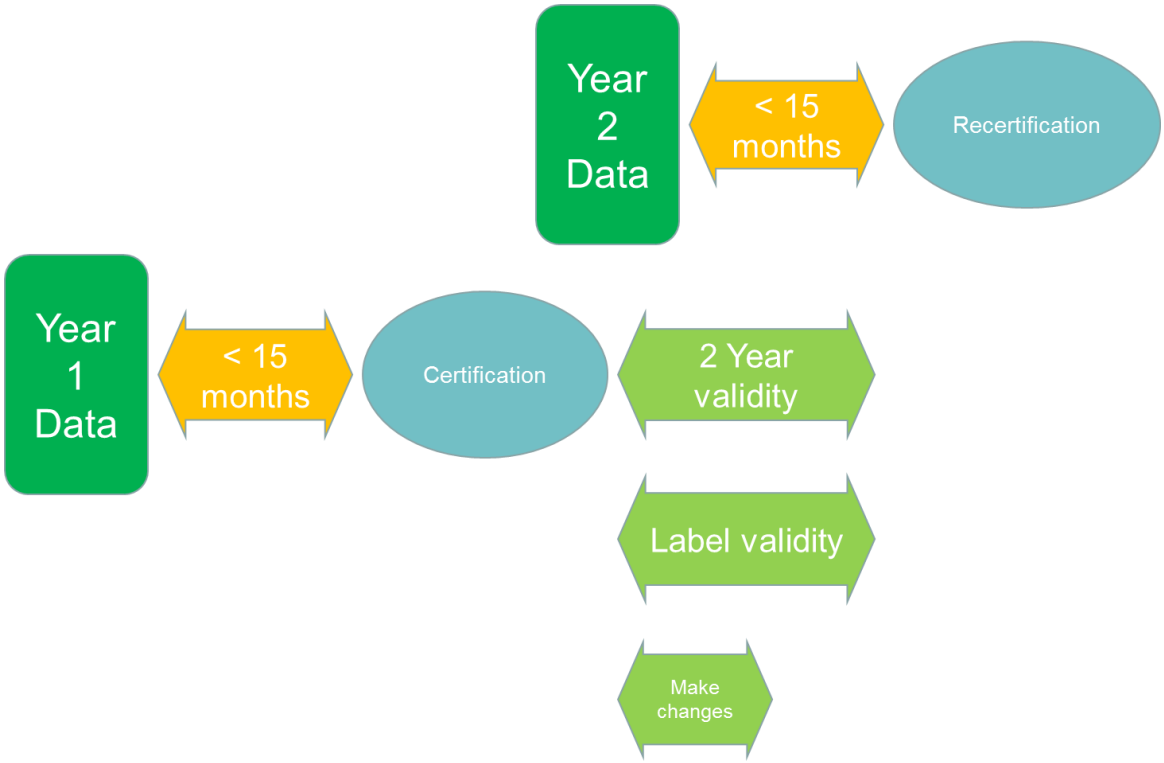
5.4 Footprint Validity and Time Periods

In order to effectively manage and use footprint results, organisations must ensure that the limits implied by the time periods in figure 3 are adhered to.

Figure 3 illustrates the main activities and time periods involved in the continuous process of data gathering, calculation, certification and labelling of a product's footprint. Note that there is an option in the first year to make changes to the scope of certification.

[6] PAS 2050, GHG Protocol Product Standard, ISO/TS 14067 as defined in section 6

Figure 3 - The time periods involved in the footprint calculation and certification process



6 References

Further relevant information on product emissions assessment and certification may be found in the following referenced documents:

- 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 14064-3:2006 Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions
- ISO 14065:2013 Greenhouse gases – Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition
- ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- Publicly Available Specification PAS 2050:2011, BSI
- Greenhouse Gas Protocol: Product Life Cycle Accounting and Reporting Standard (2011), WRI & WBCSD
- ISO/TS 14067:2013 Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification and communication
- Code of Good Practice for Product Greenhouse Gas Emissions and Reduction Claims (2008), Carbon Trust

7 Appendix: Definitions

For the purposes of the PF Protocol (Parts 1 & 2) the following terms and definitions apply:

A1.1 baseline period

data period, prior to the assessment period, against which an assessment of GHG emissions reduction performance is made.

A1.2 carbon dioxide equivalent (CO_2e)

universal unit of measurement for indicating the global warming potential (GWP) arising from different GHGs, expressed in terms of the equivalent amount of carbon dioxide

A1.3 certification period

period for which an organisation is assessed as complying with the requirements of the chosen footprint standard.

A1.4 combined heat and power (CHP)

type of generation that delivers both electricity and useful heat (e.g. for heating or processes) as a normal part of its operation

A1.5 consequential allocation

the principle of calculating emissions based upon those of the normal activities displaced by a product. For example, animal manure emissions may be defined by those of the chemical fertiliser that is no longer needed.

A1.6 emissions assessment (carbon footprint)

the greenhouse gas emissions associated directly and indirectly with the activities of an organisation for a specified product boundary and time period (also referred to as a greenhouse gas inventory, or carbon footprint).

A1.7 emission factor

amount of GHG emitted, expressed as carbon dioxide equivalent relative to a relevant unit (e.g. kgCO2e per kWh)

A1.8 emissions reduction credits (emissions offsets)

claiming a reduction in the emissions of an organisation through the purchase (or otherwise acquiring or causing) of a reduction in GHG emissions from another unrelated location or organisation

A1.9 fugitive emissions

emissions that are not physically controlled but result from the intentional or unintentional releases of GHGs

Note. Fugitive emissions commonly arise from the production, processing, storage and use of fuels and other chemicals, often through joints, seals, packing, gaskets, etc., e.g. hydrofluorocarbon (HFC) emissions during the use of refrigeration and air conditioning equipment

A1.10 GHG emissions

release of GHGs to the atmosphere.

A1.11 greenhouse gas inventory

the greenhouse gas emissions associated directly and indirectly with the activities of an organisation for a specified organisation boundary, operational boundary and time period (also referred to as a carbon footprint).

A1.12 global warming potential (GWP)

factor describing the radiative forcing impact of one mass-based unit of a given greenhouse gas relative to an equivalent unit of carbon dioxide over a given period of time

[BS ISO 14064-1:2006, 2.18]

Note. Carbon dioxide is assigned a GWP of 1, and the GWP of other gases is expressed relative to carbon dioxide over a 100 year time period.

A1.13 organisation

a business or other entity, or part of a business or other entity, that implements this Protocol

A1.14 organisational boundary

the boundary that determines the operations and premises owned or controlled by the organisation

A1.15 primary data

data obtained by direct measurement

A1.16 process emissions

emissions generated from manufacturing processes

Note. Examples of process emissions include manufacture of cement, aluminium, ammonia and waste processing

A1.17 programme operator

Carbon Trust Certification Limited or its approved and licensed certification partner(s)

A1.18 secondary data

data obtained from sources other than direct measurement

A1.19 SKU

Stock Keeping Unit