Carbon Footprint Appraisal Methodology Document

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1. Carbon management journey

Carbon Footprint provides a simple six step annual journey to enhance your sustainability credentials whilst complying to best practice and differentiating your brand. The Carbon Footprint Appraisal report is the first step of an annual carbon management journey.

Measure Aim Reduce Offset Communicate Comply

The purpose of the Carbon Footprint Appraisal report is to:

- Summarise the results of the carbon footprint assessment.
- Provide practical recommendations to enhance your sustainability programme and reduce your emissions.

1.1. What is a carbon footprint?

A carbon footprint is a measure of the impact our activities have on the environment in terms of the amount of greenhouse gases produced, measured in units of carbon dioxide equivalents (CO_2e). A carbon footprint comprises three parts, Scope 1 (direct), Scope 2 and Scope 3 (indirect) emissions.

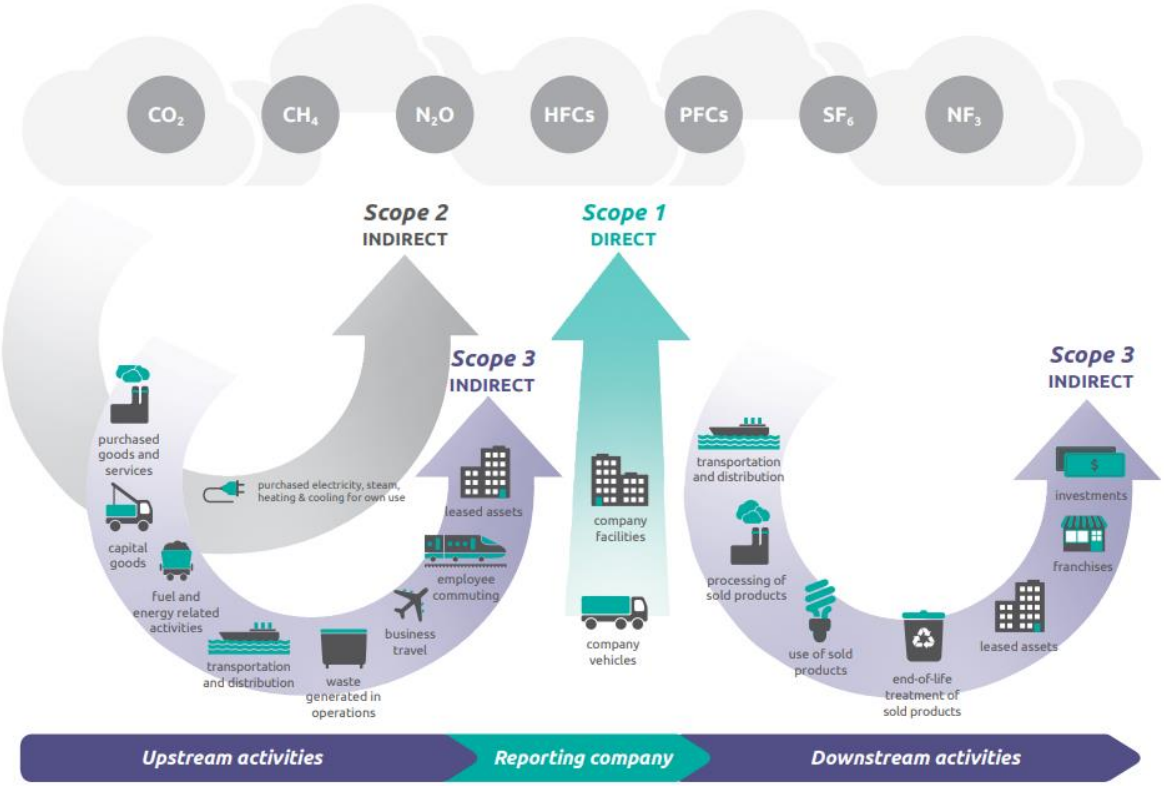

Figure 1 Overview of emissions scopes (GHG Protocol 2013)

Direct emissions:

Direct emissions are produced by sources which are owned or controlled by the reporting organisation and include electricity use, burning oil or gas for heating, and fuel consumption as a result of business travel or distribution. Direct emissions correspond to elements within scope 1 of the GHG Protocol, as shown in Table 1.

Indirect emissions:

Indirect emissions result from a company's upstream and downstream activities. These are typically from outsourced/contract manufacturing, and products and the services offered by the organisation. Indirect emissions correspond to scopes 2 (Table 1) and 3 (Table 2) of the GHG Protocol.

Table 1: Scope 1 and 2 emissions sources

Footprint	Activity	Scope
Direct	Electricity, heat or steam generated on-site	1
	Natural gas, gas oil, LPG or coal use attributable to company-owned facilities	1
	Company owned vehicle travel	1
	Production of the seven GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6 and NF_3)	1
Indirect	On-site Consumption of purchased electricity, heat steam and cooling	2

Table 2: Indirect emissions sources

Footprint	Activity / Scope 3 Category	Scope
Indirect	1. Purchased goods and services	3
	2. Capital goods	3
	3. Fuel- and energy related activities (not included in scope 1 or scope 2)	3
	4. Upstream transportation and distribution	3
	5. Waste generated in operation	3
	6. Business travel (not included in scope 1 or scope 2)	3
	7. Employee commuting	3
	8. Upstream leased assets	3
	9. Downstream transportation and distribution	3
	10. Processing of sold products	3
	11. Use of sold products	3
	12. End-of-life treatment of sold products	3
	13.Downstream leased assets	3
	14. Franchises	3
	15. Investments	3

1.2. Why is it important?

Climate change is a global threat which will impact the lives of everyone on the planet.

Over the past two decades the effects of climate change have accelerated. Considerable evidence exists proving climate change has been exacerbated by human activity. Changes in our post-industrial lifestyles have altered the chemical composition of the atmosphere, generating a build-up of greenhouse gases – primarily carbon dioxide, methane, and nitrous oxide levels – raising the average global temperature.

The consequences are already evident and will continue to worsen unless significant action is taken and quickly. **Sea level will continue to rise and local climate conditions to be altered, causing an increase in extreme weather events, affecting forests, crop yields, and water supplies. This can lead to homelessness, famine and conflict as resources become scarcer.**

Environmental pollution and climate change affect human health, accelerate species extinction, and disrupt vital ecosystems. **Ambient (outdoor) air pollution is responsible for at least 4.2 million human deaths each year** (WHO 2022). In addition to this, poor air quality and issues of clean water availability leave us more susceptible to diseases such as COVID-19. Combined with rises in temperature and deforestation (from direct human action and climate change related events), resulting in the displacement of animals from their native habitats, the frequency of disease occurrence will increase, as disease will transfer from animals to other geographical areas and larger human populations.

It is vital that all individuals, businesses, organisations and governments work towards the common goal of reducing greenhouse gas emissions. This carbon footprint assessment will enable your organisation to do its bit by monitoring, reducing and potentially offsetting its emissions.

2. Calculation methodology

The Carbon Footprint Appraisal is derived from a combination of client data collection and data computation by Carbon Footprint's analysts.

Carbon Footprint's analysts have calculated the emissions using the conversion factors developed by the UK Department for Environment, Food and Rural Affairs (Defra) and the Department for Business, Energy & Industrial Strategy (BEIS) for the year of reporting[1]. These factors are multiplied with the company's GHG activity data. Carbon Footprint has selected this preferred method of calculation as a government recognised approach and uses data which is realistically available from the client, particularly when direct monitoring is either unavailable or prohibitively expensive.

Carbon Footprint confirms that the methodology used to quantify the carbon footprint meets the following principles:

a) The subject and its boundaries have been clearly identified and documented.
b) The carbon footprint has been based on primary activity data unless the entity could not demonstrate that it was not practicable to do so, in which case an authoritative source of secondary data relevant to the subject was used.
c) The methodology employed minimised uncertainty and yielded accurate, consistent and reproducible results.
d) Emission factors used are germane to the activity concerned and current at the time of quantification.
e) Conversion of non-CO_2 greenhouse gases to CO_2e has been based upon the 100-year Global Warming Potential figures published by the IPCC or national (Government) publication.
f) Carbon footprint calculations have been made exclusive of any purchases of carbon offsets.
g) All carbon footprints have been expressed as an absolute amount in tCO_2e.

Any CO_2 emissions from the combustion of biomass or business processes resulting in the reduction of greenhouse gases from the atmosphere will be detailed in the main report if relevant.

2.1. ISO 14064: 2018

The Carbon Footprint Appraisal report has been prepared in accordance with Part 1 of ISO 14064: 2018. The GHG inventory, report, or statement has not been externally verified.

This standard requires the estimation of likely error margin based on a simple error analysis, to identify uncertainty in the calculations. Our simple error analysis provides a level of uncertainty based on the accuracy of the data provided. This shows the error for each emissions source, as well as the sum of these divided by the total emissions, to produce a total percentage error.

[1] Where international electricity factors are used for sites outside of the UK, these are sourced from AIB, IEA and country specific reports. Open-source international emission factors can be found on our website: https://www.carbonfootprint.com/international_electricity_factors.html. Further details provided on request.

2.2. Dual- Reporting of Location and Market Based Emissions

If the report includes both location-based and market-based totals, the calculation and report have been prepared in accordance with The Greenhouse Gas Protocol Corporate Standard.

The GHG Protocol's dual-reporting method requires both location and market-based GHG emissions to be reported alongside one another. The two methods are outlined below:

Location-based approach – reflects the emissions from electricity coming from the national grid energy supply. This method utilises location-based factors.

Market-based approach – reflects the emissions from the electricity sources or products that the consumer has specifically chosen. This method utilises supplier-specific factors as a preference, with residual factors being used where supplier-specific factors are not available.

2.3. Why is my market-based total higher than my location-based total?

In some cases, market-based emissions may be higher than the location-based emissions. This is typically due to:

1. The chosen energy supplier or tariff (supplier-specific factor) may be more carbon intensive than the national-grid average (location-based factor).
2. A lack of data regarding supplier tariffs means we have had to model emissions using residual mix factors.

2.4. Why is dual-reporting important?

By calculating market-based emissions the organisation can benefit from choosing to purchase low / zero carbon electricity. By switching electricity tariffs to renewables, your market-based Scope 2 emissions will reduce. If all of your electricity tariffs are renewable already, this choice will be reflected within your market-based results.

Emission Factors Used for Dual- Reporting
Location-based factors **–** provides the average GHG emissions associated with electricity production, transmission and distribution, for a country or region (e.g. state or province). This average includes both renewable (green) and non-renewable (brown) electricity supplies. ***Supplier-specific factor*** – provides the accurate GHG emissions associated with a specific electricity tariff provided by a specified energy supplier. This emissions factors vary depending on the fuels and amount of renewable energy used to generate the electricity. ***Residual mix factor*** – provides the GHG emissions associated with electricity production, transmission and distribution, for a country or region (e.g. state or province) after all claimed contributions from renewables have been removed to avoid double counting their benefits. This is typically higher than the location-based factors.

2.5. Well-To-Tank emissions

If the emissions assessment includes Well-to-Tank (WTT), the DEFRA emissions factors have been used to calculate the upstream emissions for fuels and energy. The emissions factors include an average of all GHG emissions released in the production, processing and delivery of fuels or energy.

2.6. Supply Chain Screening

If the emissions assessment includes supply chain footprint, this is calculated using the latetst conversion factors developed by the UK Office for National Statistics (ONS) as recommended by DEFRA in its own SIC analysis. These factors are multiplied with the company's supply chain expenditure data. This method of calculation was selected as a government recognised approach and uses data which is easily obtainable for the client, particularly when direct monitoring of data from suppliers is either unavailable or prohibitively expensive to obtain.

Greenhouse gas emissions intensity is calculated by the ONS by dividing the amount of total greenhouse gas emissions by the Gross Value Added (GVA). GVA is the difference between output and intermediate consumption for any given industry. This means the difference between the value of goods and services produced (output) and the cost of raw materials and other inputs which are used up in production (intermediate consumption). This is following the methodology recommended by Eurostat (the statistical office of the European Union).

3. References

1. BEIS GHG Conversion Factors for Company Reporting Government conversion factors for company reporting of greenhouse gas emissions - GOV.UK (www.gov.uk)
2. DEFRA and BEIS - Environmental reporting guidelines: including Streamlined Energy and Carbon Reporting requirements Environmental reporting guidelines: including Streamlined Energy and Carbon Reporting requirements - GOV.UK (www.gov.uk)
3. ISO 14064-1:2018 - Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals (2018) https://www.iso.org/standard/66453.html
4. ONS (Office of National Statistics) (2022) Home - Office for National Statistics (ons.gov.uk)
5. The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, Revised Edition (March 2004) Corporate Standard | Greenhouse Gas Protocol (ghgprotocol.org)
6. The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (2013) Scope3_Calculation_Guidance_0.pdf (ghgprotocol.org)
7. WHO (World Health Organization) Air Pollution (2022) Air pollution (who.int)