Carbon Footprint

Climate Change (CE-12101)

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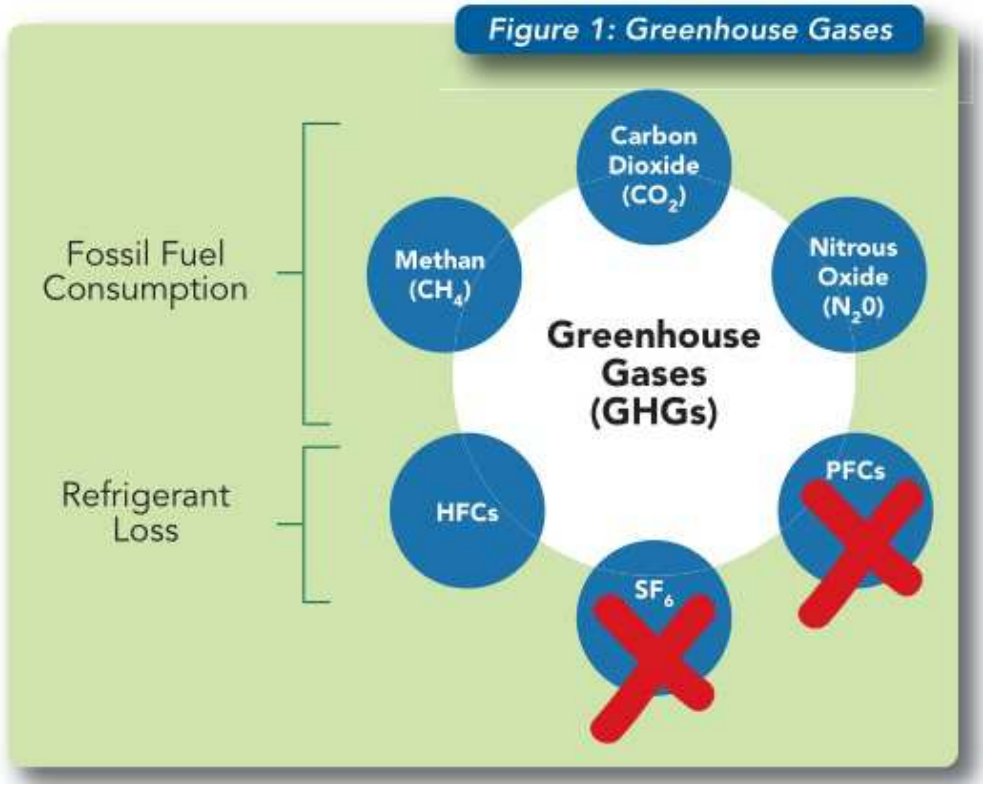
Introduction

- The term carbon footprint is commonly used to describe the total amount of CO_2 and other greenhouse gas (GHG) emissions for which an individual or organization is responsible.
- The full footprint of an organization encompasses a wide range of emissions sources from direct use of fuels to indirect impacts such as employee travel or emissions from other organization up and down the supply chain.
- When calculating an organization's footprint it is important to try and quantify as full a range of emissions sources as possible in order to provide a complete picture of the organization's impact
- In order to produce a reliable footprint, it is important to follow a structured process and to classify all the possible sources of emissions thoroughly.
- This includes the emissions released when burning fossil fuels for transportation, heating and electricity, as well as the leakage of refrigerants into the environment. A carbon footprint is one measure of a company's impact on global climate change.

COMPONENTS OF A CARBON FOOTPRINT

- While six gases are internationally recognized by the Kyoto Protocol as greenhouse gases for emissions-reporting purposes (see Figure 1), only four are relevant to most food retailers:
- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydroflourocarbons (HFCs)
- The first three are byproducts of burning fossil fuels. HFCs are the gases that make up a growing portion of refrigerants. Perfluorocarbons (PFCs) and sulfur hexafluoride (SF6) are typically associated with electronics and manufacturing.



CARBON DIOXIDE EQUIVALENT (CO2-E) UNITS OF MEASUREMENT

- GHGs have different abilities to trap heat (infrared radiation) in the atmosphere, including the amount they absorb and length of time for which the heat is absorbed. A "global warming potential" (GWP) number is assigned to each and converted to carbon dioxide equivalent (CO_2-e) units.
- For example, methane can trap atmospheric heat 21 times more effectively than carbon dioxide. Therefore, methane's GWP is 21. In other words, releasing one pound of methane into the air is considered to have the same GWP as releasing 21 pounds of carbon dioxide (21 pounds of CO_2-e).

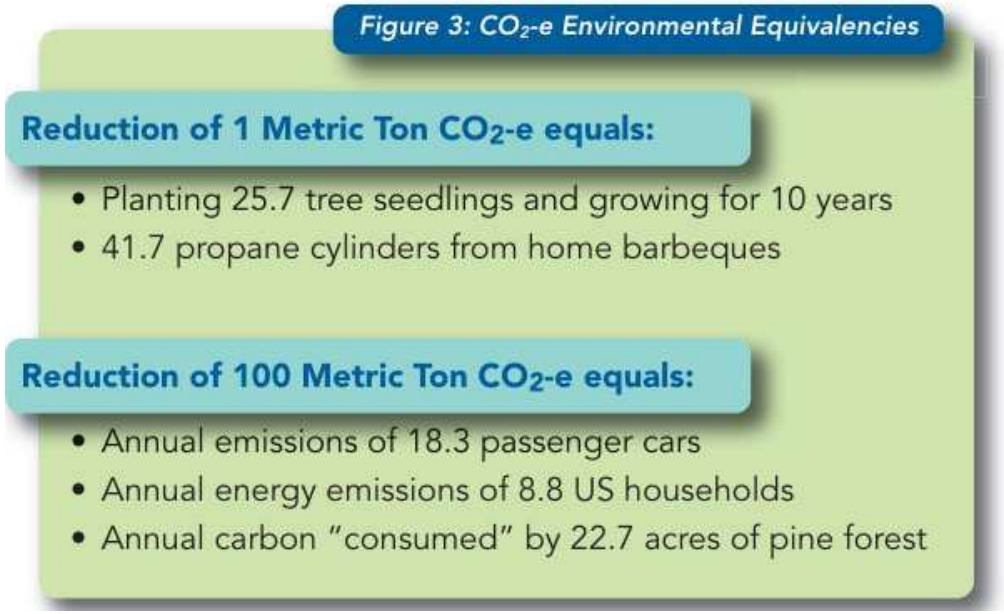
Global Warming Potential (GWP)	
Carbon Dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous Oxide (N_2O)	310
HFC-134a (HFC)	1,300
HFC-23 (HFC)	11,700

WHAT ONE METRIC TON OF CO_2-E LOOKS LIKE

- A carbon footprint is typically measured in metric tons of CO_2-e (MT CO_2-e) to maintain consistency with international standards. Even small locations can produce significant emissions.
- Even relatively small reductions can have a big impact. For example, reducing HFC-404a refrigerant leakage by a single pound is equivalent to reducing the GHGs in the atmosphere by the amount of exhaust that is produced by a 2,670 mile car trip.

COMMUNICATING THE ENVIRONMENTAL IMPACT OF REDUCTIONS

- The Greenhouse Gas Equivalencies Calculator developed by the Environmental Protection Agency (EPA) provides an online tool that converts GHG emission reductions into commonly understood terms that can be used for internal and external communications.
- For example, reducing carbon emissions by one MT CO_2-e has the same impact as planting 25.7 tree seedlings and letting them grow for 10 years (trees consume these emissions)



Direct emissions that result from activities the organization controls

- Most commonly, direct emissions will result from combustion of fuels which produce CO_2 emissions, for example the gas used to provide hot water for the workspace.
- In addition, some organizations will directly emit other greenhouse gases. For example, the manufacture of some chemicals produces methane (CH_4) and the use of fertilizer leads to nitrous oxide (N_2O) emissions.
- Burning natural gas in a store, consuming fuel in a company-owned car or truck or refrigerants leaking from a freezer.

Emissions from the use of electricity

- Workplaces generally use electricity for lighting and equipment. Electricity generation comes from a range of sources, including nuclear and renewables.
- However, in the UK around 75% is produced through the combustion of fossil fuels.
- Although the organization is not directly in control of the emissions, by purchasing the electricity it is indirectly responsible for the release of CO_2.

Indirect emissions from products and services

- From activities a company can influence but cannot control directly.
- Each product or service that is purchased by an organization is responsible for emissions. So the way the organization uses products and services affects its carbon footprint.
- For example, a company that manufactures a product is indirectly responsible for the carbon that is emitted in the preparation and transport of the raw materials.
- Downstream emissions from the use and disposal of products can also be indirectly attributed to the organization.

Complexities

- Despite emerging international standards not all organizations follow the same approach to calculating their footprint or classify their emissions in the same way
- Some footprints are expressed on a time period basis, such as the footprints of an individual or company which are typically measured annually. Others are expressed on a unit basis, such as per event or product purchased
- Carbon footprints are typically calculated to include all greenhouse gases and are expressed in tonnes of CO_2 equivalent (tCO2e). However, others calculate the footprint to include CO_2 only and express the footprint in tCO2 (tonnes of CO2).

Why calculate a carbon footprint?

Footprinting for management of emissions

- Calculating an organization's carbon footprint can be an effective tool for ongoing energy and environmental management.
- If this is the main reason that an organization requires a carbon footprint, it is generally enough to understand and quantify the key emissions sources through a basic process, typically including gas, electricity and transport.
- This approach is relatively quick and straightforward. Having quantified the emissions, opportunities for reduction can be identified and prioritized, focusing on the areas of greatest savings potential.

Footprinting for accurate reporting

Organisations increasingly want to calculate their carbon footprint in detail for public disclosure in a variety of contexts:

- For CSR (Corporate Social Responsibility) or marketing purposes
- To fulfil requests from business or retail customers, or from investors.
- To ascertain what level of emissions they need to offset in order to become 'carbon neutral'.

For these purposes, a more robust approach is needed, covering the full range of emissions for which the organization is responsible. It may also be appropriate for the calculation to be independently verified to ensure that the methodology has been correctly used and that the results are accurate`

Calculating a carbon footprint

A basic approach to carbon footprinting

For most organisations, calculation of a basic carbon footprint is a fairly quick exercise. A basic footprint is likely to cover direct emissions and emissions from electricity as these are the simplest to manage, but exclude some of the indirect emissions. There are usually a handful of major emissions sources that must be quantified, including:

- Onsite fuel usage
- Onsite electricity usage
- Use of transport which you own.

To get the key information to calculate a basic carbon footprint, collect data from all utility meters and record the distances travelled by the organization's vehicles. Convert the fuel, electricity and transport consumption figures to CO_2 by using the standard emissions factors, which are published by Defra (Department for Environment, Food & Rural Affairs) and reproduced on the Carbon Trust website, together with advice on how to undertake the calculation

A basic approach to carbon footprinting

When calculating a basic carbon footprint it is common to exclude sources of indirect emissions which your organization does not control, for example emissions from waste, from the supply chain or from employee travel on public transport or airlines.

Once the basic carbon footprint has been established, it is then possible to take steps to manage the emissions:

- Set and agree efficiency or emissions reduction targets
- Identify likely opportunities for efficiency or emissions reduction
- Priorities the opportunities, based on environmental or financial criteria
- Take action to implement the opportunities
- Monitor the performance of the actions taken and improve as necessary.

Producing a full carbon footprint

- Accurate calculation of your carbon footprint requires a more detailed approach and may require specialist advice.
- The five steps below show a systematic approach, suitable for producing an accurate carbon footprint:

1. Define the methodology
2. Specify the boundary and scope of coverage
3. Collect emissions data and calculate the footprint
4. Verify results (optional)
5. Disclose the footprint (optional).

Define the methodology

- For a footprint to be accurate there must be a consistent approach, which is why it is important to define the organization's methodology from the outset.
- This also ensures that when issues arise they can be dealt with systematically. A consistent methodology is particularly important in a large organization which depends on many individuals to help collect and interpret data.
- Some organizations choose to define their own approach for carbon footprinting. However, it is usually quicker and better to use a methodology that is already widely accepted and understood. The results may be seen to be more credible, and can be compared with other organizations using the same methodology.

Define the methodology

- One commonly used methodology is the GHG Protocol produced by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD).
- This methodology provides detailed guidance on corporate emissions reporting and is available free of charge online. A more recent standard from the International Organization for Standardization, ISO 14064, also provides guidance on corporate footprint calculation and emissions reporting. It builds on many of the concepts introduced by the GHG Protocol.

Specify the boundary and scope of coverage

Be clear about which set of emissions will be quantified. This is commonly referred to as defining your 'boundary'. Common issues include:

- Treatment of emissions from wholly or partially owned subsidiaries
- Treatment of emissions from leased assets, such as from a van which is leased from a hire company.

It is usual to define the boundary to include the full range of emissions that the organization controls directly and this is likely to include subsidiaries and leased assets.

Specify the boundary and scope of coverage

Having defined the boundary, consider what types of emissions will be included.

- CO_2 only or all greenhouse gases?
- Direct emissions from fuel use onsite and from transport?
- Direct emissions from manufacturing processes onsite?
- Emissions from the electricity the organization purchased?
- Emissions from the organization's supply chain and other activities for which the operation is indirectly responsible, such as outsourced activities or manufacture and transport of raw materials, by another company, which your organization then uses?

Specify the boundary and scope of coverage

- The GHG Protocol and ISO 14064 discussed above provide helpful guidance and accepted standards on these questions.
- It is common to report all directly controlled emissions and emissions from electricity in full. Emissions from indirect sources, such as the supply chain, are more complex to define and are usually treated as optional reporting items.
- However, where indirect sources contribute very large amounts of emissions it may be important to include them – a lot will depend on the purpose of reporting the carbon footprint.
- Whatever the approach taken to the organizational boundary and inclusion of emissions sources, it is important to document the decision transparently

Collect emissions data and calculate the footprint

The accuracy of the footprint relies on correct data and may include collecting information on:

- Onsite fuel consumption
- Owned transport utilization
- Emissions from chemical reactions in manufacturing processes or from land use or agricultural activities
- Electricity consumption
- Employee travel by air, rail and in vehicles not owned by the organization
- Suppliers' emissions.

Collect emissions data and calculate the footprint

For gas and electricity, collect consumption data in MWh or kWh. Data for other fuels can be collected in a variety of units, for example, kWh, MJ, Liters and so on.

For transport emissions it may be necessary to estimate the total fuel consumption based on the mileage of the vehicles and fuel economy assumptions.

Data on energy consumption can be translated into equivalent CO_2 emissions data using standard emissions factors, which are available from DEFRA (Department for Environment, Food & Rural Affairs) and reproduced on the Carbon Trust website.

For other emissions sources, more complex calculations may be required. Emissions of other greenhouse gases must be translated into equivalent emissions data in tCO2e, using the global warming potential factors published by DEFRA and available from the Carbon Trust. Before collecting the data, decide what level of accuracy is required, and how much margin for error is acceptable

Verify results

- Having a carbon footprint verified by a third party, such as a consultancy or accountancy firm can lend credibility to an organization's claims. Verification typically involves analysis of the methodology, data collection techniques and the calculation process that was used.
- Different levels of assurance or verification of your results are available. Greater levels of assurance or verification are more onerous and expensive to achieve, but provide greater confidence in the results.

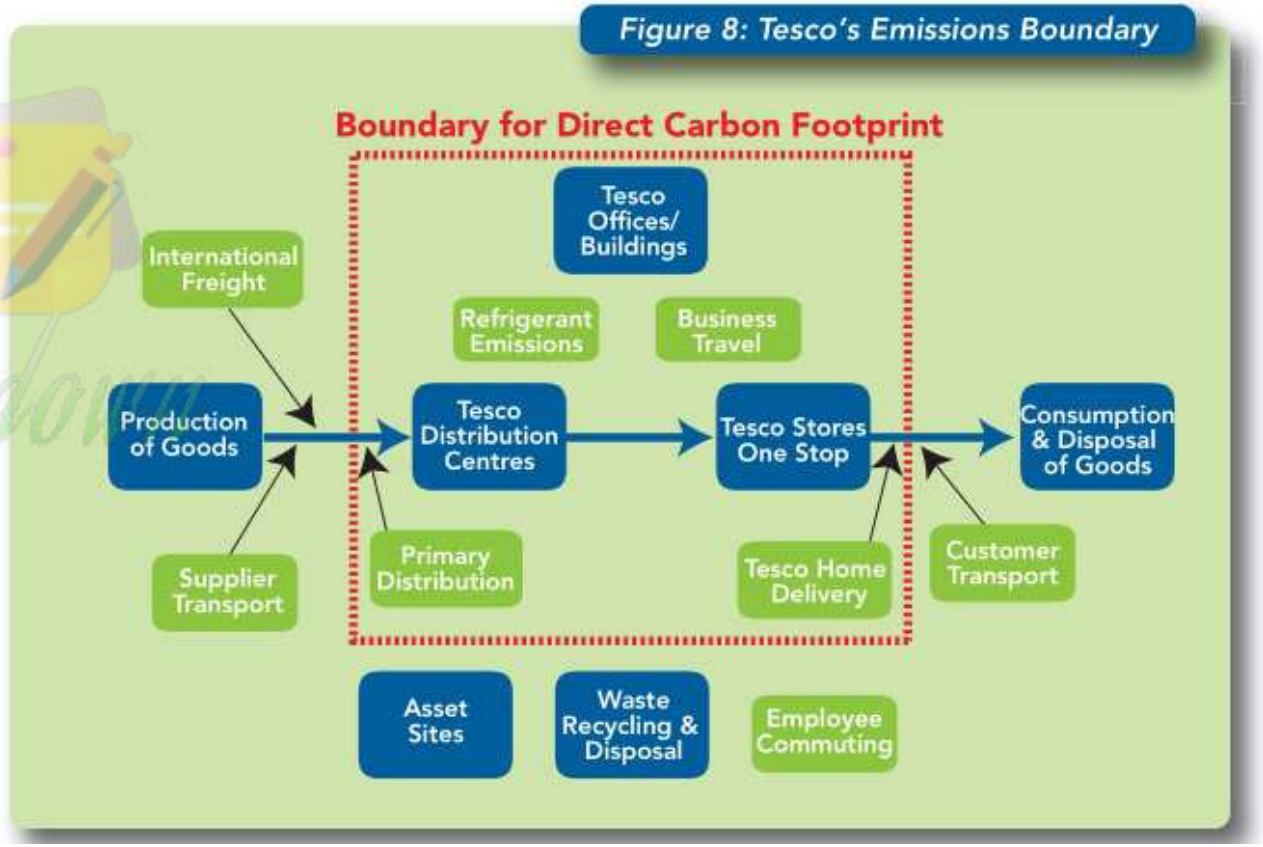
Disclose the footprint

- Whether the footprint is disclosed in advertising material, a CSR report or other collateral, ensure that the data is presented transparently, providing full information about the process followed and what the information means. Make the following information available:
- The methodology
- What boundary conditions were set and which types of emissions are included and excluded
- The data collection techniques, including what level of accuracy was achieved and any assumptions or estimates that were required
- The level of verification of the results provided by independent third parties.

This robust approach to calculating a carbon footprint should give enough information to be able to report it with confidence.

MINI CASE STUDY: TESCO'S CARBON FOOTPRINT MANAGEMENT

- Tesco began measuring its carbon footprint in 2005 With help from a consultant and in accordance with the Greenhouse Gas Protocol, Tesco has quantified its Scope 1 and Scope 2 emissions.
- Tesco calculated that it emitted approximately 4.13 million MT of CO_2-e in 2007. Over time, Tesco has expanded its business while reducing its GHG emission intensity. For example, Tesco's emissions from 2006 to 2007 remained constant even though sales and selling area increased by 10.9 percent and 17.4 percent, respectively.

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