

UNDERSTANDING YOUR FOOTPRINT

PREPARED FOR:

CAMBRIDGE CLIMATE CHANGE CHARTER



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DOCUMENT DATE

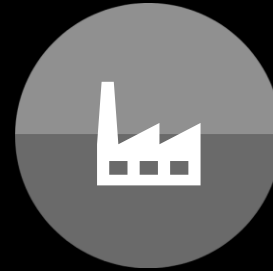
VERSION DATE: 11th May 2021
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AGENDA

AIMS AND OBJECTIVES FROM SESSION



Introduce the principles of
greenhouse gas reporting



How to map your
operations and
emissions



Understanding how to use
your data



Using the footprint to
gain insight for net zero



Key things to think
about

GREENHOUSE GASES

HEAT TRAPPING ABILITY

GHG GWP

CO ₂	1
CH ₄	21
N ₂ O	310
HFCs	140-11,700
PFCs	6,500-9,200
SF ₆	23,900



CARBON DIOXIDE
CO₂



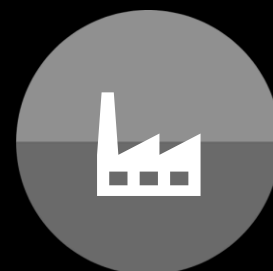
METHANE
CH₄



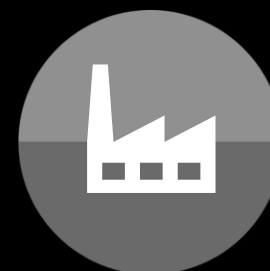
NITROUS OXIDE
N₂O



HYDROFLUOROCARBON
S
HFCs



PERFLUOROCARBONS
PFCs



**SULPHUR
HEXAFLOURIDES**
SF₆

CARBON FOOTPRINTS

USING CO₂E

CO₂e, or carbon dioxide equivalent, is a standard unit for measuring carbon footprints. The idea is to express the impact of each different greenhouse gas in terms of the amount of CO₂ that would create the same amount of warming.

That way, a carbon footprint consisting of lots of different greenhouse gases can be expressed as a single number.

CARBON FOOTPRINTS

HOW TO CALCULATE CARBON

EMISSIONS FACTORS CONVERT ACTIVITY DATA INTO CARBON DATA

- Take an example:

ELECTRICITY

$$\begin{array}{ccccccc} \underbrace{1,000 \text{ kWh}} & \times & \underbrace{255.6 \text{ g CO}_2\text{e}} & = & \underbrace{255,600 \text{ g CO}_2\text{e}} \\ \text{Activity data} & \times & \text{Carbon factor} & = & \text{Carbon emissions} \end{array}$$

Kg or tonnes are more useful measurements so 1,000 kWh =

*255.6 kg CO₂e **OR**
0.2556 tonnes CO₂e*

CARBON FOOTPRINTS

EMISSIONS FACTORS

AVAILABILITY OF EMISSIONS FACTORS

GOVERNMENT DATASET: <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

WILL COVER:

1. Fuels
2. Bioenergy
3. Refrigerants
4. Vehicle usage
5. Electricity
6. Water
7. Waste
8. Business travel
9. Construction and industrial material use
10. Some logistics

WILL NOT COVER:

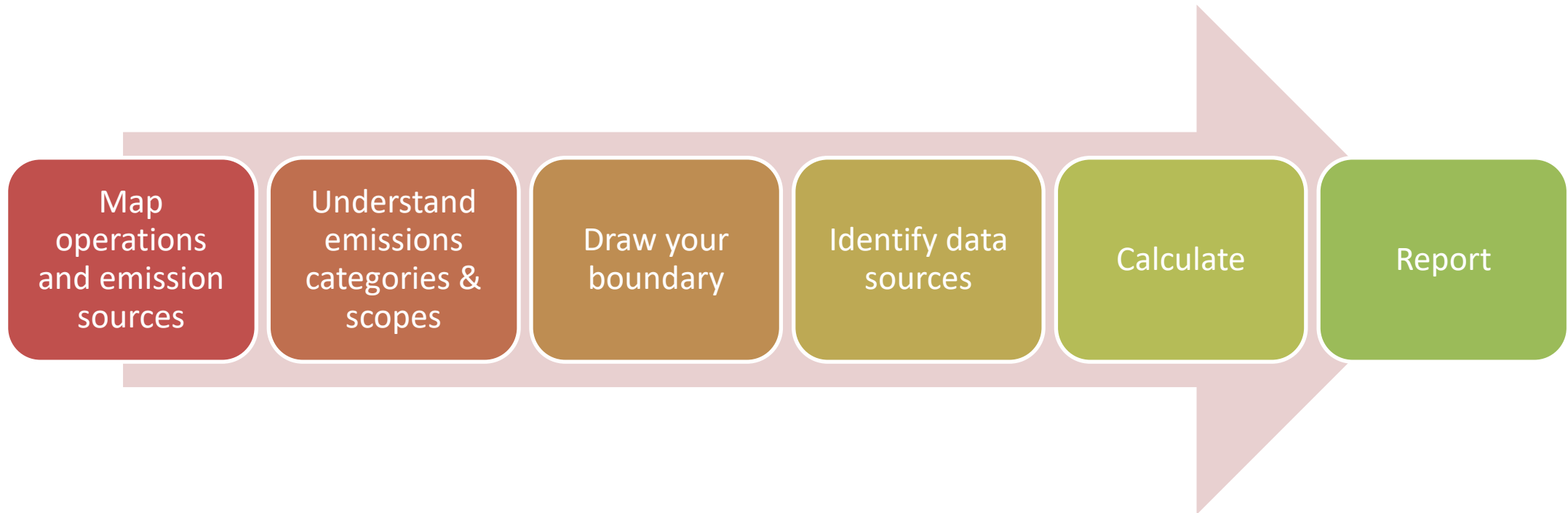
1. International emissions (complete coverage)
2. Chemical use
3. Embodied emissions for materials
4. Electronics
5. Fashion & fabrics
6. Food & drink
7. Detailed purchasing and material use
8. Timber

These emission datasets are generally only available in paid solutions (e.g. a software platform)

CARBON FOOTPRINTS

EMISSIONS REPORTING PROCESS

PROCESS FLOW



01

GHG EMISSIONS



Scope 1: Direct
Greenhouse gas emissions from sources that are owned or controlled by a company.



Scope 2: Indirect
Greenhouse gas emissions resulting from the generation of electricity, heat or steam purchased by a company.



Scope 3: Indirect
Greenhouse gas emissions from sources not owned or directly controlled by a company but related to the company's activities.

GHG PROTOCOL



The Greenhouse Gas Protocol provides accounting and reporting standards, sector guidance, calculation tools, and trainings for business and government. It establishes a comprehensive, global, standardized framework for measuring and managing emissions from private and public sector operations, value chains, products, cities, and policies.

It is operated as a partnership between the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD).

STRENGTHS:

- Well structured
- The de-facto standard
- Over 90% of global emissions reporting is produced using it

WEAKNESSES/CHALLENGES:

- Double counting: When two or more individuals or organisations claim ownership of specific emission reductions or carbon offsets. Double-counting occurs when the greenhouse gas emissions (GHG) resulting from a particular activity are allocated to multiple parties in a supply chain, so that the total allocated emissions exceed the total actual emissions of that activity.

PRINCIPLES (WHICH SHOULD APPLY TO ALL CLIMATE CHANGE/NET ZERO ACTIVITY):

- Relevance – the emissions are appropriate and relevant to the company
- Completeness – account for and report all activities and emission sources
- Consistency – use consistent methodologies to allow for meaningful comparison
- Transparency – address all relevant issues in a factual and coherent manner
- Accuracy – ensure quantification does not over or under report, reduce uncertainty

TOOL OPTIONS



<https://www.carbontrust.com/resources/sme-carbon-footprint-calculator>

Limited scope reporting



<https://www.smartcarboncalculator.com/>



<https://www.netzeroclub.com/>



<https://www.cbn.expert/>

Limited scope reporting

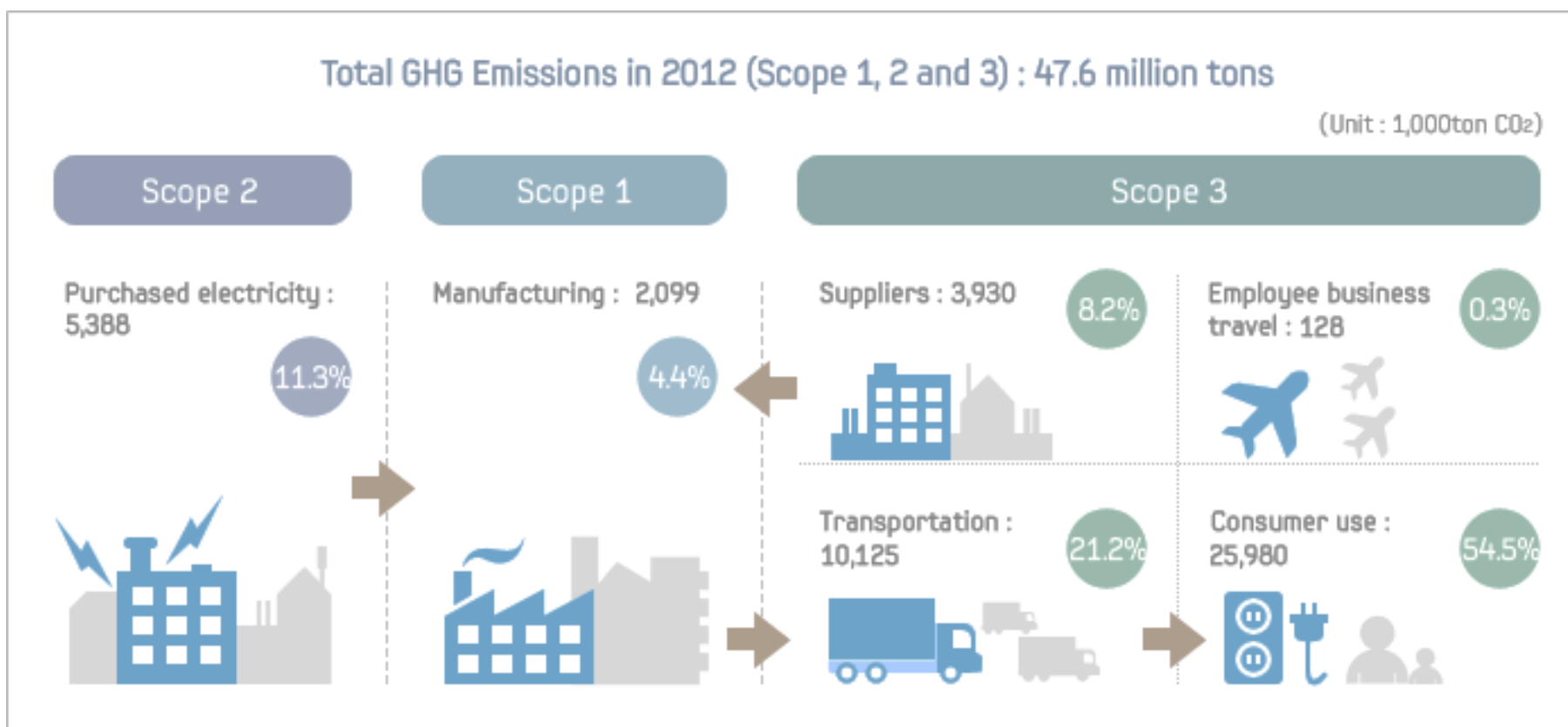


https://www.carbonfootprint.com/small_business_calculator.html



Use a spreadsheet tool/
Develop your own spreadsheet

RELATIVE IMPACT



05

ELECTRICITY & GAS

Electricity Invoice

Page 1 of 2

TOTAL GAS & POWER

XXXXXXXXXXXXXXXXXXXX
 XXXXXXXX
 XXXXXXXXXXXXXXXX
 XXXXXXXX
 XXXXXXXX

Enquiries:

If you have any queries regarding this invoice or your account in general, please call our Customer Services Help Line on 03330 037 874, write to us at Total Gas & Power, Bridge Gate, 55-57 High Street, Redhill, RH1 1RX, or email electricity.enquiries@totalgp.com

Fossil Fuels Levy

Account Number: XXXXXXXXXXXX
 Invoice Number: XXXXXXXXXXXX
 Date (Tax Point): XXXXXXXX
 Supplied Address: XXXXXXXXXXXXXXXXXXXXXXXX
 XXXX
 XXXXXXXXXXXXXXXX
 XXXXXXXX
 XXXXXXXX
 XXXX

Climate Change Levy

Statement Section	FFL	CCL	VAT	Total
Total balance from previous invoice	-	-	-	
Payment received on 22 May 2017	-	-	-	
Balance Carried Forward	-	-	-	£0.00

Charge Description	Period of use From To	Billed Units	Unit Desc	Price	Cost (£)
Supply Number: S 00 845 500 Number: 17 005 2715 333 Meter No. 8888888888					
Day (00:00-24:00)	01/05/17 31/05/17	43,836.90	kWh	12.5574p	5,505.03
Night (00:00-07:00)	01/05/17 31/05/17	11,746.40	kWh	8.1919p	962.25
Standing Charge	01/05/17 31/05/17	31.00	Day	105.6763p	32.76
DUoS Capacity Charge	01/05/17 31/05/17	720.00	kVA/Month	£1.52	1,094.40
Reactive Power	01/05/17 31/05/17	199.86	kVARh/Month	0.4670p	0.93

Supply Number: MPAN
 (Meter Point Administration
 Number)

kWh (Kilowatt Hours)

Total (Consumption) 55,585.30 kWh	£6,467.28
Total Other Charges	£1128.09
CCL at 0.568p/kWh	£315.72
VAT at 20.00%	£1,582.22
Total Electricity Sales	£9,493.31
Total Invoice Value	£9,493.31
Balance Brought Forward	£0.00
Balance Due	£9,493.31

Continued on next page...

ELECTRICITY

$$1,000 \text{ kWh} \times 255.6 \text{ g CO}_2\text{e} = 255,600 \text{ g CO}_2\text{e}$$

$$\text{Activity data} \times \text{Carbon factor} = \text{Carbon emissions}$$

Kg or tonnes are more useful measurements so 1,000 kWh =

$$255.6 \text{ kg CO}_2\text{e} \text{ OR } 0.2556 \text{ tonnes CO}_2\text{e}$$



Postal Address: Bridge Gate, 55-57 High Street, Redhill, Surrey RH1 1RX Tel: 01737 275800 Fax: 01737 784900 www.totalgp.com
 Total Gas & Power Limited VAT Registration No: 889638949 Registered in England No: 2172239
 Registered Office: 10 Upper Bank Street, Canary Wharf, London E14 5BF



FUEL

OR

MILEAGE RECORD

Week
ending
Saturday

	Su.	M.	Tu.	W.	Th.	F.	S.	Total
May 1								
" 8				33			114	147
" 15							106	106
" 22		50					50	
" 29	94	23			58			175
June 5	59							59
" 12								
" 19								
" 26				14			21	35
July 3	33						102	135
" 10								
" 17					33			33
" 24		45				49		94
" 31	75		46				168	309
Aug. 7	58	71						129
" 14		37	34		12	67	102	252
" 21							108	108

MILEAGE RECORD

Week
ending
Saturday

	Su.	M.	Tu.	W.	Th.	F.	S.	Total
Aug. 28	67		33					100
Sept. 4							33	33
" 11	54	33			33		102	222
" 18		11	33		33		46	123
" 25	55				28	33	63	179
Oct. 2	64							64
" 9								
" 16	42							42
" 23							105	105
" 30							109	109
Nov. 6								
" 13							41	41
" 20	66						36	102
" 27	42						38	80
Dec. 4	64							64
" 11	42							42
" 18	32							32
" 25								
						30	51	80

4509

1. **Identify the problem.** The first step in the problem-solving process is to identify the problem. This involves recognizing the issue, gathering information, and defining the problem in clear, specific terms.



You may need to ask your maintenance engineer for the record, or they may not have it

It is a legal requirement for systems of a certain size, so needs to be looked it if not available.

SCOPE 3

INTRODUCTION

EMISSION SCOPES

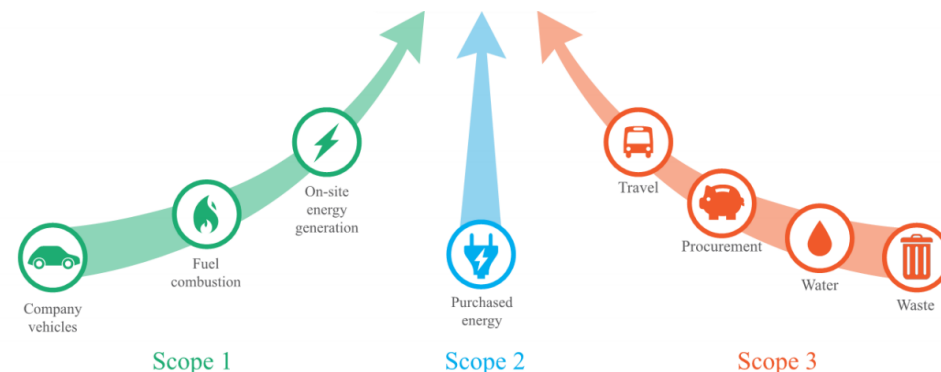
Carbon emissions are divided into three categories (shown in the diagram below):

- **Scope 1 (direct):** emissions from sources that you own or control, such as boilers and fleet vehicles you own/operate.
- **Scope 2 (energy indirect):** indirect emissions from the generation of purchased electricity, heat, steam etc.
- **Scope 3 (other indirect):** indirect emissions (i.e. those owned, controlled and generated by others) which result from the organisation's activities such as travel, procurement, water and waste.

SCOPE 3 EMISSIONS

At a high level, the Scope 3 emissions can be broken down into several high level reporting categories. These are summarised below:

 <h4>TRAVEL</h4> <ul style="list-style-type: none"> • Business travel • Employee commuting & remote working 	 <h4>PROCUREMENT</h4> <ul style="list-style-type: none"> • Services • Products • Materials • Capital Projects 	 <h4>LOGISTICS</h4> <ul style="list-style-type: none"> • Transportation • Distribution 	 <h4>WASTE</h4> <ul style="list-style-type: none"> • Recycling • Composting • Reuse • Landfill 	 <h4>WATER</h4> <ul style="list-style-type: none"> • Supply • Sewerage and Wastewater 	 <h4>WELL TO TANK</h4> <ul style="list-style-type: none"> • Fuel (W2T) • Electricity (T&D) 	 <h4>OTHER</h4> <ul style="list-style-type: none"> • Sold Products & Services • End of Life • Franchises • Investments
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TRAVEL

The travel emissions should be calculated for:

Business travel: air travel, road vehicle travel, rail travel, taxi travel, bus and coach travel, ferry travel

Employee commuting/remote working: employee commuting, emissions from employee remote working

The travel included within Scope 3 should specifically exclude any in vehicles owned and operated by the organisation which are categorised as Scope 1 – direct emissions.

SCOPE 3

TRAVEL

CALCULATION METHODS

There are four calculation methods that can be used to calculate travel related activity:



Volume of fuel used for each travel/transport category



Distance travelled by category



Expenditure on each category



Using a benchmark to estimate from appropriate data sets

We can use a decision tree to determine which methodology is appropriate. There are situations where a hybrid of different methodologies will be used for the same category as the most accurate method should be used where possible and a variety of methods may be needed across a data set.

INFORMATION REQUIRED

The following information is an example of the data required to compile your carbon footprint:



Quantity of fuel used and/or amount spent on fuel



Total distance travelled
Mode of travel/transport used



Expenditure by mode



Number of employees
Average distance travelled (from survey)
Typical mode of travel (from survey)
Average number of working days per year
Days working from home

WHAT DATA SETS TO COLLECT

Information can typically be collected from:

- Fuel receipts
- Purchasing records
- Business travel documentation
- Business travel receipts/tickets
- Invoices
- Transport/travel management systems
- Surveys

ACCURACY HIERARCHY



Volume (quantity x factor)



Distance



Expenditure



Benchmark

MORE ACCURATE
LESS ACCURATE



PROCUREMENT

The procurement emissions should be calculated for all purchased goods, services and materials:

Construction: products purchased as part of the supply chain, energy used during the construction activities

Services: equipment rental, security, travel and business services, catering, accounting

ICT: manufacture of ICT products, such as PCs, monitors, printers and associated consumables, IT support

Manufactured products: furniture, products, specialist machinery

Food & Drink: food products, drinks

Raw materials: metals, wood, plastics, glass

The above list is not exhaustive – an aspects and impacts assessment is generally required to understand where to assess for your organisation. We will guide you through this.

SCOPE 3

PROCUREMENT

CALCULATION METHODS

There are four calculation methods that can be used to calculate procurement related activity:



Cradle-to-gate emissions collected from goods and services suppliers



Scope 1 and 2 data collected from goods and services suppliers



Physical quantity of goods and services used



Amount of money spent on goods and services

We can use a decision tree to determine which methodology is appropriate. There are situations where a hybrid of different methodologies will be used for the same category as the most accurate method should be used where possible and a variety of methods may be needed across a data set.

INFORMATION REQUIRED

The following information is an example of the data required to compile your carbon footprint:



Mass or number of product/material or the amount spent on product/material



Scope 1 or 2 supplier emissions
Materials input emissions
Transport emissions
Waste emissions



Purchase records
Inventory data
Bills of materials



Purchase records
Invoices
Expenses
Finance system records
LCA and Sustainability data sets

WHAT DATA SETS TO COLLECT

Information can typically be collected from:

- Lifecycle GHG emissions
- Inventory data
- Bill of materials
- Purchase records
- Invoices
- Expenses
- Financial Management Systems

ACCURACY HIERARCHY



Supplier data & LCA



Supplier allocated S1 & S2



Quantity



Spend method

MORE ACCURATE
LESS ACCURATE



LOGISTICS



Logistics emissions calculation guidance

SCOPE 3

LOGISTICS EMISSIONS

The activity-based method uses the following formula:

$$\text{CO}_2 \text{ emissions} = \text{Transport volume by transport mode} \times \text{average transport distance by transport mode} \times \text{average CO}_2\text{-emission factor per tonne-km by transport mode}$$
$$[\text{Tonnes CO}_2 \text{ emissions} = \text{tonnes} \times \text{km} \times \text{g CO}_2 \text{ per tonne-km} / 1.000.000]$$

UNDERSTANDING LOCATION OF ORIGIN & SUPPLY CHAIN PATHWAYS

To calculate this element correctly, you need to understand and have records related to:

1. Location of origin of products (the same list as used in the Procurement section)
2. Method of transportation (for each step of logistics that occurs beyond the end of the cradle-to-gate factor from the supplier – i.e. when it leaves their “factory”)
3. Weight transported



WATER

The water emissions should be calculated for:

Water supply: water supplied by water companies or from borehole extraction

Wastewater treatment: wastewater treated by the institution or a third party including greywater, rainwater, borehole extraction water

SCOPE 3

WATER

CALCULATION METHODS

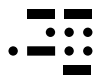
There are four calculation methods that can be used to calculate water related activity:



meters on-site for waste supply volume and wastewater volume



water supply information provided by the utility supplier



wastewater factor provided by the utility provider



calculated wastewater based on the water supply volume

We can use a decision tree to determine which methodology is appropriate. There are situations where a hybrid of different methodologies will be used for the same category as the most accurate method should be used where possible and a variety of methods may be needed across a data set.

INFORMATION REQUIRED

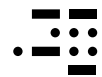
The following information is an example of the data required to compile your carbon footprint:



Water consumption volume
Wastewater volume from water consumption, greywater volume, rainwater volume, borehole extraction water volume



Water consumption volume
Total wastewater volume



Total consumption volume
Total wastewater volume
Wastewater factor

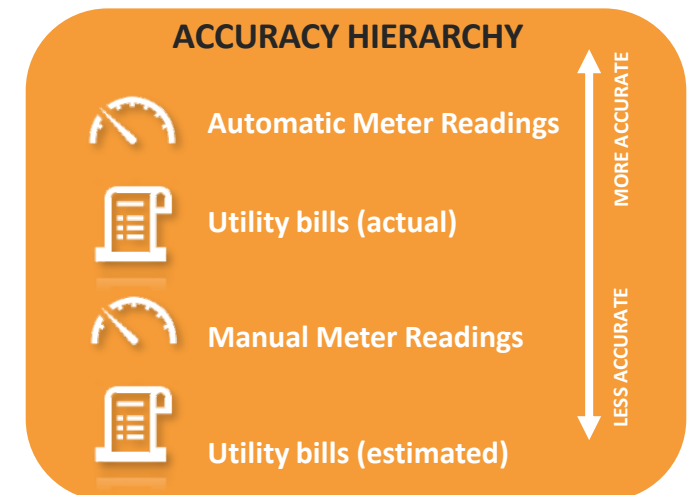


Water consumption volume

WHAT DATA SETS TO COLLECT

Information can typically be collected from:

- Utility bills (actual)
- Utility bills (estimated)
- Automatic meter readings (AMR)
- Manual meter readings





The waste disposal emissions should be calculated for (as an example – list is not exhaustive):

Re-use: construction waste, glass, clothing, electrical items

Recycling: construction waste, books, glass, refuse, electrical items, metal, plastic, paper

Composting: timber, books, reduce (organic waste), paper

Waste to energy: timber, books, glass, clothing, refuse, electrical items, metal, plastic, paper

Landfill: construction waste, books, glass, clothing, refuse, electrical items, metal, plastic, paper

SCOPE 3

WASTE

CALCULATION METHODS

There are four calculation methods that can be used to calculate waste related activity:



emissions provided from the waste treatment/disposal companies



amount of waste produced for each waste stream



total waste produced and the proportion allocated to each waste stream

We can use a decision tree to determine which methodology is appropriate. There are situations where a hybrid of different methodologies will be used for the same category as the most accurate method should be used where possible and a variety of methods may be needed across a data set.

INFORMATION REQUIRED

The following information is an example of the data required to compile your carbon footprint:



Amount of waste produced (mass or volume)
Waste streams



Amount of waste for each waste stream
(mass or volume)



Total mass or volume of waste generated
Proportion of waste allocated to each waste stream

WHAT DATA SETS TO COLLECT

Information can typically be collected from:

- Waste treatment emissions
- Internal management systems
- Waste invoices
- Waste documentation

ACCURACY HIERARCHY



Amount of waste per supplier



Amount of waste per waste stream



Total waste figure

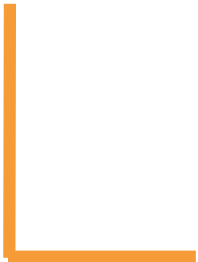


Benchmark

MORE ACCURATE
LESS ACCURATE



WELL-TO-TANK

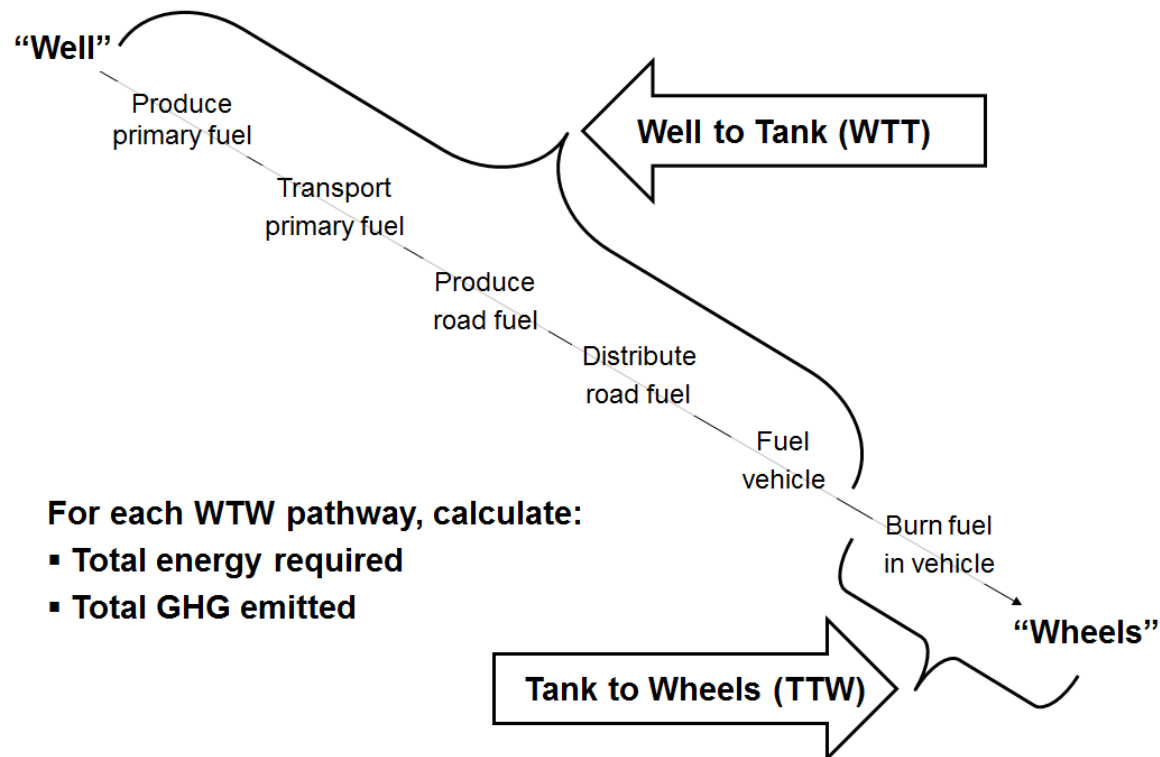


Well to tank emissions guidance

SCOPE 3

WELL-TO-TANK

Representation of what well-to-tank means for fuel. Transmission and distribution is the equivalent of the delivery of electricity from power station to your premises.



UNDERSTANDING TRANSMISSION AND WELL-TO-TANK & DISTRIBUTION EMISSIONS

To calculate this element correctly, you need to understand and have records related to:

1. Total volume of fuels
2. Total quantity of electricity, heat, steam or cooling

These records are generally available from your Scope 1 and Scope 2 emissions records, so this section is relatively resource light to complete.

Factors based on the total supplied volume will be used linked to the country in which the fuel/electricity was used.



OTHER



Guidance on other aspects of a corporate carbon footprint value chain

SCOPE 3

OTHER



Guidance by Scope 3 Category

Introduction

Date: April 2013 Size: 1.75 MB

Category 1 - Purchased goods and services

Date: April 2013 Size: 607.85 KB

Category 2 - Capital goods

Date: April 2013 Size: 181.49 KB

Category 3 - Fuel- and energy-related activities

Date: April 2013 Size: 443.25 KB

Category 4 - Upstream transportation and distribution

Date: October 2013 Size: 567.97 KB

Category 5 - Waste generated in operations

Date: April 2013 Size: 477.3 KB



Guidance by Scope 3 Category

Category 6 - Business travel

Date: April 2013 Size: 233.89 KB

Category 7 - Employee commuting

Date: April 2013 Size: 225.43 KB

Category 8 - Upstream leased assets

Date: April 2013 Size: 234.59 KB

Category 9 - Downstream transportation and distribution

Date: April 2013 Size: 334.68 KB

Category 10 - Processing of sold products

Date: April 2013 Size: 230.57 KB

Category 11 - Use of sold products

Date: April 2013 Size: 288.39 KB

Category 12 - End-of-life treatment of sold products

Date: April 2013 Size: 200.77 KB



Guidance by Scope 3 Category

Category 13 - Downstream leased assets

Date: April 2013 Size: 171.62 KB

Category 14 - Franchises

Date: April 2013 Size: 229.08 KB

Category 15 - Investments

Date: April 2013 Size: 327.61 KB

Appendix A - Sampling

Date: April 2013 Size: 202.11 KB

Appendix B - Scenario Uncertainty

Date: April 2013 Size: 182.33 KB

Appendix C - Intensity Metrics

Date: April 2013 Size: 173.42 KB

Appendix D - Summary Tables

Date: April 2013 Size: 235.17 KB

UNDERSTANDING OTHER ASPECTS OF YOUR CARBON FOOTPRINT

To calculate this element correctly, you need to understand and have records related to each area. These will need to independently evaluated with the technical guidance provided by the GHG Protocol (seen in the image shown).

The areas covered by this are (list is not exhaustive):

- Sold Products & Services
- End of Life of Products
- Franchises
- Investments

