



Camden
Climate Change
Alliance

MEASURE YOUR CARBON FOOTPRINT

Made Easy guide series

HOW THESE GUIDES WORK

Our 'Made Easy' guide is designed to provide you with tools and tips to help you implement a sustainability project. Each of these guides focuses on a different type of project, and each is packed with hints, tips, links and case-study information. These presentations are not designed to be detailed step by step toolkits; rather, they aim to provide guidance and inspiration for your future sustainability projects.

Blue case-study boxes are dotted throughout these guides. All are from CCCA members who have successfully implemented a variety of sustainability projects, and we're delighted to be able to highlight some of their work for your benefit in these guides.

These yellow boxes contain useful facts and figures

These green boxes link you to a key external resource

INTRODUCTION

Your carbon footprint is an accurate account of all the emissions that your organisation produces through the different activities that takes place within your organisational boundary. The footprint allows you to convert different measures of energy consumption into one unit called CO₂ (carbon dioxide) or CO₂e (carbon dioxide equivalent).

KWh (electricity) , litres (petrol),
Litres (Diesel) all converted into
CO₂ or CO₂e.

CO₂e is the measure of other greenhouse gasses in
combination with carbon dioxide This is explained in more
detail later on in this guide

WHY?

When you drive your car, or turn on a light bulb, or work on your computer, fossil fuels (coal, oil & natural gas) are burnt in order for the activities to occur. Carbon dioxide and other greenhouse gases are released when these fuels are burnt. The gases rise into the atmosphere and cause a greenhouse effect by trapping heat. This causes global temperature rises and other major effects on weather systems. Measuring your emissions allows you understand where they are occurring, and how to manage and reduce them.

WHERE DO I START?

The beginning of the journey is to understand how emissions are categorised. This has already been done as part of a global standard of emissions accounting called the GHG Protocol. This guide is essentially a short summary of the 100 page global standard.

Greenhouse gas emitting activities are placed into the following three categories:

Scope	Source of emissions	Scenario to explain
Scope 1	Direct emissions	All emissions released from the burning of fuels on the site of facilities or machinery under your organisational boundary control. For example, burning gas in a boiler within your facility. For definition of organisational boundary see the next page.
Scope 2	Indirect emissions through purchase of energy / steam	All emissions released through the use of electricity from the national electricity grid. For example if you switch on a light and the electricity is generated at a power station outside of your control, but is generated because you switch the light on in your facility.
Scope 3	All other indirect emissions	Any other activity or service that you do where emissions are released but not within your facility e.g. taking a taxi (someone owns the taxi, but you use it as a service), having office supplies delivered by a third party, or disposing of waste (a service provider owns the waste processing plant)

REPORTING PERIOD & ORGANISATIONAL BOUNDARY

Before you begin to calculate your emissions you must set your boundaries. This will prevent you from measuring emissions that are outside of the scope of your jurisdiction and outside your sphere of influence. You have the following options to take:

ORGANISATIONAL BOUNDARY

If you calculate emissions for a current regulation such as CRC or the EU ETS, then the regulation will dictate your boundary. If you are voluntarily measuring your emissions, then you can choose your boundary approach. Your options are:

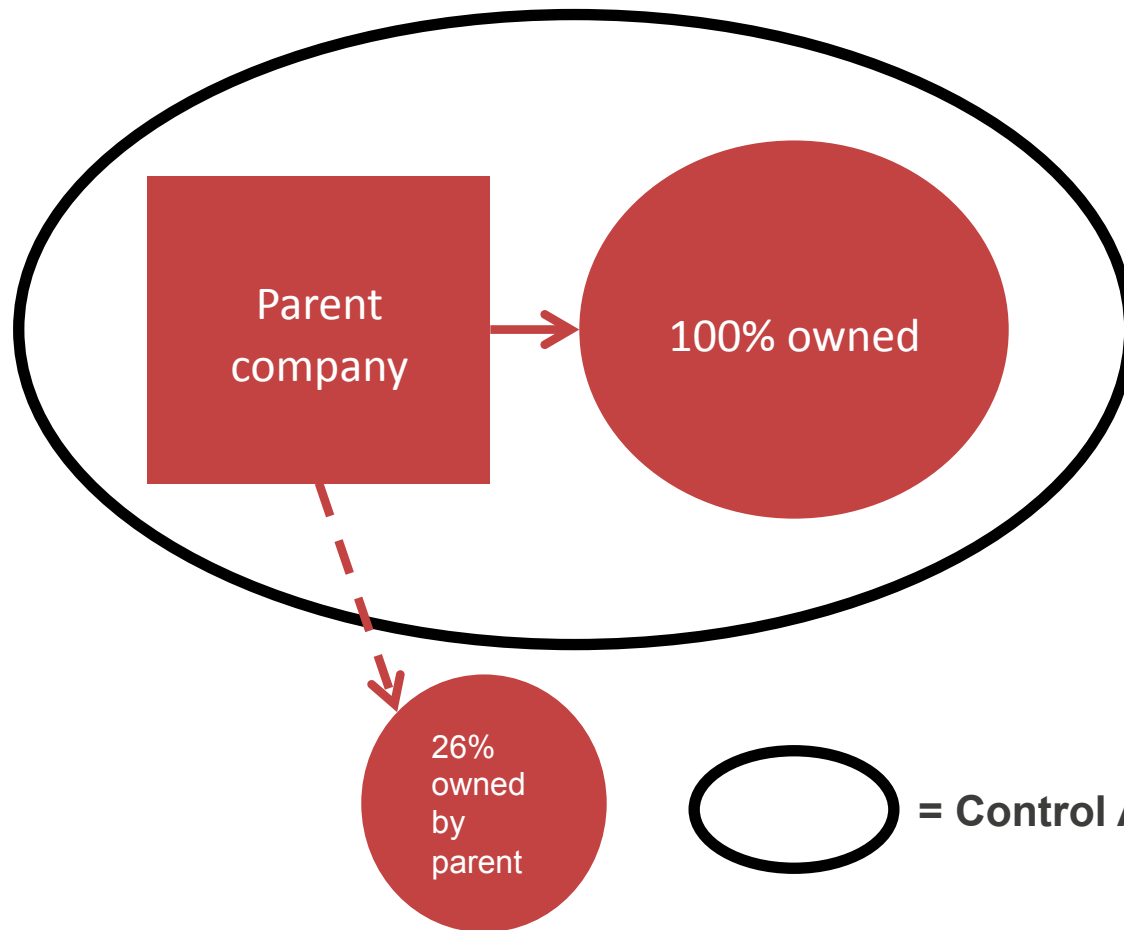
1. Control Approach

Account for 100% of emissions if you have control over the facility. You will choose whether control means **financial control**, or **operational control**

2. Equity Approach

Account for a share of the emissions if you own equity in operations. For example, if you own 26% of a company, then you own 26% of the emissions.

REPORTING PERIOD & ORGANISATIONAL BOUNDARY



With the **Control Approach**, you decide whether you want to account for those facilities your parent company has a controlling **OPERATIONAL** ownership of, or those they have a **FINANCIAL** ownership of. For some companies, it won't make a difference, for others it will.

ORGANISATIONAL BOUNDARY & REPORTING PERIOD

After choosing your boundary approach as stated in the previous slide, you will then need to determine your reporting period (unless you are reporting under a Government compliance regulation – in which case consult your regulation or the CCCA). Your reporting period is your yearly cycle that you commit to measuring to.

Things to consider:

Other events through the calendar that you wish to align with e.g. Director's report, sustainability report, voluntary reporting obligations, calendar year, financial year. You may have to undertake multiple reporting for different regulations therefore it's advisable to establish data collection methods which helps meet all reporting requirements.

Typical periods used are:

- **Financial year** (April to March)
- **Calendar year** (January to December)
- **Academic year** (September to August or October to September)

WHAT DATA DO I COLLECT

Now you have your boundary stated, you need to assess what activities your organisation conducts that uses energy. See below as an example for a typical organisation:

Activity	Type of energy used	Scope category	Source of data	Units of data to collect
Computers	Electricity from mains	Scope 2	Electricity bill supplier	KWh
Heating	Gas from internal boiler	Scope 1	Gas supplier	KWh or cubic feet/meters.
Office lighting	Electricity from mains	Scope 2	Electricity bill supplier	KWh
Backup electricity generator	Diesel generator in emergency situation.	Scope 1	Diesel purchased	Litres
Company car use (owned vehicles)	Unleaded petrol	Scope 1	Staff expense claims	Distance or Litres
Business travel (non owned vehicles)	Aviation fuel, taxi fuel, etc.	Scope 3 *	Staff booking procedure	Distance

* When reporting to the CCCA, Scope 3 data is optional. Begin with your Scope 1 & 2 emissions.

HOW OFTEN DO I COLLECT DATA?

The regularity of your data collection is up to you and what you wish to get out of measuring your emissions. The minimum frequency for data collection is once per year. The choice is yours, but will depend on your resource and payback to managing it. You should also consider any other reporting requirements you have and their timeframes as collecting data more regularly may help you to fulfil multiple requirements more easily. The table below looks at the benefits of more frequent data collection for energy consumption:

Collection Frequency	Benefits
Once a year	This will allow you to calculate your emissions and report annually
Quarterly	You can review your energy consumption quarterly to determine how seasons affect behavioural use of energy
Monthly	Take a proactive look at consumption and try and implement and track measures that will reduce them.
Weekly / Daily	Identify causes to spikes in energy and take action to actively manage those spikes.
Half hourly	See the spikes as they happen through computer technology and actively manage over consumption when it happens.

SET A BASELINE

Your baseline is important as it allows you to compare and benchmark your emissions based on a specific period of time. It also allows you to compare against your business growth.

When you choose a base year, it will be the earliest point in time that you can collect relevant historical energy data from.

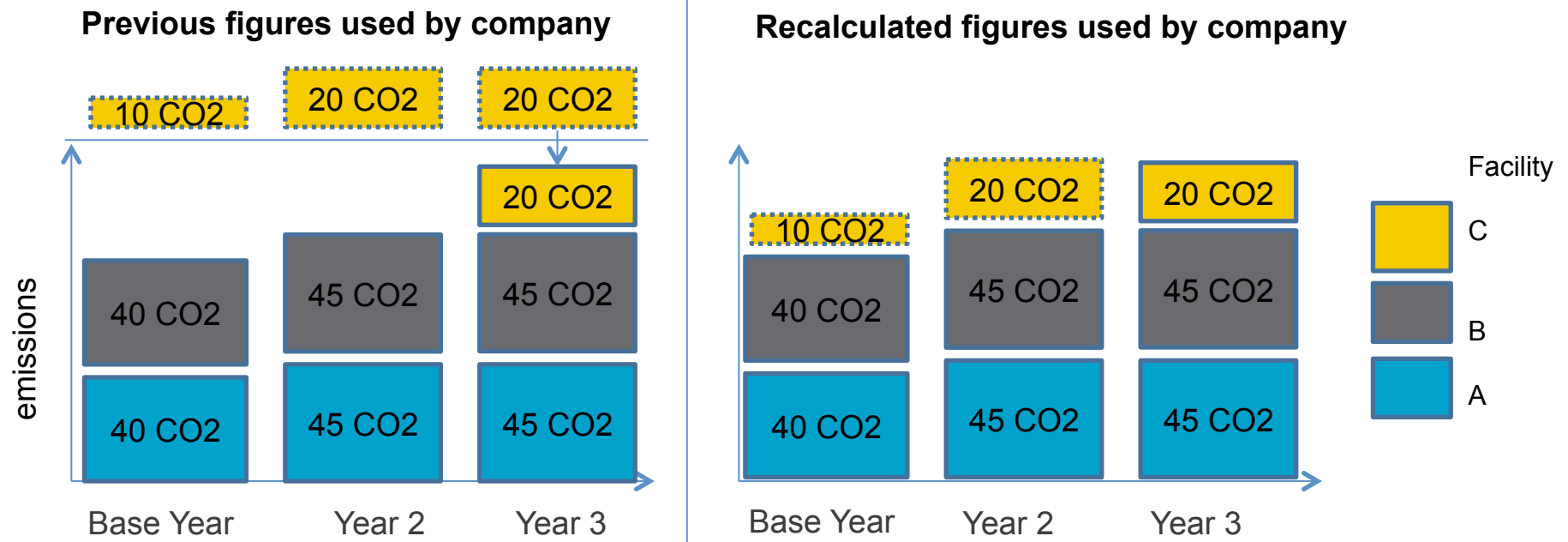
The base year allows you to analyse yearly trends and patterns. For instance, the UK winter that began in October 2015 was unusually warm. So be aware of unusual patterns when selecting your base year as a base year of 2015 will probably see a large increase in emissions in 2016 which will look negatively on your organisation.

Once you select a year, you will need to collect all historical energy data back to that reporting year and calculate your emissions for each year (using the subsequent methodologies in this guide).

SIDENOTE: YOU CAN RECALCULATE YOUR BASELINE

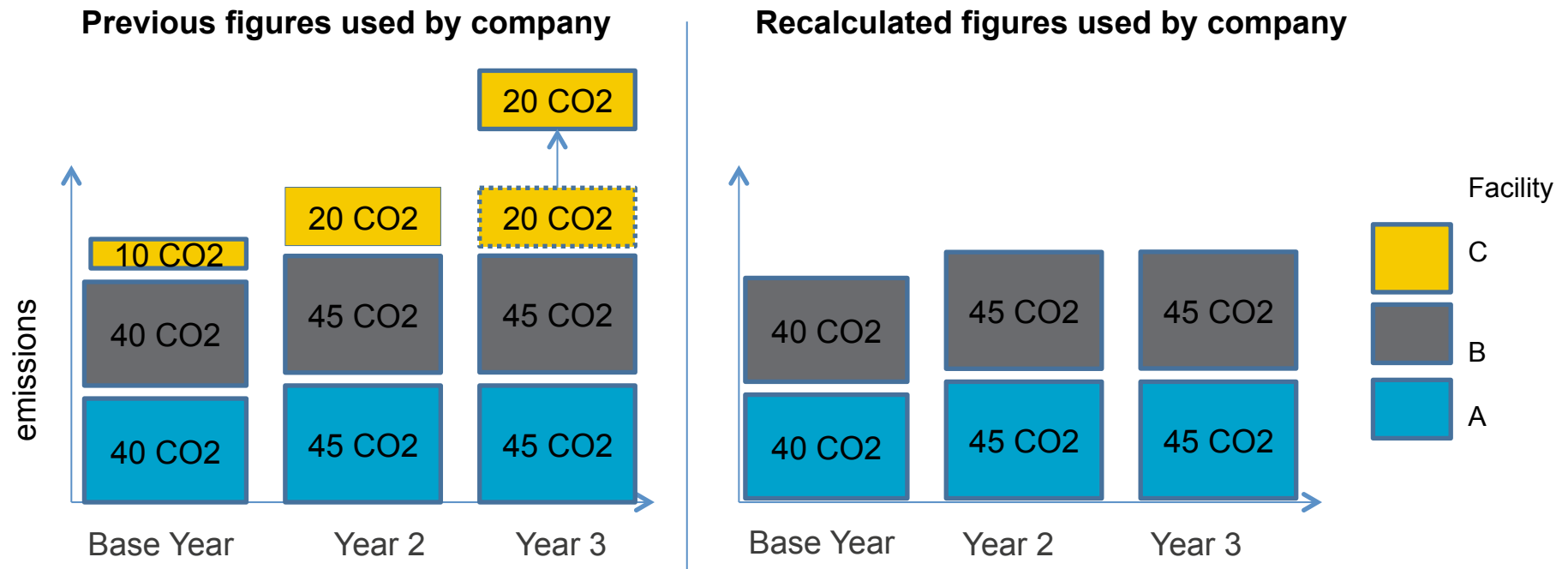
Your baseline emissions figure can be amended to show changes in your organisational structure. If you buy or sell new facilities this will reflect in your baseline.

In the scenario below, **facility C** is purchased in year 3. If the business selling the facility provides previous year's emissions these can then be added onto the new owner's baseline.



SIDENOTE: YOU CAN RECALCULATE YOUR BASELINE

In the scenario below, **facility C** is sold in year 3. It has been reporting on the emissions of facility C since the Base Year. Therefore, it will remove any existence of the emissions from any year of accounting. The company that purchases the facility will take on the associated emissions.



CALCULATING EMISSIONS – GLOBAL WARMING POTENTIALS

Greenhouse gases (GHG) consist of:

CO₂ (Carbon dioxide)

CH₄ (Methane)

PFCs (Perfluorocarbons)

SF₆ Sulphur Hexafluoride

N₂O (Nitrous Oxide)

CFCs (Chlorofluorocarbons)

These gases differ in their contribution to climate change. For example, 1 tonne of Nitrous Oxide has the ability to warm the climate by up to 298 times more than CO₂. If we were calculating all 6 greenhouse gases, then we convert to a comparable figure called CO₂(e) or carbon dioxide equivalent.

Therefore to work out the total CO₂(e) of Nitrous Oxide:

$$\text{GHG (tonnes)} \times \text{GWP} = \text{CO}_2(\text{e}) \quad \text{or} \quad 100 \text{ tonnes} \times 298 = 29,800 \text{ tCO}_2(\text{e})$$

Note: CO₂ has a global warming potential of 1

CALCULATING EMISSIONS – EMISSIONS FACTORS

In order to convert your raw energy data into a CO₂ figure, you must use what is called an **emissions factor**. This takes into account how much carbon is released into the atmosphere by a specific process. For example. Coal is known to have a higher carbon content than gas. When it is burnt to create electricity, it will release more carbon into the atmosphere. We therefore allocate it a higher emissions factor.

Emissions factors are provided to us on a yearly basis via DEFRA:

<http://www.ukconversionfactorscarbonsmart.co.uk/>

The number that you use will be multiplied by your activity data. Also, you will know what units to collect your activity data in by viewing the conversion factor in the above link. The calculation will look something like this:

10,000 KWh electricity used (activity data) x **0.44548** (emissions factor in kg CO₂e for 2013)
= 4454.8 kg of CO₂ generated

CALCULATING EMISSIONS – ELECTRICITY EMISSIONS FACTORS

In the previous slide we used the electricity as an example for calculating emissions. Each year the UK will release their emissions factors for the previous year, and it will differ based on a changing energy mix as a result of free market forces and energy policy. The UK energy utility companies like Scottish Power and E.ON will generate energy with differing mixes of fuels (gas, coal, nuclear and renewables) which will affect the overall emissions factor for electricity.

Choosing the correct emissions factor:

Defra guidelines state that you should use the emissions factor which corresponds to your reporting year. If you report on non-calendar years then you should choose the emissions factor for the year in which the majority of the reporting months fall. For example:

- If your reporting year is January-December 2014, your emissions factors should relate to 2014
- If your reporting year is April 2014-March 2015, your emissions factors should relate to 2014
- If your reporting year is September 2014-August 2015, your emissions factors should relate to 2015

CALCULATING EMISSIONS – ELECTRICITY EMISSIONS FACTORS

Below we can see the UK electricity factors for the last 4 years from DEFRA.

As more renewable energy comes online (like it did in 2013) the national average UK electricity emissions factors reduces. If more coal was required in a year (as it was in 2014), then it will increase. This will affect your emissions total when you calculate.

Activity	Country	Unit	Year	kg CO ₂ e
Electricity generated	Electricity: UK	kWh	2012	0.46002

Activity	Country	Unit	Year	kg CO ₂ e
Electricity generated	Electricity: UK	kWh	2013	0.44548

Activity	Country	Unit	Year	kg CO ₂ e
Electricity generated	Electricity: UK	kWh	2014	0.49426

Activity	Country	Unit	Year	kg CO ₂ e
Electricity generated	Electricity: UK	kWh	2015	0.46213

CALCULATING EMISSIONS – FINAL WORD

Therefore, when you are calculating your emissions inventory that will consist of electricity, gas, and other fuels burnt. You will need to calculate each fuel used separately, then add them together at the end. For example:

Fuel	Total used	Emissions factor for 2015	Kg CO ₂	Scope
Electricity	10000 KWh	0.46213	4621.3	Scope 2
Gas (Heating)	25000 KWh	0.18445	4611.25	Scope 1
Petrol (company owned vehicles)	400 litres	2.29968	919.972	Scope 1

Our total carbon print will therefore be:

Scope 1 = 5531.22 kg CO₂

Scope 2 = 4621.3 kg CO₂

Total = 10,152.522 kg CO₂

SCOPE 3 EMISSIONS

You will have noticed that the previous total emissions calculation consists of just scope 1 and scope 2 (direct emissions, and purchased electricity). This is because these are your priority.

Scope 3 emissions are everything else that your business conducts through suppliers, investments, franchises, travel, energy used by your products from your customers and more. There is potential for the list to be unmanageable, and therefore we first concentrate on scope 1 and 2 emissions. When we are managing our direct emissions from within our own facilities correctly, we can then consider managing some of our scope 3 emissions.

The CCCA provide help and assistance in calculating and reporting on your carbon emissions and can provide carbon footprint reports on your behalf. Contact the team for more information.

You can also try using our CCCA Carbon Tracker to track carbon emissions from different sources. Contact the team for more information.

SCOPE 3 EMISSIONS

It will be up to you which out of 15 categories of scope 3 emissions that you calculate. It may involve 'business travel' or may involve the 'use of your sold products'. These are the categories, and as you can assume, it may require significant work. Therefore a thorough assessment will be required from the company as to the materiality of these categories prior to taking the decision to measure.

Upstream scope 3 emissions

1. Purchased goods and services
2. Capital goods
3. Fuel- and energy-related activities (not included in scope 1 or scope 2)
4. Upstream transportation and distribution
5. Waste generated in operations
6. Business travel
7. Employee commuting
8. Upstream leased assets

Downstream scope 3 emissions

9. Downstream transportation and distribution
10. Processing of sold products
11. Use of sold products
12. End-of-life treatment of sold products
13. Downstream leased assets
14. Franchises
15. Investments



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For further information and to work out the business case for implementing any of these methods for improving air quality and reducing emissions, please contact the Alliance: