

# BIC Sustainability 101 Guides

*BIC Sustainability 101 Guides are a series of short, introductory level, papers on sustainability topics of interest to BIC Members.*

*If there is a topic you would like to see as a BIC Sustainability 101 Guide, please contact [info@bic.org.uk](mailto:info@bic.org.uk)*

## Guide 3 - Scopes 1, 2 and 3

The third in our series, Guide 3 looks at what is meant by "Scopes 1, 2 and 3", how to start calculating them, and how to improve them.

These terms are often used in conversations and documents but what do they actually mean and how is this relevant to an organisation. They are used in conjunction with measuring an organisation's carbon footprint. Why do we need to measure an organisation's carbon footprint/emissions? This is done for a number of reasons, one of which is to give an organisation a starting point/baseline and an understanding of their effect upon the environment. It is only when a baseline is established, for a particular year of emissions along with an understanding of where they are being generated that an organisation can create a reduction plan.

### Definition of terms

In the simplest of terms Scopes 1, 2 and 3 are a way of breaking down and grouping areas of an organisation's business activities into measurable areas for assessing its carbon footprint.

[The Green House Gas \(GHG\) Protocol Corporate Standard](#) classifies an organisation's GHG emissions into three scopes as follows: Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions (not included in Scope 2) that occur in the value chain of the reporting organisation, including both upstream and downstream emissions. According to the GHG Protocol, the main idea behind this categorisation is to "help delineate direct and indirect emission sources".

Scope 1 emissions cover such things as burning fossil fuels to heat an organisation's building and its company cars. They also cover fugitive emissions that escape from an organisation's equipment such as refrigerators and cooling systems. As an organisation has direct control over these emissions, it can make decisions on what they want to change. This could be to move towards electric vehicles or changing the fuel that it uses to heat the building.

Scope 2 emissions cover emissions that are generated indirectly to provide electricity to an organisation. In this case an organisation has control over the volume of electricity they consume and whether they generate their own electricity from renewable sources or who they buy their electricity from, and can therefore change supplier if they want, to one that generates electricity from renewable energy sources.

Scope 3 emissions are all indirect emissions (not included in Scope 2) that occur in the value chain of the reporting organisation, including both upstream and downstream emissions. In this case it is much harder for an organisation to reduce these emissions as they have to influence their supply chain partners to make the change. The GHG Protocol divides Scope 3 emissions into upstream and downstream emissions and classifies them into 15 categories. Upstream emissions encompass the indirect greenhouse gas emissions within a company's value chain related to purchased or acquired goods (tangible products) and services (intangible products) and generated from cradle to gate (the point the goods or services reach the organisation). While Downstream emissions include the indirect greenhouse emissions within a company's value chain related to sold goods and services and emitted after they leave the company's ownership or control.

### How to start measuring the various scopes

Starting to measure these scopes may seem daunting when an organisation starts their journey. Perhaps the easiest way to begin is to break the task down into the three scopes and within each scope, smaller bite-sized pieces. There are a lot of organisations and carbon calculators that can help with this.

Start by creating a project plan and a process – what are you trying to achieve by measuring your emissions? Comply with regulations? To meet customer reporting requirements? To set targets? To reduce emissions? How frequently do you need to report? What framework are you going to use? This should define how you approach measuring your emissions, which guidelines, and standards you should follow, how much detail you need to reach and the way you engage with different stakeholders in the measurement process.

As an example, if you are trying to set targets through the [Science Based Targets initiative \(SBTi\)](#), they follow specific rules for measuring greenhouse gas emissions compared to other frameworks. If you are trying to meet regulatory requirements, these regulations might have different disclosure requirements or if you are looking at potential co-benefits such as saving energy costs or paper, you may want to look at how to integrate your measurement processes with existing performance metrics. Also consider if there is any specific sector guidance you can follow or similar companies like publishers, printers, and distributors up and down the book industry supply chain who have already measured emissions. Understanding your individual objectives whilst bearing in mind the objective importance of accurately measuring your emissions to reflect your impact on climate change should help to model your measurement process. Depending on these aims, you may wish to engage an external partner along this journey. Nonetheless, there are some general guidelines and rules of thumb to apply with a degree of judgement:

Measuring emissions across all scopes follows a simple equation – you need to multiply a unit of activity such as KWh, by an ‘emissions factor’ expressing the quantity of emissions released from that unit of activity. The more specific the unit of activity and the emissions factor the better, however which data you use needs to be considered based on your objectives.

### **For Scopes 1 and 2, which typically should be relatively easier to measure than Scope 3**

Based on the definitions above, consider the likely sources of emissions within each scope. For Scope 1, this will most likely be your heating fuel and for Scope 2, the amount of purchased electricity, both of which may be readily available from purchasing data. If you are in a shared building, you may need to explore ways to allocate the energy use for the building to your company. From there, you can find relevant emissions factors for the sources of energy. For example, The UK government publishes emissions factors here: [Government conversion factors for company reporting of greenhouse gas emissions - GOV.UK](#). For the location-based method in Scope 2, you can use the grid average and for the market-based method, consider the type of tariff you are purchasing and a suitable factor for this purchase. Consult other sources and find the most relevant emissions factor for each activity within each scope, and apply these to your activity data accordingly.

### **Scope 3, follows a similar pattern whilst the measurement is normally more complex**

Scope 3 is split into 15 different categories, start by reviewing these categories using the directory below and determining which categories are applicable to company. Then, look at your organisation's activities in each category and what activity and emissions factor data is available in each. Typically, the emissions released in the production of purchased goods are the highest impact area, measurement may involve engaging with your suppliers to obtain usage data or asking them if they are measuring emissions, and if not using secondary average figures such as those published by the UK government (if you are a UK based organisation). You should aim for a complete measurement of Scope 3; however varying levels of data may be immediately available so you should take a considered view against your objectives and likely significance of each source of emissions.

When reporting your organisation's emissions, it is important to be transparent about your approach and the assumptions you will inevitably need to make. Stakeholders who view your emissions reporting may form a view on which areas would be worthwhile to develop and how to apply the emissions towards their objectives. You can then improve your measurement processes iteratively as you start to understand more and more and how you can effectively act on climate change.

## Examples of how you measure the scopes

The following have been provided by [CPI](#), as examples of what a calculation might look like for individual sources of emissions within the three scopes. When calculating scopes 1, 2 and 3 emissions, all potential sources of emissions should be considered following the Greenhouse Gas Protocol Corporate Standard or other relevant framework/guidance.

### Scope 1

Scope 1 - example - using ghg conversion factors 2024 from gov.uk						
Conversion factor for gas (mains gas supplied in the UK)						
Activity	Fuel	Unit	kg CO <sub>2</sub> e	kg CO <sub>2</sub> e of CO <sub>2</sub> per unit	kg CO <sub>2</sub> e of CH <sub>4</sub> per unit	kg CO <sub>2</sub> e of N <sub>2</sub> O per unit
	Natural gas	tonnes	2568.16441	2563.12000	3.85280	1.19161
		cubic metres	2.04542	2.04140	0.00307	0.00095
		kWh (Net CV)	0.20264	0.20223	0.00031	0.00010
		kWh (Gross CV)	<b>0.18290</b>	0.18253	0.00028	0.00009
Gas kwh from bills or supplier portal		1900 kwh				
Conversion factor Gross CV kwh		0.1829				
Calculation		1900x0.1829				
Kg Co2e		347.51				

### Scope 2

Scope 2 - example - using ghg conversion factors 2024 from gov.uk							
Electricity kwh from bills or supplier portal							
Activity	Country	Unit	Year	kg CO <sub>2</sub> e	kg CO <sub>2</sub> e of CO <sub>2</sub> per unit	kg CO <sub>2</sub> e of CH <sub>4</sub> per unit	kg CO <sub>2</sub> e of N <sub>2</sub> O per unit
Electricity generated	Electricity: U	kWh	2024	<b>0.20705</b>	0.20493	0.00090	0.00122
Electricity kwh from bills or supplier portal		240000 kwh					
Conversion factor Gross CV kwh		0.20705					
Calculation		240000x0.20705					
Kg Co2e		49692					

### Scope 3

Scope 3 - example - using ghg conversion factors 2024 from gov.uk							
Electricity kwh from bills or supplier portal							
Activity	Type	Unit	Year	kg CO <sub>2</sub> e	kg CO <sub>2</sub> e of CO <sub>2</sub> per unit	kg CO <sub>2</sub> e of CH <sub>4</sub> per unit	kg CO <sub>2</sub> e of N <sub>2</sub> O per unit
Distribution - district heat & steam	5% loss	kWh	2024	<b>0.00946</b>	0.00936	0.00007	0.00003
Electricity kwh from bills or supplier portal		240000 kwh					
Conversion factor Gross CV kwh		0.00946					
Calculation		240000x0.00946					
Kg Co2e		2270.4					

  

Scope 3 - example - using paper suppliers carbon footprint for paper production						
Tonnes of paper used from printer						
Activity	Mill	Unit	Year	kg CO <sub>2</sub> e per tonne of paper produced		
Paper tonnage for text paper	Mill name	tonne	2024	<b>681.00000</b>		
Tonnes of paper used from printer data		179 tonne				
Conversion factor from mill per tonne		681				
Calculation		179x681				
Kg Co2e		121899				

Totals of these three examples:

Total Scope 1	347.51	
Total Scope 2	49692	
Total Scope 3	124169.4	
Total	174208.91	Co2e kg
Total	174.20891	Co2e tonne

It should be noted by the reader that this is only an example for the purposes of this document. The actual reality of an organisation's calculation will vary from this as not all possible sources of emissions have included.

### Site policies:

By "site" this guide means office, factory or warehouse or any other building the organisation conducts business in. Once an organisation has a baseline measure of its carbon footprint in the three scopes, it can then start to

consider its policies with regards to a reduction strategy. Has the organisation thought about what policies it might like to put into place, have employees been encouraged to put forward ideas? There is an opportunity to consider this as a collaborative exercise to help build a comprehensive and inclusive policy.

An area not often mentioned can be the potential conflict between what an organisation is trying to do with its sustainability journey and carbon reduction policies and what its customers would like the organisation to focus on. This type of conflict can create internal pressures in trying to decide what is the best way forward, especially as some of the pressure might come from the regulations that organisations have to respond to. These new regulations can conflict with the requirements of customers, a possible "decision tightrope" for an organisation to walk.

What follows are some examples/suggestions of site policies for consideration:

### **Public transport**

Does your organisation have a policy on public transport? Is there an advantage for employees to use public transport. Is there an opportunity for employees to connect with public transport easily or can an organisation make changes to enable this?

### **Single use plastics**

Single use plastics are bought, used once and then disposed of. There is an opportunity for an organisation to reduce its carbon footprint within the scopes by moving to a circular economy of reusing items. It would reduce the amount of waste plastic either going to landfill or being recycled (depending upon the plastic) and recycling capabilities of the organisation. To begin with an audit should be undertaken to see what single use plastics are being used by an organisation in its offices and factories. This audit will determine what changes can be made.

For example, in a larger organisation this might be changing how things are done in its canteen and the kitchen spaces around the premises, such as offering employees the chance to buy and use reusable cups. Removing plastic cutlery and replacing it either with metal or wooden alternatives. Supplying any kitchen areas with dishwashers to enable the use of washable crockery. These relatively simple changes can also be adopted by smaller organisations depending upon their various set-ups.

This process can also be extended to any packaging materials used by the organisation. Are there cost efficient alternatives that could be used? Would a survey of customers help the organisation understand if changing the packaging and a slight increase in the price of goods is acceptable.

Changes in packaging can be seen across our daily lives with supermarkets using more paper packaging for dry goods. The same can be said with online shopping and goods arriving in paper bags rather than oversized boxes.

### **Power use**

Typically, one of the key sources of emissions within Scopes 1 and 2 is from electricity use, such as for running printing machinery, warehousing systems, lighting, air conditioning units or charging electric vehicles. Part of a strategy to reduce the impact could be to look at the type of energy your organisation is purchasing - is it on a renewable energy tariff? If so, how is the supplier purchasing the renewable energy? Another part of your site policy for power use should look at how to reduce the amount of electricity your organisation/site consumes.

This can range from low resource quick-wins to more substantial behavioural change programmes and technological investments. Mapping out the probable impact of different actions against the ease of implementation can help chart a programme to reduce electricity use, building momentum along the way to align with your organisation's emissions target trajectories and meet compliance obligations. Look at your onsite equipment such as lighting and production machinery, are these turned off when not in use? Consider ways to manage control procedures through improving awareness around your site(s) and making physical changes to help facilitate. Think about ways to monitor that these changes are happening and track the impact on site electricity use by installing sub-meters (for example).

Other changes might require more upfront investment, such as switching lighting from fluorescent tubes to LEDs, or improving the insulation in buildings to reduce your organisation's overall energy demand. Such investments often may have short payback periods and help to mitigate exposure to energy price increases and fluctuations, alongside environmental and compliance benefits.

Whilst emissions from electricity use are bracketed under Scope 2, and are therefore 'your' emissions rather than those from the rest of the supply chain, you should consider the effect of decisions made across the full supply chain on your organisation's site(s) electricity use. For a printer (for instance), certain finishes or books selected for books by publishers will use more or less electricity in the application process. Different trim sizes can cause excess electricity use from further machine changeovers. You should therefore consider how you

can integrate energy usage in discussions with relevant stakeholders.

## Communicating site policies to employees

Any communication plan needs to be comprehensive to employees. It also has to be easy to enact and maintain. There is no point in making a change, such as removing takeaway cups and asking employees to bring in their own mugs if you do not provide them with a kitchen to be able to wash up, for example.

## Directory of information

[The Green House Gas \(GHG\) Protocol Corporate Standard](#)

[Climate Partner guide to Scopes 1, 2 and 3](#)

[Government conversion factors for company reporting of greenhouse gas emissions - GOV.UK](#)

[UK Business Climate Hub](#)

[UK Business Climate Hub – Financial help](#)

[Carbon Trust – better business guide to energy saving](#)

## Glossary

Acronym	Full name	Description	Source/further notes
	1.5°C	Science has made it clear that we must limit global temperature rise to 1.5°C above pre-industrial levels. We are currently at 1.1°C and are on track for 2.7°C according to the UNDP's Emissions Gap Report 2021. Every fraction of a degree matters. Wildfires, heavy flooding, intense heat, drought, and storms are becoming more frequent and devastating. Every bit of warming we avoid will reduce the climate risks we face. We need to keep global warming to 1.5°C to have a fighting chance of having a habitable and a thriving planet for all of us.	<a href="#">Net-Zero Jargon Buster - a guide to common terms - Science Based Targets</a>
	Carbon neutral	Although often used interchangeably with 'net-zero', the two are not the same. In general, when companies claim carbon neutrality, they are counterbalancing CO2 emissions with carbon offsets without necessarily having reduced emissions by an amount consistent with reaching net-zero at the global or sector level. This may conceal the need for deeper emissions reductions that are in line with what the science requires for the world to keep global warming to 1.5°C. Carbon neutrality claims also do not necessarily cover non-CO2 GHGs. The SBTi does not validate carbon neutrality claims.	<a href="#">Net-Zero Jargon Buster - a guide to common terms - Science Based Targets</a>
Acronym	Full name	Description	Source/further notes
	CarbonNeutral®	CarbonNeutral® mark indicates you have followed The CarbonNeutral Protocol, which is the global standard, managed for over 20 years, to deliver clear, credible, and transparent carbon neutral programs.	<a href="https://www.climateimpact.com/business-solutions/carbon-offsetting/">https://www.climateimpact.com/business-solutions/carbon-offsetting/</a>

Acronym	Full name	Description	Source/further notes
	Climate change adaptation	Policies and measures which make societies and companies more resilient to the impacts of climate change such as flooding and heatwaves.	<a href="#">List of Sustainability Definitions -CDP</a>
	Climate change mitigation	Policies and measures which aim to reduce greenhouse gases from companies and governments with the intention of lessening the global impacts of climate change, such as reducing the amount and intensity of fossil fuel burning.	<a href="#">List of Sustainability Definitions -CDP</a>
	Carbon footprint	A carbon footprint is the total amount of greenhouse gases (including carbon dioxide and methane) that are generated by our actions.	<a href="#">The Nature Conservancy</a>
GHGs	Greenhouse gases	Gases that absorb and trap heat (i.e. infrared radiation) from the Sun in the Earth's atmosphere. Includes the following gases that are covered by the UNFCCC/Kyoto Protocol: carbon dioxide (CO <sub>2</sub> ), methane (CH <sub>4</sub> ), nitrous oxide (N <sub>2</sub> O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF <sub>6</sub> ) and nitrogen trifluoride (NF <sub>3</sub> ). These gases are the direct cause of climate change. The term "GHGs" is often used interchangeably with "all UNFCCC/Kyoto GHGs," and these gases must be covered by targets set under the Net-Zero Standard. Water vapor is also a GHG but is not covered by the UNFCCC/Kyoto Protocol or GHG emissions targets because concentrations of this gas are self-limited by the atmosphere and thus not a direct cause of global warming.	<a href="#">Net-Zero Jargon Buster - a guide to common terms - Science Based Targets</a>
	Greenwashing	The practice of falsely promoting an organisation's environmental efforts, or spending more resources to promote the organisation as green than are spent to engage in environmentally sound practices	<a href="#">List of Sustainability Definitions -CDP</a>
	Location based method	A location-based method reflects the average emissions intensity of grids on which energy consumption occurs (using mostly grid-average emission factor data).	<a href="#">GHG Protocol Scope 2 Guidance</a>
	Market based method	A market-based method reflects emissions from electricity that companies have purposefully chosen (or their lack of choice). It derives emission factors from contractual instruments, which include any type of contract between two parties for the sale and purchase of energy bundled with attributes about the energy generation, or for unbundled attribute claims.	<a href="#">GHG Protocol Scope 2 Guidance</a>

Acronym	Full name	Description	Source/further notes
	Net-zero	A state of balance between anthropogenic emissions and anthropogenic removals. In most cases, it is important to specify either net-zero CO2 emissions or net-zero GHG emissions, which also includes non-CO2 GHGs. Net-zero GHG emissions must be achieved at the global level to stabilise temperature increase, and targets set using the Net-Zero Standard must cover all UNFCCC/Kyoto GHG emissions. The SBTi's Net-Zero Standard outlines what companies need to do to enable the global economy to achieve net-zero. The Standard makes clear that for corporate net-zero targets in line with keeping global warming to 1.5°C require rapid and deep emission reductions. Companies must take action to halve their emissions by around 2030. Likewise, long-term deep emissions cuts of at least 90% before 2050 are crucial for net-zero targets to align with science.	<a href="#">Net-Zero Jargon Buster - a guide to common terms - Science Based Targets</a>
	Paris Agreement	A legally binding international treaty on climate change, adopted at COP21 in Paris in 2015. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.	<a href="#">List of Sustainability Definitions - CDP</a>
	Scope 1	Direct GHG emissions occurring from sources that are owned or controlled by the organisation, for example, emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc. or emissions from chemical production in owned or controlled process equipment.	<a href="#">Net-Zero Jargon Buster - a guide to common terms - Science Based Targets</a>
	Scope 2	Emissions from purchased electricity, heat, and steam for use in business operations. Scope 2 emissions physically occur at the facility where electricity is generated, and so would fall into the Scope 1 category for the power generator.	<a href="#">Net-Zero Jargon Buster - a guide to common terms - Science Based Targets</a>
	Scope 3	Scope 3 is a reporting category that allows for the treatment of all other indirect emissions. Scope 3 emissions are a consequence of the activities of the organisation but occur from sources not owned or controlled by the organisation - typically as a result of supplier or customer activities. These can be up or down the value chain - for example, transport and distribution, or the disposal of goods or services after they reach the consumer. Some examples of Scope 3 activities are extraction and production of purchased materials; transportation of purchased fuels; and use of sold products and services.	<a href="#">Net-Zero Jargon Buster - a guide to common terms - Science Based Targets</a>

Acronym	Full name	Description	Source/further notes
SDGs	Sustainable Development Goals	17 social goals established by the United Nations Department of Economic and Social Affairs to promote prosperity while protecting the planet. The goals are: No poverty; zero hunger; good health and wellbeing; quality education; gender equality; clean water and sanitation; affordable and clean energy; decent work and economic growth; industry, innovation and infrastructure; reduced inequalities; sustainable cities and communities; responsible consumption and production; climate action; life below water; life on land; peace, justice and strong institutions; and partnerships for the goals	<a href="#">List of Sustainability Definitions - CDP</a>

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