

Environmental Checklist



2022

Understanding the typical environmental impacts of business, and how to measure and reduce them

Environmental Checklist

Carnstone supports large companies and NGOs with their sustainability strategies. As the focus on climate change intensifies, we are speaking with increasing numbers of small and mid-sized companies looking for our advice. As a useful first step, we have put together this short Environmental Checklist to help SMEs understand the typical environmental impacts of business, and how to measure and reduce them.

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Introduction

“Climate change” refers to long-term shifts in temperature and weather patterns and is one of the defining issues of our age. It is now an essential topic for all businesses:

- We see an increasing trend for **investors** to favour assets with positive environmental impact.
- **Regulators** are setting mandatory environmental disclosure guidelines to understand corporates’ environmental performances.
- **Employees**, especially the younger generation, are more willing to start their career in climate-positive companies.
- **Consumers** are switching to environmentally friendly products and Business-to-Business (B2B) customers are checking the climate change credentials of their suppliers.

Six greenhouse gases* (GHGs) are responsible for trapping heat inside the Earth’s atmosphere and warming the planet. All businesses need to consider their impact on the climate by understanding just how much of these gases they are responsible for emitting, either directly or indirectly (the ‘Carbon Footprint’).

There are three scopes of emissions that should be considered when you measure the carbon footprint of your business:

- **Scope 1:** direct GHG emissions (CO₂, CH₄ and/or N₂O) created when you use fossil fuels in company-owned facilities and equipment. Scope 1 may also include fugitive emissions from gases used in refrigeration and air conditioning (HFCs).
- **Scope 2:** indirect GHG emissions caused by those who supply you with energy, likely from electricity and heat/steam.
- **Scope 3:** all other indirect GHG emissions from the whole value chain; the materials you use, the investments you manage, your employees and customers using your products.

*CO₂, CH₄, N₂O, HFC, PECs, SF₆.

Of these, the most important for the majority of companies is CO₂, with CH₄ also particularly relevant in some sectors.

How do we measure GHG emissions? As this guide shows, it is possible to estimate or calculate emissions of GHGs. As Carbon Dioxide (CO₂) is the most abundant GHG in the atmosphere and the most important for many companies, all of the six GHGs are commonly bundled together and normalised into CO₂-equivalent (which is written CO₂e). CO₂e is usually measured and reported in metric tonnes. GHG emissions are usually expressed as annual figures (i.e. tonnes per year). The picture overleaf (taken from the UK Committee on Climate Change) shows that a typical UK household is responsible for around 8 tonnes of CO₂e per year, and that this is falling.

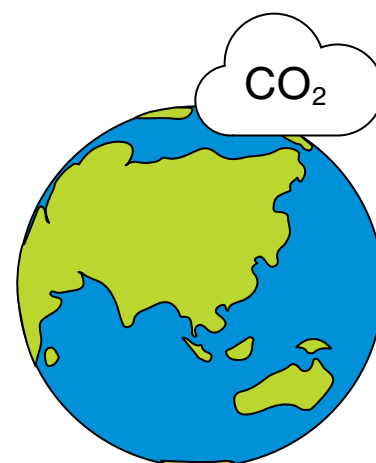


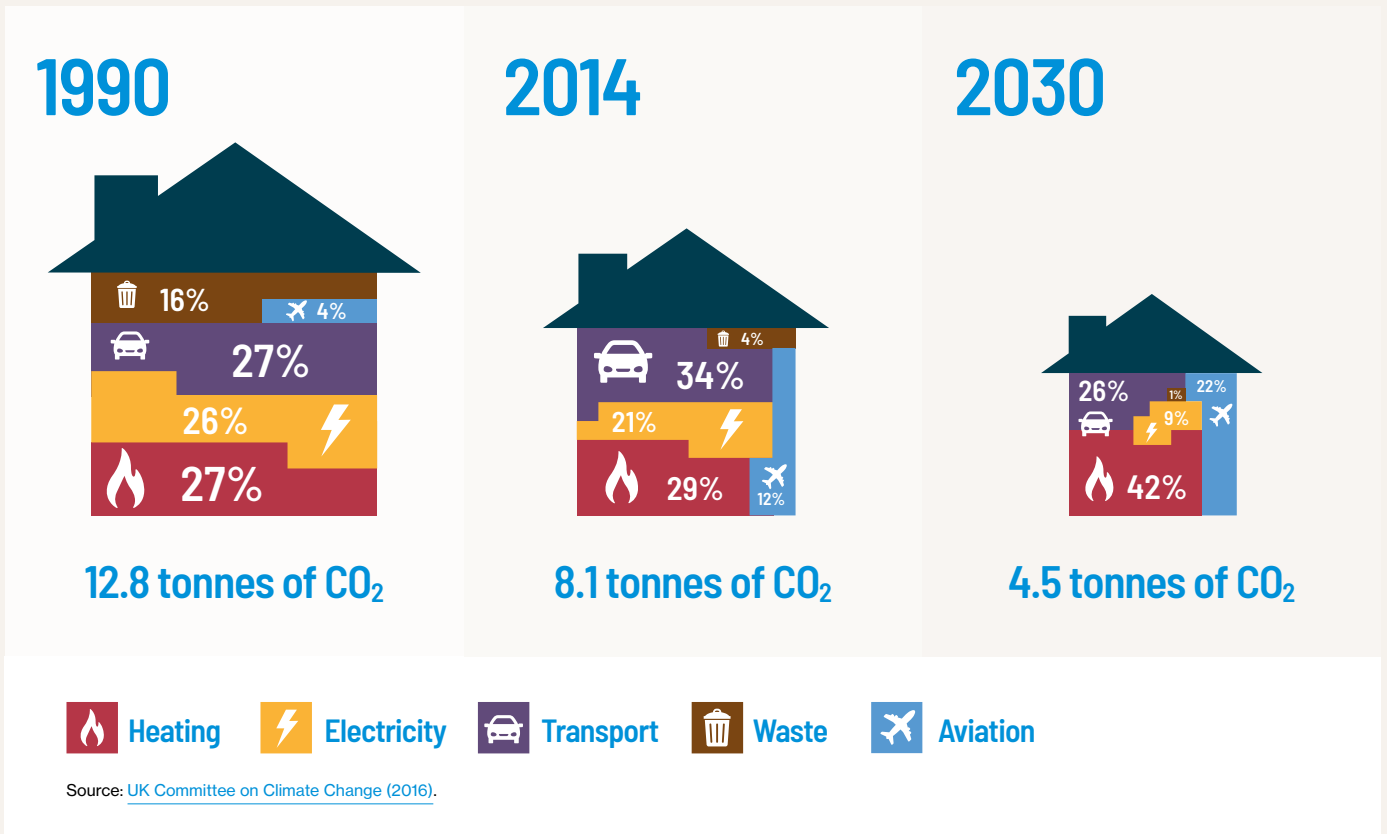
It's not just carbon

We’re focusing on climate change. Water and waste are two other environmental issues that businesses manage. Extracting water for human use can damage ecosystems. Producing solid waste uses up non-renewable resources and can cause pollution. Both water use and waste also play a small part in damaging the climate.

Every business should measure and do what they can to reduce water use, and avoid, reuse, or recycle as much waste as possible. When this is not possible, ensure waste is disposed of safely and legally.

6 greenhouse gases (GHGs) are responsible for warming the planet





What can I do in my business?

We suggest a simple three step process that every business can follow:

01

Start with the big numbers;

as the important first step you should figure out (by estimate) what your largest climate impacts are across Scopes 1, 2 and 3.

02

Look for quick wins;

there are some straightforward things you can do to reduce these emissions.

03

Set a long-term plan;

assign responsibilities for accurately measuring your emissions and continuing to reduce them.

01

Start with the big numbers

The discussion on climate change is easily diverted into certain totemic issues; plastic packaging, meat eating, air travel and so on. But for most companies, these aren't the big impacts. How can you estimate what those big impacts are likely to be?

tonnes of CO₂e typically emitted by the average car in a year

2-3

Direct impacts (Scopes 1 and 2)

Buildings: For most companies (apart from manufacturers) the biggest direct impacts will come from your buildings; the electricity and fuel you use to heat and light them. As a (very rough) rule of thumb this is likely to be:

- 1 tonne of CO₂e per employee per year in **offices** (more or less, depending on the efficiency and quality of your buildings).
- 5-6 tonnes of CO₂e for every 1,000 m² of **warehouse or distribution centre**, depending on heating requirements and warehouse type (based on a study of US warehouse emissions from [City, University of London](#)).
- For **factory space**, it strongly depends on what is being produced so we are not able to provide a rough estimate.

Process emissions: if you heat, chill, process or move materials inside your buildings there will be energy consumption and emissions associated. Ovens, chillers, conveyors, presses etc all use considerable amounts of energy. Very roughly it will be

- 1-2 tonnes of CO₂e per £1,000 spent on electricity or
- 6 tonnes of CO₂e per £1,000 spent on gas

(These figures approximately correct at March 2022 in the UK)

Your own vehicles: if you put fuel into vehicles which you own, these will lead to emissions that you should account for (unlike employees' own cars or vehicles run on your behalf by couriers etc, which are not part of your direct impact). A typical car driving 10,000 miles in a year emits 2-3 tonnes of CO₂e.



Indirect impacts (Scope 3)

The largest sources of indirect impacts are likely to be:

- Your **suppliers** of physical goods and services. It is possible to very roughly estimate the CO₂e emissions from your supply chain based on the amount of money you spend on certain types of supplier. This simple table is adapted from the UK government's [DEFRA table 13: Indirect emissions from the supply chain](#); it's a very approximate guide:

Least carbon intensive		Typical emissions for each £1,000 you spend
Low	Professional and clerical services – lawyers, accountants, web services, marketing etc	0.1 tonnes
	Transportation & distribution	
Medium	Textiles	0.7 tonnes
	IT equipment	
	Office furniture	
High	Light engineering or general manufacturing	1 tonne
	Industrial commodities – steel, aggregate, concrete etc	2.5 tonnes
Most carbon intensive		

NB If you are a manufacturing business, we recommend that you do this calculation much more accurately, engaging your key materials and ingredient suppliers into the project.

- Employee travel on business.** Driving, flying or taking the train on company business all lead to Carbon emissions. Most companies find they can access this data via their fuel-card system and/or expenses payments. Simple rules of thumb are:
 - 250 kg CO₂e for every 1,000 miles in a car
 - 15 kg for a long (400km) UK rail journey and 2 kg for a short one (50km)
 - 350 kg for a round trip flight in Europe
 - 2 tonnes for an economy class inter-continental round trip
 - 6 tonnes for a business class inter-continental round trip

20KG of Greenhouse Gas emissions produced per tonne of solid waste if that waste is recycled

- Employee travel to and from work.** You may also wish to estimate your employees' footprint as they travel to and from your offices for which you can use the same approximate factors. This category also includes employees who work from home or are remotely based.
- The **solid waste** resulting from your operations. Waste sent to landfill degrades and produces Greenhouse Gas emissions; roughly 400 kg for every tonne of waste you dispose of. If you recycle that waste, the figure falls to 20 kg per tonne!
- The **use of your product** (if it consumes energy or emits CO₂e). For many Business-to-Consumer (B2C) companies this can be a large figure and is often the most significant of your impacts. Reducing consumption in-use is almost always the biggest single improvement you can make. It is hard to give an estimator for this total, but it is safe to say that – if you make consumer products – looking at in-use emissions should certainly be in your long-term plan (see section 3).



02 Look for quick wins

Buy renewable electricity

The quickest thing to do, especially if you are based in the UK or another country where there is a deregulated electricity market, is buy renewable electricity to power your offices and equipment.

There are roughly three ways to buy renewable:

Least complicated

01 Changing to a **green tariff** with your current or new supplier. This should be backed up by Energy Attribute Certificates (EACs), also known as Renewable Energy Guarantees of Origin (REGOs) in Europe.

02 Enter into a **Power Purchase Agreement (PPA)** with a renewable electricity project developer. By signing a contract with a developer for a fixed term (e.g. 10 years) and fixed price, you make the project financially viable and therefore add directly to renewable generation capacity. There are different types of PPAs, including direct PPAs (where you are directly supplied with the generated electricity) and virtual PPAs (where the electricity goes to the grid and you receive the EACs). Note that you need a large annual energy load and good credit rating to make a PPA a viable option.

Most complicated

03 Invest in **on-site renewable** generation, e.g. solar panels on the roof or a windmill on-site. This requires upfront capital investment, but, depending on your situation could earn itself back in ~3 years (assuming typical business electricity rates and at the current price of renewables). This is also the most visible option; employees, customers and other visitors to your site can physically see your investment in a better climate.

Least impactful

Most impactful

Switch it off

There is a whole science behind **energy saving in your buildings** (see Section 3). Large amounts of energy can be wasted from appliances being left on when they are not in use. Your buildings may have Building Energy Management Systems (BEMS); if they do, check the timer settings and challenge yourself to save an hour's power a day. If you don't, make sure that it is crystal clear who turns off lights and HVAC systems at the end of the day. Don't worry too much about IT equipment; yes they do use energy in standby, but only a small amount. Do make sure that they are all in standby though...

If you manufacture physical products (either directly or indirectly through suppliers), you can often make **changes during the design stage** that can have a very significant impact on the energy (and therefore GHG emissions) required to produce them, and/or the energy consumption/GHG emissions during consumer use. For example, phones or laptops, which are made to last as long as possible on a single charge, are multiple times more energy-efficient than PC or TV screens which are designed to always be plugged in. While it is difficult to give specific guidance here as it depends on the product you make, often there is industry-specific information available about the environmental trade-off's of design decisions. For example, see the [Book Chain Project's Design Guide](#) for publishers.

The other business activity that you can readily reduce is **business travel**. The Covid-19 pandemic has already helped many business realise that most meetings for which people used to travel, can be conducted online. Most commentators expect that we will not return to "normal" in terms of the amount of business travel, and many companies have already amended travel policies. Policy instruments that can help you reduce emissions from business travel include:

- Mandate travel over land where possible for in-country travel and where high-speed international rail-links exist, and factor in higher cost and longer time spent for travel in budgets and planning.
- Introduce tests for any air travel being requested by employees to ascertain the necessity of the travel.
- Encourage employees to combine international air travel with personal holidays. While this won't reduce your business' carbon footprint, it can lead to a reduction in overall air travel.

The beautiful thing is that reducing energy consumption and business travel will not only reduce your carbon footprint, but also save you cash!

IT equipment does use energy in standby, but only a small amount

03 Set a long-term plan



CO₂e emissions for a long
(400km) UK rail journey and
2 kg for a short one (50km)

15KG

Make someone responsible

We suggest allocating responsibility (and accountability) to an individual or team within the company. For most SMEs this won't be anywhere near a full-time role, so you'll be able to combine it with an existing function. The individual should have;

- 01** The necessary technical and analytical skills to get to grips with this agenda (a good test: can they make the estimates we suggest in Step 1?).
- 02** A good understanding of your business and how it works.
- 03** The confidence of senior management when they make recommendations.

The individual can be someone from production, operations or another function. They should regularly report to the leadership team on progress against targets and have internal resources available (support from other functions, a small budget for investments).

Turn your estimates into calculations

The ready reckoners above are based on a much more comprehensive set of conversion factors from the UK environment department, DEFRA. However, these were last updated in 2014, and have recently been decommissioned by the UK Government. They also lump entire industries together, for example "marketing and advertising services" – which could include printed advertisements, but also digital ads that lead to very little CO₂e emissions. They also do not take into account the specific suppliers you are working with and the actions they may already have taken to become more environmentally friendly.

As you get going on your journey, you will want to firm up your estimates by collecting accurate activity data and making more careful conversions:

	Measure and convert using DEFRA conversion factors
Buildings	Electricity used per year (kWh)	DEFRA: UK Electricity
	Gas used per year (kWh)	DEFRA: Fuels
	Heating oil used per year (kWh)	DEFRA: Fuel
	Losses of refrigerant gas ask your air-conditioning maintenance company, commonly 'kg')	DEFRA: Refrigerant
Process emissions	Electricity used per year (kWh)	DEFRA: UK Electricity
	Gas used per year (kWh)	DEFRA: Fuels
Your own vehicles	Diesel and petrol used per year (l)	DEFRA: Fuels
Suppliers	Expenditure in different categories	DEFRA: Table 13
Employee travel – business	km driven in different vehicle types	DEFRA: Business travel – land
	Flights taken; destination and class	DEFRA: Business travel – air
	km travelled by train	DEFRA: Business travel – land
	Taxi trips	DEFRA: Business travel – land
Employee travel – commuting	Numbers of employees	Simple mathematical model using factors from DEFRA: Business travel – land
	Average distance travelled	
	Transport mode	
	Travel pattern (days)	
Waste	Waste produced by type (tonnes)	DEFRA: Waste disposal
	Waste recycled (% or tonnes)	
In-use product emissions	Product energy consumption (W)	Simple mathematical model using factors from DEFRA: UK Electricity
	Usage patterns	
Other	Read the Scope 3 Categories in the technical guidance and consider if any of the others are material for your business. Consider possible franchises, investments or other ways that customers might use and dispose of your products	

Make sure to always use the latest set of DEFRA conversion factors, and use the CO₂e figure, which is normally the left most column in the table.

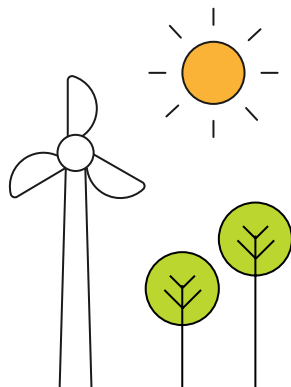
Engage with your suppliers

Engaging with your key suppliers should be an integral part of your long-term plan. You can identify key suppliers by spend, or expected emissions (e.g. if you're buying a commodity that you expect requires a lot of energy to produce, even if this does not make your highest spend shortlist).

Once you have a list of your key suppliers, you'll need to set up a plan to engage with them. A good place to start is to explain your own approach and the actions you have already taken to reduce your carbon footprint. Then, ask the supplier what they have done so far to reduce their impacts – giving them the chance to own their story. Then, there will probably be some questions you want to ask to get a clearer picture.

For example:

- Do you measure your carbon footprint? Have you set targets to reduce it?
- Have you explored purchasing renewable electricity? If they are already sourcing renewable electricity, can they share the EACs to support this (if it's not on-site renewable generation)?
- What have you done so far to become more energy efficient? Where do you still see opportunities to become even more efficient?
- For physical products, how are you transporting your products after they leave your site? Have you explored more environmentally friendly options? Have you engaged on this with the transportation providers?
- Ask your suppliers if they have any relevant certifications. There are various certification schemes that suppliers might mention to demonstrate their environmental credentials. For example, ISO14001 means they have a certified Energy Management System (EMS), which should be enabling them to measure energy use accurately and take action to reduce energy use where possible. FSC and/or PEFC mean any wood-based products are from responsibly managed forests. And there are many others...



the global warming limit widely considered the 'safe' level

1.5°C



Set a public target

Committing to a specific target helps give your efforts external credibility, commits the business to achieve a certain outcome, and allows you to report clearly on your progress. Increasingly, investors, customers, and regulators all want to know about a company's targets and commitments.

For best practice, look to the [Science-Based Targets initiative](#) (SBTi); a coalition of respected environmental NGOs which validate corporate climate targets that are in line with what the latest climate science says the world needs to do to limit global warming below 1.5°C, which is widely considered the "safe" level of global warming. The SBTi has a [streamlined route for SMEs](#), which has simpler requirements than those for large companies.

Below are some examples of climate targets.

Actions	Targets
Reduce own emissions	By 2027, we will reduce our Scope 1 and Scope 2 (market-based) GHG emissions by 25% from a 2022 baseline.
Reduce value chain emissions	By 2030, the total value chain GHG emissions will be reduced by 30% compared to the 2020 baseline
Switch to renewable energy	By 2025, 50% of our electricity consumption will come from renewable sources
Sustainable waste disposal	By 2025, we will reuse or recycle 100% of our waste.
Use more sustainable materials	By 2030, our paper will be 100% FSC or PEFC certified.

Conclusion

Understanding and doing something about your environmental impacts can feel like a daunting task. It's a technical yet fast-moving area, and there's a fair share of conventional wisdom. By breaking it up into separate steps (measure > find short-term quick wins > set up a long-term plan) you can make it manageable. Don't get lost in trying to measure every indicator to two decimal-places; often too much time is spent on measurement, which doesn't actually reduce any emissions! Rather, take an intelligent approach to identify the likely largest impacts based on your understanding of the business, and use reasonable assumptions and proxies to estimate the size. You can increase the accuracy of your measurement and robustness of your calculations over time.

Finally, remember you are not alone. We are all in the same boat; the entirety of business – and humanity – will have to play its part if we are to reverse the negative impact we are having on the planet. Make sure to talk to your peers, exchange ideas, partner with your suppliers, and bring in colleagues from across the business. And, if you ever get stuck, please feel free to reach out to us or another consultancy; there is plenty of help out there.

Other useful sources

SME Carbon Footprint Calculator

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

GHG Protocol

<https://ghgprotocol.org/>

SBTi website

<https://sciencebasedtargets.org/>

GRI website

<https://www.globalreporting.org/>

SASB website

<https://www.sasb.org/>

CDSB website

<https://www.cdsb.net/>



Appendix: Sector guidance, Publishing

Although, general principles such as the three scopes of emissions apply to all sectors when we estimate environmental impact and carbon footprint, each sector is unique in its own way. This section provides some more specific guidance for publishing.

We expect both Scope 1 and 2 emissions to be a fairly small share of publishers' total value chain emissions. This is not dissimilar to other consumer-facing companies! Often, the biggest source of GHG emissions for publishers is related to paper – this often represents 50-80% of the total carbon footprint across Scopes 1-3. This is mainly due to high energy use in the pulping process. Mechanical pulping requires heat, which is often generated by fossil fuels and difficult to electrify. Most of the rest usually stems from emissions at print sites.

We suggest asking the paper manufacturers you purchase from about the GHG intensity of their paper. There are standardised reporting methods such as Paper Profile that can help you understand and compare manufacturers. Another handy source is the Transition Pathway Initiative's Paper Pathways. This investor initiative has calculated the carbon intensity of paper that needs to be achieved between 2020 and 2050 to limit global warming below 2°C – the goal enshrined in the Paris Agreement – and has gathered data on how paper manufacturers are currently performing against those pathways and whether their targets are sufficiently ambitious. Here are some GHG intensity figures you can use to estimate your carbon footprint from paper products:

- 0.73 kg of CO₂e per kg paper/pulp produced (based on average carbon intensity of 10 mills from the Book Chain Project database in year 2021).
- 2.71 kg of CO₂e per paperback book produced (based on a study that takes the average carbon intensity of 400,000 books mostly distributed in North America).

As digital products grow in market share, the IT infrastructure to host and deliver these products to end consumers plays an increasing role. Data centres are energy intensive due to energy costs for running the servers as well as cooling. That said, some of the main data centre providers – for example Google and Amazon – have ambitious climate targets of their own or are already running on 100% renewable energy. Therefore, it is a good idea to engage with your hosting provider to understand their current performance and commitments to improve, if digital is an important or growing revenue source.

carbon footprint across Scopes 1-3 related to paper, often, the biggest source of GHG emissions for publishers

50-80%



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