HOW TO

CALCULATE
EMISSIONS

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FIRST THING'S FIRST
Get to know the jargon

Before you start measuring your emissions, you'll need to know a few definitions:

Scope 1, 2, and 3 emissions

Scope 1
Your 'direct' greenhouse gas emissions from sources that your company directly owns or controls. These are emissions from burning fuels in boilers and furnaces you own or control; petrol burned in company vehicles; and emissions from chemical production in owned or controlled process equipment.

Scope 2
Scope 2 are emissions from the electricity your company purchases from an energy supplier. As these emissions come from an electricity generator or energy supplier burning fuels on your behalf, these are known as 'indirect' emissions.

Scope 3
Scope 3 is all other emissions from the activities that are necessary for your business to run – i.e. emissions from your supply chain and customers using your products or services.

As these activities are outside your direct control, they are also known as 'indirect' emissions. Some examples of scope 3 activities are the extraction and production of purchased materials; transportation of goods; the use of data centres; employees working from home; and the use of your products and services. Scope 3 is likely to make up the majority of your carbon footprint.

Activity data

Activity data is a level of activity that results in GHG emissions, and may be measured in litres of fuel, kWh of electricity, or kg of material purchased.

Emissions factors

Emissions factors – also called 'conversion factors' – are numbers that convert activity data into GHG emissions data. You can find almost all the emissions factors for the UK on the UK Government website, but we've also made a basic list for you.

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Get to know the jargon

Activity-based and spend-based calculation methods

There are two different ways you can calculate your emissions. 'Activity-based' is where you use your specific activity data and multiply it by the emissions factors associated with that activity.

The 'spend-based' method simply takes how much you've spent on products and services, and multiplies it by the related emissions factor. This will give you the amount of emissions per financial unit, and result in an estimate of your actual footprint. Where possible we recommend using the location-based method.

Normative defines it like this: "The spend-based method takes the financial value of a purchased good or service and multiplies it by an emission factor – the amount of emissions produced per financial unit – resulting in an estimate of the emissions produced."

Location-based and market-based calculation methods

To calculate emissions from energy usage (scope 2 emissions), you need to use the location-based method and the market-based method.

The location-based method uses the average emissions factor for the grid that you take your energy from, and takes into account all the different fuels that go into that grid. So, if you're using electricity from the UK grid, there will be emissions associated with the amount of coal and gas used to generate the UK's electricity.

The market-based method reflects the choices your company has (or hasn't) made, for example choosing a renewable energy tariff. So, if your business is on a renewable energy tariff, your emissions from electricity use will be 0, as you've chosen to spend your money on renewable sources (you can read more about how this works on our blog.)

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STEP 2
Define your boundary

The 'boundary' of your organisation defines what's included in your calculations, and what isn't. It can be defined in terms of:

Legal boundaries, such as the legal entities you have control over.

Physical boundaries, such as the number of sites, subsidiaries, and international offices within your business.

Your boundary must:

Cover a 12-month period
You should use the same 12-month period each year. For example, if you calculated your baseline emissions using data from March 2019 to March 2020, the next year you'll measure emissions from March 2020 to March 2021, etc.

Cover all activities directly related to your business, and that are essential to its functioning
This includes all activities performed by your suppliers and your customers, such as transportation, production processes, and the use of your product.

Fairly represent the total GHG emissions of your business
You shouldn't exclude a certain part of your business because it's tricky to calculate the emissions or it's a heavy emitter. If you do, must justify why.

Include all entities related to and controlled by your business
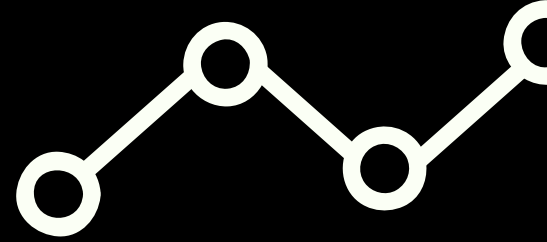
STEP 3
Gather your data

You'll need to gather all relevant activity data from the last 12 months (or whichever 12 month period you're calculating. If this is the first time you're measuring and reporting emissions, you must use the most recent year as your baseline.)

Below is a list of the necessary data you'll need to gather, along with some recommended data. This is not a comprehensive list – you can get much more detailed if you want to!

Scope 1
- Amount of fuel consumed in the boilers, furnaces and turbines owned by your company (in kWh or m3)
- Amount and type of fuel consumed by your generator, trucks, trains, ships, aeroplanes and cars (in litres)
- Emissions released in manufacturing processes
- Amount and type of refrigerant used in company-owned/controlled air conditioning (in kg)
- Estimated leakage of refrigerant, methane, and other gases (kg)

Scope 2
- How much electricity you've used in your offices/sites (kWh)

Scope 3
Office commodities
- Paper (tonnes)
- Stationery
- Furniture
- Uniforms/swag
- Tea and Coffee (tonnes)
- Milk
- Snacks

IT
- PC/Laptops
- Monitors
- Phones
- Internet Usage
- Data Centre Usage
- Website usage

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Gather your data

Services
- Subcontracting
- Professional services, such as consultants, lawyers, etc.
- Emissions from the production of your physical products
- Water usage (litres)

Business travel
- All transportation by air, public transport, rented/leased vehicle and taxi (km)
- Hotel accommodation associated with business travel (room per night)
- Data from events / conferences such as transport to/from, energy use at the venue, and catering

Employee commuting
- Method of transport to/from the office (km)

Waste
- Recycled waste by category – glass, plastic, paper, etc. – (in tonnes)
- Waste to landfill or to incineration (in tonnes.)

If you don't know where your waste goes or if it's recycled, assume it goes to landfill!

Transport of goods (distance)
- Third party transportation and storage of service-related goods
- Third party transportation and storage of sold products
- Deliveries of packages to your business
- Third-party transportation and distribution services and products to the end user

Use of your products
- Energy use associated with the use of sold services and products (kWh)
- End-of-life treatment of sold services – how your products are disposed of at the end of their life
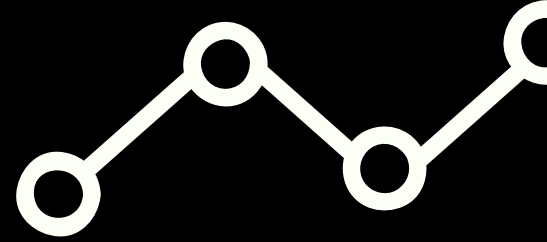- Transport/treatment of waste products

Investments
- Amount you hold in investment funds, including those you indirectly hold through your choice of bank

Upstream leased assets
- Fuel used or km travelled in leased vehicles
- Leased equipment
- Leased office space (m2)

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Gather your data

How to get this data
This may be the hardest part of the journey. It will involve reaching out to different teams within your organisation and from external suppliers and stakeholders.

Key recommendations:
- For each of the above areas, list out the team or person you think will be able to help provide the information, and approach them with a list of the data you require, rather than asking them several times for multiple things!

- Ask your suppliers whether they calculate their emissions, and if they have emissions data for the specific product or service they provide. Here's an email template to help you do this.

- Ask your employees to fill in details of their commute in a Google form or other survey tool. Allow them to select the methods they use to travel to/from the office, how far they travel, and how many days a week.

- If you can't find primary or detailed data for some areas, make a note of these areas, make it clear in your reporting that you instead used averages or secondary data for them. Make a plan for how you might improve this data next year!

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STEP 4
Calculate!

Calculating scope 1 and 2 is pretty straightforward. For each aspect of scope 1 that applies to your business, multiply it by the relevant emissions factor. Add all of these together and you have your scope 1 footprint! Do the same for your energy use and you have your scope 2 footprint.

Scope 3
When you have activity data for each aspect of scope 3, find the emissions factor for each aspect and multiply the activity data by the emissions factor. Again, if you haven't got the exact data in tonnes, kms, or litres, you can look at how much you've spent in each area and multiply this amount by the emissions factor.

Add together the emissions of each of the various subsections, such as 'business travel', 'waste', and 'employee commute'. This will help you identify which areas are responsible for the bulk of your emissions.

You can then of course add each of the subsection totals together to get your overall scope 3 footprint.

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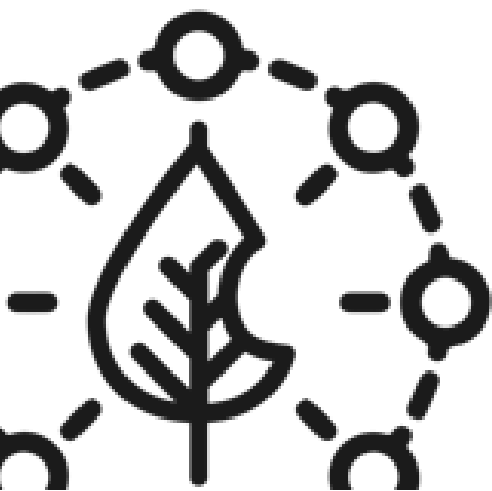
FAQs

How do I measure emissions from...
..employee commuting?
..employees WFH?
..shared office spaces?
..our use of data centres?
..the laptops we buy and use?
..upstream transportation and distribution?
..downstream transportation and distribution?
..waste?
..investments?

Do I have to report all emissions? What if they're a really small part of our footprint?

How do I measure emissions from employee commuting?
The best way to gather this information is by carrying out an employee transport survey that asks where they travel from, or the distance travelled to work, and the methods of transport they use to get to work.

You can then multiply the average distance travelled by your employees by the number of journeys made, and multiply this by the different emissions factors depending on commuting method (train, subway, car, etc).

Transport method emissions factor x Number of journeys x Average distance

If your employees cycle or walk, their emissions are 0!

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FAQs

How do I measure emissions from employees WFH?
You must measure and report the energy consumption associated with employees working from home. With increased numbers of people working from home, this can understandably lead to confusion when it comes to calculating and reducing emissions, due to the lack of control employers have over certain working locations. But there are benefits from remote working, such as reduced commuting and travel.

We recommend sending a survey to your employees to ask them a) the city or region where they live, and b) how many days a week they work from home. Then, you can take the following averages:

2.47 kWh electricity per person per day
8.91 kWh natural gas per person per day

...and multiply them by the emissions factors for their region.

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FAQs

How do I measure emissions from shared office spaces?
If you use a shared workspace, the emissions associated with your business will be a percentage of those used by the whole workspace.

Whether you hot desk, or rent three floors, to calculate the emissions associated with your energy use you need to know the energy use associated with the whole building and divide by the proportion for which you are responsible: either a square metre fraction for fixed office space, or per employee per day for hotdesking.

You can ask the landlord or building manager for total electricity use. Some spaces, such as WeWork, will be able to provide energy use per desk or area.

If the electricity bill for the building as a whole is unattainable, or your business is provided with a single service bill that combines rent and utilities, you can use the UK government's tool to calculate the estimated carbon footprint of a building based on its energy certificate. It can also provide annual CO2e per metre squared.

If the size of your space is not clear, the benchmark to use is:

Basic: 10m2 / employee
Comfort: 15m2 / employee
Luxury: 20m2 / employee

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FAQs

How do I measure emissions from our use of data centres?
Data centres based in the UK use about 38 TWh of electricity, roughly 10% of the total UK electricity consumption.

As a tech business, you'll likely rent a space for servers in a data centre, so your data will be responsible for a certain percentage of this centre's consumption.

The three major cloud providers all have free tools you can use to measure your cloud-based emissions:
Microsoft's Emissions Impact Dashboard
Google's Carbon Footprint calculator
AWS' Customer Carbon Footprint tool

If you want to try and measure your data centre emissions yourself, the accuracy of your measurement will depend on the provider's billing method. Some centres use metered power billing, which means you'll be able to see how much electricity your servers used. You can then multiply the electricity used (in kWh) by the electricity emissions factor where your data centre is located.

Read more about how to measure your Cloud carbon footprint, and see how much carbon is generated by your website, you can use free tools such as Website Carbon Calculator.

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FAQs

How do I measure emissions from the laptops we buy and use?
You can find specific emissions data for Apple products and Dell products.

For other manufacturers, you can calculate an average based on how many laptops you purchased, and the emissions factor for the laptop.

As an estimate, the emissions factor for laptops is 329 kg CO2e per laptop. If you purchased 10 laptops:

10 x 329 = 3,290 kg CO2e, or 3.29 tCO2e

How do I measure emissions from upstream transportation and distribution?
This can be calculated by multiplying the average distance of deliveries made to your office or warehouse(s) by the number of deliveries made, and multiplying this number by the emissions factor of the delivery method (air freight, shipping, van delivery, etc.)

Average distance (km) x Number of deliveries x Delivery method emissions factor

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How do I measure emissions from downstream transportation and distribution?

Distance (km) x Transportation method emissions factor

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FAQs

How do I measure emissions from waste?
All waste must be recorded and categorised by recycled and non-recycled waste.

To calculate emission from waste, simply multiply the mass of waste (kg) by the emissions factor associated with the disposal method.

Type of waste (tonnes) x emissions factor

If you don't know the disposal method, you should assume it goes to landfill.

How do I measure emissions from investments?
Workout the percentage of investment you hold in the company vs their total revenue.

Find the total carbon footprint of your bank or investment firm, and multiply it by this percentage.

For example, say your business holds £1 million and the investment fund is worth £100 million.

Your money accounts for 1% of this fund. Your business is therefore responsible for 1% of the company's emissions.

So, you'd find their total footprint from their reporting and multiply it by 0.01 to get your impact.

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FAQs

Do I have to report all emissions? What if they're a really small part of our footprint?
If an emissions source represents less than 0.5% of total emissions, and/or you can show it wouldn't be feasible or practical to measure, you can exclude it. However, if you have multiple sources of emissions that individually represent less than 0.5%, you should only exclude them if they collectively add up to less than 5% of overall emissions.
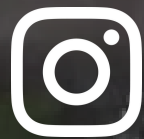
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