Spherics

SPHERICS WHITEPAPER

An overview of the 20 GHG emissions protocol sub-categories

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Contents

INTRODUCTION

Many know the Greenhouse Gas (GHG) protocol in terms of the scope 1,2 and 3 classifications, but far fewer know the official breakdown of emissions sub-categories beyond that.

In this whitepaper we list out all 20 sub-categories of the GHG Reporting Protocol offer a desciption and also a preview as to how Spherics methodology adresses each.

BACKGROUND

Overview of the GHG emissions protocol

The Greenhouse Gas (GHG) Protocol supplies the world's most widely used greenhouse gas accounting principles, with 9 out of 10 Fortune 500 companies reporting their impact to the Carbon Disclosure Project using this methodology.

Not just for large multinationals, these collectivised standards can provide the protection your business needs by giving you visibility into not only your highest emitting areas but also the risks they are exposing you to.

You may have heard of the different 'scopes' which the GHG uses to categorise business emissions:

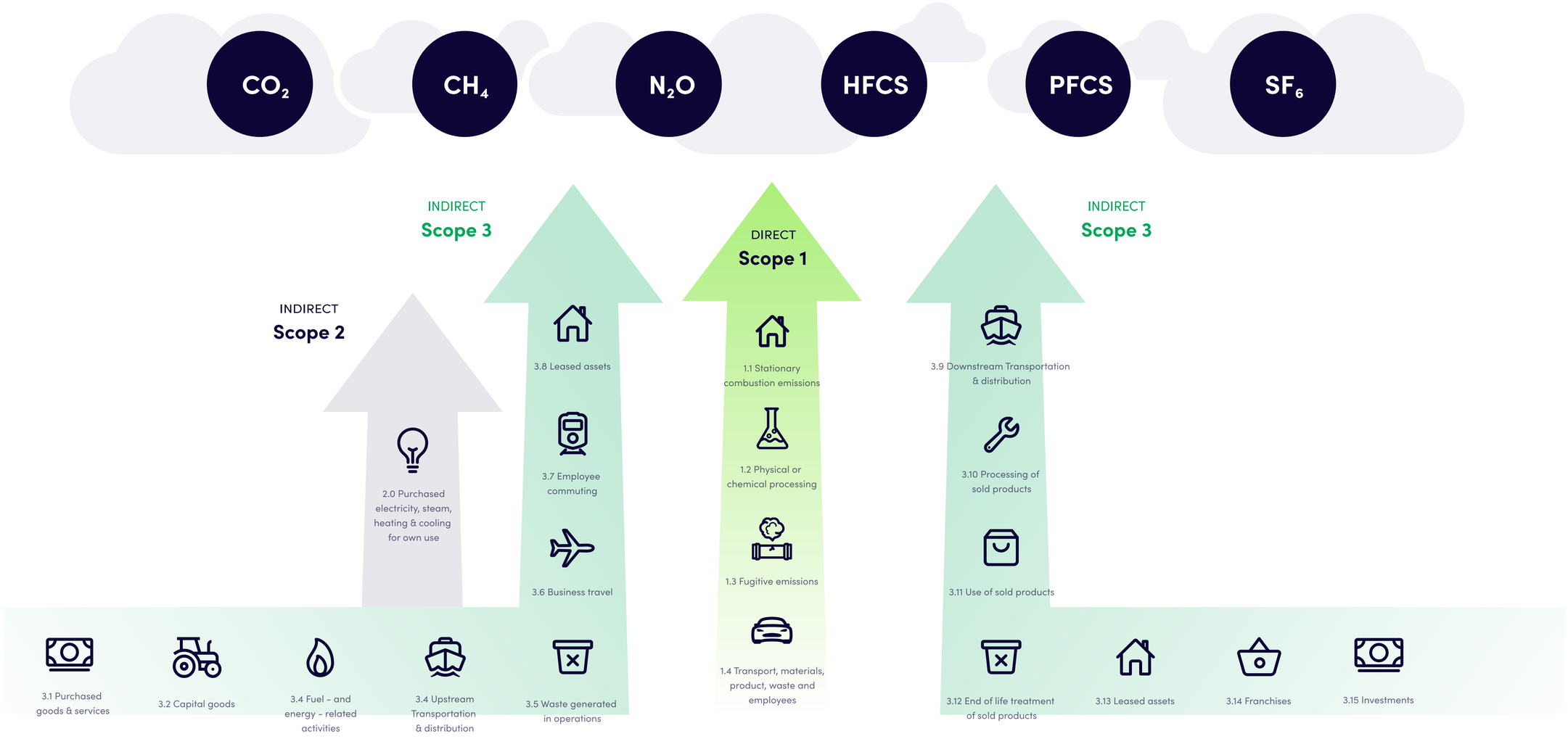
Scope 1 refers to direct emissions from your owned or controlled resources, e.g. from the fuel burned by your van or the gas used to power your boiler.

Scope 2 refers to indirect emissions from the powering, heating, cooling bought by your company from third party providers, most commonly electricity consumption.

Scope 3 includes all other indirect emissions that occur within a company's value chain. This will, most likely, make up the majority of your emissions.

9 out of 10 Fortune 500 companies report using the GHG emission protocol framework

GREENHOUSE GAS PROTOCOL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CH_4
N_2O
HFCS
PFCS
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INDIRECT
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DIRECT
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INDIRECT
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Reporting company
Downstream activites

Methodology key

For each category of the GHG protocol we use different calculation methodologies. We have given a very topline overview of our approach within this guide and bucketed the different approaches below. In reality the methodology is more complex, but this is detail we share with customers during initial consultation.

Spend

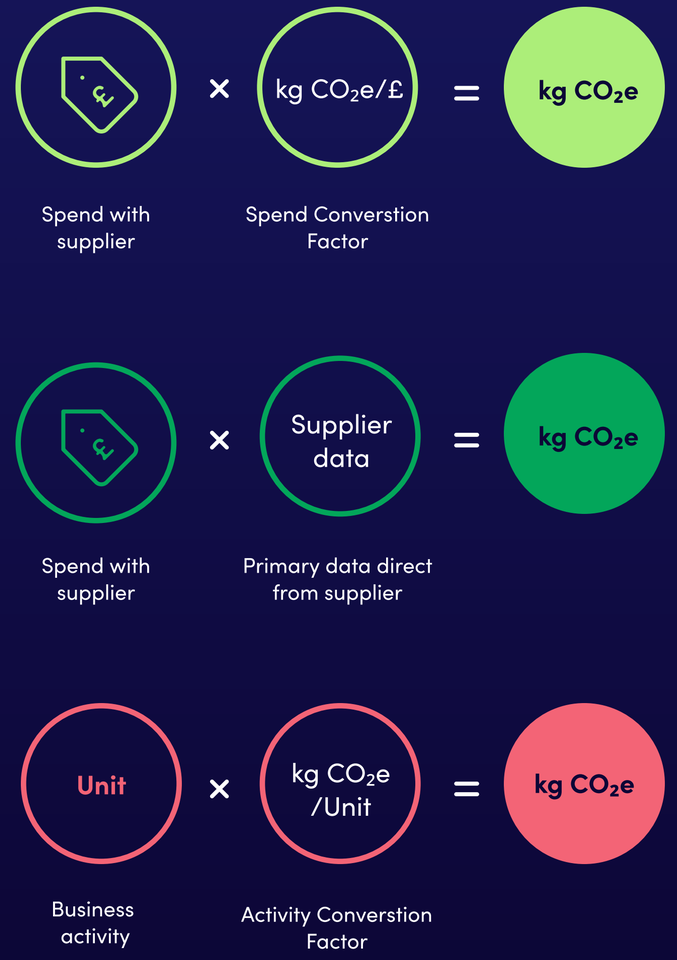
We use a spend-based methodology for the calculation. Spend data is pulled automatically from your accounting software and multiplied by a conversion factor.

Network

To increase accuracy of calculations, we gather emissions data directly from your supply chain network. This data gets fed into the aforementioned Spend and Activity calculations replacing conversion factors.

Activity

We use an activity-based methodology for the calculation. We ask you for information such as the number of staff or fuel consumed. This “unit” is then multiplied by a conversion factor.

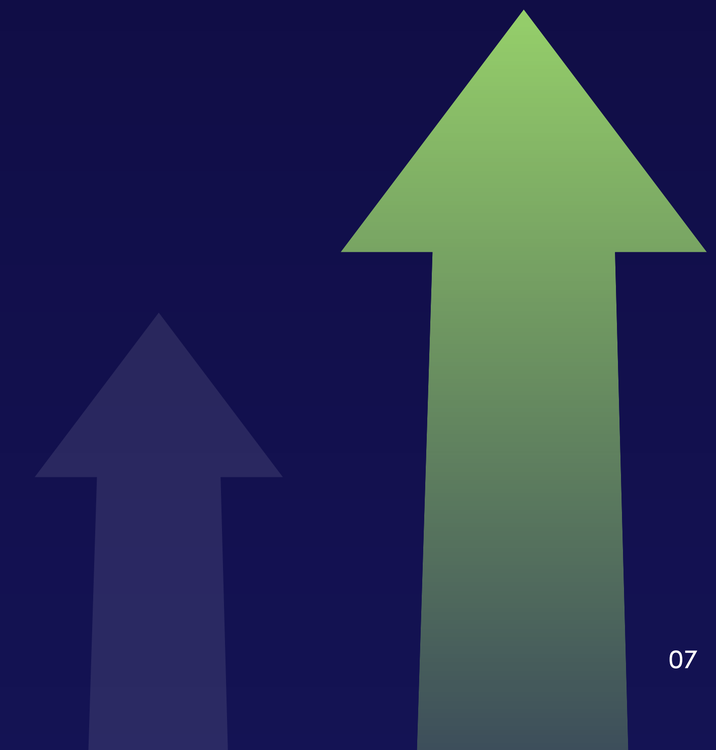


SCOPE 1 & 2

Direct and indirect emissions

Scope 1 & 2 emissions are linked directly to business operations. These emissions are typically much easier to measure and as businesses have direct control over them, they are often easier to manage too.

Although it varies by sector, scope 1 and 2 almost always make up a very small percentage of overall business emissions.



SCOPE 1

Direct emissions

All direct emissions from the activities of an organisation or under their control. These direct emissions are broken down into 4 further categories within the GHG emissions protocol.

1.1 Stationary combustion emissions

Spend Activity

These emissions result from combustion of fuels in stationary sources, e.g., boilers, furnaces, turbines, generators.

1.2 Physical or chemical processing

Activity

Most of these emissions result from manufacture or processing of chemicals and materials, e.g., cement, aluminum, adipic acid, ammonia manufacture, and waste processing. These are GHG emissions that come directly from the process (e.g. from the biological activity of yeast in brewing) rather than from the generation of energy to run that process (e.g. a boiler).

1.3 Fugitive emissions

Activity

These emissions result from intentional or unintentional releases, e.g., equipment leaks from joints, seals, packing, and gaskets; methane emissions from coal mines and venting; hydrofluorocarbon (HFC) emissions from refrigeration and air conditioning equipment; and methane leakages from gas transport.

1.4 Transportation of materials, products, waste and employees

Spend Activity

Identified fuel spend in company vehicles. Note: this only includes fuel that you pay for, e.g. if you take a taxi, you don't pay directly for the fuel, so your emissions would go into 3.6 (see below); the taxi driver would put them in 1.4.

SCOPE 2

Indirect emissions

Scope 2 has just one component to it, but within our increasingly electrified lives it's a big one.

2.0 Emissions from purchased energy

Spend

The way emissions from electricity consumption are, and should be, calculated, could easily be the subject of an entire blog on its own. Broadly speaking, the GHG Reporting Protocol suggests either a location-based or market-based approach. Location-based means that you use the average emissions intensity of electricity generation (and distribution) in your area; market-based means you use the fuel mix of your energy provider. Both have complex issues, and neither gives a truly accurate assessment of your emissions. This is partly due to the way the electricity market is structured, and partly because neither methodology considers when you use the electricity. These issues are gradually being resolved, but in the meantime, we use the most accurate approved methodology: location-based.

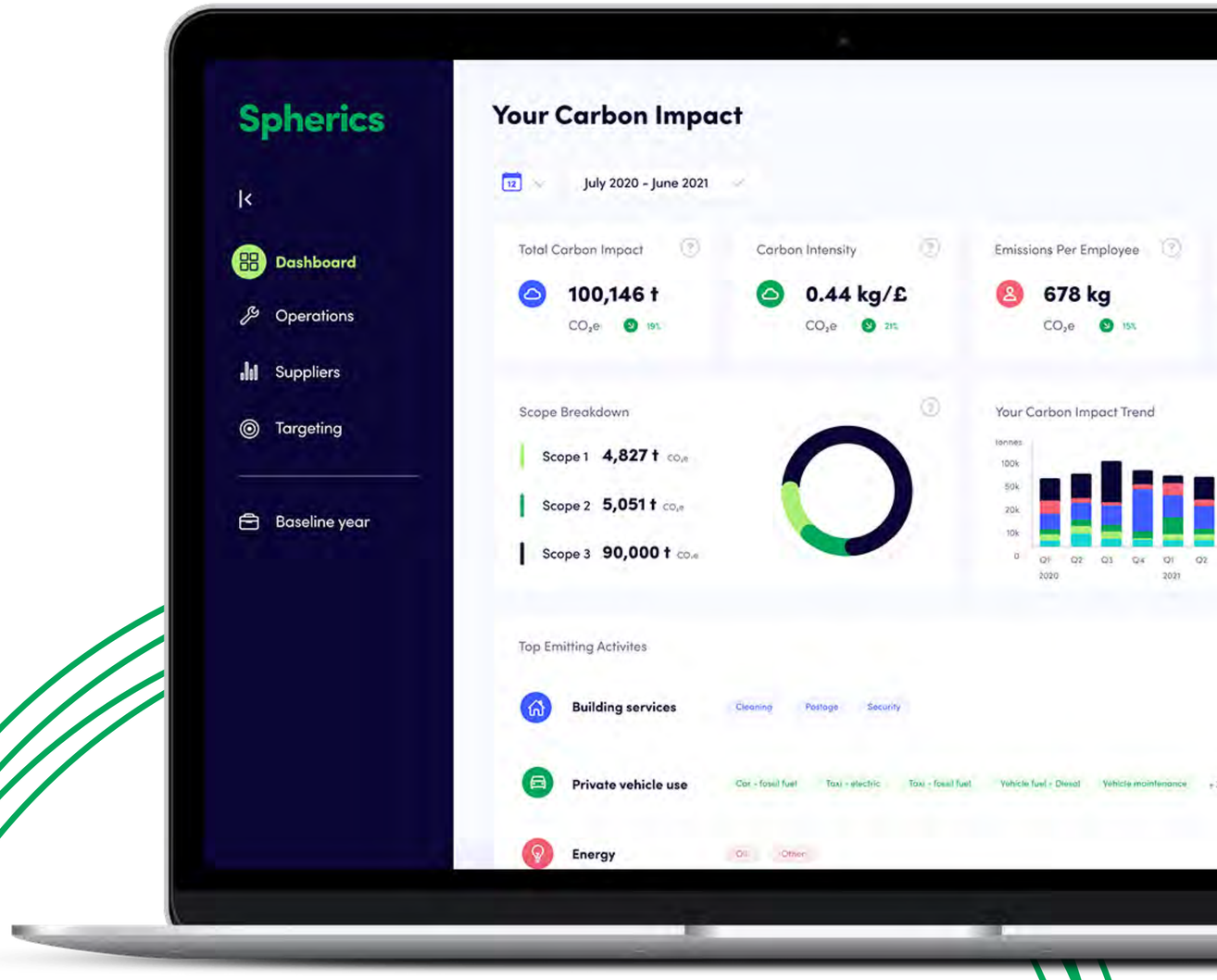


TABLE 1: LEVERS FOR REDUCING EMISSIONS BY SCOPE 1 CATEGORY

Scope 1 category	Most relevant emissions reduction levers
1.1 Stationary combustion emissions	The key to reducing this category of emissions is simple: stop burning stuff. Almost all activities which result in emissions in this category can be replaced by alternatives running on electricity: fossil cars and vans have electric options, fossil heating can be replaced by heat pumps, and so on. But before you do that, look into how much you can reduce emissions by reducing consumption: the kWh that you don't use has the lowest cost and highest impact.
1.2 Physical or chemical processing	Greenhouse gas emissions from physical or chemical processing can only be reduced by changing the process, or by capturing the emissions. The former is widespread but can be a formidable project: this is the approach being taken by steel and glass factories switching to hydrogen, and through the development of novel cement chemistry; it is not always easily accessible to smaller businesses. And for some processes, such as brewing and distilling, changing the process is effectively impossible. In these cases, as emissions are concentrated and relatively uncontaminated, they can be captured, but this only helps to reduce climate impact if they are then permanently taken out of the carbon cycle, for example by reinjection into gas fields, which is not often a practical option for small businesses. This source of emissions often falls into the category of "extremely hard to abate," meaning that it is legitimate to use offsetting to achieve net zero emissions.
1.3 Fugitive emissions	This category includes emissions of gases with a high Global Warming Potential (GWP). This is normally refrigerant gases which leak from air conditioning and refrigeration equipment, which is picked up only when the equipment is serviced and the missing refrigerant is replaced. To address these emissions, the first step is to ensure that any and all equipment you have which uses these gases is regularly serviced by qualified contractors (this is a legal requirement in many countries, for exactly this reason). They can advise on the best solution for your circumstances, which might be a programme of more frequent checking, active leak detection equipment, substitution of refrigerant or replacement of equipment.
1.4 Transportation of materials, products, waste and employees	These emissions come from any form of transportation where you buy the fuel yourself, ranging from a scooter to a private jet. In almost all cases, there are alternatives with lower emissions. Do you need to travel, or can you use video-conferencing? Can goods be transported by rail rather than road, electric vehicle rather than fossil? Have you considered options for employee commuting: home-working, bike to work schemes, mass transit subsidies, and so on?

TABLE 1: LEVERS FOR REDUCING EMISSIONS BY SCOPE 2 CATEGORY

Scope 2 category	Most relevant emissions reduction levers
2.0 Emissions from purchased energy	Scope 2 emissions come predominantly from the use of electricity. Reducing emissions from electricity consumption in reality is more complicated than the Greenhouse Gas Reporting Protocol would suggest, as discussed above. The best you can do at the moment is to buy the best green energy you can find, and reduce consumption as much as possible, particularly at times of high grid carbon intensity. Grid carbon intensity is a measure of the emissions caused by the generation of each unit of electricity drawn from the grid. It varies all the time, depending on demand, and on the mixture of generation sources. One of our favourite examples of excellent coding, Electricity Map shows quite beautifully how this works. Others, such as the National Grid Carbon Intensity Forecast and Carbon Intensity API allow you to predict carbon intensity and, where possible, modulate demand accordingly. Demand reduction (or energy efficiency) is the best solution to reducing scope 2 emissions, followed by on-site generation of renewables (where infrastructure allows, and generation/consumption scale and profile match), and then a quality green tariff. Until electricity markets are reformed so that renewable electricity can be generated in one place and used in another, and tracked in real time (which is coming), this is about the best you can do to reduce scope 2. On a more positive note, grid carbon intensity is plummeting around the world, as more renewable generation is added. This is one area where the UK leads, with a reduction of 71.4% from 1990 to 2020.

SCOPE 3

All other indirect emissions

All other Indirect Emissions, as the name suggests, is a bit of a catch all and as such has 15 categories within it. These emissions occur from sources an organisation doesn't own or control. Scope 3 is often split into two:

- Upstream emissions. From activity that happens "upstream" of the reporting company e.g. suppliers
- Downstream emissions. From activity that happens "downstream" of the reporting company. e.g. customers

Scope 3 is usually the greatest share of the carbon footprint. Upstream indirect emissions alone are no average 11.4 times as much as direct operational emissions, according to CDP) but are often missed out by many carbon footprinting services due to their complexity. Our approach is to focus on these emissions rather than ignoring them.

The aim of the detailed categorisation system is to ensure that nothing is left out; it is more important to include emissions than to worry about where they should be recorded.

SCOPE 3

Upstream emissions

Scope 3.1. to 3.8. Can be classified as Upstream Scope 3 Emissions.

Upstream emissions are those attributed to your suppliers, or supply chain.

3.1 Purchased goods and services

Spend | Network method

Extraction, production, and transportation of goods and services purchased or acquired by the reporting company in the reporting period, not otherwise included in Categories 2 - 8.

This is often the most complex category to calculate, as it requires businesses to manage emissions factors or carbon footprints from every supplier. Many businesses have thousands of suppliers, and keeping track of every transaction with every single one is not practical. This process is entirely automated using Spherics.

3.2 Capital Goods

Activity

Extraction, production, and transportation of capital goods purchased or acquired by the reporting company in the reporting period.

The distinction between 3.2 and 3.1 is more important to accountants than environmentalists. Examples of capital goods include equipment, machinery, buildings, facilities, and vehicles but 3.2 only includes emissions not picked up elsewhere, so if you buy a vehicle and then buy fuel to put in it, that would fall into 1.4.

3.3 Fuel - and energy - related activities

Activity

Not including scope 1 or 2. "Extraction, production, and transportation of fuels and energy purchased or acquired by the reporting company in the reporting period, not already accounted for in scope 1 or scope 2, including:

a. Upstream emissions of purchased fuels (extraction, production, and transportation of fuels consumed by the reporting company)

b. Upstream emissions of purchased electricity (extraction, production, and transportation of fuels consumed in the generation of electricity, steam, heating, and cooling consumed by the reporting company)

c. Transmission and distribution (T&D) losses (generation of electricity, steam, heating and cooling that is consumed (i.e., lost) in a T&D system) – reported by end user

d. Generation of purchased electricity that is sold to end users (generation of electricity, steam, heating, and cooling that is purchased by the reporting company and sold to end users) – reported by utility company or energy retailer only. [All included in specialised carbon-conversion factors - eg. well-to-tank factors for electricity, gas, & fuels, transmission-and-distribution-losses factor for electricity]"

This category mops up emissions that come from getting fossil fuels to you (or e.g. to your electricity supplier) which don't come directly from burning the fuels themselves. They include emissions from the operation of fossil fuel companies, fugitive emissions of methane from coal mines and gas pipelines, and so on.

3.4 "Upstream" transportation and distribution

Spend Activity

Transportation and distribution services purchased by the reporting company in the reporting period, including inbound logistics, outbound logistics (e.g., of sold products), and transportation and distribution between a company's own facilities (in vehicles and facilities not owned or controlled by the reporting company).

This category includes emissions from upstream transportation and distribution that have not already been captured. For example, if you buy in materials and haulage is included in the conversion factor or carbon footprint you use to calculate the associated emissions, then this would be covered in 3.1. If haulage is not included, e.g. if it is billed separately and provided by a specialist logistics company, then it should be included in 3.4.

3.5 Waste generated in operations

Activity

Disposal and treatment of waste generated in the reporting company's operations in the reporting period (in facilities not owned or controlled by the reporting company). Different types of waste, and different methods of treatment, have different emissions conversion factors, so to calculate the emissions associated with your waste, we need to know how much you generated, what it was, and what you did with it.

SCOPE 3

3.6 Business travel

Spend Activity

Transportation of employees for business-related activities during the reporting period (in vehicles not owned or operated by the reporting company).

This can be a huge source of emissions for some businesses, and it can be tricky to assess accurately on the basis of spend alone, as you can travel from one place to another (even by the same transport mode) for a wide range of prices. We identify spend as travel automatically and, particularly where it is an important component of your carbon footprint, ask for more detail to refine the calculation.

3.7 Employee commuting

Spend Activity

Transportation of employees between their homes and their worksites during the reporting period (in vehicles not owned or operated by the reporting company).

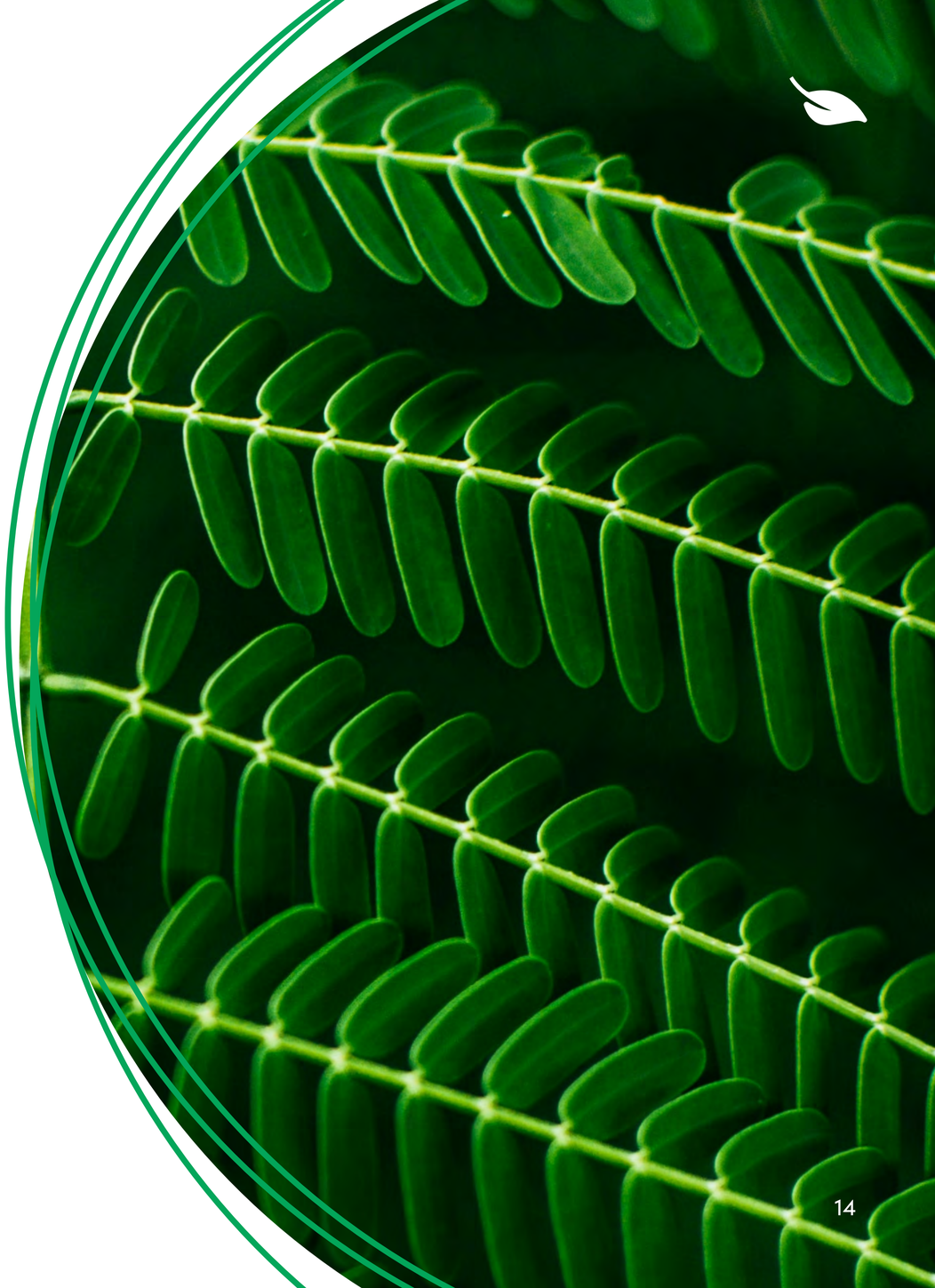
This is one that hardly ever turns up in spend-based analysis, as employees typically have to pay their own commuting costs. Spherics initially generates an estimate based on known regional commuting behaviour, which is augmented by user data.

3.8 Upstream leased assets

Spend Activity

Operation of assets leased by the reporting company (lessee) in the reporting period and not included in scope 1 and scope 2 – reported by lessee.

This is emissions from things that you lease (or rent, or hire) which are not picked up elsewhere.



SCOPE 3

Downstream emissions

3.9. To 3.15. Can be classified as Downstream Scope 3 Emissions.

Downstream emissions are those attributed to customers' behaviour. They are often hard to pin down, as it can be impossible to know how products are used, and what happens to them at the end of their life. These categories often have to be estimated based on reasonable assumptions.

3.9 Downstream transportation and distribution

Activity

Transportation and distribution of products sold by the reporting company in the reporting period between the reporting company's operations and the end consumer (if not paid for by the reporting company), including retail and storage (in vehicles and facilities not owned or controlled by the reporting company).

This includes warehousing and other logistical activities, not just transportation, and includes these activities even if you don't pay for them (if you do pay for them, they belong in 3.4.)

3.10 Processing of (intermediate) sold products

Activity

Processing of intermediate products sold in the reporting period by downstream companies (e.g., manufacturers).

3.10 and 3.11 are very similar, but 3.10 is appropriate where your product is an intermediary (e.g flour) rather than a finished product (e.g. bread).

3.11 Use of sold products

Activity

End use of goods and services sold by the reporting company in the reporting period.

This is a tricky one to calculate other than by estimation. For example, Apple and Microsoft estimate the emissions from electricity used to run their hardware and software, even though it's not them that is running it. They have to do this by estimating product numbers, life-span, usage profiles, and regional grid carbon intensity.

3.12 End-of-life treatment of sold products

Activity

Waste disposal and treatment of products sold by the reporting company (in the reporting period) at the end of their life.

Much the same as 3.11, most companies don't know exactly what happens to their products at their end of life, so this emissions category has to be estimated, based on sales, design life, disposal methods etc.

3.13 Downstream leased assets

Spend Activity

Operation of assets owned by the reporting company (lessor) and leased to other entities in the reporting period, not included in scope 1 and scope 2 – reported by lessor.

The flip side of 3.8, this is for any emissions (not otherwise accounted for) that come from the operation of assets that you rent out to someone else.

3.14 Franchises

Spend Network method

Operation of franchises in the reporting period, not included in scope 1 and scope 2 – reported by franchisor.

This one is fairly self-explanatory: if you run franchises, what are their emissions?

3.15 Investments

Activity

Operation of investments (including equity and debt investments and project finance) in the reporting period, not included in scope 1 or scope 2.

Last, but by no means least, the investments category is a tricky one. It is split into mandatory and voluntary reporting: you have to report emissions from equity and debt investments, and project finance, but you don't necessarily need to report on fund management, underwriting or advisory services, or pensions (even though these may constitute a very large portion of emissions, the management of which could lead to significant reductions in your carbon footprint).

The complexity and diversity of emissions calculations that could be included in this category preclude automated calculation.

TABLE 3: LEVERS FOR REDUCING EMISSIONS BY SCOPE 3 CATEGORY

Scope 3 category	Most relevant emissions reduction levers
3.1 Purchased goods and services	Supplier engagement, procurement policy and choices, product and service design, business model innovation
3.2 Capital goods	Supplier engagement, procurement policy and choices, product and service design
3.3 Fuel and energy related activities	Procurement policy and choices, product and service design, operational policies
3.4 Upstream transportation and distribution	Supplier engagement, procurement policy and choices, product and service design
3.5 Waste generated in operations	Product and service design, business model innovation,operational policies
3.6 Business travel	Procurement policy and choices, operational policies
3.7 Employee commuting	Operational policies
3.8 Upstream leased assets	Procurement policy and choices
3.9 Downstream transportation and distribution	Supplier engagement, procurement policy and choices, product and service design
3.10 Processing of sold products	Product and service design, customer engagement
3.11 Use of sold products	Product and service design, customer engagement, business model innovation
3.12 End-of-life treatment of sold products	Product and service design, customer engagement, business model innovation
3.13 Downstream leased assets	Product and service design, customer engagement
3.14 Franchises	Product and service design, operational policies
3.15 Investments	Investment strategy

SUMMARY

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