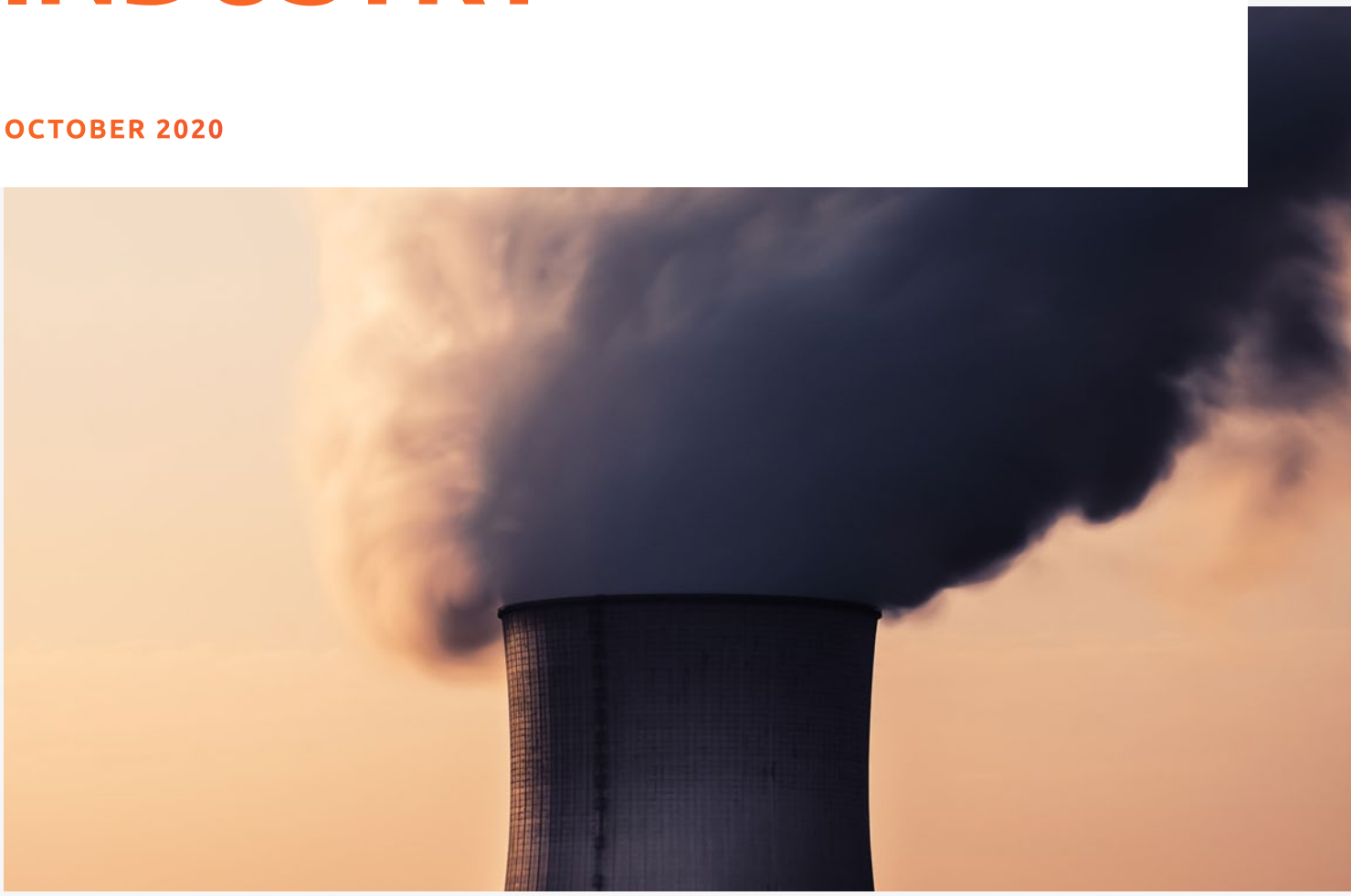
PSCI PHARMACEUTICAL SUPPLY CHAIN INITIATIVE

Building responsible supply chains

SCOPE 3 GREENHOUSE GAS EMISSIONS CALCULATION: GUIDANCE FOR THE PHARMACEUTICAL INDUSTRY

OCTOBER 2020



THE PHARMACEUTICAL SUPPLY CHAIN INITIATIVE

Established in 2006, the Pharmaceutical Supply Chain Initiative (PSCI) is an industry-based membership body that collaborates with partners to define, implement, and champion responsible supply chain practices, fair and safe workplaces, responsible business practices, environmental sustainability and efficiency of resources, and improved supplier capability. Membership is open to companies that manufacture medical products or provide materials to the pharmaceutical, biotechnology, or medical devices industries and that agree to the PSCI Principles on Responsible Supply Chain Management on ethics, human rights and labor, health and safety, environment, and management systems. All members agree to incorporate the Principles into key supplier agreements, which are supported through implementation guidance and online audit collaboration and supplier capability building platforms. Overall, the PSCI is the leading organization for responsible supply chain management in the pharmaceutical industry.

You can find out more and join the community via The Link.

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INTRODUCTION

There is increasing pressure on business to measure, manage and reduce their contribution to climate change. Many companies have completed the process of measuring and reporting emissions of greenhouse gases (GHG) from their own operations – so-called scope 1 and 2 emissions - and as a result have put in place robust programmes to reduce them.

The GHG Protocol Corporate Standards classifies a company's GHG emissions into three different scopes. Scope 1 are direct emissions from owned or controlled sources whilst scope 2 are indirect emissions from the generation of purchased energy.

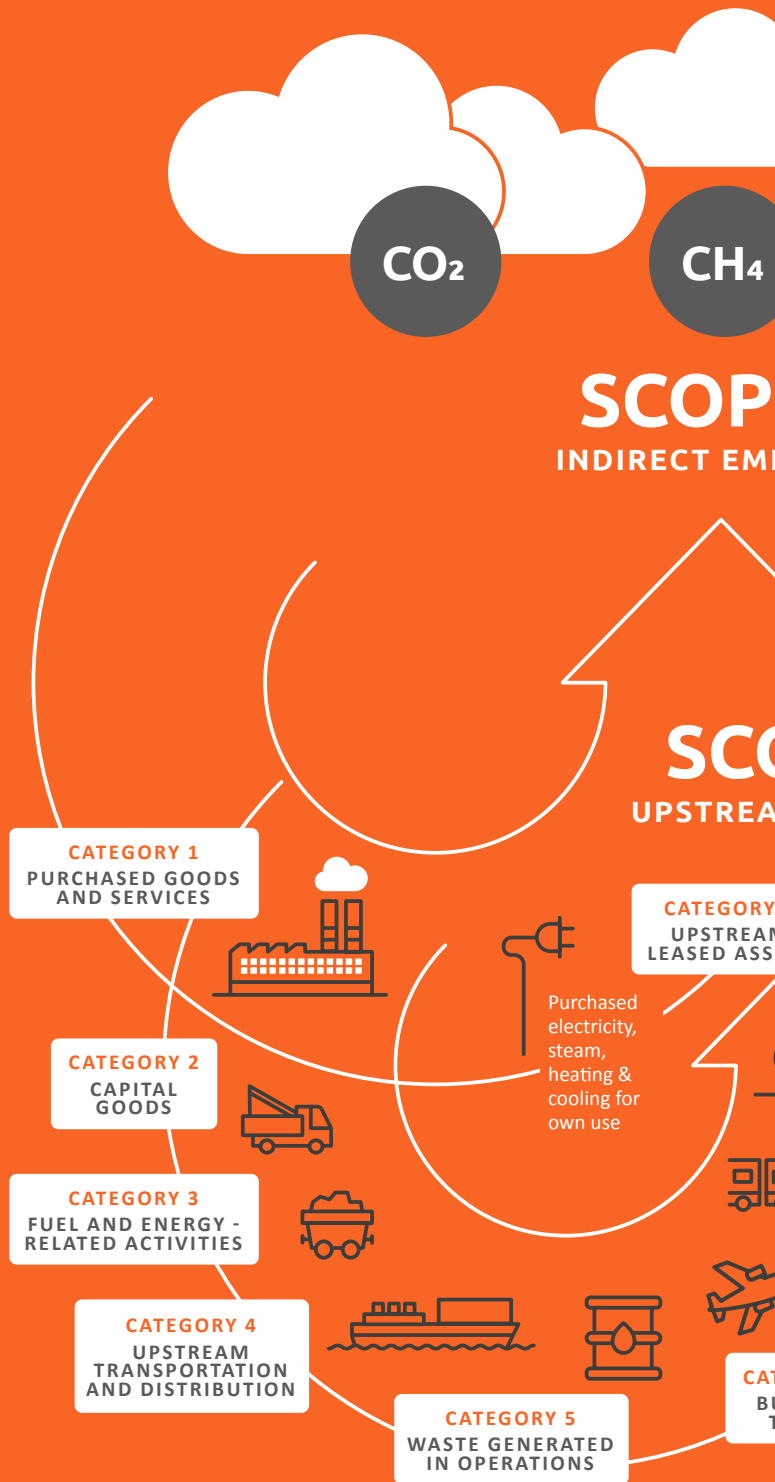
> Scope 3 emissions include all other indirect emissions that occur in a company's value chain, upstream or downstream from own operations, divided into 15 different business activity categories.

For many sectors, including the pharmaceutical industry, upstream and downstream emissions will be significantly higher than emissions from their own operations.

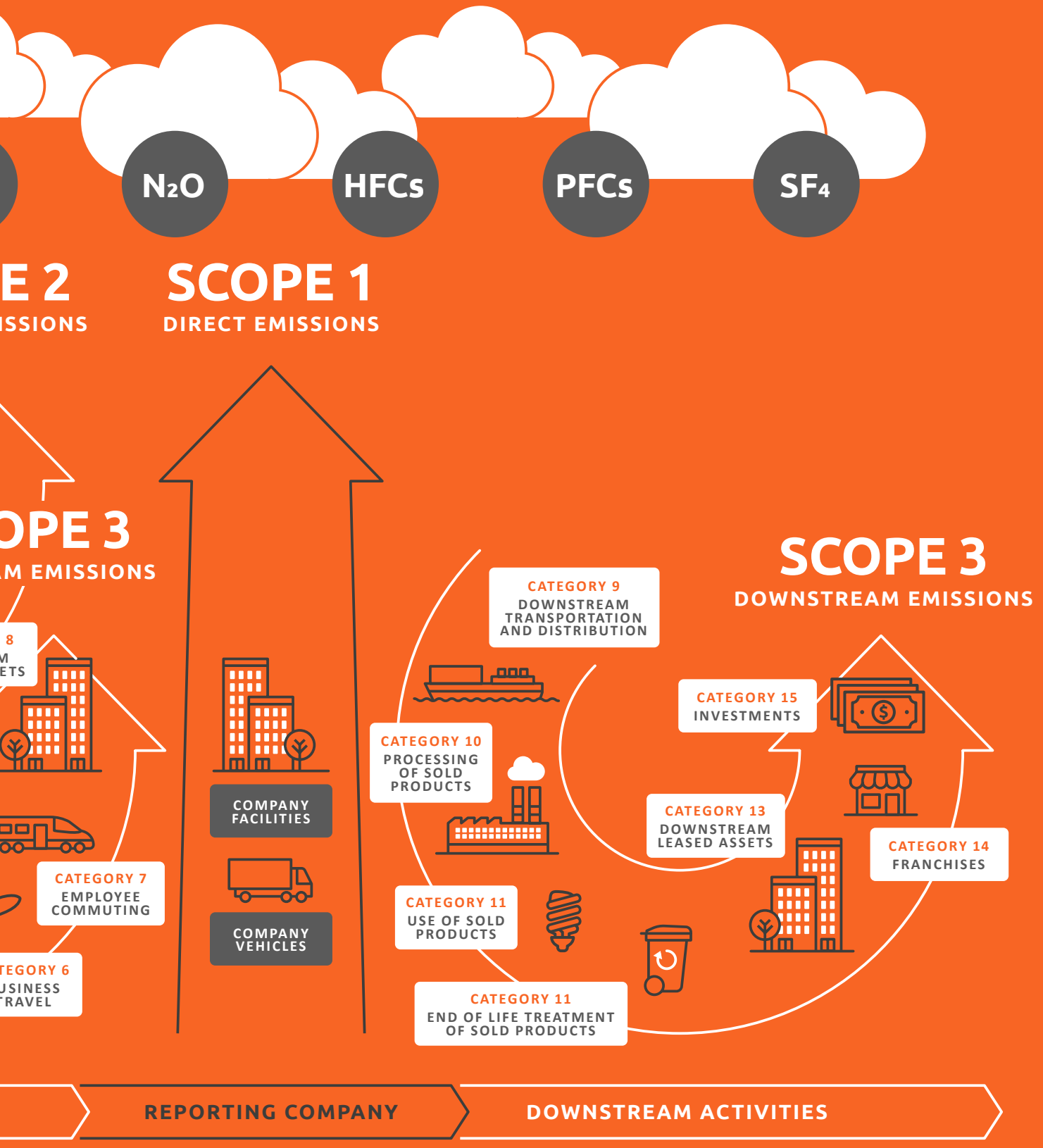
However, measuring and reporting GHG emissions from activities within the value chain, such as those associated with the manufacture of goods and services used by a company, is much more challenging, particularly for pharmaceutical companies with large and complex value chains.

The primary focus of this document is to provide a consistent guidance for pharmaceutical companies to calculate GHG emissions in their upstream and downstream value chains. It provides methodologies consistent with recommendations from the GHG Protocol for calculating emissions which are tailored for each different category. The methodologies have been structured so that both companies just getting started, as well as those more advanced in their calculation and measurement capabilities, will find them useful and accessible.

This document was developed by the Pharmaceutical Environment Group (PEG) and its participating companies, who have kindly shared it with the PSCI for diffusion amongst its members. The Pharmaceutical Environment Group consists of leading pharmaceutical companies who collaborate in order to demonstrate and promote environmental leadership in the pharmaceutical industry, working together to enhance their performance.



Graphic based on original source: Greenhouse Gas Protocol, Corporate Value Chain (Scope 3) Accounting and Reporting Standard, World Resources Institute and World Business Council for Sustainable Development, 2011, page 31



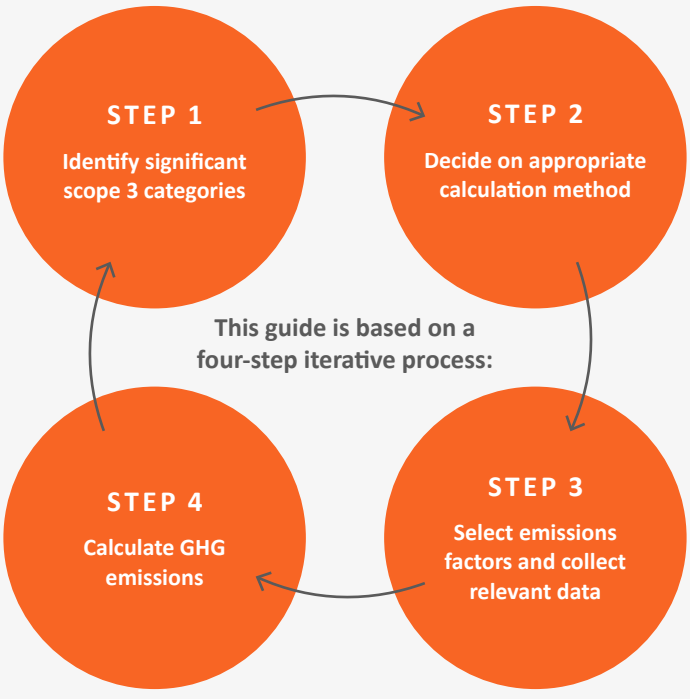
GUIDANCE PRINCIPLES

Calculating emissions for a pharmaceutical company's value chain can be a daunting prospect: obtaining representative emissions data from upstream and downstream partners; finding emissions factors from industry databases that reasonably reflect the product or service, geography, and timeframe; and taking that data and processing it in a way to give meaningful results, are all time-consuming and difficult activities.

To mitigate these challenges, and to allow pharmaceutical companies to estimate GHG emissions with the minimum amount of time and resource, we have developed these principles:

- **Keep the goal in mind:** Estimating GHG emissions and reporting them is not an end in itself, it's all about reduction. This guide is about facilitating the quick and accurate identification of emissions 'hotspots' that companies can then use to prioritise and develop emissions reduction initiatives.
- **Focus effort:** Calculating GHG emissions in value chains can be complex; companies should focus time and resources on those Scope 3 categories that have significant emissions, and from value chain partners that companies will be able to influence to reduce emissions.
- **Keep it simple:** Many approaches are available to calculate Scope 3 emissions, with differing levels of complexity and accuracy. We suggest using the simplest method that will produce results with an acceptable level of accuracy.
- **Scale over precision:** If we can estimate an entire value chain's GHG emissions using a methodology that is representative enough to drive business decisions toward meeting our goals, then the priority should be to account for the entire value chain emissions with reasonable accuracy rather than a subset at higher accuracy.
- **Improve accuracy over time:** Companies' GHG estimations will improve as participants collect and share data from suppliers to create an ever-improving body of emissions factor data for pharma-specific activities.
- **Suitable for all:** Some companies will already be at an advanced stage with GHG calculation capability, and this guide will give them the tools to go further. But for those just starting out, this document will enable them to quickly reach a reasonable level of accuracy for the categories they consider material.

APPROACH



STEP 1 IDENTIFY SCOPE 3 CATEGORIES WITH SIGNIFICANT EMISSIONS

There are 15 categories of scope 3 emissions, which are summarised in the table below. Further details – particularly on the boundaries (i.e., what should and should not be included) – is in Appendix 1:

SCOPE 3 CATEGORY	DEFINITION
1 PURCHASED GOODS AND SERVICES	Includes all upstream cradle-to-gate emissions from the production of products purchased or acquired by the reporting company in the reporting year.
2 CAPITAL GOODS	Includes all upstream (i.e., cradle-to-gate) emissions from the production of capital goods purchased or acquired by the reporting company. Capital goods are final products that have an extended life and are used by the company to manufacture a product, provide a service, or sell, store, and deliver merchandise.
3 FUEL AND ENERGY - RELATED ACTIVITIES	Includes the emissions of the extraction, production and transportation of fuels and energy purchased by the reporting company in the reporting year.
4 UPSTREAM TRANSPORTATION AND DISTRIBUTION	Includes emissions from the transportation and distribution of products purchased by the reporting company in vehicles/facilities not owned or operated by the reporting company.
5 WASTE GENERATED IN OPERATIONS	Includes emissions from third-party disposal and treatment of waste that is generated in the company's owned or controlled operations. This category includes emissions from disposal of both solid waste and wastewater. Only waste treatment in facilities owned or operated by third parties is included in scope 3.
6 BUSINESS TRAVEL	Includes emissions from the transportation of employees for business-related activities in vehicles owned or operated by third parties, such as aircrafts, trains, buses, and passenger cars.
7 EMPLOYEE COMMUTING	Includes emissions from the transportation of employees between their homes and their worksites. Emissions may arise from automobile travel, bus travel, rail travel, air travel (if any) or other modes of transportation.
8 UPSTREAM LEASED ASSETS	Includes emissions from the operation of assets that are leased by the company and not already included in the company's scope 1 or scope 2 inventories.
9 DOWNSTREAM TRANSPORTATION AND DISTRIBUTION	Includes emissions from transportation and distribution of products sold by the reporting company between the company's operation and the end consumer, if not paid for by the reporting company, in vehicles and facilities not owned or controlled by the reporting company.
10 PROCESSING OF SOLD PRODUCTS	Includes emissions from processing of intermediate products by third parties (e.g., manufacturers) after sale by the reporting company.
11 USE OF SOLD PRODUCTS	Includes emissions from the use of goods and services sold by the reporting company in the reporting year. The scope 3 emissions from use of sold products include at least the scope 1 and 2 emissions of end users.
12 END OF LIFE TREATMENT OF SOLD PRODUCTS	Includes emissions from the waste disposal and the treatment of all products sold by the reporting company at the end of their life, during the reporting year.
13 DOWNSTREAM LEASED ASSETS	This category is applicable to lessors, i.e. companies that receive payments from lessees. This category includes emissions from the operation of assets that are owned by the reporting company, acting as lessor, and leased to other entities in the reporting year that are not already included in scope 1 or scope 2.
14 FRANCHISES	This category includes emissions from the operation of franchises not included in scope 1 or scope 2. A franchise is a business operating under a license to sell or distribute another company's goods or services within a certain location.
15 INVESTMENTS	Includes emissions associated with the reporting company's investments in the reporting year, not already included in scope 1 or scope 2. This category is mostly applicable to investors, i.e. companies that make an investment with the objective of making a profit, and companies that provide financial services.

Ideally, a company should calculate emissions for each of these categories. However, some categories are much more relevant and significant than others, and it is prudent to tackle only categories that are relevant for the reporting company. This requires a screening process to determine relevance to the business.

Approaches and rules to determine relevance will vary by company but in our view there are two ways to do this: Firstly, based on the scale of GHG emissions and secondly, on the ability the company has to influence emissions reductions at value chain partners or within their own operations. Other factors may also be considered such as supplier geography, size, tier within the value chain and carbon intensity.

To determine the scale of GHG emissions for the 15 categories, companies should carry out a quick calculation using this guide, or publicly available tools like the GHG Protocol Scope 3 Evaluator[1]. Any screening assessment should be in alignment with Greenhouse Gas Protocol Scope 3 methodology guidance. Looking at peer companies' Scope 3 emissions is also a useful indication of scale. This may be from peers' corporate sustainability disclosures or from other data providers, such as the Carbon Disclosure Project (CDP).

A review of a pharmaceutical company's CDP emissions data shows that there are six categories that dominate GHG emissions:

SCOPE 3 CATEGORY	EMISSIONS IN TONNES CO2e
Purchased goods and services	4,746,971
Use of sold products	904,707
Capital goods	696,634
Fuel and energy- related activities	605,035
Waste generated in operations	454,633
Downstream transportation and distribution	452,584
End of life treatment of sold products	261,253
Upstream transportation and distribution	213,194
Processing of sold products	184,211
Business travel	110,259
Employee commuting	102,811

With these emissions 'hotspots' identified, it then becomes relevant to think about how a pharmaceutical company could influence a reduction in emissions.

HOTSPOT CATEGORY	ABILITY TO INFLUENCE REDUCTION	EXPLANATION
PURCHASED GOODS AND SERVICES	HIGH	Companies have considerable influence over suppliers, including their behaviour in terms of efficiency and GHG emissions reduction.
USE OF SOLD PRODUCTS	MEDIUM	Pharmaceutical companies can influence over how their products are used, through design choices and guidance for consumers on product use.
CAPITAL GOODS	MEDIUM	Influencing producers of capital goods such as computers or machinery is difficult and reducing the need for them internally is also a challenging task.
FUEL AND ENERGY RELATED ACTIVITIES	HIGH	Influence on extraction, production and transportation of fuels and energy will be weak, but high for reducing consumption of fuel.
WASTE GENERATED IN OWN OPERATIONS	HIGH	Companies should be able to control how their own waste is processed and should be able to bring about reductions in waste generated.
UPSTREAM TRANSPORTATION AND DISTRIBUTION	HIGH	Companies can influence GHG emissions at the transport companies that deliver the goods they buy by diligently managing logistics; and should have even more influence on the transport companies that distribute the goods that the company sells.

Therefore, for this company the target five categories for calculating emissions should be purchased goods and services, use of sold products, waste generated in own operations, fuel and energy related activities, and upstream transportation and distribution. It is worth noting that for other pharmaceutical companies with different product mixes, the conclusions may be different.

[1] https://ghgprotocol.org/scope-3-evaluator

STEP 2 DECIDE ON AN APPROPRIATE CALCULATION METHOD

These are the three main emissions calculation methods we recommend companies use:

- **Primary data methods** – this approach involves collecting product-level cradle-to-gate GHG inventory data from value chain partners. It is the most accurate method, if carried out correctly, because it provides an emissions factor for the specific product or service purchased or sold. However, it does require a relatively high level of sophistication from value chain partners in terms of their ability to follow a reliable methodology such as the GHG Protocol Product Standard, and their willingness to provide this level of detail.
- **Secondary data methods** – estimates emissions by collecting activity data on the economic value of goods and services or the mass or other unit of measure (hours worked, or km travelled) and multiplying by relevant secondary emission factors.
- **Proxy data method** – If a reporting company has a sufficiently large number of product-level emissions factors that are available from value chain partners, this trusted data can be used as proxy for the same or similar products from other partners.

In addition, there is a 'hybrid methodology' that uses a combination of primary data (where available) and secondary or proxy data to fill the gaps. This is an increasing common approach as companies seek to develop an approach that is pragmatic and efficient in terms of resources available. In this guidance we have not treated this as a distinct calculation method, although recognise that companies may use a combination of the three approaches outlined above so long as this is done so in an appropriate and transparent matter (for example, disclosing which approach is used for each scope 3 category).

The table below summarises the strengths and weaknesses of each approach:

METHOD	PROS	CONS
SUPPLIER-DATA	■ Accurate data from suppliers on their scope 1 and 2 emissions, rather than using industry or sector wide averages.	■ Time-consuming to collect data and verify its quality ■ Suppliers may not be in the position to accurately allocate emissions to individual products ■ Not all suppliers will share data
SECONDARY-DATA	■ Quick to carry out calculations ■ Easy to scale to whole value chain ■ Average data relatively accurate if good emissions factors are used	■ Industry or sector wide averages that may not reflect specific work undertaken to reduce emissions within a company's supply chain. ■ Requires time to ensure emissions factors have a good match for time, geography, and technology ■ Spend data relies on EEIO models, that may contain assumptions.
PROXY	■ If enough data exists, it can be an accurate and quick way to fill in gaps	■ Requires time to ensure extrapolation has a good match for time, geography, and technology ■ Requires a good sample size for accurate results

In this guidance we recognise that different companies are at different stages of their journey to calculate GHG emissions. Some are more advanced than others, and some are just getting started. In the following sections, when outlining the methods of calculation for each of the scope 3 categories, we give a choice for companies to use primary or secondary data calculation method.

STEP 3 SELECT EMISSIONS FACTORS AND COLLECT RELEVANT DATA

Emissions factors: There are several different sources of GHG emissions factors, some are publicly available for free – such as those published by national governments – while others are offered on a commercial basis. A list of emission factor providers can be found in Appendix B. Please note that this is not an exhaustive list.

In the guidance, we have specified some emissions factors, and these are clearly referenced. In most cases these are UK-based UK emissions factors produced by the UK Government to ensure a consistent approach. As most pharmaceutical companies trade in terms of US Dollars, these factors have been adjusted accordingly into a kgCO2/$ rather than kgCO2/£.

However, it is up to individual companies to choose their own emissions factors appropriate to their business, particularly if they are following more advanced methods of calculations. In all cases, the source of emissions factors should be clearly and transparently reported alongside the calculation of emissions.

We also strongly recommend that the factors used are done so in a consistent way – i.e., that once a source is chosen, that this is used for all categories (where possible) and on a year on year basis. Furthermore, we advise that emissions factors are updated on an annual basis in line with updates in source factors.

Emission factors based on environmentally extended input-output (EEIO) models are expressed on a purchasers' price basis in real terms (i.e. the actual sales price in that year including taxes on products and distribution margins). Reporting companies should take subsequent price changes into account when using the factors shown below, by adjusting for inflation from the date of the creation of the database to the present day. In your calculations, you can use a five-year average for exchange rates to avoid short term fluctuations which could skew results.

Activity data collection: The following scope 3 category sections specify the data required and recommended calculation methods for each of the scope 3 GHG categories. In general, activity data (spend, or amounts of purchased or sold goods, or distance travelled) should be available from internal company systems, or from value chain partners (i.e. customers or suppliers).

STEP 4 CALCULATE GHG EMISSIONS

Once a source of emissions factor has been selected and activity data collected, calculating emissions is a reasonably straightforward process. Calculations should take the following format:

$$\text{TOTAL EMISSIONS, TONNES CO2e} = \left[\text{EMISSIONS FACTORS (KG CO2e/\$ SPEND OR KG CO2e/UNIT OF MEASUREMENT)}\right] \times \left[\text{SPEND OR AMOUNT OF ACTIVITY (UNIT OF MEASUREMENT COULD BE KG, OR HOURS WORKED, OR DISTANCE TRAVELLED)}\right] / 1{,}000$$

All calculations should cover an annual period (the reporting year). This may be on a calendar or fiscal basis.

CATEGORY GUIDANCE

The following sections take each of the 15 GHG categories and offer guidance on the appropriate approached to calculate emissions.

PURCHASE OF GOODS AND SERVICES CATEGORY 1

The upstream cradle-to-gate emissions from the production of products, goods and services purchased or acquired by the reporting company in the reporting year.

The first step is to understand the types and amounts of goods and services purchased over the course of the reporting year. The type of information available will be different from company to company, but where possible this should in include:

- Individual good and service name
- Category and sub category where applicable
- Supplier name and location
- The spend on the good and service purchased
- The quantity of the item purchased (this may be useful in future calculations)

Exclusions (as these are covered by other categories):

- Purchases of capital equipment
- Warehousing and logistics
- Business travel

The next step is to segment this data in a way that is applicable to the method of calculation the reporting company has decided to adopt. In the first instance, we suggest 'category level' will suffice, except for those goods and services that are unique to the pharmaceutical sector or are particularly carbon intensive, such as packaging and raw materials, where more detailed information at a 'sub category' level should be sought.

We recommend the following breakdown, based on an analysis of a sample of pharmaceutical companies currently reporting and relevant data provided by PEG participating companies:

CATEGORY / SUB CATEGORY
PACKAGING
Paper
Glass
Plastic
RAW MATERIALS
API / Intermediates / Preparations
Bulk chemicals
Excipients
Biological products
Other chemical products
RESEARCH & DEVELOPMENT
INFORMATION SERVICES
GENERAL & ADMINISTRATION

USING SECONDARY DATA

We suggest that GHG emissions relating to purchased goods and services are calculated based on spend data. Once this information has been collected it is then a case of applying the appropriate emissions factor (kg CO2e per monetary value of spend by product category). The calculation is:

[EMISSIONS FROM GOOD AND SERVICES, TONNES CO2e] =

([SPEND ON PURCHASED GOODS OR SERVICES, $]

X

[EMISSIONS FACTOR, KG CO2e PER $])/1,000

The table below suggests some emissions factors for key goods and services. The factors are based on a model of the economy, known as the input-output model, which describes in monetary terms how the goods and services produced by different sectors of the economy are used by other sectors to produce their own output. These monetary accounts are linked to information about the greenhouse gas emissions of different sectors of the economy.

Industrial emissions are attributed to final products bought by consumers. The result is an estimate of the total upstream emissions associated with the supply of goods or services.

We have used the UK government's emissions factor database *Indirect emissions from the supply chain*[2] as it is based on international averages for GHG emissions and provides a good range of product and service categories. However, please note that companies can use any other emission factor sources and should be make sure that their approach is consistent.

UK government emissions factors for pharma-specific categories adjusted for 2019 US dollar prices[3].

CATEGORY / SUB CATEGORY	SUGGESTED EMISSION FACTOR (KG CO2e PER US$)
PACKAGING	
Paper	1.858
Glass	3.431
Plastic	1.507
RAW MATERIALS	
API / Intermediates / Preparations	0.541
Bulk chemicals	1.110
Excipients	1.792
Other chemical products	2.466
RESEARCH & DEVELOPMENT	0.380
INFORMATION SERVICES	0.276
GENERAL & ADMINISTRATION	0.281

For example, if $1,000 is spent on paper packaging, then the associated CO2e emissions would be 1.803 tonnes of CO2e emitted during all stages of the production of these goods, including raw material extraction, processing, manufacturing, transportation, packaging etc.

We appreciate the level of imprecision associated with this methodology that is associated with both the high-level segmentation of goods and services purchased and the application of the emissions factor (see appendix C). However, our view in this guidance is that this is enough to enable a pharmaceutical company to gauge the scale of their scope 3 emissions in this category and the priority areas for potential reduction. To improve the precision of these calculations, a company may choose to select their own emissions factors based on other publicly available or commercial databases. Alternatively, they may choose to follow the advanced methodology for some or all goods and services purchased and use data on emissions from suppliers.

[2] Table 13 - Indirect emissions from the supply chain, Department for Environment, Food & Rural Affairs, 2012 (updated 2014)

[3] See Appendix C of this document for emissions factors not adjusted for currency and year

USING PRIMARY DATA

This methodology relies on information from suppliers on the GHG emissions associated with the production and supply of goods or services received. There are two potential approaches:

(i) Calculation of supplier or product specific emissions factors

For this method, a company must request specific data from suppliers, from which they can then calculate either a supplier-specific emission factor, or if a supplier has allocated emissions to individual products, product-specific emissions factors.

To calculate supplier-specific emissions factors, suppliers must provide both their total emissions and their total units or value of production. To calculate the emissions factor, use this formula:

[SUPPLIER-SPECIFIC EMISSIONS FACTOR, CO2e PER KG PRODUCTION] =

[TOTAL GHG OF SUPPLIER, KG CO2e] / [TOTAL PRODUCTION, KG]

This factor can then be used by the company to calculate the emissions associated with the proportion of goods they receive. No calculations are needed if a product-specific emissions factor has been provided by the supplier, but companies should verify that the methodologies used for calculation and allocation are robust.

Once you have calculated the supplier-specific emissions factors using the above formulae or you have been given product-specific emissions factors by suppliers then you can calculate your total GHG emissions.
The calculation is:

[EMISSIONS FROM GOOD AND SERVICES, TONNES CO2e] =

([QUANTITY PURCHASED, KG]

X

[SUPPLIER – SPECIFIC EMISSIONS FACTOR, KG CO2e PER KG])/1,000

Below is a working example of a pharmaceutical company calculating emissions based on supplier-specific emissions factors. All names and figures are illustrative only.

GOOD/SERVICE	QUANTITY PURCHASED (KG)	SUPPLIER	SUPPLIER-SPECIFIC EMISSIONS FACTOR (KG CO2e/KG)	TOTAL EMISSIONS (TONNES CO2e)
API	300	Pharma ABC	37.82	11.34
Excipient – starch	9,000	Chemicals XY	1.47	13.23
Excipient – sugar	9,000	Chemicals XY	0.98	8.82
Packaging – glass bottles	18,000	Pack XYZ	2.09	37.6
Packaging – Plastic label and box	4,000	Pack XYZ	0.28	1.12
			TOTAL	72.13

Companies should not only collect the supplier-specific emissions factors for the products and services purchased, but also find out the methodology by which those factors were calculated. Only data from suppliers with a robust cradle-to-gate GHG inventory process should be used for calculating emissions.

To undertake this assessment across the entire range of goods and services procured is complex and resource intensive. Companies using the supplier-data method are likely to find that not all suppliers of goods and services are willing or able to provide accurate emissions factors. This can be overcome by using the data already provided by suppliers to create a set of proxy emissions factors that can then be used for suppliers providing similar goods.

For example, if 100 out of 500 API suppliers provide good emissions factor information, those 100 sets of data can be divided into API type and geography to give a subset of emissions factors that can be used to calculate emissions from the APIs purchased from the remaining 400 suppliers.

(ii) Calculation of emissions based on spend

In many cases, it will not be possible or efficient to calculate emissions at a product level, particularly if a supplier provides a range of goods and services. In this case, is it acceptable to request the total emissions from a supplier and then pro-rate this based on spend. Put another way, this approach requires a company to understand each suppliers' total emissions and their revenue, and then assume that a proportion of this relates to their spend with that supplier.

$$[\text{EMISSIONS FROM GOOD AND SERVICES, TONNES CO2e}] = \frac{([\text{SUPPLIER EMISSIONS, TONNES}] / [\text{SUPPLIER REVENUE, \$}])}{X} \times [\text{COMPANY SPEND WITH SUPPLIER, \$}]$$

Our recommendation is that whichever approach is used, suppliers should provide:

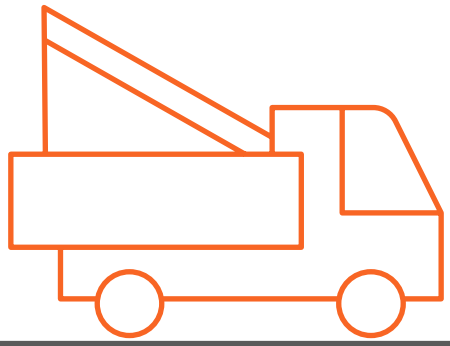
- Emissions factors used
- Details of how emissions were calculated, and data sources used, and whether from primary or secondary sources.
- Description of any verification or assurance carried out. (Preference should be given to verified data.)

CAPITAL GOODS CATEGORY 2

All upstream (i.e., cradle-to-gate) emissions from the production of capital goods purchased or acquired by the reporting company. Capital goods are final products that have an extended life and are used by the company to manufacture a product, provide a service, or sell, store, and deliver merchandise.

The calculation methods for category 1 (Purchased goods and services) and category 2 (Capital goods) follow the same logic. For guidance on calculating emissions from category 2 (Capital goods), refer to the guidance in the previous section for category 1 (Purchased goods and services).

Below are the relevant emissions factors for capital goods taken from the UK government figures[4].



CATEGORY / SUB CATEGORY	SUGGESTED EMISSION FACTOR (KG CO2e PER US$)
COMPUTER, ELECTRONIC AND OPTICAL PRODUCTS	0.645
ELECTRICAL EQUIPMENT	0.973
MACHINERY AND EQUIPMENT	0.878
MOTOR VEHICLES, TRAILERS AND SEMI-TRAILERS	0.964
CONSTRUCTION	0.587

For the original emissions not adjusted for currency or inflation, see appendix C of this document.

[4] Table 13 - Indirect emissions from the supply chain, Department for Environment, Food & Rural Affairs, 2012 (updated 2014)

FUEL AND ENERGY-RELATED ACTIVITIES CATEGORY 3

This category includes: emissions from the extraction, production and transportation of fuels consumed, including fuels consumed in the generation of electricity, steam, heating and cooling; from energy purchased and from the generation of energy consumed in a transmission and distribution system by the reporting company in the reporting year. Emissions associated with the combustion of fuels, or the combustion of fuels to produce electricity are excluded from this category.

Fuel and energy-related activities emissions are calculated by using secondary (e.g. industry average) emission factors for upstream emissions per unit of consumption. It relies on a knowledge of what and how much fuel is used.

This information should be available based on scope 1 and 2 emissions calculations for your organisation. For electricity, the country of generation should also be recorded.

Often 'Well to Tank' (WTT) emissions factors will already be available from when your scope 1 GHG inventory was calculated. If they are not available, we suggest using the UK Government's 'Well to Tank' (WTT) emissions factors to calculate emissions for this category[5]. To be consistent throughout this document, we have used UK based emission factors, but we would like to reiterate that reporting companies can use other viable alternatives if they want.

For fuel, the calculation is:

[FUEL AND ENERGY-RELATED ACTIVITIES – FUEL, TONNES CO2e] =

([FUEL USED, KWH]

X

[WTT EMISSIONS FACTOR, KG CO2e PER KWH])/1,000

For electricity, the calculation is:

[FUEL AND ENERGY-RELATED ACTIVITIES – ELECTRICITY, TONNES CO2e] =

([ELECTRICITY USED, KWH]

X

[WTT EMISSIONS FACTOR, KG CO2e PER KWH])/1,000

To calculate emissions from transmission and distribution losses, please follow the same calculation logic as for WTT but replace the emissions factor with T&D emission factors.

[5] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

UPSTREAM TRANSPORTATION AND DISTRIBUTION CATEGORY 4

Emissions from the transportation and distribution of products purchased by the reporting company in vehicles/facilities not owned or operated by the reporting company. It also includes emissions from transportation and distribution services purchased by the reporting company (either directly or through an intermediary), including outbound logistics for sold products, inbound logistics and transportation and distribution between a company's own facilities.

Calculating emissions associated with the distribution of goods and services to the company from a supplier is not a straightforward process. There is no simple way to use proxy data – like spend – as it is unlikely that suppliers will itemise distribution costs. Given this, we propose using a distance-based methodology that requires a company to either estimate the mode of distribution (e.g., rail, sea or air) and the distance the goods have been transported, or to ask this directly of suppliers. In practice, it may be better to use a sample of supplier information to use as a proxy.

The distance-method involves determining the mass, distance, and mode of each shipment, then applying the appropriate mass-distance emissions factor for the vehicle used. These emissions factors are measured in emissions for one tonne of goods transported over one kilometre (kg CO2e per tonne-km), or emissions for one twenty-foot container equivalent of goods transported over one kilometre (kg CO2e per TEU-km).

Emissions factors can vary by vehicle, region, or country, and companies should be careful in selecting factors which most closely resemble their supply chain logistics context. In the US and the UK, there are government databases with transport emissions factors[6,7].

The calculation is:

[EMISSIONS FROM UPSTREAM TRANSPORTATION AND DISTRIBUTION, TONNES CO2e] =

([MASS OF GOODS, KG]

X

[DISTANCE TRAVELLED, KM]

X

[EMISSIONS FACTOR, KG CO2e PER TONNE-KM])/1,000

For example:

ITEM TRANSPORTED	MASS OR VOLUME OF GOODS (TONNES)	DISTANCE TRAVELLED (KM)	VEHICLE CLASS	VEHICLE TYPE EMISSIONS FACTOR (KG CO2e/TONNE OR TEU/KM)	TOTAL EMISSIONS (TONNES CO2e)
API	0.3	300	HGV refrigerated, rigid (>3.5-7t)	0.619	0.06
Chemicals	9	800	HGV rigid (>17t)	0.218	1.57
Chemicals	10.62	9600	Container ship (8,000 TEU+)	0.013	1.28
Packaging	22	500	HGV articulated (>33t)	0.090	0.99
				TOTAL	3.90

[6] UK government GHG Conversion Factors 2020, developed by Department for Business, Energy & Industrial Strategy

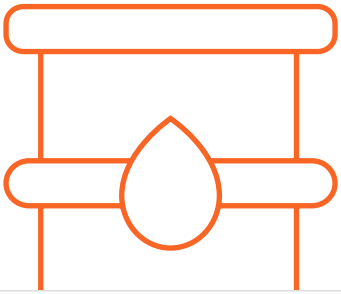
[7] U.S. EPA Climate Leaders GHG Inventory Protocol, Optional Emissions from Commuting, Business Travel and Product Transport

WASTE GENERATED IN OPERATIONS CATEGORY 5

Emissions from third-party disposal and treatment of waste that is generated in the company's owned or controlled operations. This category includes emissions from disposal of both solid and liquid waste, as well as waste water. Only waste treatment in facilities owned or operated by third parties is included in scope 3.

The information required for this category is the following:

- Amount and type of waste produced by each reporting company site
- Type of treatment performed
- Amount and type of wastewater produced by site and sent to external treatment facilities



ASSUMPTIONS

All hazardous waste is considered as incinerated. The emission factors used should come from a recognized database. Non-hazardous waste is considered as municipal waste, and waste that is recycled are considered material-related (e.g.: paper/cardboard, plastic, metal, etc.).

Waste treatment at facilities owned or controlled by the reporting company is accounted for in scope 1 and scope 2. Treatment of waste generated in operations is categorized as an upstream scope 3 category because waste management services are purchased by the reporting company.

We do not recommend reporting emissions from the transportation of waste, since these will not be material to the final emissions figure for this category.

The calculation is:

[EMISSIONS FROM WASTE GENERATED IN OPERATIONS, TONNES CO2e] =

[MASS OF WASTE, KG]

X

[% BY DISPOSAL METHOD]

X

[EMISSIONS FACTOR FOR DISPOSAL METHOD]/1,000

For example:

	DISPOSAL METHOD	EMISSIONS FACTOR CO2e/KG
COMMERCIAL AND INDUSTRIAL WASTE	Recycling	0.0214
	Landfill	0.458
	Incineration	0.0214
WASTE WATER	Effluent treatment plant	0.708

Emissions factors in this table come from the UK government GHG conversion factors database[8].

[8] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

BUSINESS TRAVEL CATEGORY 6

Emissions from the transportation of employees for business-related activities in vehicles owned or operated by third parties, such as aircrafts, trains, buses, and passenger cars. This should not include any vehicles owned or controlled by the company.

By far the most significant emissions from business travel for pharmaceutical companies relates to air travel, which is the most carbon intensive mode of travel and so should be the place to start. The simplest approach to is to ask travel agencies for distances travelled. However, it is often not possible to get this data and only spend data is available.

In this case it is important to understand the details of the journeys undertaken – including the origin and destination. From this information estimates then need to be made to determine the distances travelled and by which mode. For air travel it is important to distinguish between short and long-haul and business and economy journeys, as different emissions factors apply to each of these.

The calculation is:

[EMISSIONS FROM BUSINESS TRAVEL, TONNES CO2e] =

[DISTANCE TRAVELLED, KM]

X

[EMISSIONS FACTOR, KG CO2e/ PASSENGER KM]/1,000

The emissions factors below are a selection from the UK government GHG conversion factors[9]. Once again we have used UK based emission factors for consistency across this document, however reporting companies can use other sources for this calculation.

TRAVEL TYPE	DISTANCE (KM)	EMISSIONS FACTOR (KG CO2e/ PASSENGER KM)	TOTAL EMISSIONS (TONNES CO2e)
Flight- Short haul, economy class	55,463,471	0.153	8,485.91
Flight- Long haul, economy class	34,883,322	0.146	5,092.97
Flight- Short haul, business class	293,910	0.229	67.31
Flight- Long haul, business class	244,587,745	0.424	103,705.20
National rail- passenger	83,155,687	0.036	2,993.60
Ferry- average	52,467	0.113	5.93
Car- average, petrol	45,912,347	0.174	7,988.75
Car- average, diesel	12,548,892	0.168	2,108.21
Taxi	541,266	0.145	78.45
Coach	56,211	0.273	15.35
Bus	127,368	0.103	13.12
		TOTAL	130,554.83

All emissions related to car travel by sales representatives should be included in Scope 1, as the car is paid for by the reporting company. Sales representatives' emissions related to taxis and public transport should be included in Scope 3 under business travel.

Emissions relating to subsistence and accommodation (i.e., hotel nights) have been excluded on the basis of significance and the challenges associated with calculating a representative potential emissions factor. This could be done on a case by case basis if a company thought there was a particularly high proportion of hotel stays in one location over an annual period (for example, near the company HQ).

[9] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

EMPLOYEE COMMUTING CATEGORY 7

This category includes emissions from the transportation of employees between their homes and their worksites.

We suggest that companies do not include emissions from remote working in this category, as the calculation process is not worthwhile for the emissions that could be measured.

USING SECONDARY DATA

For most companies, employee commuting will not be a materially significant category, and we recommend that the average data method is used. Companies should estimate:

- The average commuting distance for each work site
- The likely mode of transport as a % of the workforce at each site
- The number of commuting days in a year

For this example, we have used the UK Government GHG Conversion Factors for Company Reporting, 2018, averaging the diesel and petrol emissions factors for car travel. We multiply the average commute distance by 2 to account for the return journey each day.

The calculation is:

EMISSIONS FROM EMPLOYEE COMMUTING, TONNES CO2e =

[NUMBER OF EMPLOYEES]
X
[AVERAGE COMMUTE X 2]
X
[COMMUTING DAYS]
X
[% OF DISTANCE FOR EACH TRANSPORT TYPE]
X
[EMISSIONS FACTOR] /1,000

Employee travel emissions calculations for standard methodology.

LOCATION	EMPLOYEES	AVERAGE COMMUTE KM	COMMUTING DAYS	CAR (0.18KG/KM)	RAIL (0.044KG/KM)	SUBWAY (0.038KG/KM)	BUS (0.10KG/KM)	BIKE/ WALK (0KG/KM)	TOTAL EMISSIONS (TONNES CO2e)
London	12,000	35	230	5%	35%	35%	15%	10%	10,181.64
Peterborough, UK	600	15	230	70%	10%	0%	20%	0%	622.66
Chicago, US	2,500	45	240	60%	0%	25%	5%	10%	6,615.00
Chicago, US	3,500	45	240	60%	10%	10%	0%	20%	8,784.72
Peterborough, UK	8,600	20	230	65%	0%	20%	10%	5%	10,649.55
								TOTAL	36,833.59

USING PRIMARY DATA

Companies with the resources or easily available data may wish to collect actual commuting distances and transport types from employees and use the distance-based method. It may be easier to survey only a smaller sample of employees and extrapolate up to the total employee number.

Companies should collect data on:

- Total distance travelled by employees over the reporting period (e.g., passenger-kilometres travelled)
- Mode of transport used for commuting (e.g., train, subway, bus, car, bicycle).
- Number of days per year commuting to work.

The calculation using the distance-based method will follow the same logic as the calculations for business travel. We recommend using emissions factors from the country or region that employees are based in.

UPSTREAM LEASED ASSETS CATEGORY 8

Emissions from the operation of assets that are leased by the company and not already included in the company's scope 1 or scope 2 inventories.

In most cases, it is unlikely that the emissions associated with leased assets are significant or are not under the operational control of the company. In the case of the latter, where the pharmaceutical company has control then the emissions associated with these assets – for example, office or laboratory space – should be treated as scope 1 or 2 emissions (rather than scope 3).

In the case where there is no operational control, the company should seek to obtain emissions data relating to the total building and the pro-rate this emission based on the floor area occupied. This data should be readily available from the leasing company or their agent.

IN MOST CASES, IT IS UNLIKELY THAT THE EMISSIONS ASSOCIATED WITH LEASED ASSETS ARE SIGNIFICANT OR ARE NOT UNDER THE OPERATIONAL CONTROL OF THE COMPANY.

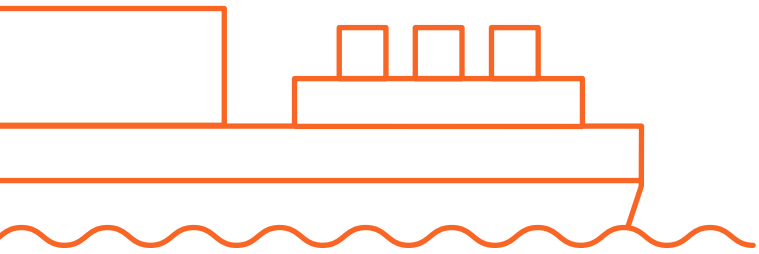
DOWNSTREAM TRANSPORT AND DISTRIBUTION CATEGORY 9

*Emissions from transportation and distribution of products sold by the reporting company between the company's operation and the end consumer, **if not paid for by the reporting company**, in vehicles and facilities not owned or controlled by the reporting company.*

For the pharmaceutical industry, this category will include the transport of medicines to wholesalers, hospitals and pharmacies, as well as patient travel to pharmacies, doctors, and hospitals to collect medicine.

Spend data will not be available for transport not paid for by the reporting company, and so we suggest estimating for activity data (patient travel, distances for product delivery etc.) and the use of emissions factors databases using average data.

We suggest leaving refrigeration of products during travel and the warehousing of products (refrigerated or not) out of these calculations as the work involved will not be proportionate to the extra emissions estimated.



METHODOLOGY FOR PRODUCT TRANSPORTATION AND DISTRIBUTION

If companies have internal systems that record the distance and transport mode used to deliver products to customers where the company does not pay for distribution, these figures should be used. If this is not available, the methodology below should be used instead.

- Companies will have to collect information on the mass of products sold where the company does not pay for transport and distribution
- Then companies will have to estimate distances their products travel to wholesalers, hospitals and pharmacies.

If transport of products where the reporting company does not pay for transport is negligible, we suggest not calculating emissions.

Where there is significant spend on transporting the reporting company's products, companies should calculate distances from their top five distribution centres to delivery points (only at destinations where transport is not paid for by the reporting company), look up the distance travelled by the top customer at each distribution centre, and use these distances as a proxy for all other products. This will provide an acceptable level of accuracy without incurring large amounts of research time.

We have used UK government emissions factors for freighting goods[10], a selection of which we use in the example calculation below.

VEHICLE CLASS	MASS OR VOLUME OF GOODS (TONNES)	DISTANCE TRAVELLED (KM)	VEHICLE TYPE EMISSIONS FACTOR (KG CO2e/TONNE OR TEU/KM)	TOTAL EMISSIONS (TONNES CO2e)
HGV refrigerated, rigid (>3.5-7t)	1000	1,500	0.619	928.06
Short haul flight to/from UK	100	1,800	2.209	397.62
Container ship (8,000 TEU+)	1000	9600	0.013	120.94
			TOTAL	1,446.62

[10] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

USING PRIMARY DATA

If emissions are significant and companies want to improve the accuracy of calculations, more data should be sought from more company sites on distances travelled by products.

METHODOLOGY FOR PATIENT TRAVEL FOR PICK-UP OF MEDICAL PRODUCTS

Companies should collect data from internal systems on the number of products sold directly to customers, prescription products or over the counter items, for instance by box or bottle. (We account for purchases by individual products, not by mass, or value, as this is how patients buy OTC items).

To calculate emissions, we suggest using the following assumptions for a European context:

- Average journey of 8km (return trips of 4km each way). We use the French national statistics bureau data for convenience store shopping[11].
- Car emissions factor of 0.174kg CO2e per km travelled. We use the UK government conversion factor for a medium sized petrol car.
- 50% of journeys by car. (Our estimate, but likely higher in North America, and lower in the rest of the world.)
- 30% of the journey attributable to medical product. (Our estimate, based on the fact that other items may be purchased, and more than one medical product will be bought per journey.)

The formula will be:

[AVERAGE JOURNEY DISTANCE]
X
[% CAR USE FOR MEDICAL PRODUCTS]
X
[% OF JOURNEY ATTRIBUTED PER PRODUCT]
X
[NUMBER OF PRODUCTS SOLD]
X
[EMISSIONS FACTOR KG CO2e/KM]/1000

= TOTAL TONNES CO2e

Calculating patient emissions using the above formula

JOURNEY DISTANCE KM	CAR USE FOR PURCHASE OF MEDICAL PRODUCTS	JOURNEY ATTRIBUTED PER MEDICAL PRODUCT	NUMBER OF PRODUCTS SOLD	CAR EMISSIONS FACTOR (KG CO2e / KM)	TOTAL EMISSIONS (TONNES CO2e)
8	50%	30%	10,000,000	0.174	2,082.36

[11] https://www.insee.fr/fr/statistiques/1281145

PROCESSING OF SOLD PRODUCTS CATEGORY 10

Emissions from processing of intermediate products by third parties (e.g., manufacturers) subsequent to sale by the reporting company. This category does not include emissions from the manufacture of the intermediate product or use of the end product bought by the consumer.

If the reporting company produces APIs that are sold to other pharmaceutical companies, which manufacture final medicines using those APIs, the GHG emissions related to the processing of these APIs into final medicines at clients' plants is part of this category.

If the Reporting Company produces semi-finished products that are sold to other pharmaceutical companies, which package these semi-finished products before selling the final products to end-users, the GHG emissions related to the processing of these semi-finished products into final product is part of this category.

The standard or advance calculation method specified for category 1 (purchase on goods and services) can then be used to determine emissions associated with the processing of these products.

USE OF SOLD PRODUCTS CATEGORY 11

Emissions from the use of goods and services sold by the reporting company in the reporting year. The scope 3 emissions from use of sold products includes the scope 1 and 2 emissions of end users.

Emissions are divided into emissions from direct use devices (e.g. electricity-using medical devices), and emissions from indirect use devices (e.g. Refrigeration of medicine). We recommend that reporting companies evaluate which categories their products may fall in and focus on the products with the largest footprint and where they have the most influence over. Emissions from indirect use devices are likely to be much smaller, and therefore should only be tackled by companies at an advanced stage of emissions calculations.

STANDARD METHODOLOGY

- Emissions from direct use devices:
  1. products that consume energy during their use such as cars, electrical goods, or software
  2. fuels and feedstocks such as petrol, natural gas, biofuels
  3. greenhouse gases or products that emit greenhouse gases like CO2, CH4, N2O, refrigeration and air-conditioning equipment, industrial gases, fertiliser, and inhalers.

For the pharmaceutical industry this includes electrical medical equipment, and emissions from use of propellant based inhalers by patients.

DIRECT USE DEVICES ACTIVITY DATA

The data below should be collected from product managers and designers, from consumer surveys, and from internal systems. It is likely that in some cases these will be estimates:

- Total lifetime expected uses of product(s)
- Quantities of products sold
- Where the product is sold
- Electricity consumption per use of product, and likely use pattern
- For inhalers, type of propellant used, and quantity emitted per use

CALCULATING EMISSIONS FOR DIRECT USE DEVICES

Calculating emissions for devices relies on a clear understanding of how these products are used. Individual companies are best placed to know the attributes of the products they sell and can reasonably estimate how they are used. The following calculation needs to be repeated for each device type or grouping of devices.

[EMISSIONS FROM DIRECT USE DEVICES, TONNES CO2e]

([NUMBER OF DEVICES SOLD, UNITS]

X

[LIFETIME USES]

X

[ELECTRICITY CONSUMPTION PER USE, KWH]

X

[EMISSIONS FACTOR, KG CO2e PER KWH])/1,000

Electricity grid emissions factors should be used relating to the country in which these products are used. Country level emissions factors are available from the International Energy Agency .

The example below shows how to calculate direct use phase emissions for a medical device (a physiological Monitoring System), assuming a device is used 270 days a year for 12 hours a day, with an average power consumption of 120W, and that it has a useful life of 5 years.

MEDICAL DEVICE	NUMBER SOLD IN PERIOD (UNITS)	LIFETIME USES	ELECTRICITY CONSUMPTION PER USE (KWH)	COUNTRY OF USE	EMISSIONS FACTOR (KG CO2e PER KWH)	TOTAL EMISSIONS (TONNES CO2e)
Physiological Monitoring System	7,500	1,350	1.44	UK	0.233	3,397.14

CALCULATING EMISSIONS FROM INHALERS

Inhaler emissions are likely to be significant given the high global warming potential (GWP) of propellants used. The table below describes the GWP relative to CO2, for the two most commonly used hydrofluorocarbon (HFC) propellants, HFC 134a and HFC 227ea, adapted by GHG Protocol from the IPCC Fifth Assessment Report, 2014 (AR5).

NAME	CHEMICAL FORMULAE	GWP TO CO2
HFC-134A	CH_2FCF_3	1,300
HFC-227EA	CF_3CHFCF_3	3,350

The calculation that should be used to calculate emissions from inhalers is:

$$[\text{EMISSIONS FROM INHALERS, TONNES CO2e}] = \frac{([\text{NUMBER OF INHALERS SOLD, UNITS}] \times [\text{MASS OF PROPELLANT USED, KG}] \times [\text{GWP OF PROPELLANT}])/1{,}000}{}$$

For example, the table below shows the calculation of emissions for 50,000 inhalers that contain 6.68g each of the propellant HFA 134a.

ITEM	NUMBER SOLD	PROPELLANT	PROPELLANT PER UNIT KG	GWP CO2e	TOTAL EMISSIONS (TONNES CO2e)
Inhaler	50,000	HFA 134A	0.068	1300	4,420.00

USING PRIMARY DATA

- Emissions from indirect use devices:
  1. Products that consume energy indirectly during use, such as clothing which requires washing and drying, or products that require refrigeration such as food, or products that require hot water such as detergents.

For the pharmaceutical industry, this relates to refrigeration of vaccines and biological medicines, and trips made to patients by medical staff and veterinary staff.

CALCULATING EMISSIONS FROM REFRIGERATION

Refrigerated storage should be calculated using estimations for energy use and storage times, as primary data is difficult to obtain. Energy used for refrigeration at wholesalers and pharmacies is estimated to be 40 kWh/m3 per year, and average storage time at 90 days.

Activity data is the number of boxes of product sold, and the volume of product box in m3 (volume stored is considered to be three times the volume of the product packaged).

CALCULATING EMISSIONS

The calculation for refrigeration is:

[REFRIGERATION EMISSIONS, TONNES CO2e] =

[PRODUCT SOLD]
X
[VOLUME PER BOX]
X
[STORAGE TIME]
X
[REFRIGERATION ENERGY]
X
[EMISSIONS FACTOR]/1,000

ITEM	NUMBER OF PRODUCT BOXES SOLD	VOLUME PER BOX (M3)	STORAGE TIME (YEARS)	REFRIGERATION ENERGY (KWH/M3/YEAR)	EMISSIONS FACTOR (KG CO2e/KWH)	TOTAL EMISSIONS (TONNES CO2e)
Vaccine	1,000	3	0.25	40	0.233	6.99

CALCULATING EMISSIONS FROM NURSE AND VET TRIPS

Injection products and vet trips require a nurse to travel to someone's home, except insulin, of which we can assume 50% is self-injected. We can assume a 5km average trip travelled in Europe, and that a medium sized family car will be used.

Activity data is the number of injectable products sold and delivered at patients' homes, assuming one trip per product.

The calculation is for nurse and vet trips is:

[NURSE AND VET TRIP EMISSIONS, TONNES CO2e] =

[PRODUCT SOLD]
X
[DISTANCE PER TRIP]
X
[EMISSIONS FACTOR FOR VEHICLE]/1,000

TRAVEL TYPE	PRODUCTS SOLD (TRIPS MADE)	DISTANCE PER TRIP (KM)	EMISSIONS FACTOR (KG CO2e/ PASSENGER KM)	TOTAL EMISSIONS (TONNES CO2e)
Car- average, petrol	1,000	10	0.174	1.74

END OF LIFE TREATMENT OF SOLD PRODUCTS CATEGORY 12

Emissions from the waste disposal and the treatment of all products sold by the reporting company at the end of their life, during the reporting year.

We recommend using the secondary data emissions factors and average data, as companies should have easy access to the mass of their products and the packaging used and can obtain good average-data emissions factors relating to the mass of the sold products. Companies should collect:

- Total mass of packaging from the point of sale by the reporting company to the end-of-life after consumer use (e.g., packaging used to transport products through to the point of retail and any packaging that is disposed of prior to the end-of-life of the final product). This data may be available in the EU, via information submitted as part of the Producer Responsibility Regulations.
- Proportion of this waste being treated by different methods (e.g., percent landfilled, incinerated, recycled).
- Typical routes of waste disposal within markets, including recycling and waste to landfill.

The calculation is:

[EMISSIONS FROM END OF LIFE TREATMENT OF SOLD PRODUCTS, TONNES CO2e] =

[MASS OF PRODUCT PACKAGING, KG]
X
[% BY DISPOSAL METHOD]
X
[EMISSIONS FACTOR FOR DISPOSAL METHOD, KG CO2e PER KG DISPOSED]/1,000

In the example below, we use UK recycling rates.

	MASS (KG)	DISPOSAL METHOD	PERCENT (%)	EMISSIONS FACTOR (CO2e/KG)	TOTAL EMISSIONS (TONNES CO2e)
Glass bottles	1,057,763	Landfill	14.30%	0.0090	1.36
	1,057,763	Recycling	71.40%	0.0214	16.16
	1,057,763	Incineration	14.30%	0.0214	3.24
Plastic label / box	235,058	Landfill	14.30%	0.0090	0.3
	235,058	Recycling	71.40%	0.0214	3.59
	235,058	Incineration	14.30%	0.0214	0.72
Cardboard packing	65,935	Landfill	14.30%	1.0419	9.82
	65,935	Recycling	71.40%	0.0214	1.01
	65,935	Incineration	14.30%	0.0214	0.2
				TOTAL	36.40

DOWNSTREAM LEASED ASSETS CATEGORY 13

This category is applicable to lessors, i.e. companies that receive payments from lessees. This category includes emissions from the operation of assets that are owned by the reporting company, acting as lessor, and leased to other entities in the reporting year that are not already included in scope1 or scope2.

Please refer to category 8.

FRANCHISES CATEGORY 14

This category includes emissions from the operation of franchises not included in scope 1 or scope 2. A franchise is a business operating under a license to sell or distribute another company's goods or services within a certain location.

Not relevant for the pharmaceutical industry.

INVESTMENTS CATEGORY 15

This category is not material to pharmaceutical companies. Page 51 of the GHG Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard says that:

"This category is applicable to investors (i.e., companies that make an investment with the objective of making a profit) and companies that provide financial services. Category 15 is designed primarily for private financial institutions (e.g., commercial banks), but is also relevant to public financial institutions (e.g., multilateral development banks, export credit agencies, etc.) and other entities with investments not included in scope 1 and scope 2."

There may be certain circumstances through which a pharmaceutical may make a financial investment, for example, through the acquisition of a business, patent or technology. In most cases the emissions associated with these investments will be captured within the business' own scope 1 and 2 emissions in time. However, there may be certain situation where this is not the case or where their business does not have operational control – for example, if the company makes a minority investment in a joint venture. The recommendation is these be treated on a case by case basis to ensure that the associated emissions are properly captured and distributed between business partners.

LIMITATIONS AND AREAS FOR DEVELOPMENT

LIMITATIONS

Our approach simplifies a complex process. We think this guidance will enable companies to meet the goal of emissions reduction without diverting limited internal resource to many hours of data collection, verification, and analysis.

However, this approach does necessarily involve a loss of accuracy, and companies should be aware of those limitations:

1. **Secondary data can be a blunt tool.** The average spend-based method calculates emissions by collecting data on the economic value of purchased goods and services and multiplying them by the relevant Environmentally-Extended Input Output (EEIO) emission factors.

   EEIO models estimate GHG emissions in supply chain activities by allocating national GHG emissions to groups of finished products, based on economic flows between industry sectors. However, this whole-economy approach means that many individual products and processes fall under broad categories, and products of different monetary value within a sector cannot be accounted for. In the pharmaceutical industry, this means that cheaper generic medicines are lumped together with more expensive blockbuster drugs. EEIO databases are also often limited to one country.

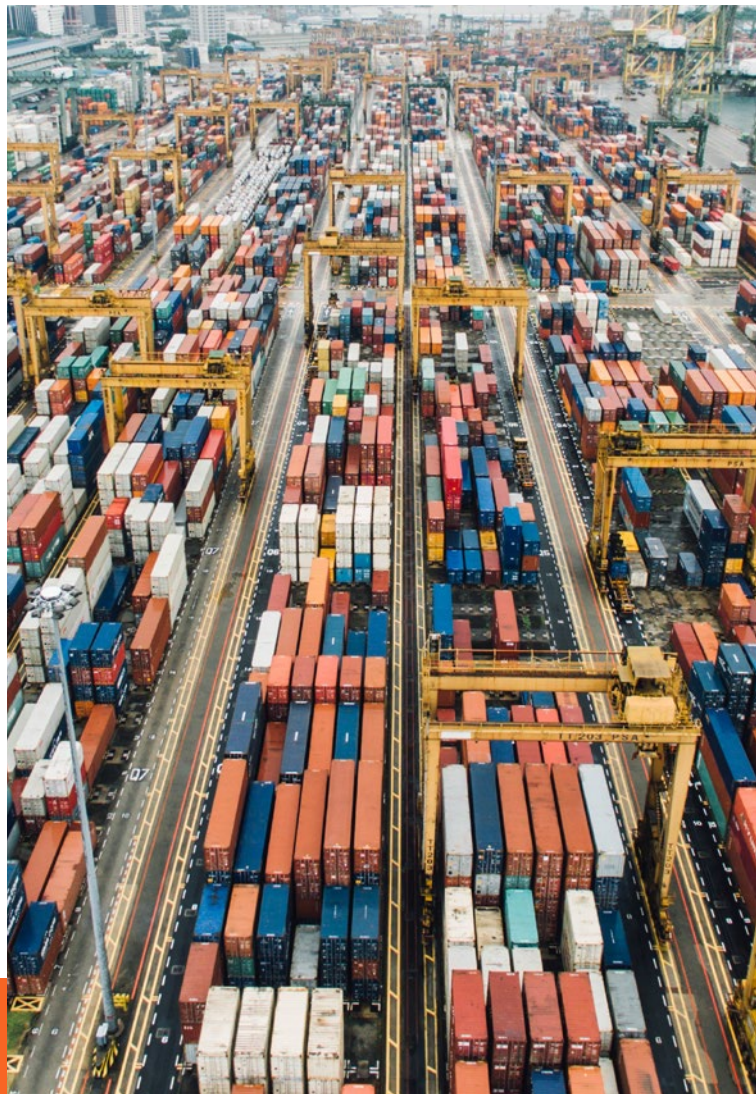
2. **Focusing effort on material categories risks missing changes**. Materiality analysis should not be done once, and should also be carried out at the start, and at the end of the calculation process. It should also be repeated on an annual basis to consider changes to the business.

3. **Bad primary data can be less reliable than secondary data**. If suppliers do not use robust emission calculation methods, or if they do not accurately allocate emissions to the products or services sold to the reporting company, emissions can be less accurate than secondary data which is produced using reliable methods. It is therefore vital to understand suppliers' data calculation methods, and to help them improve if necessary.

AREAS FOR DEVELOPMENT

To overcome these limitations, companies from the industry can pool data from their work with suppliers and other value chain partners to create a pharma-specific lifecycle emissions database.

This can be done by collecting submissions from partners who have done their own scope 1 & 2 emissions calculations at a product level, and creating emissions factors based on an average for those products. This process would become more accurate over time and would be only for average data emissions factors (using mass or other units of measure for products), which is often more accurate, and would preserve pricing confidentiality.



APPENDIX A: SCOPE 3 CATEGORIES AND BOUNDARIES

CATEGORY UPSTREAM EMISSIONS	CATEGORY DESCRIPTION	MINIMUM BOUNDARY
1-PURCHASE OF GOODS AND SERVICES	Extraction, production, and transportation of goods and services purchased or acquired by the reporting company in the reporting year, not otherwise included in Categories 2-8	All upstream (cradle-to-gate) emissions of purchased goods and services
2-CAPITAL GOODS	Extraction, production, and transportation of capital goods purchased or acquired by the reporting company in the reporting year	All upstream (cradle-to-gate) emissions of purchased capital goods
3-FUEL- AND ENERGY-RELATED ACTIVITIES	Extraction, production, and transportation of fuels and energy purchased or acquired by the reporting company in the reporting year, 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	a. For upstream emissions of purchased fuels: All upstream (cradle-to-gate) emissions of purchased fuels (from raw material extraction up to the point of, but excluding combustion) b. For upstream emissions of purchased electricity: All upstream (cradle-to-gate) emissions of purchased fuels (from raw material extraction up to the point of, but excluding, combustion by a power generator) c. For T&D losses: All upstream (cradle-to-gate) emissions of energy consumed in a T&D system, including emissions from combustion d. For generation of purchased electricity that is sold to end users: Emissions From the generation of purchased energy
4-UPSTREAM TRANSPORTATION AND DISTRIBUTION	Transportation and distribution of products purchased by the reporting company in the reporting year between a company's tier 1 suppliers and its own operations (in vehicles and facilities not owned or controlled by the reporting company) Transportation and distribution services purchased by the reporting company in the reporting year, 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)	The scope 1 and scope 2 emissions of transportation and distribution providers that occur during use of vehicles and facilities (e.g., from energy use) **Optional:** The life cycle emissions associated with manufacturing vehicles, facilities, or infrastructure
5-WASTE GENERATED IN OPERATIONS	Disposal and treatment of waste generated in the reporting company's operations in the reporting year (in facilities not owned or controlled by the reporting company)	The scope 1 and scope 2 emissions of waste management suppliers that occur during disposal or treatment **Optional:** Emissions from transportation of waste

6-BUSINESS TRAVEL	Transportation of employees for business-related activities during the reporting year (in vehicles not owned or operated by the reporting company)	The scope 1 and scope 2 emissions of transportation carriers that occur during use of vehicles (e.g., from energy use) **Optional:** The life cycle emissions associated with manufacturing vehicles or infrastructure
7-EMPLOYEE COMMUTING	Transportation of employees between their homes and their worksites during the reporting year (in vehicles not owned or operated by the reporting company)	The scope 1 and scope 2 emissions of employees and transportation providers that occur during use of vehicles (e.g., from energy use) **Optional:** Emissions from employee teleworking
8-UPSTREAM LEASED ASSETS	Operation of assets leased by the reporting company (lessee) in the reporting year and not included in scope 1 and scope 2-reported by lessee	The scope 1 and scope 2 emissions of lessors that occur during the reporting company's operation of leased assets (e.g., from energy use) **Optional:** The life cycle emissions associated with manufacturing or constructing leased assets
9-DOWNSTREAM TRANSPORTATION AND DISTRIBUTION	Transportation and distribution of products sold by the reporting company in the reporting year 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)	The scope 1 and scope 2 emissions of transportation providers, distributors, and retailers that occur during use of vehicles and facilities (e.g., from energy use) **Optional:** The life cycle emissions associated with manufacturing vehicles, facilities, or infrastructure
10-PROCESSING OF SOLD PRODUCTS	Processing of intermediate products sold in the reporting year by downstream companies (e.g., manufacturers)	The scope 1 and scope 2 emissions of downstream companies that occur during processing (e.g., from energy use)
11-USE OF SOLD PRODUCTS	End use of goods and services sold by the reporting company in the reporting year	The direct use-phase emissions of sold products over their expected lifetime (i.e., the scope 1 and scope 2 emission of end users that occur from the use of: products that directly consume energy (fuels or electricity) during use; fuels and feedstocks; and GHGs and products that contain or form GHGs that are emitted during use) **Optional:** The indirect use-phase emissions of sold products over their expected lifetime (i.e., emissions from the use of products that indirectly consume energy (fuels or electricity) during use)
12-END-OF-LIFE TREATMENT OF SOLD PRODUCTS	Waste disposal and treatment of products sold by the reporting company (in the reporting year) at the end of their life	The scope 1 and scope 2 emissions of waste management companies that occur during disposal or treatment of sold products
13-DOWNSTREAM LEASED ASSETS	Operation of assets owned by the reporting company (lessor) and leased to other entities in the reporting year, not included in scope 1 and scope 2-reported by lessor	The scope 1 and scope 2 emissions of lessees that occur during operation of leased assets (e.g., from energy use) **Optional:** The life cycle emissions associated with manufacturing or constructing leased assets
14-FRANCHISES	Operation of franchises in the reporting year, not included in scope 1 and scope 2- reported by franchisor	The scope 1 and scope 2 emissions of franchisees that occur during operation of franchises (e.g., from energy use) **Optional:** The life cycle emissions associated with manufacturing or constructing franchises
15-INVESTMENTS	Operation of investments (including equity and debt investments and project finance) in the reporting year, not included in scope 1 or scope 2	See the description of category 15 (Investments) in section 5.5 for the required and optional boundaries

APPENDIX B: PROVIDERS OF EMISSIONS FACTORS

ENVIRONMENTAL EXTENDED INPUT-OUTPUT FACTORS

DATABASE AND PROVIDER	GEOGRAPHY	YEAR
3EID Database, Center for Global Environmental Research, National Institute for Environmental Studies	Japan	2005
EIO-LCA Database, Carnegie Mellon University	US	2002
Indirect emissions from supply chain, UK government (DEFRA)	UK	2014
USEEIO, US government (EPA)	US	2017
ADEME Database French Environmental Agency (ADEME)	Fr	2018

PUBLICLY AVAILABLE CONVERSION FACTOR DATABASES

DATABASE AND PROVIDER	GEOGRAPHY	YEAR
GHG Conversion Factors for Company Reporting, UK government (BEIS)	UK	2020
Center for Corporate Climate Leadership GHG Emission Factors Hub, US government (EPA)	US	2020
Facteur de conversion – Base Carbone, ADEME	Fr	2020
Emission Factors for Greenhouse Gas Inventories, US government (EPA)	US	2020

COMMERCIAL DATABASES

We do not recommend any particular database, the two below are used by PEG participant companies

DATABASE AND PROVIDER	GEOGRAPHY
Comprehensive Environmental Data Archive (CEDA)	US
Ecoinvent Database	Global
Exiobase	Global
Gabi Databases	Global

SCREENING TOOLS

Screening tools help companies complete a first, rough approximation of their full scope 3 footprint

DATABASE AND PROVIDER	GEOGRAPHY
Quantis Scope 3 Evaluator	Global

TOPIC AND COUNTRY-SPECIFIC DATABASES can be found at the GHG Protocol's website.

APPENDIX C: UK GOVERNMENT SUPPLY CHAIN EMISSIONS FACTORS

The figures below are taken from a larger dataset- Indirect emissions from the supply chain, Department for Environment, Food & Rural Affairs, 2012 (updated 2014). Emission factors relate to 2011.

CATEGORY / SUB CATEGORY	EMISSIONS FACTOR US DOLLARS (KG CO2e PER $US) 2019	EMISSIONS FACTOR GB POUNDS (KG CO2e PER £GBP) 2011	EMISSIONS FACTOR GB POUNDS (KG CO2e PER £GBP) 2019
GOODS AND SERVICES			
Packaging			
Paper	1.858	1.184	1.456
Glass	3.431	2.186	2.688
Plastic	1.507	0.96	1.180
Raw materials			
API / Intermediates / Preparations	0.541	0.345	0.424
Bulk chemicals	1.110	0.707	0.869
Excipients	1.792	1.142	1.405
Other chemical products	2.466	1.571	1.932
Research & Development	0.380	0.242	0.297
Information services	0.276	0.176	0.216
General & Administration	0.281	0.179	0.220
CAPITAL GOODS			
Computer, electronic and optical products	0.645	0.4107	0.505
Electrical equipment	0.973	0.6202	0.763
Machinery and equipment	0.878	0.5591	0.688
Motor vehicles, trailers and semi-trailers	0.969	0.6173	0.759
Construction	0.587	0.3739	0.460

ASSUMPTIONS

6% UK inflation 2014-2017 (Bank of England inflation calculator)

1.276 GBP / USD 5-year average (Yearly Average Rates, OFX.com) as at December 2019.

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