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Normative Emissions Calculation Methodology

Abstract

Normative is a carbon accounting engine that enables businesses to calculate, report, and reduce their carbon emissions. The core of Normative's carbon accounting engine is our calculation methodology. It builds on the Greenhouse Gas (GHG) Protocol and our deep database of emissions factors. The engine delivers exceptionally accurate calculations and brings a new level of scientific accuracy to emissions accounting. This paper explains in detail the fundamentals of corporate carbon accounting and outlines Normative's proprietary implementation of the GHG Protocol.

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1. Introduction to corporate carbon footprints

Every business activity emits greenhouse gasses that contribute to global warming¹ – whether it's electricity powering your office building or your manufacturing facilities, fuel for your machines or your employees' corporate vehicles, laptops and equipment purchased, or servers that store your corporate data. The sum total of greenhouse gasses emitted through all of the economic activities in your value chain constitutes your corporate carbon footprint.

How can we quantify a company's carbon footprint?

For some economic activities, Greenhouse Gas (GHG) emissions can be directly measured by monitoring the concentration and flow rate in flue gasses. For example, in some manufacturing facilities flow meters or other monitoring devices are installed on the ducts that discharge gasses to take a direct reading of greenhouse gasses emitted. For most economic activities, however, direct measurement is impractical or impossible. This is especially true for the purchase of goods and services, which constitutes a large part of a company's business activities.² Indirect methods can be used to estimate GHG emissions based on economic or consumption data.

The procedure for indirect GHG emissions estimation relies on two sets of data:

Business data: The data describing the activities of your company. This can be either:

- Spend data, i.e., how much money was paid to company X for a certain good or service, or
- Activity data, e.g., how many liters of fuel or kilograms of material were bought.

Emissions factors: An emissions factor specifies the mass of GHG emissions associated with a given unit of business data.

Normative's carbon accounting engine can calculate your company's total GHG emissions by first sourcing business data covering all of your company's economic activities and, second, pairing each piece of business data with an appropriate emissions factor.

The Greenhouse Gas Protocol as the gold standard

The Greenhouse Gas Protocol (generally referred to as GHG Protocol) establishes comprehensive global standardized frameworks to measure and manage greenhouse gas emissions from private and public sector operations, value chains, and mitigation actions.³ Virtually every corporate sustainability reporting program is based on the GHG Protocol, making it crucial for companies to have a compatible approach when beginning a net-zero journey.⁴

The GHG Protocol requires that companies set appropriate organizational and operational boundaries. Organizational boundaries relate to a clear attribution of business activities and the associated GHGs to separate legal entities and organizational structures – just as is required in financial accounting. Operational boundaries, on the other hand, assign all operational activities of your company to one of three scopes of emissions. These scopes help to distinguish between the activities and emissions that are under the direct control of your company and those on which you only have indirect influence – but for which you are still accountable.

Scope 1 covers the direct emissions that your company generates while performing its business activities. This includes:

- electricity, heat, or steam that your organization itself generates; manufacture or processing of chemicals and materials, as well as own waste processing;
- transportation of materials, products, and waste using vehicles owned or controlled by your company;
- fugitive emissions, such as equipment leaks of gasses or vapors from pressure-containing equipment.

Scope 2 covers emissions from purchased and consumed energy. This includes:

- purchased electricity;
- purchased heating;
- purchased steam;
- purchased cooling.

Scope 3 emissions are all other indirect emissions that occur in your company's value chain and are not already included within scope 2. These emissions are a consequence of your company's business activities, but occur from sources your company does not own nor control. They account for approximately 92% of an average company's emissions.⁵ Scope 3 emissions include the following contributions:

- emissions generated in your company's supply chain, such as extraction, production, and transportation of purchased materials and fuels;
- emissions generated from the use of sold products and services;
- emissions generated from waste disposal. This includes the disposal of waste generated both in operations and in the production of purchased materials and fuels, as well as the disposal of sold products at the end of their life.⁶

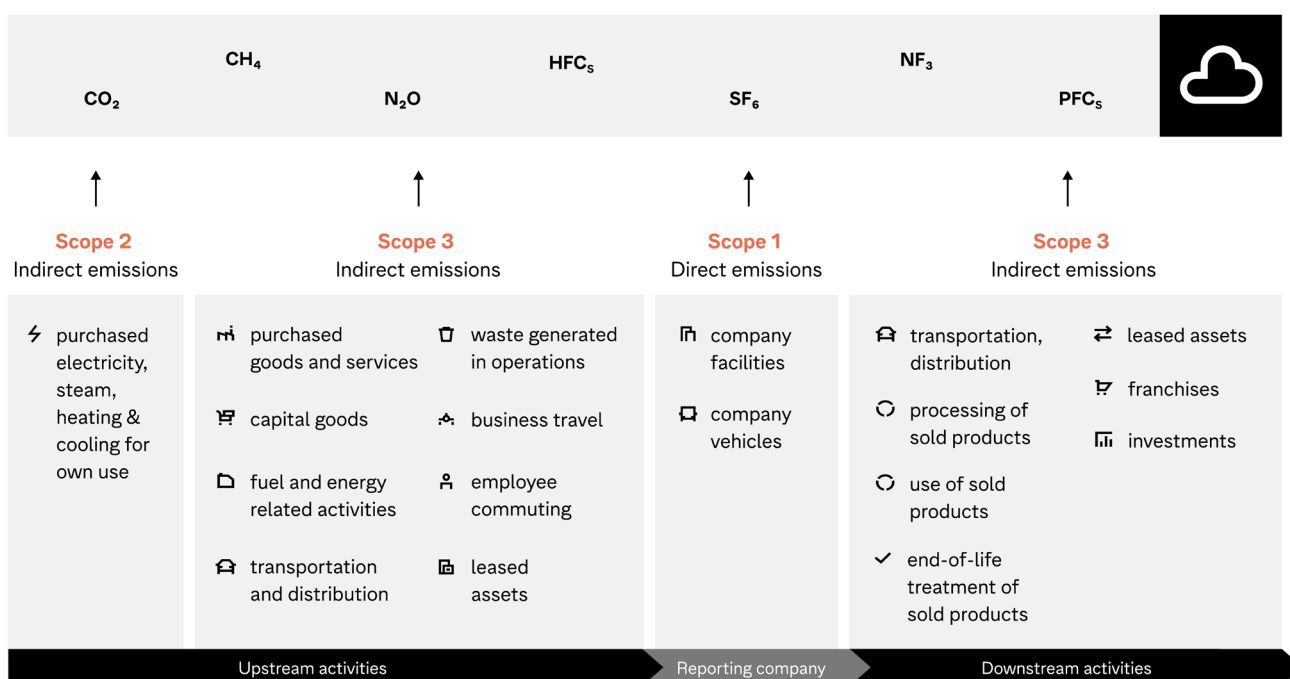


Figure 1: The three scopes of corporate emissions according to the GHG Protocol

Data types used for carbon accounting

Two types of data are needed to calculate a corporate carbon footprint: business data and emissions factors. Small changes to this foundation – e.g., using slightly different business data or updating certain emissions factors – can lead to very different outcomes for the overall carbon footprint calculated.

A. Business data

There are two different categories of business data: spend and activity data.

Spend data comprises outbound financial transactions that your company performs over the course of a reporting period. This data can usually be retrieved directly from your company's financial accounting or Enterprise Resource Planning (ERP) systems. Importantly, the spend data used for carbon accounting should reflect all economic activities performed by the company over the course of the relevant period. Since spend data is readily available in the majority of organizations, it generally constitutes a good starting point for a corporate footprint analysis. Relying on expense data, one is also able to capture the majority of business activities that happen across the company's supply chain (defined as upstream activities).

Activity data allows one to get a more accurate view of the nature of the financial transactions, which can only be classified quite broadly when relying on spend data. This means collecting all the possible inbound energy and material flows that the company has received over the course of a reporting period. Thus in the calculations, each financial transaction can be swapped with a detailed amount of goods or services (i.e., the activities). For instance, a USD transaction representing the purchase of fuel is replaced by an activity displaying the volume of fuel purchased with that amount of money.

B. Emissions factors

The second category of data used to calculate a carbon footprint is emissions factors, which represent emissions per unit of activity.

In general, the calculation of the carbon emissions for a generic activity follows the equation below:

$$E \text{ [kgCO}_2\text{e]} = \text{BDP [unit]} * \text{EF [kgCO}_2\text{e/unit]} \quad (1)$$

E: Emissions; BDP: Business Data Point representing the activity; EF: Emissions Factor

For example, to calculate the emissions associated with the purchase of 5 kg of organic beef, we would calculate $5 \text{ kg} * 21.7 \text{ kgCO}_2\text{e/kg} = 108.5 \text{ kgCO}_2\text{e}$.

Thus, calculating emissions is equivalent to multiplying the quantity of an activity by an emissions factor that represents the emissions per unit of activity.

2. Normative's carbon accounting engine

Normative's engine calculates corporate carbon footprints using either of the two types of business data outlined in the previous section: transaction data or activity data. To ensure the most accurate calculation, the engine selects the approach depending on the type of data provided by your company. Your dedicated Normative Climate Strategy Advisor advises you on the most suitable approach for each category, following the GHG Protocol.⁷ The following flow chart illustrates the general data flow for each of the two approaches.

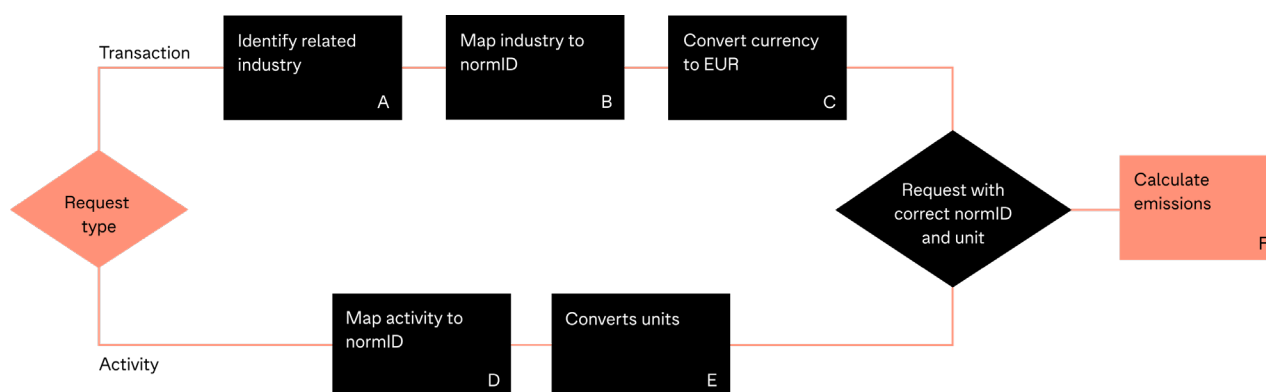


Figure 2: Normative engine data flow chart (version Oct 2022)

Transaction-based method

For many companies, the transaction- or spend-based approach is the initial step to calculate baseline emissions. This method uses financial transaction data readily available in your company – such as supplier invoices – to estimate your scope 1, 2, and 3 emissions. For this, Normative's engine needs five main data points as input:

- (i) the supplier name,
- (ii) the cost and
- (iii) the currency of a transaction,
- (iv) the transaction date, and
- (v) the supplier's tax identification number (e.g., VAT).

As an alternative to (v), you might have an internal classification system of your purchases – e.g., by industry or product category – which can be used instead of the supplier's VAT number.

Once all of your financial transactions from a reporting period are uploaded, the transaction-based method provides high-level estimates of your company's emissions across all three scopes, including estimates of upstream value chain emissions.

The following sections trace each step of the flowchart in Figure 2 to illustrate how the engine takes your raw input of financial transactions to calculate the emissions associated with this transaction.

A - Identify relevant industry

Working with transaction data, the Normative engine first identifies the relevant industry for each financial transaction received as input. By assigning an industry to a financial transaction, the engine ensures that the most appropriate emissions factor for this specific transaction can be chosen later on in the flow. Depending on the available data points received as input, industry matching can be achieved in a number of ways with different reliability and accuracy levels. Some options for this are:

1. Unique public company tax identifiers, such as VAT number;
2. Established industry and product categorizations, such as NACE⁸, GICS⁹, UNSPSC¹⁰, or similar;
3. Your own categorization system of suppliers and purchases;
4. Supplier / partner name, address, and other available information that helps the engine to identify the counterparty of a transaction.

B - Mapping industry to normID

The next step in the process is to map the industry associated with a specific transaction, as identified in step A above, to a corresponding entry in Normative's internal classification system. This system – the Normative taxonomy – consists of thousands of normIDs, each representing a specific economic activity to which an emissions factor can be attributed. The mapping process from industry to normID is determined by how the engine identified the relevant industry for a specific transaction in step A. I.e., a normID can either be assigned by using your company's own categorization system for the submitted transaction data, or the engine will find the most suitable normID using the supplier's main industry as determined by its VAT number.¹¹

C - Currency Conversion

Once the most appropriate normID is found for a specific transaction, this transaction can then be linked to a cost emissions factor, expressed in kgCO₂e/monetary unit (MU), as this information is contained in the assigned normID.

As one final step prior to calculating the associated emissions, Normative's engine has to ensure that the currency of each transaction is compatible with the underlying emissions factor of the assigned normID. Transactions can be expressed in several currencies while the spend emissions factors used by Normative's engine are in the form of kgCO₂e/EUR. Therefore, the engine converts the transaction currency provided by the customer into the base currency, Euro. The conversion process receives the quantity and the date of the transaction and sends a request to an external API that returns the exchange rate on the date of the transaction.

Evaluating the transaction-based method

The strength of the transaction-based approach is that it makes use of economic transactions to calculate the carbon footprint of a company. Transactions are more readily available than other types of data, since they are kept by the company for accounting purposes and cover the majority of the company's upstream scope 3 emissions (excluding employee commuting and leased assets; see Appendix A for more).

Due to its simplicity, this method is mainly adopted as the first step to produce a rough estimate of your corporate carbon footprint. Although the accuracy of the results can still be enhanced, this approach allows companies to see, for the first time, proportional relationships between their upstream value chain activities and the climate impact that these activities produce, revealing which activities constitute a large share of their scope 3 emissions. This approach is suggested for companies that are working to identify their main emissions drivers, or hotspots, for which they can then collect more detailed physical data regarding materials and energy. Such data is the starting point for a deeper analysis of the carbon footprint, as described in the following section.

Activity-based method

Normative adopts an activity-based approach to improve the accuracy of its initial transaction-based calculations. The main difference between the two methods lies in the emissions factors used to calculate the GHG emissions. While cost-based emissions factors are used whenever transaction data is provided as input, using your company's activities – such as quantities of a purchased good or service – as input enables the engine to use more granular, activity-specific emissions factors.

The Normative engine can process various input formats for your company's activity data.¹² In general, the data provided for an activity-based approach always contains some sort of physical unit, such as kilograms of material or kilowatt-hours (kWhs) of energy, that describes the economic activity performed by your company. Collecting all possible inbound energy and material flows that your company has received over the course of a reporting period will yield an even more granular view of your corporate carbon footprint than relying on transaction data alone. The following sections trace each step of the activity-based approach (refer to Figure 2 for letter coding).

D - Map activity to normID

The activity data your company submits to the Normative engine can be directly matched to a normID. This mapping is done via Normative's relational database of all normIDs, using a semantic analysis to find the closest distance between the respective activity and all normIDs to identify the most relevant one.

E - Convert units

After having assigned a normID from the Normative taxonomy to the activity your company has provided, the Normative engine needs to make sure that the physical unit of the activity is compatible with the emissions factor associated with the matched normID.

If the activity provided is expressed in the default unit of that specific activity category, e.g., kgCO₂e/kWh for an electricity-related activity, this quantity can be directly used in combination with the matched emissions factor (see step F below). If the unit provided for an activity deviates from the default, it first has to be converted into the equivalent default unit, e.g., converting tons of wood into kilograms of wood.

Evaluating the activity-based method

The strength of the activity-based method lies in its use of very specific emissions factors to estimate the cradle-to-gate carbon emissions of the energy and material flows of your company. This approach allows the resulting carbon footprint to be more accurate than the transaction-based method, as no assumptions on prices have to be made.

Increasing the coverage and granularity of emissions factors (i.e., covering more and more economic activities and products, and differentiating among different types of similar products) is an ongoing effort that Normative's dedicated Carbon Calculations Team is performing. Through conversations with researchers, as well as new and long-term customers, we determine what areas of our database need to be expanded. Every single emissions factor is reviewed and vetted by our team of sustainability engineers.

For companies that provide input data for the activity-based calculations, the data collection process itself can at times be quite cumbersome. With carbon accounting being a relatively recent practice, many companies are struggling to extract complete and organized sets of data that contain the required physical units of measurement for each economic transaction needed for the activity-based method.

Thus, this method is mainly adopted by companies that are further along in their journey to measure and reduce their carbon footprint, and have reached the stage of engaging internally with several other departments to collect the relevant data.

Since the GHG Protocol recommends that businesses calculate activities that produce the most emissions with the highest specificity, Normative combines transaction- and activity-based methods to achieve the highest level of accuracy where it matters most.

F - Calculate emissions

After having completed steps C and E for transaction and activity data, respectively, each of your input data points is successfully mapped to one normID and converted to the appropriate currency or unit of measurement. The normID is the key the engine needs to identify the most accurate emissions factor for the given input data. The relational structure of Normative's database of normIDs and associated emissions factors ensures that the most accurate and relevant emissions factor for a given normID is chosen from the search space of related emissions factors.

The calculation of the carbon emissions for a generic activity/transaction then follows the schema below:



Therefore, calculating emissions is equivalent to multiplying the quantity of an activity/transaction with an emissions factor that represents the emissions per unit of activity/transaction.

For both calculation approaches, Normative automatically sources emissions factors from our deep database. There are over 8,000 material and activity categorizations and 10,000,000 suppliers and industries in the database, including regional-specific emissions factors for all major countries. The database is populated with peer-reviewed, scientifically vetted sources. The emissions factors are updated on an ongoing basis, always reflecting the most recent versions available.

In addition to these updates, our R&D department tracks the most prominent research institutions and journals for the latest developments in the field to see if new or improved databases could be added. Normative's dedicated Climate Strategy Advisor identifies potential opportunities for improving our coverage, informing our scientists on where the taxonomy would benefit from further development.

3. Concluding remarks on Normative's emissions calculation methodology

Accurate carbon accounting is the first step on the net-zero journey. With Normative's scientific and automated calculation methodology, you can uncover meaningful emissions insights – quickly. Those insights will form a clear roadmap for short-term wins and long-term success.

Accurate emissions information is essential for thorough GHG reporting and taking informed action towards net zero. Wherever the GHG Protocol gives flexibility for handling a particular process or situation, our sustainability engineers make deliberate choices about how to handle the calculations to ensure the highest possible degree of accuracy in the results while reducing the cost and complexity for your company.

Often, this results in choosing a hybrid approach, which uses a combination of activity data for your most critical emissions sources and transaction-based data to fill the gaps. To ensure you are gradually bridging these gaps, Normative supports you in increasing your data granularity over time. We help you to engage your entire value chain, collecting supplier-specific GHG inventory data directly from your suppliers, whenever such data is available.¹³

With Normative's emissions calculation methodology, you are optimally positioned to drive real, sustainable change at your organization.

4. Appendix

Appendix A: Scope 3 categories of the GHG Protocol

Upstream scope 3 emissions		
Category	Category description	Minimum boundary
1. Purchased goods and services	Extraction, production, and transportation of goods and services purchased or acquired (e.g., raw materials, products, legal counseling, etc.) 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 (not included in scope 1 or scope 2)	Extraction, production, and transportation of fuels and energy purchased or acquired by the reporting company in the reporting year which are 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 the generation of purchased electricity that is sold to end users: Emissions from the generation of purchased energy

Table 1: Overview of all scope 3 categories. Source: [Technical Guidance for Calculating Scope 3 Emissions](#)

Upstream scope 3 emissions		
Category	Category description	Minimum boundary
4. Upstream transportation and distribution	Transportation and distribution (paid by the reporting company) 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 the use of vehicles and facilities (e.g., from energy use) <i>Optional:</i> 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 <i>Optional:</i> Emissions from the 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 the use of vehicles (e.g., from energy use) <i>Optional:</i> 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 the use of vehicles (e.g., from energy use) <i>Optional:</i> 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) <i>Optional:</i> The life cycle emissions associated with manufacturing or constructing leased assets

Table 1: Overview of all scope 3 categories. Source: [Technical Guidance for Calculating Scope 3 Emissions](#)

Downstream scope 3 emissions		
Category	Category description	Minimum boundary
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 the use of vehicles and facilities (e.g., from energy use) <i>Optional:</i> 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). Intermediate products are goods integrated into another product before use (cranberries that will be added to a granola bar; a car engine that will be installed in a car).	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 emissions 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) <i>Optional:</i> 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). <i>Optional:</i> 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 –	The scope 1 and scope 2 emissions of franchisees that occur during operation of

Table 1: Overview of all scope 3 categories. Source: [Technical Guidance for Calculating Scope 3 Emissions](#)

Downstream scope 3 emissions		
Category	Category description	Minimum boundary
14. Franchises	reported by franchisor	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 of the GHG Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard for the required and optional boundaries

Table 1: Overview of all scope 3 categories. Source: [Technical Guidance for Calculating Scope 3 Emissions](#)

Appendix B: Summary overview of data and calculation methods for scope 1, 2, and 3 as recommended by the GHG Protocol

Scope	Recommended data and calculation method
Scope 1	Best approach: Direct measurement of GHG emissions by monitoring concentration and flow rate. Alternative approach: GHG emissions calculated based on the purchased quantities of commercial fuels and emissions factors.
Scope 2	Best approach: Calculated from metered electricity consumption and supplier-specific emissions factor. Alternative approach: Local grid or other more general emissions factors can be used to calculate emissions starting from metered electricity or electricity bills.
Scope 3	Best approach: Primarily calculated from activity data such as fuel use or passenger miles, as well as published or third-party emissions factors. In most cases, if source- or facility-specific emissions factors are available, they are preferable to more generic or general emissions factors. Alternative approach: For smaller scope 3 emissions contributors, a transaction-based method with general emissions factors can be used to reduce costs and complexity without overly compromising quality.

Table 2: Overview of calculation methods for scopes 1, 2, and 3

Appendix C: Further details on step B - Mapping industry to normID

The mapping process is performed according to one of two methods, depending on the identification of the related industry:

- A. By using an established industry categorization, customer-specific categorization or other publicly available information, Normative can identify which normID is best suited to represent that industry. This method allows transactions from the same supplier to receive different normIDs, if they are categorized differently.
- B. By using unique company identifiers, Normative can use the internal supplier database to map the transactions to the normID that was assigned for that supplier's main industry. This method does not break down the spend into different categories, and the supplier's industry will be a decisive factor in how all transactions with that supplier will be classified initially. However, if needed, your company can always further break down the spend simply by adjusting any single transaction in the Normative application.

Appendix D: On the concept of activity

An activity for Normative is a representation of a physical process that produces emissions directly or indirectly. This representation is expressed in terms of physical quantities (e.g., mass, volume, energy, distance).

Generally, activities can be expressed in different quantities, according to the level of knowledge we have. For example, the activity of driving an internal combustion engine (ICE) car can be expressed in

1. the quantity of fuel consumption of the car,
2. the distance traveled by the car, or
3. the price paid for all the fuel consumed in the car drive.

All these measures represent the same activity, but they describe it at different levels of accuracy in relation to carbon emissions calculations.

In particular, the emissions for driving an ICE car are generated by the fuel combustion in the engine, and, with very good approximation, we can say that the same quantity of fuel produces the same amount of emissions when it is combusted. Therefore:

- 1) the quantity of consumed fuel is the best representation that we can have for the computation of the emissions related to the activity of driving a car; and
- 2) the distance traveled is also a good measure of the impact of the activity, though the engine's consumption of fuel per kilometer (in other words, how many kilometers a car can travel on a liter of fuel) varies widely by car model, age, and size. Thus, we need to make assumptions about all of these items, which will increase the uncertainty of the result; or, finally,
- 3) the price paid for the fuel forces the calculator to make assumptions on the fuel price that was charged, which is different for each petrol station and can have daily variations. Hence, the uncertainty on the result is likely to be substantial.

5. References

¹ For more information on the greenhouse effect, see <https://www.bgs.ac.uk/discovering-geology/climate-change/how-does-the-greenhouse-effect-work/>, last accessed: 2022-12-13.

² CDP, 2022. [CDP Technical Note: Relevance of Scope 3 Categories by Sector](#).

³ For more information on the GHG Protocol, see <https://ghgprotocol.org/about-us>, last accessed: 2022-12-13.

⁴ For example, in 2016, 92% of Fortune 500 [reported](#) using the GHG Protocol, either directly or indirectly through a program based on GHG Protocol.

⁵ CDP, 2020. [Transparency to Transformation - A Chain Reaction](#).

⁶ For a complete overview of the 15 scope 3 categories as defined by the GHG Protocol, please refer to [Appendix A](#).

⁷ For a complete overview of the best-in-class calculation approaches per scope of emissions, please see [Appendix B](#).

⁸ Nomenclature statistique des activités économiques (Statistical Nomenclature of the Economic Activities)

⁹ Global Industry Classification Standard

¹⁰ United Nations Standard Products and Services Code, see <https://www.unspsc.org/>, last accessed 2022-12-13.

¹¹ For further details on how the Normative engine assigns an industry and normID in the transaction-based approach, please refer to [Appendix C](#).

¹² For a detailed overview of how Normative defines and works with different types of activity data, please refer to [Appendix D](#).

¹³ This so-called supplier-specific method results in the highest degree of accuracy. The data required for this method can come from the supplier who has conducted a reliable upstream product GHG inventory or internal Life Cycle Assessment (LCA) report. While this data is currently quite scarce, Normative is actively working on improving the availability of this data through its own product development and by supporting related global initiatives.

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