

# Understanding the Complexities of Scope 3 Carbon Emissions Data

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Scope 3 carbon emissions data faces a range of hurdles due to constraints on company data collection and inconsistencies among vendor methodologies. While much has been written about the challenges related to environmental, social, and governance (ESG) data (see [The ESG Data Challenge](#)), defining and measuring Scope 3 emissions is a particularly difficult exercise for companies and for market participants seeking to use ESG criteria for investment decisions. In this piece, we define Scope 3 emissions, explain why the data is so complex, suggest solutions, and provide insight into why the data's unreliability matters for investors.

## Background: The Formation of Scope 3 Emissions

To mitigate the temperature rise, global resources organizations set up the Greenhouse Gas Protocol standards to provide guidelines for companies seeking to take inventory of their GHG emissions. To help delineate direct and indirect sources of CO<sub>2</sub>, the GHG Protocol defined three types, or “scopes,” of emissions for accounting purposes:

**Scope 1 Emissions** Direct emissions from operations that are owned or controlled by the reporting company. Examples include emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc., and emissions from chemical production in owned or controlled process equipment.

**Scope 2 Emissions** Indirect emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company.

**Scope 3 Emissions** All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions. Examples include emissions from the production of purchased products, transportation of purchased products, or use of sold products. (Figure 1).

Figure 1  
**Scope Three Emissions Data Come from a Broad Mix of Sources**

- Upstream Activity
- Downstream Activity

	Scope 1	Scope 2	Scope 3
<b>Type of Emissions</b>	Direct	Indirect	Indirect
<b>Entity Performing Activity</b>	Company Itself	Suppliers	Suppliers
<b>Activities/GHG Categories</b>	Company Facilities Company Vehicles	Electricity Steam Heating Cooling	<div style="background-color: #e0ffe0; padding: 2px;">Employee Commuting Business Travel Waste from Operations Fuel &amp; Energy Related Capital Goods Purchased Goods &amp; Services Transportation &amp; Distribution Leased Assets</div> <div style="background-color: #ffe0e0; padding: 2px;">Transportation &amp; Distribution Processing of Sold Products Use of Sold Products End-of-Life Treatment of Sold Products Leased Assets Franchises Investments</div>

Source: State Street Global Advisors, [WRI/WBCSD Corporate Value Chain \(Scope 3\) Accounting and Reporting Standard \(PDF\)](#), page 5.

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As an example, a textile manufacturer could have Scope 1, 2, and 3 emissions as follows:

- Scope 1 emissions: By-products of the heating oils or air conditioners used in the factory.
- Scope 2 emissions: GHG emissions arising from the electricity used by the factory to run the machines.
- Scope 3 emissions: GHG emissions occurring across the lifecycle of the textile output, including the processes used to make the fabric and the decaying of the final product in a landfill.

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## Challenges in Calculating Scope 3 Emissions

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Given the simple definitions for Scope 1 and 2 emissions, they are easier than Scope 3 emissions to calculate and control, and regulators in a number of countries have mandated that companies report Scope 1 and 2 emissions in company data. This requirement provides investors with verifiable data.

However, given the numerous parties and processes involved in the supply chain, the calculation of Scope 3 emissions is a complex task. Even a seemingly minor omission in Scope 3 reporting can create an inaccurate picture of a company's emission profile.

We can attribute problems with Scope 3 reporting primarily to the following:

- 1 Inaccurate and Unreliable Data** Unlike Scope 1 and 2 emissions, in which the company itself has more control over the sources of carbon emissions, Scope 3 involves the GHG emissions of companies' supply chains. As a result, a large number of external players enter the fray for nearly every single product. This can make it extremely difficult for organizations to collect relevant granular and primary data from their suppliers.

To manage the unwieldy breadth of supplier data, some companies perform calculations using secondary data based on industry averages or spend-based emission factors. In certain situations, secondary data can be erratic or off-base due to different lifecycle assessments of similar products, varying origin countries in the data sets, or other inconsistencies that create large discrepancies in the estimated Scope 3 emissions values. For context, in a Global Developed Standard universe, for one of the major data vendors, 58% of the emissions data is estimated.

- 2 Lack of Standardized Methodologies** While the GHG Protocol provides guidance on the calculation of Scope 3 metrics, no single standard methodology is available for companies. In Figure 2, we list four of the existing methodologies, each coming with its own sets of advantages and disadvantages. The diverging calculation practices can lead to variations in estimates.

- 3 Lack of Resources and Personnel** Given that GHG emissions measurement is a relatively new practice, specialised tools and personnel may be required to reliably estimate GHG metrics for an individual firm.

Figure 2  
**Scope 3 Emissions  
 Lack a Standard  
 Calculation Methodology**

Available Methodologies	Data Sources	Advantages	Disadvantages
Supplier Specific	Suppliers' activity data based on product level emission factors.	Accurate	Time consuming and expensive. May be limited by contractual boundaries.
Average Data Method	Secondary Datasets.	Sector/Industry/Country specific	Lacks precision due to averaging at different levels. Not ideal for firms.
Hybrid Method	Combination of supplier and hybrid data.	Compromise between accuracy and speed	Requires effort to obtain supplier specific data.
Spend-Based Method	Environmental Extended Input Output Models (EEIO)* — Secondary Data.	Quick (calculated by models)	Imprecise due to aggregation of multiple sectors.

Source: The GHG Technical guidance for scope 3 emissions report [Scope3\\_Calculation\\_Guidance\\_0.pdf \(ghgprotocol.org\)](#).  
 \* Environmental Extended Input Output Models (EEIO) are models that evaluate linkages between economic-consumption activities and their impacts on the environment.

## Assessing Data Set Consistency

As an asset manager, we rely on emissions data from external vendors for measuring and reducing the carbon profile of portfolios. To understand the consistency of the data sets, we undertake a comparison of emissions data from major data providers.

To calculate the Scope 3 numbers, vendors usually rely on combinations of the following two methods:

- 1 Disclosed values** Values disclosed by firms to the CDP, or their issued financial statements/sustainability reports, alongside a sense check.
- 2 Estimated values** Calculations based on the spend-based method (EEIO models)<sup>3</sup> relying on aggregation of sector and industry averages. Calculations could also be based on supplier activity data or secondary datasets.

While disclosed values are the easiest and often the most accurate assessment for the vendor, many firms do not disclose their Scope 3 values. For example, for the MSCI World Index, the disclosures cover only about 62% of the portfolio on a weighted basis (Figure 3).

Figure 3  
**Nearly 40% of Companies  
 in a Global Index Do Not  
 Disclose Scope 3 Emissions**

Vendor	ISS
% Reported (Cap-Weighted) Based on the MSCI World Index	62

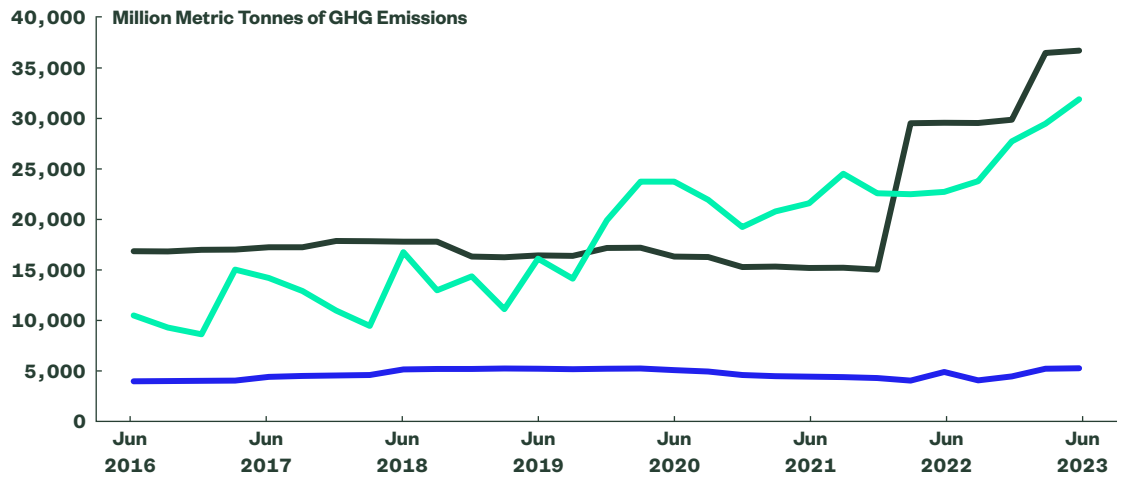
Sources: State Street Global Advisors, ISS, as of June 30, 2023.

The vendors calculate emissions for the remaining companies using estimated values, based on proprietary EEIO models. However, the definitions used by the vendors to feed their models lack consistency, which in turn leads to variations in CO<sub>2</sub> estimates.

Moreover, vendor definitions are subject to change. For example, one vendor adjusted its methodology to include CDP disclosures and further reclassified its sectors into larger sub-sectors in early 2022. This change is evident in the spike in this vendor’s observed emissions levels in 2022 (Figure 4). The new methodology led to a significant increase in Scope 3 emissions for a number of sectors such as industrials and information technology, which can be detrimental to investors trying to use GHG emissions data in their investment decisions. Abrupt methodology changes were also observed in a second vendor’s data, which saw a sharp decline in emissions levels in Q2 2016; this second vendor’s emissions data, in general, exhibits fluctuation (Figure 4). Large changes such as these can lead to high turnover and unwanted volatility in portfolios within a single rebalancing period.

Figure 4  
**Vendor Methodology Can Result in Lower Emissions Levels**

- Vendor 1
- Vendor 2
- Vendor 3

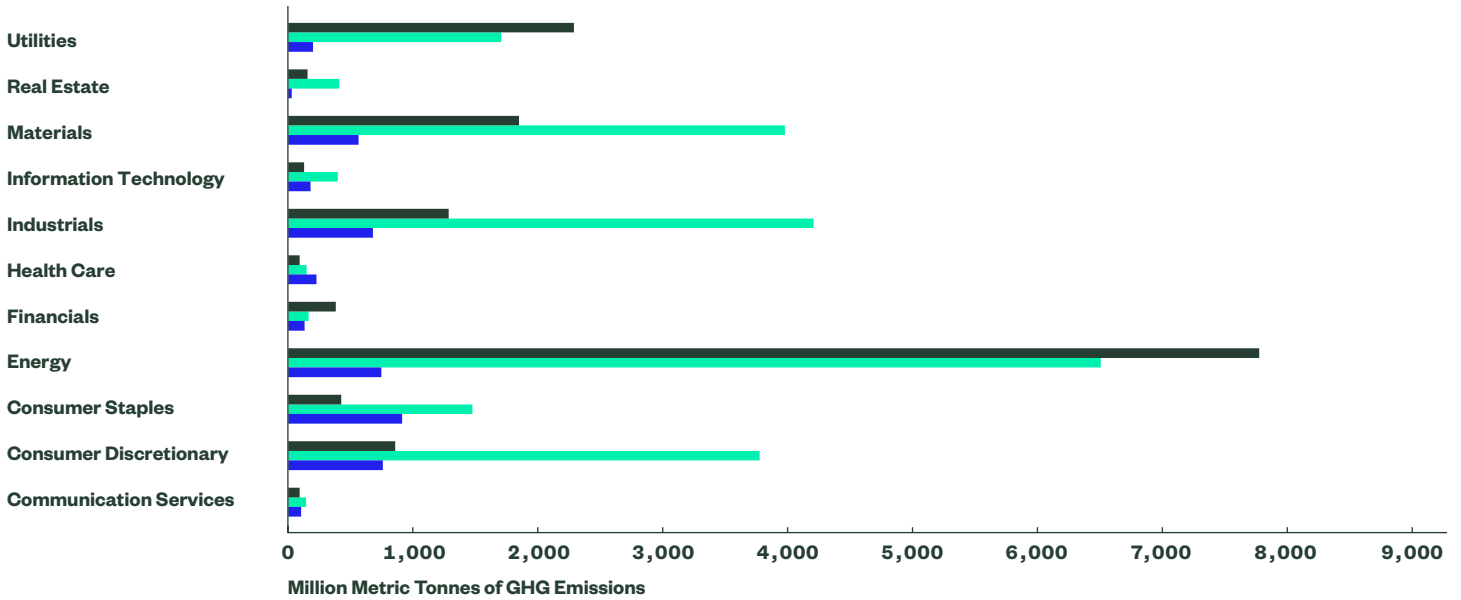


Source: Various ESG data vendors, as of June 30, 2023.

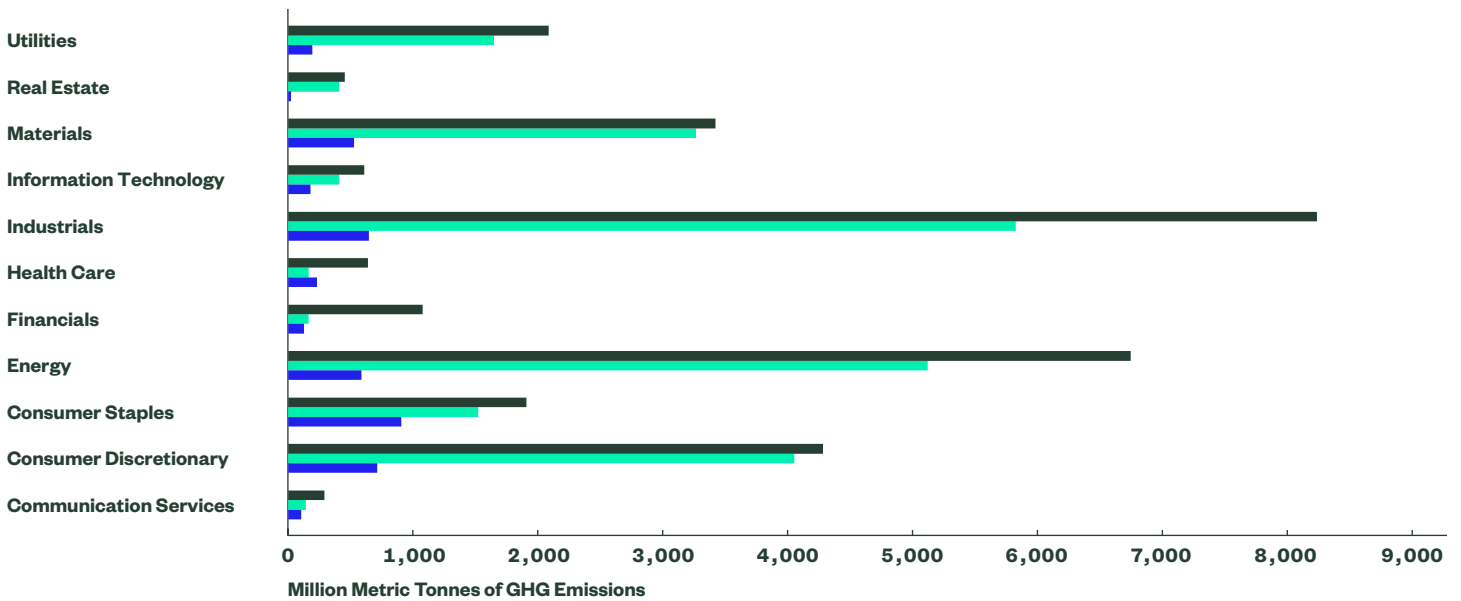
Figure 5 shows the change in emissions levels for all three vendors from just one quarter to the next. Notably, emissions levels have risen significantly in industrials and have declined in energy.

Figure 5 **Total Scope 3 Emissions by Sector**

As of Q4 2021



As of Q1 2022



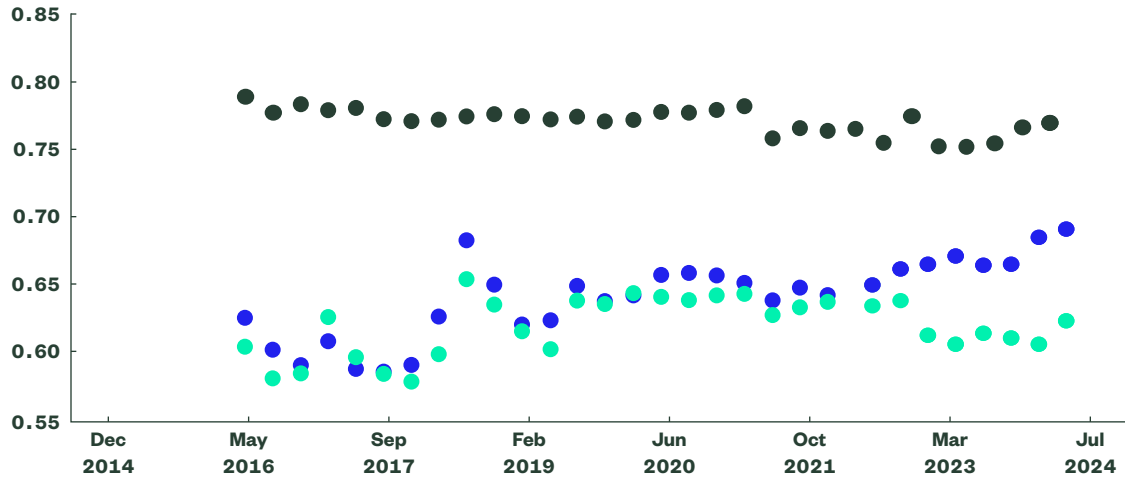
Vendor 1 Vendor 2 Vendor 3

Source: Various ESG data vendors. Data provided at Q4 2021 and Q1 2022 in an aim to show the differences between various quarters following vendor definition changes at the end of 2021.

We would expect the Scope 3 metrics of all three vendors to have largely similar behavior since they are trying to calculate the same data using similar frameworks. However, Figures 6 and 7 show that the correlations among three prominent ESG vendors' data points are low. The correlation (for both the raw and intensity factor<sup>1</sup> data) ranges from 60% to 80%, suggesting that there is a fair bit of inconsistency among the vendors. By contrast, Scope 1 and 2 correlations are greater than 90%.<sup>2</sup>

Figure 6  
**Scope 3 Intensity Correlations (Spearman)**

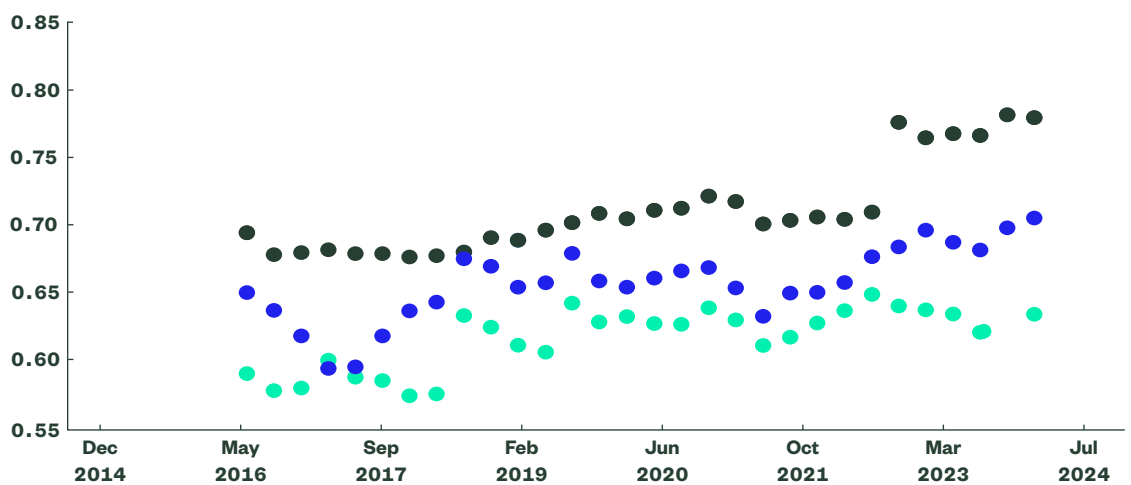
- Vendor 2 x Vendor 3
- Vendor 2 x Vendor 1
- Vendor 2 x Vendor 3



Sources: State Street Global Advisors, Various ESG data vendors, as of June 30, 2023.

Figure 7  
**Scope 3 Correlations (Spearman)**

- Vendor 2 x Vendor 3
- Vendor 1 x Vendor 3
- Vendor 2 x Vendor 1



Sources: State Street Global Advisors, Various ESG vendors, as of June 30, 2023.

## Closing Remarks

Our empirical analysis shows that Scope 3 data remains in a nascent stage, and it is not practical to include it in investment strategies without risking unreliable data. The lack of consistency among vendors can prompt misalignment in portfolio construction and reporting, which are critical elements for clients who have pledged to reduce Scope 3 emissions in their portfolios.

Incorporation of Scope 3 would, at minimum, require a higher disclosure ratio, which will depend on government intervention and may be challenging for suppliers and users. The current voluntary disclosure activity has been low, even though the GHG Protocol standards were created nearly a decade ago.

That said, we believe that better measurement of Scope 3 emissions can lead to improvements in portfolio construction, and can enable more accurate market pricing of companies' climate risks and/or opportunities. For further details on a framework that may help companies manage the challenges of measuring Scope 3 emissions, see [Quantifying Supply Chain ESG Risks: A Flexible Framework \(ssga.com\)](#).

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## Endnotes

- 1 Intensity factors are calculated by dividing the emissions by a comparable financial metric such as revenues (used in tis case), EVIC, profit, etc. to facilitate a per-unit comparison between firms.
- 2 Various ESG data vendors, as of September 30, 2022.

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\* Pensions & Investments Research Center, as of December 31, 2022.

<sup>†</sup> This figure is presented as of June 30, 2023 and includes approximately \$63 billion USD of assets with respect to SPDR products for which State Street Global Advisors Funds Distributors, LLC (SSGA FD) acts solely as the marketing agent. SSGA FD and State Street Global Advisors are affiliated. Please note all AUM is unaudited.

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