

Accounting for supply chain emissions: The guide to Purchased Goods & Services (PG&S)



With companies aiming for net-zero carbon emissions and the growing global requirement for businesses to report their climate impact, reducing emissions across internal operations and the external value chain is now crucial for long-term success and the ability to withstand business challenges.

Central to this endeavor is the management of Purchased Goods & Services (PG&S) emissions, which fall under scope 3, category 1 within the GHG Protocol, commonly referred to as “supply chain emissions.” This guide covers the complexities of quantifying these emissions, explores the methodologies for accurate accounting, and highlights the technical innovations that improve transparency and reporting of these emissions—all essential for navigating a path to net-zero.



Table of contents



01 Foundations of supply chain emissions accounting

- Significance of managing supply chain emissions
- Anatomy of supply chain emissions

02 Exploring the complexities of supply chain emissions accounting

- Key stakeholders in supply chain emissions accounting
- Addressing challenges in supply chain emissions accounting

03 Strategies for supply chain emissions calculation

- Key terms for supply chain emissions accounting
- Comparative analysis of supply chain emissions calculation methodologies

04 Implementing methodologies

- The manual dilemma
- The automated solution



Foundations of supply chain emissions accounting

Significance of managing supply chain emissions

Supply chain emissions often represent the largest source of emissions for companies. As such, regulators and corporates alike have increasingly focused on these emissions over the past several years to decarbonize economies and achieve net-zero goals. Beyond regulatory compliance, accurate tracking, and diligent reporting, the effective reduction of these emissions is a strategic priority for value creation and long-term resilience. Here, we share the key reasons why managing these emissions is imperative for the enduring success of businesses.

Regulatory compliance

Legislative frameworks, including California's SB 253 and the Corporate Sustainability Reporting Directive (CSRD) in Europe, mandate corporations disclose greenhouse gas (GHG) emissions. These regulations, which cover 5,000 and 50,000 companies respectively, include scope 3 emissions, compelling companies to broaden their emissions reporting and reduction efforts beyond their immediate operations and include their supply chain.

Risk management

Proactively managing supply chain emissions has become central to corporate risk management strategies. Companies recognize that proper oversight of environmental risks within their supply chains can mitigate potential operational disruptions, reduce liabilities linked to emissions regulations, and bolster their competitive edge.

Economic benefits

Analyzing and refining supply chain operations not only reduces emissions but can also yield financial gains. In their pursuit to reduce scope 3 emissions, companies frequently uncover ways to enhance efficiency, curtail waste, and optimize procurement strategies, leading to cost savings and operational improvements.

Organizations' supply chains emissions are, on average,

11.4 times higher, which equates to approximately
92% of an organization's total GHG emissions

(Source: CDP 2020 Global Supply Chain Report)

Anatomy of supply chain emissions

The Greenhouse Gas Protocol (GHG Protocol) categorizes business activities and their associated emissions into three scopes; within this framework, emissions from purchased goods and services (i.e., “supply chain emissions”) fall under scope 3, category 1.

Scope 3 encompasses emissions linked to a company’s activities that originate from sources not owned or directly controlled by the company. This includes emissions from activities like business travel, employee commuting, and those arising from suppliers, collectively termed “value chain emissions.”

An organization’s value chain consists of both its upstream and downstream activities. Upstream emissions occur during the production of goods or services that a business purchases or uses, while downstream emissions result from the use or disposal of a business’s products or services.

The GHG Protocol defines 15 categories of scope 3 emissions. Upstream activities span categories 1–8 and cover activities like waste generated in operations (category 5) and business travel (category 6). Downstream activities span categories 9–15 and cover activities like use of sold products (category 11) and end-of-life treatment of sold products (category 12). Supply chain emissions encompass emissions from all purchased goods and services not covered by the other categories of upstream scope 3 emissions (i.e., categories 2 through 8).

Effectively managing supply chain emissions presents a complex challenge. Organizations must not only comprehend the intricate details of their supply chain but also promote transparency and establish collaborative relationships with suppliers. Through this partnership, they can identify and execute comprehensive emission reduction strategies that span the lifecycle of the products and services they procure.

The Greenhouse Gas Protocol (GHG Protocol) is a globally recognized framework for measuring and managing greenhouse gas emissions.

It divides emissions into three scopes:

Scope 1

Direct emissions from sources owned or controlled by a company

Scope 2

Indirect emissions from purchased energy, including electricity, steam, heat, and cooling

Scope 3

All other emissions associated with a company’s activities

Exploring the complexities of supply chain emissions accounting

Managing supply chain emissions presents a complex challenge that requires collaboration across various stakeholders. This endeavor involves an intricate interplay of these stakeholders, each bearing distinct responsibilities and unique challenges in the collective effort to measure, manage, and mitigate emissions.

Key stakeholders in PG&S emissions accounting

Enterprises

These are typically large corporations, which are increasingly held accountable for the environmental impact of their operations, including the activities of their supply chains. They must comply with regulatory mandates for emissions reporting and are under scrutiny by consumers and investors to demonstrate a commitment to reducing their carbon footprint. Their responsibility extends beyond their immediate operations to the emissions associated with all the goods and services they procure, encompassing the entirety of scope 3 emissions.

Suppliers

Suppliers are responsible for producing the actual goods and services that enterprises procure. The emissions resulting from their production processes are a significant component of an enterprise's scope 3 emissions. The capability of suppliers to measure and control these emissions is critical, yet it can vary widely. Many smaller suppliers may not have the resources or expertise to contribute effectively to the emissions management process, representing a challenge for enterprises looking to manage their overall carbon footprint.

Data management providers

The role of data in tracking supply chain emissions cannot be overstated. Accurate data is the foundation of effective emissions management. Data management providers, which can range from specialized consultancies to software platforms, like Sustain.Life, often play a pivotal role in helping enterprises and suppliers gather, analyze, and communicate business activity data into emissions outputs. Where primary data is not available, these providers will often leverage representative datasets to fill in gaps and project impact.

Addressing challenges in supply chain emissions accounting

The primary challenge in effective supply chain emissions management is the discrepancy between enterprise goals and their suppliers' abilities to measure their emissions. Enterprises are under pressure to disclosure and decarbonize, requiring emissions data from their suppliers. However, suppliers often lack the means to provide accurate data, impeding joint decarbonization efforts.

Key barriers include:

DATA

Many enterprises face a data void with limited visibility into the emissions impact of their supply chain. The lack of accessible and reliable data hampers the ability to make informed decisions and measure progress effectively.

MATURITY

There is often a disparity in sustainability maturity between large enterprises and their suppliers. Enterprises may have dedicated teams and resources to comply with regulations and drive decarbonization efforts. In contrast, suppliers, especially smaller ones, may not have the same level of sophistication or resources. This maturity gap can lead to uneven progress and makes collaboration more challenging.

RELATIONSHIPS

The customer-supplier dynamic is complex and vital to the business success of both parties. Bridging the gap between data and maturity requires not just technical solutions but also a nuanced management of this relationship. Enterprises need to engage with and enable their suppliers to act toward decarbonization.

COMMUNICATION

Effective communication is essential for exchanging data, documenting initiatives, and verifying progress. Requests for this information can strain the relationship if not managed carefully, particularly when one party may not fully understand the demands or lacks the capacity to meet them.

Technology can bridge the gap between the ambitious decarbonization goals of enterprises and the current capabilities of their suppliers. By utilizing collaborative platforms that leverage technologies such as artificial intelligence, web scraping, and cloud computing, enterprises and suppliers can engage in cooperative

efforts to foster a more transparent, sustainable supply chain. Such collaboration not only propels environmental objectives forward but also yields operational efficiencies, reduces costs, and boosts market competitiveness for all involved parties, thereby establishing a mutually beneficial scenario.

Strategies for supply chain emissions calculation

Before exploring how technology solutions can help, it's crucial to understand the different methodologies prescribed by the GHG Protocol for calculating supply chain emissions. This section covers these methodologies, examining the benefits and drawbacks of each.

Key terms for supply chain emissions accounting

The accurate accounting of supply chain emissions hinges on a clear grasp of key terms that underlie the methodologies used. This section introduces these key terms. In the subsequent section, we will detail each methodology and its relevance to these terms.

Primary data

Data provided by suppliers or other value chain partners related to specific activities in the reporting company's value chain. Such data may take the form of primary activity data, or emissions data calculated by suppliers that are specific to suppliers' activities. Primary data should always be prioritized as it provides better representation of specific value chain activities, allows performance tracking for facility and company-specific operational improvements, and peer benchmarking against industry averages.

Secondary data

Includes industry average data (e.g., from published databases, government statistics, literature studies, and industry associations), financial data, proxy data, and other generic data. In certain cases, companies may use specific data from one activity in the value chain to estimate emissions for another activity in the value chain. Secondary data may be used to fill gaps and inform estimates when primary data is not readily available and may not reflect the specific activities of an entity's supply chain.

Allocation

The process by which suppliers assign a portion of their total greenhouse gas emissions to the individual goods or services they provide, based on the buyer's share or use. Allocation helps a purchasing company to account for the emissions related to their specific purchases, when production-specific primary data is not feasible. Most allocation methods are either physical (reflecting a relationship of inputs and outputs such as mass, volume, energy, total number of units), chemical, or economic, reflecting the market value of each output or product. Recommended allocation methods vary based on the type of product or service and industry norms.

Life Cycle Assessment (LCA)

A technique to assess the environmental impacts associated with all stages of a product's life—from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling. When accounting for supply chain emissions, LCAs consider the direct and indirect greenhouse gas emissions over the entire life cycle of purchased goods and services.

Comparative analysis of supply chain emissions calculation methodologies

The GHG Protocol offers four methodologies for calculating supply chain emissions. These range from primary-data driven methods such as supplier-specific and hybrid methods, to secondary data-driven methods such as average-data and spend-based methods. While the methods vary in specificity, the GHG Protocol allows flexibility in choosing the approach that balances accuracy with practicality for each company. Here, we explain these methods from least- to most-specific.

Methodology	How it works	Data needed & sources	Contextual summary
Spend-based method	Estimates emissions by collecting data on the economic value of goods and services purchased and multiplying it by relevant secondary (e.g., industry average) emission factors (e.g., average emissions per monetary value of goods)	Data needed: Amount spent on purchased goods or services, by product type, using market values (e.g., dollars) Sources: Internal data systems (e.g., accounting system)	Practical for organizations starting their carbon accounting, as it requires minimal data and provides a broad overview of emissions hotspots, and where to focus efforts. However, its simplicity comes at the cost of accuracy, as it assumes a direct correlation between spend and emissions, implying that the only strategy for reducing emissions is to decrease spending
Average data method	Estimates emissions by collecting data on the mass (e.g., kilograms or pounds), or other relevant units of goods or services purchased and multiplying by the relevant secondary (e.g., industry average) emission factors (e.g., average emissions per unit of good or service)	Data needed: Material or ingredient mass or number of units of purchased goods or services for a given year (e.g., kg, hours spent) Sources: Internal data systems (e.g., inventory logs, purchase records, delivery receipts)	Bridges the gap between spend-based estimates and detailed analyses, suitable for organizations looking to improve the granularity of their carbon footprint assessments without the need for extensive supplier engagement
Hybrid method	This method uses a combination of supplier-specific data (where available) and secondary data to fill the gaps	Data needed: Allocated scope 1 & 2 data specific to supplier's product, all other upstream emissions either primary or secondary data as available Sources: Direct from suppliers or from public disclosures, regulatory filings, and published sustainability reports	Best for organizations willing to invest in comprehensive data collection for a tailored approach. It adapts to varying levels of data availability and combines accuracy with flexibility, though it requires more effort in data management
Supplier-specific	This method requires product-level cradle-to-gate GHG inventory data from goods or services suppliers, allowing for the most accurate accounting of emissions.	Data needed: Supplier-specific, product-level GHG emissions data for each purchased good or service Sources: Directly from suppliers, requiring suppliers to provide product-specific emissions data through life cycle assessments or third-party verified reports	Represents the gold standard in emissions accuracy, directly reflecting the unique attributes of an organization's supply chain. However, its high demands on data collection and supplier cooperation make it an unrealistic option for most companies

Implementing methodologies

Implementing these methodologies presents a range of challenges, as manually managing the process is both time-consuming and prone to error. Technology, however, offers a pathway to streamline these processes, enhancing both efficiency and precision. In this section, we will explore these challenges in greater depth and illustrate how technology can make a significant difference.

The manual dilemma

Traditionally, supply chain emissions have been managed by service providers and internal teams through manual efforts, presenting many challenges for organizations. The process, which typically involves sifting through an expanse of spreadsheets and various documents, is inherently complex and disorganized. The resultant data mosaic, which spans different scopes, boundaries, and categories, is rife with inconsistency and often lacks comparability. This not only hampers comprehensive analysis but also creates barriers to the strategic management of emissions.

Moreover, the manual approach includes particularly arduous tasks, such as mapping purchases across Economic

Input-Output (EEIO) commodity categories. This task is not just laborious but also time-intensive, turning what should be a strategic exercise into a burdensome endeavor.

Additionally, engaging suppliers to obtain primary data brings its own set of challenges. It demands ongoing communication and coordination, heavily dependent on suppliers' ability and willingness to provide precise emissions data. Compounded by these challenges are the frequent data voids—scenarios where companies face limited visibility into their supply chain emissions due to a lack of accessible and reliable data, which hampers informed decision-making and the monitoring of progress.



The technology solution

Adopting technology in supply chain emissions accounting introduces accuracy and agility, essential for adapting to the evolving landscape of emissions reporting and promoting decarbonization across the value chain. Sustain.Life's platform revolutionizes this process with its transformative capabilities:

Sustain.Life: Transformative capabilities

- **Adaptive methodologies:** At the center of Sustain.Life's approach is our capacity to dynamically adapt to the data landscape of each organization, deploying a range of methodologies for emissions accounting. This includes leveraging AI to access publicly-available emissions data, utilizing data that companies already have on their supply chains, and integrating emissions data provided by suppliers, including LCA data. In instances where data is incomplete or absent, our system automatically fills gaps with secondary data. This adaptive approach ensures that our emissions accounting process is not only customized to meet the specific requirements and data availability of each company but also maximizes accuracy and completeness.
- **Automation and efficiency:** Sustain.Life streamlines emissions accounting by integrating with corporate systems to ingest spend data efficiently. It uses AI for accurate mapping of purchases to EEIO commodity categories, reducing time and increasing precision. Additionally, features like data quality detection and anomaly flagging uphold the integrity of emissions tracking.
- **Supplier empowerment:** Our technology simplifies supplier engagement, with automated data requests and a systemized process for collecting and managing supplier-specific emissions data. This minimizes the administrative burden and encourages suppliers to contribute to the emissions management process more effectively, driving toward higher quality primary data. The platform also supports suppliers, especially those lacking expertise or resources, by providing accessible tools for accurate emissions measurement and reporting, thereby fostering a collaborative environment to achieve sustainability goals.

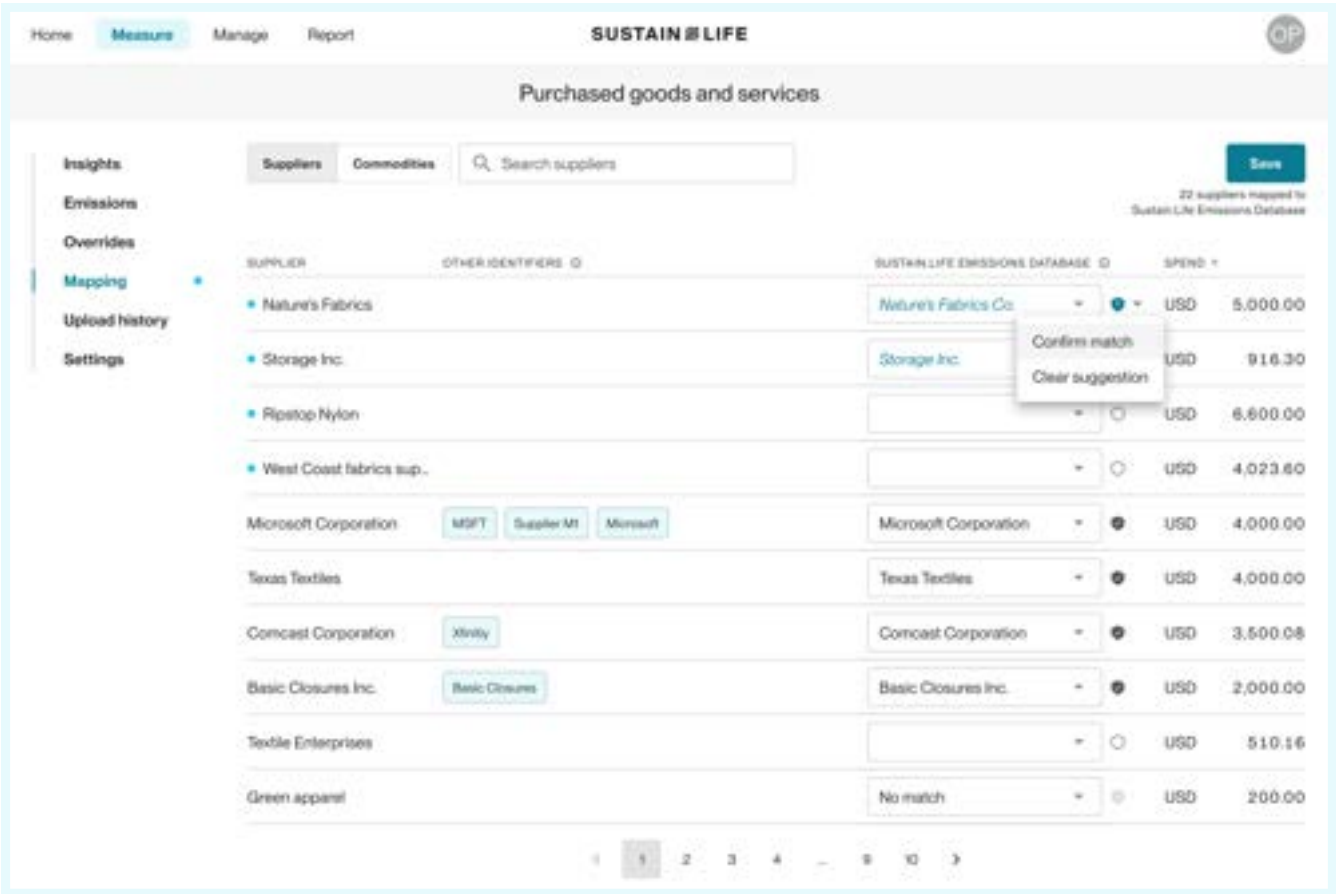
By addressing the manual dilemma with a technology solution, Sustain.Life simplifies the complex process of supply chain emissions accounting and empowers organizations and their suppliers to contribute meaningfully to sustainability objectives. This technology-driven approach ensures that companies can navigate the path to net-zero with greater precision, efficiency, and collaboration.



How it works

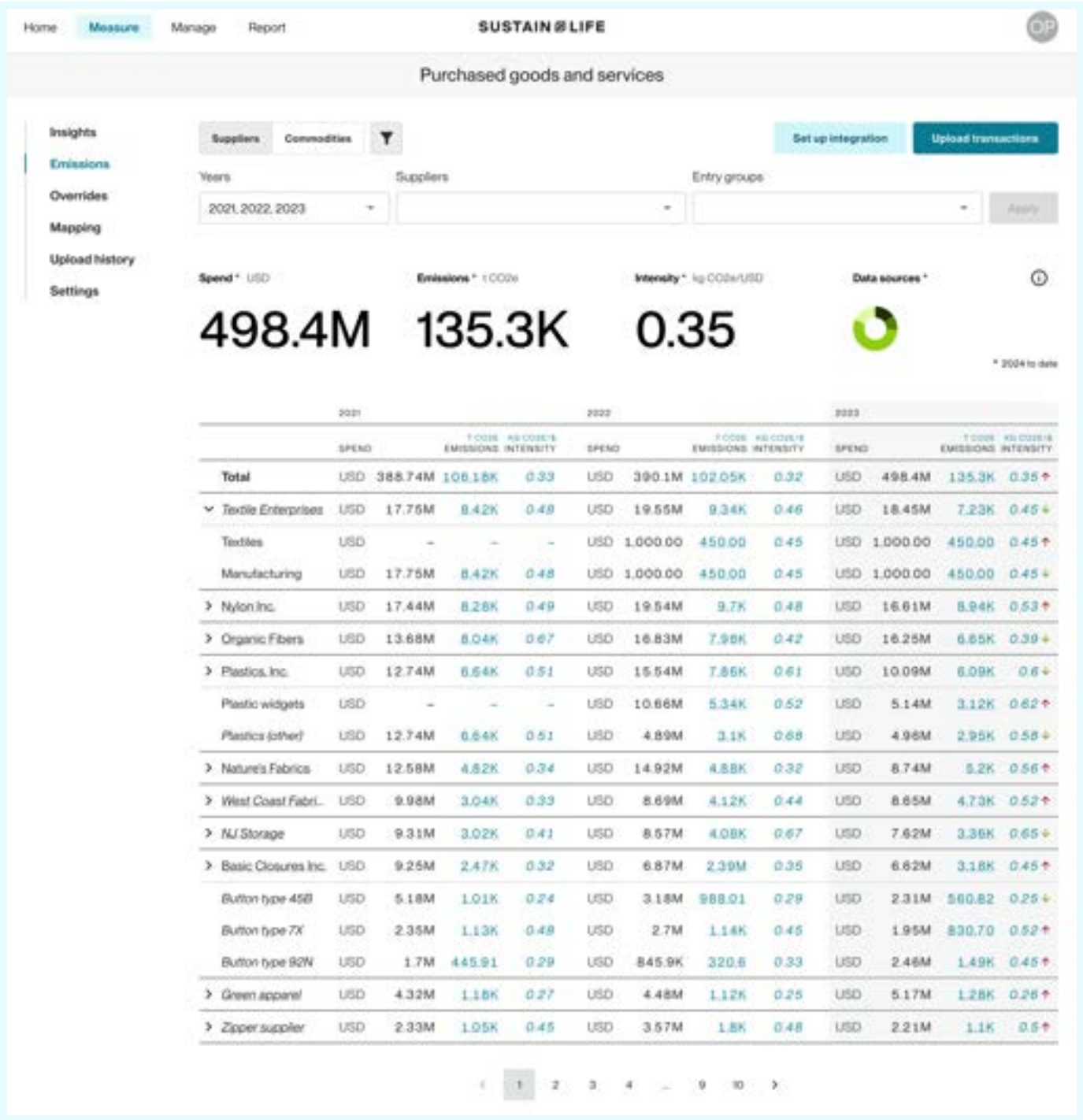
- **Seamless data integration:** Upload your purchase data easily through direct integration or bulk upload. Our AI-driven technology automatically matches the suppliers you upload to the companies in our proprietary emissions database, surfacing the primary data you need for accurate, revenue-based emissions allocation.

The Sustain.Life Emissions Database is built using primary data extracted through AI-driven scraping of sustainability reports and other publicly accessible datasets, including CDP.

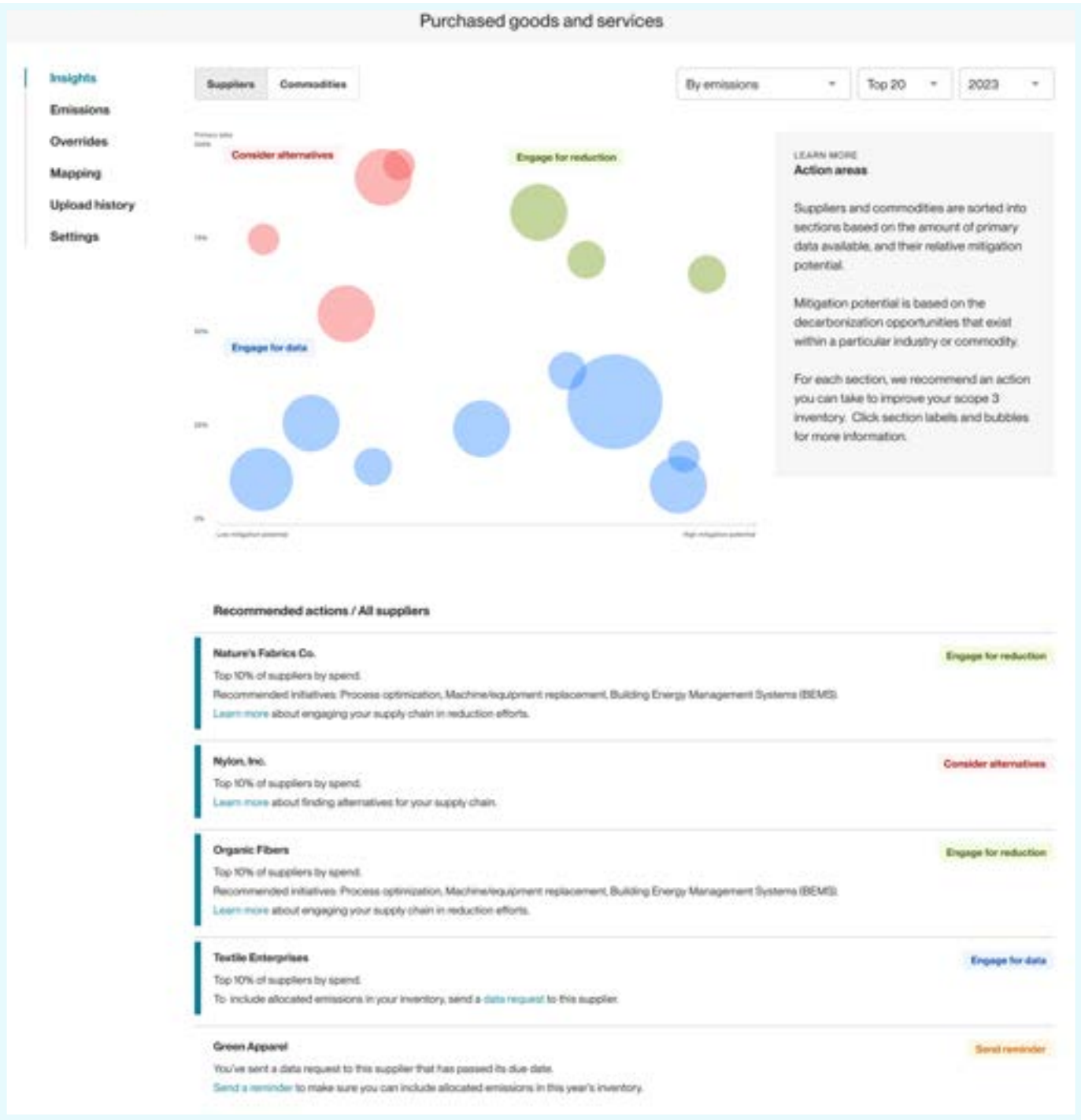


- **Prioritized data accuracy:** Our commitment to data accuracy is unwavering. In scenarios where primary data isn't available in the Sustain.Life database, or you have more accurate data, we provide a suite of options:
 1. Use supplier-provided emissions data (for example product-specific LCAs) or input supplier-specific factors.
 2. Employ our proprietary supplier proxy calculation.
 3. Engage suppliers for primary data, using intuitive tools that facilitate their measurement and allocation tasks.
 4. Apply spend-based proxies only as a final alternative to ensure data coverage.

- **Comprehensive data overview:** View your entire PG&S emissions data in one place, by commodity or supplier. Drill down into detailed analyses, compare across time frames, and understand data sources to assess data accuracy and completeness.



- **Actionable insights:** Transform your emissions data into an effective strategy with tailored insights. Pinpoint critical suppliers for collaboration, consider alternative procurement options, and establish informed pathways for emissions mitigation based on supplier emissions profiles.



- **Supplier empowerment:**

- **Data acquisition & accuracy:** Grant suppliers access to intuitive measurement tools, empowering them to accurately report emissions data. This enhances data integrity and supports supplier accountability, laying the groundwork for data-driven environmental strategies.
- **Strategic reduction collaboration:** Collaborate with suppliers on targeted reduction efforts, offering sector-specific guidance to model impactful decarbonization projects. Monitor these initiatives for cost-effectiveness and return on investment, reinforcing your joint commitment to sustainability.
- **Disclosure-aligned reporting:** Automatically align your emissions data with key frameworks and regulations like CDP, ISSB IFRS, GRI, and CSRD. Our system ensures that all information is organized, transparent, and audit-ready, simplifying the compliance process.





Ready to tackle your supply chain emissions with precision and efficiency?

Accounting for PG&S emissions can be a complex and resource-intensive aspect of moving toward a sustainable and net-zero future. Recognizing this challenge, **Sustain.Life offers an advanced technology solution that streamlines and simplifies this process.** Contact us today to discover how we can support your journey to a more sustainable future.

www.sustain.life