Trinity Consultants

WHITE PAPER

A Practical Approach to Scope 3 Greenhouse Gas Management

Anu Krishnan and Kathryn Connolly

ABSTRACT

This whitepaper will provide:

- Insight into the various regulatory and non-regulatory drivers influencing sustainability programs for the pulp & paper industry
- A brief primer on the 15 categories of Scope 3 – those indirect emissions that occur in the value chain — representing a substantial portion of the industry's carbon footprint, and insight into the relevance and materiality of those 15 categories for the pulp and paper sector
- Practical and actionable strategies for companies that are just getting started with preparing a Scope 3 GHG inventory, as well as those looking to fill gaps or otherwise improve the robustness of their Scope 3 estimates
- Perspective on challenges around activity data collection and explore the hierarchy of calculation methods for quantifying Scope 3 emissions, including the benefits of using life cycle assessment (LCA)

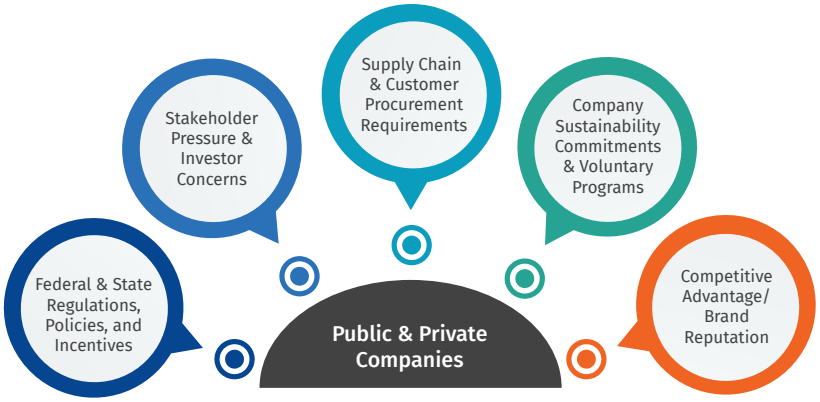
INTRODUCTION

The pulp and paper industry is among the top five most energy-intensive industries globally and accounts for approximately 2% of direct industrial CO_2 emissions. The pulp and paper industry is also the largest user of original or virgin wood, which can have adverse impacts on both human health and local biodiversity.[1] The accounting and management of indirect greenhouse gas (GHG) emissions across the value chain, i.e., Scope 3, has become a necessary next step in climate transition planning for organizations in this sector.

There are multiple drivers in place that continue to drive the momentum for companies to quantify, manage, and improve their Scope 3 GHG emissions. Despite the U.S. Securities and Exchange Commission (SEC) climate disclosure targeted for roll back under the new administration, U.S. states are showing leadership and bolstering efforts to ensure continuity of corporate responsibility and reporting on climate related topics. On October 7, 2023, Governor Newsom signed several climate-related bills including California's Climate Corporate Data Accountability Act (SB 253).[2] SB 253 applies to public and private U.S. companies that do business in California and have total annual revenues of $1 billion or greater (calculated on global basis) and requires disclosure of Scope 3 emissions beginning in 2027. In early 2025, the states of New York, New Jersey, Colorado, and Illinois introduced bills which would require companies with total revenues exceeding $1 billion that do business in these states to disclose Scope 3 emissions data on an annual basis.

On January 5, 2023, the European Corporate Sustainability Reporting Directive (CSRD) entered into force, requiring large public EU companies, and large companies with listed securities on EU-regulated markets (even if not based in the EU) to disclose the environmental, social and governance information outlined in the European Sustainability Reporting Standards (ESRS).[3] ESRS 1 addresses climate change disclosure and includes Scope 3 emissions reporting as early as 2025 for reporting year 2024. On February 26, 2025, the Commission released proposals to limit the scope of these regulations to large companies only at this time.

FIGURE 1: Graphic illustrating the range of external drivers for Scope 3



In many industries, including the pulp and paper industry, there are strong business drivers for assessing and managing value chain emissions beyond regulation. Supply chain pressure and brand reputation/competitive advantage are significant drivers. Many large corporations have established aggressive climate goals to help drive the transformation to a low carbon economy and are extending these aspirations to their value chains through procurement policies and customer engagement programs. As Scope 3 emissions often represent the largest portion of a company's overall GHG footprint, gaining visibility across the value chain can reveal emissions hot spots and identify reduction opportunities. As of 2024, 44 companies within the forestry and paper industry have attained validation under the Science-based Target Initiative (SBTi), alongside 88 companies that have made some form of environmental or sustainability commitment.[4]

[1] sciencedirect.com/science/article/pii/
[2] leginfo.legislature.ca.gov/
[3] finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/
[4] resourcewise.com/forest-products-blog

In light of the many potential drivers and benefits of assessing Scope 3 emissions, companies that have not yet done so may want to get started in order to understand the potential risks and opportunities associated with their value chain footprints. The old adage, "you can't manage what you don't measure" certainly applies.

Calculating Scope 3 Emissions – Where to Start?

Per the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard, there are 15 categories of Scope 3 emissions that represent a company's entire value chain.[5] There are 8 categories which represent upstream impacts, such as purchased good and services, upstream transportation and distribution, waste generated in operations and employee commuting. The remaining 7 categories represent downstream impacts, such as downstream transportation and distribution, processing of sold products, and end-of-lie treatment of sold products.

FIGURE 2: List of Scope 3 Categories

Upstream or Downstream	Scope 3 Category	
Upstream Scope 3 Emissions	1. Purchased goods and services 2. Capital goods 3. Fuel- and energy-related activities (not included in scope 1 or scope 2) 4. Upstream transportation and distribution	5. Waste generated in operations 6. Business travel 7. Employee commuting 8. Upstream leased assets
Downstream Scope 3 Emissions	9. Downstream transportation and distribution 10. Processing of sold products 11. Use of sold products 12. End-of-life treatment of sold products	13. Downstream leased assets 14. Franchises 15. Investments

Scope 3 accounting and management can be approached through a series of practical steps, enabling the creation of an initial inventory all the way to developing a roadmap for ongoing improvement and management.

Practical Steps for Tackling Scope 3:

- **Step 1:** Define relevant Scope 3 categories
- **Step 2:** Identify best available activity data for each potentially relevant category across value chain
- **Step 3:** Identify best available emissions data that can be mapped to available activity data for each category according to Scope 3 hierarchy
- **Step 4:** Calculate Scope 3 GHG emissions and identify hotspots
- **Step 5:** Develop a roadmap for improving completeness and accuracy of Scope 3 inventory over time

[5] ghgprotocol.org/sites/default/files/2023-03/Scope3_Calculation_Guidance

Reviewing Relevance/Materiality of Scope 3 Categories

The first step is to determine which of the fifteen Scope 3 Categories may be relevant or material to the reporting company. The GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard establishes the following relevance criteria:[6]

- **Size:** The category contributes significantly to the company's total Scope 3 emissions footprint
- **Influence:** The company can influence the reduction of emissions in the category
- **Risk:** The category's emissions expose the company to significant risks (e.g., financial, regulatory, supply chain, product and technology, compliance/litigation, and reputational risks)
- **Stakeholders:** The category's emissions are considered critical by the company's key stakeholders (e.g., customers, suppliers, investors)
- **Outsourcing:** The category is outsourced by the company but was previously performed in-house or is typically performed in-house by other companies in the sector
- **Sector guidance:** The category has been identified as significant in published industry sector guidance
- **Spending or Revenue:** The category requires significant spending or generates significant revenue
- **Other:** The category meets additional relevance criteria developed by the company or industry sector

Hence, Scope 3 materiality is a company-specific assessment that requires both quantitative and qualitative considerations. To begin with, certain categories may be qualitatively eliminated because they are simply not applicable (e.g., the company does not own any franchises, the company is not a lessee or lessor). Next, peer benchmarking and review of sector guidance may provide insight on which categories are considered material by others in the same industry sector. Before qualitatively eliminating a Scope 3 category from consideration based on this insight, a company should discern whether it can influence emissions reductions in the category, thereby providing opportunities for improved efficiency and cost savings, product innovation, and/or company differentiation. After this initial qualitative review, the remaining Scope 3 categories are considered potentially or likely relevant and require quantification.

CDP published a technical note which indicates that, based on a review of literature and analysis of CDP's response data in 2021, companies in the Paper sector should primarily measure and report Scope 3 Category 1 (Purchased Goods and Services) to account for upstream emissions from land use change of forestry companies. Additionally, per CDP, companies in the pulp and paper industry should evaluate Category 4 (Upstream Transportation and Distribution) and Category 9 (Downstream Transportation and Distribution) to evaluate impacts from supply and distribution chains. Other potentially relevant categories for this sector include Category 5 (Waste Generated in Operations) and Category 7 (Employee Commuting). Companies may also evaluate downstream emissions driven by end-of-life treatments like waste incineration, landfilling, and paper recycling.

Evaluating Hierarchy of Emission Factors for Relevant Categories

When calculating Scope 3, there is a hierarchy associated with emission factor data. The least accurate approach is the use of spend-based emission values from environmentally extended input/output (EEIO) models for a screening level assessment. Due to financial accounting procedures, a company's spend data is often more accurate and complete than the tracking of actual amounts (i.e., mass) of materials used in its operations, and therefore provides a starting point for quantifying certain Scope 3 categories. EEIO databases combine data on economic transactions with available environmental data including GHG emissions. The U.S. EPA's Supply Chain Emission Factors for U.S. Industries and Commodities dataset provides supply chain emission factors in units of kilograms of emissions per U.S. dollar of purchases for all categories of goods and services in the U.S. economy.[7] The factors are aggregated in two ways:

1. Supply chain emission factors without margins which represent cradle-to-factory gate estimates, and
2. Supply chain emission factors with margins which represent cradle-to-shelf estimates which add the emissions from transportation, wholesale and retail of products to the cradle-to-factory gate estimates.

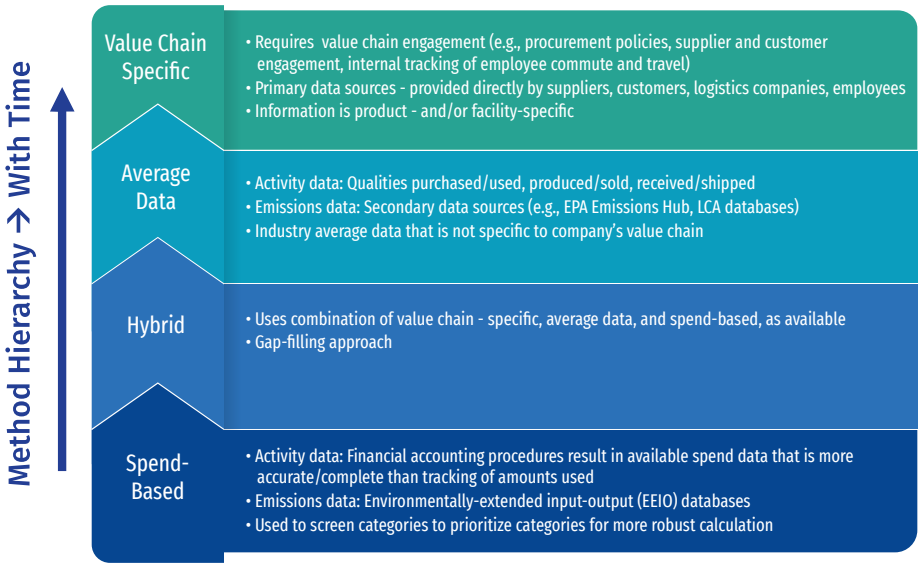
[6] ghgprotocol.org/sites/default/files/2023-03/Scope3_Calculation_Guidance
[7] cfpub.epa.gov/si/si_public_record_Report.cfm

Hence, use of the factors with margins would combine emissions from Scope 3, Category 1: Purchased Goods and Services (Scope 3.1) with Scope 3, Category 4: Upstream Transportation and Distribution (Scope 3.4). While the spend-based approach provides a starting point for calculating certain Scope 3 categories, companies should prioritize the use of higher-level factors where accurate activity data is available.

The use of secondary data based on industry average emissions data provides a more accurate estimate than the spend-based assessment. For example, the EPA Emissions Hub[8] provides a regularly updated set of default emission factors which includes Scope 3 factors for upstream and downstream transportation and distribution (Categories 4 and 9), employee business travel (Category 6), and employee commuting (Category 7) that are developed from the EPA's Annual Inventory of U.S. GHG Emissions and Sinks. The EPA Emissions Hub also provides U.S.-based emission factors for waste generated in operations (Category 5) and end of life treatment of sold products (Category 12) developed from U.S. EPA, Office of Resource Conservation and Recovery documentation for the Waste Reduction Model (WARM). Other available sources of industry average emissions data may include publicly available life cycle inventory (LCI) databases.

Ultimately, the use of primary data based on supplier- and facility-specific emissions provides the most accurate assessment. However, the lack of available primary data in all industry sectors is a challenge. While there are strong drivers for companies to quantify and manage their value chain emissions, most companies currently rely almost exclusively on spend-based estimates and secondary data from industry averages, with few companies using primary data from suppliers.

FIGURE 3: Graphic illustrating Scope 3 Calculation Method Hierarchies



Quantifying Scope 3, Category 1 Emissions (Purchased Goods and Services)

For the pulp and paper industry, the quantification of Scope 3.1 can be particularly complex as it accounts for upstream emissions from land use change of forestry companies. The GHG Protocol Land Sector and Removals Guidance provides details on how to account for land-related emissions and removals for companies operating in the Forest, Land and Agriculture (FLAG) Sector. The draft guidance released in 2022 is currently under public review and expected to be finalized in late 2025.[9] This guidance covers emissions accounting from, (1) Land management and land use change, (2) CO_2 removals and storage in land, product, and geologic carbon

[8] epa.gov/climateleadership/ghg-emission-factors-hub
[9] ghgprotocol.org/land-sector-and-removals-guidance

pools, and (3) Biogenic products and products derived from technological CO_2 removals across the value chain. The GHG Protocol Land Sector and Removals Guidance (draft version) addresses FLAG emissions and removals inventories across scopes, including scope 3. The Science Based Targets initiative (SBTi) issued guidance for FLAG Target-Setting that provides a pathway for companies to set near-term and net-zero targets for land use change and land management emissions. The SBTi FLAG Guidance outlines how companies should set science-based targets for mitigation of land-related emissions and removals.[10] Companies can set FLAG targets based on the draft version of the GHG Protocol Land Sector and Removals Guidance.

Biogenic CO_2 emissions are defined by the U.S. EPA as CO_2 emissions related to the natural carbon cycle, as well as those resulting from the combustion, harvest, combustion, digestion, fermentation, decomposition, or processing of biologically based materials. Biogenic CO_2 emissions are considered to be carbon neutral.

The GHG Protocol Corporate Standard requires that direct CO_2 emissions from the combustion of biomass be included in the public report for transparency purposes, but reported separately from the scopes.[11] The GHG Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard has a similar requirement that biogenic CO_2 emissions that occur in a company's value chain shall not be included in the scopes and must be reported separately.[12] The requirement to report biogenic CO_2 emissions separately refers to CO_2 emissions from combustion or biodegradation of biomass only, not to emissions of any other GHGs (e.g., CH_4 and N_2O), or to any GHG emissions that occur in the life cycle of biomass other than from combustion or biodegradation. Any GHG removals (e.g., biological GHG sequestration) shall not be included in scope 3 but may be reported separately.

An example paper manufacturing company that purchases wood pulp and sells finished paper products would not account for upstream CO_2 removals from biological carbon sequestration that occurs in trees in scope 3, but instead may report CO_2 removals separately. The company also would not account for downstream biogenic CO_2 emissions from the incineration of sold paper products at the end of their life in scope 3, but instead may report those emissions separately.[13]

For this industry sector, Scope 3.1 is not only expected to be the largest category in size, but also in the amount of influence that a company may have in reducing emissions through procurement decisions. Hence, there is a compelling reason to work towards the use of primary data from suppliers in calculating it.

In November 2022, Together for Sustainability (TfS) published guidance for calculating Scope 3.1 for the chemical industry.[14] The TfS guidance provides recommendations and practical approaches for quantifying Scope 3.1 that are applicable to any industry sector. Companies should strive for consistency in Scope 3.1 inventory boundaries, the basis for data collection, and the calculation methodologies used. When collecting activity data, the guidance recommends collecting additional attributes regarding the purchased materials besides the total amount of spend or the quantity purchased. Information such as the material's chemical name, structure or group, Chemical Abstracts Service Registry (CAS) number, country where it is manufactured, and supplier information may be critical to mapping the activity data to the most appropriate emission factor data. Also, grouping materials by SIC or NAICS, similar chemical structure, and similar manufacturing process or technology could facilitate the identification of reasonable proxy data in the event that a material-specific emission factor is not available. In addition, for companies with an expansive list of raw materials, such information may facilitate the implementation of a data management system for the large volume of information needed to track Scope 3.1 emissions going forward.

Scope 3 Inventory Best Practices for Continual Improvement

Once the available activity data and emission factors are identified, it is important to assess the quality of the available data, and to identify any gaps along with an approach for addressing them.

The following are key considerations when assessing Scope 3 inventory data quality:

- Third party-verified primary data should be the preferred source of data (e.g., life cycle GHG data obtained from a purchased material's supplier facility-specific environmental product declaration)

[10] sciencebasedtargets.org/resources/files/SBTiFLAGGuidance.pdf
[11] ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf
[12] GHG Protocol Corporate Value Chain Standard | ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf
[13] Example 6.2, Accounting for biogenic emissions and removals, GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard
[14] tfs-initiative.com/app/uploads/2024/12/TfS-PCF-Guidelines-2024.pdf

- The time period associated with the activity data or emissions data should be as close as possible to the time period being reported (i.e., the year associated with the data used to develop an emission factor is the same as, or as close as available, to the year of the inventory)
- The geographic origin of the data should align with the corresponding company operations location, if possible (e.g., use of industry average data from Mexico for chemical sourced from Mexico)
- The technical boundary of the data should be considered (e.g., concentration of chemical solution) and align with that associated with the company's activity
- The sensitivity of an emission factor should be determined by checking multiple sources, if possible
- If using product carbon footprint (PCF) or life cycle analysis (LCA) data, the declared unit should align with the form of the product that the company is using (e.g., data provided on a "per ton of crude steel" should not be used to estimate Scope 3.1 emissions for purchased steel parts)

Depending on the number of Scope 3 categories to be considered, implementation of digital solutions to extract data from existing systems and better assess data quality may be warranted.

Any assumptions or proxy data that are used to close data gaps should be clearly documented so that they may be addressed through future inventory improvement efforts. Also, internal data gathering and quality assurance procedures should be fully documented in an inventory report and/or monitoring plan as a best practice so that the process may be repeated and improved upon for the next inventory. This documentation can also serve to support internal audit processes or 3rd party verification efforts. Finally, once the Scope 3 emissions are calculated for a company's relevant categories, they should be analyzed to identify hot spots. To do this, rank all Scope 3 categories, and Scope 3.1 sub-categories, from largest to smallest according to their estimated emissions to determine which activities and material sources represent the biggest impacts. Then, develop a method for prioritizing improving the accuracy of the GHG emissions estimates. For example, use the Pareto Principle (i.e., the 80/20 rule) to prioritize the categories/sub-categories that are the top 80% contributing sources of value chain emissions by improving the accuracy of their emissions estimates by developing and implementing a plan to up the Scope 3 emissions hierarchy.

Practically speaking, Scope 3 emissions quantification is an iterative process of continual improvement. Starting now, when it may not yet be required by regulation, gives companies an opportunity to begin with whatever data is currently available, take a first pass at quantification and then identify data gaps and hot spots to develop a plan for gathering the necessary activity and emissions data to ultimately improve the accuracy and completeness of future inventories. As more and more companies make the move to publicly disclose their value chain footprints, data quality will inherently improve. The key is just to take the first step, and don't let any unrealistic expectations of perfection get in the way of your progress.

Leveraging Technology to Move Up the Scope 3 Emissions Management Maturity Curve

Along the same vein of continuous data improvement, understanding your organization's existing technology landscape plays an important role in the evolution of your Scope 3 emissions management program. According to GlobeScan's The Sustainability Value Triangle report published in February 2025[15], collaboration between finance, information technology (IT), and sustainability functions within an organization is crucial to the success of sustainability initiatives and helps to embed sustainability throughout the organization. Given the cross-functional nature of the activity data behind Scope 3 emissions calculations, as well as the volume and disparate nature of the data, it is critical to partner with IT and finance to identify opportunities to improve data quality, consolidate data streams when possible, and automate data collection to support continuous improvement of your organization's Scope 3 emissions calculations and management.

There are many ways to leverage technology and there are numerous different technology options available to support Scope 3 emissions calculation management. Ultimately, technology aims to drive efficiency, reduce the risk of errors, and operationalize change management through the following avenues:

- **Standardize** calculation methodologies, emission factors, data transformations, nomenclature, and more to reduce organizational risk and improve reporting efficiencies

[15] globescan.com/2025/02/06/the-sustainability-value-triangle-creating-impact-through-finance-it-and-sustainability/ (GlobeScan, n.d.)

- **Automate Data Collection** using application programming interfaces to eliminate duplicative data collection efforts and reduce the risk of errors
- Establish **Data Quality Assurance Checks** to flag anomalies and address issues proactively
- Leverage **Advanced Data Analytics** capabilities to provide meaningful and real-time insights into hot spots as well as progress towards related targets and goals
- Simplify **Verification** processes by leveraging built-in audit trails, calculation and emission factor transparency, and efficiency opportunities over time

Ultimately, the software and technology market is highly saturated, which is why it's important to first understand your organization's existing systems through a partnership with IT and finance. IT will provide insight into existing software, ensure alignment with internal IT best practices and taxonomy, and suggest pathways to automate data transformations and aggregations using the latest technological advances, including AI. Given the greater ties between finance data and sustainability data, it is critical to look to manage sustainability data with the same rigor as you would investor grade financial data. Organizations do not rely on spreadsheets to manage investor grade financial data, and therefore, the sustainability team should also not be relying on spreadsheets to manage their data. For this reason, it may be wise to invest in a software solution that meets your organization's specific sustainability and Scope 3 needs, whether that means leveraging a toll your organization already licenses or evaluating new tools.

The key to producing a successful Scope 3 data management strategy is soliciting the right input. Similar to the stakeholder engagement when reviewing relevance and materiality of Scope 3 categories, stakeholder groups who can provide accurate and comprehensive information regarding the people, processes, and tools behind the Scope 3 data should be involved in identifying and standing up Scope 3 data management technology and software.

Finally, Scope 3 data management and establishment of technology solutions to support the program is not a one and done process. Without an invested group of stakeholders and buy-in from IT and finance, adoption of technology and change management will fall to the wayside. Hence the importance of engaging the right stakeholders up front in the strategy and planning - providing ownership drives interest and commitment. In addition, there is no perfect technology solution for managing Scope 3 data. Therefore, we must engage in digital transformation in a way that recognizes it is a journey. This can be challenging at times, but through iteration and continued investment, great value can be derived for the organization to free up subject matter experts to spend less time collecting, aggregating, and transforming data, and more time driving Scope 3 emissions reduction strategies.

Scope 3 Emissions Management

Companies with more mature sustainability programs may seek to use the Scope 3 emissions inventory data to manage and improve their value chain emissions particularly for the highest contributing source categories. Some options companies can evaluate include:

- **Sustainable sourcing:** Prioritize sourcing wood from sustainably managed forests
- **Efficient transportation:** Optimize logistics to minimize fuel usage in transportation
- **Chemical optimization:** Explore alternative chemicals with lower environmental impact
- **Recycling initiatives:** Increase the use of recycled paper in production
- **Collaboration with suppliers:** Work with suppliers to improve their sustainability practices

CONCLUSION

As regulatory pressures and stakeholder expectations around sustainability continue to grow, effective Scope 3 greenhouse gas management is becoming a critical priority. Understanding the drivers behind Scope 3 disclosures, identifying the most relevant emission categories, and implementing practical strategies for data collection and quantification are essential first steps toward building a comprehensive and credible Scope 3 GHG inventory, with the expectation that the inventory will be refined over time. By leveraging life cycle assessment methodologies, digital solutions, and enhanced supplier engagement, companies can not only improve the accuracy of their Scope 3 emissions but also uncover opportunities for emissions reduction and sustainable sourcing. A proactive approach to Scope 3 management will not only help organizations meet compliance requirements but also drive long-term business resilience and environmental stewardship.