

Scope 3 Guidebook

- Expressing Reduction Efforts Along the Value Chain -

March 2026

Contents

- Chapter 1 Introduction.....1**
 - 1. Background to Scope 3 Disclosure 1
 - 2. Purpose of This Guidebook..... 2

- Chapter 2 Summary of Metrics Related to Emissions in the Value Chain4**
 - 1. What is Scope 3? 4
 - 2. Summary of Concepts Related to Scope 3 5
 - (1) Carbon Footprint of Products (CFP) 5
 - (2) Avoided Emissions 5
 - (3) Reduced Emissions of Product..... 6

- Chapter 3 Current Status and Significance of Calculating Scope 3 Emissions in Corporate Transition9**
 - 1. Current Status of Scope 3 Emissions Calculation and Disclosure 9
 - (1) Business Company Perspectives 9
 - (2) Investor Perspectives 11
 - 2. The Meaningfulness of Calculating and Disclosing Scope 3 Emissions..... 13
 - (1) Business Company Perspectives 13
 - (2) Investor Perspectives 14

- Chapter 4 How Scope 3 Emissions Should Be Disclosed and Utilized16**
 - 1. Business Company Perspectives 16
 - 2. Investor Perspectives 17

- Chapter 5 Concluding Remarks.....20**

- Sector Guides21**
 - 1. Overview of the Sector Guides 21
 - 2. Automotive Sector..... 22
 - (1) Sector Overview..... 22
 - (2) Material Categories in the Automotive Sector 23
 - 3. Electrical and Electronics Sector 29
 - (1) Sector Overview..... 29
 - (2) Material Categories in the Electrical and Electronics Sector 30
 - 4. Real Estate Sector 36
 - (1) Sector Overview..... 36
 - (2) Material Categories in the Real Estate Sector 37
 - 5. Retail Sector..... 43
 - (1) Sector Overview..... 43
 - (2) Material Category in the Retail Sector 44

6. Food Sector.....	48
(1) Sector Overview.....	48
(2) Material Categories in the Food Sector.....	49
7. Trading Companies	55
(1) Sector Overview.....	55
(2) Material Categories of Trading Companies	57
Appendix.....	64

1. Background to Scope 3 Disclosure

Many companies have begun to calculate and disclose Scope 3 emissions following the standardization of their calculation method by the GHG Protocol¹ in 2011. The Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD Recommendations), published in 2017, recommended the disclosure of Scope 3 emissions alongside those of Scope 1 and 2 but with less emphasis.² However, the TCFD's 2021 document titled "Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures" included statements such as, "The disclosure of Scope 3 GHG emissions is subject to materiality; however, the Task Force encourages organizations to disclose such emissions" and "The Task Force strongly encourages all organizations to disclose Scope 3 GHG emissions" which put a stronger emphasis on Scope 3 emissions. The IFRS S2 "Climate-related Disclosures," a global disclosure standard published in 2023 by the IFRS Foundation based on the TCFD Recommendations treats Scope 3 emissions on the same level as Scope 1 and Scope 2 emissions, and requires disclosing the categories included in the calculation.

In Japan, the Sustainability Standards Board of Japan (SSBJ) issued the Sustainability Disclosure Topic Standard No. 2, Climate-Related Disclosure Standard in March 2025 following IFRS S2. Like IFRS S2, the standard includes a requirement to disclose Scope 3 emissions. The Financial Services Agency is currently considering incorporating the SSBJ standards into statutory disclosures, and as a result, companies with large market capitalization are expected to begin preparing securities reports in accordance with the SSBJ standards, which will include information on Scope 3 emissions.

Various private environmental initiatives also require the disclosure and reduction of Scope 3 emissions. For example, the Science-based Targets Initiative's (SBTi) Corporate Net Zero Standard requires companies to calculate their Scope 3 emissions and set Scope 3 targets if Scope 3 emissions account for 40% or more of their combined Scope 1, 2, and 3 emissions.³ In addition, CDP, which discloses and assessed environmental information of companies and other organizations, evaluates not only the disclosure of Scope 3 emissions but also third-party assurance, establishment of reduction targets and progress confirmation, as well as engagement with the value chain, including suppliers.

While Scope 3 disclosure is increasingly required in disclosure regulations and environmental initiative activities, recently there has been debate about how Scope 3 should

¹ The Corporate Value Chain (Scope 3) Accounting and Reporting Standard

² "Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks."

³ All companies involved in the sale or distribution of natural gas and/or other fossil fuels shall set separate scope 3 targets for the use of sold products, irrespective of the share of these emissions compared to total scope 1, 2, and 3 emissions of the company. All companies shall include emissions from all relevant scope 3 categories in long-term science-based targets. (SBTi Corporate Net-Zero Standard Criteria version 1.3)

be treated under disclosure regulations. During the process of the U.S. Securities and Exchange Commission (SEC)'s consideration of climate-related disclosure rules, a requirement for Scope 3 disclosure was included in the exposure draft but was removed from the final version released in March 2024. Even within discussions at the Financial Services Agency on mandatory sustainability disclosure, discussions about whether Scope 3 should be included in the scope of assurance have been postponed, and discussions are moving toward first establishing a safe harbor, indicating that Scope 3 is being considered as an issue clearly different in nature compared with Scopes 1 and 2.

A likely issue behind this trend is a growing awareness of the challenges facing market participants regarding Scope 3 emissions. For example, from the perspective of business companies, the costs associated with calculation and disclosure will be a burden, figures can fluctuate depending on factors such as sales, and emissions cannot necessarily be reduced through in-house efforts alone. Meanwhile, investors have voiced concerns that information on Scope 3 emissions is not being fully utilized due to concerns about data accuracy and comparability. Furthermore, while the goal of reducing GHG emissions across the entire value chain is shared, there has not been sufficient discussion about the specific content of disclosure and how it should be utilized. Further, the lack of mutual understanding between business companies and investors about the challenges posed could also be a barrier to disclosing and utilizing Scope 3 information.

2. Purpose of This Guidebook

Based on the understanding that the growing attention on Scope 3 emissions stems from expectations for GHG emission reduction efforts throughout the entire value chain, including mid-cap as well as small and medium-sized enterprises, this guidebook examines how disclosure of Scope 3 emissions can be used as a metric for evaluating reduction efforts across the value chain, and summarizes how to approach Scope 3 emissions that is useful for investors without placing an excessive burden on business companies. In addition, from the perspective of discussing what types of disclosure are desirable for companies to express their efforts, it also touches on metrics other than Scope 3 emissions, such as product carbon footprint, avoided emissions, and reduced emissions of product.

Furthermore, since we must acknowledge that industries have significant variance of Scope 3 emission trends by category and the challenges faced by each company, we have also created industry-specific guides as an appendix to this guidebook. These guides cover emission trends and the challenges and initiatives surrounding major emission categories for six industries (automotive, electrical, and electronic equipment, real estate, retail, food, and trading) that tend to have high proportions of Scope 3 emissions, including case examples. It should be noted that this guidebook and the industry-specific guides are not meant to recommend specific Scope 3 disclosure as part of mandatory disclosure based on the Sustainability

Disclosure Standards established by the Sustainability Standards Board of Japan (SSBJ Standards).

Since its founding in 2019, the TCFD Consortium has provided a forum for business companies and investors to share their understanding of voluntary climate change disclosure, with a view to exploring how this disclosure can lead to business opportunities and has publicly disseminated the results of these discussions. In this context, this guidebook and the industry-specific guides recognize the significance and challenges of Scope 3 disclosure and emphasize that multifaceted disclosure, including voluntary disclosure as well as efforts to interpret such disclosure, are called for in order to create a market environment recognizing efforts to reduce emission across the value chain. We hope that this guidebook will serve as a starting point for deepening understanding and discussion between both companies and investors regarding the disclosure of efforts to reduce emissions across the value chain, leading to the future recognition of GX products and the creation of new markets.

Chapter 2 Summary of Metrics Related to Emissions in the Value Chain

It is widely understood that reducing emissions across the value chain is important for decarbonizing society as a whole, but there are a variety of metrics other than Scope 3 that can be used to show how emissions reductions should be achieved, each with its own unique characteristics. In examining the issues and significance of Scope 3 emissions, their relationship with other related metrics is clarified.

1. What is Scope 3?

Scope 3 emissions refer to indirect greenhouse gas (GHG) emissions occurring in a company's value chain, not including Scope 1 (direct emissions associated with energy combustion and industrial processes) or Scope 2 (indirect emissions associated with the use of electricity and heat purchased from other companies). The Corporate Value Chain (Scope 3) Accounting and Reporting Standard (hereinafter referred to as the Scope 3 Standard), developed primarily by the GHG Protocol, provides a method for calculating GHG emissions resulting from corporate activities and classifies Scope 3 emissions into 15 categories from upstream to downstream of the value chain. Understanding the scale of emissions by category should lead to the development and implementation of more efficient and effective emissions reduction plans. The Scope 3 Standard lists four business goals for companies to understand Scope 3 emissions: (1) identify and understand the risks and opportunities associated with value chain emissions, (2) identify GHG reduction opportunities, set reduction targets, and track performance, (3) engage value chain partners in GHG management, and (4) enhance stakeholder information and corporate reputation through public reporting.

One characteristic of Scope 3 is that, because it is calculated as a value throughout the value chain, it overlaps with upstream and downstream entities, inevitably resulting in multiple counts for society as a whole. Also, Category 11 emissions may be counted over a long timeframe, covering the entire life of a product rather than a single fiscal year. This means that the calculated Scope 3 emissions figures for many industries are disclosed as a value that are orders of magnitude larger than those for Scope 1 and 2. Furthermore, the fact that the sources of emissions are not within the company presents a challenge, as calculating emissions and reducing measures are outside the scope of a company's discretion. As a result, Scope 3 can be said to be a metric with very large figures, and the effects of measures tend not to become apparent in the reported values.

2. Summary of Concepts Related to Scope 3

As countries and companies increasingly move toward decarbonization, discussions are also evolving regarding how to disclose reductions across the entire value chain. Three key metrics that are being discussed for evaluating the value of GX products will be identified and discussed below: carbon footprint of products (CFP), avoided emissions, and reduced emissions of product.

(1) Carbon Footprint of Products (CFP)

The carbon footprint of products (CFP) is the GHG emissions emitted throughout the entire life cycle of a product or service, from raw material procurement to disposal and recycling into CO₂ emissions displayed as a numerical value on the product, or a system to do so. The main difference between Scope 3 emissions and CFP is that Scope 3 emissions cover the entire value chain from the company's perspective, while CFP is product focused. For example, if a product is made more energy efficient, Scope 3 emissions will increase when sales of that product increase, whereas CFP looks at emissions on a product-by-product basis, enabling it to express reduction efforts without being affected by factors such as sales.

CFPs are being used both domestically and internationally as information for green procurement by the government and the private sector. By providing CFPs covering the entire process from raw material procurement to disposal and recycling (cradle to grave) for final products, and from raw material procurement to manufacturing (shipment) for intermediate products (cradle to gate), it is expected that they will not only help visualize the value of green products, but also contribute to calculating Scope 3 emissions for product purchasers.

ISO standards⁴ have been developed for CFP calculations, and the Ministry of Economy, Trade and Industry and the Ministry of the Environment have formulated Carbon Footprint Guidelines⁵, which refer to these standards and explain the requirements, methods for consideration and implementation methods for CFP calculations.

(2) Avoided Emissions

Avoided emissions are defined as the quantified amount of contribution of the target product to reducing GHG through the whole life cycle of final products that achieve a reduction effects on environmental loads, in comparison to a baseline amount.⁶ In other words, quantifying avoided emissions allows a company to express the extent to which its products and services contribute to overall emissions reductions in society. For example, when a home

⁴ ISO 14067:2018 Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification

⁵ Ministry of Economy, Trade and Industry, Ministry of the Environment, 2023 “Carbon Footprint Guidelines” (in Japanese)

⁶ The Institute of Life Cycle Assessment of Japan, 2022 “Guidelines for Assessing the Contribution of Products to Avoided Greenhouse Gas Emissions” ver.1

appliance manufacturer improves the energy efficiency of its products or a materials manufacturer develops ultra-lightweight materials to improve aircraft fuel efficiency, avoided emissions can reflect the efforts throughout the value chain. Because the reductions associated with new product development can sometimes increase Scope 3 emissions as sales increase or the classification based on the 15 Scope 3 categories may not sufficiently capture the characteristics of emissions, it may be said that avoided emissions are a more accurate representation of a company's efforts to reduce emissions across the value chain than Scope 3 emissions.

When calculating avoided emissions, it is possible to refer to guidelines such as the GX League's "Basic Guidelines for Disclosure and Evaluation of Climate-Related Opportunities"⁷ and "Hypothetical Cases for Avoided Emissions Disclosure"⁸ as well as the WBCSD's "Guidance on Avoided Emissions". However, since there are no clear standards on how to describe avoided emissions, it is desirable to ensure as much transparency as possible through disclosing not only the calculation results of avoided emissions, but also the underlying scenarios and calculation methods.

(3) Reduced Emissions of Product

Reduced emissions of product express the reduction in emissions per product that reflects measures that have actually reduced a company's emissions (Scopes 1 and 2), and its specific definition is currently being considered by the Life Cycle Assessment Institute of Japan and other organizations. Unlike CFP which expresses actual emissions, it is a metric that attempts to directly evaluate reduction efforts by calculating the difference in emissions compared with conventional products or previous versions of the product. In this respect, it is similar to avoided emissions,⁹ but while avoided emissions are often expressed as the result throughout the value chain (especially pertaining to the use of products), reduced emissions of products are under consideration as a metric for evaluating reduction performance in the company's manufacturing stage focusing on the manufacturing process and resource input.

Reduced emissions of products is an effort to incorporate environmental value into product value. For example, the Japan Iron and Steel Federation has been discussing the reduced emissions of product achieved as part of its efforts to create a market for GX Steel. Calculation methods and allocation methods for the amount of reduction achieved are summarized in the "GX Steel Guidelines". According to these guidelines, the requirements for projects that qualify for the calculation of emission reductions include that they must involve process changes and raw material/fuel conversion within the organization, that they must have additionality, and

⁷ GX League, 2023 "Basic Guidelines for Disclosure and Evaluation of Climate-Related Opportunities"

⁸ GX League, 2024 "Hypothetical Cases for Avoided Emissions Disclosure"

⁹ Study Group on the Creation of GX Product Markets that Contribute to Demand Generation for the Realization of Industrial Competitiveness and Emission Reductions, 2024, "Approach to the Creation of GX Markets" (in Japanese)

that the reduced emissions of product achieved can be calculated appropriately. These requirements are subject to third-party verification.¹⁰

As mentioned above, it must be noted that there are several metrics related to emission reductions by business companies in the value chain other than Scope 3. In assessing the reduction efforts and environmental value (positive impact) of companies in the value chain, or in promoting the creation of markets for green products, consideration is being given to metrics suited to each purpose, such as carbon footprint, avoided emissions, and actual reductions.

Column: Efforts to Evaluate and Promote Reduction Efforts Across the Value Chain

Within the framework of mandatory disclosure, Scope 3 is often referenced as a metric of reduction efforts across the value chain, but as described in Chapter 2 of this guidebook, consideration and use of metrics other than Scope 3 is also progressing.

In October 2025, Mizuho Bank announced the launch of “Mizuho Avoided Emissions Impact Finance”, a sustainable finance product that evaluates borrowing companies' efforts to disclose their avoided emissions. Mizuho Bank will provide loans with its own unique label based on evaluation of the companies' avoided emissions and their environmental initiatives. Annual monitoring and engagement will continue even after the loan is executed, so this can be said to be a system that supports ongoing efforts rather than just a specific point in time. This is a novel initiative in that it is a financing method that places particular focus on avoided emissions, and it is hoped that it will expand into the future as it encourages diverse disclosure of reduction efforts across the value chain.

Kawasaki Heavy Industries Ltd., the first company to use this product, has also formulated the first Sales Enhancement Framework, “Sustainable Finance Master Framework With Our Partners”. This not only enables the company itself to procure through sustainable finance but also allows purchasers of products that contribute to emissions reduction to implement sustainable finance procurement based on the framework. This is a unique and new initiative in that it attempts to provide financial incentives to purchasers of low-emission products in order to reduce the company's own Scope 3 emissions. In addition to encouraging emissions reductions across the value chain, it is also expected to have the effect of broadening the scope of sustainable finance to include entities that find it difficult to formulate their own frameworks due to cost burdens, etc.

The GX League has focused on reducing emissions through voluntary emissions trading. The launch of the emissions trading scheme is expected to foster the creation of GX products and services. Going forward, the GX League intends to promote efforts to create demand for GX products and services, and it is being considered to add the requirement of evaluating

¹⁰ Japan Iron and Steel Federation, 2025, GX Steel Guidelines (revised January 2026, in Japanese)

and promoting such efforts to reduce emissions across the value chain as a new requirement for participation. Specifically, the League is considering requiring members to select two or more of the following initiatives by 2030: (A) a commitment to creating demand for GX products and services, such as the “GX Acceleration Declaration”, (B) Strengthening collaboration with suppliers, including through the calculation of Scope 3 emissions and CFP, or (C) financing efforts, such as engagement with financial institutions. To support these efforts, the government is also considering policy measures such as providing incentives for companies that actively procure GX products and services to receive additional points in the government budget review process.

In order to advance reduction efforts across the value chain, not only will businesses themselves have to make efforts, but financial institutions and the government will also need to work together to come up with various ideas to increase incentives for reduction efforts.

Chapter 3 Current Status and Significance of Calculating Scope 3 Emissions in Corporate Transition

1. Current Status of Scope 3 Emissions Calculation and Disclosure

As mentioned in Chapter 1, the disclosure of Scope 3 emissions is being encouraged and institutionalized from the perspective of promoting reduction efforts across the entire value chain, including not only large companies but also medium-sized and small businesses. However, it is also true that the metric still has many challenges for the business companies that actually calculate and disclose it, and for the investors who are expected to use it. In this chapter, we will summarize the issues that are considered to be problems from the perspectives of both business companies and investors.

(1) Business Company Perspectives

First, calculating reliable Scope 3 emissions incurs a significant burden for disclosing companies. Scope 3 emissions are often calculated by multiplying the activity data of purchased raw materials, sold products, etc. by their respective emissions intensity values. While activity data is often measured internally in terms of purchase volume or monetary value, emissions intensity values are not, and companies need to rely on third parties for data. While the most accurate method for reflecting actual conditions is to rely on emissions intensity data (primary data) provided directly by suppliers and users, it is not realistic to obtain emissions intensity data for all activity volumes in the form of primary data. While the importance of reducing emissions throughout the value chain is gaining attention and supplier companies could potentially improve their competitiveness by tracking their own emissions and providing them to their customers, this understanding is not universal given the diverse procurement criteria such as price and quality. Furthermore, to obtain accurate data, the supplier companies also need to track their own upstream emissions but tracing them all the way back to the very beginning of the value chain is considered extremely difficult.¹¹

Therefore, in many cases, when calculating Scope 3 emissions, emissions intensity per unit of weight or monetary value are calculated using relatively easily available data (secondary data), such as industry standard values. Even in this case, companies are forced to carefully consider the assumptions and databases they should use to arrive at figures that are more in line with reality, so this is by no means a light burden. In addition, the values stated in these databases may lack accuracy because they do not reflect the circumstances of individual

¹¹ In theory, data that covers all stages from raw material procurement to each product (cradle to gate) is closest to the actual situation, but it is difficult to obtain data for each individual product from all suppliers. Business companies should work with suppliers as necessary, taking measures such as prioritizing important suppliers. For information on obtaining primary data and supplier engagement, please refer to the Ministry of the Environment's "Guide to Calculating Supply Chain Emissions Using Primary Data - Towards Calculating Scope 3 Emissions That Reflect Reduction Efforts" and "Practical Guide to Engagement Towards Decarbonization of the Entire Value Chain" (in Japanese).

companies.

Another issue facing companies calculating Scope 3 emissions is that some Scope 3 emissions are difficult to control, limiting their ability to proactively reduce them. For example, for a company that produces products that consume electricity, Scope 3 Category 11 (Use of sold products) emissions cannot be fully controlled because they depend not only on the energy efficiency of the company's products but also on the CO₂ emission factor of electricity selected by the user. Similarly, Category 1 (Purchased products and services) emissions are also affected by factors such as upstream companies' Scope 1 and 2 emissions reduction efforts. This externally driven nature of Scope 3 presents significant challenges, particularly when companies set Scope 3 emissions reduction targets and are evaluated for their actual reduction performance.

Furthermore, Scope 3 emissions are easily affected by factors other than emissions reduction efforts. For example, even if a company makes its products less energy-intensive by using greener materials and services, if sales increase, the Scope 3 figure will actually rise. If investors conduct a simplistic analysis based solely on the total Scope 3 figure without taking into account the company's activities (sales, number of employees, etc.), they may make incorrect assessments and judgments.

Column: Assurance of Scope 3 Emissions

While companies are required to obtain reasonable assurance for annual audits and limited assurance for interim reviews for their disclosed financial statements, there are also increasing cases of companies receiving third-party assurance for sustainability information, including Scope 3 emissions, disclosed in their voluntary disclosure such as sustainability reports or media containing financial information. This is due to the fact that the European sustainability disclosure standard, ESRS, requires disclosure of material information with limited assurance, and environmental initiatives such as CDP award additional points for obtaining assurance on Scope 3 disclosures. In light of this trend, with the introduction of statutory sustainability information disclosure, the need for assurance on Scope 3 emissions, which is one of the disclosure items specified in the SSBJ standards, became an issue and was discussed by the Financial System Council's Working Group on Disclosure and Assurance of Sustainability-related Financial Information. Opinions expressed at the Council included those that advocated for third-party assurance for all sustainability-related information, but there were also views that it would take time for companies to establish reporting processes, and there was concern that requiring assurance for all sustainability information would lead to a decline in corporate disclosure. As a result, it was decided that the scope of assurance would be limited to Scope 1 and 2 emissions, governance and risk management for the first two years, with further consideration to be given from the third year onwards, taking into account international trends, etc. In other words, at present, assurance is not required for

Scope 3 emissions in statutory disclosure.

As described in this guidebook, the calculation of Scope 3 emissions involves numerous assumptions, including those related to the definition of system boundaries; therefore, there is no single “correct” value. In light of this background, a range of views were expressed regarding the assurance of Scope 3 emissions in discussions held at forums such as the roundtables organized by the TCFD Consortium. For instance, with respect to the method currently adopted by many companies that relies on secondary data—namely, the approach of multiplying quantities or monetary values by emission factors derived from databases—limited assurance can be implemented relatively easily. By contrast, primary data within the value chain would present significant challenges for assurance that involves data verification, even if such data could be collected and calculated. Consequently, some participants indicated that if assurance of Scope 3 emissions were to become mandatory, it could lead companies to favor calculation methods based on secondary data rather than prioritizing the collection of primary data. Furthermore, as noted in the main text, the information on Scope 3 emissions itself presents certain challenges when used by investors for investment decision-making. Some participants therefore suggested that, even if assurance were obtained, the fundamental situation—namely that Scope 3 emissions are not readily linked directly to investment decisions—may remain unchanged.

Looking ahead, in Japan, the need for assurance of Scope 3 emissions is expected to continue to be examined in light of international developments. In conducting such deliberations, it will be important to take into account concerns that mandating assurance may make it more difficult for companies to adopt calculation methods based on primary data, as well as questions regarding the significance of assurance for actual investment decision-making. In addition, for Japanese companies operating globally, the harmonization of international frameworks is also of considerable importance. Accordingly, further international discussions will likely be required regarding the appropriateness of including Scope 3 emissions within the scope of assurance.

(2) Investor Perspectives

For investors and other users of disclosed information, there are two challenges on Scope 3 information: comparability between companies and the limitations of time-series data for the same company. As mentioned above, Scope 3 emissions are often calculated using assumptions or secondary data to complement data that cannot be obtained in-house, and even within the same industry and category, the assumptions used for the calculation and the sources of the secondary data may differ. For example, even if companies manufacture similar products in the same industry, if assumptions such as the product's usage period differ or if intensity data are cited from different databases, the meaningfulness of comparing only the resulting calculated Scope 3 emissions can be questioned.

When making comparison of a single company over time, there are challenges that are different from those when comparing between companies. Because Scope 3 emissions fluctuate significantly due to factors such as changes in a company's sales volume or its business portfolio, as well as the expansion of categories calculated, increases or decreases in Scope 3 emissions do not necessarily indicate progress or decline in reduction efforts. For example, companies experiencing strong sales, expanding their business, or companies expanding categories to be calculated as part of their serious efforts to implement Scope 3 measures may see increases in Scope 3 emissions compared to the previous year. Therefore, a superficial look at changes in Scope 3 emissions over time does not fully capture a company's efforts; a comprehensive analysis of the background to those changes is required. These issues may limit the usefulness of Scope 3 emissions data for investment decisions. In fact, some argue that it is currently difficult to use Scope 3 emissions data for investment decisions.

In addition, in cases where a business company does not disclose its Scope 3 emissions, investors can purchase and use data from external data vendors that independently estimate each company's Scope 3 emissions. However, it has been noted that this poses challenges, such as making it difficult to understand the company's thinking and efforts, and there is also the risk of discrepancies with the actual figures because the data is not calculated in-house.

(Excerpts from interviews)

- ✓ Categories with the highest emissions vary depending on the industry. Category 11, which accounts for the majority of our company's emissions, depends on the customer's circumstance of usage, so emissions cannot be controlled, and the figures that collectively account for the lifetime amounts that vary for each product are merely estimates. It needs to be understood that Scope 3 values cannot be simply compared across companies. (Business company A)
- ✓ Calculating Scope 3 involves uncertainty, and different companies have different assumptions, calculation methods, and information sources, making it difficult to compare between companies. If comparison is necessary, it would be more appropriate to assess it in terms of product emissions intensity. (Business company B)
- ✓ Scope 3 emissions are estimates. It is hoped that investors recognize the difference between Scope 3 and Scopes 1 and 2, and make distinction between material figures and those that serve as reference data. Also, detailed tracking all the way back to the source of raw materials is unrealistic for Category 1, and the meaning of measures such as the use of default values is questionable. It is hoped that efforts such as supplier engagement efforts are evaluated. (Business company C)
- ✓ Detailed tracking of Category 1 and obtaining all primary data is in reality difficult. There are also operational challenges, such as educating the vast number of small and medium-sized businesses that comprise the supply chain and supporting them with measurements and calculations, as well as the challenge of developing inexpensive

digital transformation tools. (Business company D)

- ✓ Suppliers may consist of many small businesses, making it difficult to collect primary data (Business company E).
- ✓ Concentrating on material categories would be practical and effective, but prioritizing is not easy because the business portfolio is constantly changing. (Business company F)
- ✓ This is one of the monitoring items in some overseas-based ESG-labeled funds; therefore, if the companies do not disclose them, there is currently no choice but to use the estimates by service providers which may be inaccurate. (Investor a)
- ✓ In many cases, investors do not understand the issues and problems facing business companies, and business companies do not know how investors use information. This is an issue that requires a common understanding on both sides. (Investor b)
- ✓ Information pertaining to Scope 3 is difficult to use for investment decisions. It is hard to compare over time or with other companies, and it is hard to know how to evaluate figures where appropriate benchmark does not exist. (Investor c)
- ✓ Metrics related to value chain emissions, such as Scope 3, carbon footprints, and avoided emissions, do not fit into discussions about comparability. Therefore, dialogue is important. (Investor d)

2. The Meaningfulness of Calculating and Disclosing Scope 3 Emissions

As discussed in the previous section, Scope 3 emissions present many challenges for both business companies in calculating and disclosing them, and for investors in using them. This raises questions on the meaningfulness of such efforts, beyond being mandated by disclosure standards. This issue is discussed from the perspectives of both business companies and investors.

(1) Business Company Perspectives

First, calculating Scope 3 emissions by category allows companies to understand their own risks and opportunities associated with the transition to a carbon-neutral society. For example, with the introduction of carbon pricing in mind, raw materials and other materials with high emissions intensity carry the risk of increased costs. By understanding which categories of emissions tend to be high, companies can develop effective plans for reducing GHG emissions that are linked to management and take these risks into account. This also allows companies to provide persuasive explanations for their initiatives and meet the expectations of investors and other stakeholders.

Furthermore, while there is a societal demand for business companies to work on reducing emissions across their value chains, they face the difficulty that their efforts are not necessarily

reflected in their Scope 3 emissions, as mentioned above. However, if a company can express its reduction efforts across its value chain and this leads to increased corporate value, disclosing its Scope 3 emissions could be meaningful. For example, if a company switches from procuring materials from conventional products to products that have implemented GHG emissions control measures, disclosing its Scope 3 emissions (upstream) can make those efforts visible, and if this leads to increased corporate value, then disclosing its Scope 3 emissions could be considered a benefit.

In addition, disclosing Scope 3 emissions and efforts to reduce emissions is considered effective in demonstrating governance over the value chain. Conversely, if a company sets targets related to Scope 3 emissions but is deemed to have insufficient efforts to grasp and reduce Scope 3 emissions, it runs the risk of being assessed as lacking governance over its value chain. Even for companies that are not subject to statutory disclosure, it may be desirable for them to calculate and disclose Scope 3 emissions from a governance perspective.

(2) Investor Perspectives

Even if a company's Scope 3 information does not directly influence investment decisions, it can be meaningful for investors in identifying risks and opportunities in the business' value chain. For example, if demands for Scope 3 emissions reductions increase in the future, investors can assess the risk of incurring additional costs, such as switching raw materials or reviewing product performance. At the same time, identifying materials that have a significant impact on emissions throughout the value chain can also provide insights into which product categories may give rise to "GX markets" in which GX measures are recognized as added value. From this perspective, as global GX trends evolve, Scope 3 emissions trends may be useful in analyzing the impact and sensitivity of changes in the market environment. Scope 3 information and initiatives can also provide insight into the overall societal impact of the business and the governance structure, such as the extent to which the company understands its supply chain.

(Excerpts from interviews)

- ✓ It is not clear regarding what perspective Scope 3 disclosure is required, but Scope 3 is not necessarily an appropriate metric of risks and opportunities. Therefore, it may be necessary to align understanding with investors and, include other metrics such as avoided emissions. (Business company A')
- ✓ When making investment decisions, it's important to consider not only short-term KPIs and figures, but also the management's stance and structure regarding how the company will approach the issue in the long term. (Investor a')
- ✓ At least in Japan, investment decisions are not made based on Scope 3 information alone, but it is an important element of information that forms the basis of investment

decisions, and is particularly important for assessing the feasibility and reliability of transition plans and as a starting point for engagement (Investor b').

- ✓ In Europe, companies are being asked to present detailed plans to reach the 2050 net-zero target. Scope 1 and 2 are used as metrics of risk, while Scope 3 is used as a metric of opportunity. Because a company's GHG information is disclosed after various internal considerations and confirmations, investors engage based on the company's data and use it to evaluate future corporate value and the feasibility of long-term growth. (Investor c')
- ✓ Scope 3 is important as a means of understanding risks and opportunities. We check how companies are reducing their emissions intensity, as well as how they are working to understand risks from the perspective of capital costs and for responsible investment. (Investor d')
- ✓ The quality of Scope 3 data is not of primary interest; the narrative is the most important, and we look at the strategy. We would also like companies to disclose avoided emissions. (Investor e')

Chapter 4 How Scope 3 Emissions Should Be Disclosed and Utilized

Based on the above discussions, here we consider an approach to how Scope 3 emissions should be disclosed and utilized in a way that does not impose an excessive burden on companies and allows them to become a meaningful metric.

1. Business Company Perspectives

First, companies are required to understand GHG emissions across the entire value chain of their business activities, as well as categories that are of high importance (materiality) to climate change. Visualizing emissions by category, as required by the SSBJ and other standards, serves as the foundation for efforts toward the overall goal of reducing GHG emissions across the entire value chain. However, in this case, it is not always necessary to obtain detailed, precise information using primary data; it is important to provide a bird's-eye view of emissions across the entire value chain utilizing estimated values, the accuracy of which has been improving in recent years. Through this process, companies can understand their own risks and opportunities and use them to develop effective reduction plans and explain them to external parties.

For categories deemed as being material from the above process, it is necessary to calculate and disclose the emissions. However, the nature of Scope 3 emissions varies significantly depending on the category, such as whether it is upstream or downstream, and whether the company can take action or not. Therefore, as part of voluntary disclosure, it is advisable to consider a disclosure method for particularly important categories that allows companies to have their efforts evaluated appropriately, taking into account whether the emissions are manageable through their own efforts or are influenced by external factors, and whether they are affected by sales or other factors. It may also be useful to present specific emissions reduction initiatives, such as a policy for switching materials in Scope 3 Category 1. Furthermore, if such initiatives become increasingly recognized, manufacturers of products that implement GHG emission reduction measures will be able to expand their sales channels, potentially leading to further expansion of the GX market.

It should be noted that, since efforts may not necessarily be reflected through values of emissions for each category of Scope 3, it is desirable for companies to make multifaceted disclosures that combine other metrics such as CFP, avoided emissions and reduced emissions of product, depending on the reduction efforts they wish to promote.

2. Investor Perspectives

As mentioned above, Scope 3 emissions are difficult to compare between companies. Further, there are many factors that are difficult for a company to control, and the meaning of Scope 3 emissions varies greatly depending on the category. Therefore, it is important to first recognize the limitations of evaluating a company's efforts based solely on the total amount of Scope 3 emissions. For the same reason, even if a company sets a reduction target for Scope 3 emissions, it should be understood as a future aspirational aim, rather than a mandatory target. Evaluations should be made with the understanding that not achieving the target should not result in any penalties being imposed or require measures such as the purchase of carbon credits.

That being said, Scope 3 emissions are useful information from the perspective of understanding risks and opportunities across the entire value chain of a business activity or across society as a whole. In this case, it is important to focus on material categories rather than the total value of all categories, and to conduct an analysis that takes into account factors such as the activity data of the company. Also, depending on the calculation method, metrics such as emissions intensity and avoided emissions may be more directly reflective of a company's efforts, so it is desirable to view a company's efforts from multiple angles, including these metrics.

If investors become accustomed to positively evaluating companies' proactive efforts through Scope 3 emissions, companies will be able to find strategic significance in reducing their Scope 3 emissions, which is expected to have a significant impact on reducing emissions across the economy through the creation of a market for GX products through changes in procurement practices and increased reduction efforts in cooperation with business partners across the value chain.

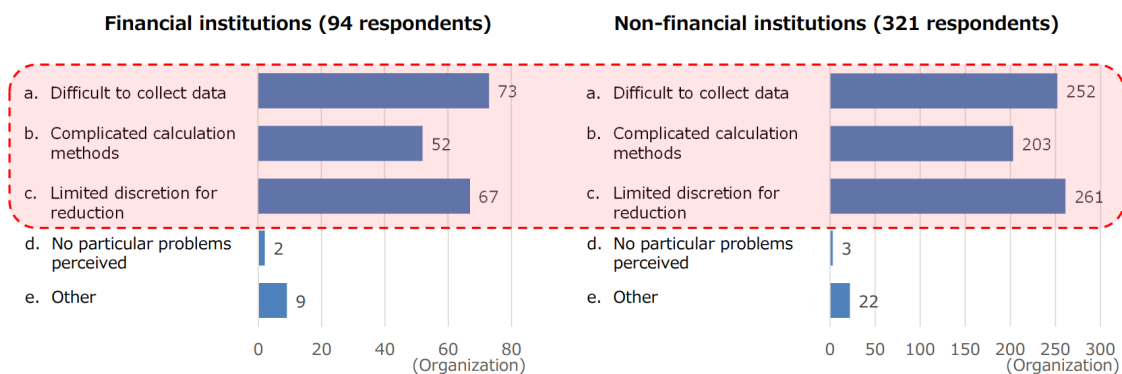
Column: Disclosure and Utilization of Scope 3 Emissions as Seen in the TCFD Consortium Member Survey

The TCFD Consortium conducted a survey on the status of Scope 3 disclosure and utilization in its FY2025 “TCFD Consortium Member Survey” A total of 419 companies responded, including 94 financial institutions and 325 non-financial institutions. The survey results revealed that while the majority of responding companies felt there were challenges with disclosing and utilizing Scope 3 emissions, they also recognized its meaningfulness.

For details about the survey itself, please refer to GX Future Consortium website.

- Approximately 80% of responding companies disclose Scope 3 emissions.
- Approximately 30% of financial institutions and approximately 50% of non-financial institutions disclose information in all categories.
- Most of the respondents (including financial institutions) felt that there were challenges in calculating Scope 3 emissions, but also acknowledged that there was meaningfulness in calculating them (see figure).
 - The challenges cited include the difficulty of collecting data, complicated calculation methods, and limited discretion for reduction. Only around 1% of companies responded that they did not perceive any particular problems.
 - In terms of meaningfulness, the most common response from financial institutions was “understanding climate-related risks and opportunities,” while the most common response from non-financial institutions was “enhancing engagement through the value chain.” Very few companies responded that they do not see any particular meaning in this disclosure.

Question: What are the challenges in calculating Scope 3 emissions? (Multiple choice)



Question: What is the significance of calculating Scope 3 emissions? (Multiple choice: Only for companies that have disclosed their emissions)

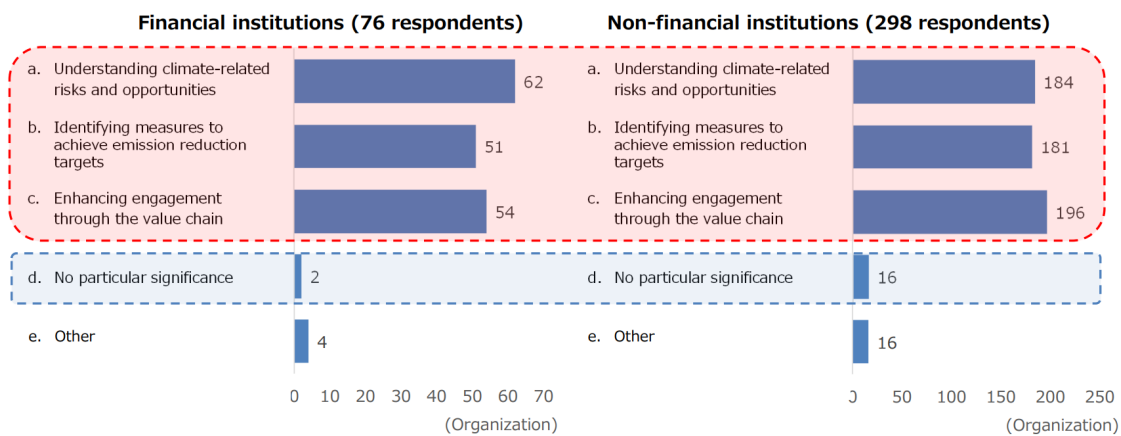


Figure 1 Issues and significance of accounting for corporate Scope 3 emissions from TCFD Consortium member survey

Source: FY2025 TCFD Consortium Member Survey

- Regarding the use of Scope 3 emissions information by financial institutions, approximately half of the respondents cited “understanding climate-related risks and opportunities”, “identifying measures to achieve reduction targets”, and “enhancing engagement through the value chain,” while around 20% of financial institutions responded that they do not make any particular use of the information.
- Regarding calculation methods, half of non-financial institutions answered that they calculate by multiplying procurement or sales value by a given emission factor, and about 30% answered that they calculate by multiplying procurement or sales volume by a given emission factor. Less than 10% of companies answered that they calculate by collecting activity data or emission factors from suppliers or buyers.
- Regarding the meaningfulness of calculating Scope 3 emissions, a majority of companies cited “understanding climate-related risks and opportunities”, “identifying measures to achieve emission reduction targets”, and “enhancing engagement through the value chain”. Only about 5% of companies responded that they did not see any particular meaning in calculating their Scope 3 emissions.

Chapter 5 Concluding Remarks

In the preceding chapters, the current situation regarding Scope 3 emissions disclosure based on interviews etc., is analyzed, as well as a way forward on desirable approach towards disclosure.

Firstly, for business companies, it is important to tackle the issue as a part of an overall process to identify risks and opportunities pertaining to corporate transition, rather than listing the 15 categories simply to comply with disclosure regulations. Companies should first determine an overview of GHG emissions across their entire supply chain and calculate and disclose key categories, as well as initiatives which can be implemented under their discretion. If it is difficult to express initiatives solely in terms of Scope 3 emissions, companies should appropriately select disclosure metrics such as avoided emissions and, if necessary, incorporate qualitative explanations. Investors, for their part, should understand the limits of what Scope 3 emissions alone can express and gain a multifaceted view of a company's initiatives through disclosures that include metrics other than Scope 3. It is important to interpret these disclosures in terms of how they lead to actual reductions across the value chain and to use that understanding as the foundation for engagement.

To achieve this, reducing emissions across the value chain should not be left solely to the responsibility of companies, but efforts must be made to ensure that society as a whole, including investors and consumers, evaluates the reduction, and an environment including government support measures must be created. In practical terms, too, both business companies and investors need to engage in dialogue and reach a common understanding of how Scope 3 disclosure should be conducted.

As mentioned in the introduction, Scope 3 emissions fall within the scope of statutory disclosure of sustainability information under the SSBJ Standards. However, in the process of complying with statutory disclosure requirements that require uniformity, it is possible that the individual circumstances and reduction efforts behind Scope 3 emissions may be overlooked and become obscured. Given this, it is hoped that flexible disclosure, as outlined in this guidebook, will be promoted within the scope of voluntary disclosure, thereby stimulating dialogue.

1. Overview of the Sector Guides

The main text of the Scope 3 Guidebook outlines the general cross-sectoral challenges and meaning of disclosing Scope 3 emissions and proposes recommended approaches to addressing them. However, the categories that account for a large share of Scope 3 emissions, as well as the underlying reasons for those emissions, vary depending on the products handled and business models of individual companies. Therefore, when disclosing or utilizing Scope 3-related information, it is also important to understand the specific circumstances of each company.

In this context, this sector-specific guide analyzes emissions trends by category in six sectors where the proportion of Scope 3 emissions tends to be relatively high, and summarizes the calculation methods used and the characteristics of major emission categories together with the general direction of initiatives being undertaken within each sector.¹² Although this guide presents discussions at the sector-wide level, it may not necessarily apply to all companies within the respective sector. Nevertheless, when investors interpret disclosures of Scope 3 emissions and related information, it is desirable that they consider the background of such disclosures while referring to the typical issues described in this guide.

In addition, with the intention of providing practical reference for corporate disclosures, a separate collection of case studies has been compiled based on a survey of GIG Supporters. This casebook presents best practices in value chain emissions disclosure together with the reasons for their evaluation.

Through this guide and the accompanying case studies, it is expected that mutual understanding between companies and investors regarding Scope 3 emissions will be enhanced, thereby providing a foundation for more constructive dialogue.

¹² The discussion in this paper represents a snapshot of the current situation. Corporate calculation methods and appropriate disclosure practices may evolve as disclosure frameworks and regulatory requirements continue to develop.

2. Automotive Sector

(1) Sector Overview

This section examines the current situation and challenges related to the disclosure of Scope 3 emissions in the automobile and auto-parts sector.

The automotive sector supply chain generally consists of the following stages: materials and parts manufacturing, vehicle manufacturing, logistics, vehicle use (driving), and end-of-life treatment such as disposal and recycling. Looking at the emissions reported by major companies in the sector, Scope 3 emissions tend to account for the bulk of total emissions.

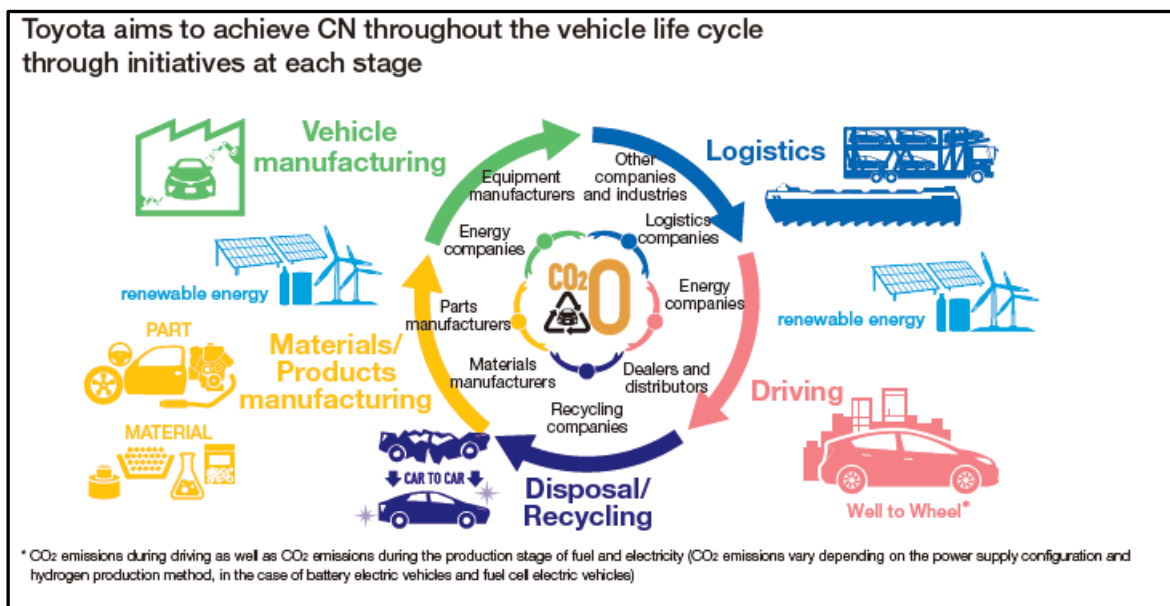


Figure 2 Example of disclosure of the value chain in the automotive sector

Source: Toyota Motor Corporation Sustainability Data Book 2024, p. 20

The breakdown of Scope 3 emissions for major companies is shown below. Within Scope 3 emissions, Category 11 (Use of sold products) is particularly large across companies, accounting for approximately 70–90% of the total. Category 1 (Purchased goods and services) tends to be the next largest. Category 11 emissions are particularly large because automobiles generally have long lifetimes and substantial fuel consumption occurs during the product use phase.

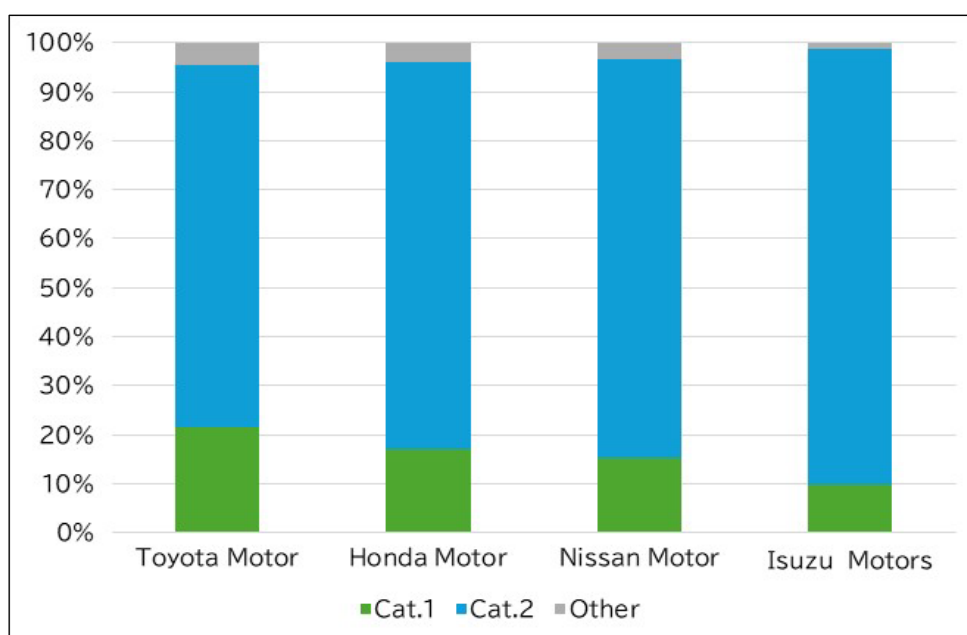


Figure 3 Scope 3 emissions by category in the automotive sector

Source: Compiled based on company disclosures (see appendix for details)

(2) Material Categories in the Automotive Sector

As described above, automakers tend to have a considerable proportion of Category 11 and Category 1 emissions within Scope 3. The calculation methods and challenges associated with these categories are described below, followed by examples of initiatives being undertaken within the sector.

① Category 11: Calculation Methods and Challenges

(a) General Calculation Methods

General calculation methods are as shown below.

- CO₂ emissions
= number of new vehicles sold x fuel efficiency x lifetime mileage x emission coefficient for each fuel

Examples of calculation of Category 11 are as follows:

- Calculated with reference to the IEA Mobility Model, SBTi guidance, and the Worldwide Harmonized Light Vehicles Test Procedure (WLTP), based on the number of new vehicles sold in the reporting year, vehicle lifespan, lifetime mileage, and CO₂ emission factors.¹³
- Calculated by multiplying the estimated lifetime running distance of products sold in the fiscal year under review by the emissions intensity for each model. Annual

¹³ Based on Toyota Motor Corporation Sustainability Data Book 2025 p.61

running distance and years of use are based on published information, primarily the IEA SMP Model. Emissions intensity for each model is based on the certified values prescribed by the regulations of each country and converted to WTW (Well-to-Wheel).¹⁴

(b) Challenges and Solutions in Calculation

The following issues are envisaged when calculating Category 11.

- Because emissions increase as sales volumes increase, Scope 3 emissions do not necessarily reflect companies' emission reduction efforts. It may therefore be useful to complement Scope 3 emissions data with additional indicators such as the emissions intensity of products.
- Fuel consumption associated with onboard electrical equipment such as air conditioners and navigation systems is not reflected in the Scope 3 calculation formula. As a result, certain emission reduction efforts may not be captured.
- Fuel efficiency and lifetime mileage used in the calculations are based on assumptions. Consequently, there are limitations to accurately capturing real-world fuel efficiency and lifetime mileage during actual vehicle use.

② Category 1: Calculation Methods and Challenges

(a) General Calculation Methods

The Ministry of the Environment's guidelines present the following calculation approaches.

- [Accounting method 1]
Determining emissions for goods and services purchased or acquired by the reporting company from the stage of resource extraction to the stage of manufacturing for each supplier and combining these amounts.
CO2 emissions = Σ {Emissions* by supplier}
*From the stage of resource extraction to the stage of manufacturing for purchased or acquired goods and services
- [Accounting method 2]
Determining data on physical amounts and monetary values for goods and services purchased or acquired by the reporting company and multiplying those figures by emissions unit values from the stage of resource extraction to the stage of manufacturing for the respective goods and services.
CO2 emissions = Σ {(Data on physical amounts and monetary values for goods and

¹⁴ Based on Suzuki Motor Corporation website

(https://www.globalsuzuki.com/sustainability/environment/climate_change.html)

services purchased or acquired by the reporting company) x (Emissions unit value*)}

*Going back to the stage of resource extraction for purchased or acquired goods and services

Source: Adapted from Ministry of the Environment, 2012, "Basic Guidelines for Calculating Greenhouse Gas Emissions Throughout the Supply Chain (ver. 1.0)"

Example of calculation of Category 1 is as follows:

- Calculate GHG emissions per unit of standard model to determine the correlation between the weight of the vehicle and GHG emissions. Based on the result, calculate the total GHG emissions from the total number of vehicles produced/sold and their weights.¹⁵

(b) Challenges and Solutions in Calculation

The following challenges are envisaged when calculating Category 1 emissions.

- There are limitations to obtaining primary data (emissions data for each supplier). When emission factor databases are used instead, it may be difficult to reflect emission reduction efforts achieved through supplier engagement.
- When secondary data are used, differences in emission intensity among vehicle models or suppliers cannot be reflected. This makes it difficult to capture actual emission reduction efforts. Conversely, if emission reduction efforts are implemented only for representative vehicle models, emissions may be underestimated.
- In automobiles, steel accounts for the largest share of materials by weight. Therefore, a considerable proportion of Category 1 emissions is assumed to originate from the production of automotive steel sheets and steel materials. Reducing the carbon footprint of these materials could therefore significantly contribute to reducing Category 1 emissions. The Japan Iron and Steel Federation has developed guidelines for calculating and certifying GX Steel. It is the Federation's understanding that, purchasing GX Steel with certificates can be used to claim reductions in Scope 3 Category 1 emissions.¹⁶ However, unlike Scope 2, the GHG Protocol does not provide a market-based accounting method for Scope 3. At present, the interpretation is divided, with some concluding that at present it is not possible to be used in Scope 3 calculations.¹⁷

¹⁵ Based on Toyota Motor Corporation Sustainability Data Book 2025 p.61

¹⁶ Customers who purchase steel products accompanied with emission reduction certificates may use those certificates to claim reductions in upstream emissions at both the organizational level (Scope 3 Category 1) and the product level for the relevant steel products. In other words, when certificates are applied at the steel product level, customers may also use the purchased certificates to claim reductions in the carbon footprint of their own products. (The Japan Iron and Steel Federation, GX Steel Guidelines, in Japanese)

¹⁷ Ministry of Economy, Trade and Industry, 2025, Report by the Study Group on Green Steel for Green Transformation (GX)

(c) Sector Initiatives

For Category 11 emissions, possible reduction measures available to automotive companies include improving the fuel efficiency of their products and decarbonizing fuels. However, it should be noted that such reduction efforts may sometimes be evaluated more directly using metrics other than Scope 3 emissions, for example by multiplying the difference in emission intensity compared with conventional vehicles by activity data. Accordingly, companies may disclose improvements in product fuel efficiency or emission intensity alongside Scope 3 emissions through metrics such as the carbon footprint of products (CFP), avoided emissions, or the share of EVs and FCVs in total vehicle sales. However, the feasibility of such measures may depend heavily on the product portfolio of each company. For example, the adoption of EVs in heavy trucks still faces significant barriers. Other initiatives include quantifying eco-driving performance and collaborating with insurance companies to offer reduced insurance premiums to drivers who demonstrate eco-driving behavior.

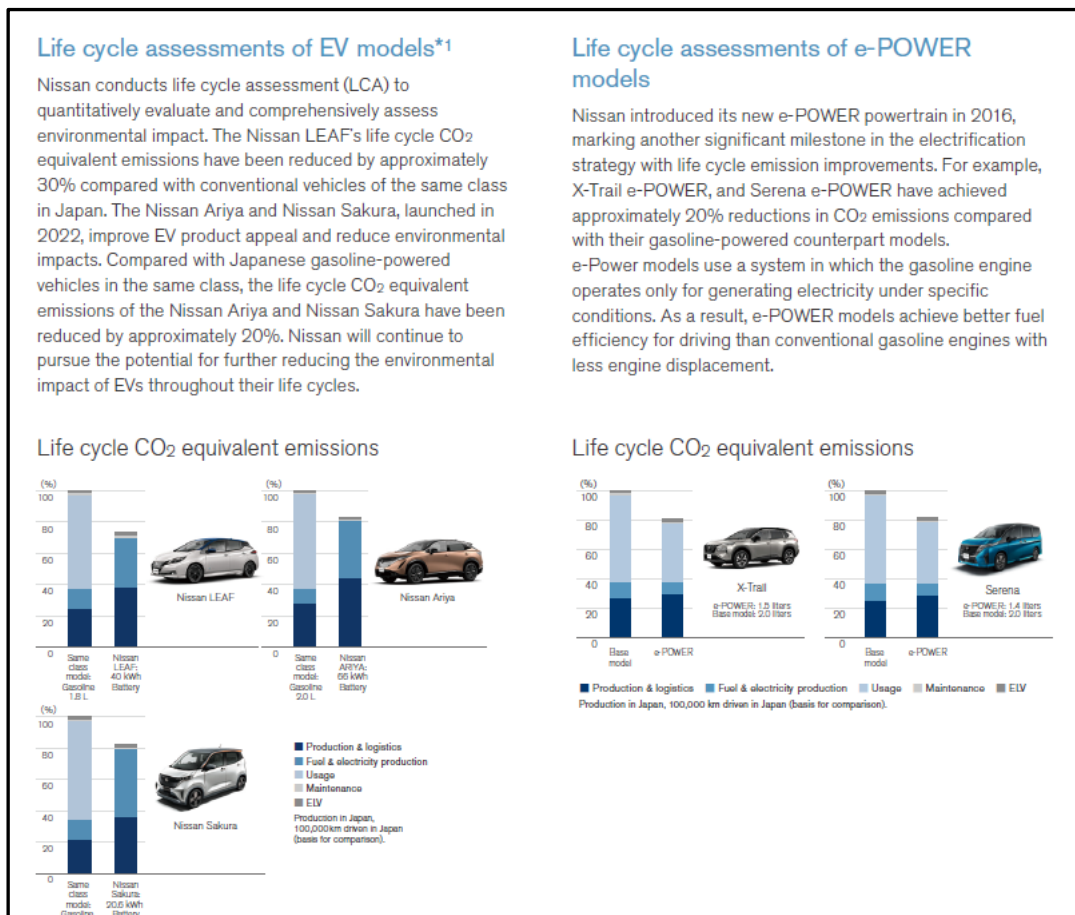


Figure 4 Examples of disclosure of life cycle assessments for different drive systems

Source: Nissan Motor Co. Ltd. Sustainability Data Book 2025, p.37

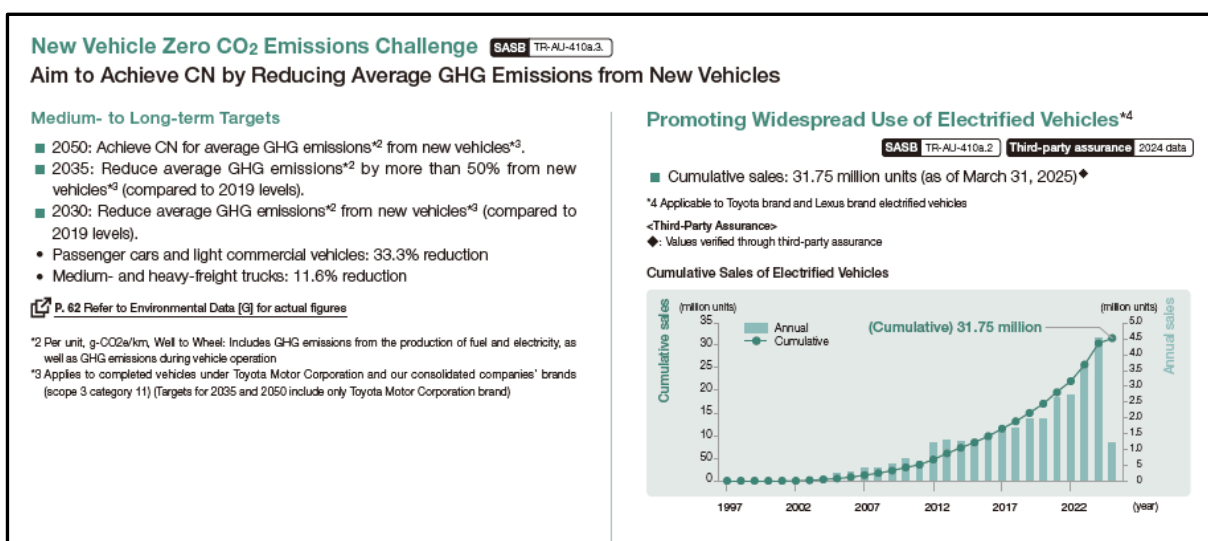


Figure 5 Examples of disclosure of emissions reduction efforts across the entire value chain

Source: Toyota Motor Corporation Sustainability Data Book 2025, p. 27

For Category 1 emissions, potential reduction measures available to automotive companies include engaging suppliers and switching procurement sources. By disclosing primary data for the portions where such initiatives have actually been implemented, companies can demonstrate the effects of emission reductions. However, maintaining relationships with suppliers is also important, and some automakers have indicated that it may be difficult to impose strong unilateral requests on suppliers. In cases where companies switch to raw materials with improved environmental performance, it may also be useful to disclose the extent of the reduction effect (reduced emissions of product) relative to conventional materials. As noted earlier, GX Steel may play an important role in reducing Scope 3 emissions in the automotive sector. However, currently it is not clear whether it can be used for reducing Scope 3 emissions.

The automotive sector is also promoting the collection of primary data. A shared materials data system known as IMDS (International Material Data System) has been established as a common platform. The Japan Automobile Manufacturers Association (JAMA)'s Guidelines on Carbon Footprint¹⁸ state that primary data are preferable to secondary data "to reflect corporate efforts toward carbon neutrality". The guidelines also recommend the use of IMDS material information (such as material names, quantities used, material weight, and chemical substance information) when collecting primary data. On the other hand, because the automotive supply chain is long and complex, even if data can be collected from Tier 1 suppliers, collecting data from Tier 2 and Tier 3 suppliers as well as from overseas suppliers is recognized as a challenge.

In addition to Scope 3 emissions, the carbon footprint of products (CFP) can also be used as

¹⁸ Japan Automobile Manufacturers Association (JAMA), 2024, JAMA's Guidelines of Carbon Footprint of Automobile Products 2024 Version

metric to represent corporate emission-reduction efforts. The Japan Automobile Manufacturers Association (JAMA) has established its Guidelines on Carbon Footprint of Automobile Products” with the aim of enabling fair evaluation of corporate initiatives. While CFP may enable companies to demonstrate emission reduction efforts without being influenced by factors such as sales volumes, it has been voiced that simple comparisons between companies would be difficult due to differences such as the ratio of internally produced components and externally sourced parts. Therefore, caution is required when interpreting CFP values, as is also the case with Scope 3 emissions.

Scope 3 emissions may fluctuate due to factors such as sales volumes, regardless of a company’s emission-reduction efforts. Accordingly, when investors evaluate companies’ emission reduction efforts, they should not rely solely on Scope 3 emissions figures but consider them in a multifaceted way alongside other metrics such as avoided emissions and product emission intensity. At the same time, companies are encouraged to analyze the reasons when significant changes in emissions occur, and provide explanations using breakdowns of Scope 3 calculations.

3. Electrical and Electronics Sector

(1) Sector Overview

This section reviews the current status and challenges of Scope 3 emissions disclosure in sectors that manufacture equipment which consumes electricity (hereinafter referred to as the electrical and electronics sector). Under industry-specific disclosure standards, this sector primarily includes appliance manufacturing, electrical and electronic equipment, hardware, semiconductors, and software and IT services, although it is not limited to these categories.



Figure 6 Example of value chain disclosure in the electrical and electronics sector (in Japanese)

Source: Japan Electrical Manufacturers' Association (JEMA) website

(https://www.jema-net.or.jp/sustainability/ecd/01_LCA.html)

The life cycle of electrical and electronic equipment generally consists of procurement, manufacturing, transportation, product use, collection, and disposal / recycling.¹⁹ For many companies in this sector, Scope 3 emissions account for the bulk of total Scope 1–3 emissions.²⁰ The Scope 3 category with the largest emissions varies among companies. Some companies report higher emissions in Category 11, while others report higher emissions in Category 1. In general, manufacturers of final products tend to have a high proportion of emissions during the product-use phase, and therefore Category 11 accounts for the majority of their Scope 3 emissions. In contrast, companies producing intermediate products such as semiconductors or providing IT solutions that are not tied to specific products may have a higher share of Category 1 emissions. It should be noted that companies with large absolute emission volumes often tend to have a high proportion of Category 11 emissions.

¹⁹ Japan Electrical Manufacturers' Association website (LCA: Life Cycle Assessment) (https://www.jema-net.or.jp/sustainability/ecd/01_LCA.html)

²⁰ However, in some cases, such as in the parts industry, scope 1 and 2 emissions resulting from clean room management and refrigerant fluorocarbons may be greater depending on the product. Also, unlike scope 3, when evaluating a product's life cycle assessment or carbon footprint, the scope of assessment is sometimes limited to a certain part of each stage of the life cycle (cradle to gate/gate to gate) based on its function or use (such as B2B or B2C), and not necessarily all stages up to cradle to grave/cradle to cradle, such as use, disposal, and recycling.

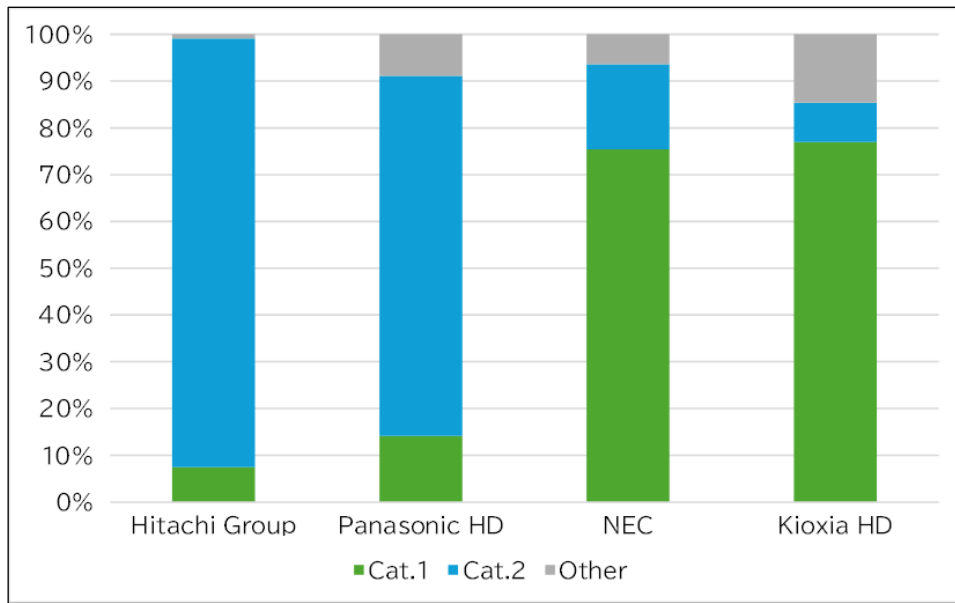


Figure 7 Scope 3 emissions by category in the electrical and electronics sector

Source: Compiled based on company disclosures (see appendix for details)

Emission characteristics in this sector have also been analyzed in the JEMA GX Report prepared by the Japan Electrical Manufacturers' Association (JEMA), an industry organization representative of the sector.²¹

(2) Material Categories in the Electrical and Electronics Sector

In the electrical and electronics sector, particularly among manufacturers of final products, Category 11 (Use of sold products) and Category 1 (Purchased goods and services) tend to account for a substantial proportion of Scope 3 emissions. Current approaches to calculating these categories and the associated challenges are outlined below.

① Category 11: Calculation Methods and Challenges

(a) General Calculation Methods

In the electrical and electronics sector, Category 11 corresponds to emissions associated with the use of sold products. In general, emissions are calculated using the following formula:

- CO2 emissions
 = (CO2 emissions from the use of fuel consumed during product use) + (CO2 emissions from the use of electricity consumed during product use) + (Emissions of 6.5 gases during product use, converted into CO2) = Σ (Anticipated number of lifetime uses of the product x Number sold during the reporting period x Amount of fuel consumption per use x Emissions unit value) + Σ (Anticipated number of lifetime uses of the product x

²¹ Japan Electrical Manufacturers' Association, JEMA-GX Report 2024 (in Japanese)

Number sold during the reporting period x Amount of electricity consumption per use x Emissions unit value) + Σ (Emissions of 6.5 gases during product use x Global warming coefficient).

Source: Adapted from Ministry of the Environment, 2012, "Basic Guidelines for Calculating Greenhouse Gas Emissions Throughout the Supply Chain (ver. 1.0)"

Examples of calculation of Category 11 are as follows:

- Calculated as the electricity consumption per unit based on the assumed usage time of each major product (11 items such as PCs, storage systems, and mobile base station equipment) shipped in the relevant fiscal year, multiplied by the number of units shipped.²²
- For CO₂ emission coefficients for electricity, the latest figures published by individual electric power providers from the Ministry of the Environment and the Ministry of Economy, Trade and Industry for Japan and by the International Energy Agency for overseas are used.²³
- Lifetime energy usage is calculated for each product and then multiplied by the average electricity emission factor.²⁴

(b) Challenges and Solutions in Calculation

The following challenges are envisaged when calculating emissions for Category 11.

- Estimates of electricity consumption during product use, expected product lifetime, and emission factors are typically based on assumptions or by applying established rules.²⁵ In addition, it is often difficult to determine how products are actually used after they are sold. Unless remote monitoring is possible, these estimates must rely on assumptions. Consequently, there are inherent limitations to the accuracy of the calculated emissions. This reflects the characteristic of Scope 3 emissions in that they are indirect emissions. Nevertheless, because these values are derived based on manufacturers' knowledge and established calculation rules, the underlying assumptions and calculation methodologies may serve as useful points of engagement between companies and investors.
- Another important factor influencing Category 11 emissions is the emission factor of electricity. As the emission factor of electricity is expected to decline significantly in the future, the extent to which Category 11 emissions can be reduced will depend not only

²² Based on Fujitsu Group "Environmental Performance Data Calculation Standards" (<https://global.fujitsu/-/media/Project/Fujitsu/Fujitsu-HQ/sustainability/2025/method-2025-en.pdf>)

²³ Based on Mitsubishi Electric Corporation website "Environmental Data" (<https://www.mitsubishielectric.com/en/sustainability/environment/environmental-data/>)

²⁴ Based on Canon Inc. website: "Climate Change: Basic Approach / Targets and Achievements" (<https://global.canon/en/sustainability/environment/climate-change/basic/>)

²⁵ In some cases, methods for measuring energy consumption efficiency during product use (e.g., fuel or electricity consumption and losses) are defined in standards such as ISO, IEC, JIS, or industry standards.

on the efforts of manufacturers but also on the reduction of emission factor of electricity supplied to the market.

- Even when companies develop and promote highly energy-efficient products that contribute to reducing emissions during product use, Scope 3 emissions may temporarily increase if product sales increase during the transitional period during the reduction of electricity emission factor. Since Scope 3 emissions represent inventory-based accounting similar to Scopes 1 and 2, there are limitations to using them alone to evaluate corporate emission reduction efforts. Therefore, other indicators such as avoided emissions may also be used to evaluate such contributions. Avoided emissions represent emission reductions enabled by products or services that contribute to decarbonization in the wider economy. The electrical and electronics sector has played a leading role in developing international frameworks for avoided emissions, and international standards and guidelines have been issued by organizations such as WBCSD and IEC. Avoided emissions are metrics of positive contribution to decarbonization and are assessed and disclosed separately from inventory-based emissions.²⁶

② Category 1: Calculation Methods and Challenges

(a) General Calculation Methods

Category 1 emissions in the electrical and electronics sector refer to emissions associated with purchased goods and services. In general, these emissions are calculated using the following methods.

- [Accounting method 1]
Determining emissions for goods and services purchased or acquired by the reporting company from the stage of resource extraction to the stage of manufacturing for each supplier and combining these amounts.
CO₂ emissions = Σ {Emissions* by supplier}
*From the stage of resource extraction to the stage of manufacturing for purchased or acquired goods and services
- [Accounting method 2]
Determining data on physical amounts and monetary values for goods and services purchased or acquired by the reporting company and multiplying those figures by emissions unit values from the stage of resource extraction to the stage of manufacturing for the respective goods and services.
CO₂ emissions = Σ {(Data on physical amounts and monetary values for goods and services purchased or acquired by the reporting company) x (Emissions unit value*)}
* Going back to the stage of resource extraction for purchased or acquired goods and services

²⁶ WBCSD, 2025, Guidance on Avoided Emissions Ver2.0, IEC 63372 Ed.1.0 (2026)

Source: Adapted from Ministry of the Environment, 2012, “Basic Guidelines for Calculating Greenhouse Gas Emissions Throughout the Supply Chain (ver. 1.0)”

Examples of calculation of Category 1 are as follows:

- Covers the entire procurement amount based on spend and also partially reflects primary data from procurement partners.²⁷
- Calculated by multiplying the gross weight of products sold in the fiscal year of reporting by emissions intensity per the weight of products made within the group. For some products, primary data from suppliers is used.²⁸
- Procurement amount of each item multiplied by 3EID – based emissions factor corresponding to the item of each procurement item.²⁹
- Calculated by multiplying the weight of each material input (including any inputs emitted as waste) by the emission factor for each material / process.³⁰

(b) Challenges and Solutions in Calculation

The following challenges are envisaged when calculating Category 1:

- Obtaining primary data (supplier-specific emission data) is often difficult due to the large number of companies involved in the upstream supply chain and the complexity of supplier relationships.
- When secondary data such as emission factor databases are used, it may be difficult to reflect emission reduction efforts achieved through supplier engagement in the calculated results.

③ Sector Initiatives

In the electrical and electronics sector, industry associations and member companies have established the Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention. Through this initiative, the sector as a whole is working to address climate change and participates in the Keidanren (Japan Business Federation)’s Carbon Neutrality Action Plan.³¹

As a measure to reduce Category 1 emissions, companies are seeking to procure materials

²⁷ Based on Hitachi, Ltd., Sustainability Report 2025 p.51

²⁸ Based on Sony Group website: “Greenhouse Gas Related Data Collection Methods and Rationale” (https://www.sony.com/en/SonyInfo/csr_report/environment/data/method/ghg.html)

²⁹ Based on Fujitsu Group “Environmental Performance Data Calculation Standards” (<https://global.fujitsu/-/media/Project/Fujitsu/Fujitsu-HQ/sustainability/2025/method-2025-en.pdf>) 3EID is “Embodied Energy and Emission Intensity Data for Japan Using Input—Output Tables” developed by the National Institute for Environmental Studies, Japan.

³⁰ Based on Canon Inc. website: “Climate Change: Basic Approach / Targets and Achievements” (<https://global.canon/en/sustainability/environment/climate-change/basic/>)

³¹ Website of Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention (<https://www.denki-denshi.jp/en/>)

from suppliers with lower emissions.³² In such cases, when supplier primary data can be obtained and disclosed, it may be possible to reflect emission reduction efforts in Scope 3 calculations for the portion where primary data is obtained. For products with relatively few components and a high share of emissions associated with materials, replacing materials with lower emission alternatives may have a particularly visible effect. Conversely, for products with many components, the effect of replacing individual parts may be small and the overall reduction impact may be less apparent. Companies in the electrical and electronics sector are therefore promoting initiatives to understand upstream emissions and to reduce emissions across the entire value chain, including collaboration with suppliers. Examples of such initiatives are shown below.

<p>Encouraging procurement partners to reduce their environmental footprint</p> <p>Hitachi's businesses cover a broad range of business domains, and our procurement is supported by many procurement partners from whom we source various products and parts. In order to encourage these procurement partners to reduce their impact on the environment, we are working to ensure that relevant guidelines are widely known, and Hitachi's environmental policy is shared through briefings. In particular, we set a target to achieve carbon neutrality by fiscal 2050 throughout our value chain as we pursue our goal of realizing Net Zero. To this end, we encourage collaboration and cooperation with procurement partners on initiatives upstream in the value chain.</p> <p>Environmental Vision and Hitachi Environmental Innovation 2050</p> <p>Efforts toward carbon neutrality upstream in the value chain</p> <p>GHG emissions measurement upstream in the value chain</p> <p>In order to calculate GHG emissions of Scope 3 Category 1, Purchased Goods and Services, upstream in the value chain, Hitachi uses a calculation method that covers the entire procurement amount based on spend and also partially reflects primary data from procurement partners. We place emphasis on partner engagement in collecting primary data from procurement partners and utilize a third-party sustainability evaluation platform, EcoVadis.</p> <p>The calculation result for Scope 3 Category 1 in fiscal 2024 is 15,370,000 tons.</p>	<p>GHG emissions reduction efforts upstream in the value chain</p> <p>To foster GHG emissions reduction activities among Hitachi's procurement partners, we engaged in dialogue with 21 procurement partners selected in fiscal 2022. Through these discussions, we explored methods for GHG reduction, calculation techniques, and approaches to data collection, analysis, and utilization. Leveraging the insights and methods gained, Hitachi carried out reduction initiatives with approximately 100 procurement partners in fiscal 2023 and approximately 250 partners in fiscal 2024.</p> <p>Target procurement partners were selected from those with the highest Scope 3 Category 1 emissions, and key procurement partners in Hitachi's business activities. Our selected procurement partners are located in a wide range of countries and regions, and in a variety of industries, including raw materials, parts, and equipment. In terms of scale, our partners include not only large companies but also small and medium-sized companies.</p> <p>Hitachi has been working to understand the amount of GHG reductions upstream in Hitachi's value chain by obtaining reduction plans from procurement partners and analyzing the details of these plans. While some of the targeted partners are steadily progressing with emissions calculation, target setting, and action plan development, Hitachi has recognized that others—particularly small and medium-sized enterprises—are uncertain about what steps to take, how to schedule them, how to apply specialized calculation methods, or how to set appropriate targets. With the goal of having 700 procurement partners establish reduction targets and plans by fiscal 2027, Hitachi is working to expand GHG emissions reduction activities. Moving forward, based on insights gained from previous fact-</p>	<p>finding surveys, Hitachi will focus on supporting small and medium-sized enterprises by developing and providing capacity-building programs and support tools ("Handbook for Carbon Reduction Journey" and others).</p> <p>Sharing our Green Procurement Guidelines and related initiative</p> <p>Hitachi distributes the Green Procurement Guidelines that define our basic position on procuring environmentally friendly parts and products as well as our requirements of procurement partners. The guidelines set out requirements, such as establishing environmental management and recommend obtaining environmental certificates. They also address environmental conservation reducing the impact of products supplied to Hitachi, such as conserving resources and energy, recycling, managing chemical substances in products, and appropriate disclosures of related information.</p> <p>To address the issue of chemical substances in products, we recommend using chemSHERPA^{*1} Cl/AI, a standardized format for communicating information on chemical substances in products throughout the supply chain.</p> <p>^{*1} chemSHERPA: Developed by the Japanese Ministry of Economy, Trade and Industry to facilitate the management of chemical substances in products by creating a standardized format throughout the supply chain. The chemSHERPA-Cl standard is applicable to chemical substances contained in chemical products and chemSHERPA-AI to those contained in molded products</p> <p>Green Procurement Guidelines</p> <p>Green Procurement Guidelines Annex</p>
---	--	---

Figure 8 Example of disclosure of upstream emission-reduction initiatives in the electrical and electronics sector

Source: Hitachi, Ltd. Sustainability Report 2025, p.51

JEMA monitors Scope 1–3 emissions of its member companies and reports that emission reductions have progressed since 2021.³³ JEMA is also developing a series of guidelines related to life cycle assessment (LCA) and carbon footprint in order to establish methods for evaluating the environmental impact of products.³⁴ The Japan Electronics and Information Technology Industries Association (JEITA) has also established the Green x Digital Consortium, which is working on initiatives such as developing platforms to visualize CO2 emissions

³² For example, the Panasonic Group reports that it has actively procured low-carbon materials, such as aluminum smelted using hydropower and recycled iron, resulting in a reduction of approximately 67,000 tons of CO₂ emissions in FY2024 (Panasonic Holdings Sustainability Data Book 2025, p.34)

³³ Japan Electrical Manufacturers' Association, JEMA-GX Report 2024

³⁴ JEMA website (https://www.jema-net.or.jp/sustainability/ecd/01_LCA.html)

4. Real Estate Sector

(1) Sector Overview

This section reviews the current status and challenges of Scope 3 emissions disclosure in the real estate development and sales sector (hereafter referred to as the real estate sector). Under industry-specific disclosure standards, the sectors included in the real estate sector primarily comprise “real estate” and “real estate services” but are not limited to those, and its value chain has considerable commonalities with industries included in the construction sector.

The real estate supply chain generally consists of upstream activities such as the manufacture of building materials and building construction to emissions by real estate and developer companies to downstream activities such as emissions from real estate sold or rented.

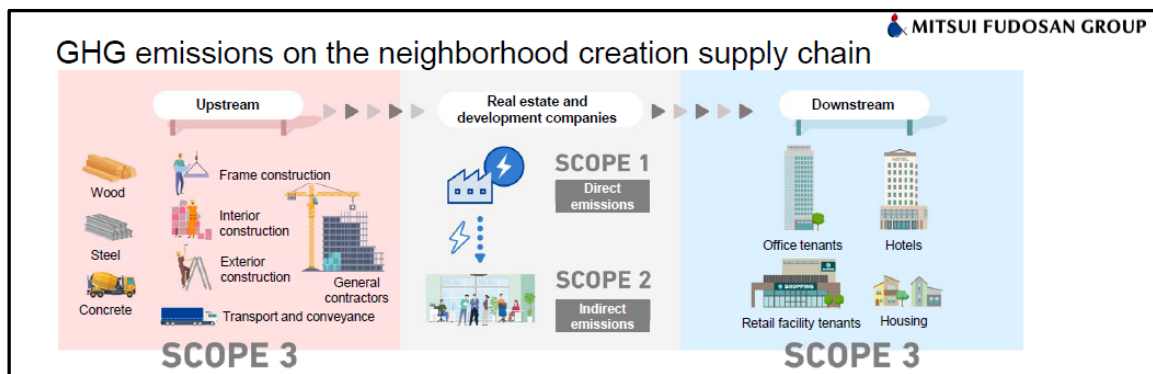


Figure 10 Disclosure examples of value chain in the real estate sector

Source: Mitsui Fudosan Group, “Progress on the Mitsui Fudosan Group Decarbonization Action Plan: Initiatives Engaging the Entire Supply Chain.”

For the leading companies in the sector, the bulk of emissions belong to Scope 3. When Scope 3 emissions are broken down by category, emissions from upstream activities primarily comprise Categories 1 and 2, whereas Categories 11 and 13 dominate emissions from downstream activities. The proportion of upstream and downstream categories varies by company. Category 1 comprises emissions from purchased goods and services, and corresponds to emissions from the construction of buildings, and is linked to construction and sales activities. On the other hand, Category 2 covers emissions associated with capital goods and tends to be higher for companies and in years with significant property acquisitions. As for downstream activities, Category 11 covers emissions related to the use of sold products and generated during the use of properties after they are sold. Category 13 covers emissions related to downstream leased assets and generated through the properties being rented and used. Annual variations are observed notably in Categories 1 and 2 emissions, which are likely to be influenced by large-scale development projects.

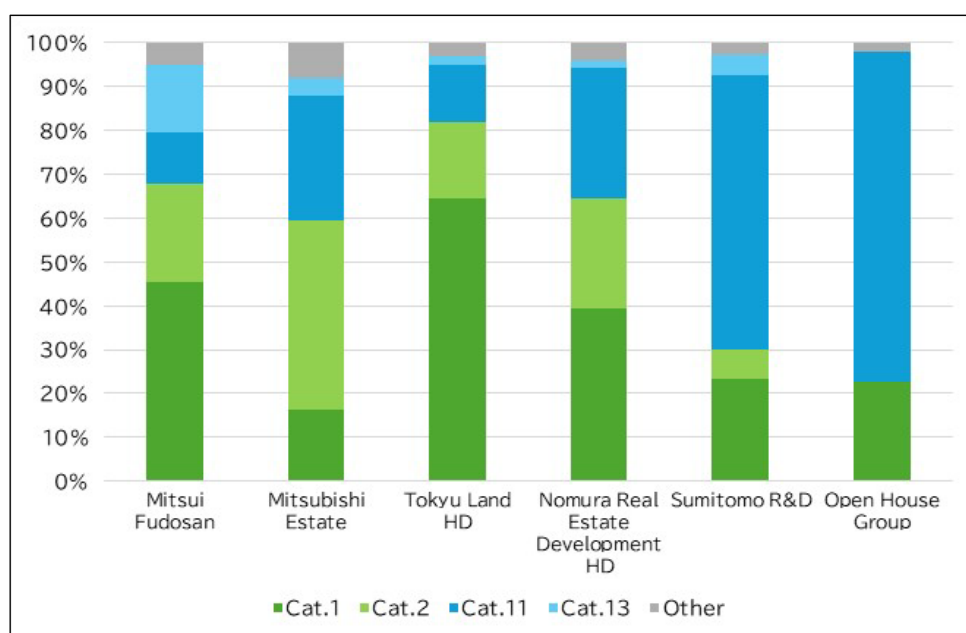


Figure 11 Breakdown of Scope 3 emissions by category of companies in the real estate sector

Source: Compiled from company data (See appendix for details.)

(2) Material Categories in the Real Estate Sector

The material categories in the real estate sector are as discussed above. This section outlines the corresponding calculation methods and key challenges.

① Categories 1 and 2: Calculation Methods and Challenges

(a) General Calculation Methods

Categories 1 and 2 are generally calculated using the following Calculation methods and challenges for Categories 1 and 2 methods:

- Category 1: CO₂ emissions = total construction cost X emissions unit value: This can be calculated as “upfront carbon” from procurement of materials to construction, using LCA tools (described below).
- Category 2: As follows:
 - Accounting method 1: CO₂ emissions = $\sum \{(Amount\ purchased\ \times\ Supplier's\ unique\ emissions\ unit\ value\ by\ capital\ goods)\}$ *These are the unit values in cases where highly reliable GHG inventories, product carbon footprints, or internal LCA reports have been prepared; they cover emissions from the stage of resource extraction to the stage of manufacturing.
 - Accounting method 2: CO₂ emissions = $\sum (Suppliers'\ Scope\ 1\ and\ 2\ emissions\ related\ to\ capital\ goods^*) + \sum \{(Amount\ or\ value\ of\ raw\ materials\ brought\ in)\} \times (Emissions\ unit\ value) + \sum \{(Raw\ material\ transport\ amount)\} \times (Emissions\ unit\ value) + \sum \{(Weight\ of\ wastes\ related\ to\ capital\ goods)\} \times (Emissions\ unit\ value)^*$

- This includes energy consumption such as electricity and fuel during construction.
- Accounting method 3: CO₂ emissions = $\Sigma \{(\text{Weight of capital goods}) \times (\text{Emissions unit value})\}$ or $\Sigma \{(\text{Sale units of capital goods}) \times (\text{Emissions unit value})\}$ or $\Sigma \{(\text{Price of capital goods (construction expenses)}) \times (\text{Emissions unit value})\}$ * Each of the company's capital goods may be accounted for using any of the above formulas.

Source: Ministry of the Environment, 2012, "Basic Guidelines for Calculating Greenhouse Gas Emissions Throughout the Supply Chain (ver. 1.0)"

Examples of calculation of Category 1 and 2 emissions undertaken are as follows:

- Category 1: Calculated by multiplying the emission factors determined by the Ministry of the Environment by the sales cost price part of real estate for sale that was sold during the fiscal year and the services provided part during the fiscal year.³⁷
- Category 2: Calculated by multiplying the amount of increase in property, plant and equipment excluding land and construction in progress by emission factors determined by the Ministry of the Environment.³⁸

(b) Challenges and Solutions in Calculation

The following challenges are envisaged when calculating Categories 1 and 2:

- If Category 1 emissions are calculated as "total construction cost × emission factor", differences in emissions arising from the type of construction or materials used may not be reflected, and reduction efforts may not be properly evaluated.
- If Category 2 emissions are calculated as "amount or value of raw materials purchased × emission factor" differences in emissions due to the type of construction or materials used in the capital good also may not be reflected, resulting in reduction efforts may not be properly evaluated.
- Common to Categories 1 and 2, projects in the real estate sector may span multiple years. If emissions from raw materials used during multi-year construction are accounted for in the year of sale, the timing of the recorded emissions may differ from when the emissions actually occurred (the year the raw materials were purchased). This may cause large year-to-year fluctuations in reported emissions. When such fluctuations occur, it is advisable to explain the background to the extent possible.
- When emissions in Categories 1 and 2 are calculated by spend-based method, purchasing high-quality, environmentally friendly but often more expensive raw materials may result in an apparent increase in emissions, even though the purchase reflects reduction efforts.

³⁷ Based on Mitsui Fudosan Co., Ltd. website "Environment-related data"
(https://www.mitsuifudosan.co.jp/english/esg_csr/esg_data/environment/)

³⁸ Same as above

It is therefore recommended to provide explanations of such efforts, including qualitative disclosures.

② Categories 11 and 13: Calculation Methods and Challenges

(a) General Calculation Methods

Category 11 (Use of sold products) covers emissions arising from customers' use of the company's products. Category 13 (Downstream leased assets) covers emissions from the operation of assets the company owns and leases to third parties as part of its real estate rental business. These are generally calculated using the following methods.

- Category 11: CO_2 emissions = (CO₂ emissions from the use of fuel consumed during product use) + (CO₂ emissions from the use of electricity consumed during product use) + (Emissions of 6.5 gases during product use, converted into CO₂) = Σ (Anticipated number of lifetime uses of the product x Number sold during the reporting period x Amount of fuel consumption per use x Emissions unit value) + Σ (Anticipated number of lifetime uses of the product x Number sold during the reporting period x Amount of electricity consumption per use x Emissions unit value) + Σ (Emissions of 6.5 gases during product use x Global warming coefficient).
- Category 13: According to the following methods:
 - 1. Emissions from the operation of assets leased to others if it is possible to determine energy consumption by type of energy for each leased asset: CO_2 emissions = Σ (Consumption by energy type in leased assets x Emissions unit value by energy type)* In cases where it is necessary to allocate energy consumption in an asset because the asset held by the reporting company is a portion of an entire asset, such as cases where the reporting company is a tenant of an office building, energy consumption should be allocated by means such as the area ratio.
 - 2. If it is possible to determine energy consumption for each leased asset, but the proportions of consumption by type of energy are unknown: CO_2 emissions = Σ (Energy consumption in leased assets x Emissions unit value as a weighted average by energy type) * In cases where it is necessary to allocate energy consumption in an asset because the asset leased by the reporting company is a portion of an entire asset, such as cases where the reporting company is a tenant of an office building, energy consumption should be allocated by means such as the area ratio.
 - 3. If calculations using the above methods are not feasible, then CO_2 emissions = Σ (Floor area of leased building x Emissions unit value per unit area)

Source: Adapted from Ministry of the Environment, 2012, "Basic Guidelines for Calculating Greenhouse Gas Emissions Throughout the Supply Chain (ver. 1.0)"

Examples of calculation of Categories 1 and 2 emissions undertaken are as follows:

- Category 11: Calculated by multiplying the area, etc., of real estate sold during the fiscal year by the annual emissions unit value and the remaining service life.³⁹
- Category 11: For condominiums sold and large-scale renovation homes, annual CO2 emissions per unit are first calculated, and total CO2 emissions are then calculated by multiplying this value by the years of occupancy and the number of units accounted for. For custom-built homes, CO2 emissions are calculated by multiplying the standard CO2 emissions based on ZEH energy-saving calculations by the ZEH plan-specific energy-saving rate, years of occupancy, and the number of units accounted for.⁴⁰
- Category 13: Calculated using emission factors and other methods in line with the Act on Promotion of Global Warming Countermeasures, based on the amount of energy used (actual figures or estimates) in the relevant fiscal year. Some figures are estimates calculated by considering a base unit floor area for each business division.⁴¹

(b) Challenges and Solutions in Calculation

The following challenges arise when calculating emissions for Categories 11 and 13:

- Category 11: Calculation of energy consumption during the use phase of sold properties is based on assumptions and cannot be accurately done. It is also difficult to reflect energy saving efforts made during the use phase.
- Category 13: Tenant cooperation is essential to measure and reduce energy consumption in leased properties.

③ Sector Initiatives

Initiatives in the real estate sector are grouped into upstream and downstream sections. In the upstream section, for Category 1 (purchased goods and services) where material can be selected, companies can partner with cement and steel manufacturers and with materials processing companies (subcontractors) to design, procure, and calculate emission factors to visualize low emission products. Given the current preference for calculating Category 1 emissions through the spend-based method as well as the recent rise in construction costs, using primary data may result in a lower emission figure.

³⁹ Based on Mitsui Fudosan Co., Ltd. website "Environment-related data"
(https://www.mitsuifudosan.co.jp/english/esg_csr/esg_data/environment/)

⁴⁰ Based on Sumitomo Realty & Development Co., Ltd. "FY2023 Environmental Data Book for the Fiscal Year Ending March 2024 p.3"

⁴¹ Based on Mitsui Fudosan Co., Ltd. website "Environment-related data"
(https://www.mitsuifudosan.co.jp/english/esg_csr/esg_data/environment/)



Figure 12 Disclosure examples of emissions reduction initiatives across the value chain in the real estate sector (1)

Source: Mitsubishi Estate Group website “Climate Change Strategies”

(<https://mec.disclosure.site/e/sustainability/activities/environment/climate-change/>)

In the downstream section, for both Category 11 (Use of Sold Products) and Category 13 (Downstream Leased Assets), electricity consumption accounts for the bulk of emissions, particularly in office buildings. Where tenants adopt zero-emission electricity procurement targets, substantial reductions can be demonstrated as achievements. Other measures include energy-saving facilities such as façades that reduce thermal loads and high-performance glazing, as well as on-site renewable electricity generation such as solar photovoltaic panels. Under these circumstances, efforts are undertaken to promote zero-emission buildings and housing (ZEBs and ZEHs) and disclose their quantity and share of portfolio.

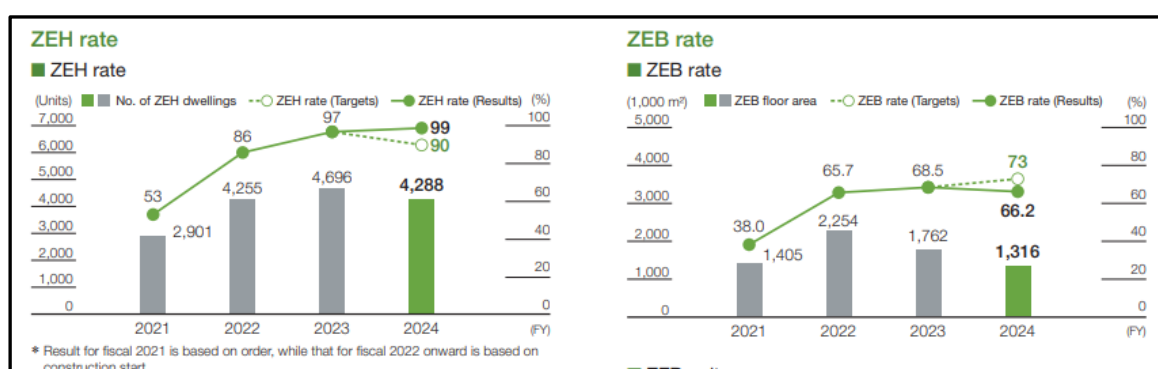


Figure 13 Disclosure examples of emissions reduction initiatives across the value chain in the real estate sector (2)

Source: Daiwa House Industry Co., Ltd. Sustainability Report 2025 p.142

Among the tools available to real estate companies are detailed databases of emission

factors for materials that enable the quantification of abatement efforts in addition to Scope 3 emissions. However, depending on the construction contractor, utilizing these tools may be challenging. Where reductions cannot be made visible, disclosing specific measures such as improvements in construction methods and the use of green materials can still be positively assessed by investors. In addition, standards for quantifying avoided emissions are currently under development.

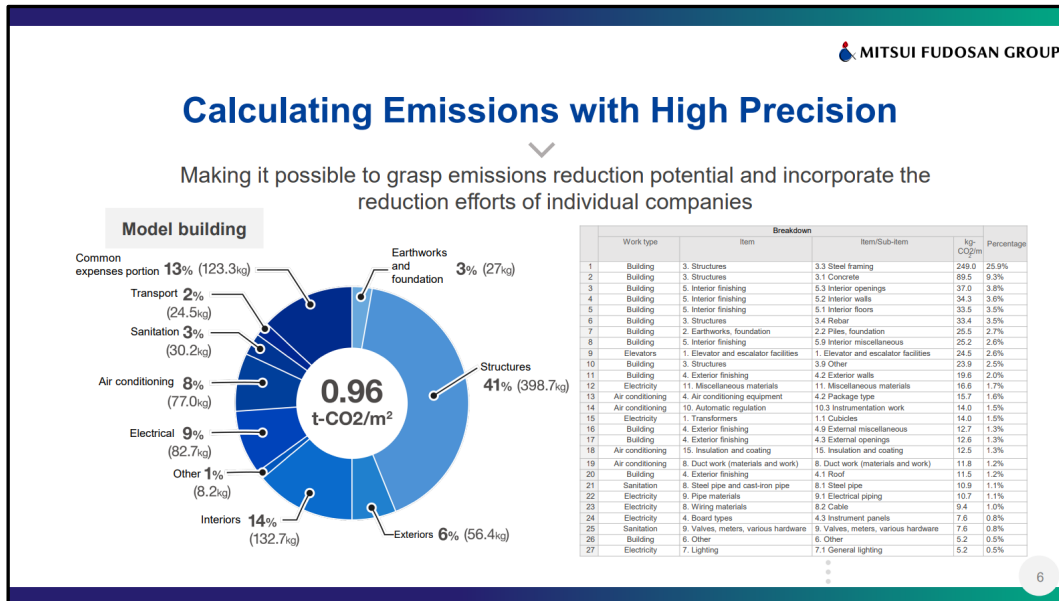


Figure 14 Example of disclosure on quantifying emissions-reduction efforts in the real estate sector

Source: Mitsui Fudosan Group, “Introducing Three Plus Concrete Initiatives for Reducing Scope 3 Emissions”

The real estate and construction sectors use J-CAT/Japan Carbon Assessment Tool for Building Lifecycle as a life-cycle emissions calculation tool.⁴²

In Category 2 (purchases of capital goods) not involving construction, it would be difficult to undertake measures on building materials. Differences in the acquired assets can also cause substantial year-to-year volatility in calculated emissions. As a result, it is challenging to quantify Category 2 emission reductions in a stable, consistent manner. However, post-acquisition retrofits can contribute to emission reductions in Categories 11 and 13, and selecting/acquiring assets with lower life-cycle emissions can further help curb emissions.

⁴² Institute for Built Environment and Carbon Neutral for SDGs (IBECS) Website (<https://www.ibecs.or.jp/english/JCAT/index.html>)

5. Retail Sector

(1) Sector Overview

This section outlines the current status and challenges of Scope 3 emissions disclosure in the retail sector. Under industry-specific disclosure standards, the retail sector includes multiline and specialty retailers.

Retail supply chains generally consist of manufacturing, distribution, and sales stages. For most retail companies, Scope 3 emissions account for the bulk of total Scope 1–3 emissions. A typical example of the life cycle is shown below.

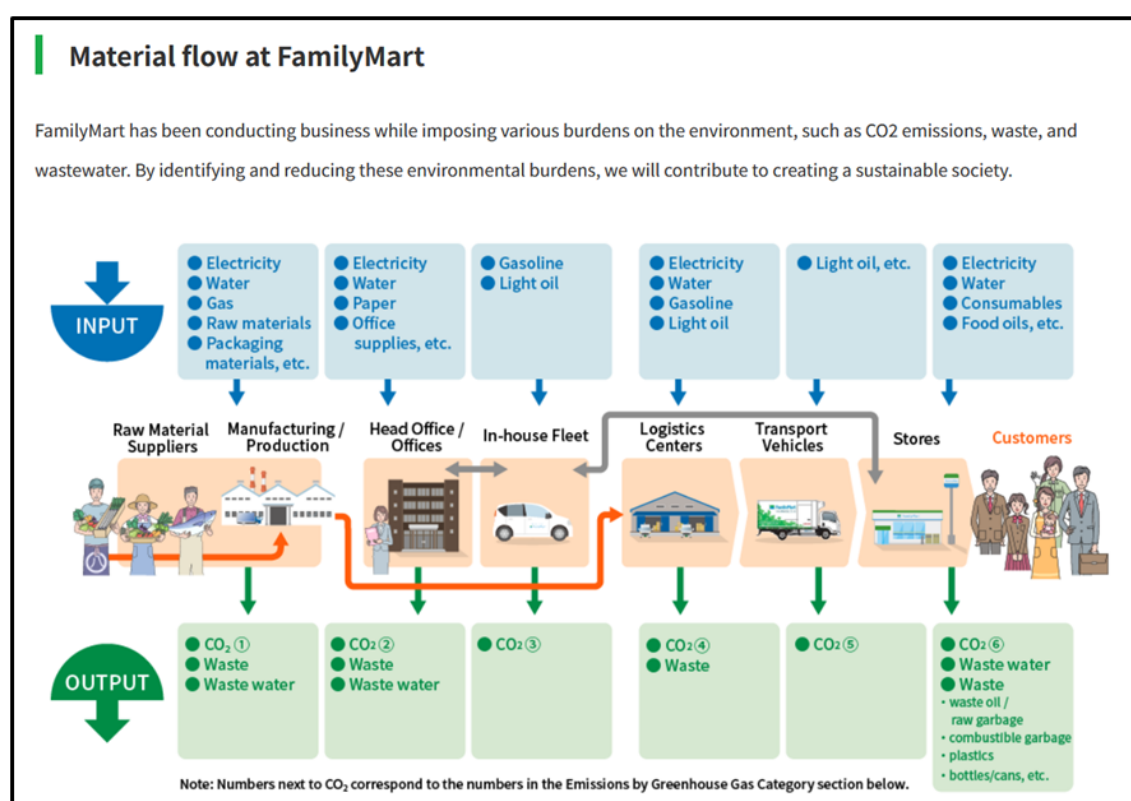


Figure 15 Example of value chain disclosures in the retail sector

Source: FamilyMart Co., Ltd. website “Climate Change Mitigation and Adaptation”

(https://www.family.co.jp/sustainability/material_issues/environment/carbon.html?kw)

For the leading companies in the sector, the majority of emissions belong to Scope 3. Within Scope 3, categories with large emissions vary depending on the products sold. Companies primarily handling food or apparel tend to report large emissions in Category 1, while companies selling energy-consuming products such as electrical appliances often report significant emissions in Category 11. Regardless of product mix, however, Category 1 accounts for a substantial portion of emissions and therefore can be considered as material. A breakdown of Scope 3 emissions of major companies is shown below.

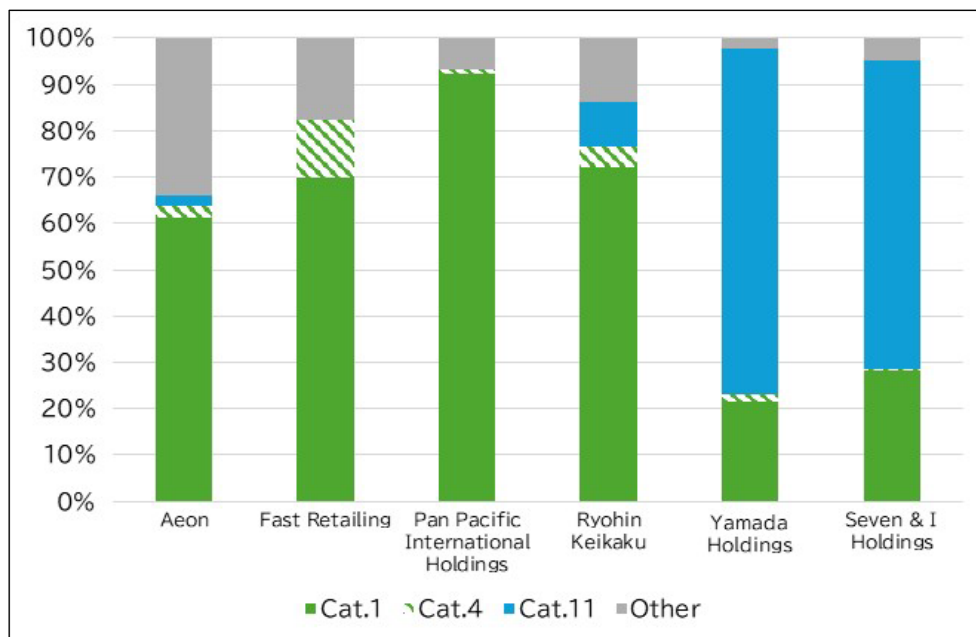


Figure 16 Breakdown of Scope 3 emissions by category of companies in the retail sector

Source: Compiled from company data (See appendix for details.)

(2) Material Category in the Retail Sector

In the retail sector, Category 1 (purchased products and services) typically represents a large share of Scope 3 emissions. The calculation method and challenges for this category are described below.

① Category 1: Calculation Methods and Challenges

(a) General Calculation Methods

Category 1 covers emissions associated with the procurement of raw materials and services, and is generally calculated using the following methods:

[Accounting method 1]

- Determining emissions for goods and services purchased or acquired by the reporting company from the stage of resource extraction to the stage of manufacturing for each supplier and combining these amounts.
- $CO_2 \text{ emissions} = \sum \{Emissions^* \text{ by supplier}\}$
*From the stage of resource extraction to the stage of manufacturing for purchased or acquired goods and services

[Accounting method 2]

- Determining data on physical amounts and monetary values for goods and services purchased or acquired by the reporting company and multiplying those figures by emissions unit values from the stage of resource extraction to the stage of manufacturing for the respective goods and services.
- $CO_2 \text{ emissions} = \sum \{(\text{Data on physical amounts and monetary values for goods and services}) \times (\text{Emissions unit values})\}$

services purchased or acquired by the reporting company) x (Emissions unit value*)}
 *Going back to the stage of resource extraction for purchased or acquired goods and services

Source: Adapted from Ministry of the Environment, 2012, “Basic Guidelines for Calculating Greenhouse Gas Emissions Throughout the Supply Chain (ver. 1.0)”

Company examples of calculation of Category 1 are as follows:

- Applies emission factors derived from a value-based input-output table at purchaser prices to procurement expenditures.⁴³
- Emissions are calculated by multiplying the purchase weight, purchase quantity or expenditure of products by product-specific emission factors.⁴⁴

(b) Challenges and Solutions in Calculation

The following challenges are envisaged when calculating Category 1.

- Retail companies typically handle a wide range of products sourced from numerous small and medium-sized enterprises. Frequent product turnover results in a change in suppliers, often leading to difficulty in obtaining information on upstream emissions.
- Calculations are often performed by multiplying the monetary value of purchases by spend-based emission factors. This may result in deviating from actual emissions and may not adequately reflect emission reduction efforts.

② Sector Initiatives

Supplier engagement is an example across the retail value chain. By collaborating with suppliers that provide materials or products, who are the source of upstream emissions, it becomes possible to obtain accurate emissions data and analyze them, which can then be used to develop reduction measures or reflect reduction efforts. Disclosure of such initiatives also clarify the position of companies or their governance over the value chain.

⁴³ Based on FamilyMart Co., Ltd. website: “Climate Change Mitigation and Adaptation” (https://www.family.co.jp/sustainability/material_issues/environment/carbon.html?kw)

⁴⁴ Based on ASKUL Corporation website “Climate Change and Decarbonization” <https://askul.disclosure.site/ja/themes/91> (in Japanese)

Supply Chain Initiatives

■ Production Partners

• Initiatives to reduce GHG emissions

Based on strong relationships with production partners, Fast Retailing is working to achieve its greenhouse gas emissions reduction targets in the supply chain leading up to fiscal year ending August 31, 2030. We use the Higg Index and other apparel industry indices to measure environmental impact, including greenhouse gas emissions, at our core garment factories and fabric mills, then work with each partner to reduce this impact. By November 2021, we defined specific conditions and issues across countries and regions, and at each of the core partner factories jointly accounting for 90% of UNIQLO and GU manufacturing. We then formulated plans to reduce greenhouse gas emissions incorporating activities for energy saving, coal phase-out, and the introduction of renewable energy. In November 2025, we raised our greenhouse gas reduction target for 2030 from the previous 20% to 30%.

To ensure these plans are implemented, we work closely with our partner factories to check progress every three months, and review plans once a year. To help our partners meet challenges, we provide tailored advice for each factory on suitable options for their circumstances, and introduce funding sources to help them implement plans. Examples are as follows.

<Support for energy saving activities>

At some fabric mills, our introduction of boiler suppliers has led to the installation of highly efficient small boilers and other key equipment. Additionally, we have been providing energy efficiency assessment to some of our suppliers, aiming to identify further energy-saving opportunities. From May 2025, we have expanded the assessment to include our core fabric mills and some garment factories.

<Support for introducing renewable energy>

In Bangladesh—a region where it remains difficult to procure renewable energy—we worked directly with renewable energy providers to ensure our partner factories could procure renewable energy certificates on a priority basis.

<Collaboration with External Stakeholders>

In Indonesia, where our production partners are located, we participate in the Clean Energy Investment Accelerator (CEIA), an international public-private partnership program aimed at accelerating the introduction of renewable energy in emerging countries. We are exchanging information with CEIA and other participating companies about initiatives and challenges in the supply chain.

■ Promoting GHG emission reductions in the sourcing of raw materials

From our product-planning stage, we encourage the use of raw materials that were produced with lower GHG emissions. Specifically, we aim to increase the proportion of materials with low GHG emissions such as recycled materials to approximately 50% by the fiscal year ending August 2030, and are starting to switch to use them. In fiscal 2025, the ratio of products* made from materials with low GHG emissions such as recycled materials increased to 19.4% (from 15.9% in the previous year) of total materials used. For polyester, 46.4% (from 41.5% in the previous year) of total materials used were made from recycled polyester.

We have introduced DRY-EX, AIRism, HEATTECH, and Fluffy Fleece items of clothing that incorporate recycled polyester fibers, and waist bags using recycled nylon. We are expanding the introduction of materials that place a lower burden on the environment, starting with synthetic fibers such as rayon and nylon.

*Previous year's Fall/Winter products and current year's Spring/Summer products

Related Links

▶ [Responsible Procurement](#)

Figure 17 Disclosure example of upstream value-chain emission-reduction initiatives in the retail sector

Source: Fast Retailing Co., Ltd. website

(<https://www.fastretailing.com/eng/sustainability/environment/climatechange.html>)

In addition to communicating with suppliers as mentioned above, it is also important for retail companies, who are in contact with consumers, to communicate with them. Examples of such activities include development and disclosure of metrics to communicate product-level emissions information to consumers.



Figure 18 Disclosure example of upstream value chain emission-reduction initiatives in the retail industry (1) (in Japanese)

Source: FamilyMart Co., Ltd. website

(<https://www.family.co.jp/sustainability/topics/2025/s20250609.html>)

Furthermore, as mentioned above, the supply chain in the retail industry is complex, which may make engagement difficult. However, where emissions are large and the number of entities is small, efforts may be effective and relatively straightforward; for example, reducing or switching to packaging materials could be an example of this.



“Cup Deli” products with top-seal lids

Figure 19 Disclosure examples of upstream value-chain emission-reduction initiatives in the retail industry (2) (in Japanese)

Source: Seven & i Holdings Co., Ltd. website “Introduction of environmentally friendly containers and packaging”

(<https://www.7andi.com/sustainability/theme/theme3/invention.html>)

6. Food Sector

(1) Sector Overview

This section reviews the current status and challenges of Scope 3 emissions disclosure in the food sector (including beverage). Under industry-specific disclosure standards, the sectors included primarily comprise “processed foods” and “non-alcoholic beverages”.

The supply chain of the food sector is generally represented as a flow consisting of production and transportation of raw materials and packaging materials, manufacturing, transportation of finished products, use, and disposal.

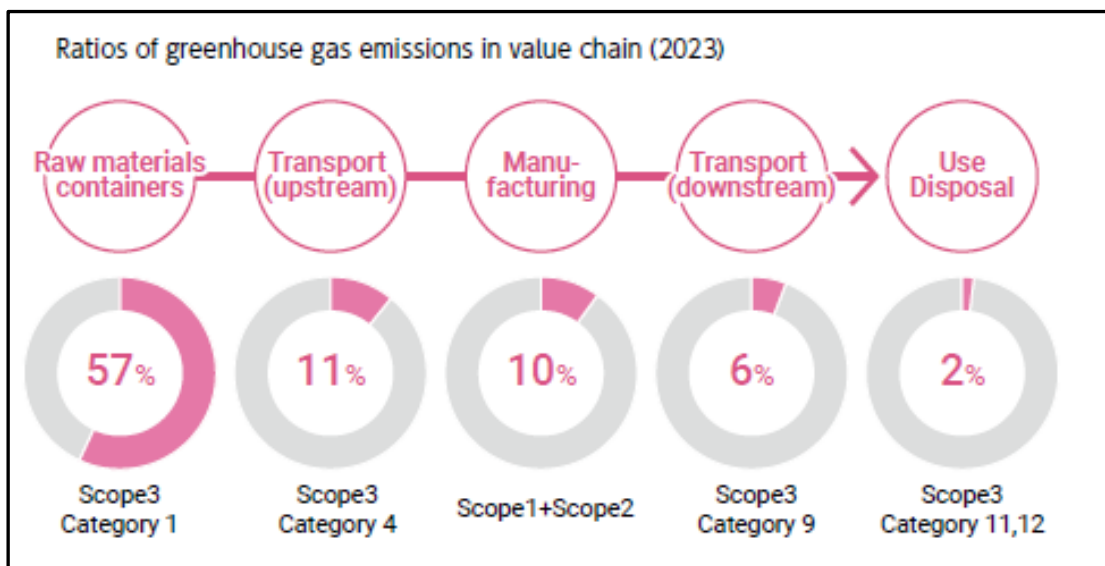


Figure 20 Kirin Group Proportion of GHG emissions across the value chain

Source: Kirin Group Environmental Report 2024 p.66

For the leading companies in the sector, the bulk of emissions belong to Scope 3. Within Scope 3, Category 1 (Purchased goods and services) accounts for the largest share. These emissions primarily arise from the procurement of raw materials and packaging materials, both of which represent significant portions of Category 1 emissions.

While the importance of Category 1 is broadly consistent across companies, there are differences in the relevance of Category 11. In particular, when foods that require heating or cooking account for a large proportion of a company’s products, the share of Category 11 emissions is considered to be higher. Accordingly, measures such as simplifying preparation (e.g., microwave-ready products) may help reduce Category 11 emissions. In addition, emissions from Categories 4 and 9 (Upstream and downstream transportation and distribution) account for approximately 10–20% of total emissions.

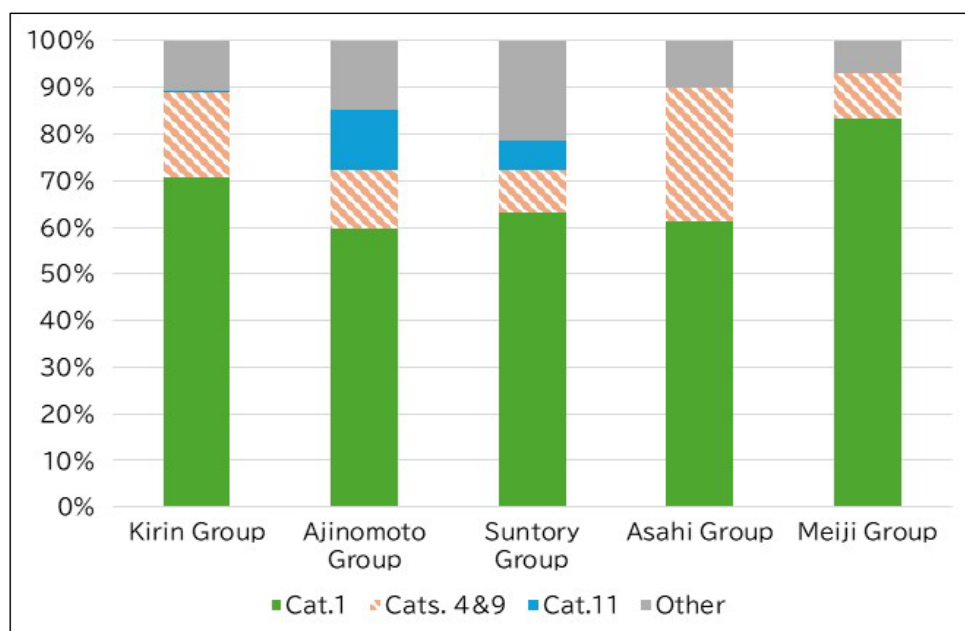


Figure 21 Breakdown of Scope 3 emissions by category of companies in the food sector

Source: Compiled from company data (See appendix for details.)

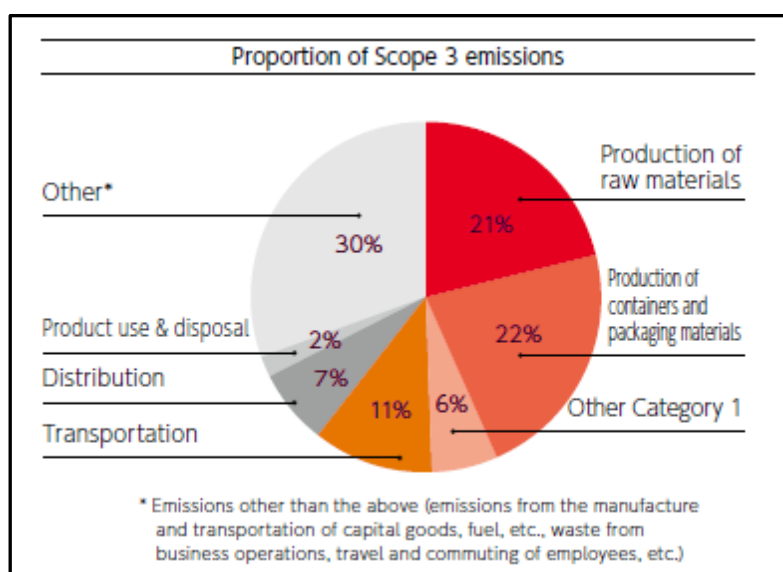


Figure 22 Kirin Group category breakdown of Scope 3 emissions

Source: Kirin Group Environmental Report 2025 p.28

(2) Material Categories in the Food Sector

As described above, in the food sector, Categories 1 (Purchased goods and services), 4 (Upstream transportation and distribution), and 9 (Downstream transportation and distribution) generally account for a large proportion of Scope 3 emissions. The calculation methods and associated challenges for these categories are outlined below.

① Category 1: Calculation Methods and Challenges

(a) General Calculation Methods

Category 1 covers emissions associated with the procurement of raw materials and services, and is generally calculated using the following methods:

[Accounting method 1]

- Determining emissions for goods and services purchased or acquired by the reporting company from the stage of resource extraction to the stage of manufacturing for each supplier and combining these amounts.
- $CO_2 \text{ emissions} = \sum \{ \text{Emissions}^* \text{ by supplier} \}$
* From the stage of resource extraction to the stage of manufacturing for purchased or acquired goods and services

[Accounting method 2]

- Determining data on physical amounts and monetary values for goods and services purchased or acquired by the reporting company and multiplying those figures by emissions unit values from the stage of resource extraction to the stage of manufacturing for the respective goods and services.
- $CO_2 \text{ emissions} = \sum \{ (\text{Data on physical amounts and monetary values for goods and services purchased or acquired by the reporting company}) \times (\text{Emissions unit value}^*) \}$
* Going back to the stage of resource extraction for purchased or acquired goods and services

Source: Adapted from Ministry of the Environment, 2012, "Basic Guidelines for Calculating Greenhouse Gas Emissions Throughout the Supply Chain (ver. 1.0)"

Examples of calculation of Category 1 are as follows:

- Activity data are determined in accordance with the requirements of the Product Category Rules (PCR), and emissions are calculated by applying the emission factor per unit weight.⁴⁵
- Emissions are calculated by multiplying the weight of raw materials and packaging materials purchased and used for products manufactured and sold by the Group by the emission factors calculated from the GHG emissions of suppliers of raw materials and packaging materials.⁴⁶
- Emissions are calculated using the purchase price of raw materials, etc. before FYE 3/2022, and using the weight of purchased raw materials from FYE 3/2023 onwards. Specifically, they are calculated by multiplying the purchase weight of major raw

⁴⁵ Based on Ministry of the Environment, Green Value Chain Platform "Industry-specific Case Studies" (https://www.env.go.jp/earth/ondanka/supply_chain/gvc/files/jp2023/C2023_ajinomoto_jp.pdf)

⁴⁶ Based on Suntory Group website (<https://www.suntory.com/sustainability/data/data/>)

materials and packaging materials by the IDEA⁴⁷ emission intensity.⁴⁸

(b) Challenges and Solutions in Calculation

The following challenges are envisaged when calculating Category 1.

- Although many companies actively engage with suppliers, primary data is often unavailable for agricultural raw materials. Suppliers may lack emissions data or may expect compensation for providing such data, making it difficult to calculate Category 1 emissions based on primary data. In particular, the primary (agriculture) sector includes many small and medium-sized enterprises (SMEs) and gaining understanding of the importance of emissions accounting may require time. For commodities such as wheat that are imported in bulk at the national level, it may be difficult to directly request primary data from overseas farmers. On the other hand, calculation methods based on secondary data cannot reflect the emissions reduction efforts of suppliers or logistics providers.
- When raw materials are purchased from trading companies rather than directly from the manufacturers, it becomes more difficult to identify the emissions associated with their production.
- For animal-derived raw materials, emissions related to feed production must also be taken into account; however, obtaining such data is often difficult.
- In order to ensure a stable supply, it may at times be necessary to procure raw materials from suppliers with relatively high emissions.
- Because emissions are calculated by multiplying volume or monetary data by emission factors derived from databases, the effects of switching to low-carbon products may not be readily reflected in the results. However, as discussed later, collaboration with packaging material manufacturers may create opportunities for improvement with respect to materials included in Category 1.

② Categories 4 and 9: Calculation Methods and Challenges

(a) General Calculation Methods

Category 4 covers emissions related to upstream transportation and distribution, and Category 9 covers emissions related to downstream transportation and distribution. These emissions are generally calculated using the following methods.

- Fuel method: $\text{CO}_2 \text{ emissions} = \Sigma (\text{Amount of fuel usage} \times \text{Emissions unit value})$
- Fuel consumption method: $\text{CO}_2 \text{ emissions} = \Sigma (\text{Transport distance} / \text{Fuel consumption} \times \text{Emissions unit value})$

⁴⁷ Inventory Database used to calculate greenhouse gas emissions throughout the life cycle.

⁴⁸ Based on Meiji Group Sustainability Report 2024

(https://www.meiji.com/global/sustainability/sustainability_report/pdf/2024/sustainability_report_2024.pdf)

- Ton-kilometer method:*
 - For trucks: CO₂ emissions = Σ (Ton-kilometers transported x Unit value of fuel usage for the ton-kilometer method x Emissions unit value)
 - In the above formula, the emissions unit value is equal to (Unit calorific value x Emission coefficient x 44/12).
 - For railroads, ships, and aircraft: CO₂ emissions = Ton-kilometers transported x Emissions unit value by mode of transport with the ton-kilometer method
- *With the ton-kilometer method, emissions from empty haulage on return trips cannot be calculated.

Source: Adapted from Ministry of the Environment, 2012, "Basic Guidelines for Calculating Greenhouse Gas Emissions Throughout the Supply Chain (ver. 1.0)"

Within the sector, Categories 4 and 9 are generally calculated using the following methods:

- Calculated by multiplying the transportation volume in tons-km of goods owned by the group by emission factors.⁴⁹
- Based on the purchase weight of raw materials (Category 4) or the total product sales volume (Category 9), emissions are calculated by developing a transport scenario that specifies truck size/class, transport distance, and loading ratio.⁵⁰

(b) Challenges and Solutions in Calculation

Although emissions can be calculated using the above methods, the transport scenarios assumed (e.g., load factors) and the emission factors applied may differ from actual operating conditions. As a result, emissions reduction efforts such as increasing load factors or improving fuel efficiency may not be fully reflected in the calculated figures.

③ Sector Initiatives

The major sources of Category 1 emissions, which account for the bulk of Scope 3 emissions in the food sector, can largely be divided into agricultural raw materials and packaging materials. To reduce emissions associated with agricultural raw materials, one approach is to increase the proportion of low-carbon or decarbonized raw materials through supplier engagement. However, as noted above, there are challenges related to data availability. In addition, for the food sector, ensuring stable supply and maintaining quality are of paramount importance, and such engagement does not necessarily lead directly to reductions in Scope 3 emissions. Nevertheless, collaboration with producers is essential for the food sector in many aspects, and similar initiatives are also being pursued from an environmental perspective.

⁴⁹ Based on Suntory Group website (<https://www.suntory.com/sustainability/data/data/>)

⁵⁰ Based on Meiji Group Sustainability Report 2024

(https://www.meiji.com/global/sustainability/sustainability_report/pdf/2024/sustainability_report_2024.pdf)

To reduce emissions associated with packaging materials, two approaches can be considered: increasing the proportion of low-carbon or decarbonized packaging and reducing the amount of packaging itself. To increase the proportion of low-carbon packaging, collaboration with suppliers is being undertaken to use environmentally friendly materials such as recycled and bio-based materials. Efforts to reduce the amount of packaging itself include lightweighting PET bottles and adopting label-free packaging.

Sustainable Packaging

Activities

Packaging plays an important role in the provision of products. In addition to maintaining quality, ensuring resistance during transportation, serving other functional purposes such as design, and acting as a means of communication for displaying information, packaging is also expected to be easily usable, and be made from sustainable raw materials and resources. Meanwhile, the inappropriate disposal of plastic packaging creates urgent social issues, such as ocean plastic pollution and impacts on ecosystems.

As a company that conducts business activities using nature's gifts, the Asahi Group promotes the 3R (reduce, reuse, recycle) of packaging. To achieve this aim, we will work with industry associations for each packaging material and jointly develop technologies with suppliers.



indicating the necessary information is affixed to one side of a bottle, instead of a roll label which was conventionally used for *Asahi OISHI MIZU*. This makes it possible to reduce the CO₂ emissions from labels by nearly 63% and to sell the bottled products individually*.

In November 2021, we launched completely label-free *Asahi JUROKUCHA* in limited quantities, utilizing laser marking technology that employs a laser to create minute dot patterns on the surface of PET bottles. This technology eliminates the need for small tack stickers and neck ringers to indicate the required information. Furthermore, in July 2023, we launched limited quantities of *Asahi JUROKUCHA Simple Eco-Label PET 660 ml* with a tack sticker (simple eco-label) instead of the usual label. The simple eco-stickers reduce CO₂ emissions per bottle by approximately 46% compared to the usual labels.

Moving forward, Asahi Soft Drinks Co., Ltd. will develop new label-free products and expand their sales channels.

* Compared with *Asahi OISHI MIZU PET 600ml*

Plastic Packaging

Reduce Labels

▶ **Label-free Bottles: Reducing the Use of Sticker-type Labels to Achieve Completely Label-free Bottles**



→



PET 600ml PET 2L PET 600ml PET 2L

In May 2018, Asahi Soft Drinks Co., Ltd. launched label-free products, available for sales by the box only. Currently, four categories and 16 items are sold in this way. Eliminating the use of labels on PET bottles has successfully reduced the amount of resin used to make labels by nearly 90%. This reduces the effort necessary to peel off labels when disposing of bottles and also reflects other convenience considerations. Furthermore, this activity has been praised for its contribution to solving the problem of marine plastics. Our label-free products were exhibited at the G20 Osaka Summit in 2019 as part of the Japanese government's publicity exhibition. In April 2021, *Todoku Tsuyosa no Nyusan kin W* was added to the portfolio of Asahi's label-free products sold by the box only.

Also, in April 2021, *Asahi OISHI MIZU* with a simple eco label went on sales in stores and some vending machines. It is currently available in two varieties, PET 585ml and 600ml. A small tack sticker (simple eco-label)

▶ Use of Roll Labels on Beverage PET Bottles






Asahi Soft Drinks Co., Ltd. began using roll labels on some of its *MITSUYA CIDER* PET bottles to reduce label

Figure 23 Examples of disclosure on emissions reduction initiatives across the value chain in the food sector (1)

Source: Asahi Group Holdings Sustainability Report 2024 p.150

In Categories 4 and 9, joint transportation initiatives are being promoted within the food sector. Since 2015, six food manufacturers have collaborated on the F-LINE Project, a joint logistics initiative. The second phase of the project, launched in 2022, aims to achieve emissions reductions through shared warehousing and consolidated deliveries. Efforts are also underway to promote modal shift (transitioning freight transport from trucks to rail or maritime transport). For road freight, selecting vehicle types or transport modes with lower emissions may contribute to emissions reductions.

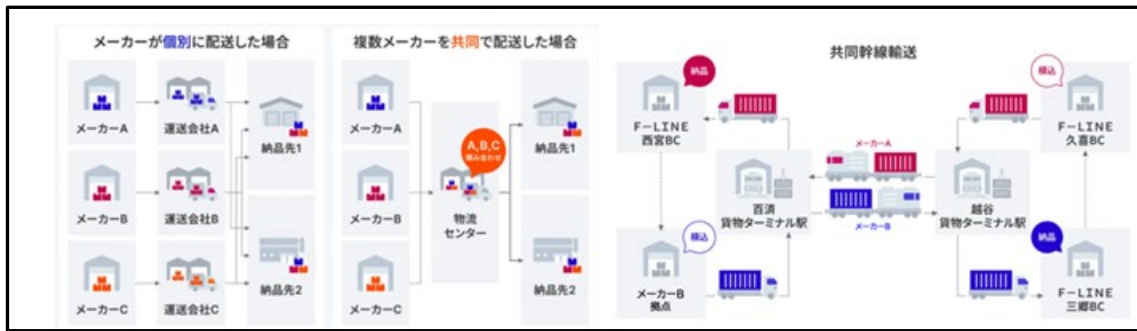


Figure 24 Examples of disclosure on emissions reduction initiatives across the value chain in the food sector (2) (in Japanese)

Source: F-LINE Corporation website Left figure: “Joint Logistics Initiative” (<https://www.f-line.tokyo.jp/service/joint/>); Right figure: “Improving Line-Haul Transportation Efficiency”. (<https://www.f-line.tokyo.jp/strengths/project/line/>) Figure from the F-LINE Corporation website (partially modified by the secretariat with permission).

7. Trading Companies

(1) Sector Overview

This section reviews the current status and challenges of Scope 3 emissions disclosure of trading companies. The supply chains of trading companies vary, resulting in diverse value chains. As an example of value chain disclosure, the following is an example of disclosure by a trading company, on business domains according to their respective value chain in the respective sectors.



Figure 25 Examples of value chain disclosure of a trading company

Source: Mitsui & Co., Ltd., Disclosure Based on TCFD Recommendations, p. 19⁵¹

For the leading companies in the sector, the bulk of emissions belong to Scope 3, but the composition of categories of Scope 3 emissions varies from company to company. Emissions from traded commodities are primarily reflected in Category 1 (Purchased goods and services), Category 10 (Downstream: Processing of sold products), and Category 11 (Downstream: use of sold products), while emissions from invested businesses such as power plants are expected to be reflected in Category 15.

Emissions from products and business activities are expected to be concentrated in energy, minerals and power generation, leading to an overall tendency to show significant downstream emissions (Categories 10 and 11). However, for some companies, emissions are highest in upstream (Category 1). This is thought to be from food products and mineral

⁵¹ Disclosure as of September 2025.

resources, and companies with significant activities in these commodities tend to have high upstream emissions.

Trading companies have extensive supply chain networks. This makes it difficult to grasp the picture of emissions in its entirety, which makes it hard to quantify in a comprehensive and precise manner. Therefore, views have been expressed that it is practical and effective to focus disclosure on important categories. On the other hand, it has been expected that emission reduction efforts across the supply chains of trading companies can propagate their impact to a wide range of companies. However, it is also suggested that frequent restructuring of business portfolios makes it harder for trading companies to assess reduction effects using time-series analysis, compared with other sectors.

An example of supply chain of trading companies, disclosed along with information of GHG emissions is shown below.

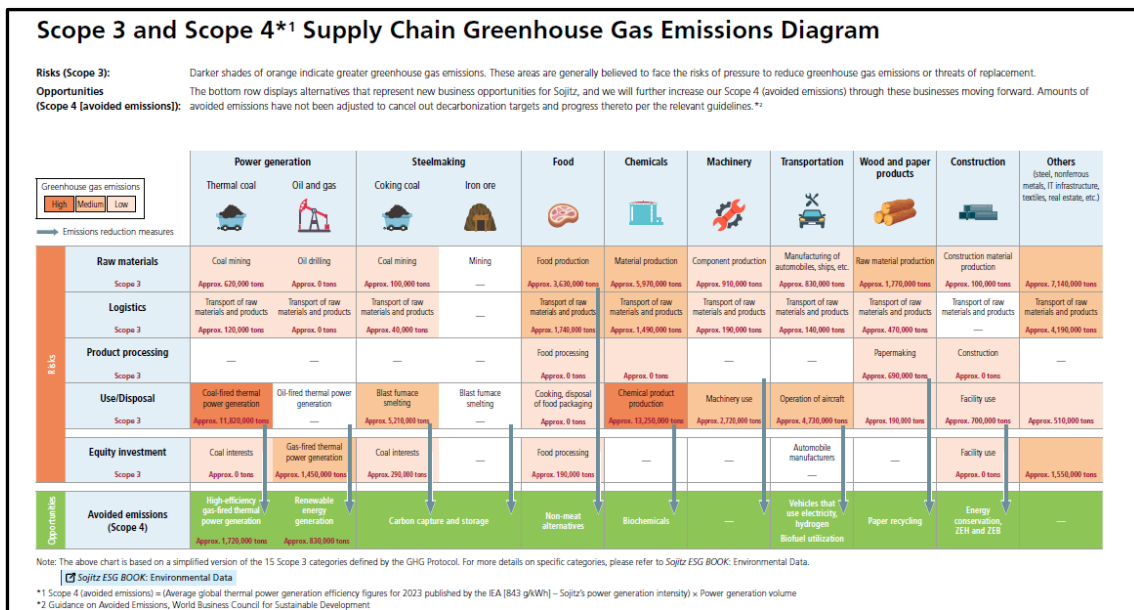


Figure 26 Example of disclosure on emissions across the value chain of a trading company.

Sojitz Corporation Integrated Report 2025 p. 40

A breakdown of Scope 3 emissions of major companies is shown below.

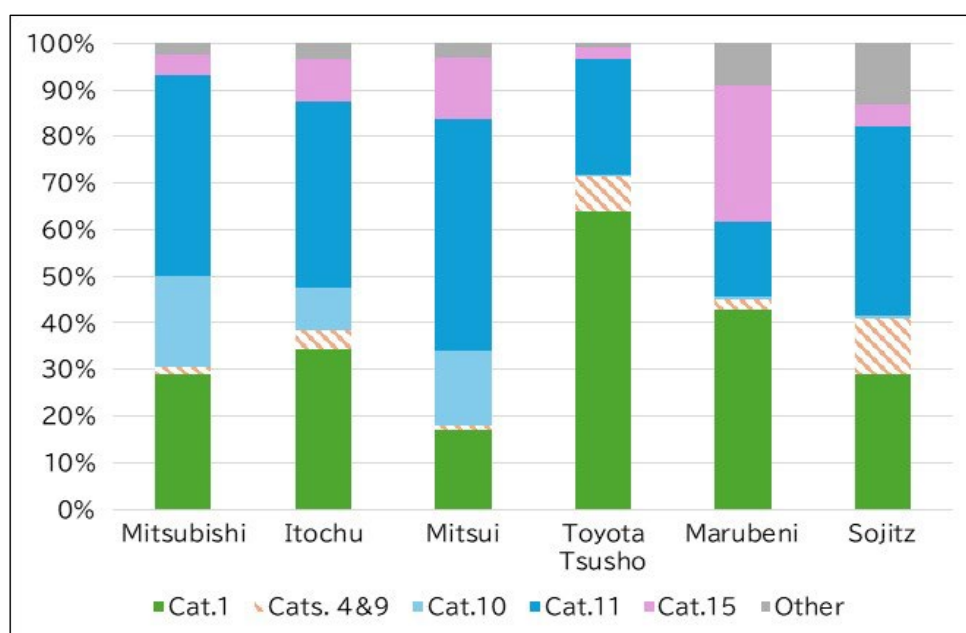


Figure 27 Breakdown of Scope 3 emissions by category of trading companies

(2) Material Categories of Trading Companies

As described above, the Scope 3 categories that are material for trading companies depend on the commodities and business activities. Nevertheless, Category 11 (Use of sold products), and Category 1 (Purchased goods and services) consistently account for a significant share of emissions across companies. The calculation methods and challenges for these categories are described below.

① Category 11: Calculation Methods and Challenges

(a) General Calculation Methods

- CO2 emissions

CO2 emissions = (CO2 emissions from the use of fuel consumed during product use) + (CO2 emissions from the use of electricity consumed during product use) + (Emissions of 6.5 gases during product use, converted into CO2)

= Σ (Anticipated number of lifetime uses of the product x Number sold during the reporting period x Amount of fuel consumption per use x Emissions unit value) + Σ (Anticipated number of lifetime uses of the product x Number sold during the reporting period x Amount of electricity consumption per use x Emissions unit value) + Σ (Emissions of 6.5 gases during product use x Global warming coefficient)

Source: Adapted from Ministry of the Environment, 2012, "Basic Guidelines for Calculating Greenhouse Gas Emissions Throughout the Supply Chain (ver. 1.0)"

Company examples of calculation of Category 11 are as follows:

- Calculation methods are with reference to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard (GHG Protocol) and the Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain (ver2.6) (Ministry of the Environment and Ministry of Economy, Trade and Industry).⁵²
- For each sector such as power generation and steelmaking, emissions are calculated by multiplying the amount of fuel and material (thermal and coking coal) traded by an emissions factor.⁵³

(b) Challenges and Solutions in Calculation

The following challenges are envisaged when calculating Category 11.

- Activity data and emission factors for the use phase which are required for calculation are based on assumptions, and it would be difficult to reflect emission reduction efforts during the use phase, if any.
- As trading companies are not final product manufacturers, obtaining detailed information on use-phase (activity data, emission factor) can be difficult. It would be desirable to provide explanation on the assumptions or calculation methods.

② Category 1: Calculation Methods and Challenges

(a) General Calculation Methods

Category 1 pertains to emissions from materials procured and is usually calculated by multiplying the quantity (weight) or the monetary value of procurement by an emission factor. In this sector, Category 1 is calculated using the following method.

[Accounting method 1]

- Determining emissions for goods and services purchased or acquired by the reporting company from the stage of resource extraction to the stage of manufacturing for each supplier and combining these amounts.
- $CO_2 \text{ emissions} = \sum \{ \text{Emissions}^* \text{ by supplier} \}$
 - * From the stage of resource extraction to the stage of manufacturing for purchased or acquired goods and services

[Accounting method 2]

- Determining data on physical amounts and monetary values for goods and services purchased or acquired by the reporting company and multiplying those figures by emissions unit values from the stage of resource extraction to the stage of

⁵² Based on Mitsubishi Corporation website: "Sustainability Report / ESG Data"

(<https://www.mitsubishicorp.com/jp/en/ir/library/esg/>) (Refer to the "ESG Data" linked on this page)

⁵³ Based on Sojitz Corporation website "Environmental Data" (<https://www.sojitz.com/en/sustainability/esg-e-data/>)

manufacturing for the respective goods and services.

- CO2 emissions = $\Sigma \{(\text{Data on physical amounts and monetary values for goods and services purchased or acquired by the reporting company}) \times (\text{Emissions unit value}^*)\}$
 - * Going back to the stage of resource extraction for purchased or acquired goods and services

Source: Adapted from Ministry of the Environment, 2012, "Basic Guidelines for Calculating Greenhouse Gas Emissions Throughout the Supply Chain (ver. 1.0)"

Example of calculation of Category 1 undertaken is as follows:

- For each sector such as power generation and steelmaking, emissions are calculated by multiplying the amount of fuel and material (thermal and coking coal) traded by an emissions factor.⁵⁴

(b) Challenges and Solutions in Calculation

A key challenge in calculating Category 1 is that, for certain primary commodities, accurate quantification is difficult. Since trading companies deal in a wide variety of commodities, if it is possible to focus on high-emission commodities or businesses such as energy and mineral resources, it may allow for reasonably robust estimates for Category 1 emissions.

③ Sector Initiatives

As mentioned above, trading companies are characterized by complex value chains due to the large number of commodities and businesses they encompass. For this reason, trading companies are making efforts to disclose their Scope 3 emissions and measures, including avoided emissions, in a way that provides a bird's-eye view and makes it easy to understand. There are also examples of analyses with increased detail for categories considered material. In this way, efforts are being made to deepen investor understanding.

⁵⁴ *ibid.*

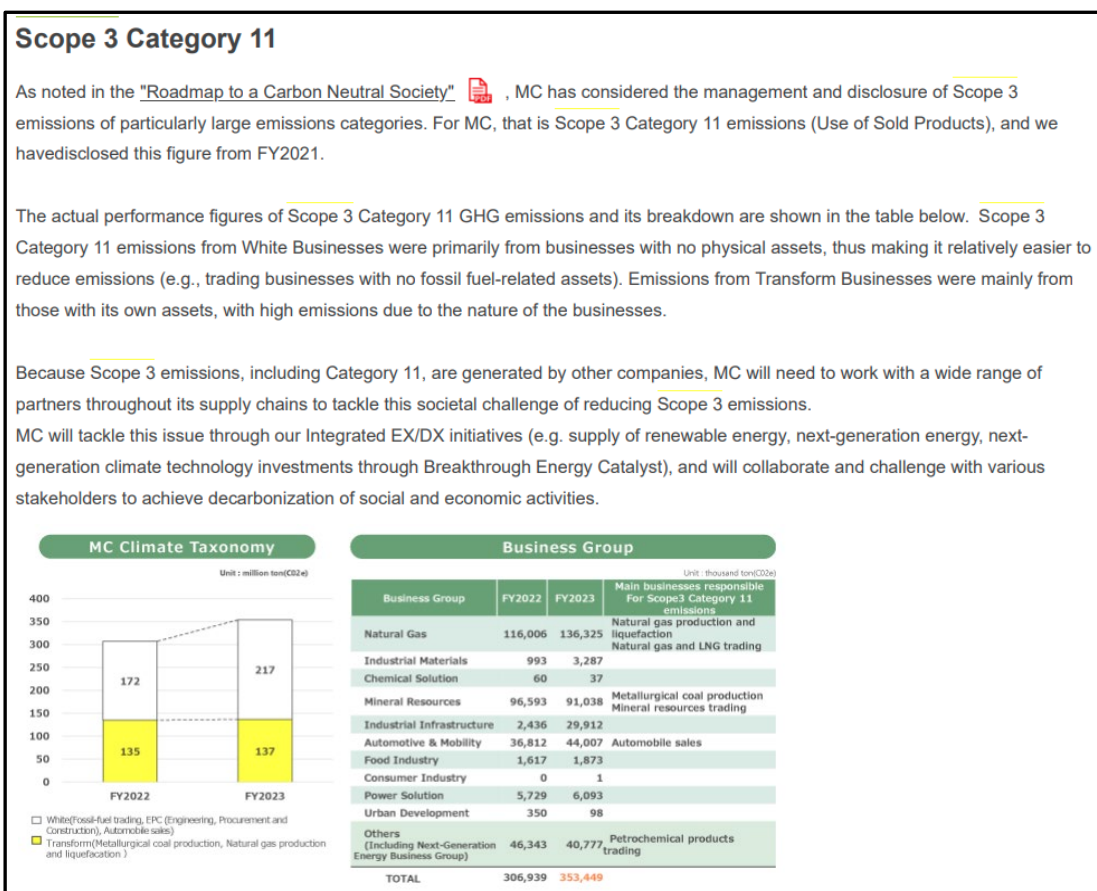


Figure 28 Examples of disclosure on emissions reduction initiatives across the value chain of a trading company (1)

Source: Mitsubishi Corporation Sustainability Report 2024 p.65-66⁵⁵

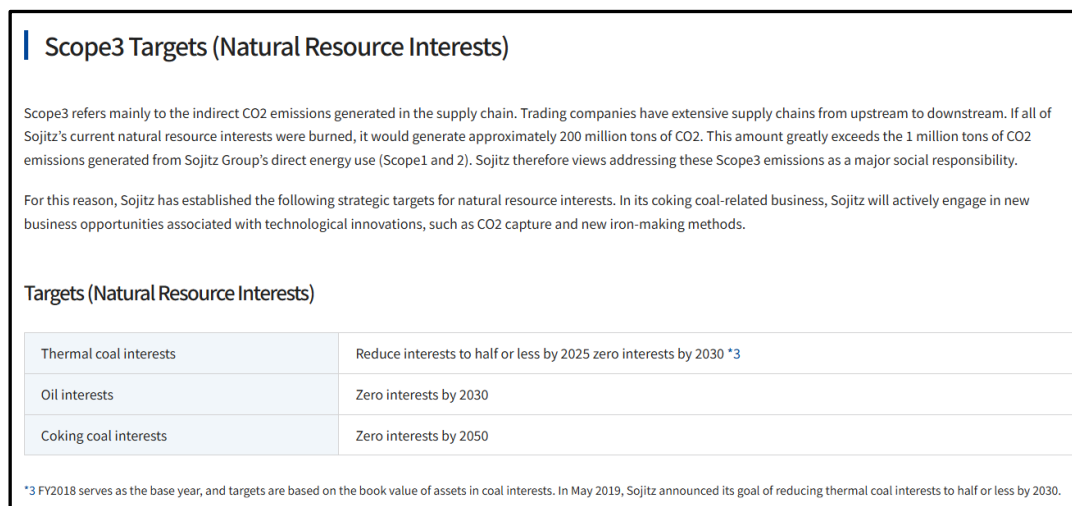


Figure 29 Examples of disclosure on emissions reduction initiatives across the value chain of a trading company (2)

Source: Sojitz Corporation website "Sojitz Group's Policy for Realizing a Decarbonized Society" (https://www.sojitz.com/en/sustainability/policy/carbon_neutrality/)

⁵⁵ Mitsubishi Corporation discloses all Scope 3 categories in April 2025 and report on supply-chain collaboration efforts. (Mitsubishi Corporation website <https://www.mitsubishicorp.com/jp/en/sustainability/environmental/climate-change/002.html>).

Furthermore, because trading companies have a large impact on the supply chain, progress in accounting for Category 1 emissions by trading companies could contribute to improving the accuracy of calculations of Scope 3 emissions by companies which markets products, and as a consequence contribute to reducing emissions in the value chain.

Chapter 1

Chapter 2

Chapter 3

Chapter 4

Chapter 5

Case
Examples

Appendix

The graphs showing the breakdown of Scope 3 emissions by category in the sector guides are intended to illustrate the characteristics and diversity of Scope 3 emissions both across and within industries. It should be noted that the definition of organizational boundaries and calculation methodologies vary among companies, and may be revised in the future due to changes in them. It should also be noted that the figures may fluctuate over time as a result of changes in business environment and emissions reduction measures.

Industry	Company	Data Source
Automotive	Toyota Motor	Sustainability Data Book 2025, p.61
	Honda Motor	Honda ESG Report 2025 p.59
	Nissan Motor	Sustainability data book 2025 p.149
	Isuzu Motors	Corporate website (ESG Data (Environment) Isuzu Motors Limited)
Electrical and Electronics	Hitachi	Hitachi ESG Data Book 2025 p.2
	Panasonic Holdings	Corporate website (Overview of Environmental Impact and Environmental Accounting - Environmental Governance - Environment - Sustainability - Panasonic Holdings)
	NEC	Corporate website (Climate Change: Environment NEC)
	Kioxia Holdings	Corporate website (Climate Change KIOXIA Holdings Corporation)
Real Estate	Mitsui Fudosan	Corporate website (Mitsui Fudosan Sustainability/ESG Environment-related Data)
	Mitsubishi Estate	Corporate website (E: Environmental data Sustainability Activities (ESG) Mitsubishi Estate Sustainability)
	Tokyu Fudosan Holdings	Corporate website (ESG Data / Third-party Verification ESG Data / Third-party Verification Sustainability: Tokyu Fudosan Holdings)
	Sumitomo Realty & Development	ESG Report "Environment" p.4 (ESG Report EN Environment.pdf)
	Nomura Real Estate Holdings	Corporate website (Environment Nomura Real Estate Holdings, Inc.)
	Open House Group	Corporate website (Environmental Conservation Sustainability and ESG Initiatives Corporate Information OPEN HOUSE Group)
Retail	AEON	AEON REPORT 2025 p.74
	YAMADA Holdings	Integrated Report 2025 p.68
	FAST RETAILING	Corporate website (Response to Climate Change FAST RETAILING CO., LTD.)
	Seven & i Holdings	Corporate website (Supply Chain Management (Environment) Sustainability Seven & i Holdings Co., Ltd.)
	Pan Pacific International Holdings	Pan Pacific International Holdings Corporation ESG Data Book FY2025 p.3
	Ryohin Keikaku	Corporate website (Response to Climate Change Ryohin Keikaku Co., Ltd.)
Food	Kirin Group	Kirin Group ESG Databook 2025 p.23
	Ajinomoto Group	Ajinomoto Group Sustainability Report 2025 p.58
	Suntory Group	Corporate website (Suntory Sustainability Sustainability Data Performance Data)

Industry	Company	Data Source
	Asahi Group	Asahi Group Sustainability Report 2025 p.60
	Meiji Group	Meiji Group Environmental Data FYE3/2025 (environmental data.pdf)
Trading Company	Mitsubishi Corporation	Mitsubishi Corporation ESG Data 2025 (Sustainability Report Library Investor Relations Mitsubishi Corporation)
	ITOCHU Corporation	Company Announcement: Update on Initiatives Addressing Climate Change(Update on Initiatives Addressing Climate Change)
	MITSUI & CO.	Corporate website (Environmental Performance Data Environment Sustainability MITSUI & CO., LTD.)
	Toyota Tsusho Corporation	Corporate website (Climate Change Environment Sustainability Toyota Tsusho)
	Marubeni Corporation	Corporate website (Environmental Data Environment Sustainability Marubeni Corporation)
	Sojitz Corporation	Corporate website (Environmental Data Sojitz ESG BOOK Sustainability Sojitz Corporation)

Viewed February 19, 2026

Appendix

Appendix 1: TCFD Consortium Planning Committee Members and TCFD Consortium

#	Category	Applicable Emission Activities (Examples)
1	Purchased goods and services	Sourcing raw materials, outsourcing packaging, sourcing consumables
2	Capital goods	Expansion of production facilities (if construction and manufacturing take place over multiple years, it is recorded in the final year in which construction and manufacturing is completed)
3	Fuel and energy-related activities (not included in Scope 1 and 2)	Upstream processes of procured fuels (mining, refining, etc.) Upstream processes of the electricity procured (extraction and refining of fuel used for power generation, etc.)
4	Upstream transportation and distribution	Procurement logistics, horizontal logistics, shipping logistics (our company is the shipper)
5	Waste generated in operations	Transporting (*1) and processing waste (excluding valuable waste) outside our company
6	Business travel	Employee business trips
7	Employee commuting	Employee commuting
8	Upstream leased assets	Operation of leased assets rented by the company (in the accounting, reporting, and disclosure system, this is recorded as Scope 1 and 2, so in most cases it is not applicable)
9	Downstream transportation and distribution	Shipping and transportation (after the company is the shipper), storage in warehouses, and sales at retail stores
10	Processing of sold products	Processing of intermediate products by businesses
11	Use of sold products	Use of the product by customers
12	End-of-life treatment of sold products	Transportation (*2) and disposal of the product by the user
13	Downstream leased assets	Operation of leased assets owned by the company as a rental business and rented to others
14	Franchise	Activities of franchisees under the company that fall under Scope 1 and 2
15	Investments	Management of stock investments, bond investments, project finance, etc.
	Other (optional)	the daily lives of employees and consumers

*1 Under the Scope 3 Standard and the “Basic Guidelines on Accounting for Companies’ Greenhouse Gas Emissions Throughout the Supply Chain,” transportation is treated as an optional item for calculation.

*2 Under the Scope 3 Standard and the “Basic Guidelines on Accounting for Companies’ Greenhouse Gas Emissions Throughout the Supply Chain,” transportation is excluded from the calculation boundary; however, it may still be included in the calculation if desired.

GHG Protocol, 2013, Technical Guidance for Calculating Scope 3 Emissions ver. 1.0, Based on Ministry of the Environment “Green Value Chain Platform” website
(https://www.env.go.jp/earth/ondanka/supply_chain/gvc/estimate_03.html)

Appendix 2: Guidance for Calculating Scope 3 Emissions

As mentioned above, the method for calculating Scope 3 emissions is described in the GHG Protocol's Scope 3 Standard and Calculation Technical Guidance, both of which have been translated into Japanese. The Ministry of the Environment also⁵⁶ publishes various guidelines for accounting for supply chain emissions on its "Green Value Chain Platform." Specifically, they are as follows:⁵⁷

Table 1 Various guidelines under the Ministry of the Environment's "Green Value Chain Platform"

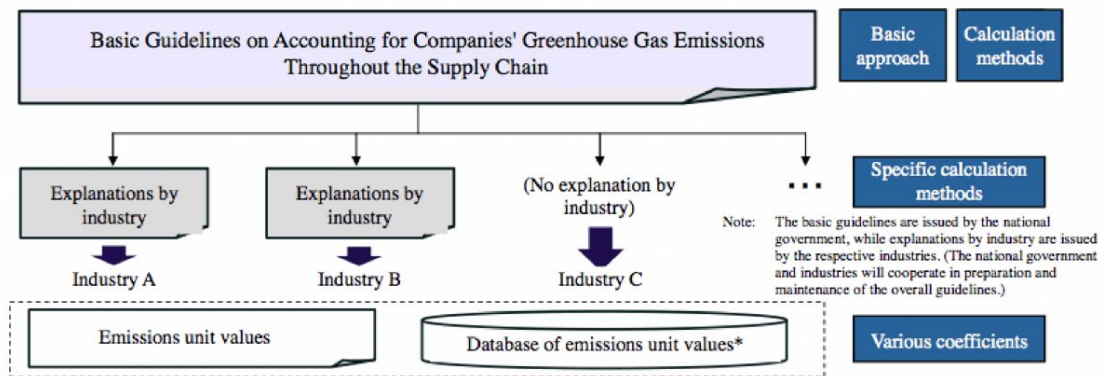
Literature Name	Overview
Basic Guidelines on Accounting for Companies' Greenhouse Gas Emissions Throughout the Supply Chain (March 2025)	This is a basic guideline for accounting for supply chain emissions, and describes calculation methods for each category of Scope 3, along with Scope 1 and Scope 2 emissions. Regarding Scope 3, it presents two methods for calculation: (1) calculating using emissions data specific to related business partners (method using primary data) and (2) using an emissions intensity database (method using secondary data). This guideline mainly describes (2).
Guide to Calculating Supply Chain Emissions Using Primary Data - Towards Calculating Scope 3 Emissions That Reflects Reduction Efforts (March 2025)	provides basic guidelines for the use of primary data, based on the recognition that the use of primary data is essential to achieving reductions in Scope 3 emissions. It also addresses the issues with the calculation method that uses secondary data, which is currently mainstream, and the measures to reduce emissions. This paper explains the importance of using primary data, the basic concept of calculating emissions using primary data, specific examples, and points to note when receiving third-party assurance and verification.
Explanations by industry (2012-2014)	As a supplementary document to the above basic guidelines, industry associations and the Ministry of the Environment have created documents for the cement, retail, logistics, and construction industries (prefabricated housing).
Emissions intensity for calculating an organization's greenhouse gas	This document outlines the requirements that emissions intensity data must meet in order to calculate supply chain emissions, etc., as well as how to develop and use an emissions intensity database. It lists reliability,

⁵⁶ GHG Protocol "Corporate Value Chain (Scope 3) Accounting and Reporting Standard" (https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf) and "Technical Guidance for Accounting for Scope 3 Emissions" (https://ghgprotocol.org/sites/default/files/standards/Scope3_Calculation_Guidance_0.pdf)

⁵⁷ https://www.env.go.jp/earth/ondanka/supply_chain/gvc/index.html

emissions throughout its supply chain	representativeness, temporal compatibility, geographic compatibility, and technical compatibility as requirements that intensity data must meet, and explains how to use the database, using decision trees and other tools, the intensity units that can be applied to each Scope 3 category depending on the amount of activity (physical quantity, monetary value, etc.).
---------------------------------------	--

The relationship between these documents is shown below:



* This indicates the emissions unit values related to these guidelines. Companies may decide whether or not to use these unit values at their own discretion.

Figure 30 Overall Structure of the Guidelines for Supply Chain Emissions Accounting

Source: Green Value Chain Platform website

(https://www.env.go.jp/earth/ondanka/supply_chain/gvc/en/guideline_for_value_chain.html)

Additionally, the Green Value Chain Platform lists the following as sources of information to be used when primary data on emissions intensity is not obtained.

Table 2 Guidelines that List the Basic Units that Can Be Used for Secondary Data

name	Overview	Conditions
Emissions intensity database for calculating an organization's greenhouse gas emissions throughout its supply chain	This database compiles emissions intensity data that can be used to calculate supply chain emissions. It also lists domestic and international emissions intensity data (in spreadsheet format), as well as links to external databases.	-
AIST-IDEA ⁵⁸	This database provides environmental impact information for approximately 5,000 types of products and services in	Paid service

⁵⁸https://www.aist-solutions.co.jp/english/service/aist_idea/

	Japan.	
JLCA Database	This database ⁵⁹ covers data for inventory analysis, such as “Gate-to-Gate” inventory data provided voluntarily by industry associations, data for impact assessment, and literature-based data.	Membership in the LCA Japan Forum is required
J-CAT	This is a tool (software and manual) for calculating GHG emissions throughout the entire life cycle of a building. ⁶⁰	-

⁵⁹<https://lca-forum.org/database/>

⁶⁰<https://www.ibecs.or.jp/english/JCAT/index.html>

Appendix 3: TCFD Consortium Planning Committee Members and TCFD Consortium Members

(1) Member of the TCFD Consortium Steering Committee

*In alphabetical order

[Chair]

Kunio Ito Director of Hitotsubashi CFO Education and Research Center

[Steering Committee member]

Takao Aiba Project General Manager / Public Engagement Group Manager, Environment Affairs and Engineering Management Div., Carbon Neutral Engineering Development Center, Toyota Motor Corporation

Takashi Furukawa Senior Chief, Responsible Care Dept., SUMITOMO CHEMICAL Co., Ltd.

Yasunori Iwanaga Chief Responsible Investment Officer, Amundi Japan Ltd.

Masaaki Izumiya Executive Counselor, General Manager, Head of Div. , Environmental Planning Div., Nippon Steel Corporation

Naruyoshi Kuwata General Manager in Charge of Sustainability Promotion, Corporate Planning Dept., SUMITOMO LIFE INSURANCE COMPANY

Masayuki Matsuyama Senior Fellow, Development Bank of Japan Inc.

Masaaki Nagamura Fellow International Initiatives, Tokio Marine Holdings, Inc.

Kyoko Shoji General Manager, Sustainability Department, Mitsubishi Corporation

Hiroyuki Takahashi General Manager, ESG Office, Tokyo Electric Power Company Holdings, Inc.

Kazunori Takahashi Senior Advisor, Group Sustainability Division and Group Environment Division, Hitachi, Ltd.

Gosuke Tateno Director for ESG Environmental Strategy Promotion, ESG Division ESG Global Action Promotion, Kao Corporation

Toru Terasawa Executive ESG Advisor, Asset Management One Co., Ltd.

Daisuke Tezuka Corporate Planning Division Director, Sustainability Office, MUFG Bank, Ltd.

Hiroyuki Tezuka Fellow, JFE Steel Corporation

Note: Affiliation and position as of March 16, 2026.

(2) Number of TCFD Consortium members
900 organizations (as of March 16, 2026)

Chapter 1

Chapter 2

Chapter 3

Chapter 4

Chapter 5

Case Examples

Appendix

Published March 2026