

**Explanations by Industry (Cement Production) for the Basic
Guidelines on Accounting for Greenhouse Gas Emissions
Throughout the Supply Chain, Ver. 1.0**

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Japan Cement Association

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for Greenhouse Gas Emissions Throughout the Supply Chain, Ver. 1.0**

Table of Contents

Part 1.	Basic Approach of Accounting.....	2
1.	Role and usage of the explanation.....	2
1.1	Role	2
1.2	Relationship between the cement industry and supply chain emissions.....	2
1.3	How to use this explanation	3
2.	Scope of accounting	4
2.1	Organizational boundaries.....	4
2.2	Activities and scope subject to accounting	4
3.	Using the results of accounting	9
Part 2.	Explanations of Accounting Methodology.....	10
1.	Company's emissions	10
1.1	Direct emissions (Scope 1).....	10
1.2	Energy-derived indirect emissions (Scope 2).....	12
2.	Other indirect emissions (Scope 3)	14
2.1	Category 1: Purchased goods and services	14
2.2	Category 3: Fuel and energy related activities not included in Scope 1 or 2.....	17
2.3	Category 10: Processing of sold products	19
2.4	Category 11: Use of sold products	22
2.5	Category 12: End-of-life treatment of sold products	24

Part 1. Basic Approach of Accounting

1. Role and usage of the explanation

1.1 Role

The explanation has been prepared for the cement industry as a supplement to the Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain (Ministry of the Environment and Ministry of Economy, Trade and Industry). It describes GHG emissions accounting by the cement industry and accounting methods for use by the industry, including specific case studies. However, the explanation does not deterministically define specific interpretations and accounting methods for the cement industry. For the overall structure of the guidelines and the role of this document, please refer to the figure below.

Section 1.5 (Scope of the Guidelines)¹ of the Scope 3 Standard expresses the view that it would be possible to draw comparisons among companies if there was additional information for the sake of improving consistency by means of sector-specific guidance; however, the explanation does not provide such kinds of additional information that would be needed in order to draw comparisons among companies.

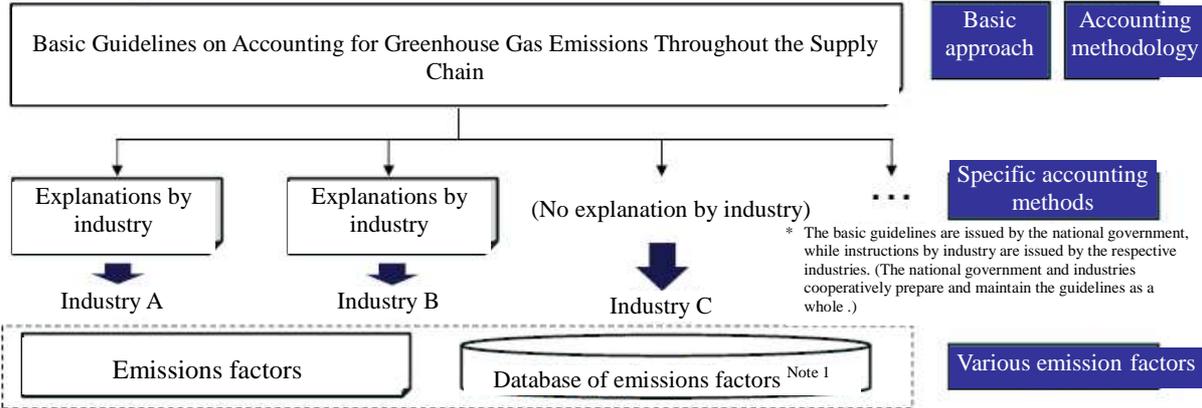


Fig. 1.1-1 Overall structure of the guidelines and role of this document

We plan to review and revise the explanation in the future as needed, based on changes in the national government's basic guidelines as well as the situation of the industry.

1.2 Relationship between the cement industry and supply chain emissions

In the cement industry, steps are already being taken with regard to accounting for GHG emissions from a company's own plants as well as logistical operations. However, it is possible that intermediate product manufacturers located on the upstream side in the supply chain will be required to take the following kinds of steps in the future.

- Supplying information to the supply chain (downstream side)
- Further promotion of green logistics

¹ Provisional translation into Japanese by Mizuho Information & Research Co., Inc.

Since these kinds of efforts are subject to indirect control by other parties, it will not be possible to fully control all aspects of these kinds of steps, in contrast to the scope that has been dealt with in the past, such as a company's own plants. However, the expectation is that companies will engage in these efforts in order to actively address the supply chain as a whole.

1.3 How to use the explanation

From among the fifteen Scope 3 categories indicated in the Basic Guidelines, the explanation focuses on the categories that include points specific to the cement industry and categories where the covered activities or accounting methods may be difficult to understand. Specifically, these are as shown in Table 2.2-2. Users should also refer to the Basic Guidelines if needed when calculating supply chain emissions; for example, if they are accounting for emissions in categories not covered by the explanation.

In addition, companies has their own guidelines can use based on Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain.

2. Scope of accounting

2.1 Organizational boundaries

As a general rule, the organizational boundaries for accounting by a reporting company consist of all business activities (including business activities other than cement manufacturing) owned or controlled by the reporting company, including those of the reporting company (corporation, etc.) and companies subject to consolidation, etc.

However, the explanation applies only to business activities that are part of the cement industry. Here, the cement industry is defined as follows, in accordance with the definition under the Japan Standard Industrial Classification:

"The cement industry refers to places of business that manufacture Portland cement, slag cement, silica cement, fly ash cement, etc."

Source: Japan Standard Industrial Classification (revised in November 2007)

2.2 Activities and scope subject to accounting

The activities subject to accounting as supply chain emissions are classified under the following three general scopes, and Scope 3 is further subdivided into fifteen categories.

Scope 1: Direct greenhouse gas emissions by the company itself.

Scope 2: Indirect emissions from the use of power, heat, or steam supplied by external parties.

Scope 3: Other indirect emissions besides Scope 2 (Emissions by external parties related to the company's activities).

The content of each category is as follows.

The explanations given in the Basic Guidelines have been partially revised for the cement industry.

Table 2.2-1 Categories

Division	Category		Emissions subject to accounting for the cement industry
Emissions from Reporting Company			
Direct emissions (Scope 1)			Direct emissions from the use of fuel and industrial processes by the company
Energy-derived indirect emissions (Scope 2)			Indirect emissions from the use of power and heat purchased by the company
Other indirect emissions (Scope 3)			
Upstream	1	Purchased goods and services	Emissions from activities up to manufacturing of raw materials
	2	Capital goods	Emissions from construction and manufacturing of the company's capital goods (mills, silos, and other facilities and equipment)
	3	Fuel and energy related activities not included in Scope 1 or 2	Emissions from extraction of purchased fuel, and emissions from procurement of fuel used in power generation, etc., for power and heat, etc. procured from

			other entities
	4	Transportation and delivery (upstream)	Emissions from distribution of raw materials, up to delivery to the company
	5	Waste generated in operations	Emissions from transportation and processing of waste generated by the company's plants and offices
	6	Business travel	Emissions from business travel by employees
	7	Employee commuting	Emissions from transportation of employees when commuting to and from the place of business
	8	Leased assets (upstream)	Emissions from operation of assets leased to the company (excluding emissions calculated under Scope 1 or 2)
Downstream	9	Transportation and delivery (downstream)	Emissions from the transportation, storage, and cargo handling of cement and cement manufacturing
	10	Processing of sold products	Emissions from processing into concrete, etc. by companies to which cement is sold and from concrete construction
	11	Use of sold products	Indirect emissions from use of concrete structures, etc. (optional)
	12	End-of-life treatment of sold products	Emissions from transportation and processing upon disposal of concrete, etc.
	13	Leased assets (downstream)	(Emissions from operation of assets leased to other entities)
	14	Franchises	(Scope 1 and 2 emissions from franchise members)
	15	Investments	(Emissions from operation of investments)
		Other	(Emissions from daily lives of employees and consumers, etc.)

As indicated in the Basic Guidelines, it is desirable to calculate emissions for all categories, but considering the burden of accounting, it would also be possible to select certain categories for accounting. The following are possible criteria for excluding certain categories from the scope of accounting.

- If there were no activities corresponding to that category
- If the level of emissions is low, with only a small effect on overall supply chain emissions
- If it is not feasible for the company to influence emissions or measures to reduce emissions
- If it is not feasible to collect the necessary data to calculate emissions
- If the category is unnecessary in terms of the purpose of emissions accounting established by the reporting company

Reference: Statement concerning importance in ISO 14064-3

The Specification with Guidance for the Validation and Verification of Greenhouse Gas Assertions (ISO 14064-3, JIS Q 14064-3) makes the following statement concerning the threshold of importance, or materiality, in the GHG Program.

"In order to ensure consistency and avoid unanticipated discrimination, some GHG programmes or internal programmes assist this decision-making process by including materiality thresholds. This can be defined at the overall level, such as 5% of an organization's or GHG project's GHG emissions."

Also, the Scope 3 Standard states, "For example, a company may produce an intermediate product with many potential downstream applications, each of which has a different GHG emissions profile, and be unable to reasonably estimate the downstream emissions associated with the various end uses of the intermediate product. In such a case, companies may disclose and justify the exclusion of downstream emissions from Categories 9, 10, 11, and 12 in the report."²

In general, it is much difficult for the cement industry to collect the data in Japan because there is such a wide range of companies on the downstream side. Therefore, the following scope of accounting is recommended in the explanation.

As a general rule, the scope of accounting in the cement industry is from the extraction of raw materials to the shipping of cement (including primary transport). However, cement companies whose consolidated companies include ready-mixed concrete companies should account for such emissions as well. Companies should clearly indicate the scope of accounting when disclosing their activities subject to accounting.

The explanation also covers emissions related to processing and use, etc., on the downstream side, considering that some reporting companies may wish to determine not only their own emissions but also the overall emissions from upstream to downstream.

Table 2.2-2 Scope of this explanation

Division	Category	The following categories are explained in this document. (Part 2)	
GHG Emissions from Accounting company			
	Direct emissions (Scope 1)	Chapter 1.1	
	Energy-derived indirect emissions (Scope 2)	Chapter 1.2	
Other indirect emissions (Scope 3)			
Upstream	1	Purchased goods and services	Chapter 2.1
	2	Capital goods	
	3	Fuel and energy related activities not included in Scope 1 or 2	Chapter 2.2
	4	Transportation and delivery (upstream)	
	5	Waste generated in operations	
	6	Business travel	
	7	Employee commuting	
	8	Leased assets (upstream)	
Downstream	9	Transportation and delivery (downstream)	
	10	Processing of sold products	Chapter 2.3
	11	Use of sold products	Chapter 2.4
	12	End-of-life treatment of sold products	Chapter 2.5
	13	Leased assets (downstream)	
	14	Franchises	

² Provisional translation into Japanese by Mizuho Information & Research Co., Inc.

	15	Investments	
		Other	

Note) Covered categories are identified with "Yes." Numbers in parentheses indicate the outline sections in Part 2.

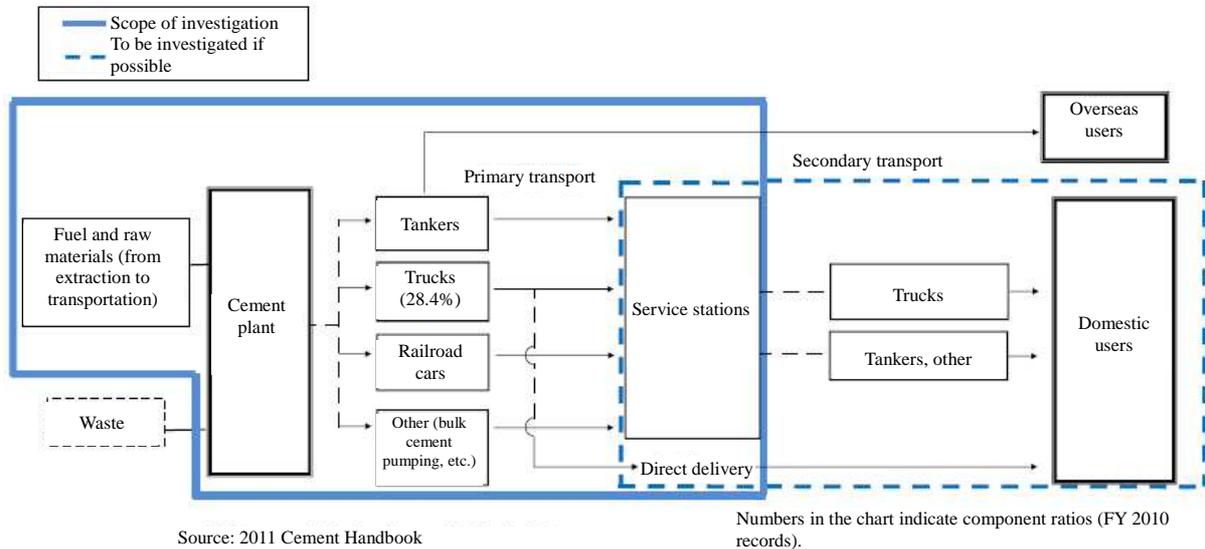
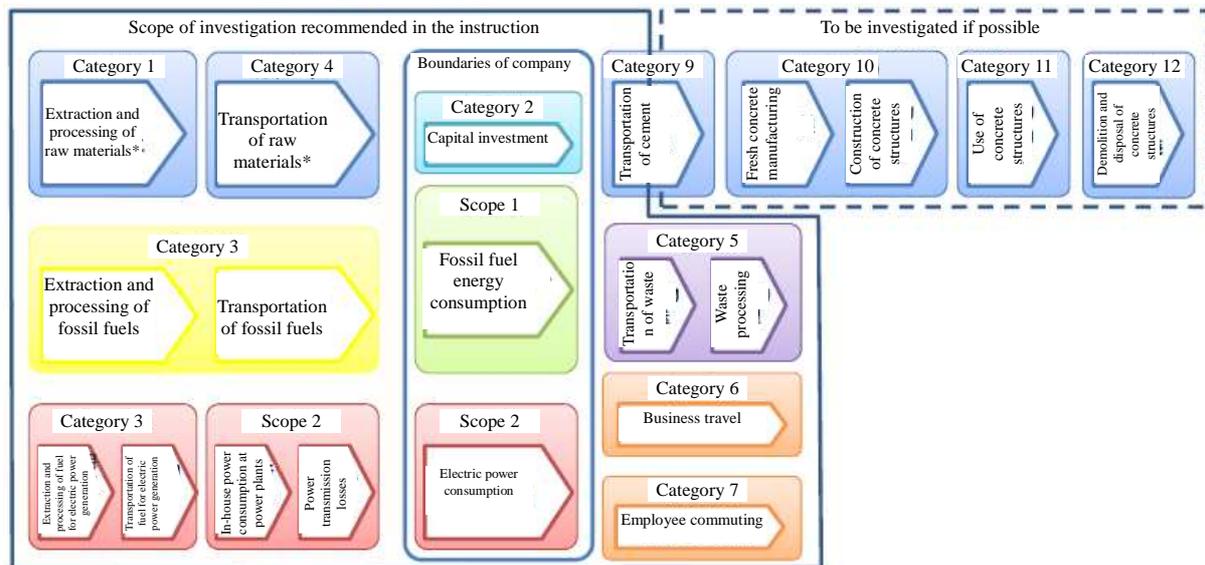


Fig. 2.2-1 Scope of supply chain investigation in the cement industry



* Raw materials charged to the kiln include coal.

Fig. 2.2-2 Recommended scope of investigation in each category

The GHG emissions from wastes/byproducts accepted at the plant and co-processed by combustion in cement kiln is reported under the Accounting, Reporting, and Disclosure System and it comes under Scope 1. At the present time, the emissions from the production, use, and transportation of wastes/byproducts prior to its acceptance are not to be accounted.

Meanwhile, in cases where electric power is used for preprocessing at the plant, this is counted as indirect emissions and included in power consumption under the accounting, reporting, and disclosure System.

Emissions from the production of byproducts are not accounted, but a collection of information on the emissions from transportation between producers and the plant is recommended.

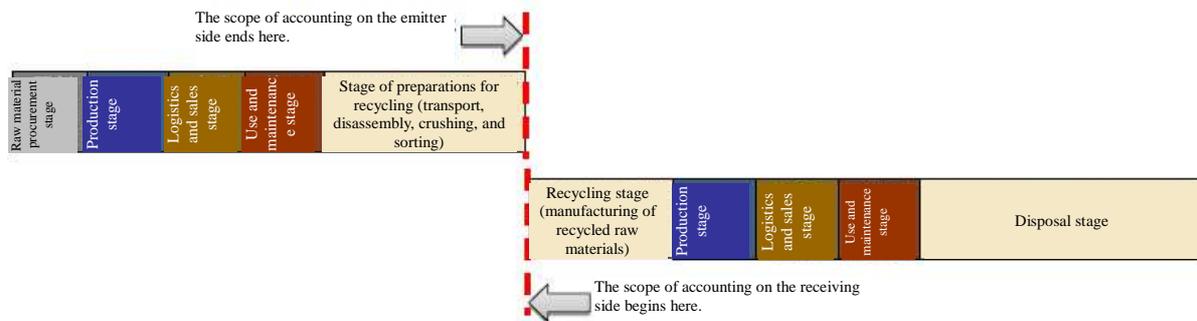


Fig. 2.2-3 Approach to scope of accounting for waste accepted at cement plants

3. Using the results of accounting

The results of accounting for emissions in the supply chain can be used in various ways, including the following.

- Determining the scale of the company's supply chain emissions and identifying emissions to be targeted for reduction
- Determining changes in the company's supply chain emissions over time and confirming the progress of measures taken by the company to reduce emissions
- Disclosing the company's supply chain emissions to build understanding among investors, consumers, community residents, and other stakeholders

Concerning the first and second points above, it is anticipated that various insights that can be used in measures for reducing emissions will be gained not only from the results of accounting but also through the accounting process.

Changes in the scale of a company's business, such as expanding production, lead to changes in supply chain emissions. One way to evaluate progress in efforts to control emissions in a way that is commensurate with a company's growth would be to evaluate emissions in terms of intensity, in addition to simply looking at total emissions.

For example, the following methods could be used. However, this does not necessarily limit the indices to be used for this purpose, since these should be established in accordance with their purpose and the actual business circumstances.

Table 2.2-1 Emissions performance indicators in supply chains (examples)

Example of performance indicators	Advantages	Disadvantages
GHG emissions / Sales volume	Suitable for evaluating management efficiency. Consistent with the approach that the scope of accounting is the scope recorded as sales.	Sales volumes tend to fluctuate based on commodity prices, economic conditions, etc.
GHG emissions / (Plant's total floor area x Operating hours)	Suitable for evaluating efficiency of energy consumption (GHG emissions) per amount of operations at a plant.	Some aspects of plant operation are difficult to quantify, such as the use of capital goods and transported, delivered, and sold products. Also, since increased scale and expanded operating hours are related to decreases in consumption rates, this may not lead to substantive reductions.
GHG emissions / Cement sales volume	Suitable for evaluating management efficiency in cases where there is a limited number of products and sales volume can be determined in terms of physical quantities (such as weight).	Difficult to use for determining sales volume if there is a wide range of products.

Part 2. Explanations of Accounting Methodology

1. Company's emissions

1.1 Direct emissions (Scope 1)

1.1.1 Scope of accounting

Approach in the Basic Guidelines

Scope 1 covers emissions from domestic and foreign business operations owned or controlled by the reporting company, and accounts for direct emissions including emissions from the use of fuel and industrial processes. Scope 1, combined with Scope 2, which is described in section 1.2, has similar coverage to the Accounting and Reporting System.

However, there are also some emissions activities that go beyond the scope of accounting under the Accounting and Reporting System. These can be optionally included in supply chain emissions.

The Accounting and Reporting System excludes emissions from the use of construction machinery at construction sites, as well as emissions from the use of company-owned passenger cars at companies other than transportation companies. However, all emission activities related to the reporting company's activities are included in the scope of supply chain emissions accounting, so those emissions are also covered in Scope 1.

[Basic approach in the cement industry]

In the cement industry, emissions from domestic and international business operations owned or controlled by the company include all uses of fuels and raw materials at cement plants and offices and uses of fuel in company-owned vehicles, etc.

In cases where the company occupies offices as a tenant of an office building, the scope is as follows, based on the owner/tenant approach under the Accounting and Reporting System and the Energy Conservation Act.

- All emissions from portions used exclusively by the tenant (within leased spaces)
 - * Emissions from common portions (such as common kitchenettes) are not included.

Specific examples of included emissions are indicated below. As a general rule, all of these should be included. However, emissions may be excluded based on clearly expressed criteria, such as cases where accounting would be difficult or the amount of emissions is sufficiently small.

[Examples of included uses of energy:]

- Use of fuels and raw materials* at cement plants and offices, etc.: Coal, Oil coke, C heavy oil, etc.
- Use of fuel in company-owned vehicles, etc.: Gasoline, etc. (beyond the scope of the Accounting and Reporting System)

*It is recognized that “coal” is categorized by raw materials in Japan since it plays a role of raw materials for clinker production.

[Examples of other included emissions:]

- Clinker production: Non-energy-derived CO₂
- Beginning use, usage*, maintenance, and disposal of freezer, refrigerator, and air conditioning equipment: HFCs

* Accounting for usage is recommended beyond the scope of the Accounting and Reporting System .

1.1.2 Accounting methodology

Approach in the Basic Guidelines

(1) Accounting methodology

Calculations are performed using the methods of the Accounting and Reporting System. The emissions unit values used are also those of the Accounting and Reporting System.

In accounting for emissions at overseas places of businesses, if calculation methods are specified by systems of the countries where such places of business are located, then those methods are used. If that is not feasible, calculations are performed using the methods of the IPCC guidelines.

(2) Amount of activity

The amounts of activity used in calculations under the Accounting and Reporting System may be used.

[Basic approach in the cement industry]

Calculations are performed using the methods of the Accounting and Reporting System.

When accounting for emissions activities that are not covered by that system, the company should use actual measurements or use domestically and internationally approved emissions accounting methods such as the IPCC guidelines.

1.2 Energy-derived indirect emissions (Scope 2)

1.2.1 Scope of accounting

Approach in the Basic Guidelines

Scope 2 covers emissions from the use of heat and electric power purchased by the reporting company in Japan and overseas. Along with Scope 1 as described in section 1.1, it has generally similar coverage to that of the Accounting and Reporting System under the Global Warming Countermeasures Act.

[Basic approach in the cement industry]

In the cement industry, emissions from the use of heat and power purchased by the company in Japan and overseas include all uses of heat and electric power at cement plants and offices and in company-owned vehicles, etc. This does not include heat generated by boilers in the company's plants or electric power generated by in-house power generation equipment.

In cases where the company occupies offices as a tenant of an office building, the scope is as follows, based on the owner/tenant approach under the Accounting and Reporting System and the Energy Conservation Act.

- All emissions from portions used exclusively by the tenant (within leased spaces)
 - * Emissions from the use of heat and power in common portions (such as toilets, corridors, and common kitchenettes) are not included.

Specific examples of included emissions are indicated below. As a general rule, all of these are to be included. However, emissions may be excluded based on clearly expressed criteria, such as cases where accounting would be difficult or the amount of emissions is sufficiently small.

[Examples of included uses of heat and power delivered from other parties:]

- Use of heat and power at cement plants and offices, etc.
- Use of power in company-owned vehicles (beyond the scope of the Accounting and Reporting System)

1.2.2 Accounting methodology

Approach in the Basic Guidelines

(1) Accounting methodology

Calculations are performed using the methods of the Accounting and Reporting System. The emissions unit values used are also those of the Accounting and Reporting System.

In accounting for emissions at overseas places of businesses, if calculation methods are specified by systems of the countries where such places of business are located, then those methods are used.

(2) Amount of activity

The amounts of activity used in calculations under the Accounting and Reporting System may be used.

[Basic approach in the cement industry]

Calculations are performed using the methods of the Accounting and Reporting System.

2. Other indirect emissions (Scope 3)

2.1 Category 1: Purchased goods and services

2.1.1 Scope of accounting

Approach in the Basic Guidelines

The scope of accounting for Category 1 consists of emissions from the stage of resource extraction to the stage of manufacturing for all goods (raw materials, parts, purchased items, sales-related materials, etc.) and services purchased or acquired by the reporting company. Goods and services indicate all raw materials, parts, products, and services, etc., brought into the reporting company, including the types indicated below; however, goods and so on that are not directly purchased by the reporting company and are beyond its control may be excluded from accounting. Emissions from the stage of resource extraction until transportation to the primary supplier are also included in Category 1. (However, transportation from the primary supplier to the reporting company falls under Category 2.)

- Raw materials, intermediate products, and final products purchased or acquired by the reporting company (including purchased items)
- Software and other services purchased or acquired by the reporting company

[Basic approach in the cement manufacturing industry]

In the cement industry, accounting covers emissions for all goods and services directly purchased or acquired by the company and processed and sold or used by the company, from the stage of resource extraction to the stage of manufacturing (in the case of raw materials, only the stage of resource extraction). Specific examples of included goods and services are indicated below. As a general rule, all of these are to be included. However, some goods and services may be excluded based on clearly expressed criteria, such as cases where accounting would be difficult and only a small amount is handled.

[Examples of included goods:]

- Raw materials procured from other companies for manufacturing by the company:
 - Raw materials used in cement manufacturing by the company (limestone, silica, coal for use in kilns, etc.)
(The scope of accounting is the stage of extraction of these raw materials and the processing stage up to delivery to the company. Emissions during the stage of raw material transportation fall under Category 4.)
- Goods used by the company in business activities:
 - Office equipment and supplies such as paper products, PCs, copiers, etc.

Please refer to the Basic Guidelines for information concerning services.

2.1.2 Accounting methodology

Approach in the Basic Guidelines

(1) Accounting methodology

There are two methods of accounting, as follows:

- [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.
- [2] Determining data on volume and monetary amounts 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.

Accounting method 1 provides a high level of accounting accuracy, but may be difficult to use in cases where suppliers cannot determine emissions data or emissions data cannot be obtained from suppliers.

Accounting method 2 uses data on physical amounts and monetary values for goods and services purchased or acquired by the reporting company, so accounting is relatively easy. However, since data on physical amounts and monetary values for goods and services purchased or acquired by the reporting company is multiplied by emissions unit values from the stage of resource extraction to the stage of manufacturing, the accuracy of accounting depends on the appropriateness of the categories of data on physical amounts and monetary values determined by the company, as well as the emissions unit values used.

(2) Amount of activity

In accounting method 1, the actual emissions data is collected. In accounting method 2, amounts of activity are represented by data on physical amounts and monetary values for goods and services purchased or acquired by the reporting company during the accounting period.

[Basic approach in the cement industry]

(1) Accounting methodology

In the cement industry, the raw materials, etc., needed for production are generally managed in terms of physical quantities. Therefore, accounting method 2 is used, as a general rule.

$$\text{CO}_2 \text{ emissions} = \Sigma \{(\text{Data on physical amounts and monetary values for goods and services purchased or acquired by the reporting company}) \times (\text{Emissions unit value}^*)\}$$

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

Please refer to the guidelines on emissions unit values for emissions unit value categories. In cases where the categories of data determined by the company for physical amounts of raw materials, etc., do not match the emissions unit value categories, the data or emissions unit values are modified in accordance with divisions that cover a larger scope.

[Calculation example:]

An emissions unit value that may be used in cases where imported coal is used in raw materials is the value of 0.0365 kg CO₂ per kg of coal, as specified in the Database of CO₂ Conversion Factors for the Carbon Footprint of Products Pilot System (Provisional, Ver. 3). This emissions unit value was determined with consideration for open-cut mining, underground mining, and transportation to export ports in Australia. The only emissions unit value available in public databases is this value for Australia, so it is necessary to assume that the same emissions unit value also applies when importing coal from countries other than Australia.

For example, in the case of importing 100,000 tons of coal for use in raw materials, emissions from the purchase of such coal are calculated as follows.

Emissions from purchase of coal for use in raw materials (estimation)

$$= 0.0365 \text{ [tCO}_2 \text{ / ton coal]} \times 100,000 \text{ [tons coal]} = 3,650 \text{ tCO}_2$$

(2) Amount of activity

The physical amounts of raw materials, etc., purchased by the company represent the amount of activity, in accordance with accounting method 2 of the Basic Guidelines.

2.2 Category 3: Fuel and energy related activities not included in Scope 1 or 2

2.2.1 Scope of accounting

Approach in the Basic Guidelines
The scope of accounting in Category 3 consists of upstream emissions (resource extraction, production, and transportation) from fuel purchased by the reporting company and upstream emissions (resource extraction, production, and transportation) in the production processes of electricity and heat (steam, hot and cold water) purchased by the reporting company in the fiscal year subject to reporting.
Emissions from purchased electricity and heat and emissions from the use of electricity and heat produced by the reporting company are covered under Scope 2 and Scope 1, so these are not included in Category 3.

[Basic approach in the cement industry]

In the cement industry, the basic approach concerning the scope is the same as the Basic Guidelines.

[Examples of included goods:]

- Fuels used in cement manufacturing at the company (heavy oil, oil coke)
(The scope of accounting includes emissions at stages that are upstream from the company, including fuel resource extraction, refining, and transportation. Transportation of fuel is included under Category 3, not Category 4.)
- Power and heat used in cement manufacturing at the company
(The scope of accounting consists of emissions upstream of the suppliers (resource extraction, production, and transportation of energy used in the power generation and heat).

2.2.2 Accounting methodology

Approach in the Basic Guidelines
(1) Accounting methodology
For fuel purchased by the reporting company, data on physical amounts and monetary values of fuel purchased by the reporting company is multiplied by emissions unit values from the stage of resource extraction to the stage of manufacturing.
The emission coefficients used in accounting for electricity differ according to the type of contract.
In cases where electricity is procured from a power company under an ordinary contract, if the contract does not specify the type of power source, calculations are based on the average emission coefficient for the stages of resource extraction, production, and transportation for all sources of electric power.
In cases where electricity is procured under a contract that specifies the type of power source, the emission coefficient for the stages of fuel resource extraction, production, and transportation is based on the type of electric power source.
(2) Amount of activity

The amount of activity is the amount of fuel purchased by the reporting company and the amount of electricity and heat purchased from other parties and introduced into the reporting company during the accounting period.

[Basic approach in the cement industry]

The approach of the Basic Guidelines is also used in the cement industry.

[Calculation example:]

An emissions unit value that may be used in cases where C heavy oil is purchased and used as fuel is the value of 0.175 kg CO₂ per liter, as specified in the Database of CO₂ Conversion Factors for the Carbon Footprint of Products Pilot System (Provisional, Ver. 3). This emissions unit value was determined with consideration for crude oil extraction and refining. Also, it is assumed that the purchased C heavy oil is not imported, but was refined at domestic refineries. Therefore, emissions from domestic transportation should be accounted for in this category, although that is omitted in this calculation example.

For example, in the case of purchasing 1,000 liters of C heavy oil for use as fuel, emissions from its purchase are calculated as follows.

Emissions from purchase of C heavy oil for use as fuel (estimation)

$$= 0.175 \text{ [kg CO}_2 \text{ / liter]} \times 1,000 \text{ [liters]} = 175 \text{ kg CO}_2$$

2.3 Category 10: Processing of sold products

Category 10 in the is explanation may be excluded from accounting in cases where it is difficult to collect data or the emissions unit values needed for calculations have not been established. If the data needed for accounting can be obtained, accounting is performed as follows.

2.3.1 Scope of accounting

[Approach in the Basic Guidelines]

The scope of accounting in Category 10 consists of emissions that occur when intermediate products manufactured by the reporting company are processed by companies (third parties) on the downstream side of the reporting company. That is, the Scope 1 and 2 emissions of companies that process intermediate products become Scope 3, Category 10 emissions for the company that sold the intermediate products. Here, "intermediate products" are products requiring further processing or assembly, etc., before final consumers can use them. However, this may be excluded from accounting, upon giving adequate grounds, in cases where the company selling the intermediate products cannot determine the types of final products made by processing the intermediate products that it has sold.

[Basic approach in the cement industry]

[1] Manufacturing of concrete, etc.

Accounting covers emissions that occur when cement manufactured and sold by the company is used in concrete, mortar, etc.

The scope for ready-mixed concrete is as follows.

[Scope of accounting:]

- Emissions from manufacturing of ready-mixed concrete

The same approach is used for other concrete manufacturing, etc.

[2] Construction with concrete, etc.

Accounting covers emissions that occur in construction with concrete, etc. Products used directly at construction sites, etc., such as cement stabilizer are also included in accounting under this category.

Because the products sold by the cement industry are intermediate materials, and it is difficult to identify the final products in which they are used, the final products after processing are estimated, based on various statistical materials such as statistical surveys on delivery of ready-mixed concrete, and accounting covers emissions that occur during the manufacturing of such final products.

[Scope of accounting:]

- Emissions from construction with ready-mixed concrete
- Emissions from construction with hardeners

2.3.2 Accounting methodology

Approach in the Basic Guidelines

(1) Accounting methodology

If data on emissions or energy consumption during processing can be obtained from the buyer company, accounting is based on such data. If those types of data cannot be obtained from the buyer company, accounting is performed by multiplying the amount sold by emissions unit values per unit amount processed. These emissions unit values may be values from the life cycle database or the GHG Protocol website, or values independently prepared by businesses or industry organizations. Emissions of other gases besides energy-derived carbon dioxide should also be included if they are important from the standpoint of scale of emissions or potential for reduction, etc.

In cases where multiple intermediate products are processed by a downstream processing company, emissions need to be allocated between the intermediate products subject to accounting and other intermediate products. The indicators that may be used in allocation include monetary value data in addition to data on physical amounts such as weight and volume. However, we recommend avoiding allocation whenever possible.

(2) Amount of activity

If energy data can be obtained from the downstream processing company, that data on the amount of energy consumption is the amount of activity. If accounting is performed using unit values per amount sold, the amount sold in the reporting year is the amount of activity.

[Basic approach in the cement industry]

(1) Accounting methodology

[1] Manufacturing of concrete, etc.

If data on emissions or energy consumption during the manufacturing of concrete, etc., can be obtained from the ready-mixed concrete plant, etc., accounting is based on such data.

If data on emissions or energy consumption during manufacturing cannot be obtained, accounting is performed by multiplying the amount of cement sold by emissions unit values per unit amount manufactured. Concerning unit values for processing into ready-mixed concrete, please refer to the guide issued by JSCE (draft)^{*1} and the report of the Japan Concrete Institute.^{*2}

*1: Guide on Environmental Performance Verification for Concrete Structures (Draft), 2005, Concrete Library 125, Japan Society of Civil Engineers [in Japanese]

*2: Report of the Study Committee on Minimization of Global Warming Substances and Wastes in the Concrete Sector, 2010, Japan Concrete Institute [in Japanese]

[Calculation example:]

If data cannot be obtained on the amount of concrete manufactured from the amount of cement sold, the company may refer to the survey results cited in the report of the Japan Concrete Institute (total production of ready-mixed concrete: 19,361,118 m³/year) and multiply this by its own share of the total.

If data on emissions or energy consumption during concrete manufacturing cannot be obtained, the company may refer to the following survey results cited in the report of the Japan Concrete Institute.

According to the results of a compounding survey in the guide issued by JSCE (draft), the amount of cement used per cubic meter of concrete is estimated to be 300 kg/m³.

Survey results on the environmental burden of ready-mixed concrete (extract)

Item	Emissions unit value	Unit
CO ₂ from production of 1 cubic meter	2.07	kg-CO ₂ /m ³
CO ₂ from transportation of 1 cubic meter (company-owned vehicle; for reference)	10.52	kg-CO ₂ /m ³

* The emissions unit value for transportation is included for reference purposes. This unit value may be used in accounting under Category 9, Transportation and delivery (downstream).

For example, if a company has sold 10 tons of cement, CO₂ emissions from concrete plants are calculated as follows.

CO₂ emissions from concrete plants (estimation)

$$= 2.07[\text{kg-CO}_2/\text{m}^3] / 300 [\text{kg}/\text{m}^3] \times 10 \text{ t}$$

$$= 69 \text{ kg-CO}_2$$

[2] Construction with concrete, etc.

Various approaches could be used, including a data-based accounting method that uses statistical surveys concerning concrete to estimate the amounts of concrete used in each application along with emissions unit values for construction in each application, and a method of accounting based on standard scenarios.

However, although partial data exists on unit values for each type of construction, it is difficult to determine data on amounts of activity during construction (scale of construction, etc.), so accounting could be difficult. The data should be used in accounting if such figures can be determined.

2.4 Category 11: Use of sold products

Category 11 in the explanation may be excluded from accounting in cases where it is difficult to collect data or the emissions unit values needed for calculations have not been established. If the data needed for accounting can be obtained, accounting is performed as follows.

2.4.1 Scope of accounting

[Approach in the Basic Guidelines]

The scope of accounting consists of emissions from the use of products. The products covered are products (including systems and services) sold in the fiscal year subject to accounting.

Specifically, emissions included in this category belong to the following two stages.

[Direct use stage emissions:]

- Energy-derived carbon dioxide emissions from the use of electricity, fuel, and heat in products such as household appliances
- Emissions of 5.5 gases in products that directly emit 5.5 gases during use, such as air conditioners

[Indirect use stage emissions:]

- Energy-derived carbon dioxide emissions from the use of products that indirectly use electricity, fuel, and heat, such as clothing (requires washing and drying) and food (requires cooking, refrigeration, and freezing).

Of the above, direct use stage emissions from sold products are subject to accounting without fail. Indirect use stage emissions from sold products may also be included in accounting, and must be included if they are important in terms of the scale of emissions or potential for reduction of emissions, etc.

Concerning the period subject to accounting, all emissions that a product is expected to emit in the future during the stage of use are calculated in the year when the product was sold.

Emissions related to the maintenance of sold products during use may also be included in accounting.

[Basic approach in the cement industry]

As a general rule, accounting is voluntary for emissions at the indirect use stage of structures, etc., after processing of the company's products. If a company chooses to account for such emissions, the scope consists of emissions at the indirect use stage of structures, etc., built using concrete made with cement and aggregate manufactured and sold by the company. That is, in cases where the structures built with concrete are buildings, accounting covers emissions from energy consumption in those buildings.

Specific examples of included products are indicated below.

[Examples of included products:]

- Indirect use stage emissions from housing, buildings, railroads, power plants, harbors, airports, etc.

2.4.2 Accounting methodology

Approach in the Basic Guidelines

(1) Accounting methodology

When accounting for emissions during use, the amount of energy consumption during use, based on quantities sold, etc., and standard usage scenarios (a product's design specifications and assumptions concerning the conditions of product use by consumers), is multiplied by an emissions unit value.

For cases where products that emit 5.5 gases are included in accounting, if the Accounting and Reporting System specifies an accounting method (e.g., HFC emissions during maintenance of commercial air conditioners), that method is used. If it does not, accounting is based on usage scenarios for each carbon footprint product.

It must be noted that the amount of emissions during usage can fluctuate widely depending on the content of the usage scenarios that are established.

(2) Amount of activity

Both for emissions at the direct use stage and emissions at the indirect use stage, the amount of activity is based on the actual number of units sold and a standard usage scenario. It should be noted that the amount of emissions during usage can fluctuate widely depending on the content of the usage scenarios that are established. Also, for exported goods, usage conditions may vary between Japan and other countries, and the conditions set could cause emissions to be too low or too high.

Here, it is acceptable for individual companies to independently establish standard use scenarios; however, if scenarios have been specified by industry organizations and the like, it is desirable to set the amounts of activity in accordance with those. Also, companies should disclose the methods used in calculating emissions (usage scenarios).

[Basic approach in the cement industry]

Because of the wide variety of downstream companies, it may not be feasible to determine the actual situation of types of structures, etc., built with cement sold by the company, making it difficult to account for such emissions. In cases where amounts (such as area) of structures, etc., built with cement sold by the company can be determined, accounting should be performed using emissions unit values for the use of such structures, etc.

2.5 Category 12: End-of-life treatment of sold products

2.5.1 Scope of accounting

Category 12 in the explanation may be excluded from accounting in cases where it is difficult to collect data or the emissions unit values needed for calculations have not been established. If the data needed for accounting can be obtained, accounting is performed as follows.

[Approach in the Basic Guidelines]

The scope of accounting under Category 12 consists of emissions from the disposal and processing of products manufactured or sold by the reporting company, as well as the containers and packaging of such products. In cases where products are recycled, accounting under this category includes the collection stage, but does not include recycling processes of the company that receives the recyclable materials (such as bale opening, crushing, and sorting). Meanwhile, on the side of the company that receives the recyclable materials, recycling processes are accounted for under Category 1.

[Basic approach in the cement industry]

In the cement industry, accounting includes emissions from the disposal and processing of products and packaging sold by the company. Because the products sold by the cement industry are intermediate products and it is not feasible to identify the final products, emissions are estimated based on certain assumptions.

[Examples of included emissions from sold products and packaging:]

- Emissions from the demolition and disposal of final products using cement shipped by the company. (Here, it is assumed that all shipped cement is used in buildings and structures.)
- Emissions from the disposal of packaging used in the shipping of cement.

According to a 2008 survey of construction byproducts, the recycling rate of concrete debris is 97.3%. Because almost all concrete debris is recycled, practically all of the products sold are included in accounting until just prior to recycling processes. Specifically, accounting covers emissions up to the demolition of concrete structures, but does not include processes at the recycled aggregate processing site and beyond.

A very small percentage of concrete debris is subject to final disposal (landfill), and accounting covers the emissions from its final disposal. (However, accounting is not required in cases where recycled concrete debris ends up in final disposal.)

2.5.2 Accounting methodology

[Approach in the Basic Guidelines]

(1) Accounting methodology

In cases where actual figures on disposal and recycling can be determined (processing methods by type of waste, etc.), emissions are calculated by multiplying the amounts of processed/recycled waste (for each type of waste and processing method) by emissions unit values for each type of waste and processing method. In cases where actual figures

on disposal and recycling cannot be determined, emissions are estimated by multiplying the fees charged by or amounts consigned to waste disposal/recycling companies by emissions unit values based on standard scenarios for each type of waste. Standard scenarios could be established with reference to processing rates throughout Japan for each type of waste and each processing method.

(2) Amount of activity

In cases where actual figures on disposal and recycling can be determined (processing methods by type of waste, etc.), the amount of activity is the amount of waste processed or recycled for each type of waste and each processing method. In cases where such data cannot be determined, the costs of waste processing (or amounts) and costs of consignment for recycling (or amounts) should be determined as amounts of activity.

[Basic approach in the cement industry]

Accounting methodology

In the cement industry, it is difficult to directly determine actual figures on disposal and recycling (processing methods by type of waste, etc.) of products sold by the company and their containers and packaging. Therefore, accounting is performed with emissions unit values for the amount of cement sold, assuming that all products sold are used in buildings and structures.

For emissions unit values for the demolition and disposal of concrete structures, for example, companies may refer to the report of the Japan Concrete Institute.*2

[Calculation example:]

If data cannot be obtained on the demolition of concrete structures made from the amount of cement sold, the company may refer to the survey results cited in the report of the Japan Concrete Institute.*2

Inventory data on the demolition of concrete structures (extract)

Item	CO ₂ emissions (kg)
All demolition processes (per cubic meter)	16.922

Note: This includes the work of separating rebar from concrete debris.

According to the guide issued by JSCE (draft),*1 the amount of cement used per cubic meter of concrete is 300 kg/m³.

For example, if a company has sold 10 tons of cement, assuming that all of it was used in structures, the amount of CO₂ emissions from concrete structures is calculated as follows.

CO₂ emissions from demolition of concrete structures (estimation)

$$= 16.922 \text{ [kg-CO}_2\text{/m}^3\text{] } / 0.3 \text{ [t/m}^3\text{] } \times 10 \text{ [t] } \doteq 51 \text{ [kg-CO}_2\text{]}$$

It would also be conceivable to include disposal in the amount of activity, but this would not be feasible since no suitable emissions unit value exists for disposal.

Emissions from disposal of the packaging (bags) used when shipping cement are excluded from accounting at this time because their volume is very small, less than 2% of the total

volume of cement shipments in fiscal 2010, and the disposal methods used for such bags are unknown.