Environmental Accounting Guidebook II

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Japan

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Chapter 1
Report from the Electronic and Electric Working Group

- Arrangement of the System Relating to the Effects in Environmental Accounting -

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Chapter 1 Report from the Electronic and Electric Working Group

- Arrangement of the System Relating to the Effects in Environmental Accounting -

Introduction

In electronic and electrical and electronic industries, more effects corresponding to environmental conservation cost that was input are announced in environmental accounting. The Electronic and Electrical Working Group had discussions regarding the effects corresponding to environmental conservation cost with a special emphasis on the effects that are expressed in monetary units.

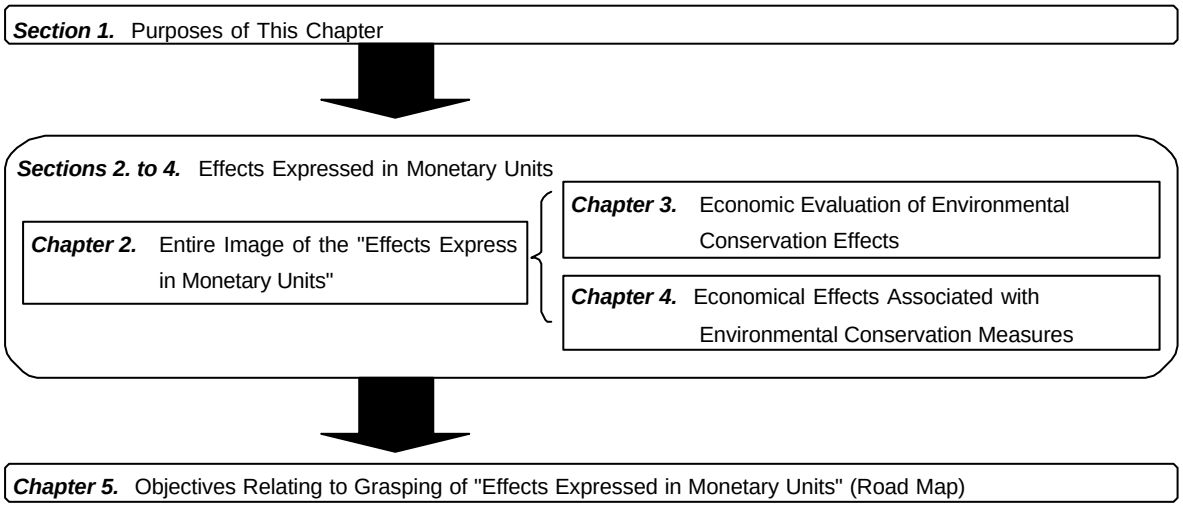
The "Guideline for Introduction of an Environmental Accounting System (2000 version)" prepared by the Ministry of the Environment (referred to as the "Environmental Accounting Guideline (2000 version)" henceforth also refers to the effects that are expressed in monetary units. In this Report, the details of the concept were organized as a part of the examination for revising the "Environmental Accounting Guideline (2000 version)". This Report may be useful as a reference for the companies that have measured environmental conservation cost by introducing environmental accounting to pursue further measuring of effects.

The details are discussed in the main text, however, the following two types of effects can be presented as the effects that are expressed in monetary units.

- Economic evaluation of environmental conservation effects:
  Result of conversion of environmental conservation effects (social effects) to a monetary amount
- Economical effects associated with environmental conservation measures:
  Internal effects such as revenue acquired by input of environmental conservation cost and cost saving

This chapter describes the summary of roles of these two types of effects in environmental accounting and also describes the detailed examination carried out based on the latter effect, "economical effects associated with environmental conservation measures."

These issues were discussed in the following sequence.



1. Purposes of This Chapter

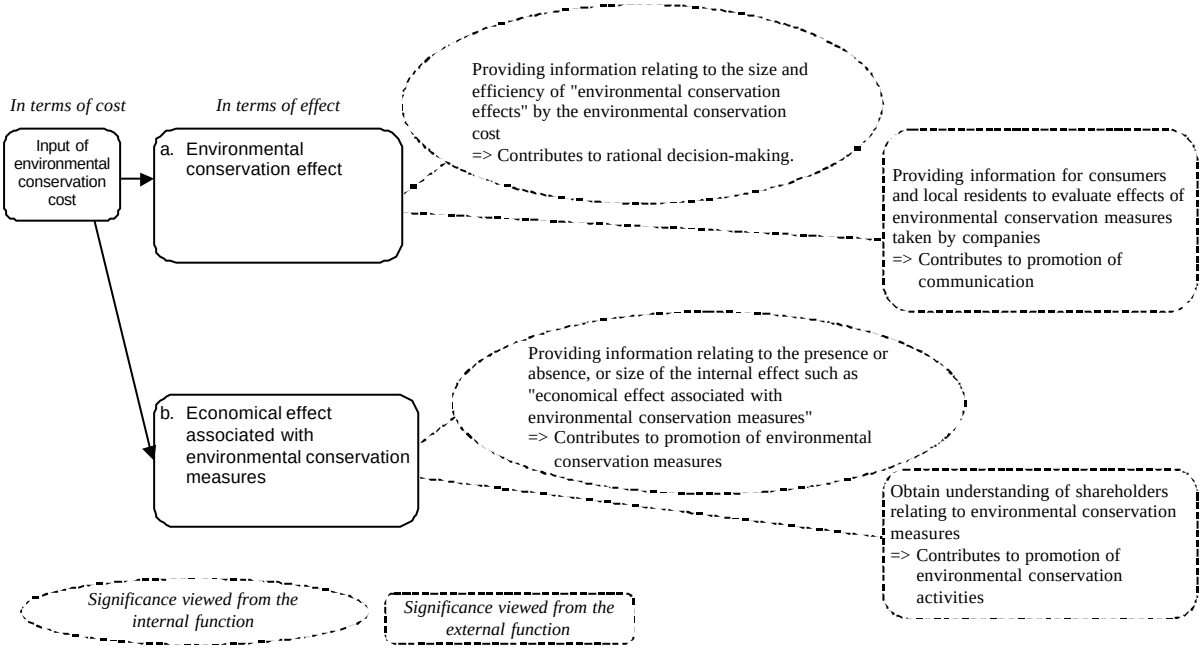
(1) Background of this chapter

The "Environmental Accounting Guideline (2000 version)" describes the measuring of "environmental conservation cost" and its "effects." The following two "effects" are presented.

a. Environmental conservation effects
   Indicate the degree of achievement of environmental conservation (prevention and suppression of environment impact associated with business activities and elimination of the influence). The effects indicate social effects.

b. Economical effects associated with environmental conservation measures:
   Indicates the degree of realization of operating revenue and cost saving achieved as a result of input of environmental conservation cost. These effects indicate internal effects.

The illustration below summarizes the significance of measuring "a. environmental conservation effects" and "b. economical effects associated with environmental conservation." These two types of "effects" are important in effective and efficient input of the environmental conservation cost that is increasing, in terms of internal functions. In terms of external functions, announcement of environmental accounting information by companies in an appropriate form will be useful for consumers, shareholders and so on to evaluate the effects of the environmental conservation measures.



Based on these significances, this Chapter examines further "effects" discussed in the "Environmental Accounting Guideline (2000 version)" and arranges the effects, focusing on the "effects" that are expressed in monetary units.

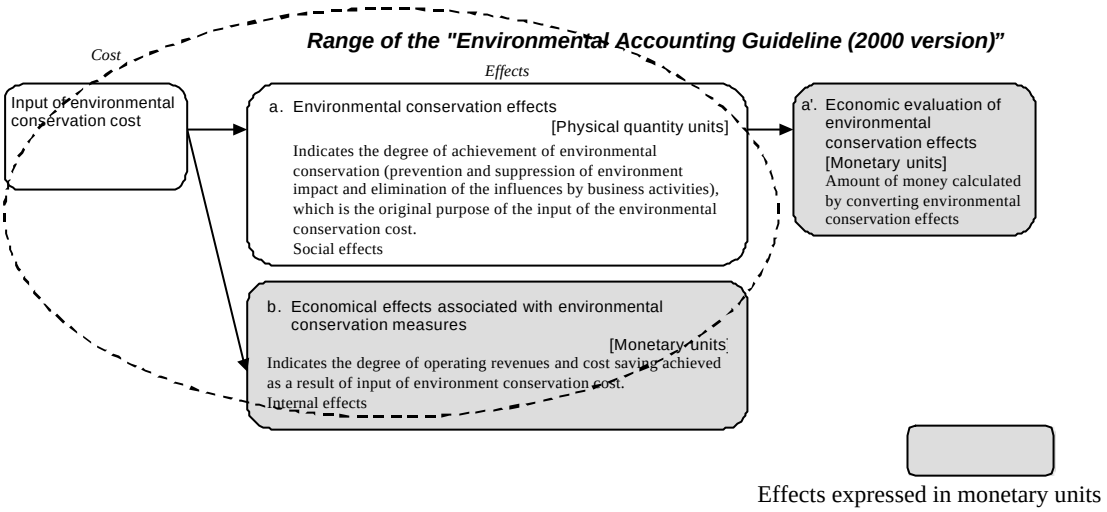
(2) Issues in this Chapter

This section discusses in what units the two types of effects, "a. environmental conservation effects" and "b. economical effects associated with environmental conservation measures" are expressed.

The effects discussed in "a. Environmental conservation effects" are basically expressed in the unit of physical volume such as amount of reduction of environmental pollution wastes and amount of resources and energy that are conserved. However, recently, there are some attempts to express such environmental conservation effects that are expressed in the unit of physical volumes in the monetary units by converting the effects to the amounts of money (referred to as "economic evaluation of environmental conservation effects).

Since "b. Economical effects associated with environmental conservation measures" refer to revenues or cost saving, they can be expressed in monetary units.

This relationship is illustrated below.



Both of the effects shown above, "a'. Economic evaluation of environmental conservation effects and "b. Economical effects associated with environmental conservation measures", can be expressed in monetary units, however, they have different meanings: one stands for social effects and the other stands for internal effects. (Therefore, it is meaningless to simply add these two types of effects.) In detail, both effects contain various contents. There are still many issues to be resolved since there is no established actual evaluation method.

For the companies that tackle environmental accounting, this is still in a trial and error stage as to how the effects that are expressed in monetary units can be measured and analyzed to be useful for business management. It is also important for users of environmental accounting information to understand the meaning of the effects that are expressed in monetary units.

This Chapter clarifies the characteristics of the two types of "effects expressed in monetary units", which are indicated below, by systemizing them and indicates future objectives.

- Economic evaluation of environmental conservation effects
- Economical effects associated with environmental conservation measures

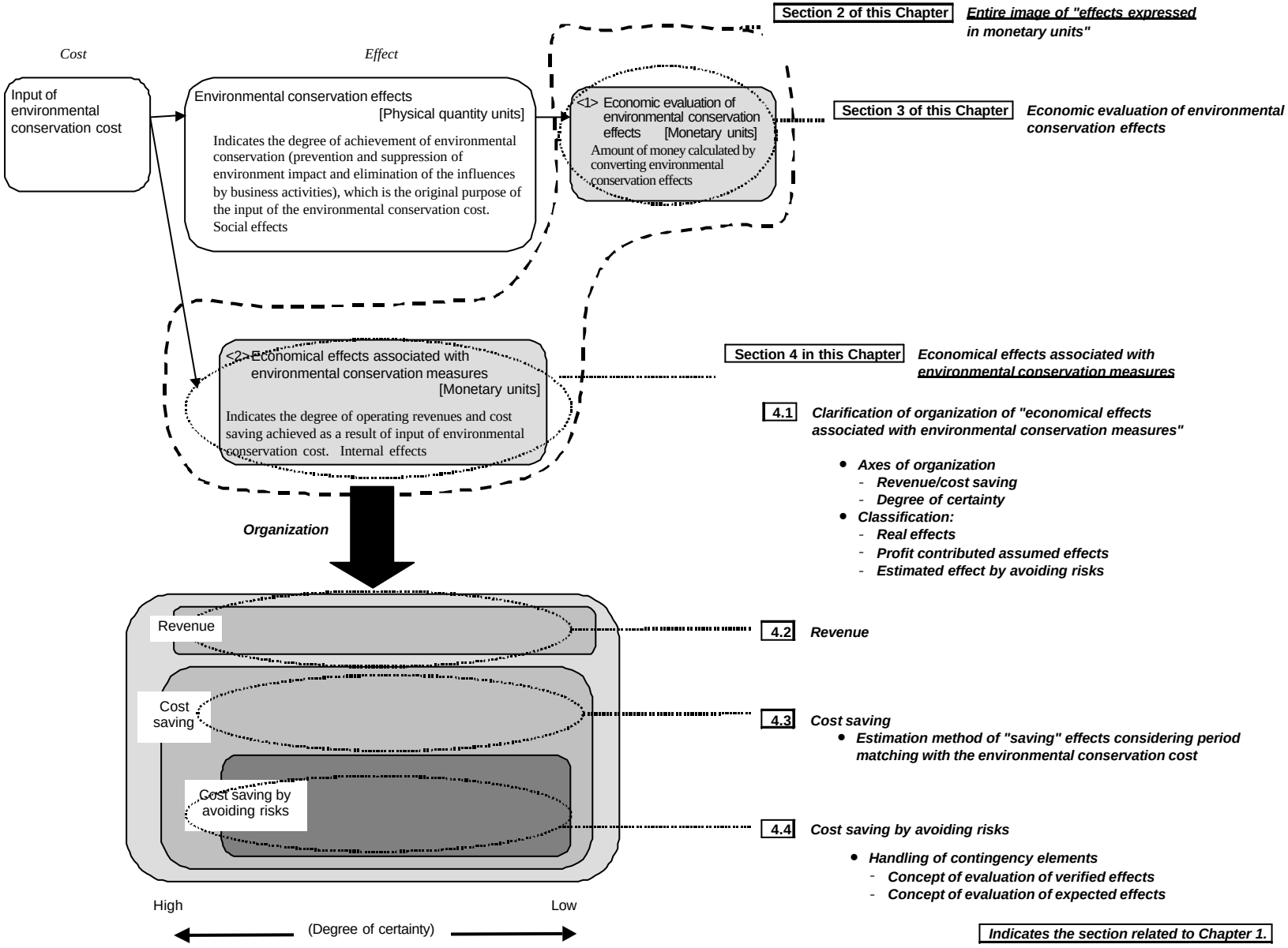
In particular, an emphasis is placed on the latter effects, "economical effects associated with environmental conservation measures", and the contents are examined classifying them into the following categories.

- Revenue
- Cost saving (excluding cost saving by avoiding risks)
- Cost saving by risk avoidance

The practical examination contents are shown in the following table and illustration.

Examination item	Contents
Section 2 in this Chapter Entire image of "effects expressed in monetary units"	● Indicates that there are two types of effects that are expressed in monetary units in environmental accounting, each of which is measured based on a different evaluation purpose. - "Economic evaluation of environmental conservation effects" (Social effects) - "Economical effects associated with environmental conservation measures" (Internal effects)
Section 3 in this Chapter Economic evaluation of environmental conservation effects	● Describes the significance of "economic evaluation of environmental conservation effects", notes on using the evaluation, and future objectives.
Section 4 in this Chapter Economical effects associated with environmental conservation measures	
4.1 Clarification of organization of "economical effects associated with environmental conservation measures"	● Clarifies organization of the "economical effects associated with environmental conservation measures" that was indicated in the "Environmental Accounting Guideline (2000 version)" by examining the contents further. ● Specifically, organizes the "economical effects associated with environmental conservation measures" with the following two axes. - Revenue/cost saving - Degree of certainty Classifies "economical effects associated with environmental conservation measures" into the following three categories focusing on the axes and the contents described above. - Real effects - Profit contributed assumed effects - Estimated effects by avoiding risks
4.2 Revenue	● Sections following Section 4.2 summarize the contents based on the "revenue/cost saving", which is one of the axes of organization in Section 4.1. ● Section 4.2 organizes the contents based on "revenue."
4.3 Cost saving	● Organizes the contents based on "cost saving." (Excluding "cost saving by avoiding risks") ● Since "cost saving" is the expense amount that was avoided, unlike "revenue", and is not expressed as a value in terms of accounting, the value needs to be assessed by some comparison (example: difference from the previous year). It is necessary to keep in mind the period matching between the amount avoided and the environmental conservation cost. This Section describes various assessment methods for cost saving amounts and the features (period matching between amount avoided and environmental conservation cost).
4.4 Cost saving by avoiding risks	● Organizes "cost saving by avoiding risks." ● In particular, this Section summarizes the following two concepts as the methods for handling contingency elements (probability of the situation that causes an economical burden for the company due to environmental pollution caused by the company) based on the examples that have been announced. - Concept of evaluating the effects that could be verified - Concept of evaluating expected effects

* Cost saving by avoiding the possible cause of the economical burden for the company due to environmental pollution caused by the company


Section 2 of this Chapter
Entire image of "effects expressed in monetary units"
Cost
Effect
Input of environmental conservation cost
Environmental conservation effects
[Physical quantity units]
Indicates the degree of achievement of environmental conservation (prevention and suppression of environment impact and elimination of the influences by business activities), which is the original purpose of the input of the environmental conservation cost.
Social effects
<1> Economic evaluation of environmental conservation effects [Monetary units]
Amount of money calculated by converting environmental conservation effects
Section 3 of this Chapter
Economic evaluation of environmental conservation effects
<2> Economical effects associated with environmental conservation measures
[Monetary units]
Indicates the degree of operating revenues and cost saving achieved as a result of input of environmental conservation cost. Internal effects
Section 4 in this Chapter
Economical effects associated with environmental conservation measures
4.1 Clarification of organization of "economical effects associated with environmental conservation measures"
Axes of organization
Revenue/cost saving
Degree of certainty
Classification:
Real effects
Profit contributed assumed effects
Estimated effect by avoiding risks
Organization
Revenue
Cost saving
Cost saving by avoiding risks
4.2 Revenue
4.3 Cost saving
Estimation method of "saving" effects considering period matching with the environmental conservation cost
4.4 Cost saving by avoiding risks
Handling of contingency elements
Concept of evaluation of verified effects
Concept of evaluation of expected effects
High
Low
(Degree of certainty)
Indicates the section related to Chapter 1.

(3) "Mapping" and "Road Map"

This chapter indicates the result of organization of "effects expressed in monetary units" as "mapping" progressively. "Mapping" is used for the following purposes.

- Useful for companies to understand various sides that are meant by the "effects expressed in monetary units" and select targets of checking and analysis according to their purposes
- Useful for users of environmental accounting information to understand the meaning of "effects expressed in monetary units", rather than simply checking the values, among the elements of environmental accounting.

At the end of this Chapter, a summary of the issues in measuring the "effects expressed in monetary units" is provided as a "road map." The "road map" is used for the following purposes.

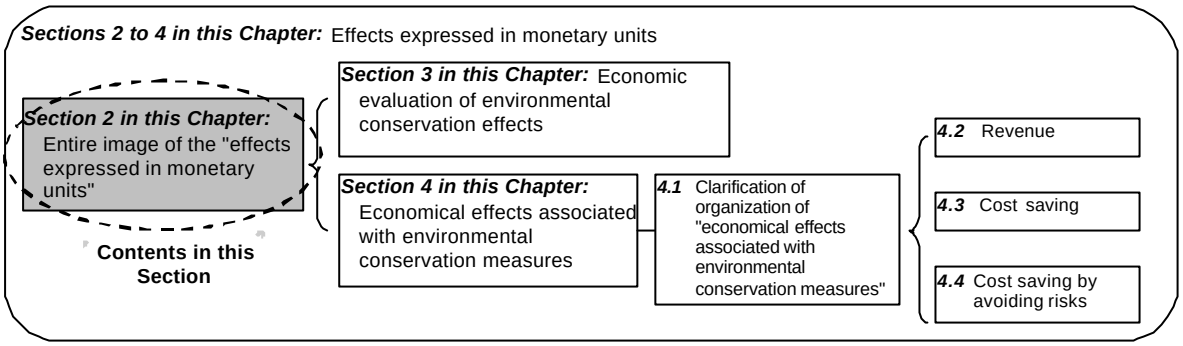
- Clarify the direction of future discussions and assist promotion of research and practice.
- Enable providers and users of environmental accounting information to have common understanding and problem awareness regarding the expression of "effect", enhancing further communication.

2. Entire Image of "Effects Expressed in Monetary Units"

Introduction

This section describes the entire image of the "effects expressed in monetary units" that was described in the previous section. This section provides the general view of the "economic evaluation of environmental conservation effects" and "economical effects associated with environmental conservation measures", which are the two contents included in the "effects expressed in monetary units." This section also summarizes the evaluation targets and differences of the evaluation purposes of both contents.

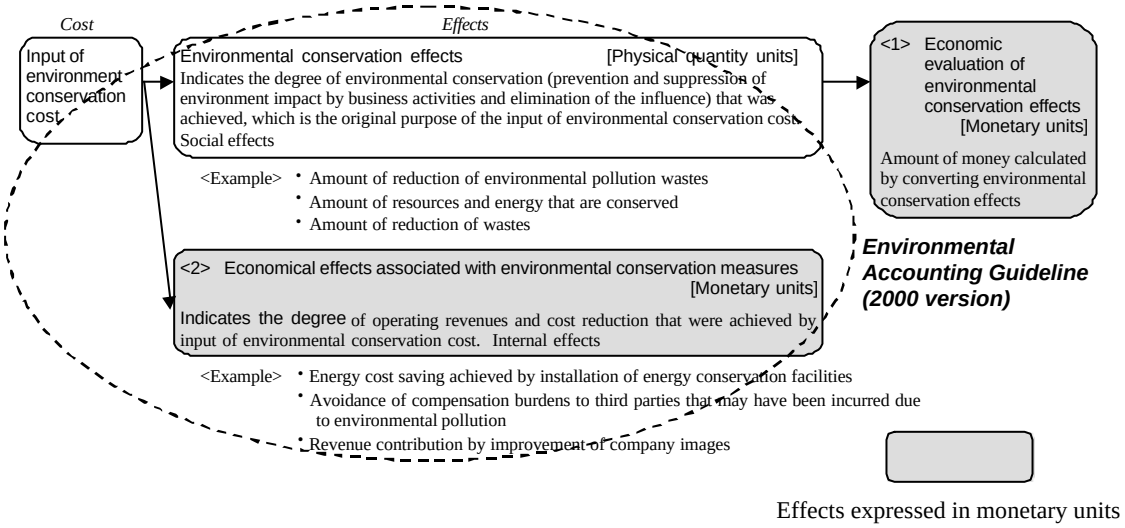
Sections 3 and 4 discuss the details of both contents.



(1) Content of "effects expressed in monetary units"

This section summarizes again the "effects derived as a result of input of environmental conservation cost" in the relationship of "environmental conservation cost." (See Mapping 1 below.)

Mapping 1 Organization of "effects expressed in monetary units"



The "effects expressed in monetary units" that were described in the previous section are applicable to the shaded sections in Mapping 1, which are the following items, <1> and <2>.

<1> Economic evaluation of environmental conservation effects
<2> Economical effects associated with environmental conservation measures

The evaluation targets and the evaluation purposes of the "effects expressed in monetary units" in <1> and <2> are different. The evaluation targets and evaluation purposes are discussed below.

(2) Evaluation targets of "economic evaluation of environmental conservation effects" and "economical effects associated with environmental conservation measures"

a. Economic evaluation of environmental conservation effects

As shown in Mapping 1, a company initially inputs "environmental conservation cost" for conserving the environment.

As a result of the input of "environmental conservation cost", "environmental conservation effects" are generated. The "environmental conservation effects" may be prevention or suppression of environment impact associated with business activities or elimination of the influence. The effects mean social effects. Practically, the effects include the following.

- Amount of reduction of environmental pollution wastes
- Amount of resources and energies that are conserved
- Amount of reduction of wastes, etc.

As shown in the above examples, "environmental conservation effects" are basically expressed in the unit of physical volume.

At the same time, a technique for converting the values held by "environmental conservation effects" and environments themselves to monetary values and expressing them in monetary units is being studied in the field of environmental economics. In Europe and the United States (in particular, USA), application of the technique is attempted in various fields such as project evaluation and policy decision.

In environmental accounting also, attempts are being made to express in monetary units "environmental conservation effects" as a result of input of "environmental conservation cost" through economic evaluation. Such evaluation is the "economic evaluation of environmental conservation effects" that was described in the previous section. In Mapping 1, it corresponds to the section <1> of the shaded sections.

b. Economical effects associated with environmental conservation measures

As shown in Mapping 1, some internal effects such as realizations of revenue and cost saving may often be generated in business also as a result of input of "environmental conservation cost." In practice, the following effects may be achieved.

- Energy cost saving achieved by installation of energy conservation facilities
- Avoidance of compensation burdens to third parties that may have been incurred due to environmental pollution
- Revenue contribution by improvement of company images

Such internal effects refer to "economical effects associated with environmental conservation measures" that were described in the previous section. The effects correspond to the shaded section <2> in Mapping 1.

The "economical effects associated with environmental conservation measures" are expressed in monetary units since the effects are revenues and cost saving.

(3) Evaluation purposes of "economic evaluation of environmental conservation effects" and "economical effects associated with environmental conservation measures"

a. Economic evaluation of environmental conservation effects

Purposes of evaluating "environmental conservation effects" are examined as follows as the preconditions of "economic evaluation of environmental conservation effects."

- Internal function: By measuring the size and efficiency of the "environmental conservation effect" by environmental conservation cost, use the effects for rational decision-making.
- External function: Useful information for consumers and local residents to evaluate the effects of environmental conservation measures taken by a company, etc. and to promote communication.

What are the purposes of expressing the "environmental conservation effects" in monetary units through economic evaluation? Section 3, "Economic Evaluation of Environmental Conservation Effects" describes the purposes.

b. Economical effects associated with environmental conservation measures

"Economical effects associated with environmental conservation measures" are evaluated for the following purposes.

- Internal function: Measure and analyze the economical merits incurred by environmental conservation measures and use the results for decision-making.
- External function: Indicate economical merits generated by environmental conservation measures to shareholders for gaining understanding.

Either the internal function or external function indicates the possibility for contribution by environmental conservation measures to company revenues and the effects can be expected as the motive force for promoting environmental conservation measures.

For companies, the necessity for measuring the "economical effects associated with environmental conservation measures" is increasing in order to achieve the goals of management considering the environment and improvement of profitability.

<Column> Capturing the effects of input of environmental conservation cost as a product life cycle

As described above, "environmental conservation effects" or "economical effects associated with environmental conservation measures" are generated as a result of input of environmental conservation cost. These effects are generated not only within the business area but also the upstream/downstream of the business area. One concept is to focus on the product life cycle in measuring of effects generated in the upstream/downstream area. That is, within the product life cycle (raw material collection -> research and development, and manufacturing -> use -> disposal), the effects generated at the raw material collection stage and the effects generated at the use/disposal stage are captured as the upstream effects and the downstream effects, respectively.

The illustration below shows the concept when effects by input of environmental conservation cost are captured by the product life cycle.

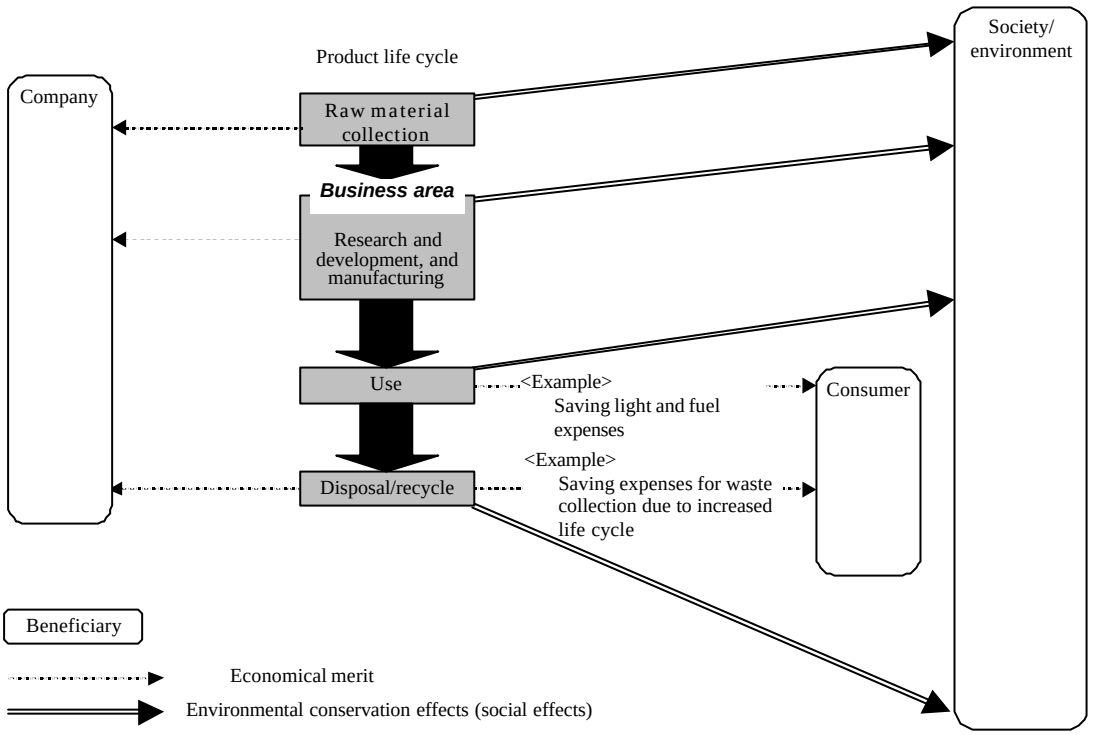
Initially, among the effects of environmental conservation cost input, "environmental conservation effects" (social effects) can be generated at each stage of the life cycle. The beneficiary is the society or the environment.

"Economical effects associated with environmental conservation measures", which is another type of effects (internal effects), are economical merits that are mainly generated at the product raw material collection stage or the research and development, and manufacturing stage. The beneficiary is the company.

At the product use stage, some economical merits are generated for consumers as a result of environmental conservation cost input by a company. For instance, consumers can save light and fuel expenses as a result of research and development carried out by a company at the product use stage.

In the course of development of the recycling-oriented society, the bearing of the expenses incurred at the

product disposal/recycling stage is the responsibility of the companies. Therefore, economical merits may be generated for both the company and consumers as a result of research and development carried out by the company to increase the product life cycle.



Recently, a concept of capturing environment impact by products through the entire life cycle, not just a part of the life cycle, has been advocated. One of the methods is life cycle assessment and more and more companies are practicing this method.

Against such a background, in environmental accounting also, a concept of capturing environmental conservation effects based on the product life cycle may be developed. In the future, it will be necessary to examine the possibility of integration of life cycle assessment of products and environmental accounting.

As the opening for measuring the effects in environmental accounting, one capturing method is to aggregate "economical merits generated to consumers" as well as "environmental conservation effects" (social effects) and "economical effects associated with environmental conservation" (internal effects).

While, currently some companies announce "economical merits generated to consumers", others may not announce yet, assuming that there are some issues to be examined in the method of measuring and expression.

However, separate from the announcement issue, it is meaningful to add "economical merits generated to consumers" in terms of the internal function. For instance, companies can utilize the information as the basic information for product development.

In this sense also, methods of measuring and expressing "economical merits generated to consumers" are to be examined in the future.

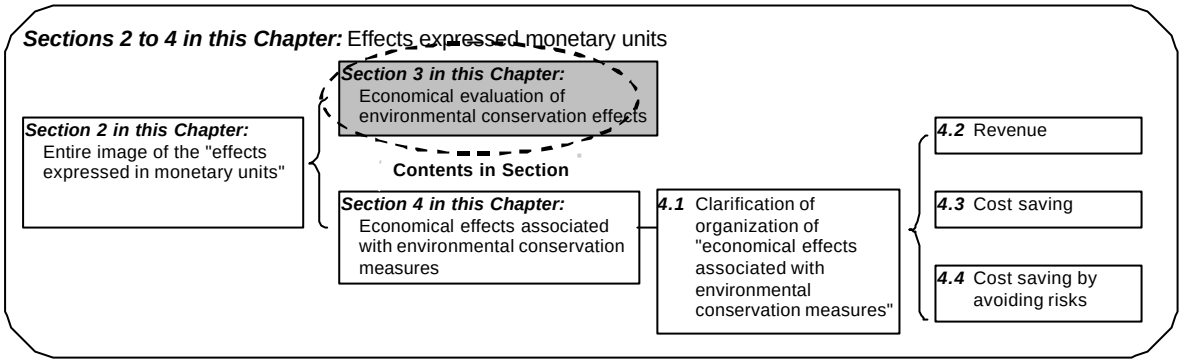
3. Economic Evaluation of Environmental Conservation Effects

Introduction

This section focuses on "economic evaluation of environmental conservation effects" of the two types of effects that are expressed in monetary units, "economic evaluation of environmental conservation effects" and "economical effects associated with environmental conservation measures."

As described in the previous section, "economic evaluation of environmental conservation effects" converts "environmental conservation effects" that are expressed in the physical quantity units into the monetary amount and expresses in monetary units.

This section initially summarizes the significance of "economic evaluation of environmental conservation effects" and indicates the notes and future objectives of using the evaluation.



(1) Significance of "economic evaluation of environmental conservation effects"

In this section, initially assume the situation where environmental conservation effects are expressed in the physical quantity units (example: CO_2 emission reduction volume OOkg, NOx emission reduction volume XX kg).

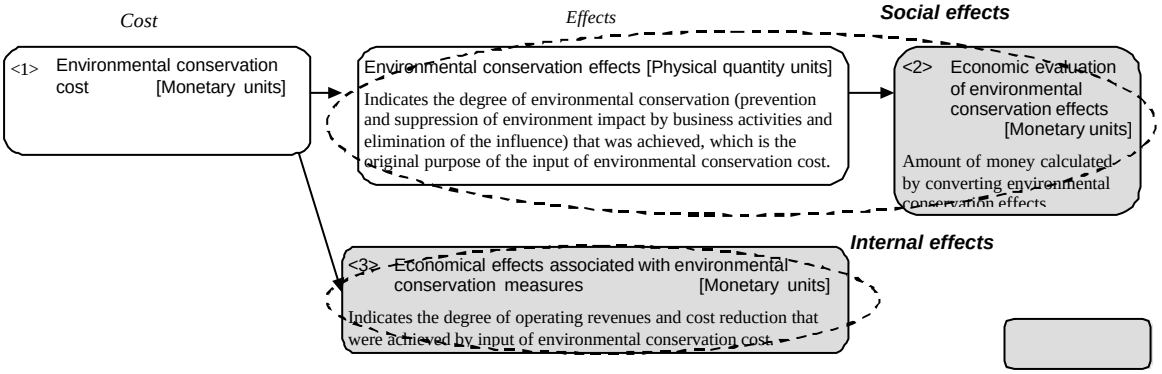
In the physical quantity units, comparison or comprehensive evaluation of different types of environmental conservation effects is not possible. For instance, simple size comparison or addition of amount of reduction of CO_2 emission and amount of reduction of NOx emission is not possible. Reduction of one ton of CO_2 emitted and reduction of one ton of NOx emitted have different influences on the environment.

If the values corresponding to the effects of reducing CO_2 and NOx are expressed in monetary units through economic evaluation, the effects of reducing CO_2 and NOx can be compared or the reduction effects can be evaluated comprehensively.

The result of the "economic evaluation of environmental conservation effects" may indicate the cost that may have been borne by the society if the company has not input the "environmental conservation cost", that is the social cost (see <Column> provided later).

Next, examine what can be detected from the relationship between the result of "economic evaluation of environmental conservation effects" and other items expressed in monetary units (environmental conservation cost and economical effects associated with environmental conservation measures).

Examine again the illustration that summarizes environmental conservation cost and the effects.



In the illustration indicated above, items that are expressed in monetary units include "<1> Environmental conservation cost", "<2> Economic evaluation of environmental conservation effects", and "<3> Economical effects associated with environmental conservation measures." The bearers of the cost and beneficiaries of these items are summarized as follows.

<1> "Environmental conservation cost": Cost paid by the company
<2> "Economic evaluation of environmental conservation effects": Social effects benefited by the society
<3> "Economical effects associated with environmental conservation measures": Internal effects benefited by the company

Based on the summary indicated above, the following items are examined.

- Relationship between "<2> Economic evaluation of environmental conservation effects" and "<3> Economical effects associated with environmental conservation measures"
- Relationship between "<2> Economic evaluation of environmental conservation effects" and "<1> Environmental conservation cost"

"<2> Economic evaluation of environmental conservation effects" and "<3> Economical effects associated with environmental conservation measures”

"<2> Economic evaluation of environmental conservation effects" indicates social effects and "<3> Economical effects associated with environmental conservation measures" indicate internal effects, and the beneficiaries are different. Therefore, in environmental accounting, it is appropriate to display them separately.

"<2> Economic evaluation of environmental conservation effects" and "<1> Environmental conservation cost"

There is a direction that judges the validity of environmental conservation measures taken by such as a company, comparing "<2> Economic evaluation of environmental conservation effects" and "<1> Environmental conservation cost".

However, at this point, there is no common standardized technique for "<2> Economic evaluation of environmental conservation effects." There are considerable differences in evaluation results according to the technique. Therefore, caution is necessary in interpretation of the value produced by subtracting "<1> Environmental conservation cost" from the result of "<2> Economic evaluation of environmental conservation effects."

When a company inputs environmental conservation cost in response to the strong social request for environmental conservation, the adequacy of environmental conservation measures cannot be judged simply by the size of the value produced by result of "<2> Economic evaluation of environmental conservation effects - <1> Environmental conservation cost." The background and reason should be taken into account in judgment of environmental conservation measures taken by a company.

Incidentally, comparison between "<1> Environmental conservation cost" and "<3> Economical effects associated with environmental conservation measures" is examined here.

Since environmental conservation activities are not commercially beneficial independently by themselves, it is meaningless to insist that the size of the value is produced by subtracting "<1> Environmental conservation cost" from "<3> Economical effect associated with environmental conservation measures." Environmental conservation cost is intended for achievement of environmental conservation effects and the adequacy should ultimately be judged in terms of environmental conservation.

However, some companies try to promote environmental conservation measures by indicating to the external and internal parties of the company that the value produced by "<3> Economical effects associated with environmental conservation - <1> Environmental conservation cost" is large.

As described above, while economic evaluation of environmental conservation effects has many possibilities of the application, there are many points to be noted and issues to be resolved. Items (2) and (3) describe these notes and issues.

<Column> Social cost

Unlike the cost that is normally paid by a company, social cost is paid by the society as the third party. For instance, social cost includes health damage and damage to agricultural products or fisheries that are caused by environmental pollutants that are emitted by business.

(2) Notes on announcing "economic evaluation of environmental conservation effects"

"Economic evaluation of environmental conservation effects" may be used for decision-making within companies, however, there are ambitious attempts to announce the results of "economic evaluation of environmental conservation effects." Progress of announcement is significant in terms of development of research. In this case, the following points should be noted.

- Clarify the technique and preconditions

  - As described in Item (1), there is no common standardized technique for "economic evaluation of environmental conservation effects" at this stage.
    The following are some examples of techniques.
    i) Evaluate in a monetary value the damage that was avoided by the environmental conservation measures.
       <Example> Monetary value of the agricultural products that are damaged by air pollution
    ii) Evaluate using the amount of money that is intended to be paid by the people (WTP*) for environmental conservation or the result of the investigation carried out on the monetary value (WTA*) that is to be accepted as the compensation of environmental influence. (Example: CVM*)

    *WTP: Willingness to Pay
    WTA: Willingness to Accept
    CVM: Contingent Valuation Method

    There are substantial differences in actual evaluation results according to the technique and preconditions applied. For instance, when the result is evaluated based on the monetary value of the damage, the evaluation result varies greatly depending on how many damage types are covered.
  - Therefore, the practical technique and preconditions must be described in announcement of environmental accounting information that was obtained through economic evaluation of environmental conservation effects.
  - Users of environmental accounting information should note that simple comparison of these results is meaningless when multiple economic evaluation results are assessed under different techniques or preconditions.

- Clearly indicate the source

  - When using results of the past research, clearly indicate the source
    (announcer, year of announcement, and the title)

- Supplement information in description as required

  - In particular, in comparison between "Economic evaluation of environmental conservation effects" and "Environmental conservation cost", it is important to provide supplementary descriptive information on the background and intention of input of the "Environmental conservation cost."
  - At the same time, users of environmental accounting information should judge the adequacy of environmental conservation measures by the company, including the descriptive information as well as the monetary value of evaluation results.

(3) Future issues

In the future environmental accounting, it is necessary to proceed with research in techniques in various social sectors including administration for "Economic evaluation of environmental conservation effects" to be useful information in terms of the internal/external function.

Organization of usable data in "Economic evaluation of environmental conservation effects" as a result of the research is significant. For instance, the coefficient that can be used for conversion to a monetary value (monetary value produced by converting environmental conservation effects by the amount of reduction of environmental impact) should be organized through examination of the assessment technique, precondition (example: region in which the coefficient was assessed), and adequacy of the assessment result.

As the precondition of "Economic evaluation of environmental conservation effects", it is important to establish the technique for measuring the environmental conservation effects themselves. The techniques are being summarized by the Ministry of the Environment as "Environment Performance Indicators for Business (2000 version) (February, 2001)." This matter is being examined continuously.

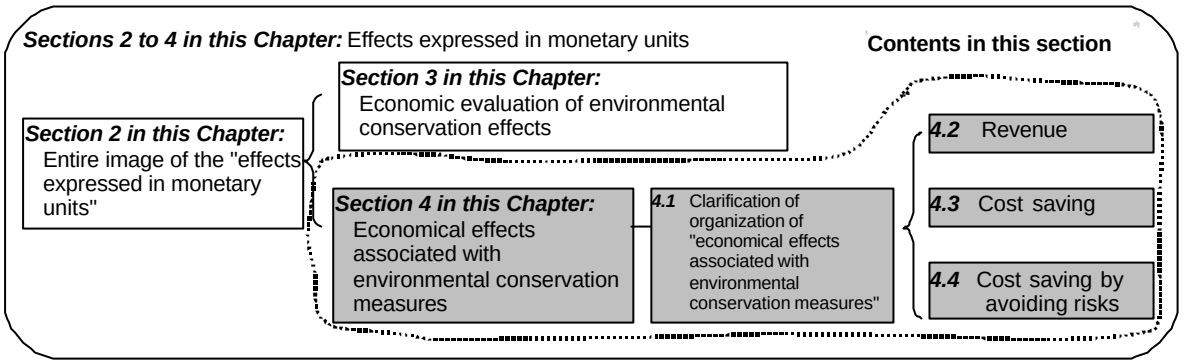
4. Economical Effects Associated with Environmental Conservation Measures

Introduction

Of the two types of effects that are expressed in monetary units, "Economic evaluation of environmental conservation effects" and "Economical effects associated with environmental conservation measures," this section focuses on the latter.

As described in Section 2, measuring of "Economical effects associated with environmental conservation measures" is important for companies to combine management with consideration to the environment and improvement of profitability.

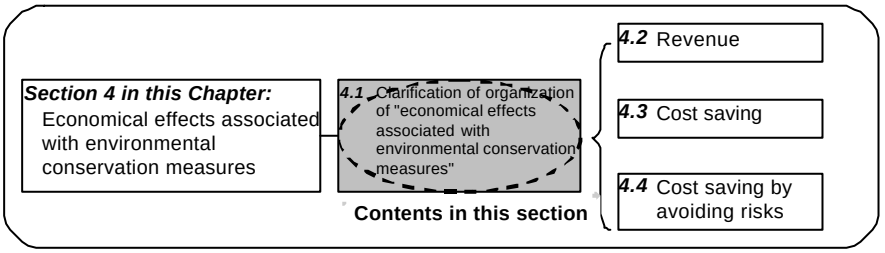
This chapter clarifies the organization of "Economical effects associated with environmental conservation measures" and summarizes the contents into three categories; "revenue", "cost saving", and "cost saving by avoiding risks."



4.1 Clarification of Organization of "Economical Effects Associated with Environmental Conservation Measures"

Introduction

"Economical effects associated with environmental conservation measures" are discussed in the "Environmental Accounting Guideline (2000 Version)." This section further examines the contents and clarifies the organization.



(1) "Economical effects associated with environmental conservation measures" in the "Environmental Accounting Guideline (2000 Version)"

The "Environmental Accounting Guideline (2000 Version)" indicates the following effects as "economical effects associated with environmental conservation measures."

- Economical effects that are calculated based on credible basis
  <Example> Saving the cost for raw materials and energy
  Saving the waste disposal cost
  Revenue by sale of valuable materials by recycling

- Economical effects based on hypothetical calculation
  - Accidental economical effects (economical effects by avoiding risks)
    <Example> Saving the cost for environment restoration
    Avoidance of operation loss

Avoidance of reparations/compensation to residents

- Profit contributed assumed effects

As shown above, the "Environmental Accounting Guideline (2000 Version)" classifies "Economical effects associated with environmental conservation measures" according to the degree of credibility of the basis and the contents. Initially, the guideline classifies the effects into "Economical effects calculated based on credible basis" and "Economical effects based on hypothetical calculation" by focusing on the degree of credibility of the basis. The latter effects are classified into "Accidental economical effects (economical effects by avoiding risks)" and "Profit contributed assumed effects" focusing on the contents.

Is the following case applicable to "Economical effects associated with environmental conservation measures" in the "Environmental Accounting Guideline (2000 Version)"?

Assume that the insurance premium corresponding to environmental damage could be saved by pollution prevention activities. The insurance premium against environmental damage is equivalent to the "Economical effects by avoiding risks" in terms of the contents. However, it may be equivalent to the "Economical effects calculated based on credible basis" when the degree of credibility of the basis is focused since the economical effects was actually generated by the saving of the insurance premium against environmental damage.

To understand accurately the characteristics of "Economical effects associated with environmental conservation measures", the organization must be clarified further including the points that are indicated above.

(2) Organization and classification in this Chapter

Based on the contents discussed in (1), this Chapter organizes "Economical effects associated with environmental conservation measures" based on the following two categories.

- Revenue/cost saving
- Degree of credibility

By focusing on the contents, the "Economical effects associated with environmental conservation measures" are classified into the following three types.

- Real effects
- Profit contributed assumed effects
- Estimated effects by avoiding risks

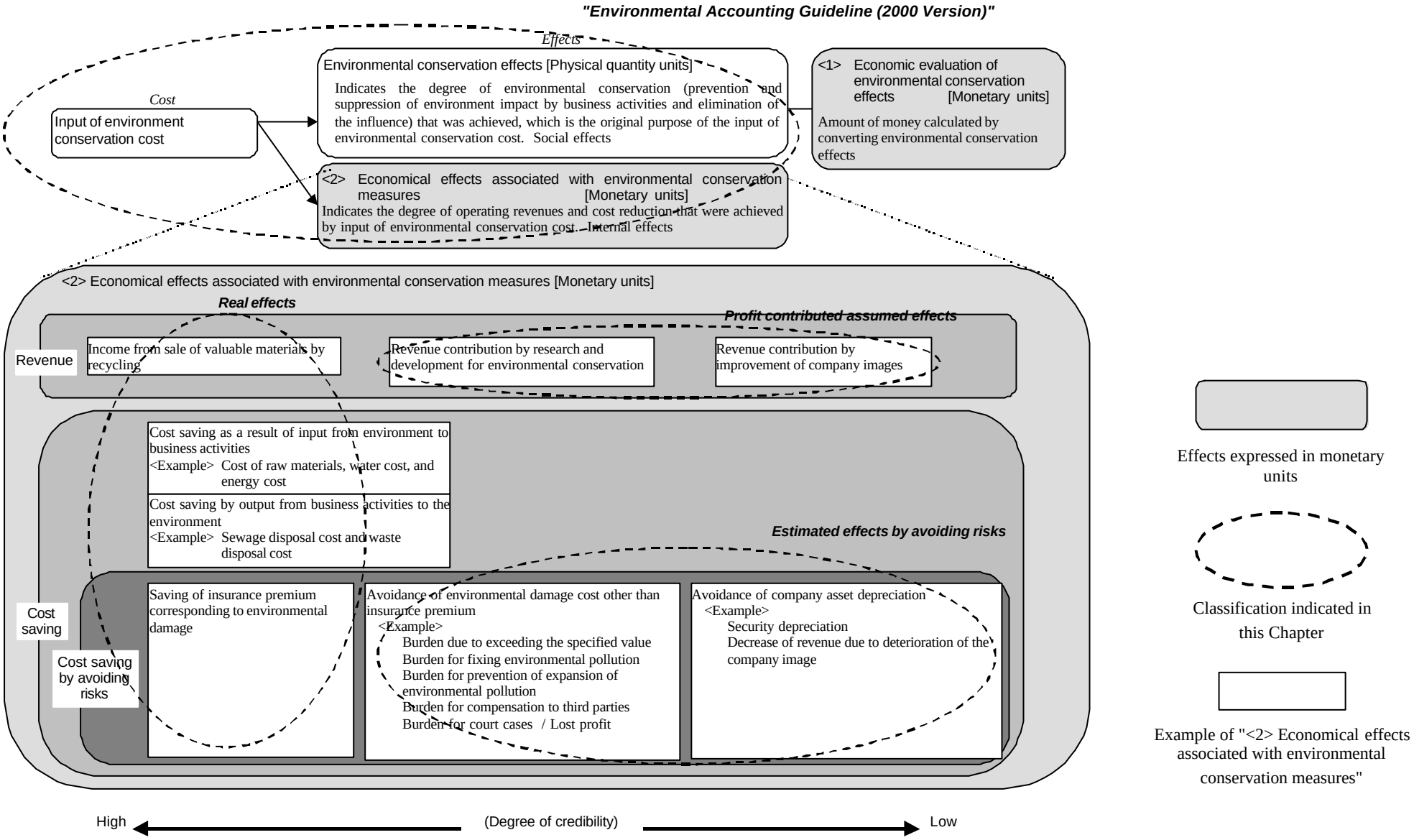
Mapping 2 illustrates the standard of organization and the classification that were indicated above.

Mapping 2 summarizes "Economical effects associated with environmental conservation measures" using the "revenue/cost saving" as the row and the "degree of credibility" as the column. Three categories, "real effects", "Profit contributed assumed effects", and "Estimated effects by avoiding risks", are indicated by ⬭ (dotted line ellipse).

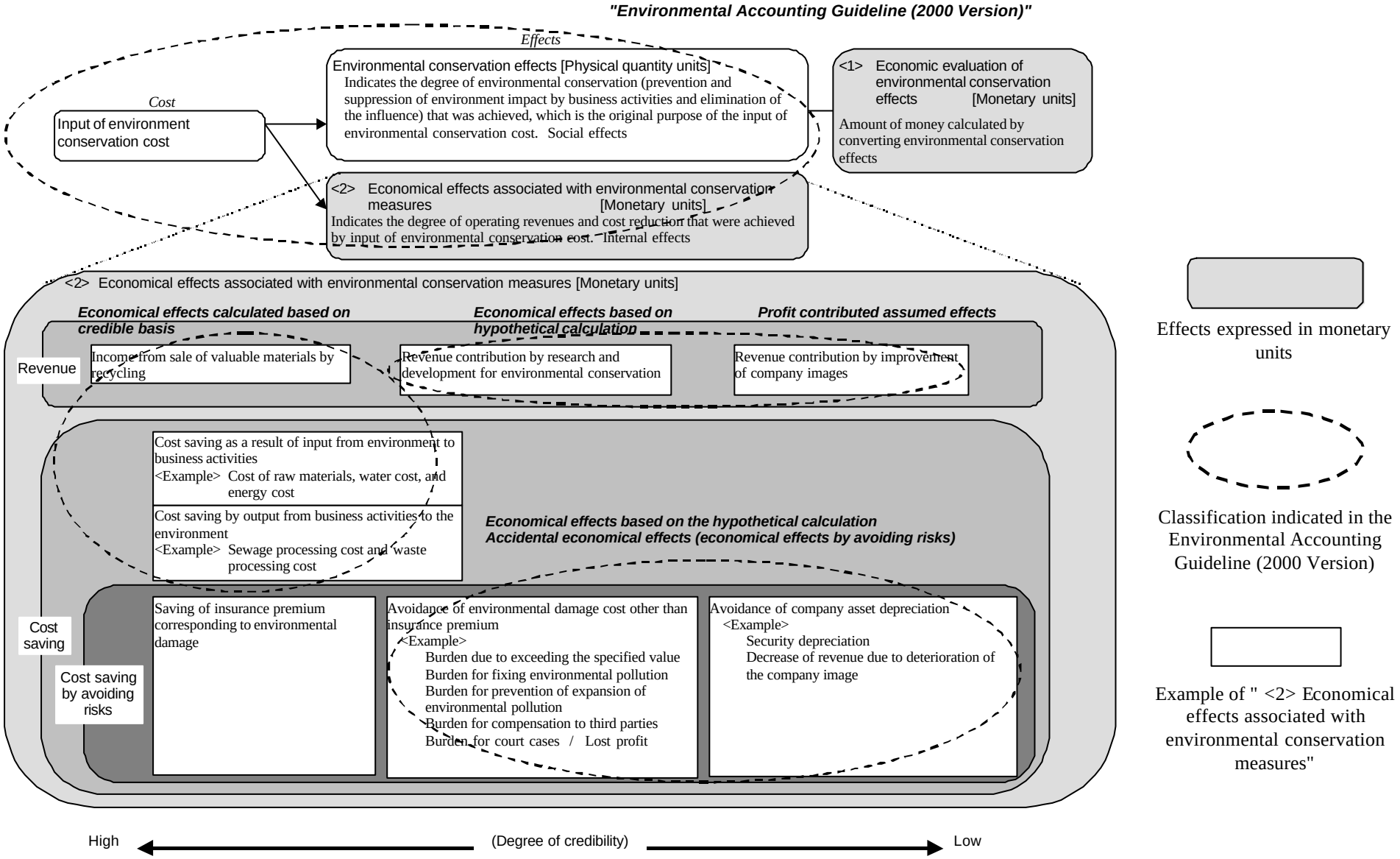
The Reference Drawing shows classification in the "Environmental Accounting Guideline (2000 Version)."

Details of the organization and classification described above are provided below.

Mapping 2 Organization and classification of “Economical effects associated with environmental conservation measures"



Reference Drawing Classification of “Economical effects associated with environmental conservation measures" in the "Environmental Accounting Guideline (2000 Version)"



a. Axes of organization

As described in the previous section, this Chapter organizes "Economical effects associated with environmental conservation measures" with the following two categories.

(a) Revenue/cost saving
(b) Degree of credibility

(a) Revenue/cost saving

This Chapter organizes "Economical effects associated with environmental conservation measures" based on the factors, "revenue" and "cost saving", and then further organizes the "cost saving" based on whether the effect is applicable to "cost saving by avoiding risks" (see Mapping 2). Here, avoiding risks refers to avoidance of any economical burdens for companies due to environmental pollution inflicted by the companies.

The "cost saving by avoiding risks" was focused because avoidance of economical burdens caused by environmental pollution that is inflicted by companies is becoming extremely important in management of enhancement of the global environmental regulations. For instance, under the so-called Super Fund Law in the USA, it is known that the company's burden of pollution purification cost may become exorbitant. It is important to measure the monetary amount of the economical burden that is avoided by pollution prevention activities by companies.

(b) Degree of credibility

This Chapter organizes "Economical effects associated with environmental conservation measures" according to the degree of credibility.

The degree of credibility may not be indicated quantitatively. In Mapping 2, items of "Economical effects associated with environmental conservation measures" (indicated by ▭ in the Mapping) are arranged from the highest degree to the lowest degree from the left to the right. However, the position of each item is relative.

As shown in Mapping 2, "Economical effects associated with environmental conservation measures" vary, from the one with high degree of credibility to the one with low degree of credibility. Some examples are as follows.

- The item that can be assessed as a single item such as "income from sale of valuable materials by recycling" is assumed to have a high degree of credibility.

- For "cost saving as a result of input from the environment to business activities" and "cost saving as a result of output from business activities to the environment", the amount of cost saving is assessed by the difference with the previous year or the basic year. For instance, assume the degree of credibility is assessed by the difference with the basic year. If the business activities would have decreased during the same period, it could be assumed that the difference contains the mixture of the effects of the environmental conservation measures and the decrease of the business activities. Therefore, it is necessary to measure the section attributed to the "environmental conservation measures" from the difference. The degree of credibility will decrease although it varies according to the assessment method.

- Some standard is also necessary for "revenue contribution by research and development for environmental conservation" also for assumption and consequently, the degree of credibility will decrease. Furthermore, assumption of "revenue contribution by improvement of company images" will be fairly uncertain.

- Among the "cost saving by avoiding risks", the degrees of credibility of "avoidance of cost by environmental damage other than insurance premium", "avoidance of depreciation of company assets", and "avoidance of deterioration of company images" will be low although they depend on the assumption method. This is based on the following two reasons.

  i) Estimation is necessary for the amount of economical burden that is avoided
  The amount of economical burden that is avoided includes the environmental damage cost other than the insurance premium, depreciation of company assets, and decrease of revenue due to deterioration of the company image.

  ii) Involvement of contingent elements:
  "Whether a situation of causing economical burden for the company due to environmental pollution inflected by the company" is a stochastic incident that is influenced by the pollution occurrence possibility, the future law enhancement and possibility of post facto application, and is related to contingent elements.

In environmental accounting, are the items that are included as "Economical effects associated with environmental conservation measures" to be limited to only those that retain a high degrees of credibility? Or, is it more preferable to include items with lower degree of credibility in "Economical effects associated with environmental conservation measures", emphasizing the coverage?

The method selected varies according to the status of the company or the purpose of the evaluation. This is because the features and merits are different between the case where only the items with high degree of credibility are selected, and the case where the items with low degree of credibility are also included. The actual details are described below.

- Case where items are restricted to only those with high degree of credibility
  The range of the items that are included as "Economical effects associated with economical conservation measures" becomes narrow. However, since the uncertainty of assessment result is low and more conservative assessment results are produced, conservative decision-making is enabled. As the additional advantage, data can be collected easily. In particular, for a company that has developed globally, data may not be collected easily in some regions. Therefore, this merit is considered to be substantial.

- Case where items that require estimation are included in the coverage
  Although the degree of credibility becomes low, economical merits of companies are widely assessed. Therefore, environmental conservation measures can be carried out easily and the results can be used as the driving force of the environmental conservation measures.
  To enhance the degree of credibility in the future, a wide range of discussions is necessary regarding the reasonable estimation method. Development of practical exercises by companies and accumulation of knowledge are expected.

b. Classification

Based on the "revenue/cost saving" and "degree of credibility" that were described in "a. Categories of organization", this Chapter classified "Economical effects associated with environmental conservation measures" as follows, focusing on the contents further (see Mapping 2).

(a) Real effects
Effects that can be calculated in terms of accounting among the effects contributed to profits by environmental conservation measures

(b) Profit contributed assumed effects
Effects that are calculated by estimation among the effects contributed to profits by environmental conservation measures

(c) Estimated effects by avoiding risks
Economical effects achieved by avoidance of economical burdens (example: cost by environmental damage that may have occurred by pollution prevention activities

*: "Estimation in (c) contains the following two meanings:

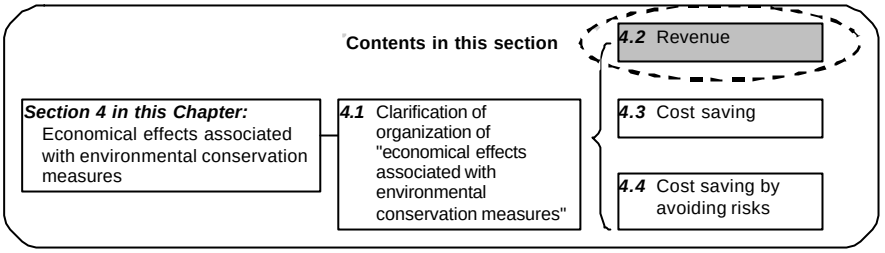
- Estimation of the amount of economical burden
- Estimation of probability of the occurrence of an incident that causes economical burden for the company due to environmental pollution inflicted by the company

4.2 Revenue

Introduction

While Section 4.1 clarifies organization of "Economical effects associated with environmental conservation measures", Sections following Section 4.2 summarize the contents of "economical effects associated with environmental conservation measures" in the order of "revenue", "cost saving" (excluding cost saving by risk avoidance), and "cost saving by avoiding risks."

Section 4.2 of this Chapter describes "revenue."



Among the "economical effects associated with environmental conservation measures", revenue indicates a revenue contribution brought by input of environmental conservation cost as the result. That is, among the numeric values that are expressed as the accounting revenue, the section corresponding to the environmental conservation cost is to be measured.

The following items are referred to as revenues here.

- Income of sale of valuable materials by recycling
- Revenue contribution by research and development for environmental conservation
- Revenue contribution by improvement of company images

Revenues are found to be applicable to the following two categories among the "economical effects associated with environmental conservation measures" that were indicated in Section 4.1, as a result of summary of these revenues according to the degree of credibility (see Mapping 2 in the previous section).

a. Real effects
b. Profit contributed assumed effects

a. Real effects

When a revenue contribution corresponding to environmental conservation cost can be credibly calculated in terms of accounting, the revenue is classified as a "Real effect."

For instance, when income is generated from sale of valuable materials by recycling, the income from the sale can be credibly calculated and can be classified as a "Real effect" since it is assumed to be a revenue contribution as the result of environmental conservation measures.

b. Profit contributed assumed effects

When estimation such as apportionment is necessary in assessment of revenue contribution corresponding to environmental conservation cost, the revenue is classified as a "Profit contributed assumed effect." The degree of credibility of the "Profit contributed assumed effect" is lower than that of the "real effect" that is described in a.

Practically, "revenue contribution by research and development for environmental conservation" and "revenue contribution by improvement of company images" are classified as "Profit contributed assumed effects." The "revenue contribution by improvement of company images" cannot be estimated easily and the degree of credibility becomes substantially low.

As the future objective for measuring "Profit contributed assumed effects", it is necessary to examine reasonable estimation methods for revenue contribution corresponding to environmental conservation cost.

<Column> Effects achieved by research and development for environmental conservation

What effects are available as the effects of research and development for environmental conservation?

In addition to revenue contributions in companies, economical merits for consumers or social effect may be generated.

For instance, consumers can save light and fuel expenses as a result of research and development in energy conservation when using the products so that the research and development also contribute to the society through alleviation of exhaustion of energy resources.

Measuring the effects and efficiency of research and development for environmental conservation is important in terms of both business management and environmental conservation. The methods of measuring and analyzing the effects need to be examined in the future.

<Column> Difference between business revenue and revenue as a result of environmental conservation measures

Is it appropriate to include revenues from environmental business (manufacturing of pollution prevention equipment, environment consultant, waste disposal and recycling business, etc.) as "Economical effects associated with environmental conservation measures"?

In this case, revenues from environmental business are considered to be the results of the cost required in the entire environmental business, rather than the result of environmental conservation measures (effects of input of environmental conservation cost). Therefore, the items to be included as "Economical effects associated with environmental conservation measures" should be revenue contributions as a result of environmental conservation measures in environmental business (effects corresponding to input of environmental conservation cost), not the revenues of such environmental business.

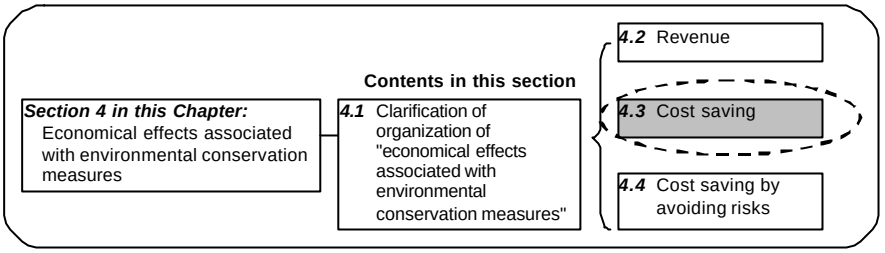
The measuring of revenues of environmental business itself is meaningful in terms of business management. In addition, revenues generated by environmental business are recognized and the environmental business becomes more active, and consequently, greater environmental conservation effects may be achieved.

Above all, it is necessary for creators and users of environmental accounting to recognize that revenues from environmental business are basically different from the effects corresponding to environmental conservation cost.

4.3 Cost Saving

Introduction

This section describes "cost saving" among "Economical effects associated with environmental conservation measures." Section 4.4 describes "cost saving by avoiding risks" of the "cost saving."



While the object of the previous Section is to measure the part that corresponds to the environmental conservation cost among the values that are indicated as accounting revenues as the "revenue", "cost saving" in this section indicates the saving effects contributed by input of environmental conservation cost. This section describes the attempt to measure how much of the "economical burden" that is assumed without input of environmental conservation cost could be avoided by inputting environmental conservation cost.

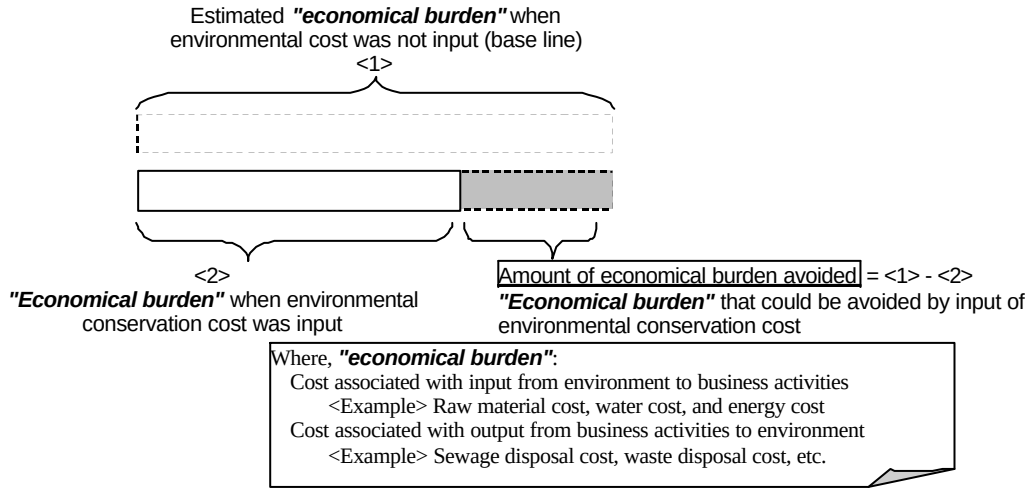
The following table shows examples of correspondence between input of environmental conservation cost and the "economical burden" that is avoided as a result.

Example of environmental conservation costs	Example of "economical burden" that is avoided	
	Cost associated with input from environment to business activities	Cost associated with output from business activities to environment
Resource circulation costs (introduction of chemical reutilization equipment, etc.)	Raw materials costs	
Resource circulation costs (introduction of water conservation equipment, etc.)	Water costs	
Global environment environmental conservation costs (introduction energy conservation equipment, etc.)	Energy costs	
Resource circulation costs (introduction of wash water recycling equipment)		Sewage disposal cost
Resource circulation costs (cost for waste recycling, etc.)		Waste disposal cost*

* In the "Environment Accounting Guideline (2000 Version)", waste disposal cost is regarded as environmental conservation cost.

The avoided "economical burden" amount is not indicated as an accounting value. Therefore, it is necessary to set the "economical burden estimated when environmental conservation cost was not input" as the base line and assess the amount by comparison. The procedure is described below.

1) Set the "estimated economical burden when environmental conservation cost is not input" (base line) (<1> in the diagram below) using some method.
2) Assess the amount of the burden that could be avoided by subtracting "economical burden when the environmental conservation cost was input" (<2> in the diagram below) from <1>.

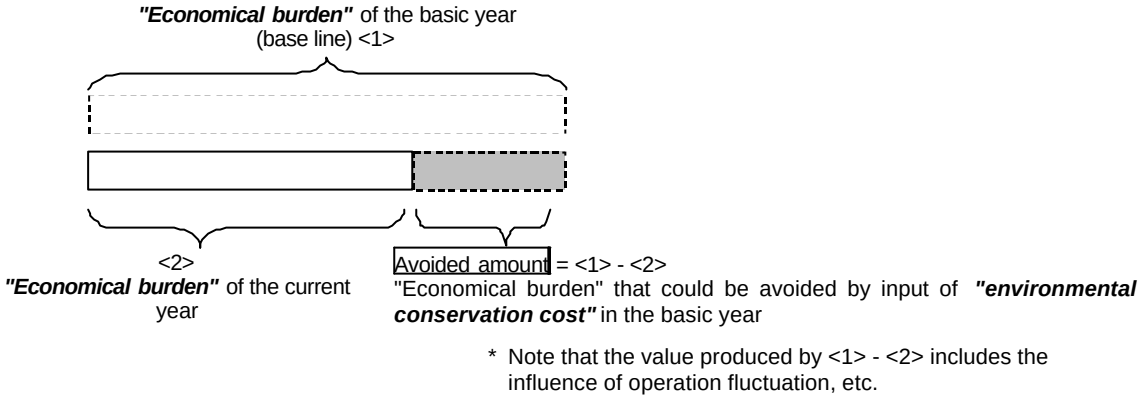


Since the avoided amount varies according to the element that is set as the base line, the method to set a base line must be clearly indicated.

As one of the methods to set a base line, "economical burden of the basic year" can be used as the base line. In this case, the avoided amount can be assessed as follows.

1) Set the "economical burden of the basic year" (<1> in the diagram below) as the base line.
2) Assess the avoided amount by subtracting the "economical burden of the current year" from <1> (<2> in the diagram below).

When the year immediately before the facility investment for environmental conservation is selected as the basic year, the avoided amount that was assessed can be considered as the effect of burden reduction as a result of the facility investment. However, the result of simple subtraction of <2> from <1> includes the influence of operation fluctuation in addition to the effect of burden reduction. Therefore, a method of comparing with the value per unit requirement such as production unit or sales unit can be considered to exclude such influence.



If the purpose of the environmental conservation measures of the current year is reduction of the environment impact from the previous year, the amount reduced can be assessed by comparison with the amount of the previous year.

That is, the result produced by subtracting the economical burden of the current year (<2>) from the economical burden of the previous year (<1>) is regarded as the reduction effect achieved as a result of the environmental conservation cost of the current year. However, in this case also, since the value produced by simple subtraction of <2> from <1> includes an operation fluctuation in addition to the reduction effect as a result of the facility investment in the same way as for comparison with the basic year, the comparison can be made using the unit requirement to exclude such influence.

In assessment of the avoided amount, it is necessary to keep in mind what is the corresponding to environmental conservation cost.

When the avoided amount is assessed through comparison with the basic year, an investment at one point of the past is assumed as the environmental conservation cost. That is, the effect of the investment made at one point in the past appears in the difference in the economical burdens between the basic year and the current year (amounts of burdens such as cost associated with input from the environment to business activities and cost associated with output from business activities to the environment).

Regarding comparison with the previous year, the effect of the environmental conservation cost appears in the difference of economical burdens between the previous year and the current year.

That is, the comparison method for evaluating the avoided amount by input of environmental conservation cost is determined by each company through selection of the range of environmental conservation cost.

<Column> How to set a period for assessing environmental conservation cost and the effects in environmental accounting

How can a period for assessing environmental conservation cost and the effects be set in environmental accounting?

One method is to display environmental conservation cost and the effects on an annual basis. The purposes for displaying the information on an annual basis are to provide explanation to top management and disclose the information externally in periodic form.

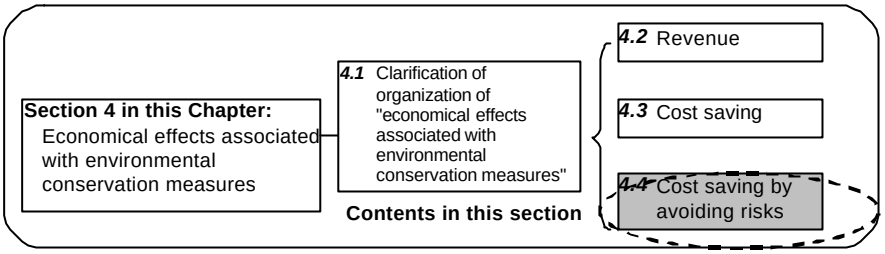
Another method is to compare environment conservation cost and the effects in a related period of a project. (Example: Segment environmental accounting implemented by Ricoh Co., Ltd.)

The purposes for displaying the information on a project basis are to verify the effects of the past investments and use the information as the basic information for decision-making of the future investments (whether investments are to be made or not or selection from plans for investments).

4.4 Cost Saving by Avoiding Risks

Introduction

This section describes "cost saving by avoiding risks" among the "economical effects associated with environmental conservation measures."



As described before, "cost saving by avoiding risks" indicates "cost saving by avoiding a possible economical burden for the company due to the environmental pollution inflicted by the company."

With the increasing awareness towards environmental conservation, environmental law and regulations are becoming stricter globally. In addition, the concept of extended producer responsibility (manufacturers should be responsible for the environmental influence imposed from production to disposal of products) is advocated and some of the global environmental laws and regulations have started to introduce this concept. That is, the range of responsibility for environmental pollution prevention by companies is expanding.

Under such a background, when a company generates environmental pollution under its responsibility, the company may have to bear a vast amount of environmental damage cost to handle the pollution (fine/charges, cost for restoration from environmental pollution, and cost for court cases). In particular, when the company was implementing business activities without noticing the emission of pollutants exceeding the law and regulation, a considerable amount of environmental pollution must have been accumulated in the soil or underground water (so called stock pollution) by the time that the pollution is discovered, causing a vast amount of economical burden such as environmental damage cost.

Implementation of pollution prevention activities by a company leads to avoidance of such economical burden as described above, in addition to the effect of prevention of environmental pollution and the measuring of the avoided amount is important in terms of management. As the result of pollution prevention activities, an emission reduction amount of the substance causing the pollution can be expressed as an environmental performance indicator and the economical burden that could be avoided can be measured in terms of environmental accounting. These information items are useful for implementation of effective and efficient pollution prevention measures.

The contents are summarized below under the following headings to assist companies to recognize the risks of such economical burdens and measure "cost saving by avoiding risks."

(1) Organization of "cost saving by avoiding risks"
(2) Example of assessment in environmental accounting
(3) Future objectives

(1) Organization of "cost saving by avoiding risks"

This section organizes "cost saving by avoiding risks" from the following angles.

a. Types of environmental pollutions as the causes
b. Types of pollution prevention activities as avoiding risks methods
c. Types of economical burdens that can be reduced or avoided

a. Types of environmental pollutions as the causes

This section summarizes environmental pollutions as described below based on the following four viewpoints to assist for recognition of environmental pollutions as the causes of risks: <1> Environmental media that are polluted, <2> Where damages occur, <3> Condition of the cause, and <4> Pollution coverage.

<1> Environmental media that are polluted: Air, oceans, soil, ground water, etc.
<2> Where damages occur: People, ecosystem, etc.
<3> Condition of the cause
- Emitted by an accident
- Emitted during normal operation
  - Although the emission exceeded the specified value, the incident was unnoticed.
  - Although the emission was within the specified value, it damaged third parties.
  - Although the emission satisfied the specified value, the law was tightened and the law was applied retroactively.

<4> Pollution coverage
- Within the business area
  <Example> Soil pollution limited to the area of business premises
- Outside of the business area
  <Example> Soil and underground pollution covering outside of business premises
  Pollution of rivers and waters by waste water
  Air pollution by exhaust gases

b. Types of pollution prevention activities as risk avoidance methods

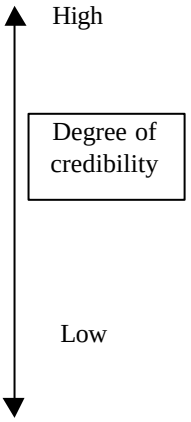
This section shows examples of the types of pollution prevention activities as risk avoidance measures. The cost required for these pollution prevention activities applies to environmental conservation cost.

- Avoidance or reduction of substances causing pollution
  <Example> Use of alternative raw materials, effective use of resources, process modification, etc.
- Avoidance or reduction of emission of substances causing pollution
  <Example> Facility improvement (recovery facility, emission prevention facility, etc.), monitoring, recycling, control system (improvement of manuals and education/training), etc.

c. Types of economical burdens that can be reduced or avoided

The following types of economical burdens can be reduced or avoided as a result of input of environmental conservation cost for implementation of pollution prevention activities as described in the above b. section.

- Insurance premium for environmental damage
- Cost for environmental damage other than insurance premium
  <Example> Burden due to exceeding the specified value (fines/charges, etc.)
  Burden for restoring environmental pollution
  (pollution purification expenses, etc.)
  Burden for prevention of environmental pollution expansion
  (facility replacement cost, etc.)
  Burden for Compensation to third parties
  (damage compensation, resident compensation, etc.)
  Burden for court cases (legal expenses, conciliation money, etc.)
  Lost profit (reduction of sales due to operation halt)
- Depreciation of company assets
- Reduction of revenue due to deterioration of the company image



These saving and avoidance of economical burdens are applicable to the following two categories among the "Economical effects associated with environmental conservation measures" that were described in Section 4.1 as a result of classification based on the degree of credibility (see Mapping 2 that was shown before).

(a) Real effects
(b) Estimated effects by avoiding risks

(a) Real effects

For a "insurance premium against environmental damage", since the amount saved can be measured from the difference with the insurance premium of the previous year, the degree of credibility is high and the effect is applicable to the "real effects".

(b) Estimated effects by avoiding risks

The degree of credibility is low for "environmental damage cost other than insurance premium", "depreciation of company assets", and "reduction of sales due to deterioration of the company image" in comparison to the "real effects." There are two reasons as described in Section 4.1 also.

a. Estimation of the amount of economical burden that is avoided is necessary.
The amount of economical burden that is avoided refers to the amount of "environmental damage cost other than insurance premium", "depreciation of company assets", or "reduction of revenue due to deterioration of the company image." Estimation of latter ones is harder, consequently, the degree of credibility is lower.

b. Involvement of accidental elements
"Whether a condition for generating economical burden for the company due to environmental pollution inflicted by the company" is a stochastic event and accidental elements are involved.

The "concept of evaluating verified effects" and the "concept where expected effects are evaluated" are available for handling accidental elements that are described in b. as a result of summary based on the examples that are currently announced. Caution is necessary since the evaluation contents of these two concepts are different.

- Concept of evaluating verified effects

  - In this concept, the amount of economical burden that could be avoided (pollution purification expenses, etc.) is evaluated when avoidance of the risk was verified by the pollution prevention activities that were implemented in the past.
    <Example> IBM Japan transferred a tank from underground to the surface and installed a dike to prevent soil contamination by leakage of a chemical substance from the underground tank. When leakage from the tank on the surface is prevented by the dike, the environmental damage cost that was avoided (pollution purification expenses, legal expenses, operation loss, etc.) is evaluated, based on the judgment that soil contamination by the leakage from the underground tank was prevented.
  - Since the effects are evaluated after verification of risk avoidance, the "accidental elements" that were described in item b. above can be excluded. Therefore, the effects are close to the "real effects" among the "estimated effects by avoiding risks" except the "necessity for estimation of the amount of economical burden (pollution purification cost, etc.)" which was described in item a. .
  - Such evaluation results can be used for post-evaluation of pollution prevention activities.

- Concept where expected effects are evaluated

  - In this concept, the amount of economical burden (pollution purification expenses, etc.) that is expected "to be avoided in the future by pollution prevention activities that are currently implemented" is evaluated.

- In comparison to the "verified effects" that were described before, the degree of credibility is low since the risk avoidance has not been confirmed.
- As described above, since accidental elements are involved, the estimated value for the amount of the economical burden (pollution purification expense, etc.) is multiplied by the probability for evaluation. However, when estimation of the probability is difficult, some alternative method may be used.
- The evaluation result can be used as an index of prior evaluation of pollution prevention activities or an index of the degree of achieving the environment improvement target in an environment management system.

- As a concept of pollution prevention activities, when a pollution is detected, other similar facilities may also be improved without waiting for occurrence of pollution as well as the facility that caused the pollution (corresponding activities of pollution prevention). Evaluation of the avoided amount for the economical burden in corresponding activities (pollution purification expense, etc.) as this case can also be assumed as "a cost saving by avoiding risks". This belongs to the category of "expected effects."

In the same way as for Section 4.3, "Cost Saving," it is necessary to keep in mind the correspondence between "environmental conservation cost" and the "amount of economical burden". This is the principle of period matching cost and effect.

The "concept of evaluating verified effects" that was discussed above suggests the substitution of the effect corresponding to the cost of the current period with the occurrence of the fact of actual avoidance of pollution. Strictly speaking, the cost release that attributed to avoidance of the pollution may have occurred before the current period, however, if the amount of the cost release and the amount of the effect are similar in every period, it is possible to assume that the period matching cost and effect is maintained.

The "concept of evaluating expected effects" is the method that estimates and includes the expense (pollution purification expense, etc.) that is expected to be avoided as the effect corresponding to the expense of the current period. In this concept, the effect for the cost that is released is logically estimated and the period matching cost and effect is more accurate, however, a higher proportion of estimation element is involved in the effect estimation method.

The relationship between "environmental conservation cost" and the "effect" needs to be examined in the future including the handling of depreciation costs.

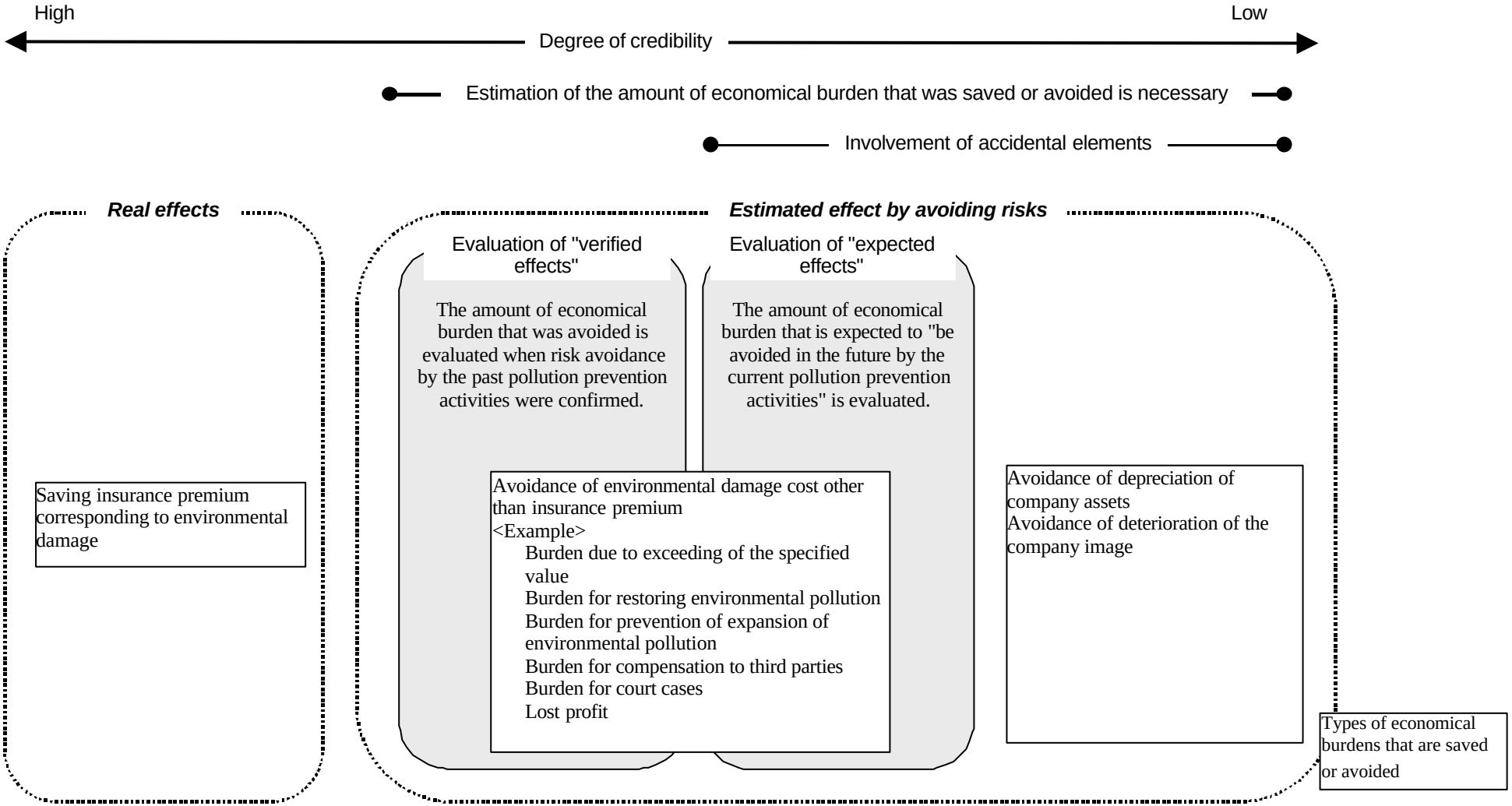
Item c., "Types of economical burdens that are saved or avoided" discussed that "insurance premium against environmental damage", "environmental damage cost other than insurance premium", "depreciation of company assets", and "revenue reduction due to deterioration of the company image" are classified into "(a) real effects" and "(b) estimated effects by risk avoidance" according to the degree of credibility.

Two reasons were indicated for a low degree of credibility of "(b) estimated effects by avoiding risks", "a. Estimation of the amount of economical burden is necessary" and "b. Involvement of accidental elements". Furthermore, as the handling of accidental elements, two concepts were summarized based on the examples that are currently announced, "concept of evaluating verified effects" and "concept of evaluating expected effects."

Mapping 3 illustrates the summary.

Mapping 3 Cost saving by avoiding risks

"Types of economical burdens that are saved or avoided" and "real effects" and "estimated effects by avoiding risks"



(2) Examples of assessment in environmental accounting

As examples of assessment of "cost saving by avoiding risks" in domestic environmental accounting, there are cases in IBM Japan, Fujitsu, and Ricoh.

The features of these companies are summarized below.

a. IBM Japan

- The evaluated items include saving of the insurance premium by avoidance of soil contamination, avoidance of the outflow improvement expense (pollution purification expense), and avoidance of the law and regulation compliance expenses (legal expenses, operation loss, etc.)
- The saving of insurance premium, avoidance of the outflow improvement expense, and avoidance of the law and regulation compliance expense are the effects that can be included due to the presence of the Super Fund Law in the USA.
- IBM has factories worldwide and by setting IBM specific rules, environmental measures are implemented under the globally standardized form. Risk avoidance assessment is also globally standardized.
- As the evaluation method, the following amounts that could have incurred is evaluated assuming that those expenses could be avoided at the time of accident (chemicals leaked from the tank on the surface was prevented by the dike) by the past pollution prevention activities (transfer of a tank to the surface and installation of a dike): pollution purification expense by soil contamination (assuming the Super Fund Law), legal expenses, and operation loss.
  The past internal record and analysis of EPA in USA were used for calculation of the value as the reference data.
  An accident occurrence probability is not considered.
- Through such assessment of risk avoidance effects as this, effects of the past pollution prevention activities are verified.
  Both the investment amount and effect are included on an accrual basis.

b. Fujitsu

- For avoidance of pollution emission exceeding the amount specified in the law and regulations, the following items are evaluated: amount of operation loss that is avoided associated with air pollution and water pollution, the penalty of the Environment Act, and penalty that is calculated from the improvements indicated by the internal environmental auditing and external environmental auditing relating to nonconformance to the law and regulations.
  Initially, for the amount of operation loss that is avoided regarding air pollution and water pollution, the number of operation days that are lost is set according to the amount of the facility investment and the added value per day of the factory is multiplied by the number of days lost. The number of days lost is calculated based on the recovery of Akashi Factory that was damaged by the Hanshin Awaji Earthquake as the example.
  Initially the amounts of agricultural and fishery damages were evaluated from court cases, but they are no longer evaluated from fiscal 2000 since there are no such direct influences around the factory.
  An accident occurrence probability is not taken into account since the assessment is difficult.
  The effect amount in improvements indicated by internal and external auditing is calculated by multiplying the number of improvements by the simple average value of the penalty of the 9 typical Environment Acts.
- For the effect of soil and ground pollution measures, the resident compensation amount required when the ground water pollution covered the neighboring areas is calculated (assumed) using the judgments of past pollution court cases as the references and the effect is evaluated assuming that the payment of the amount was avoided.
- These effect amounts are not used for decision-making of environmental investments (whether investments are to be made).
- For prevention of risk occurrence, efficient risk management is implemented by setting out the environmental pollution risk management regulation and the soil and ground water evaluation standards to be applied at site purchase or building demolition.

c. Ricoh

- The following amounts that were avoided as a result of air pollution, water contamination, and soil

contamination measures are evaluated: pollution purification expense, court case expense, and operation loss.

- As the evaluation method, the amounts of the pollution purification expense, court case expense, and operation loss that could be avoided corresponding to the annual pollution prevention activities (environmental investment) are calculated, considering the pollution occurrence coefficient (coefficient that reflects likeliness of occurrence, rather than the occurrence probability itself) and the coverage (inside or outside of the premises, etc.)
  Of the expenses that are used as the standard amount (MAX), the pollution purification expense is calculated from the past result, the court case expense is estimated from the result of other civil actions, which are not related to environmental problems, and the amount of operation loss that is avoided is calculated for each office using three days of operation stop period as the maximum.
- The evaluation result is used for evaluating the degree of target achievement of environmental improvements in each office as a part of pollution prevention of the environmental management system.
  At this point, the result is not used for decision-making for environmental investment (whether investment is to be made).
- Implementation of efficient risk management that leads to prevention of risks in each office is examined for the future.

The following table shows the summary of the features of the three companies that were described in a. to c. based on the "organization of cost saving by avoiding risks" discussed in (1).

Examples of assessment of "cost saving by avoiding risks" in environmental accounting

Standard of organization				IBM Japan	Fujitsu	Ricoh
a. Types of environmental pollution* that becomes the cause * Environmental pollution that is targeted in assessment of "cost saving by avoiding risks" of each company	Environmental medium that is polluted	Air			●	●
		Waters			●	●
		Soil and ground water		●	●	●
		Others				●
	Condition of the cause	Emitted as a result of accident		●	●	●
		Emitted by normal operation			●	●
	Coverage of pollution	Within business area		●	●	●
		Outside of business area			●	●
b. Types of pollution prevention activities(*) as the risk avoidance measures * Indicates pollution prevention activities that are considered as risk avoidance measures in assessment of "cost saving by avoiding risks" of each company		Reduction/avoidance of pollutant (cause)			●	●
		Reduction/avoidance of emission of pollutant		●	●	●
c. Types of the cost saved		Real effects	Insurance premium against environmental damage	● (Soil)		
		Estimated effect by avoiding risks	Burden due to exceeding the specified value (Example: fines, charges)		● (Air/water)	
			Burden for restoring environmental pollution (Example: Pollution purification expense)	● (Soil)		● (Soil)
			Burden for prevention of expansion of environmental pollution (Example: Facility replacement cost)	● (Soil)		
			Burden for compensation to third parties (Example: Damage compensation, resident compensation)		●(Soil/ground water)	
			Burden for court cases (Example: Legal expense, conciliation money)	● (Soil)		●
			Lost profit (Example: Reduction of sales due to operation halt)	● (Soil)	● (Air/water)	●
			Depreciation of company assets			
			Reduction of revenue due to deterioration of the company image			
When "estimated effects by avoiding risks" is assessed in c.: Handling of accidental elements		Evaluation of "verified effects" (The amount of economical burden that was avoided is evaluated when risk avoidance by the past pollution prevention activities was confirmed)		●		
		Evaluation of "expected effects" (The amount of economical burden that is expected "to be avoided in the future by the current pollution prevention activities" is evaluated.)			● (The occurrence probability is not taken into account.)	● (The likelihood of occurrence is taken into account, rather than the occurrence probability itself.)

(3) Future objectives

The following future objective are considered for measuring "cost saving by avoiding risks."

- "Environmental damage cost other than insurance premium" was indicated as an example of economical burden that can be actually saved or avoided as "cost saving by avoiding risks" in c. of (1).

  <Example>
  Burden due to exceeding of the specified value (Fines and charges)
  Burden for restoring environmental pollution (Pollution purification expense)
  Burden for prevention of expansion of environmental pollution (Facility replacement cost)
  Burden for compensation to third parties
  (Example: Damage compensation, resident compensation)
  Burden for court cases (Legal expense, conciliation money)
  Lost profit (Reduction of sales due to operation halt)

  Amounts of these burdens vary according to the volume of the pollutant that was emitted, the degree of environmental pollution, and the degree of exposure of pollution to humans and ecosystem. The future objectives are to make actual achievement values of these amounts as the burdens available widely through databases, etc. and establish reasonable estimation methods.

- Item c. in (1) indicated that there is a method for evaluating "expected effects" considering the environmental pollution occurrence probability. It is necessary to establish such an occurrence probability estimation method is necessary.

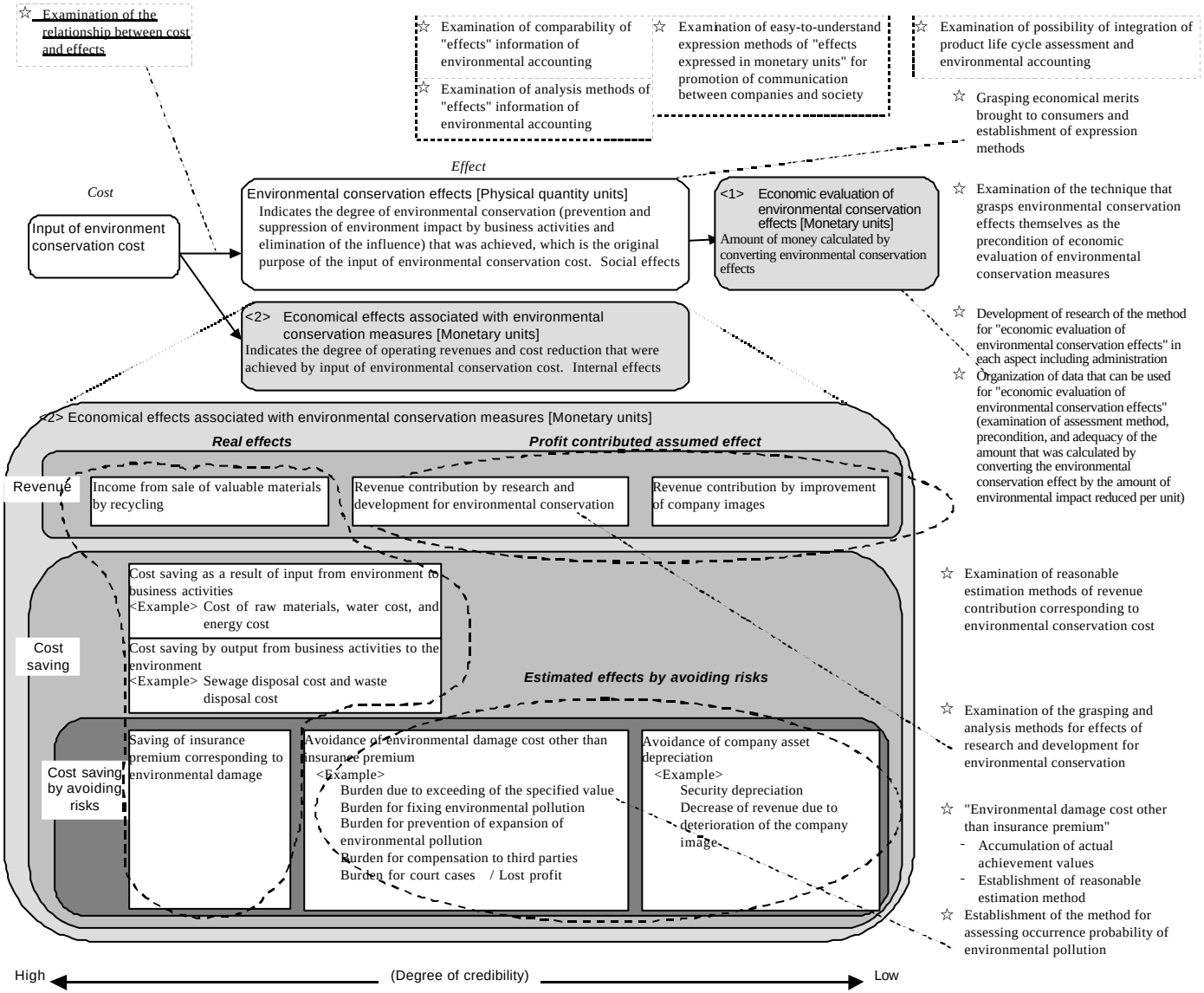
5. Objectives Relating to Measuring of "Effects Expressed in Monetary Units" (Road Map)

In the previous sections, "effects" in environmental accounting were summarized focusing on the "effects expressed in monetary units". As the "effects expressed in monetary units," "economic evaluation of environmental conservation effects" and "economical effects associated with environmental conservation measures" were indicated and organized focusing on the latter. Various objectives have been clarified during the process.

Although not discussed in this text, examination of comparison possibility and the analysis method for the information regarding effects will be included as the objectives. To utilize the information on "effects expressed in monetary units" for communication between the society and companies, examination of easy-to-understand expression methods such as supplementation of descriptive information may be necessary.

The following page shows objectives in each field in organization of "effects expressed in monetary units" as Road Map. Further discussion, research, and implementation of these objectives are expected for further development of environmental accounting.

Road Map Objectives Relating to the Measuring of "Effects Expressed in Monetary Units"



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Chapter 2 Report from the Distribution Working Group

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Introduction

Purposes of Establishing the Distribution Working Group

The "Guideline for Introduction of the Environmental Accounting System (2000 Version)" issued by the Ministry of the Environment (referred to as "Environmental Accounting Guideline (2000 Version)" classifies environmental conservation cost into the following categories in terms of business activities and environmental impact; "production/service activities" (classified further to "within the business area" and "up/down stream"), "management activities", "research and development activities", and "social activities." Cost against "environmental damage" is also added, making a total of six categories. This classification was designed so as to be able to be used in various business types and business categories, however, it is relatively closer to business activities of the manufacturing industry.

Direct environmental impacts are comparatively less in the distribution industry, which is a non-manufacturing industry, since it does not have production facilities as the manufacturing industry does (the distribution industry includes manufacturing retail, etc. and the industry modes vary). However, extended business hours are regarded as a problem in terms of energy conservation and it is closely related to the relationship with environmental problems. The distribution industry is closest to consumers and, considering the product manufacturing process and environment impact after use, the influence of the distribution industry that is in a position to supply products to consumers has a major influence.

Under these circumstances, the Distribution Working Group decided to organize the ideas that are useful for companies in the distribution industry to tackle environmental accounting and prepare the "Guide to Introduction of Environmental Accounting in the Distribution Industry." In "Activities of Research on Environmental Friendly Companies" (Ministry of the Environment) in 2000, about 40% of companies that have not introduced environmental accounting indicated "Do not know how to aggregate the information." On preparation of the Guide, the Distribution Industry Working Group compiled the information in a form that facilitates companies as prospective users of environmental accounting as well as those as existing users to tackle the project easily. To achieve this, the Group discussed and organized the sections that may become problems in the introduction of environmental accounting.

The Guide consists of five steps, from Section 2 to Section 6. Initially, the Guide indicates a procedure such as providing an overview of operation flow of the company and corresponding environmental conservation activities, collecting and organizing environmental accounting information such as environmental conservation effects and environmental conservation cost from the activities.

This Guide is an example for a company in the distribution industry intending to introduce environmental accounting. We hope that environmental accounting will be implemented in various forms using this Guide as the reference. This information may be useful for other industries also, as well as the distribution industry.

Structure of the Guide

The organization of this Guide is as follows:

a. Verifying the purposes of introduction of environmental accounting
→ **See "Step 1. Verifying the Purposes of Introduction of Environmental Accounting"**

This section organizes the purposes for introducing environmental accounting in the distribution industry.

This section introduces the purposes presented by the companies that are already implementing environmental accounting and the advantages, problems, and issues that have been clarified as a result of the introduction.

Through this information, companies that are to start environmental accounting are able to overview the tasks of environmental accounting in the distribution industry, such as purposes of tasks of environmental accounting for the companies that are already implementing and findings as a result of implementation.

b. Measuring environmental conservation activities in the distribution industry

→ See "Step 2 Measuring Environmental Conservation Activities in the Distribution Industry"

This section provides a summary of environmental conservation activities in the distribution industry according to the operation flow of the distribution industry.

The information can be classified in various ways according to the purpose of introducing environmental accounting. This Guide organizes major common environmental conservation activities in the distribution industry into an internal control table called "environmental conservation activity summary sheet." The "environmental conservation activity summary sheet" uses distribution industry operation flow as the column and "classification by the field of individual measures" as the row. This section specifies the range applicable to business activities of the company and then clarifies the environmental conservation activities that are actually tackled within the range by referencing the "environmental conservation activity summary sheet."

c. Summary of effects and cost of environmental conservation activities

→ See "Step 3. Organizing Effects and Cost of Environmental Conservation Activities"

This section organizes and describes the effects and cost of environmental conservation activities in the distribution industry under the following categories.

- Expected effects
- Effects that can be measured (in physical quantity units, monetary units)
- Cost that can be correlated to the effect that can be measured among the environmental conservation cost

This section describes these items relating to environmental conservation activities using actual examples.

d. How to proceed with actual operation of environmental accounting

→ See "Step 4 How to Proceed with Actual Operation for Introduction of Environmental Accounting"

Collect environmental accounting information for the environmental conservation activities that are tackled by the company. Organize the cost that can be correlated with the effect according to the summary method described in "c." for the environmental conservation activities that were clarified in "b." Then, collect the actual information.

This Guide introduces the "environmental conservation activity summary sheet" and information collection using an internal control table called "environmental conservation activity card" as one of the methods for proceeding with the actual operation. As an example, this Guide introduces cards that accept the following entries:

- Expected effects
- Effects that can be measured (in physical quantity units, monetary units)
- Cost that can be correlated with the effect that can be measured among the environmental conservation cost

Also

- Method of measuring data
- Source of data
- Issues and problems in assessing effects and cost
- Focusing point of descriptive information and actual examples

Using these information items, collect environmental accounting information in the environmental conservation activities that are tackled by the company.

e. How to organize environmental accounting information

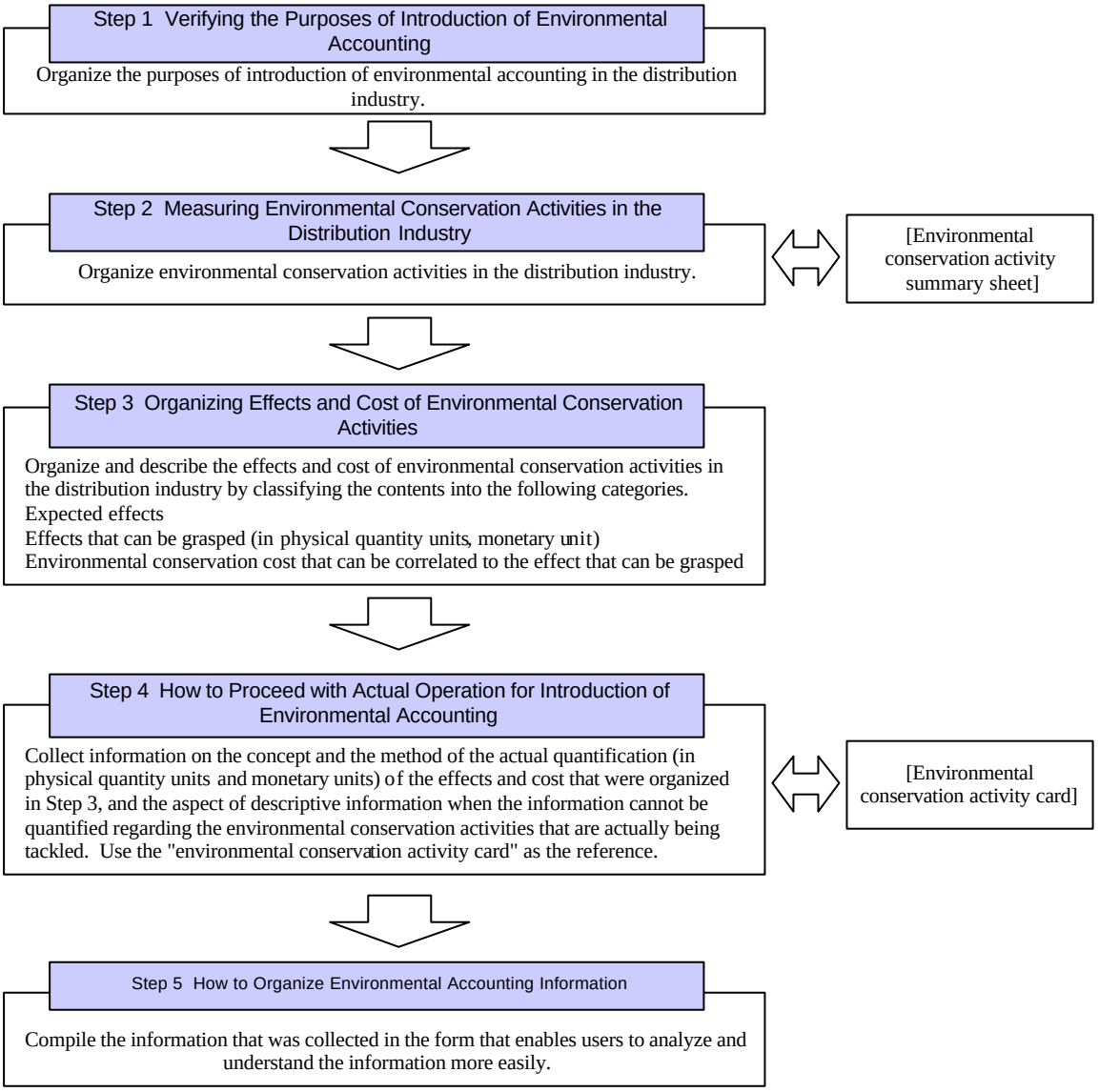
→ See "Step 5 How to Organize Environmental Accounting Information"

After collecting information on the effects and comparable cost of environmental conservation activities that are tackled by the company, compile the information in the form that enables users to analyze and understand more easily, considering the purpose of the introduction of environmental accounting.

This section shows some examples of compiling environmental accounting information using the "environmental conservation activity summary sheet" and the "environmental conservation activity card" that were introduced in this Guide. We hope these examples are useful for those who will start environmental accounting.

Figure 1 illustrates the contents of the Guide that were described above.

Figure 1 Flow of "Guide to Introduction of Environmental Accounting in the Distribution Industry"



[Guide to Introduction of Environmental Accounting in the Distribution Industry]

Step 1 Verifying the Purposes of Introduction of Environmental Accounting

1.1 Organizing the purposes of introduction of environmental accounting

In the distribution industry, what purposes can be considered for the introduction of environmental accounting?

The distribution industry alone involves many business conditions and organization modes including department stores, chain stores, and convenience stores, for example. And it covers a variety of business activities. Because of this diversity, the purposes for introducing environmental accounting may vary according to the company. However, even if the purposes are different, some common concepts may be found by organizing the contents along with the difference. Organizing of common sections and non-common sections may be useful for the companies that intend to tackle environmental accounting.

Based on the above, the purposes of introduction of environmental accounting that are indicated by the companies already implementing environmental accounting were organized into the following categories as preparation for creation of the Guide: a. Reason for introduction of environmental accounting, b. Purposes of environmental accounting information, c. Users of the information

a. Reason for introduction of environmental accounting

The following reasons are indicated by the companies that are already implementing environmental accounting in the distribution industry.

- Clarify the relationship between cost and effects and use the information for promotion of implementing environmental accounting
- Measure the annual cost and the effects of the items that are tackled of each division or shop, etc.
- Position clearly environmental conservation activities in business management.
- Measure cost and effects regarding environmental conservation and promote more efficient environmental management.
- Respond to the social demand (accountability) regarding information of environmental conservation activities intended for the public.

These reasons are classified into categories of internal functions and external functions of environmental accounting. In the "Environmental Accounting Guideline (2000 Version)" also, these two points are raised as the background and necessity for companies to tackle introduction of an environmental accounting system.

[Internal functions]

→ *For companies to tackle environmental conservation, it is important to know the investment effects and cost effectiveness for reasonable decision-making as well as further efficiency improvement of the implementation procedure. The information can be obtained by accurately measuring (measuring) the investment amount and the expense amount (environmental conservation cost) for environmental conservation of the company and aggregating and analyzing the results.*

[External functions]

→ *These days, announcement of various types of information relating to the task of environmental conservation by companies through, for example, environmental reporting is requested from various sectors and the contents of the information and announcement condition are becoming the measures for evaluating the company. As one of the important items that are announced by the company, inclusion of environmental accounting information is expected.*

These are the main reasons for companies to introduce environmental accounting.

b. Purposes of environmental accounting information

The way of understanding cost and effects of environmental conservation activities is expected to vary according to the purpose for using environmental accounting. It is important to indicate the "purposes of environmental accounting information" correctly to avoid any misunderstanding of users of the information.

The following "purposes of environmental accounting information" are indicated by the companies that are already implementing environmental accounting in the distribution industry

- Indicate the summary (overview) of the environmental conservation activities that are tackled by the company.
- Organize the tasks of the company according to the purpose of environmental conservation and indicate the cost effectiveness internally and externally.
- Collect and provide the materials for judgment of budget distribution for environmental conservation activities
- Sum up the cost and effects associated with environmental conservation for a fixed period for each of the divisions and shops and implement more efficient environmental conservation policies in the future.
- Provide information required for reviewing the expenses for waste disposal and recycling subcontracting expenses.
- Measure the details of tasks relating to waste processing measures among the environmental conservation activities that are realized through cooperation and understanding of customers.

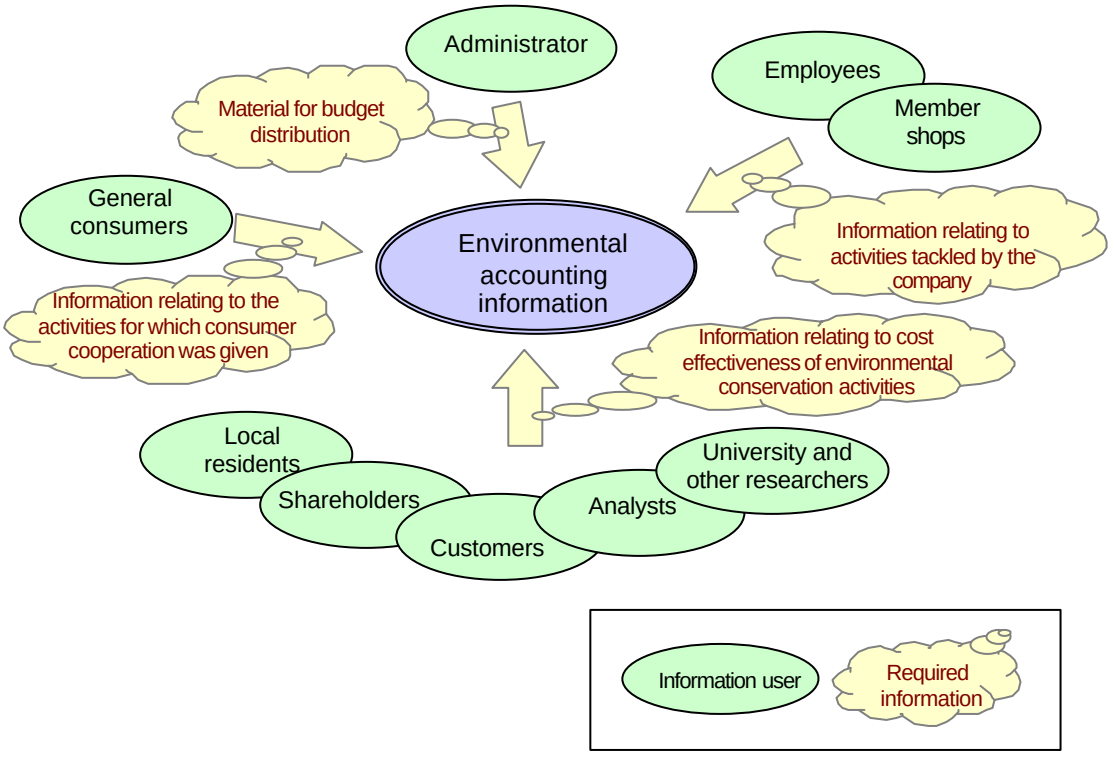
Some companies indicate the measurement of environmental conservation activities of the entire company as the "purpose of environmental accounting information", while others indicate aggregation and analysis by focusing on some specific section as the purpose. For solving management problems, detail analysis of specific tasks may be carried out as the next step by the company that has measured the entire activities. In some cases, a section is focused on initially and the process progresses to the entire company.

c. Users of the information

The reporting target of environmental accounting information is assumed to be determined by the "reason for introduction" or "purpose of environmental accounting information." The employees or the member shops will be the target of the information on the environmental conservation activities that are tackled by the company and information on cost effectiveness of environmental conservation activities will be targeted to shareholders, etc. Administrators may use environmental accounting information as the material for judgment of budget distribution for environmental accounting activities. In such an industry as the distribution industry where environmental conservation activities (for instance, recycling by collection at storefront) are achieved by cooperation and understanding of customers, general consumers may request information of environmental conservation activities intended for the public regarding the activities in which they have cooperated.

Aggregation results of environmental accounting needs to be organized in a form that facilitates users to understand and analyze the information. At collection and analysis of environmental accounting information, it is important to constantly be aware of the users of the information.

Figure 2 Users of environmental accounting information in the distribution industry (Example)



As described above, the purposes of introduction of environmental accounting vary. When the "purpose of environmental accounting" is clear, organize the contents according to the purpose. The company that intends to introduce environmental accounting may not have a clear purpose. In such a case also, environmental accounting may be introduced as a trial. The purpose will be clarified from the advantages, problems, issues that become clear as a result of introduction of environmental accounting and the sense of purpose for implementing environmental accounting becomes clear by tackling the purposes that were clarified. This contributes to effective and efficient environmental conservation activities.

1.2 Referencing Actual Examples of Advantages, Problems, and Issues that were Clarified by Introduction of Environmental Accounting

This section introduces the "advantages obtained as a result of introduction of environmental accounting" indicated by the companies that have already introduced environmental accounting in the distribution industry.

[Advantages obtained from the result]

- The expense required for disposing of waste is higher than the expense required for recycling (= recycling is the better option).
  - → Recycling requires more handling by employees for sorting and removing foreign objects. However, clarification of such activities gave the employees the awareness of recycling.
  - → To achieve cost merit, reasonable recycling without requiring high expenses is important such as use of a return trip of delivery vehicle and such mechanism was promoted.
- Requirement of high cost for waste disposal and recycling subcontracting was clarified.
  - → Allocation of a considerable amount of cost to collection for recycling could be explained to customers and the necessity for some measures for this item was clarified.
  - → This clarification gave the opportunity for examination of reduction or reuse of waste.
- The existence of green purchase that does not require extra cost was clarified.
  - → Construction of a reasonable mechanism was proven to be effective in the tasks for both the environmental and management aspects.

The following problems and issues were also clarified as well as advantages.

[Problems and issues]

- Many items of environmental conservation cost cannot be measured accurately. Calculation of the cost by separating it accurately cannot be defined easily (also applicable to effects),
- Many cost items are integrated into normal operation and only a small number of items can be clearly separated (unreasonable apportionment causes loss of reliability and clarity).
- Data collection and organization require a considerable amount of handling. A handling mechanism is necessary also to improve the precision of data that is collected.

As various problems and issues are indicated from the companies that have already introduced environmental accounting, companies that will tackle the introduction may encounter similar problems and issues. However, environmental accounting may be started and meaningful even if these problems and issues have not been solved. Companies that have already introduced environmental accounting are also implementing while examining the findings and advantages gained by the introduction of environmental accounting. Those who are to start environmental accounting are advised to examine the ways of handling their problems and issues by the companies that have already introduced the environmental accounting, using this Guide as the reference. We hope that the greater the number of examples announced, the more development of environmental accounting progresses in the distribution industry.

Step 2 Measuring Environmental Conservation Activities in the Distribution Industry

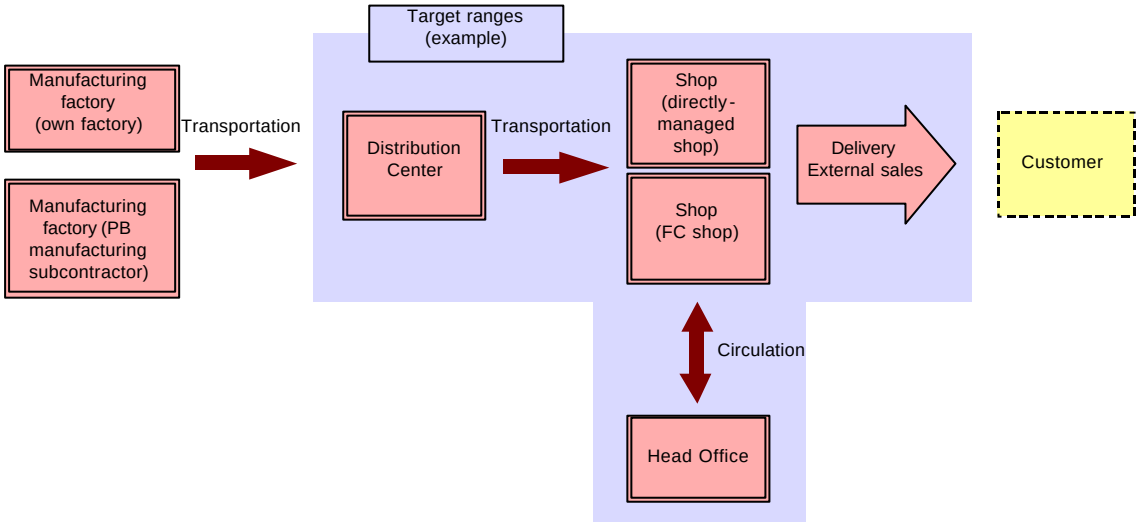
2.1 Verifying the Business Activity Range of the Company

To measure environmental conservation activities in the distribution industry, initially the business activity range of the company must be verified. The business activity ranges in the distribution industry may include the following stages in the operation flow and the head office. (There are stages other than those indicated here according to the organizational configuration.)

- Manufacturing factory (own factory, private brand (PB) manufacturing subcontractor, etc.)
- Distribution Centers
- Shops (directly-managed shops, franchise (FC) shops, etc.)
- Transportation and circulation (manufacturing factory → Distribution Center → shop, shop <-> Head Office, etc.)
- Delivery and external sales

Among those, initially verify the ranges that are targeted by the business activities of the company. For instance, in following example, the target ranges are the distribution center, shops (directly managed shop and franchise (FC) shop) delivery (or external sales), the head office, and each transportation stage.

Figure 3 Example of operation flow and target ranges in the distribution industry



Target ranges vary according to the company since some companies are providing external sales services while other use outsourcing for distribution. It is important to accurately measure to which sections in the operation flow the target ranges of the business activities of the company belong, before outlining the environmental conservation activities.

2.2 Referencing Main Environmental Conservation Activities in the Distribution Industry

This section provides an overview of the main environmental conservation activities in the distribution industry.

What environmental conservation activities are available in the distribution industry? The classification method varies according to the purpose of introducing environmental accounting. This Guide prepared an "environmental conservation activity summary sheet" and organizes environmental conservation activities based on the sheet. The sheet uses the operation flow, which is a common element regardless of the purpose, as the column and "classification by field of individual measures", which is attracting comparatively strong interest in the distribution industry, as the row of the table. Table 1 shows an environmental conservation activity summary sheet.

Table 1 Environmental conservation activity summary sheet

		Operation flow in the distribution industry							
		1. Manufacturing factory (own factory/PB manufacturing commissioning)	2. Distribution Center	3-1. Shop (directly-managed shop/ FC shop)	3-2. Conservation activities achieved by cooperation and understanding of customers	4. Transportation and circulation	5. Delivery and external sales	6. Head Office	7. Others
Classification by field of individual measures	Waste measures								
	Facility measures								
	Physical distribution measures								
	Product measures								
Management activities, social activities, etc.	Environmental management								
	Social activities and communication								

Details of Table 1 are described below.

In the column, activities are classified according to the operation flow of business activities in the distribution industry. This is created based on the classification of the operation flow that was used for verification of operation activity ranges in Section 2.1. For shops, activities are classified into the items that can be achieved by approval within the company such as "use of recycled furnishings" (to fresh aprons, name cards, and copy papers) and items that can only be achieved by cooperation and understanding of customers such as collection of trays at the storefront. The method of measuring environmental accounting information varies according to the organization mode such as directly managed shops and franchise (FC) shops. However, these are integrated to one item since hardly any difference was detected from environmental conservation activities themselves.

* Fields that were picked up as individual measures

<Waste measures>

The distribution industry, while supplying to consumers the products with container packaging, is obliged to bear the expense incurred for commissioning of "Suitable waste disposal" and "suitable container packaging recycle disposal", for which some operators collect and recycle various types of waste at shops. For these reasons, waste disposal measures seem to receive much attention in the distribution industry. There are various types of waste disposal handlings in mixed mode such as handling of control of waste generation and handling based on recycling such as storefront collection for recycling and there are various concepts regarding the effects and cost measuring method.

<Facility measures>

Considerations to buildings including energy conservation and water conservation are important items since extension of business hours and energy conservation by shops impose serious influence on business revenues. Buildings may be demolished due to preparation for new shops or closing of shops. In this Guide, an environmental conservation activity associated with observation of laws and regulations such as the Large-Scale Retail Stores Location Law is considered as one of the facility measures.

<Physical distribution measures>

Recently, many companies use outsourcing for physical distribution. Environmental consideration to a physical distribution system such as use of low-pollution vehicles is expected to be closely related to the distribution industry. In this Guide, the task in delivery and external sales is considered to be one of the physical distribution measures.

<Product measures>

As a common item in the distribution industry, an action, "selling products", can be suggested. A field of product measures was allocated based on the idea that environmental conservation activities relating to products such as product information including environmental consideration to packaging materials are very important in handling the tasks of environmental issues in the distribution industry. In actual selection and development of the products with environmental consideration, requests and cooperation to suppliers may become essential. Although not directly related to products, the handling of sales promotion tools such as catalogs, brochures, and leaflets can also be regarded as an item specific to the distribution industry.

In the row, the items were classified into "classification by field of individual measures", which is attracting interest in the distribution industry and "management activities and social activities", which are common handlings among various industries such as environmental management and social activities. The "classification by field of individual measures" is further classified into the following categories.

- Waste disposal measures
- Facility measures
- Physical distribution measures
- Product measures

"Management activities and social activities" are further classified into the following categories.

- Environmental management
- Social activities and communication

Individual measures may involve more fields other than the four fields indicated above. However, in this Guide those that were mainly discussed in the Distribution Working Group are taken up.

Table 2 shows summarization of the main examples of environmental conservation activities in the distribution industry into the "environmental conservation activity summary sheet." The environmental conservation activities indicated there are the results of extraction and summary of main items tackled in the distribution industry based on environmental reporting of some companies. Table 2 indicates environmental activities of the distribution industry over as wide a coverage as possible, and some items may not be applicable depending on the company.

2.3 Measuring Environmental Conservation Activities in the Business Activity Range of the Company

This section measures environmental activities in the business activity range of the company.

Based on the information in Section 2.1 the business activity range of the company, and Section 2.2 the overview of main environmental conservation activities in the distribution industry, environmental conservation activities in the business activity range of the company are clarified.

Table 2 lists environmental conservation activities in the distribution industry as much as possible.

The column in Table 2 forms the operation flow of business activities of the distribution industry. By focusing on a stage of the business activity flow, for instance a material distribution center and checking the column in the vertical direction, a summary of major environmental conservation activities can be referenced. The tasks in shops and the Head Office can be referenced in the same way.

Refer to Table 2 from the row. The row in table 2 shows classification of major individual measures in the distribution industry. For instance, by checking a row of waste disposal measures of individual measures in the horizontal direction, a summary of major environmental conservation activities for waste in the business range of the company can be referenced.

By referencing Table 2 from the vertical direction and the horizontal direction, environmental conservation activities in the business activity range of the company can be measured and organized. In particular, since Table 2 shows as many environmental conservation activities as possible in the distribution industry, the table will be useful for detecting the items that have not been recognized as environmental activities although they have already been tackled by the company.

Table 2 List of main environmental conservation activities in the distribution industry

By measure (effects) \ By operation flow		1. Manufacturing factory (own factory/PB manufacturing commissioning)	Control number	2. Physical distribution center	Control number	3-1. Shop (directly-managed shop/FC shop)	Control number
Classification by individual measures	Measures for waste (Resource circulation) (Global environmental conservation) (Pollution prevention)	- Implementing waste disposal (Resource waste recycling) (Suitable waste disposal) - Use of recycled furnishing 〜		- Implementing waste disposal (Resource waste recycling) (Suitable waste disposal) - Use of recycled furnishing 〜		- Implementing waste disposal (Resource waste recycling) (Suitable waste disposal) - Reduction of the amount of forms used by improvement of scan inventory-taking rate - Use of recycled furnishing - Reduction of the amount of detergent used - Sale of products in clearance sales - Garbage dehydration processing 〜	
	Facility measures (Resource circulation) (Global environmental conservation) (Pollution prevention)	- Use of recycled building materials - Introduction of water conservation equipment - Introduction of energy conservation equipment - Use of heat insulation external wall material - Replacement of devices that do not use CFCs - Smoke and soot measurement - Septic tank control - Garbage chamber cooling construction - Modification of product carry-in passage floor 〜		- Use of recycled building materials - Introduction of water conservation equipment - Introduction of energy conservation equipment - Use of heat insulation external wall material - Replacement of devices that do not use CFCs - Smoke and soot measurement - Septic tank control - Garbage chamber cooling construction - Modification of product carry-in passage floor 〜		- Use of recycled building material - Installation of rainwater usage facilities - Introduction of water conservation equipment - Introduction of groundwater utilization system - Use of heat insulation external wall material - Rooftop vegetation - Replacement to devices that do not use CFCs - Gasoline trap control - Grease srap control - Septic tank management - Garbage chamber cooling construction - Modification of product carry-in passage floor - Modification of PCB storage box - Improvement of loading/unloading facilities - Securing parking space - Revegetation 〜	
	Physical distribution measures (Resource circulation) (Global environmental conservation) (Pollution prevention)						
	Product measures (Resource circulation)	- Environmental consideration to packaging materials 〜				- Environmental consideration to advertising media - Installation of environmentally conscious product sales corner 〜	
Management activities and social activities	Environmental management	- EMS operation - ISO auditing and internal environmental auditing - External lecturers and preparation of environmental education materials for employees - Handling compliances - Thorough risk management 〜		- EMS operation - ISO auditing and internal environmental auditing - External lecturers and preparation of environmental education materials for employees - Handling compliances - Thorough risk management 〜		- EMS operation - ISO auditing and internal environmental auditing - External lecturers and preparation of environmental education materials for employees - Handling compliances - Thorough risk management 〜	
	Social activities Communication	- Preparation of environmental reporting and posters - Support for environmental protection organizations - Environmental donation activities 〜		- Preparation of environmental reporting and posters - Support for environmental protection organizations - Environmental donation activities 〜		- Preparation of environmental reporting and posters - Support for environmental protection organizations - Environmental donation activities 〜	

(Classification by operation flow and by field)

3-2. Conservation activities achieved by cooperation and understanding of customers among the shop activities	Control No.	4. Transportation and circulation	Control No.	5. Delivery and external sales	Control No.	6. Head office	Control No.
- Implementing waste disposal (Recycling by collection at storefront) - Bring-Your Own Bag campaign - Reduction of distribution of free plastic bags - Handing over disposable chopsticks on request - Changing plastic shopping bags (materials) 〜						- Implementing waste disposal (Recycling resource waste) (Suitable waste disposal) (Container packaging recycling processing) - Use of recycled furnishing 〜	
- Introduction of energy conservation equipment 〜						- Use of recycled materials - Introduction of water conservation equipment - Introduction of energy conservation equipment - Use of heat insulated external wall - Smoke and soot measurement 〜	
		- No idling - Shared transportation and effective use of return trip - Review of distribution route - Tote box and hanger delivery - Improvement of material handling (Silencing handling and weight reduction) - Introduction of low pollution vehicles (Including DPF installation) 〜		- No idling - Review of distribution route - Tote box and hanger delivery - Introduction of low pollution vehicles (Including DPF installation) 〜			
						- Research and development of environmentally conscious products 〜	
						- EMS operation - ISO auditing and internal environmental auditing - External lecturers and preparation of environmental education materials for employees - Handling compliances - Thorough risk management 〜	
						- Preparation of environmental reporting and posters - Support for environmental protection organizations - Environmental donation activities 〜	

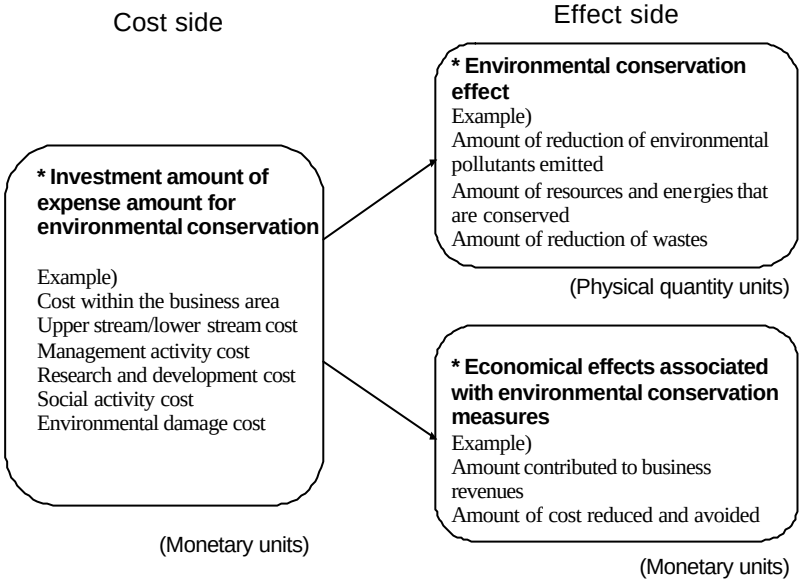
* This table lists as many environmental conservation activities as possible. Note that some items are applicable and some are not according to the company.

Step 3 Organizing effects and cost of environmental conservation activities

This section describes the effects and cost in environmental conservation activities.

The information that is handled in the framework of environmental accounting is arranged into three categories, information in monetary units, information in physical quantity units, and descriptive information.

Such information is arranged as following in the "Environmental Accounting Guideline (2000 Version)."



The "Environmental Accounting Guideline (2000 Version)" proposes two methods for measuring effects associated with environmental conservation measures. They are the <1> "physical quantity units" suitable for measuring (measuring) the amount of environment impact and the increase/decrease and the <2> "monetary units" suitable for measuring operation revenues that were obtained or reduction or avoidance of cost achieved by the company as a result of environmental conservation measures.

In this Guide, the effects and cost of environmental conservation activities in the distribution industry were arranged in the following categories.

- Expected effects corresponding to the original purpose of environmental conservation activities (effects associated with environmental conservation measures in the "Environmental Accounting Guideline (2000 Version)" such as resource circulation, global environmental conservation, pollution prevention, etc.)
- Effects that can be actually measured quantitatively with some method ("environmental conservation effects" in physical quantity units and "economical effects associated with environmental conservation measures" by monetary units)
- Cost that can be correlated with the "effects that can be measured" among the environmental conservation cost that was required for environmental conservation activities.

Among the "effects that can be measured" mentioned above, those that can be measured in physical quantity units are mainly applicable to "environmental conservation effects" and those that can be measured in monetary units are mainly applicable to "economical effect associated with environmental conservation measures" in the "Environmental Accounting Guideline (2000 Version)."

In the distribution industry with smaller investments in production facilities compared with the manufacturing industry, the cost for environmental conservation activities that are integrated with the normal operation becomes more noticeable. The "Environmental Accounting Guideline (2000 Version)" proposes a method that can be handled practically such as aggregation of balances and apportionment aggregation. A suitable measuring (measuring) method varies according to the purpose of environmental accounting introduction. Based on these circumstances, the Distribution Working Group initially arranged the effects that can be comparatively commonly recognized and then the cost that can be correlated to the effects. The next page shows the arrangement examples.

- Examples of effects and cost of environmental conservation activities in the distribution industry

[Example 1]

Operation flow: Environmental conservation activities achieved by cooperation and understanding of customers among those in the category of 3-2. Shop.

- Environmental conservation activity: Introduction of energy conservation equipment
- Expected effects: Effects related to global environmental conservation (prevention of global warming)
- Effects that can be measured
  (Physical quantity units): Reduction of the amount of energy consumed
  (Monetary units): Saving light and fuel expenses
- Cost correlated with the effects that can be measured among the environmental conservation cost
  Expenses required for introduction of energy conservation equipment, etc.
  (Difference between the cost of purchasing environmentally conscious products and the cost of purchasing existing products and facility cost, etc.)

[Example 2: Examples where multiple effects can be expected]

Operation flow: 4. Transportation and circulation

- Environmental conservation activity: No idling
- Expected effects: Pollution prevention (prevention of air pollution), global environmental conservation (prevention of global warming), and resource circulation (efficient use of resources)
- Effects that can be measured
  (Physical quantity units): Reduction of air pollutants, reduction of greenhouse gases, and reduction of fuel and consumption cost
  (Monetary units): Saving fuel cost
- Cost correlated with the effects that can be measured among the environmental conservation cost
  Cost for preparing posters and stickers for promotion movements and cost for purchasing key chains attached to the belts of drivers, etc.

[Example 3: "Economical effects by avoiding risks"]

Operation flow: 1-1. Own factory/2. Physical distribution center

- Environmental conservation activity: Control of septic tank
- Expected effects: Pollution prevention (water pollution control)
- Effects that can be measured:
  (Physical quantity units): Control of water quality pollutant (prevention of occurrence)
  (Monetary units): Saving the cost for recovering the river condition to the original condition
- Cost correlated with the effects that can be measured among the environmental conservation cost
  Cost required for installation and management of a septic tank (installation cost and management cost)

* *"Economical effects by avoiding risks" is not discussed in the report by the Distribution Working Group. See Chapter 1, "Report from Electronic and Electric Working Group" for the discussion of the economical effects.*

[Example 4: Management activity]

Operation flow: 1-1. Own factory/2. Physical distribution center/3-1. Shop/6. Head office

- Environmental conservation activity: EMS operation
- Expected effects and effects that can be measured (physical quantity units and monetary units): None
- Cost correlated with the effects that can be measured among the environmental conservation cost
  Cost required for operation of EMS (personnel cost, EMS operation cost, etc.)

* Cost required for commissioning "suitable waste disposal" and "suitable container packaging recycling disposal"

As a business operator, the distribution industry, while supplying products associated with container packages to consumers, is obliged to bear the cost required for commissioning "suitable waste disposal" and "suitable container packaging recycling processing" such as collection and recycling of various materials at storefronts. Under the circumstance, waste disposal measures in the distribution industry seem to attract much attention.

The cost required for commissioning "suitable waste disposal" indicates the cost paid for commissioning appropriate treatment of waste generated from the manufacturing factory, physical distribution center, shops, and head office to the processing operators of general business waste or industrial waste. The cost required for commissioning "suitable container packaging recycling disposal" indicates the cost required for reproduction commissioning that is paid to the specified corporation as regulated in the "Law for promotion of sorted Collection and Recycling of Containers and Packaging" (Containers and Packaging Recycling Law).

In the arrangement of this Guide, the "effects that can be measured" associated with environmental conservation activities such as "resource waste recycling" and "environmental consideration to packaging materials" are measured as "saving of the cost required for commissioning suitable waste disposal" and "saving of the cost required for commissioning product reproduction." However, the "cost required for suitable waste disposal" and "waste required for commissioning product reproduction" are not measured. Since these types of cost are definitely required in any business activities, various opinions were submitted in the meetings of the Distribution Working Group as to whether they are to be included as environmental accounting cost. The handling of these types of cost varies according to the purpose of introducing environmental accounting. However, since the items cannot be ignored in the distribution industry, they are handled as one of the "implementing waste disposal" in Table 2, "Environmental conservation activity summary sheet."

Step 4 How to Proceed with Actual Operation for Installation of Environmental Accounting

This section describes how to collect environmental accounting information regarding environmental conservation activities that are actually tackled by company. The collection procedure is as follows.

1) Clarify the environmental conservation activities that are actually tackled by the company. (See Section 2.3 in Step 2.)
2) Organize the effects and cost of the environmental conservation activities that were clarified in 1) according to the summarization method that was introduced in "Step 3, Organizing effects and cost of environmental conservation activities."
3) Collect actual information as indicated in 2).

In information collection, it is advisable to organize environmental accounting information that is considered to be important for individual environmental conservation activities. The type and the form of the information that is organized vary according to the company. The example that is introduced in this Guide uses the "environmental conservation activity card" that is shown on the next page. The following items can be entered in the "environmental conservation activity card" that is introduced here:

- Expected effects
- Effects that can be measured (physical quantity units and monetary units)
- Cost that can be correlated with the effects that can be measured among the environmental conservation cost

In addition, the following items can be entered.

- Method of measuring data
- Source of data
- Issues and problems in assessing effects and cost
- Focusing point of descriptive information and actual examples

Such environmental accounting information is organized in one card for each environmental conservation activity. These cards may be useful tools for those who proceed with actual operation. By storing this information in databases, users may be able to analyze the information easily.

Entry example

[Environmental Conservation Activity Card]

Internal Control No.	

Operation flow	Major classification	3. Shop
	Medium classification	3.2 Conservation activities achieved by cooperation and understanding of customers among the shop activities

a. Environmental conservation activity	Installation of energy conservation equipment

b. Expected effects	
	Effects related to global environmental conservation (prevention of global warming)

c. Effects that can be measured	
(Physical quantity units)	Reduction of the amount of energy consumption
(Monetary units)	Saving light and fuel expenses

d. Cost that can be correlated to the "c. Effects that can be measured" among the environmental conservation cost	
(Monetary units)	Expenses required for introduction of energy conservation equipment (Difference between the cost of purchasing environmentally conscious products and the cost of purchasing existing products and facility cost, etc.)

e. Supplementary information	
1. Method of measuring data	[Effect] Measured based on the amount of reduction in the consumption of electricity and gas, etc. [Cost] Measured by the difference between the cost of purchasing environmentally conscious products and the cost of purchasing existing products
2. Source of data	■ Office (shop, etc.) □ Head Office □ Others
3. Issues and problems in assessing effects and cost	[Effect] Measuring quantitative effects (physical quantity units) is difficult. The values often have large differences with catalog values.
4. Focusing point of descriptive information and actual examples	● Describe the fact that the activity is achieved by cooperation and understanding of customers. ● Describe also the improvement rate as well as the amount of improvement. ● Describe the actual tasks. ● Stipulation of the emission coefficient used for calculation of the greenhouse gas reduction effect is necessary. ● There are various ways in handling the case where the purchasing cost of the existing products is higher than the purchasing cost of environmentally conscious products.

* Example of "Environmental conservation activity card" (see the previous page)

The following items can be entered in the "environmental conservation activity card" that is introduced in this Guide for (a) each environmental conservation activity as described in the previous chapter:

- Expected effects (b)
- Effects that can be measured (physical quantity units and monetary units) (c)
- Cost correlated to the effects that can be measured among the environmental conservation cost (d)

In addition, the following items can be entered.

- Method of measuring data (e1)
- Source of data (e2)
- Objectives and problems in assessing effects and cost (e3)
- Focusing point of descriptive information and actual examples (e4)

Information on (b), (c), and (d) that is described in the "environmental conservation activity card" is described in the previous chapter.

(e1) to (e4) are summary examples of environmental accounting information. These items are considered to be important. The items are assumed to be entered under the following viewpoints:

<Method of measuring data (e1)>

This item describes how to actually measure the information indicated in (b), (c), and (d). For instance, the item describes the aggregation know-how such as "Measured based on the amount of reduction in the consumption of electricity and gas" and "Measured by the difference between the cost of purchasing environmentally conscious products and the cost of purchasing existing products."

<Source of data (e2)>

This item is designed so that users can sequentially check the source of the data.

<Issues and problems in assessing effects and cost (e3)>

This item describes issues and problems for the items that cannot be easily measured as the actual quantities although the methods of concrete effects and cost for environmental conservation activities could be captured.

<Focusing point of descriptive information of actual examples (e4)>

This item describes the contents that could not be explained in (e1), (e2), and (e3) and the supplements.

The tasks that cannot be measured quantitatively should be indicated descriptively. It is also convenient to introduce methods for avoiding the expression that may cause misunderstanding in the task such as "Describe also the improvement rate as well as the amount of improvement" and "compare the environmental impact reduction amount per sheet of paper."

Step 5. How to organize environmental accounting information

After collecting information on the effects and cost of environmental conservation activities that are tackled by the company, organize the information so that users can understand the information easily, based on the purpose of introducing environmental accounting.

This Guide shows some examples of how to organize the information using the "environmental conservation activity card" according to the purpose and usage, by actually using the column (operation flow) and row (individual measures) of the "environmental conservation activity summary sheet". It is important to accurately explain how to utilize the result that was organized and what can be detected from environmental accounting, not simply aiming for summary of environmental accounting.

5.1 Organizing Environmental Accounting Information in the Entire Business Activity Range of the Company

* Assumed purpose →	To express the summation (outline) of the environmental conservation activities that are tackled by the company

The common objective of introduction of environmental accounting is to improve the efficiency and enhance the effects of environmental conservation tackled by the company. To achieve the objective, it is important to measure the actual cost spent for the environmental conservation activities that have been implemented so far and the effects that have been achieved by the activities.

Based on this, this Guide introduces an example of organizing environmental accounting information that was collected by capturing the business activity range of the company. Clarify the business activity range of the company and environmental conservation activities according to the procedure described in "Step 2. Measuring environmental conservation activities in the distribution industry". Then, organize and summarize environmental accounting information that was collected in "Step 4. How to Proceed with Actual Operation for Installation of Environmental Accounting." The aggregation format should be created in the format that can express individual information most appropriately.

As an example, Figure 4 shows a company that is commissioning manufacturing of private brand products and using outsourcing for physical distribution. The sections indicated by ■ belong to the business activity range of the company. The procedure is as follows: <1> Clarify the business activity range and environmental conservation activities of the company, and then <2> organize and aggregate environmental accounting information in each environmental conservation activity.

5.2 Reorganizing Environmental Accounting Information by Changing the Expression Method

Section 5.1 showed an example of organizing environmental accounting information that was collected by capturing the entire business activity of the company. Environmental accounting is not completed by creation of a table. It is important to organize the information so that users can understand the purpose of classification and organization of the environmental accounting information and what can be detected from the table.

a. For instance, reorganize the information by the purpose of environmental conservation.

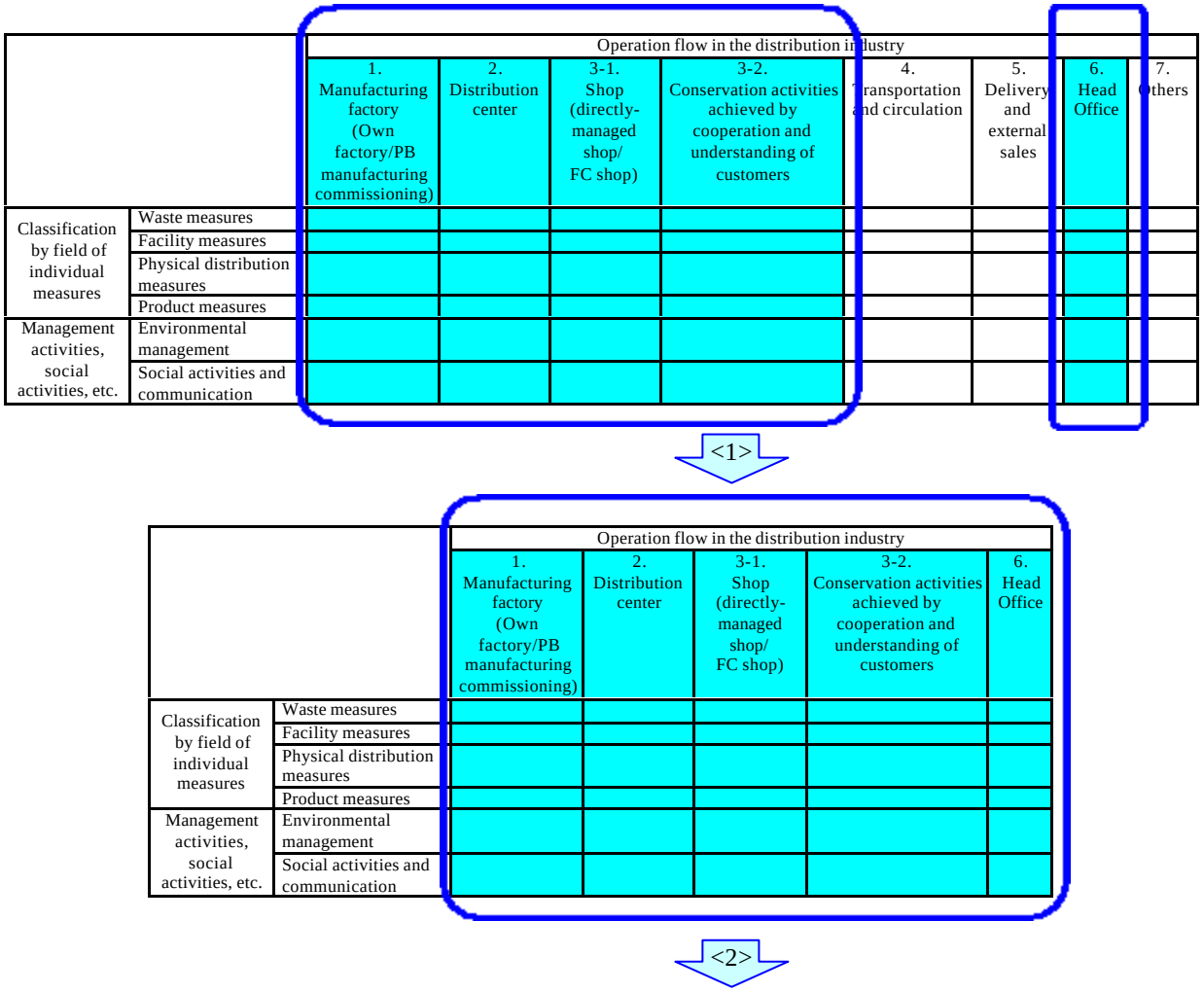
* Assumed purpose →	Organize the tasks of the company by the environmental conservation purpose and indicate the cost effectiveness internally and externally.

In Section 5.1, which introduces the procedure for organizing environmental accounting by capturing the entire business activity range of the company, Figure 4 shows an example of the aggregation by "classification by field of individual measures" after capturing the entire business activity range of the company. There are some more activity classification methods other than "classification by field of individual measures."

The "Environmental conservation activity card" that introduced in "Step 4 How to Proceed with Actual Operation for Installation of Environmental Accounting." For instance, there is an item called "expected effects." By organizing environmental conservation activities based on the information, tasks can be classified for each environmental conservation purpose (see Figure 5). As an example of classification format by environmental conservation purpose, the format presented in the "Environmental Accounting Guideline (2000 Version)" can be mentioned.

Figure 4 Capturing environmental accounting information in the entire range of business activity of the company

(Example: Company that is manufacturing and selling private brand products through OEM and outsourcing physical distribution)

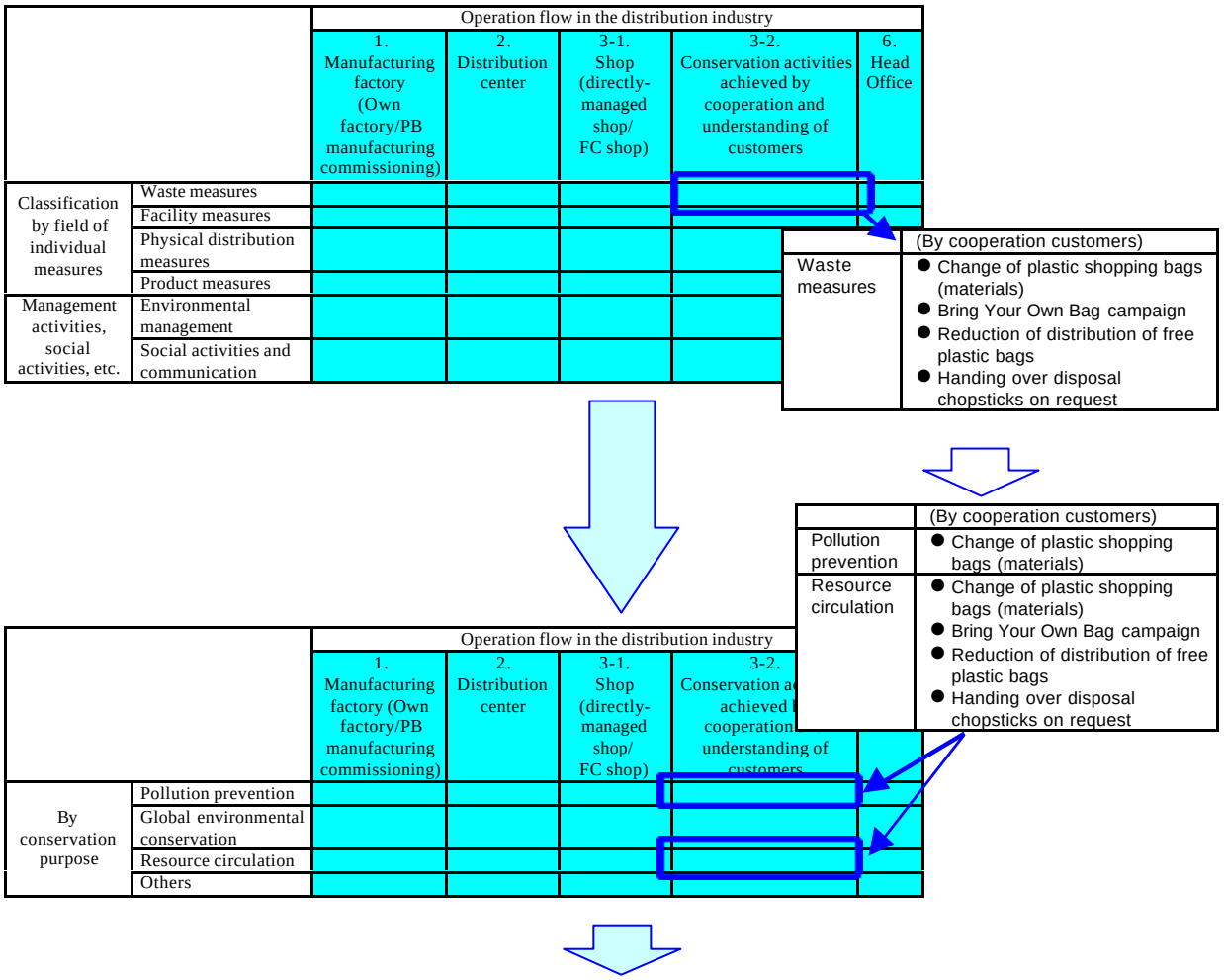


Organize environmental accounting information's for the environmental conservation activity and fill in the column.
(An example format organized according to the field of the measures)

		Content of main tasks	Environmental conservation cost	Environmental conservation effects	Economical effects associated with environmental conservation measures	Descriptive information
Classification by field of individual measures	Waste measures					
	Facility measures					
	Physical distribution measures					
	Product measures					
Management activities, social activities, etc.	Environmental management					
	Social activities and communication					
"Environmental conservation activity card" (Reference)		*a.*	*d.*	*c. (Physical quantity units)*	*c. (Monetary units)*	*e.*

Figure 5 Example of describing a different classification method

(Classifying the example shown in Figure 4 according to its environmental conservation purposes)



Organize environmental accounting information for the environmental conservation activity and fill in the column.

(An example format organized according to conservation purposes)

		Contents of main tasks	Environmental conservation cost	Environmental conservation effects	Economical effects associated with environmental conservation activities	Descriptive information
By conservation purposes	Pollution prevention					
	Global environmental conservation					
	Resource circulation					
	Others					
"*Environmental conservation activity card*" *(Reference)*		*a.*	*d.*	*c. (Physical quantity units)*	*c. (Monetary units)*	*e.*

b. Re-organize the information focusing on a specific department.

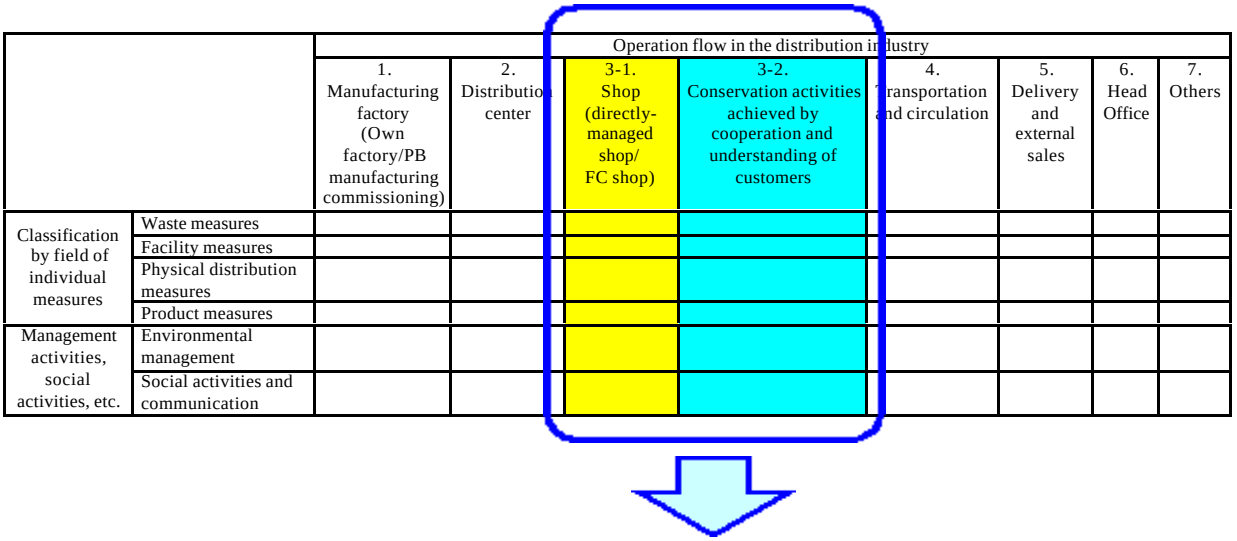
* Assumed purpose → Organize the cost and effects of a fixed period related to environmental conservation for each department and shop and implement more efficient environmental conservation measures in the future.

Items b, c, and d can be mainly used for organizing information for internal management.

When an administrator starts a new task, the aggregation of each department will be useful for providing a viewpoint for discovering the tasks such as for the administrator to discover the most efficient way of allocating the budget to each shop or for the manager of each shop to discover the effects achieved by the budget that was allocated. In addition, by taking up and indicating familiar tasks such as environmental conservation activities achieved in cooperation with customers, more understanding may be gained from shop attendants, promoting further environmental conservation activities.

Figure 6 Example of focusing on a specific department

(Example: Cost and effects associated with environmental conservation are organized for each shop)



		Operation flow in the distribution industry							
		1. Manufacturing factory (Own factory/PB manufacturing commissioning)	2. Distribution center	3-1. Shop (directly-managed shop/ FC shop)	3-2. Conservation activities achieved by cooperation and understanding of customers	4. Transportation and circulation	5. Delivery and external sales	6. Head Office	7. Others
Classification by field of individual measures	Waste measures								
	Facility measures								
	Physical distribution measures								
	Product measures								
Management activities, social activities, etc.	Environmental management								
	Social activities and communication								

(Example of organizing information on environmental conservation activities achieved by cooperation from customers)

	Amount used		c. Effects that can be measured		d. Cost that can be correlated to c.	Descriptive information, etc.	Evaluation and checking
	(Target)	(Result)	(Physical quantity units)	(Monetary units)			
Installation of energy conservation equipment (Shop A)							
Electricity [kWh/m²]							
Gas [m³/m²]							
Water [m³/m²]							

	Amount recovered		Recovered rate		c. Effects that can be measured		d. Cost that can be correlated to c.	Descriptive information, etc.	Evaluation and checking
	(Target)	(Result)	(Target)	(Result)	(Physical quantity units)	(Monetary units)			
Recycling recovered at the store (Shop A)									
Tray recycling									
PET bottle recycling									
Milk carton recycling									
Tin can recycling									

c. Re-organizing information focusing on a specific measure.

* Assumed purpose →	Provide the information required for reviewing the waste disposal cost and recycling commissioning cost.

Organization of information focusing on individual measures will be effective for an administrator to decide the task to be focused on. For instance, by focusing on a waste measure that is attracting much attention in the distribution industry and analyzing the measure by focusing on the individual tasks can be one of the indicators of administrative judgment for future plan for the tasks.

The detail format varies according to the focus point. Selected information needs to be organized to help users to analyze the information.

Figure 7 Example of focusing on a specific measure

(Example: Organizing the information focusing on a waste measure)

		Operation flow in the distribution industry							
		1. Manufacturing factory (Own factory/PB manufacturing commissioning)	2. Distribution center	3-1. Shop (directly-managed shop/ FC shop)	3-2. Conservation activities achieved by cooperation and understanding of customers	4. Transportation and circulation	5. Delivery and external sales	6. Head Office	7. Others
Classification by field of individual measures	Waste measures								
	Facility measures								
	Physical distribution measures								
	Product measures								
Management activities, social activities, etc.	Environmental management								
	Social activities and communication								

Measure	Environmental conservation activity
Waste measure	Recycling recovered at the store

Depart name/ shop name	c. Effects that can be measured		d. Cost that can be correlated to c.	Descriptive information, etc.	Evaluation and checking
	(Physical quantity units)	(Monetary units)			
Distribution center					
Shop A					
Shop B					
Shop C					
Head Office					

* The above example is one of the format examples mainly for internal management. It is advisable to design other formats also, rather than being restricted to those indicated above.

d. Re-organize information focusing on a specific measure in a specific department.

* Assumed purpose → Measure the contents of the task related to a waste measure in the environmental conservation activity achieved by cooperation and understanding of customers.

In this section, capture the information from the viewpoints of b and c and analyze the cross section.

For instance, when the labor cost required for recycling activities at the shop is considerably high and the improvement measure is being examined, it may be important, in terms of internal management, to analyze what the differences are between the shop that is carrying out efficient recovery and the shop that is not.

Figure 8 Example of focusing on a specific measure

(Example: Waste processing measure that is achieved in cooperation and understanding with customers)

		Operation flow in the distribution industry							
		1. Manufacturing factory (Own factory/PB manufacturing commissioning)	2. Distribution center	3-1. Shop (directly-managed shop/ FC shop)	3-2. Conservation activities achieved by cooperation and understanding of customers	4. Transportation and circulation	5. Delivery and external sales	6. Head Office	7. Others
Classification by field of individual measures	Waste measures								
	Facility measures								
	Physical distribution measures								
	Product measures								
Management activities, social activities, etc.	Environmental management								
	Social activities and communication								

Environmental conservation activity	c. Effects that can be measured		d. Cost that can be correlated to c.	Descriptive information, etc.	Evaluation and checking
	(Physical quantity units)	(Monetary units)			
Recycling recovered at the store					
Bring Your Own Bag campaign					
Reduction of distribution of free plastic bags					
Handing disposal chopsticks on request					
Change of plastic shopping bags (materials)					

* The above example is one of the format examples mainly for internal management. It is advisable to design other formats also, rather than being restricted to those indicated above.

Summary

As described above, we have organized the concepts that may be useful for companies in the distribution industry to tackle environmental accounting as a "Guide to Introduction of Environmental Accounting."

The method and target for measuring (measuring) the effects and cost of environmental accounting may vary according to the purpose of introducing environmental accounting. However, the basic procedure, which is to collect and organize environmental accounting information after checking overview of the operation flow of the company and corresponding environmental conservation activities, can be used by any industry, as well as the distribution industry.

This Guide introduced actual environmental conservation activities and an example of the concepts of the effects and cost. Use the examples shown in this Guide to find out what information is requested by users and in what form the information is presented in each company. Accumulation of practical implementation in various forms will contribute to further development of environmental accounting, as well as tasks to environmental accounting in the distribution industry in the future.

Chapter 3
Report from the Food Working Group

Task of Segment Environmental Accounting Focusing on the Material Flow

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Chapter 3 Report from the Food Working Group

Task of segment environmental accounting focusing on the material flow

1. Issues to Be Examined by the Food Working Group

(1) Purpose of establishing the Food Working Group

As a basic guideline for environmental accounting, the "Environmental Accounting Guideline (2000 version)" issued by the Ministry of the Environment indicates the basic attitude of giving flexible consideration to the operation of various business types and emphasizes the standardization of principles to be commonly utilized.

Since the release of the "Environmental Accounting Guideline (2000 version)", many companies have stared to introduce environmental accounting, while in the food industry, only specific categories of businesses and large companies are executing it.

The Food Working Group, established inside of the "Study Group on Practical Matters for Introducing Environmental Accounting", aims at the following objectives, based on the basic attitude of the Guideline (2000 version).

<1> Spread further environmental accounting technique in the food industry.

<2> Intensify the discussion about environmental accounting and examine new styles of use, applicable for other industries.

The food industry includes various business categories such as food manufacturing industry, food distribution industry, and food service industry. Since most of the members of the Study Group come from the food manufacturing industry, the discussions by the Study Group focus on the food manufacturing industry.

(2) Selecting environmental characteristics and discussion theme of the food manufacturing industry

The "Environmental Accounting Guideline (2000 version)" defines environmental accounting as a mechanism that enable enterprises to measure, analyze and announce the cost for environmental conservation in business activities and the effects quantitatively (monetary units or physical quantity units) as much as possible – effects that were achieved by the activities – for promoting the tackling of environmental conservation efficiently and effectively while maintaining the friendly relationship with the society in order for sustainable development.

Furthermore, the Guideline (2000 version) indicates the flow of the identification, analysis, and announcement of environmental accounting information handled in the entire company: as well as the idea, "Partial introduction (in the unit of site, business department, managerial item, etc.), which gradually widens the range of item, summary and release, is also effective if the objective for the utilization is clear."

Referring to the concept of the Guideline (2000 version), the Food Working Group discussed the Group's purpose of the examination of the food manufacturing industry that is the most progressive in terms of installing environmental accounting and has carried out the following examination based on the environmental characteristics of the food manufacturing industry.

Figure 1 shows a model of the material flow of the food manufacturing industry by dividing the flow into a business area and its upstream and downstream components. In the introduction of environmental accounting, initially the business range of the company is to be defined, and in the range, the environmental conservation costs and effects associated with the business activities should be measured. The range will be set by placing the business area in the center of the whole area. It is necessary to consider whether there are any business activities, which would cause environment impacts from the upper stream (companies that has a raw material manufacturing departments) and from the lower stream (handling waste and reused products after use).

In terms of the material flow, energy and water consumption, exhaust and processing of byproducts, container packaging and other waste are assumed to be the main cause of environmental problems in the processes of food manufacturing.

In the food manufacturing industry, because of its characteristics of producing food, safety and sanitation in the manufacturing processes and products as well as the food safety for consumers are emphasized.

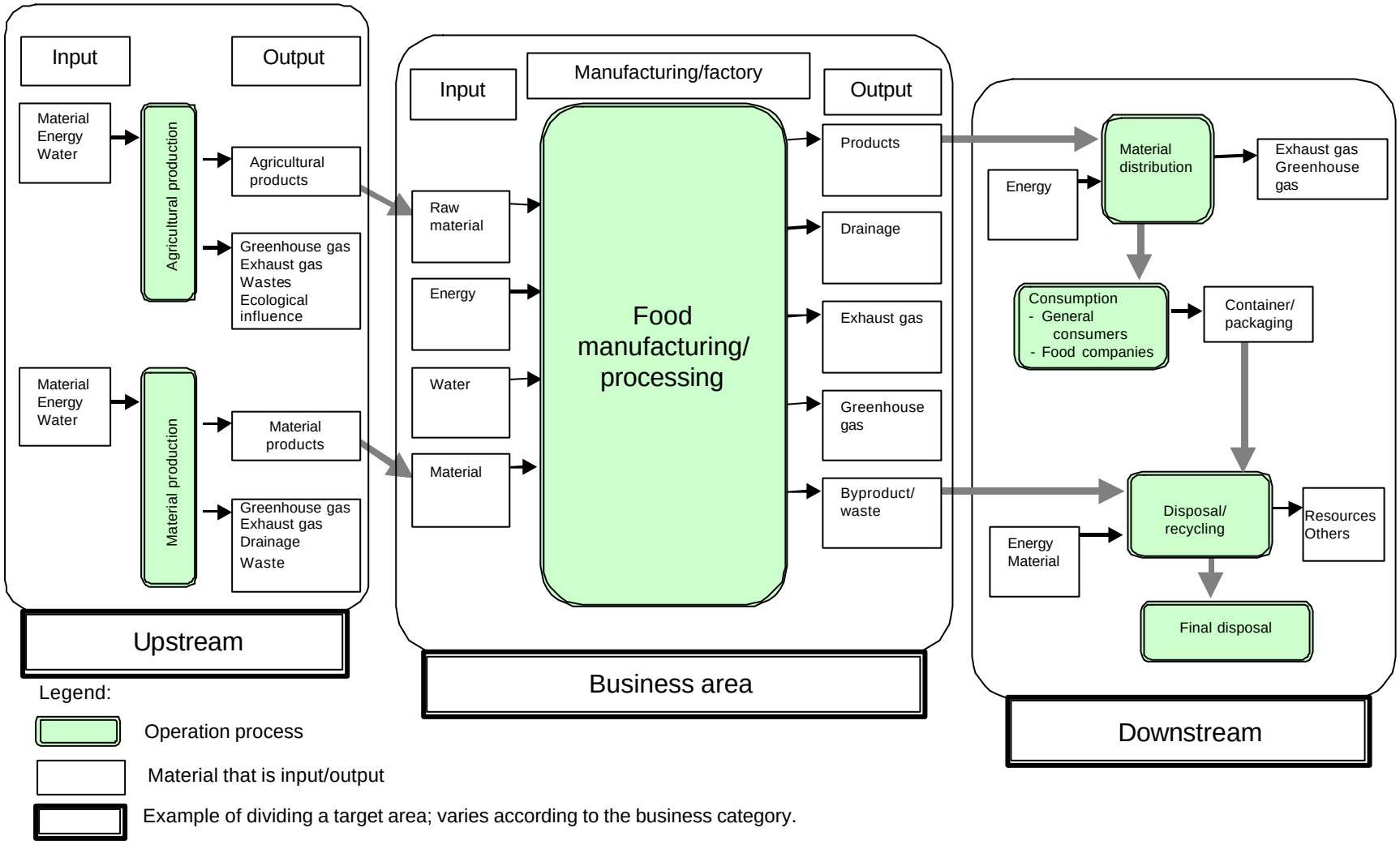
The food manufacturing industry is considered to have comparatively low environmental impact due to the reduced usage rate of chemicals and low amount of carbon dioxide emission compared to other manufacturing industries. At the same time, at the stage of preservation and packaging, the view points of being safe, sanitary, and convenient for users are important, as well as environmental conservation.

Since foods are familiar day-to-day items, consumers are quite interested in the attitude and activity of a company toward environmental conservation. The way of tackling environmental conservation by each food manufacturing company has a feature of handling many schemes that attract much social attention such as efficient use of raw materials, reduction of the use of energy and water and the amounts of byproducts, and recycling. In addition, it is required to comply with Container and Packaging Recycling Law and Food Recycling Law and it is necessary to present such tasks to consumers in a transparent manner.

In addition, the food manufacturing industry includes many small companies. Therefore, to expand environmental accounting in the industry, it can be meaningful to examine a technique for introducing environmental accounting in stages by focusing on a specific section in terms of the ease of use and the effectiveness for the internal use, as well as the technique for measuring for the entire company.

Considering these points described above, the Food Working Group decided to focus on the possibility and effectiveness of partial environmental accounting after organizing the relationship between business activities and environmental conservation of a company as the Group's target for the examination.

Figure 1 Material flow of the food manufacturing industry



2. Introduction and Utilization of Environmental Accounting

(1) Introduction patterns of environmental accounting

The following introduction methods are assumed for environmental accounting (see Figure 2).

<1> Corporate Environmental Accounting: The main objective is to measure environmental accounting of the entire company

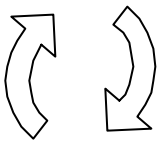
<2> Segment environmental accounting: The target unit of environmental accounting is each site or division, or some business activities or projects

The Guideline (2000 version), mainly targets corporate environmental accounting, indicates that partial introduction (in the unit of site, division, or management item) and subsequent expansion of environmental accounting are effective if the purpose of the utilization is clear.

Figure 2 Relational diagram of corporate environmental accounting and segment environmental accounting (1)

<table>
<tr><td colspan="3">Corporate environmental accounting</td></tr>
<tr><td colspan="3">Measure the cost and effects of environmental conservation of the entire company (group)

<Reference material>
● "Environmental Accounting Guideline (2000 version)" etc,</td></tr>
<tr><td>From partial to entire area as the first step of introduction

<Reference material>
● “Environmental Accounting Manuals for the Food Manufacturing Industry - First Step Guide” issued by the Ministry of Agriculture, Forestry, and Fisheries, etc.</td><td>  </td><td>From Part to Total by focusing on a specific issue</td></tr>
<tr><td colspan="3">Segment environmental accounting</td></tr>
<tr><td>[the unit of department]

● The following may be the reasons for starting segment environmental accounting.
1) Since the entire image is difficult to measure, an area group such as a factory or a specific manufacturing process is targeted.
2) A site that is assumed to have many issues is focused and the points to be improved are extracted.

<Reference material>
● "Environmental Accounting Guideline (2000 version)"
● This report, etc.</td><td colspan="2">[the unit of measure]

● The following may be the reasons for starting segment environmental accounting.
1) A measure that is to be tackled urgently is selected and measured.
2) A small area such as each measure is targeted in order to clarify the cause in the process of solving some issues.

<Reference materials>
● "Environmental Accounting Guideline (2000 version)"
● This report, etc.</td></tr>
<tr><td colspan="3">Note: It contains many common items in terms of partial introducing.</td></tr>
</table>

As shown in Figure 2, there are two methods for introducing segment environmental accounting:

- Mainly focusing on a specific section because of the ease of introduction
- Focusing on a specific section for solving administrative issues

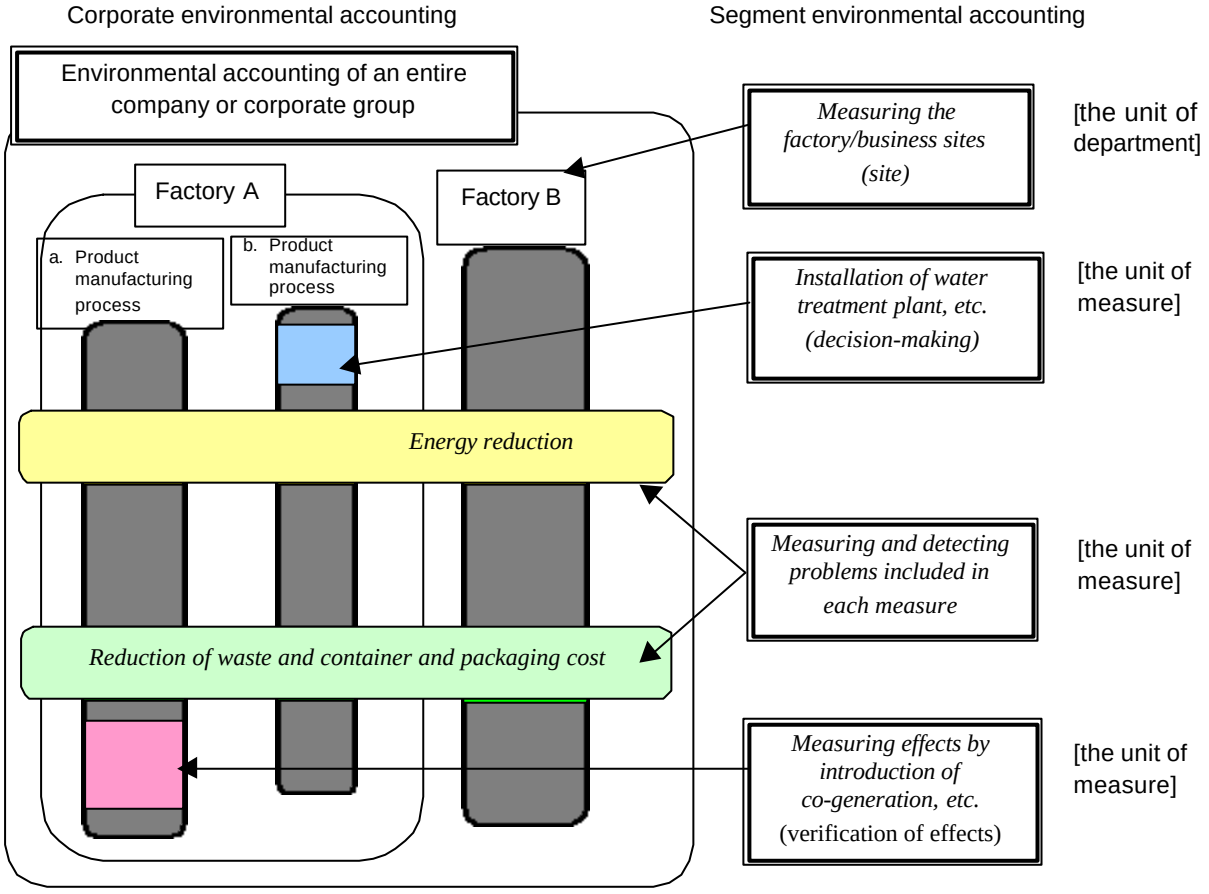
First method applies to an introductory stage of environmental accounting and will be a trigger for future development to corporate environmental accounting.

Second one aims to solve various problems existing in the company and, in many cases, a company that has already introduced corporate environmental accounting tackles the task as the next development.

Figure 3 shows the differences between corporate environmental accounting and segment environmental accounting in a model format.

There are two types of segment accounting, <1> environmental accounting, introduced by targeting a small section such as a factory or a business site is applicable to [the unit of department] in the diagram and <2> environmental accounting that is focused on the section of each issue for solving problems is applicable to [the unit of measure] in the diagram. In the process of analysis of the current condition or extracting issues for preparing segment environmental accounting [the unit of measure], a case of organizing environmental accounting information targeting a small section such as a factory and a manufacturing process can also be assumed.

Figure 3 Relationship between corporate environmental accounting and segment environmental accounting (2)



(2) Features of segment environmental accounting

Segment environmental accounting can be implemented easily, since the target is selected. This is an advantage for small to medium companies. In addition, if segment environmental accounting is created by focusing on major processes of small to medium companies, the information tends to outline the environmental accounting information of the company. In this sense, segment environmental accounting is significant.

It is predicted that many companies, trying to introduce segment environmental accounting for solving problems, would often be engaged in the task as the application stage of corporate environmental accounting. A general procedure for building corporate environmental accounting is to organize information for each process, summarize the information for each site, and organize the result as the information of the entire company. Problems may be detected during the process. Therefore, each information item that is used as the basis for creating corporate environmental accounting can also be used for segment environmental accounting.

However, although segment environmental accounting may trigger the development of corporate environmental accounting, previous experiences in segment environmental accounting are not necessarily essential for introducing corporate environmental accounting to be introduced.

(3) Segment environmental accounting as an introductory stage

As the Guideline (2000 version) recommends staged introduction of environmental accounting, it is a practical method for a company, which is introducing environmental accounting for the first time, to expand the introduction range in stages. In this case, the company would have many means to select the unit to introduce the environmental accounting, such as the unit of site/division/department, and manufacturing line. It is also possible to organize information by focusing on the major environment impact within a range.

"Environmental Accounting Manual for Food Manufacturing Industry - First Step Guide" issued by the Ministry of Agriculture, Forestry, and Fisheries is available as the guide for introducing environmental accounting focusing on main environmental impacts. This manual focuses on energy consumption, emission of carbon dioxide, use of water, water pollution, waste disposal, and container packaging.

Enquiries for the "Environmental Accounting Manual for Food Manufacturing Industry - First Step Guide"

Food Marketing Research and Information Center
Telephone: ++81-(0)-3-5567-1991

(4) Segment environmental accounting for solving issues

Segment environmental accounting can be used for identifying a section that is considered to have problems and solving them by controlling the specific section.

Specifically, segment environmental accounting can be used as a tool for detecting and solving the following problems.

- Extraction of significant problems in the site unit
- Detection of inefficiency in business activities (pursuing efficient use of cost and raw materials)
- Examination of expected effects from individual environmental conservation measure and decision-making (prior evaluation)
- Assessment and verification of the effects achieved by individual environmental conservation measure (post evaluation)

"To use segment environmental accounting for these purposes is applicable to one of the internal functions of environmental accounting, however, segment environmental accounting can also be used as an external function by announcing the information that is attracting extensive social interest.

The differences between corporate environmental accounting and segment environmental accounting are described in Section 2, "Introduction and Utilization of Environmental Accounting." The following sections mainly show the examination results of the techniques for building segment environmental accounting to solve problems. In terms of partial introduction, to install segment one would be useful for building environmental accounting. Segment environmental accounting has many parts, applicable to environmental accounting that measures activities in the unit of department, such as regarding the site.

3. The Procedure to Introduce Segment Environmental Accounting for Solving Problems

The following diagram shows the procedure for each company to measure the significant problems of each section to be solved, to apply environmental accounting to the sections, and to proceed to environmental conservation measures while managing both the costs and effects.

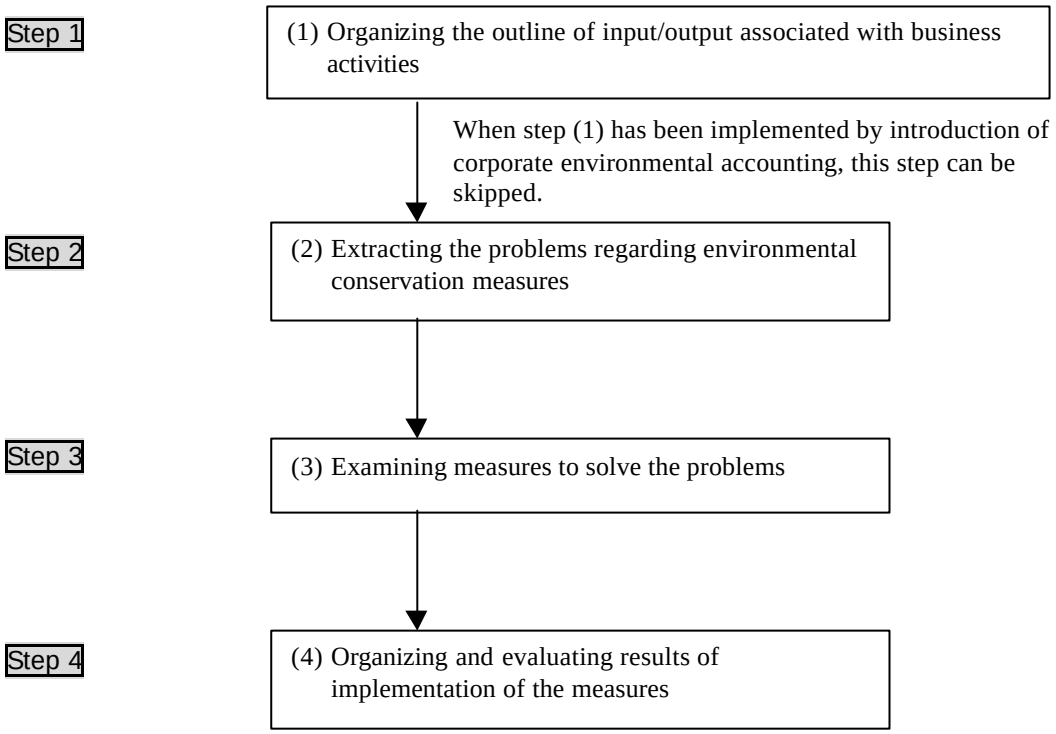


Figure 4 Flow of introduction of segment environmental accounting for solving problems

Step 1

(1) Organizing the outline of input/output associated with business activities

Firstly, organize the items that are input (submitted) and output (emitted) of the business activities flow and each process to measure the connection between business activities and the environment.

It is useful to measure which and how many items are input or output and how much cost is required from that input/output for judgment of the degree of connection and influence of the input/output on business activities (administration).

Therefore, measure the amount and cost of input/output as much as possible. If it is difficult to identify the amount and cost from each process, as another approach to do it on the basis of the entire business.

a. Measuring the entire image of business activities and creating an operation flow

Firstly, decide on which range segment environmental accounting is to be introduced in the entire business activities (see Figure 1 Material flow of food manufacturing industry).

Secondly narrow down the targets to the factory, process, or product, which would have businesses to deal with as well as problems to be solved.

After setting the range, create a simple operation flow of it. The manufacturing flow should be divided so as to extract problems of Step 2 in Figure 4.

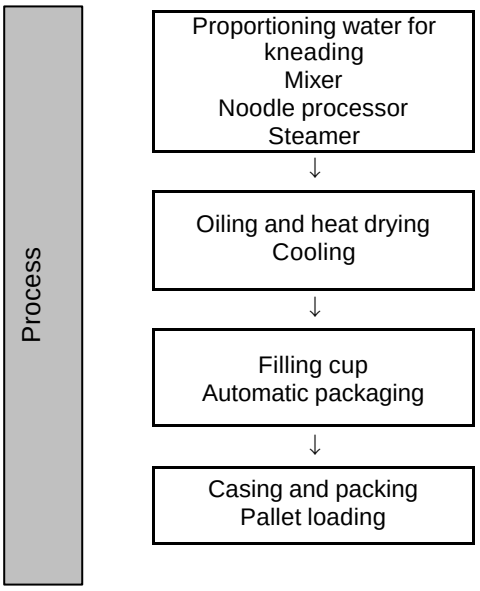


Figure 5 Operation flow (Example: Fried noodle manufacturing factory)

b. Measuring the amount and cost of the items that are input/output

Itemize the resources that are input to each process and items that are output from each process in the operation flow created in a. Input includes raw materials and energy. Output includes emitted gases, drained water, byproducts, and waste.

After that, identify the amounts and the cost as shown in Table 1.

The cost includes the cost for purchasing resources, disposing and recycling waste such as food byproducts and container packaging, and it can also include associated labor cost (see [Reference] Example of cost items associated with input and output in factory b of beverage manufacturer A).

Collect the available information on the items and the amounts that are input or output and the associated cost in possible units. If the information cannot be easily collected by process, measure the information on a larger unit such as the entire business.

Collecting year-to-year data helps clarification of the trend. Also, it is important to collect information continuously under the same methodology in order to identify issues. (Reference the concept of selecting issues: Example 2.)

If the amount and cost of input and output change as the result of environmental protection measures, the changes mean "environmental conservation effects" and "economical effects associated with environmental conservation" in (4) "Organizing and evaluating the results of implementation of measures"

The company that has already implemented an environmental management system can use the result of identification of environmental aspects. Another suggestion is to collect information on input/output (items, amounts, associated cost) by selecting the target according to the purpose of using environmental accounting.

Table 1 Image of organizing input and output (Example: Fried noodle manufacturing)

Input			Process	Output			
Type	Amount	Cost		Type	Amount	Processing method	Cost
• Raw material	Kg	Yen	Proportioning water for kneading Mixer Noodle machine Steamer	◆ Byproduct/waste		◆ Byproduct/waste disposal	
• Water	t	Yen		- Carton box	Kg	- Recycling (used paper)	Yen
• Electric power	KWh	Yen		- Paper bag	Kg	- Recycling (used paper)	Yen
• Steam	t	Yen		- Plastic bag	Kg	- Incineration	Yen
				- Noodle scrap	Kg	- Recycling (animal feed)	Yen
				◆ Exhaust	m^3	◆ Releasing to the surrounding environment	
				◆ Drainage (including that of raw materials)	m^3	◆ Drainage treatment	Yen
				◆ Exhaust heat	Kcal	◆ Releasing to the surrounding environment	
• Frying oil	t	Yen	Drying by oil heat Cooling	◆ Byproduct/waste		◆ Byproduct/waste disposal	
• Steam	t	Yen		- Noodle scrap	Kg	- Recycling (animal feed)	Yen
• Electric power	KWh	Yen		◆ Drainage	m^3	◆ Drainage treatment	Yen
• Water	m^3	Yen		◆ Exhaust (including odor)	m^3	◆ Releasing to the surrounding environment	
				◆ Exhaust heat	Kcal	◆ Releasing to the surrounding environment	
• Cup/lid	Kg	Yen	Filling cup Automatic packaging	◆ Byproduct/waste		◆ Byproduct/waste disposal	
• Soup	t	Yen		- Carton box	Kg	- Recycling (used paper)	Yen
• Ingredients	t	Yen		- Cup/lid scrap	Kg	- Incineration	Yen
• Electric power	KWh	Yen		- Noodle scrap	Kg	- Recycling (animal feed)	Yen
• Packaging	t	Yen		- Soup scrap	Kg	- Incineration	Yen
• Stamp ink	t	Yen		- Ingredient scrap	Kg	- Recycling (animal feed)	Yen
• Double-sided tape	Kg	Yen		- Plastic bag	Kg	- Incineration	Yen
				- Scrap from (external) packaging	Kg	- Returning to the supplier	Yen
				- Scrap of double-sided tape	Kg	- Incineration	Yen
				◆ Exhaust	m^3	◆ Releasing to the surrounding environment	
				◆ Exhaust heat	m^3	◆ Releasing to the surrounding environment	
• Case/tray	pieces	Yen	Casing Loading on pallet	◆ Byproduct/waste		◆ Byproduct/waste disposal	
• Adhesive	Kg	Yen		- Carton box	Kg	- Recycling (used paper)	Yen
• Electric power	KWh	Yen		- Tray scrap	Kg	- Incineration	Yen
				- Adhesive residue	Kg	- Incineration	Yen
				- Wood pieces and wood chips	Kg	- Incineration	Yen
				◆ Exhaust	m^3	◆ Releasing to the surrounding environment	

[Reference] Example of the cost items associated with input and output in factory b of beverage manufacturer A

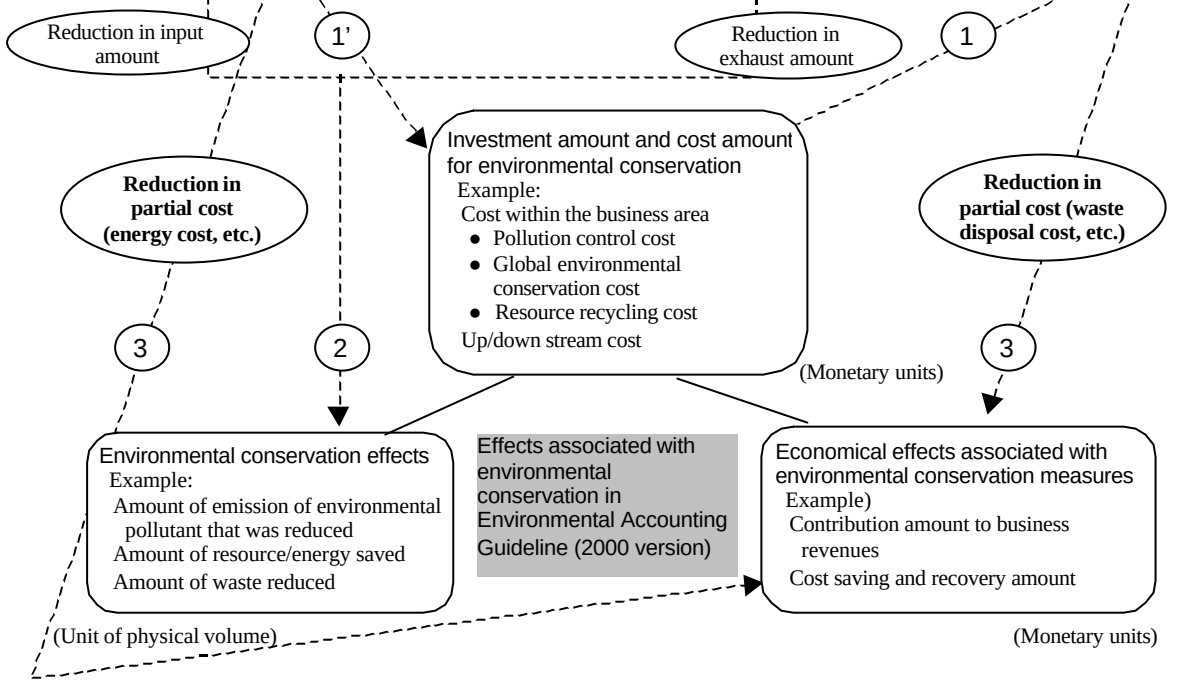
Cost items associated with input		
Raw material cost		Coffee Tea Milk Sugar, etc.
Submaterial cost	Submaterial cost	Cornstarch, etc.
	Container & packaging cost	Steel container Aluminum container Bottle PET bottle Cap Paper cup Label, etc.
	Packing material cost	Carton box Plastic case, etc.
	Material cost for facility operation	Machine oil, etc.
Water rate		Industrial water Clean water, etc.
Fuel cost		Electric power City gas Kerosene Natural gas (for automobile) Petrol (for automobile) Light oil (for automobile), etc.
Other cost	Material cost for recycling	Used container collecting bag Recycling box, etc.

Cost items associated with output		
Waste disposal cost	Processing cost	CFCs depletion Coffee deposit processing subcontracting Tea leaves processing subcontracting Carton box collection subcontracting Waste oil processing subcontracting Slug processing subcontracting Plastic processing subcontracting OA paper processing subcontracting, etc.
	Labor cost	Waste sorting labor cost, etc.
Recycling cost		Collecting expired products Container collecting sorting processing Paper cup recycling processing subcontracting PET bottle sorting processing subcontracting Empty container reuse subcontracting, etc. (Subcontracting contribution quota, etc.)
Drainage processing cost	Processing cost	Drainage processing chemical, etc.
	Labor cost	Labor cost for drainage processing, etc.
Exhaust gas processing cost	Processing cost	Activated charcoal for deodorization, etc.
	Labor cost	Labor cost for exhaust gas processing, etc.
Other cost	Penalty	Pollution impact charge, etc.

<Column> Relationship between the concepts in the material flow and terms used in the "Environmental Accounting Guideline (2000 version)"

[Amount of the items that were focused on in the material flow and associated cost]

Input			Process	Output			
Type	Amount	Cost		Type	Amount	Occurrence control/appropriate processing, etc.	Cost
● Raw material	Kg	Yen		◆ Byproduct/Waste		◆ Byproduct/waste disposal	
● Water	t	Yen		- Carton box	Kg	- Recycling (used paper)	Yen
● Electric power	KWh	Yen		- Paper bag	Kg	- Recycling (used paper)	Yen
● Steam	t	Yen		- Plastic bag	Kg	- Incineration	Yen
			Proportioning water for kneading	- Noodle scrap	Kg	- Recycling (animal feed)	Yen
				◆ Exhaust	m^3	◆ Releasing to the surrounding environment	
				◆ Drainage (including that of raw materials)	m^3	◆ Waste water treatment	Yen
				◆ Exhaust heat	Kcal	◆ Released to the surrounding environment	



<1> The cost for control of the exhaust output to the environment and the environmental conservation cost such as appropriate processing (cost for recycling) belong to the "environmental conservation cost" in the "Environmental Accounting Guideline (2000 version)." A part of the input cost such as energy cost for operation of pollution control facilities belongs to the "environmental conservation cost (<1>').

<2> When the amount of the item input or output is reduced as a result of environmental conservation measures (reduction of the amount of environmental pollutant emitted), the result belongs to the "environmental conservation effect" in the "Environmental Accounting Guideline (2000 version)."

<3> When a part of the cost associated with input (material cost, fuel cost, etc.) or a part of the cost associated with output (waste disposal cost, etc.) could be reduced, the result belongs to the "economical effects associated with environmental conservation measures" in the "Environmental Accounting Guideline (2000 version)."

The method for focusing on the material flow is also discussed in the specialist meetings of the United Nations Division of Sustainable Development (UNDSD) that was introduced in Chapter 2. The method is also described in Work book 1 that was prepared by organizing the concepts of environmental accounting, which are the actual results of research activities of UNDSD.

The concept of focusing on the material flow is not explicitly discussed in the "Environmental Accounting Guideline (2000 version)" issued by the Ministry of Environment, however, the concept is related. The contents indicated in this report by the Good Working Group is one of the ways of indicating the association.

Material flow cost accounting is available as a technique for detecting at which state of the process waste is generated and how much money was wasted, by measuring the material flow on the basis of both the physical quantity and the amount. This is considered to be the theme that contributes to particular improvement of internal functions of environmental accounting.

Step 2

(2) Selecting issues of environmental conservation measures

Selection of issues relating to the business management environment is based on the result of "(1) Organizing the outline of input/output associated with business activities."

View the outline of the target business activities in (1), proceed with examination based on the concept described below, extract and organize the issues that are to be emphasized such as the items that are to be actively managed or the items whose cost effectiveness is to be enhanced, and examine in detail the causes and direction of improvements.

[Concept of selecting issues Example 1] Extract issues according to the degree of importance.

- Select some of the important environmental conservation measures for the company and items that require high cost. (Analysis of the current condition)

⇩

- Examine any possibility for improvement in the activities for the items that were selected. (Selection of issues)

[Concept of selecting issues Example 2] Select issues according to the degree of changes or differences.

- Compare seasonal changes of the amounts and associated cost of the items that are input and output. It also makes comparison with other factories and examines if there are any considerable differences in terms of the amount and the cost. (Analysis of the current condition 1)

⇩

- Examine the cause of the considerable increase of amount or cost that might be produced for the potential changes or issues. (Analysis of the current condition 2)

  For instance, the following causes are assumed.
  - Change of the condition of the equipment (efficiency deterioration, etc.)
  - Deterioration of yield due to increase of spoilages
  - Price change, etc.

⇩

- After recognizing the cause, investigate the issues concretely for possible improvements. (Extraction of issues)

After selecting the issues, organize the issues as shown in the following.

Table 2 Example of organizing issues

Analysis of the current condition	Issue	Actual issue and improvement
High water consumption: the cost of industrial water and waste water treatment cost take up a large proportion of the cost.	Reduction in water consumption	● Prevention of water leakage from water pipes ● Further water re-use, etc.
Increase of energy consumption per unit manufacturing amount due to change of the equipment condition	Reduction in energy consumption per unit's requirement	● Deterioration of energy efficiency due to deterioration of equipment X of process Y. ● Deterioration of energy efficiency due to incomplete maintenance, etc.
Increase of waste disposal cost due to an increase of the unit of waste disposal cost	Reduction in waste disposal cost per unit	● Process control method that tends to produce spoilages ● Examination of use within the process ● Recycling byproducts ● 100% sorting, etc.

Selection of issues can also be examined based on the following items, instead of quantitative evaluation shown above.

[Concept of selecting issues Example 3]	Selecting issues based on the environmental policies or social situations.

- Item that requires environmental conservation measures corresponding to the policies or business plans of environmental conservation in the company or factory (environmental policies, purposes, targets, or plans for the industry who has an environmental management system).
- Item that requires environmental conservation measures corresponding to the environmental policies of the industry or the task implementation movement.
- Item that requires environmental conservation measures corresponding to amendment or enhancement of laws and regulations relating to environment
- Item for which environmental conservation measures are desirable as a response to the social interest

After organizing the issues, summarize together with the organized information on input and output, and issue as an internal report. Announcement of these information items to the concerned parties is useful for showing the current condition, the implementation attitude, and the concept of the company to the society.

Organization of information up to extraction of issues is applicable to segment environmental accounting by division.

[Reference] Example of selecting issues

Example 1 Selecting issues by comparing the unit requirement of the amount of input with those of other factories
(Reference: Concept of selecting issues Example 2)

Issue (1)

- Analysis of the current condition:
  Fuel consumption unit in the heating/boiling/sterilizing process of this factory: 10L/steam t
  Fuel consumption unit in the heating/boiling/sterilizing process of Factory A: 9L/steam t
  Fuel consumption unit in the heating/boiling/sterilizing process of Factory B: 8L/steam t
  The fuel consumption unit is higher than other factories by 15%.

- Issue: Reduction in fuel consumption per unit
- Actual issue: Energy efficiency is relatively low due to deterioration of the boiler

Issue (2)

- Analysis of the current condition:
  Water consumption unit in the package process of this factory: $10m^3$/product Kl
  Water consumption unit in the package process of Factory A: $9m^3$/product Kl
  Water consumption unit in the package process of Factory B: $8.5m^3$/product Kl
  The water consumption unit is higher than other factories by 15%.

- Issue: Reduction of water consumption per unit
- Actual issue: According to the difference of the recovery rate of final wash water in the bottle washing process. Improvement of the reuse rate of final wash water in the preprocess.

Example 2 Extraction of an issue corresponding to the task implementation movement relating to the environment in the industry
(Reference: Concept of selecting issues Example 3)

- Background of the examination: Distillation waste liquid generated from distilled liquors will no longer be disposed of into the ocean according to the decision made in the industry group.

- Current condition: Amount of distilled waste liquid generated: 40,000 t per year
  Cost for disposing of the waste liquid to the ocean: 4,100 yen/t

- Issue: Assuming land treatment for distilled waste liquid, the optimum comprehensive handling method is examined for the company in terms of "cost efficiency", "reduction of environment impact", and "promotion of recycling."

- Points of examination
  - Examine promotion of waste treatment considering recycling as the precondition, in terms of the "promotion of zero emission from factory" that was indicated as the environmental target.
  - Considering sales trends of distilled liquor products, examine the recycling technique that can cope with quantitative increase (securing exit of recycle products and verification of market scale).
  - Evaluate environment impacts that result from recycling and processing.
  - Evaluate the capital investment and running cost.
  - Degree of technical completeness

Step 3

(3) Examining measures for issues

Examine environmental conservation measures for solving the issues that were organized in "(2) Extracting issues of environmental conservation measures.' In examination of environmental conservation measures, initially select those from which the effects can be easily achieved.

While there is a concept of selecting measures of high economical rationality, there is another concept of selecting measures that match the policies of the company (environment) or measures of social value. Some measures that may not be economically advantageous in a short term may become advantageous in a long term.

Examination of environmental conservation measures is necessarily based on the concept or current condition of the company.

Examine environmental conservation measures that are suitable for the business of the company in terms of the following points:

[Concept of examination of environmental conservation measures]

- Improve facilities and/or consider alternatives
- Review the process and improve it
- Conduct 100% control
- Review of raw materials and materials.
- Review discharge, emission and treatment methods, etc.

[Reference] Example of examination of measures

Example: Energy conservation by increasing smaller boilers

The X process in Factory Y uses large water pipe boilers of central controlling type. Since the boilers cause considerable energy loss and would be expired soon, it is necessary to consider their replacement.

■ Current condition
- 38 t water pipe type boilers: 2 units
- Usage: Heating in the process, factory and office

  Since central controlling, the pipes are long, having considerable amount of energy loss during distribution.

  The large water pipe boilers are difficult for delicate control according to the demand. In particular, the efficiency deteriorates during the summer periods.

  The boilers use heavy oil with high CO_2 and SOx emission unit requirement.

■ Measures
- Distributed installation of smaller boilers

Heating process:	2t percolation type boiler:	30 units
Heating factory:	1t percolation type boiler:	5 units
Heating office:	2t percolation type boiler:	1 unit
	0.8t percolation type boiler:	1 unit

  The efficiency per unit function is improved by installation of new facilities.

  Delicate control according to the demand is possible and by introduction of distributed installation, the pipe lengths become shorter, reducing the energy loss during distribution.

- Replacing the energy

  Changing heavy oil to kerosene, LPG, or city gas

  By replacing the existing energy to energy of low CO_2 and SOx emission unit requirement, the CO_2 emission amount and SOx emission amount can be reduced.

In selection of environmental conservation measures, some measures may be compared and evaluated before making decisions. In such prior evaluation of measures, the cost associated with each environmental conservation measure may be correlated with the "environmental conservation effects" and "economical effects associated with the environmental conservation measure."

Table 3 Image of comparative evaluation of environmental conservation measures

	Cost associated with measures		Effects	
	Investment amount	Cost amount	Environmental conservation effects	Economical effects associated with the environmental conservation measure
Measure A				
Measure B				

* See "(4) Organizing and evaluating the results of implementing the measures" of the next section for how to fill in each column.

[Reference] Example of prior evaluation of environmental conservation measures that were collected

Example: Measure to process used containers that were collected

Currently, each office subcontracts processing of used containers that were collected to a waste disposal agent. (The total cost for subcontracting is 25 million yen.)

The change of processing method was examined for promoting recycling of used containers and more effective management.

The following table shows prior evaluation of two measures; one for subcontracting the process to a waste disposal agent collectively and the other for processing internally by establishing a recycling facility within the company.

	Cost associated with the measure				Effects (against the existing treatment method)	
	Investment amount		Cost amount		Environmental conservation effects	Economical effects associated with environmental conservation measure
	Item	Amount	Item	Amount		
Measure A Subcontract waste disposal to an agent collectively	None	0	Subcontracting waste disposal	15 million yen	(Since final disposal is subcontracted to a waste disposal agent, it is difficult for the company to trace the process up to the final disposal completely.)	Reduction of subcontracting cost: 10 million yen
Measure B Building an in-house recycling facility	Construction of recycling facility	100 million yen	Depreciation cost, operation cost, and maintenance cost, inspection cost, and miscellaneous cost of the building, machines, and facility	10 million yen 30 million yen 5 million yen	Control up to the final disposal. Reduction of the amount of waste to be incinerated by improvement of recycling rate Reduction of the amount of waste to be land filled by improvement of recycling rate	Reduction of subcontracting cost: 25 million yen Sale of recycled/reusable materials: 5 million yen

- The entire cost of measure A is lower than that of measure B although economical effects are expected from measure B. However, since more environmental conservation effects are gained from measure B, measure B was adopted.
- Assuming that the waste disposal cost will increase in the future, recycling rate was increased as a prior action.
- Development of know-how of an in-house recycling system is beneficial for the company.

Step 4

(4) Organizing and evaluating the results of implementing the measures

After implementing an environmental conservation measure, identify the cost of implementation of the measure and the environmental conservation effects and economical effects, and evaluate the influence and effects for the management. The information can be used for further examination of the measure and development (e.g. application of the same measure to other manufacturing lines) and for explanation of the necessity of budgets for environmental conservation.

Moreover the information may be not only used internally but also reported externally.

[Example of table of results]

Description of the measure	<2> Cost associated with the measure		Effects	
	Investment amount	Cost amount	Environmental conservation effects	Economical effects associated with the environmental conservation measure
<1>	<2> - 1	<2> - 2	<3>	<4>

<1> Description of the measure

Describe briefly the measure that was implemented.

<2> Cost associated with the measure

Organize the cost associated with the measure.

<2>-1 Investment amount

Indicate the amount invested for the measure.
(e.g. investment for installation of a new facility)

<2>-2 Cost amount

Indicate the cost required for operation of the measure. (e.g. the maintenance and management cost and the labor cost for operation).

Mainly itemize the cost that has changed dramatically after implementation of the measure.

[Example of cost]

Maintenance and management cost	Subcontracting cost Material cost required for maintenance and management Measurement cost for controlling status of equipments Measurement certification cost
Labor cost	Labor cost for facility operation and management

<3> Environmental conservation effects

Indicate the environmental conservation effects that were gained from this measure.

It is important to indicate environmental conservation effects quantitatively in the unit of physical volume.

A company may be implementing various environmental conservation measures concurrently and effects of each measure cannot always be evaluated. In this case, an estimated value or a predicted value may be used.

Environmental conservation effects include an amount of environmental impact after implementation of a measure and a change of amount after implementation of a measure.

Changes of the amounts of input and output identified in (1) after implementation of a measure are applicable to this category.

[Example of environmental conservation effects]

- Pollution control: Amount of emitted environmental pollutants (NOx, COD, etc.)
  Amount of harmful chemical substances that are emitted or moved
- Global environmental conservation:
  Amount of emitted greenhouse gas and energy consumption
- Resource recycling: Amount of waste generated, amount of final waste disposed, and amount of water used

Since these values may change according to the expansion or reduction of the business scale of the company, it is useful to create indicators of environmental efficiency such as converting the value to per unit production amount (monetary amount) for comparison with the value before implementation of the measure.

Some environmental conservation effects may not be measured quantitatively. An example is the effect

of preventing the environmental pollution by preventative environmental conservation measures. Environmental conservation effects that are difficult to express quantitatively may be expressed qualitatively.

Details of the concept of environmental conservation effects are described in the "Environmental Accounting Guideline (2000 version)" or the "Environmental Performance Indicators for Business Administrators -2000 version" issued by the Ministry of Environment.

<4> Economical effects associated with environmental conservation measures

The economical effects to the company will be indicated by implementation of the environmental conservation measure.

Here, the economical effects that can be assessed based on the credible basis should be entered as indicated below.

[Example of economical effects]

- Business revenue gained through recycling of resources or reutilization of byproducts within the process
- Amount of cost saved by the energy conservation measure
- Amount of cost saved by waste emission control, etc.

These items are mainly the cost gap of input and output, estimated in "(1) Organiz ing the outline of input/output associated with business activities", comparing before and after the implementation of the measure.

As indicated above, some economical effects cannot be estimated on the credible basis. One example is the cost, which would arise from environmental damage, would be avoided by implementation of the environmental measure in advance. In this case, the effects may be calculated hypothetically or the assumed effects may be indicated qualitatively.

Details of the concept of economical effects are described in the "Chapter 3 Report from the Electronic and Electric Working Group."

[Reference] Example of evaluation after the measure

Example: The result of CO_2 emission reduction measure by Factory A

This example shows the result of the following two environmental conservation measures that contributed to the reduction of the amount of CO_2 emitted. The measures were taken by screening issues corresponding to the environmental policies and targets in Factory A.

- Reduction in the fuel consumption by collecting steam discharged from the boiling pot using the steam exhaust collection equipment that is installed, compressing the steam, and using it as the heat source for the boiling pot
- Reduction in power consumption by installing new pump with inverter for drainage

Measure	Cost associated with the measure				Effects	
	Investment amount		Cost amount		Environmental conservation effects	Economical effects associated with environmental conservation
	Item	Amount	Item	Amount		
Installation of steam exhaust collection equipment	Cost for installation of stocking steam exhaust collection equipment	120 million yen	Additional operation cost (electricity) for the steam exhaust collection and compression facility	Electricity rate (1,200MWh/year)	Reduction in CO_2 by 5,400t/year	Reduction in fuel cost by 2,000 Kl/year (converted based on crude oil)
Installation of new pump with inverter for drainage	Replacement of drainage pump	1 million yen			Reduction in electricity by 50,000KWh (expected: 40,000KWh) Reduction of 1,920t-CO_2/year	Reduction in electric rate by 800,000 yen

Managerial judgment for the result

For the target of the CO_2 emission reduction in the entire factory, the reduced amount of fuel consumption gave a significant contribution by installation of the steam exhaust collection equipment.

The rate of contribution by the use of an inverter for the waste water pump for the target of CO_2 reduction is more than expected, even if reduction in the production volume is taken into account. Since the investment is comparatively low, it will be effective to actively apply the same measure to other factories.

4. Summary

The "Environmental Accounting Guideline (2000 version)" mainly discusses corporate environmental accounting that measures environmental accounting information of the entire company. The Food Working Group mainly examined a new concept called, 'Segment Environmental Accounting' that targets a specific section of a company.

Segment environmental accounting has a feature to be easily introduced due to its selected target and a feature for its effectiveness for solving environmental conservation issues. For these features, segment environmental accounting is expected to be more widely introduced in the food industry that comprises many comparatively small companies, promoting further environmental activities. Segment environmental accounting was proposed under such expectation.

Segment environmental accounting with the purpose of solving issues, which was presented as major targets in this report, adopted the concept of organizing input and output of the material flow in the targeted business activities.

By organizing the amount of input and output and associated cost for business activities, environmental conservation issues can be simplified, helping the understanding of segmentation.

The proposal of this report can also be applied for examination of environmental accounting in other industries. We hope this report will be of any use for future examination and development of environmental accounting.