

Environmental Performance Indicators Guideline for Organizations

(Fiscal Year 2002 Version)

Tentative Translation

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(Japan Government)

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Introduction: Purpose of the Revision of the Guidelines

1. Aim of the Guidelines and the Process of the Revision

The rise of the concerns among the people about environmental problems such as the global warming and waste management problem has accelerated the conversion of the current mass-production, mass-consumption, and mass-disposal type economic society into recycling-based “sustainable society.” The Basic Environment Plan defines the role of business organizations toward the construction of a sustainable society as the following:

“Today, since environmental burden caused by ordinary organization’s activities is increasing, environmental efforts of business organizations, which account for a majority of economic activities, are extremely important. It is necessary to promote active and voluntary efforts of business organizations, such as efficient use of energy and resources, the reduction of waste, the reduction of environmental burden in production and distribution processes in a variety of business activities, as well as making efforts to prevent industrial pollution, with the viewpoint of the life-cycle of products and services. ... Furthermore, in order to make environmental efforts more universal, organizations are expected to exercise their businesses with proper environmental management systems. It is desired that a social cycle in which environmental actions of consumers and investors stimulate the disclosure of environmental information through environmental reporting and environmental labelling, which helps that environmental activities of organizations are properly evaluated and their environmental efforts are appropriately evaluated with environmental accounting, environmental performance evaluation and life-cycle assessment (LCA), and therefore environmental actions are expanded.”

In order to promote active and voluntary environmental efforts, it is necessary to precisely measure and evaluate the impacts or burden of organization’s activities on the environment and the outcomes of environmental actions (environmental performance). What is required for measuring and evaluate environmental performance are environmental performance indicators. Environmental performance indicators promote environmental efforts of business organizations because business organizations use them for internal evaluation and decision making and business organizations use them with qualitative information when business organizations publish environmental

activity reports. It could become an important foundation of environmental information, which would promote environmental efforts in the entire society.

Ministry of the Environment published “The Environmental Performance Indicators for Organizations (Fiscal Year 2000)” (hereinafter called “The Guidelines Fiscal Year 2000”) in February 2001. In this publication, the Ministry proposed a desirable framework of environmental performance indicators and presented environmental performance indicators which are important for environmental conservation and which business organizations could actually use. As the title of the report, “Fiscal Year 2000 Version,” indicates, it is necessary to revise and improve the contents of performance indicators through the feedback from business organizations, which actually use them and know what would be appropriate and what would be easily-used performance indicators. These indicators need to be revised, as they are necessary, in order to keep up the progress of research on environmental performance and the change of consciousness of people on social issues.

The Ministry wished making the Guidelines more useful and it carried out a project in which 21 private enterprises tried to find problems in the 2000 Guidelines with the viewpoint of organizations. In 2000, which was around the time of the publication of The Guidelines Fiscal Year 2000, the Cabinet installed the Basic Environmental Plan, which aimed the establishment of a sustainable society as a principal philosophy. The Diet enacted the Basic Law for Establishing a Recycling-Based (sustainable) Society in the same year. The Law for Recycling of Specified Kinds of Home Appliances took effect in 2001. This is the sixth of so called the Six Recycling Laws, which realize the philosophy of sustainable society into the environmental policies of Japan. Environmental concerns among the people have risen.

For these reasons, the Ministry of the Environment revised the Environment Performance Indicator Guidelines for Organizations to make these guidelines easier-to-use for the organization and, moreover, and to have progresses in environmental management and environmental policies toward the establishment of sustainable society reflected in them.

The Ministry of Environment established "the Committee for Examination of the Environment Performance Indicator Guidelines for Organizations," which met four times and actively sought the desirable state of environmental performance indicators.

The outcome of the Committee is the Environment Performance Indicator Guidelines for Organizations (Fiscal Year 2002 Version)" (hereinafter, called "the Guidelines").

This guideline organizes and shows the framework of the environment performance indicators that are useful for the promotion of environment activities of the organization.

It is expected that each business organization improves its environmental activities and by doing so contributes to the establishment of a sustainable society.

1 What Sustainable Society Is

Sustainable Society is a society that “meets the need of the present without compromising the ability of future generations to meet their own needs,” and therefore it needs be a society which ensures high quality of life in the social and economic aspects as well as the environmental aspects.

Also, the sustainable society is a society which maintains healthy relations with the systems formed by the atmosphere, water, soil, living creatures, each of which composes environment, and does not have a negative influence on those systems. For this reason, it is necessary to use renewable resources keeping the long-term renewability and to limit the use of non-renewable resources as much as possible by promoting the substitution by renewable resources as far as possible in the social economy activity, to limit the emission of the environmental burden within the capacity of self-purification of the environment, to hold human activity below the level which the ecosystem could maintain its functions, and to avoid the nonreversible decrease of the biodiversity.

2 What Basic Environment Plan Is

Basic Environment Plan has been installed based on the Basic Environment Law. This plan declares four long-term objectives, which are the "environmentally sound material cycle," "harmonious co-existence," "participation" and "the international activities." Based on the Plan, the Ministry of Environment has deployed policies that aim the building of a sustainable society. Also, material recycling could be ensured and environmental burden could be minimized by promoting the use of renewable resources, by reducing the generation of wastes and by promoting circularly use of recyclable resources and proper disposal as much as possible. By doing so, it is possible to realize a social economy system which is based on circulation of materials.

3 Who Should Read These Guidelines

In these Guidelines, the term organizations mean profit organizations which exercise profit seeking activities (not only corporations but also corporate groups, individual factories or offices and projects). It is expected these guidelines are used by large business organizations such as companies listed on a stock market and by small and medium sized enterprises (SMEs) in the Environmental Activity Evaluation Programme (EcoAction 21), with which SMEs could develop environmental management systems relatively easily.

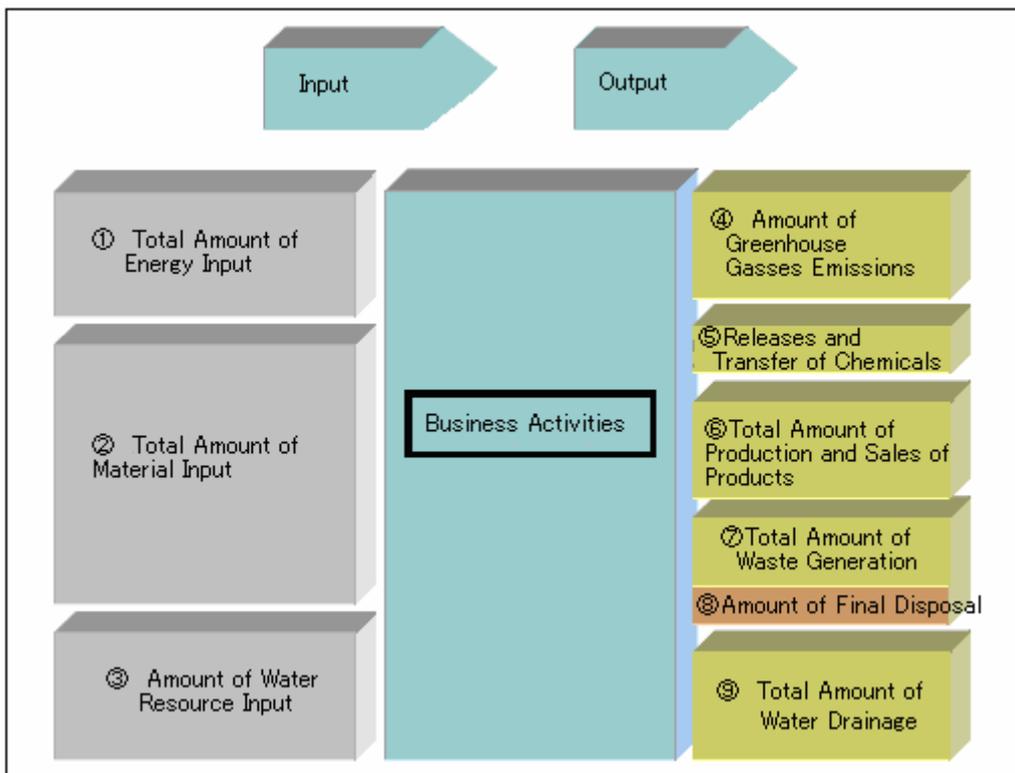
However, it is possible for governmental organizations, schools, hospitals and NPOs to use these Guidelines in accordance with their organization's characteristics.

2. Important Points in the Revision

(1) Revision of Core Indicators

The Guidelines (Fiscal Year 2000 Version) included the common core indicators and core indicators for each industry. The total number of these indicators was 80, however, relative importance of these indicators, or their priorities, were not clear. The revision systematically reviewed these indicators and regrouped them into nine sets of core indicators with the viewpoint of “material balance” which comes from the notion of the promotion of the prevention of the greenhouse effect and the establishment of recycling-based society in accordance with the Basic Environment Plan. Although several indicators may still be difficult to calculate the values for organizations in particular industries or particular size or some indicators may have different importance in other industries, the revision gives each indicators clear definitions and priority which shows what indicators are more important for organizations.

Figure 1: Relations Between Business Activity and Core Indicators



4 What Recycling-Based Society Is

The term recycling-based society refers to a society in which the consumption of natural resources is limited and the burden on the environment is reduced as much as possible by reducing the generation of waste, promoting proper and repeated use of resources, ensuring proper disposal of resources that could not be recycled.

(White Paper on Recycling-Based Society, 2002 Edition)

Core Indicators

Core indicators are important for all organizations in relations with establishing a sustainable society and reducing environmental burden.

These Guidelines defines the nine groups of core indicators, which are shown in Figure 1, from the viewpoint of material balance. Core indicators in each group should be measured and managed not individually but as a set (“a core set”). However, because these core indicators are quantitative in nature, it is important for organizations to choose sub-indicators which are appropriate for their business characteristics and to use these indicators in combination with the core sets in order to measure and manage their environmental performance more accurately.

Some core indicators may be difficult to quantitatively measure for some business organizations in certain industries. The amounts of resource input and production or sales are easier to calculate for organizations in a material industry and they are actually utilized. However, it may be difficult for organizations in assembly and manufacturing industries and distribution industry. In such cases, they should start with where they can.

Sub-Indicators

Sub-indicators are indicators that are not categorized as core indicators. Organizations should use them as it is necessary in order to measure and manage their environmental burdens, their efforts to reduce them and their outcomes according to the characteristics of organizations

Sub-indicators are divided into the following categories.

- Indicators that qualitatively supplement the core indicators
- Environmentally important indicators although they do not apply all industries
- Indicators that could become important in future in order to establish a sustainable society.
- Environmental management indicators
- Management related indicators

Other than these categories, organizations may add indicators that they have used for measuring their environmental efforts. Organizations are encouraged to develop new indicators that measure efforts to reduce environmental burden and their outcome.

(2)Expanded Range of the Selection of Indicators

The Guidelines (Fiscal Year 2000 Version) divided the types of organizations into four categories, within each of which core indicators were set. However, the new Guidelines does not employ this categorization because the business type of an organization may not necessary represent what their actual environmental burdens are, particularly for organizations that operate more than one businesses and organizations that use consolidated accounting. In the Guidelines (Fiscal Year 2002 Version), those indicators, that are common for almost all organizations and are important in terms of environmental policies, are organized as the core indicators, and other indicators are

designated to sub-indicators, which are selective by organizations. Thus, the range of selection for organizations has been expanded.

Chapter I: Purpose of the Environment Performance Indicators

1. Environmental performance indicators provide information that helps evaluation and decision making within organizations that engage in environmental efforts.
2. Environmental performance indicators provide a common foundation of information for organizations and external interested parties (such as consumers, business partners, residents in local communities, shareholders, and financial institutions) and it helps interest parties' proper understanding of activities of the organizations and their environmental efforts.
3. Environmental performance indicators provide a common foundation of information that helps the integration of environmental policies of the national and local governments, such as basic environment plans, and environmental activities of organizations.

The first objective of environmental performance indicators is to measure and evaluate environmental burdens, environmental problems that need to be solved and outcomes of environmental efforts comprehensively in order to promote environmental activities of organizations and to obtain information that helps decision making regarding these activities.

The second objective is to provide a common foundation of information between an organization and interested parties in order to facilitate that interested parties, such as consumers, business partners, residents in local communities, shareholders, and financial institutions, understand environmental activities of the organization. Organizations have significant impacts on the environment through their business activities. As the necessity of building a sustainable society rises, organizations have the responsibility of disclosing what environmental burdens they cause, what activities they implement to reducing these environmental burdens, and what environmental efforts they exercise. For external interested parties, environmental information has become necessary for their evaluation and choice of organizations. Environmental performance indicators could be used as environmental information in environmental reporting.

The third objective is to provide a common foundation of information for macro-level environmental policies of the national and local governments.

External interested parties have a number of methods to evaluate environmental efforts of organizations. However, there has not been a standard method yet. Furthermore, no definition of information, method of calculation, the boundary of

information gathering, units and so on have been standardized. When an organization or external interested party evaluate environmental efforts, it is important to understand the background of business activities of the organization that causes environmental burden, yearly changes of the environmental burden, and environmental efforts using these performance guidelines. These guidelines do not intend to evaluate organizations with quantitative values of environmental performance indicators alone.

Chapter II: Relationships with Existing Guidelines

1. Relation with the Environmental Reporting Guidelines (Fiscal Year 2000 Version)

The Environmental Reporting Guidelines (Fiscal Year 2000 Version) is a practical manual for those who wish to write and publish or and those who have already published an environmental reporting. When organizations provide information on their environmental burdens caused by their business activities and environmental efforts that reduce them in an environmental reporting, they could provide more appropriate quantitative information by choosing environmental indicators suggested in the Guidelines.

From this viewpoint, Chapter 3, i.e., “What should be Included in Environmental Reporting” in the Environmental Reporting Guidelines (Fiscal Year 2000 Version) discusses the state of environmental reporting and environmental aspects and their contents that should be included in environmental reporting based on the Guidelines (Fiscal Year 2000 Version).

Until the Environmental Reporting Guidelines (Fiscal Year 2000 Version) is updated, organizations should read its contents as indicators currently described in the Guidelines, if necessary, and choose environmental indicators from these Guidelines in order to explain Chapter 3, “What should be Included in Environmental Reporting.”

2. Relation with the Environmental Activities Report Guidelines (Eco-Action 21)

The Environmental Activities Report Guidelines (Eco-Action 21) is a program for

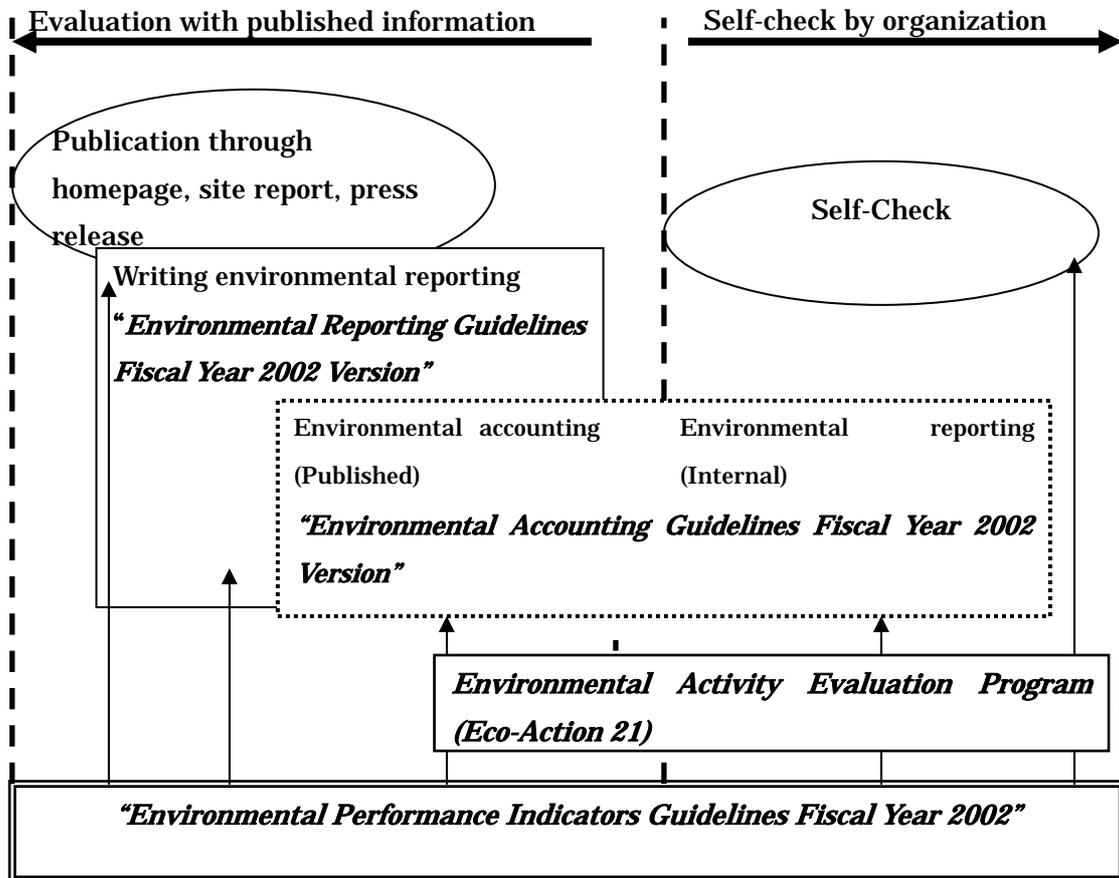
building environmental management systems that could be implemented relatively easily by a wide range of organizations including small-and-medium-sized enterprises (SMEs). This program is designed to enable SMEs developing their environmental programs, writing environmental activity reports and publish them.

SMEs could choose environmental performance indicators with referring the list of evaluation items and the worksheets for “Self-Check of Environmental Burden” and “Self-Check of Environmental Measures” of the Environmental Activities Report Guidelines. The Guidelines show environmental performance indicators for The Environmental Activities Report Guidelines.

3.Environmental Accounting Guidelines Fiscal Year 2002 Version

“Environmental Accounting Guidelines, Fiscal Year 2002 Version” defines environmental accounting as “a system that measures the costs and the benefits of environmental efforts of organizations as quantitatively as possible (in monetary or physical units) and provides the information to the society while keeping good relation with it, in order to promote environmental activities efficiently and effectively aiming at a sustainable society. The Guidelines principally describes the information on these effects that are measured in physical units.

Figure 2: Relation with Environmental Performance Indicators



4. Relation with ISO14031

ISO14031 (JIS Q 14031) is an Environmental Performance Evaluation International Standard which "Provides guidance on the design and use of environmental performance evaluation, and on identification and selection of environmental performance indicators, for use by all organizations, regardless of type, size, location and complexity".

Environmental performance evaluation is a process that helps management decisions regarding environmental performance. It consists of selecting environmental indicators, collecting and analyzing data, assessing information in the light of environmental performance indicators, reporting and communication, and periodical review of the process and improvement (JIS Q 14031).

The actual contents of environmental performance indicators are not discussed in ISO14031 (however, examples are provided in Annex A).

The indicators in this Guidelines have been written using the national macro-level indicators (“the comprehensive environmental indicators” (report of the Comprehensive Environmental Indicator Examination Meeting, Environment Agency in November 1999) and indicators developed by the World Business Council for Sustainable Development (WBCSD) and the Global Reporting Initiative (GRI)) as reference. Environmental performance should be assessed according to the process specified in ISO14031 by using the Guidelines as the reference.

ISO14031 calls for consideration to environmental conditional indicators (ECI). For more information, it is requested to refer to the “Annual Report for Environmental Conditions (Environmental White Paper)” prepared by the Ministry of the Environment and each local government and “the comprehensive environmental indicators” that are described above.

5. Relationship with ISO14001

ISO14001 (JIS Q 14001) (international standard relating to the environmental management system) based on the principle of continual improvement by constructing and operating environmental management systems with so-called the PDSA cycle. Continual improvement is defined as “enhancement of the environmental management system for achieving overall environmental performance improvement according to the environmental policies of the organization.”

It defines environmental performance as “measurable results of the environmental management systems relating to the management of the environmental aspects performed by the organization based on its environmental policies and objectives.” As described in Annex A, the objective of the implementation of environmental management systems is to improve the environmental performance. However, ISO14001 does not discuss the actual contents of the environmental aspects to be managed and the standard of environmental performance, and it leaves the decision to each organization.

Therefore, the environmental performance indicators that are presented in the Guidelines would be helpful for decision-making processes regarding choosing environmental aspects and viewpoints that need to be managed and the examination of environmental performance items that need to be improved.

The indicators in the Guidelines do not change the requirements of the environmental management systems and the certification and registration standards.

6. Relationship with Results of the Research Conducted by International Research Organizations and Foreign Countries

The following materials are available for reference, which are results of research carried out by international research organizations and organizations in other countries regarding environmental performance indicators, and have been used as reference.

- "Eco-efficiency Indicators and Reporting" (World Business Council for Sustainable Development (WBCSD))
- "Sustainability Reporting Guidelines" (Global Reporting Initiative (GRI))
- "Measuring Up - Toward a Common Framework for Tracking Corporate Environmental Performance" (World Resource Institute (WRI))
- "Measuring Eco-efficiency in Business: Feasibility of a Core Set of Indicators" (Canadian National Round Table on the Environment and Economy (NRTEE))

Chapter III: Requirements for the Environmental Performance Indicators

Environmental performance indicators need to satisfy the following requirements.

1. Relevance

Environmental performance indicators need to accurately reflect the important environmental burdens and implementation status of the organization, the conditions of the environmental problems, the trend of environmental policies, requirements of stakeholders, business characteristics, and regional characteristics. It is necessary to provide information that helps decision-making regarding environmental activities.

The items to be examined are not only the environmental burdens on which regulations or responsibilities are imposed by the laws and regulations, but also the items for preventing environmental pollution and items that enable the evaluation of outcomes of environmental activities, such as improvement of resource productivity, that contributes to transformation to sustainable society .

It is also important that environmental performance indicators can be used for evaluation of measures relating to downstream activities (distribution of products) and measures for upstream activities (purchasing raw materials and services) in addition to measures for reducing environmental burdens caused as a result of the activities within the business area (i.e., the area where the organization can directly manage environmental burdens).

2. Comparability

Environmental performance indicators need to be comparable in various forms such as circular variation comparison, comparison with other companies or business types of the same industry in Japan and overseas countries, and comparison with items required by laws and regulations. It needs to be comparable with other companies in the same industry or in another industry in the same country or a foreign country, or with the environmental situation in a region or the country as much as possible.

Otherwise, it is difficult for organizations to improve their measures and for external stakeholders to compare with other businesses and industries. For this reason, indicators should have common factors for many organizations. To realize those factors, standardization of the concepts and terminologies is necessary. In addition, the measuring scopes, the measuring methods, calculation methods, and presentation methods should also be standardized.

3. Verifiability

The information associated with the indicators should be able to be verified objectively to use the indicators as reliable ones.

This means that methods for third parties to verify the reliability of the information are available such as; there is evidence data of the information associated with the indicators, the calculation method is established, the data aggregation system is available, and the information is checked through appropriate procedures. It is important to be able to provide clear explanation on the calculation grounds of the indicators according to the request from external parties.

4. Clarity

The meanings of the indicators should be clear and unambiguous within the organization and for stakeholders. Indicators are used by a wide range of organizations and stakeholders. New indicators that have just been studied, extremely technical indicators, or indicators of ambiguous contents are difficult to be applied. Therefore, the indicators should be ones which are defined clearly by defining the items or scope through laws and regulations or government policies so that the contents and the significance are readily available and are easily understood.

5. Comprehensiveness

When choosing an indicator, it is important to use comprehensively and continually concerning important indicators for environmental burden and environmental efforts.

Chapter IV: Evaluation by Environmental Performance Indicators

1. Time-Series Comparative Evaluation

Environmental performance of a business needs to be assessed not by temporary situations, but by yearly changes such as improvements over an extended period of time. For this purpose, environmental performance indicators need to show not single-year values but time series values from the past. In this case, it is appropriate to indicate changes of the absolute values and also indicate changes of values associated with the management indicators to avoid the influence from economic fluctuations and increase and decrease of businesses that are subcontracted externally. Also any changes of boundaries and units of notations need to be stipulated.

To predict future environmental performance of an organization, the presence of programs for future efforts and the contents will be useful information. For this reason, it is important to indicate the plan and outlook and provide comparative evaluation between the future targets and the current conditions for environmental performance indicators.

It is also important to present indicators (including qualitative description) regarding environmental management conditions as well as indicators directly connected to environmental burdens in order to achieve the targets.

2. Comparative Evaluation with the Baseline

Separate from the time series evaluation, an environmental burden reduction measure may be assessed by calculating the difference between the environmental burdens indicated as a result of applying the environmental burden reduction measure and the environmental burdens (baseline) that are assumed without application of the measure. This method is useful for evaluation of results of individual measures such as development or introduction of specific products and services based on environmental conservation and implementation of specific businesses or projects.

However, the comparative evaluation based on the baseline is greatly affected by the baseline setting method and may fall into subjective evaluation. Therefore, the baseline setting method needs to be clarified to enable third parties to participate in verification.

Chapter V: Framework of the Environmental Performance Indicators

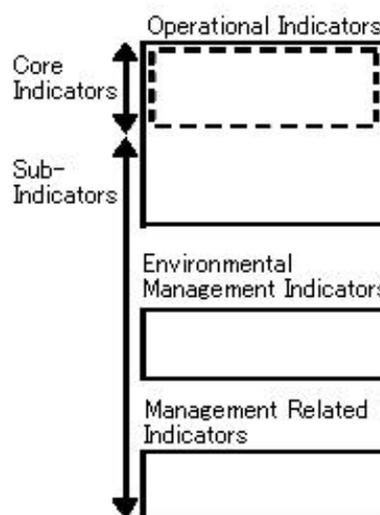
1. Framework of the Indicators

The environmental performance indicators are classified into the following three categories.

(1) Operational Indicators

Indicators that measure environmental burden caused by business activities.

In order to circulate materials and energy within business activities, only controlling environmental burdens released at the end of pipes is not enough. It is necessary to know and control what materials are inputted into the business activity, how they are used and what materials are released, and how they are released, and it is necessary to have strategies to reduce these environmental burdens from the time of input.



From this viewpoint, these environmental indicators are designed based on the principle of material balance, e.g. considering input and output of energy and materials into/from an entire business activity and designed to understand the whole business activities. Also those indicators which measure issues such as promotion of material circulation and the efficient and effective use of resources and energy, and the prevention of greenhouse effect, which are necessary condition for a sustainable society.

(2) Environmental Management Indicators

These are indicators that measure methods and organizations that manage and operate resources for business activities and their environmental activities as contributions to the society

Aspects that should be qualitatively measured are discussed in the Environmental Reporting Guidelines since they should be included in environmental reporting;

therefore the Guidelines focuses aspects that can be quantitatively measured.

(3)Management Related Indicators

These are indicators for management resources that are used for business or results of economic activities.

Management related indicators do not measure environmental burdens directly, however, they are considered as environmental performance indicators because they are necessary to calculate energy or material efficiency and to reduce environmental burden per unit of economic activity in order to realize a sustainable society.

2. Structure of the Indicators

2-1 Operation Indicators

(1)Core Indicators

Major nine indicators concerning material balance make up operation indicators.

These nine indicators are a part of operation indicators.

(1)-1 Input

The total amount of energy input

The total amount of material input

Amount of water input

Organizations directly or indirectly extract fossil fuels, mineral resources, organic resources, water resources, etc. from the environment and input them into business processes as energy, raw materials, parts, products or water. Environmental burden such as the consumption of natural resources and modification of the state of the land is the result of these business activities.

It is necessary to transform the society to the one that consumes less resources and causes less environmental burdens by switching energy sources from fossil fuels to new energy and by switching the use of natural resources to the use of recycled resources and reused parts, as well as reducing energy consumption and promoting efficient use of natural resources.

For this purpose, it is necessary to measure and manage what are being inputted into business activities.

It is often difficult to measure material input for organizations in some industries. It is important to calculate starting with possible ones.

(1)-2 Output

- Amount of greenhouse gasses emissions
- Chemical substances release and transfer
- Total amount of production or sales
- Total amount of waste generation
- Amount of final disposal of waste
- Total amount of water drainage

Business activities cause direct environmental burdens such as green house gasses, air pollution, chemical substances, wastes, waste water, while producing their main purposes such as products and parts and services (hereinafter referred to “goods and services”). It is necessary to pursue producing less environmental burden while providing energy-efficient and material-efficient products and services.

Regarding the total amounts of production and sales, it is often difficult to measure material input for organizations in some industries. It is important to calculate starting with possible ones.

(2)Sub-Indicators

(2)-1 Sub-Indicators that Qualitatively Supplement the Core Indicators

In order to properly understand environmental activities, sub-indicators that qualitatively supplement the core indicators are necessary because the core indicators mainly measure environmental efforts quantitatively.

For example, indicators that measure the total amount of energy input are purchased energy (electricity and heat), fossil fuel, new energy. In order to calculate the amount of greenhouse effect gasses, six substances such as carbon dioxide and methane, which are designated by the Kyoto Protocol, are measured and summed up.

(2)-2 Other Sub-Indicators

These include “environmentally important indicators which may not be applicable to all business organizations” and “indicators that would be important for establishing sustainable development” but exclude indicators that supplement the core indicators. Examples of these are substances that destroy the ozone layers, sulfur dioxide and nitrogen oxide.

2-2 Environmental Management Indicators (Sub-Indicators)

About environmental indicators, these guidelines include ones that can be measured qualitatively. However, under the circumstances that environmental activities of organizations have become important part of our society’s efforts toward a sustainable society, qualitative indicators would play more important roles in future.

2-3. Management Related Indicators (Sub-Indicators)

These indicators do not measure environmental burden; but it can be used to understand the size and conditions of the business and to calculate the value of products and services per unit of environmental burden and the amount of environmental burden unit per unit of product or service.

Table 1 Structure of Environmental Performance Indicators

Operational Indicators

Core Indicators	Input	Total Energy Input Total Amount of Material Input Water Resource Input
	Output	Amounts of Greenhouse Gases Emissions Amounts of Release and Transfer of Chemical Substances Total Amount of Production or Sales Total Amount of Waste Generation Total Amount of Final Disposal of Waste Total Amount of Water Drainage
Sub Indicators	Indicators That Qualitatively Supplement the Core Indicators	<ul style="list-style-type: none"> ● Breakdown of Energy Input ● Kinds of Resources, State of the Resources at the time of input ● Breakdown of Water Resources ● Emissions of Six Substances Under the Kyoto Protocol ● Amounts of Release and Transfer of Substances Under PRTR ● Amounts of Emissions of Other Substances Under Regulations ● Amounts of Products or Services that Are Measured in Unit Other than Weight ● Amount of Production or Sales of Products that Contribute to Reduction of Environmental Burden ● Amount of Production or Sales of Products with Certified Environmental Labelling ● Amount of the Use of Containers and Wrappers ● Methods of Waste Disposal ● Kinds of Waste Generated ● Kinds of Water Area Where Waste Water Are Discharged ● Quality of Water
	Environmentally important indicators which may not be applicable to all business organizations - Indicators that would be important for establishing sustainable society	<ul style="list-style-type: none"> ● Repeated Use of Water within the Organization ● Emission of Sulfur Dioxide and Nitrogen Oxide ● Concentration in Emissions that are under Regulation ● Noise, Vibration, Odor ● Nitrogen, Phosphorus ● Concentration in Water Emissions that are under Regulation ● Repeated Use of Materials within the Organization ● Recycled Materials within the Organization ● Thermally Recycled Materials within the Organization ● Energy Efficiency for Each product Group ● Amount of CO2 Emission (From Use of Product) ● Proportions of Reusable and Recyclable Part for Each Product Group

		<ul style="list-style-type: none"> ● Amount of Products, Container and Wrappers Collected ● Amount of Consumed Material, Containers and Wrapper Reused, Recycled and Thermally Recycled, and their Proportion ● State of Contamination in Soil, Ground Water and Sediment ● Area of Greening, Planting Trees, and Restoration ● Amount of Chemical Substance Storage
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Numbers attached to the core indicators correspond to the numbers in “Figure 1. Relation between Business Activities and Core Indicators

Environmental Management Indicators (Sub-Indicators)

Sub-Indicator	<ul style="list-style-type: none"> ● Environmental Management Systems ● Technology for Environmental Protection, Research and Development for Designing for the Environment of Products and Services ● Environmental Accounting ● Green procurement (purchase) ● Environmental Communication and Partnership ● Compliance with Environmental Law and Regulations ● Occupational Safety and Health ● Social Contribution concerning the environment
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Management Related Indicators

Sub-Indicator	Management Indicators ● Indicators that Measure Efficiency with Combination With Operation Indicators	Amount of Sales Amount of production Area of Floor Number of Employees, Etc.
	Indicators that Are Related to Management Indicators	Indicators that Measure Eco-efficiency Integrated Indicators of Environmental Burden

3. Boundary of Business Activities

First of all, at presentation of an indicator value, it is important to clearly establish a boundary of business activities for adding up the value.

Environmental performance indicators are divided broadly into two groups; indicators that cover the entire organization, and indicators that cover individual sites such as factories and business sites. However, while applying indicators to individual sites, it is desirable to measure and manage the entire organization using consolidated accounting as much as possible.

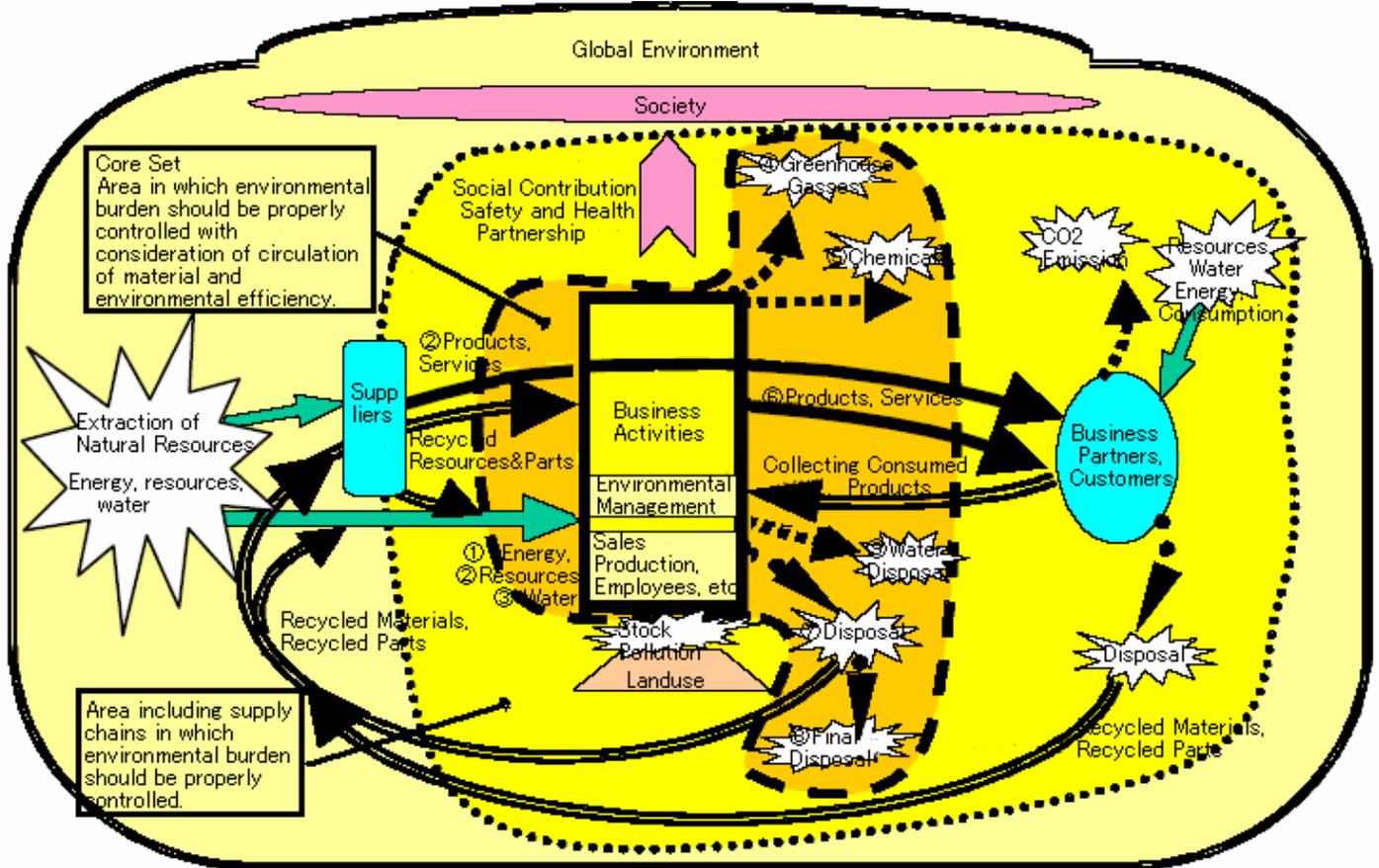
Some enterprises contract out production or transportation to domestic or overseas subsidiaries as well as performing their businesses activities by themselves. Therefore, the entire group of each enterprise should be examined according to the aggregation scope of consolidated financial accounting. However, considering the load required for aggregating the data and comparison of evaluation with other companies, the boundary shall be defined based on the actual situation (it is necessary to clearly indicate the boundary and the reason for defining the boundary). For instance, when one enterprise group includes entirely different industries, the details shall be clearly indicated to avoid any confusion. However, electricity purchased, transportation contracted-out, and green house gas emission caused by contracted-out incineration of waste are included in environmental burden by the organization because they can control environmental burden most effectively.

On the other hand, Indicators of individual factories and operation sites are important in terms of handling regional environmental issues such as pollution regarding which regional residents are the main stakeholders.

For typical products and services, the entire image of the environmental burdens should be checked beyond the boundary by implementing life cycle analysis (LCA)

through out environmental burden from the products and services (down stream), circulation of material (recycling) and environmental burden from the supply chain (upper stream), including suppliers of raw materials and OEM subcontractors.

Figure 3 Relation Between Business Activities and Circulation of Materials



About Figure 3, Relation Between Business Activities and Circulation of Materials

Serious environmental problems such as global warming, wasteful consumption of natural resources, the shortage of landfill sites are problems that come from the structure of the society. In order to solve the problems and to establish a sustainable society that has less environmental burden, it is necessary to realize circulation of materials by limiting productions and consumption, and promoting proper reuse, recycle and disposal of goods, while promoting energy and material efficiency.

Chapter VI: Important Points of Individual Indicators

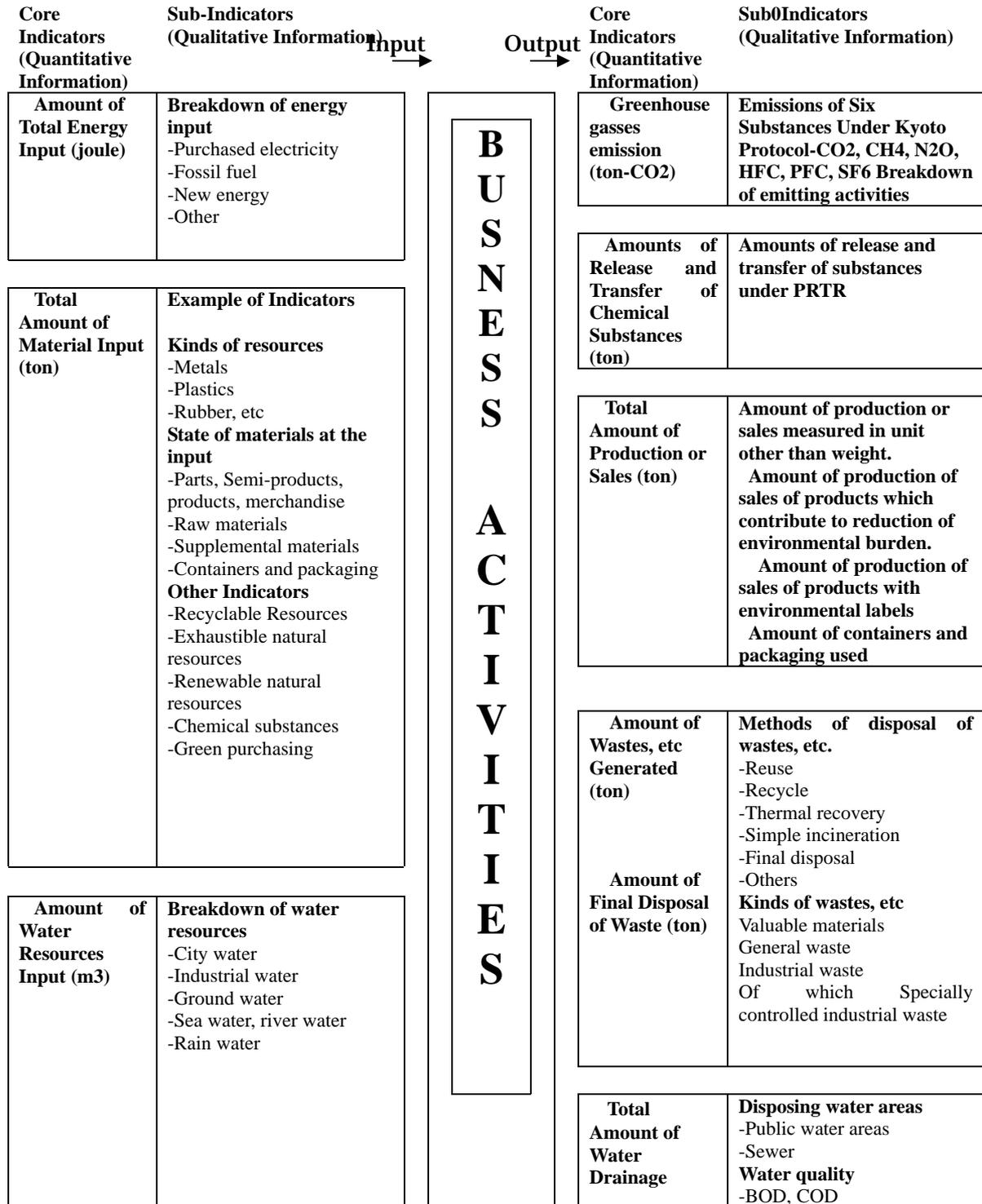
This chapter explains problems we face, presents the reasons and definitions of each indicator, and offers some considerations which organizations need to be cautious when calculating the values for indicators.

1. Operational Indicators

1-1 Core Indicators and Sub-Indicators that Supplement The Core Indicators

Figure 4 summarizes the relations between the nine core indicators and the sub-indicators that supplement the core indicators.

Figure 4 Relation Between the Core Indicators and The Sub-Indicators from the Viewpoint of Material Balance



(1) Total Energy Input

Core Indicators (Unit)	Sub-Indicators (Unit)
Total Energy Input (Joule)	Breakdown of energy Input (joule or other units) <ul style="list-style-type: none">● Purchased electricity (except purchased new energy)● Fossil fuels (oil, natural gas, LPG, coal, etc.)● New energy● Others (Purchased heat, etc)

Environmental Problem and Importance of the Indicator

Carbon dioxide, one of the causes of global warming, is released by burning fossil fuels such as oil, natural gas, and coal. Carbon dioxide emission by the use of fossil fuels consists 90 percent of the total emission of carbon dioxide in Japan.

Therefore, in addition to reducing the demand for energy, it is necessary to switch to energy sources that release less carbon dioxide by promoting the introduction of new energy including such as biomass energy, and/or renewable energy by wind power generation and solar generation which could replace oil.

Thus, the total energy input (core indicator) needs to be measured and managed. Also it is important to measure the breakdown of the input energy (sub-indicator).

Definition of Terms

(a) New Energy

New energy is defined in the Law Concerning Promotion of the Use of New Energy (New Energy Law) as energy sources that are technically in the stage of practical use but are not popularly used because of economical restriction; and are especially necessary for substituting fossil fuel energy. New energy includes electricity and heat by solar light energy, wind power, solar thermal energy, heat-pump energy, wastes combustion, biomass, and fuel-cells. (Note: Renewable energy refers to energy that is generated or supplied by solar light energy, solar thermal energy, wind power, biomass, geothermal energy and small-scale hydraulic power)

Considerations For Estimation

(a) The total energy input should be estimated by monitoring the amount of electricity, fuels and others energy sources separately, using “Table of Heat Generation By Energy Sources” published by Agency of Natural Resources and Energy.

(b) When converting purchased electricity (kWh) to heat (J), the value, 9,830 (kJ/kWh), the heat efficient rate was defined by thermal power plants, should be used as the coefficient for converting the electricity based on the “ Enforcement Regulations for the Law Concerning Rational Use of Energy.”

(c) The breakdowns of the amounts of electricity and fuel consumption (sub-indicators) should be estimated in addition to the total amount of energy input.

(d) The total amount of energy input includes fuel consumption for transportation of goods by the organization, however, the fuel consumption for transportation of goods and products that is contracted out should not be included and it should be measured separately.

(e) Oil, coal and other resources that are used as raw materials during the production should be included in the total material input.

(f) Regarding the breakdown of the energy input, proper unit of measurement can be used for each energy source.

(g) Purchased new energy (such as electricity generated by wind power generation) should be included in new energy.

(h) Surplus electricity that is sold to other organizations can be used to deduct purchased electricity. Or the amount of fossil fuel that would have been consumed to generate the electricity could be estimated, and the amount of fossil fuel may be deducted from the fossil fuel consumption. However, if the fuel that was used to generate the electricity is different from the fuel that was used to generate the purchased electricity, then the electricity should not be used for the deduction. It should be described separately in the reporting.

(2) Total Material Input

Core Indicators (Unit)	Sub-Indicator (Unit)	
	Example of Indicator	
Total Material Input	Breakdown of Resources (ton or other units) <ul style="list-style-type: none"> ● Metal (Steel, aluminum, copper lead, etc.) ● Plastics ● Rubber ● Glass ● Wood ● Paper ● Agriculture products ● Others 	State of material at the time of input (ton or other units) <ul style="list-style-type: none"> ● Parts, semi-processed articles, products, Merchandise ● Raw materials, ● Supplemental material ● Containers and wrapper Other indicators (ton or other units) <ul style="list-style-type: none"> ● Circulated resources ● Exhaustible natural resources (fossil fuel and rare metals) ● Renewable natural resources (Agricultural, forestry and fishery resources that are properly managed) ● Chemical substances (Substances under PRTR, etc.) ● Green procurement

Environmental Problem and Importance of the Indicator

Extraction of resources (natural resources) from the nature is increasing every year. The total material input to Japanese social economic activities in 2000 was 2.1 billion tons, of which the extracted from nature was 1.8 billion tons. Resources that are repeatedly used were 2300 million tons, which accounts for only 10% of the total material input.

As for natural resources, it is necessary to reduce the total input of materials as much as possible in order to build a sustainable society, as well as to switch from using exhaustible to renewable, and to reduce the consumption of exhaustible resources, and to promote cyclical use of resources (reuse, recycle, and thermal recycle).

Therefore, the total amount of material input needs to be measured. Also, when organizations consider their environmental policies, LCA approach is desired. It is important to measure whole environmental burden including not only the output from but also input into the business activities.

While measuring the amounts of natural resources or circularly used resources may be easier in material industries, it may be more difficult to measure in assembling, manufacturing, or distribution industries. Therefore, it should start with measuring amounts of inputs of measurable resources. If an organization uses parts or products in

its business activities, it may be difficult to measure the breakdown of their environmental burden. In this case, it is acceptable to start with measuring and recording the amounts according to the states of the products and parts at the moment of input.

Definition of the Terms

(a) Total amount of material input

The amount of material input means the amount of materials that are directly input into business activities as raw materials of products and services. However, materials that are repeatedly used (reuse, recycle, and thermal recovery) within an organization are not included

(b) Recyclable resources.

Recyclable resources mean those useful among wastes. (The Basic Law for Establishing the Recycling-based Society Article 5.2).

(Note) Wastes

Wastes, and articles once used, or articles collected or scrapped without use (excluding those currently in use), or the articles obtained secondarily in the course of manufacturing, processing, repairing or sales of products, supply of energy, civil engineering and building works, production of agricultural and livestock products, and other human activities (excluding the wastes listed in the preceding Subparagraph, and radioactive substances and the things contaminated by them). (The Basic Law for Establishing the Recycling-based Society Article 2.2).

Issues that Need to Be Cautious

(a) The total amount of material input should be measured by weight (The unit is ton).

(b) Since the total amount of material input is a necessary indicator to reduce the consumption of natural resources and to use natural resources efficiently, it is desired to employ the sub-indicators such as the breakdown of the kinds of resources, the breakdown of the state of the resources at the time of input, and the amount of input of natural resources and recyclable resources.

(c) Water, oil, coal, etc. that are input during production as raw materials should be

included in the total amount of materials.

- (d) The total material input is an important indicator from the viewpoint of reducing the waste generation and management of material input. It may be extremely difficult in certain industries, however. Each organization should develop methods to estimate which are proper for the organization and its kind of business.
- (e) If it is appropriate to measure sub-indicators by units other than weight (ton), using non-weight measurement is acceptable.
- (f) Regarding parts, semi-processed articles, or products, it is desired to know what kinds of materials are used in these articles. However, if it is difficult, then they can be simply measured by weight.
- (g) Materials that have characteristics of capital goods and industrial goods, such as facilities and equipment, may not be included because they might cause sudden change in the amount of input in the year of the rebuilding or the renewal of equipment. If they are included, the reason of the change and the amount of change caused by them should be explained.
- (h) Concerning green procurement, an organization should include the amount of goods which the organization think that they are environmentally-conscious should be recorded if they are purchased for providing products and services. The criteria of the selection should be noted. Materials for in-house consumption should be separately counted as green purchasing (environmental management indicators of purchasing of environmentally considered products and services).
- (i) If is difficult to measure the total amount of material input, it may be estimated by adding the total amount of products or sales and the total amount of waste generated.

(3) Amount of Water Input

Core Indicator (Unit)	Sub0Indicator (Unit)
Amount of Water Input (square meter)	Breakdown of water resources (square meter) <ul style="list-style-type: none"> ● City water ● Industrial water ● Ground water ● Sea water, river water ● Rain water

Environmental Problem and Importance of the Indicator

Water resources are indispensable to survival of lives including human beings and it is the foundation of the social economic system. Only 2.5 percent of water resources on the earth are fresh water. Furthermore, only 0.8 percent of water consist rivers, lakes and ground water that can be used as drinking water, supporting daily activities and productive activities. It is necessary to promote the efficient use of water and to increase the efficiency of water utilization. For this reason, the amount of water input needs to be measured.

Definition of the Terms

(a) Water resources used as a raw material in the production process should be included in the total material input.

(b) Water resources input do not include the amount circularly used within business establishment. It should be measured separately as a sub-indicator. It is very important to measure circularly used water within the business establishment because of the scarce supply of water resources.

(c) In addition to water resource input, it is desirable to measure water inputs from each source of water (sub-indicator).

(4) Amount of Greenhouse Gasses Emissions

Core Indicator (Unit)	Sub-Indicator (Unit)
Core Indicator (Ton-CO2)	Six substances under the Kyoto Protocol (Ton-CO2) <ul style="list-style-type: none"> ● Carbon dioxide (CO2) ● Methane (CH4) ● Nitrous oxide (N2O) ● Hydro-fluorocarbon compounds (HFC) ● Per-fluorinated compounds (PFC's) ● Sulfur hexafluoride (SF6) Emitting activities (Ton-CO2) <ul style="list-style-type: none"> ● Energy consumption on the site ● Consumption of fuel for transportation ● Waste disposal ● Industrial process ● Other

Environmental Problem and Importance of the Indicator

Global warming is a phenomenon that an average temperature of the earth increases because of greenhouse gasses such as carbon dioxide and methane released into the atmosphere as human activities expands. As global warming progresses, serious effects, such as flooding caused by the increase of the sea level, decreasing of harvesting of crops, severer transmitting diseases, extinction of wild species and so on, would be expected.

Among greenhouse gasses, the substances regulated by the Kyoto protocol are carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and three chlorofluorocarbon substitutes (hydro-fluorocarbon compounds: HFC, per-fluorinated compounds: PFC's, and sulfur hexafluoride: SF6). Particularly, carbon dioxide is released by combustion of fossil fuels, such as coal and oil, and greenhouse effect caused by carbon dioxide accounts for 90 percent of the total greenhouse effect caused by emissions in Japan.

Therefore, the amount of greenhouse gases emissions should be measured (ton-CO2 converted). Additionally, it is important to measure each of six substances under the Kyoto Protocol and their causing activities.

Definition of the Terms

(a) Greenhouse gasses

Carbon dioxide, Methane, Nitrogen dioxide, Substances of Hydro-fluorocarbons group, specified by the Enforcement Order , Substances of Per-fluorocarbons group specified by the Enforcement Order , Sulfur hexafluoride (Law Concerning the

Promotion of the Measures to Cope with Global Warming (Global Warming Measure Promotion Law), Article 2.3)

(b) Greenhouse gas emissions

The emission, discharge or leakage into the atmosphere of greenhouse gases generated from human activities, and the use of electricity or heat provided by another party (limited to those which use fossil fuel or electricity as a heat source) (Global Warming Measure Promotion Law, Article 2.4).

(c) Greenhouse effect coefficient

Coefficients defined by the Global Warming Measure Promotion Law Enforcement Order in accordance with international knowledge as a ratio of the potential of each greenhouse gas to that of carbon dioxide to cause global warming substance (Global Warming Measure Promotion Law, Article 2.5). Three substitutes for chlorofluorocarbon have much greater green house effects than carbon dioxide has.

Issues that Need to Be Noted

(a) The amount of greenhouse gases emission is estimated by calculating the amount of each greenhouse gas and multiplying it with relevant coefficient (the Enforcement Order 4) resulting the amount of CO₂-converted, and finally summing up these converted values.

(b) The amount of emission of each greenhouse gas (sub-indicator) can be estimated by multiplying the amount such as the amount of fuel consumption with relevant coefficients for the activity specified by the Enforcement Order (Enforcement Order Article 3.1 and Table)

(Examples)

-Energy consumption within the business site (including purchased electricity and heat)

-Fuel consumption for transportation

-Waste disposal

-Emission accompanied with HFC gas consumption

-Other amounts of emissions measured in proper method such as actual measurement.

(If activities are subjected by the Guidelines for the Methods for Estimating the Amount of Greenhouse Gasses Emissions by Businesses, then they need to be actually measured. If it is difficult to measure, then estimation should be made using coefficients listed in the Guidelines.)

(c) When estimating CO₂ emissions from electricity supplied by electricity utility companies, the emission coefficient provided by the electricity supplier (demand side terminal, not the supply side) should be used. If emission coefficients cannot be obtained, use the emission coefficient, shown in “the Emission Coefficient for the Consumption of Electricity Supplied by Other Individuals [General Electricity Supplier]”, provided by the Enforcement Order.

* There are a few methods to assess the effects of environmental efforts that are introduced to reduce the emission of greenhouse gases. Organizations should use the best method that is rational and fits the individual characteristics of the measures. “The Scenario for Achieving Objectives: a Subcommittee Mid-term Report” (the National Environment Commission, Global Environment Committee, March 2001) describes two methods in parallel: multiplying the reduction of the use of electricity (kWh) with power generators’ national average emission coefficient (0.36kg-CO₂/kWh) and multiplying it with thermal power average emission coefficient (0.69kg-CO₂/kWh).

(d) Concerning fuel consumption associated with transportation, greenhouse gas emissions from transportation services which are contracted out to external operators should be included as well as in-house transportation, each of which should be mentioned separately. Emissions from different transportation modes should be separately mentioned.

(e) The amount of emission caused by incineration of waste (waste oil and waste plastic) by out-side contractors should include the amount incinerated, and each of them should be mentioned separately.

(f) Carbon dioxide emissions caused by incinerating goods made of wood and paper (other than oil) should not be included. Inventory used in Japan, which is in accordance with a guideline issued by the Intergovernmental Panel on Climate Change (IPCC), treats carbon dioxide emission from wooden products as if trees were incinerated at the time of logging. Therefore, carbon dioxide emissions caused by consumption as fuel (as waste wood and black liquor) and caused by land-filling and incineration should not be included (“The Guidelines for Estimating Greenhouse Gas Emissions from Businesses” issued by the Ministry of the Environment).

- (f) Regarding details of estimating emissions in Japan, please refer the most updated “Enforcement Order of the Law Concerning the Promotion of the Measures to Cope with Global Warming”, the “Guidelines for Estimating Greenhouse Gas Emissions from Businesses,” and the “Report of the Committee for Methods of Estimation Greenhouse Gas Emissions.”
- (h) Regarding emissions outside of Japan, if emission coefficients are provided in the relevant countries, estimation should be done in accordance with them.
- (i) Hydro-fluorocarbon compounds (HFC) should be reported as PRTR in addition to reporting in this section.
- (j) Carbon dioxide emission reduction under the Kyoto Mechanism is not emission reduction performed directly by organizations, therefore they should not be entered in this section.

(5) Amount of Releases and Transfer of Chemical Substances

Core-Indicators (Unit)	Sub-Indicators (Unit)
Amount of Releases and Transfer of Chemical Substances (Ton)	Amount of Releases and Transfer of PRTR Substances (Ton) Amount of Releases of Other Controlled Substances (Ton)

Environmental Problem and Importance of the Indicator

A variety of chemical substances are produced in massive amount and used in a variety of places in modern society. There are substances, such as dioxin, that are produced unintentionally. Some chemical substances pollute the environment and cause harms on human health and ecological systems in the nature unless they are properly controlled at each stage of production, distribution, consumption and disposition.

Chemical substances are regulated by statutes in Japan including the Air Pollution Control Law, the Law Concerning Special Measure against PCB Waste, and the Law Concerning Special Measures against Dioxins (Dioxin Law). Each law regulates the use of substances, the methods of disposal and amount of emissions of particular substances. In addition, the Law Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (PRTR Law) obligates organizations to record and report the amount of emission to the

environment and the amount of transportation as waste (PRTR program) , concerning a wide variety of chemical substances including substances covered by the laws mentioned above. The Law also obligates organizations to provide Material Safety Data Sheets (MSDS) and the management of chemical substances and risk communication.

Risk communication should be promoted and environmental reporting should include the amounts of emissions and transfer, and the state of management in regards to chemical substances not only that are regulated by these laws, but also that organizations voluntary impose same standards.

Definition of the Terms

(a) Chemical Substances

The subjects of the Guidelines are chemical substances regulated by the Air Pollution Control Law, the Law Concerning Special Measure Against PCB Waste, the Law Concerning Special Measures Against Dioxins, and the Law Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management, etc. as well as substances which organizations voluntarily designate to manage..

(b) Substances Regulated by PRTR

The Substances that are designated as the first class chemical substances by the PRTR Law Enforcement Order Table 1 (354 Substances)

(c) Other Substances Under Regulation

Other substances under regulation include substances that organizations manage for example:

- a. The substances designated as Class II chemical substances by the PRTR Law Enforcement Order Table 2 (81 Substances)
- b. Substances considered as hazardous air pollutants which are listed by a report of the National Environment Commission

Issues that Need to Be Noted

- (a) There are five methods of measuring the amounts of releases and transfer of substances under PRTR.
 - a. Method that uses material balance
 - b. Method that uses coefficient

- c. Method that actually measures
- d. Method that uses the characteristics of substances
- e. Other methods

(b) Please refer to “the Manual for the Calculation of PRTR Emissions” by the Ministry of the Environment` (April 2001, Revised in October 2001) for methods of calculating the amounts of PRTR substances.

(c) Regarding CFCs that are regulated by PRTR regulations, the amounts of releases (amounts leaked), collected (amount handed to collecting business), destroyed (amount handed to a destroying business, and it is a part of collected amount) should be measured. The amounts of releases should be recorded not only as PRTR substances (CFC and HCFC) but also as greenhouse gases (HFC).

(d) It is requested to measure the amount of releases of other substances written in laws and regulations.

(6) Total Amount of Production or Sales

Core Indicators (Unit)	Sub-Indicators (Unit)
Total Amount of Production or Sales (Ton)	Amount of production or sales measured in units other than weight (number, area, or capacity.) Amount of production or sales of goods that contribute to reducing environmental burden (ton) Amount of production or sales of goods with environmental labeling (ton) Amount of containers and packaging used (tons)

Environmental Problem and Importance of the Indicator

The total amount of production or sales is important as an indicator of business output with the standpoint of material balance. This indicator is necessary to evaluate the total energy input, water resources inputs, amount of greenhouse gases emissions, chemical substance emissions, waste disposal, and the total water drainage. For example, they can be used to calculate environmental burden per unit of product and service value, which will be discussed later.

Amount of production and sales of products with environmental labeling, such as the Eco-mark, etc. is an indicator for measuring how much the total amount of production or sales includes environmental products. From the standpoint of reducing

environmental burden and the establishing a sustainable society, it is desired to increase the production and sales of products that consume less energy and produce less waste during the period of use and can be recycled after use.

The amounts of cans, bottles and plastic containers in general waste accounts a large part of wastes, 60 percent in general waste by volume and for 20 percent by weight. As remaining lives of landfill sites are urgently short, the establishment and effective operation of recycling systems of containers and packaging waste is seriously required as a measure to reduce the amount of general waste.

The “Law for Promotion of Sorted Collection and Recycling of Containers and Packaging (Containers and Packaging Recycling Law)” requires, in order to reduce the amount of containers and packaging waste, organizations to reduce the use of containers and packaging and to promote the use of recycled materials in new products. Therefore, it is important to measure and record the amount of containers and packaging under the Containers and Packaging Recycling Law.

Definitions of the Terms

(a) Containers and Packaging

Containers and packaging for commercial products, which become unnecessary when the said products have been consumed or when the said containers and packaging have been removed from the products (Law for Recycling of Containers and Packaging, Article 2).

(b) Products with Environmental Labeling, etc

There is no particular definition for products with environmental labeling. Products that the organization considers that they contribute to reduce environmental burden satisfy this definition. Examples are “eco-friendly goods, etc.” defined by the Green Procurement Law and products certified by the Eco-mark

(Note)

The “Eco-friendly goods, etc.” (Green Procurement Law, Article 2(1))

(a) Recycled resources including materials or parts/components which contribute to the reduction of “environmental impact”

(b) Products which contribute to the reduction of environmental impact on one of the following grounds:

- materials or parts/components used in the aforementioned goods contribute to the reduction of environmental impact;
- greenhouse gas, etc. emitted as a result of the use of the aforementioned goods do not cause a large environmental impact;
- the whole or part of the aforementioned goods can be easily reused or recycled, so that generation of waste can be limited.

(c) Services which contribute to the reduction of environmental impact, for example, services provided by utilizing products that contribute to the reduction of environmental impact.

Issues that Need to Be Noted in regards, to the calculation

- (a) Either the total amount of production or sales can be used.
- (b) Regarding the amount of containers and packaging, the amount of production and use of containers and packaging subjected by the Containers and Packaging Recycling Law should be measured.
- (c) Regarding products certified by environmental labels, the types and kinds of labels should be stated and measured by weight, number, dimensions, volume.

(7) Total Amount of Wastes, etc.

(8) Total Amount of Final Disposal

Total Amount of Waste Disposal (Unit)	Sub-Indicator (Unit)
Total Amount of Wastes, etc. Generated (ton)	Methods of waste treatment (ton)
Total Amount of Waste Disposal (ton)	<ul style="list-style-type: none"> ● Reuse ● Material recycle ● Thermal recovery ● Simple incineration ● Final disposal (Core indicator) ● Other methods (Storage, safekeeping)
	Kinds of wastes (ton)
	<ul style="list-style-type: none"> ● Valuable materials ● General waste ● Industrial waste ● In which amount of specially Controlled industrial waste

Environmental Problem and Importance of the Indicator

The amount of waste in Japan has increased since 1960s, and the level of waste generation has maintained at the elevated level since 1990. Remaining lives of landfill sites are urgently short, the cost of waste disposal has become very expensive, and the

problem of illegal dumping has risen. It is urgently required to reduce the amount of waste generation, and promote repeated use and proper disposal of materials.

As stated in the Basic Environment Plan and the Basic Law for Establishing a Recycling-Based Society, the order of priority should be in mind when pursuing proper measures for disposal of waste and recycling. This order of priority is, firstly, decreasing the generation of waste (reduce), secondly, reusing used products and parts (reuse), thirdly, recycling collected materials as raw materials (material recycle), and fourthly, thermal recovery (thermal recycle); and materials that becomes waste after these measures should be disposed properly. (The best order may be different in some cases because of possibilities that reduction of environmental burden from one of these measures can be tradeoff to other environmental burden).

Therefore, it is important to measure and record the amount of waste (core indicator) and the methods of it disposal. Because of urgent shortage of final disposal sites and the problem of unlawful dumping, the amount of final disposal is considered as core indicator.

Definitions of the Terms

(a) Waste

Refuse, bulky refuse, ashes, sludge, excreta, waste oil, waste acid and alkali, carcasses and other filthy and unnecessary matter, which are in solid or liquid state (excluding radioactive waste and waste polluted by radioactivity). (The Waste Management (Disposal) and Public Cleansing Law, Article 2)

(b) Wastes, etc.

The articles once used or collected or scrapped without using (excluding those currently in use), or the articles obtained secondarily in the course of manufacturing, processing, repairing or sales of products, supply of energy, civil engineering and building works, production of agricultural and livestock products, and other human activities (excluding the wastes listed in the preceding Subparagraph, and radioactive substances and the things contaminated by them) (The Basic Law for Establishing the Recycling-based Society Article 2(2))

(c) General Waste

Wastes other than industrial waste. General waste is divided into “waste” and

“excreta.” Waste is divided into “business waste,” which is generated by business activities such as offices and restaurant, and “household waste,” which is generated by daily living activities.

(d) Industrial Waste

Twenty kinds of wastes such as ashes, sludge, waste oil, etc. which are left as a result of business activity.

(e) Specially controlled industrial waste

Waste oil, waste acid and alkali, infectious industrial waste and specified hazardous industrial wastes which are specified by an Enforcement Order as explosive, toxic, infectious or harmful to human health and the living environment (The Waste Management (Disposal) and Public Cleansing Law, Article 2(5) and Enforcement Order 2(4)).

(f) Reuse

Using recyclable resources as products as they are (including the use of them after repair) and using the whole or part of recyclable resources as components or parts of products (The Basic Law for Establishing the Recycling-based Society Article 2(5)).

(g) Material Recycle

Use of the whole or part of recyclable resources as raw materials. (The Basic Law for Establishing the Recycling-based Society Article 2(6))

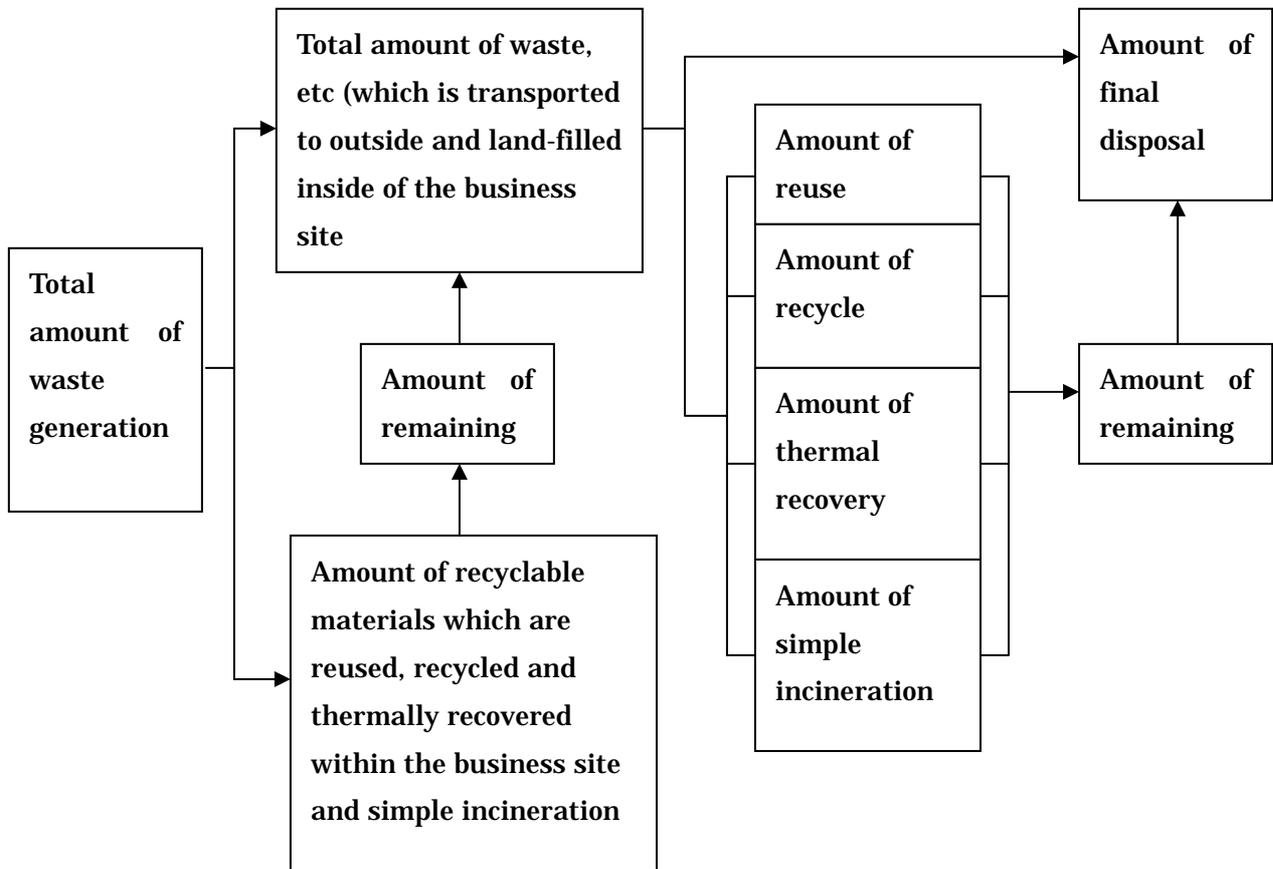
(h) Heat recovery (Thermal Recovery)

Using wastes for obtaining heat the things which are the whole or part of recyclable resources and which are available for combustion or have such a possibility (The Basic Law for Establishing the Recycling-based Society Article 2(7)).

(i) Simple incineration

Incinerating waste without heat recovery.

Figure 5 Flow of the Treatment of Wastes, etc.



Issues that Need to Be Noted in regards to the calculation

- (a) The total amount of waste, etc. includes wastes which are transported out of the business site (out of its management) (except those which are shipped as products and services) and the amount of wastes which are land-filled within the business site.
- (b) Waste generated in constructions or demolitions of factories or equipment in factories should be measured and recorded as environmental burden caused by the generators as stipulated in the Waste Management Law. However, building and equipment have characteristic of production and/or capital facilities. If these are included, the amount of waste abruptly increases in the year of renovation. These materials are separately measured and recorded from other waste.
- (c) In addition to measure and record the amount of waste, the amount of waste for each treatment method and the amount of waste for each kind of waste (sub-indicator) should be measured and recorded. The amount of final disposal should be measured and recorded as a core indicator because of the urgent shortage of landfill capacity and unlawful dumping.

- (d) Materials circuitry used within the business site is not included in wastes.
- (e) Reused or recycled materials should be measured by summing up the amounts of recycled and reused materials that the organization transported to the outside of the business site (out of its management). Those reused and recycled within the business site should be measured and recorded separately.
- (f) The remaining materials from the reuse and recycle process should not be included in the amount of recycled and reused, but included in the item of the treatment method of these materials. If it is unable to measure the remaining material and could not exclude it from the recycled and reused materials, the fact should be stated in the reporting.
- (g) Thermally recycled materials should be measured by summing up the amount of thermally recycled materials that the organization transported to the outside of the business site (out of its management). Those thermally recycled within the business site should be measured and recorded separately.
- (h) The amount of final disposal includes all materials that are finally disposed (land-filled) regardless of inside or outside of the business site.
- (i) The amount of final disposal includes remaining from recycling, reusing and thermal recovery process, but it should be measured and recorded separately. If the remaining material cannot be measured and could not be excluded in the amount of final disposal, the fact should be stated.
- (j) Hazardous wastes, and radioactive waste and waste polluted by radioactivity which are stored and safely kept should be measured by their kinds and recorded separately.

(9) Total Water Drainage

Core Indicators (Unit)	Sub-Indicators (Unit)
Total Water Drainage (Square Meter)	Water area and amount (Square meter) <ul style="list-style-type: none"> ● Public water ● Sewage Water quality (Mil Glam per liter) <ul style="list-style-type: none"> ● BOD or COD

Environmental Problem and Importance of the Indicator

Water is in a circle that rainwater falls onto the ground, it is absorbed in forests and soil and becomes ground water, runs through rivers and poured into sea, evaporated into the atmosphere, and falls as rainwater. Many pollutants are eliminated in this cycle. In order to maintain this water cycle and the quality of water, it is necessary to manage this water cycle so environmental burden from the use of water does not exceed the

capacity of natural water cycle.

Water contaminants from business activities and households have impacts on the environment of our daily lives such as damages to human health and ecological systems in water and impacts on city water systems. National standards for water pollution in public waters caused by organic compounds such as chemical oxygen demand have not been met yet.

Therefore, the total amount of water drainagel should be measured and recorded. Additionally, the amounts and qualities (BOD or COD) of water disposed to each water area should be measured and recorded.

Definitions of the Terms

(a) Public Water Areas

Rivers, lakes, coastal seas, waterways, etc. (excluding sewage) (the Water Pollution Control Law, Article 2(1))

(b) BOD

Biological oxygen demands. The amount of oxygen that bacteria need to decompose organic matters in water. The lager the value of BOD, the worse the water quality.

(c) COD

Chemical oxygen demands. The amount of oxygen that is needed to stabilize and oxidize substances (mainly organic matters) in water chemically.

Issues that Need to Be Noted in regards to the calculation

(a) The total amount of water should be calculated by summing up the amounts of disposed to sewage systems and public waters.

(d) Rainwater that is not used or treated is not included in the amount of waste water.

(c) BOD and COD should be measured and recorded for emissions from business sites and expressed in the concentration of each measurement. It is possible to estimate the total amount of pollutants by taking an average of measurements in a certain time period, and multiply the average with the amount of waste water. (It is necessary to measure and record the amount and quality of the water emission from each process in the business site.)

1-2 Other Sub-Indicator

Category	Indicator	Problem in the Environment	Unit	Note upon the calculation	Related Law and Regulation
Water Resource Input	Circuitry use of water within organization	Water resource is scarce	Square meter	Exclude circuitry use of cooling water.	
Emission to the atmosphere	Amount of SOx Emission	Could cause problems with the breathing system. Cause acid rain that negatively affect forests, rivers, lakes, etc.	Ton		Air Pollution Control Law
	Amount of NOx emission	Could cause problems with the breathing system. Cause acid rain and photochemical oxidant.	Ton		Air Pollution Control Law
	Concentration of substances under emission regulation (SOx, NOx, dusts, dioxins, etc.)	Could cause problems on human health or living environment.	Maximum concentration (ppm, ng-TEQ/m ³ N)	Set for each substance	Air Pollution Control Law, the Law Concerning Special Measures against Dioxins
	Concentration of designated substances (Benzene, Trichloroethylene, carbon-dichloride) in emission	Could be harmful for human in standpoint of long term-health, such as causing cancer.	Maximum concentration (mg/m ³ N)	Set for each substance	Air Pollution Control Law
	Noise, vibration	Causes psychological effects	Decibel		Noise Regulation Law, Vibration Regulation Law
	Odor	Causes psychological effects	Decibel		Offensive Odor Control Law
Emission to water areas	Nitrogen, phosphorus	Causes excessive eutrophication of closed waters	Ton		Water Pollution Control Law

	Concentration of designated substances (health issues, living environment issues, substances that could produce dioxines, tri-halomethane) in emission	Could cause problems on human health or living environment.	Maximum concentration (mg/l, pg-TE Q/l)	Set for each substance	Water Pollution Control Law, Law Concerning Special Measures against Dioxins
Generation of waste	Amount of reused materials in the organization	To reduce the amount of waste generation	Ton		
	Amount of circularly used recyclable materials in the organization	To reduce the amount of waste generation	Ton		
	Amount of thermally recovered materials in the organization	To reduce the amount of waste generation	Ton		
Products, etc.	Energy consumption efficiency for each product group	Improvement in energy efficiency would contribute to the reduction of CO2 emission.	Unit designated by the Energy Saving Law		Law Concerning the Rational Use of Energy (Energy Saving Law)
	Amount of CO2 emission (estimate emission from the entire products that are shipped in the year)	Improvement in energy efficiency would contribute to the reduction of CO2 emission.	Ton-CO2	Establish clear methods for estimating how products of the organization are used by consumers.	

	Proportion of reusable or recyclable part for each product group	It is necessary to design products to use reusable or recyclable parts in order to promote reusing and recycling of waste materials, etc.	%	Based on an assumption that a system of collecting, reusing, and recycling exists in the society. Parts that can be thermally recovered should be reported separately	Law for Promotion of Effective Utilization of Recyclable Resources (Promotion of Effective Resources Utilization Law)
	Amount of consumed products collected, Containers and packaging collected	Organization that produce or sell products are required to collect and circularly use their products.	Ton		
	Amounts and proportions of reused, recycled, and thermally recovered materials in the consumed products collected	Organization that produce or sell products are required to collect and circularly use their products.	Ton, %		
Stocked pollution	State of pollution of Soil, ground water and river-bed(dioxins)	Concentration (mg/kg, mg/l, pg-TEQ/g)			The Soil Contamination Measures Law, and the Law Concerning Special Measures against Dioxins
Landuse	Areas of greening, planting, restoration of nature	Contribute to improvement of landscape and living environment and to preservation of wild plants and animals	Hector		
Other environmental risk	Amount of chemical substances stored.	Although chemical substances do not cause problems if it is properly stored,	Ton	Substances under PRTR Law, hazardous	PRTR Law, Air Pollution Control Law, Law Concerning

		they have risks of accidents, leaking and evaporation to the environment.		air pollutants, PCB, etc.	the Examination and Regulation of Manufacture etc. of Chemical Substances
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2. Environmental Management Indicator (Sub-Management)

(1) Environmental Management System

- Number of sites that have environmental management systems
- Number of ISO14001 certification
- Number of training sessions regarding environmental preservation and of people attended
- Number of environmental audits by kinds (internal and external environmental audits)

Environmental Problem and Importance of the Indicator

In order for organizations to improve their environmental performance, it is necessary to manage environmental burden of their p activities, products and service effectively under a systematic environmental management systems. It is desirable to measure and record the indicators shown above in order to evaluate whether environmental management systems such as ISO14001 and Environmental Activity Evaluation Programme (Eco-Action 21) are properly operated.

The situations of establishment and operation of EMSs may largely be different by the kinds and sizes of organizations. Therefore, indicators considered they are necessary should be added in order to determine the state of establishment and operation of the total EMSs, whether policies, objectives, etc are developed and their contents, the state of the organization and structure, preparedness for emergencies, the state of monitoring and the implementation of the EMSs.

Definitions of the Terms

(a) Environmental management system

The part of the overall management systems that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental

policy (ISO14001 (JIS Q 14001))

(b) Environmental management systems audit

Systematic and documented verification process of objectively obtaining and evaluating evidence to determine whether an organization's environmental management system conforms to the environmental management system audit criteria set by the organization, and for communication of the results of this process to management (ISO14050 (JIS Q 14050))

(2)Technologies for Environmental Protection, Research and Development for Design for Environment (DfE)

- Number of products that meet energy saving standards
- Number of products designed with consideration for disassembling, recycling, reusing and energy saving
- Results of analysis and evaluation for environmental burden of main products with the viewpoint of LCA
- Funding for research and development for Design for Environment

Environmental Problem and Importance of the Indicator

From the viewpoint of establishing a recycling-based society, organizations are strongly urged to develop technologies that reduce environmental burden during the use of their products and at their disposal and provide products and services that use these technologies. Therefore, it is important to manage indicators that measure the state of research and development for technologies for environmental protection and designing for the environment (DfE).

The situations of research and development may largely be different by kinds and size of organizations. Therefore, indicators that organizations consider they are necessary should be used in order to determine the state of manage research and development for technologies for environmental protection and technologies that contribute to the reduction of environmental burden.

Definitions of the Terms

(a) Products that Meet Energy Saving Standards

For some machinery or equipment which are used in large quantities in Japan and consume a considerable amount of energy in their operation, stipulated by a government ordinance as especially requiring the improvement of performance (Designated Machinery"), the Minister shall determine and make public the matters to be used as

standards for judgment by Manufacturers, etc. with regard to the improvement of such performance for each Designated Machinery.

(Law concerning the Rational Use of Energy, Article 2; and Enforcement Order Article 7). It refers to these products that meet the energy conserving standards.

(b) Life Cycle Assessment (LCA)

Summary and evaluation of inputs and outputs and potential environmental effects of products throughout the lifecycle. (JIS Q ISO 14040)

(3)Environmental Accounting

- Cost of environmental conservation
- Economic effects as the results of environmental conservation activities

Environmental Problem and Importance of the Indicator

It is important for organizations to measure and record the costs and effects of environmental efforts of their organizations in order to make these efforts more effective and make rational decisions. The Guidelines employ information in environmental accounting that can be measured in a monetary unit.

Desirable methods in environmental accounting may largely be different by the kinds and sizes of organizations. Therefore, indicators that organizations consider they are necessary should be used in accordance with principles that are shown in “The Guidelines for Environmental Accounting for Businesses, Fiscal Year 2002 Version.”

Issues that Need to Be Noted in regards to the calculation

- (a) Economic costs and effects of environmental efforts should be measured based on the principles shown in the Guidelines for Environmental Accounting for Businesses, Fiscal Year 2002 Version.
- (b) When information of environmental accounting is published, it is necessary to define scope of its analysis clearly and the methods of data analysis.

(4)Green Purchase

- The amount or proportion of the purchase of environmentally considered products and services.
- The numbers of low-emission vehicle and fuel-efficient vehicles.

Environmental Problem and Importance of the Indicator

In order to reduce environmental burden and promote circuitry use of resources and energy, organizations should work with business partners such as organizations that supplies products, raw materials, parts and services (hereinafter, products and services) in addition to promoting environmental activities within the organization. This is, in other words, actively promoting environmental activities in the upstream of business, and one of important methods for this purpose is priority purchase of products and services that contribute the reduction of environmental burden (green purchase or procurement). In order to evaluate efforts of green purchase in organizations, the indicators shown above should be added.

Items purchased for the consumption within organizations may largely be different by kinds and sizes of organizations. Therefore, in order to measure the efforts for green purchase, indicators considered they are necessary should be added.

Definitions of the Terms

(a) Environmentally conscious products and services.

“Environmentally conscious products and services” include “eco-friendly goods, etc.” defined in Article 2 of the Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities.

(Note) “Eco-friendly goods, etc.”

a. Recycled resources including materials or parts/components which contribute to the reduction of “environmental impact”

b. Materials or parts/components used in the aforementioned goods contribute to the reduction of environmental impact; Products which contribute to the reduction of environmental impact on one of the following grounds: greenhouse gas, etc. emitted as a result of the use of the aforementioned goods do not cause a large environmental impact; the whole or part of the aforementioned goods can be easily reused or recycled, so that generation of waste can be limited; and

c. Services which contribute to the reduction of environmental impact, for example, services provided by utilizing products that contribute to the reduction of environmental impact.

(b) Low emission vehicle and fuel efficient vehicles

They are defined as vehicles which are eligible for tax reduction programs specified by the following laws.

- Tax reduction program for vehicle trading tax for fuel efficient automobiles.
- Greening program of the automobile tax
- Special measures for electric vehicles of automobile acquisition tax
- Special measures for vehicles that satisfy the latest emission regulation of automobile acquisition tax
- Tax reduction under the Automobile Nox/SOx Law
- Others

(5)Environmental Communication and Partnership

- Number of sites, which publish environmental reporting or environmental activity site reports.
- Number of participation to environment-related exhibitions.
- Number of inquiries from customers.
- Number of environment-related advertisements.
- Number of stakeholders dialogues and the number of participants
- Number of programs of environmental education that are provided for local communities and the number of participants.
- Number of environmental or social activities carried out in cooperation with local communities and the number of participants.
- Other activities carried out in cooperation with local communities and the number of participants

Environmental Problem and Importance of the Indicator

Organizations are expected to disclose information on their environmental activities through environmental reporting and to engage in environmental reporting actively. Efforts by organizations to send information on their products and serviced in addition to their environmental activities to customers through environmental labeling and advertisement are expanding. The need for environmental communication is increasing from the viewpoint of “environmental accountability” of organizations.

Additionally, organizations are expected to provide interested groups opportunities of exchanging opinions and discussing environmental activities that the organizations and the interested groups hold together cooperatively. Thus, it is important to record the number, size, and contents of activities that the organization and interested group held together.

Activities of environmental communication and partnership may largely be different by kinds and size of organizations. Organizations should use indicators considered to be necessary and they should develop their own indicators and methods.

Definitions of the Terms

(a) Stakeholder Dialogues

Meetings in which organizations discuss with interested groups (stakeholders)

(6) Conformance to Environmental Laws and Regulations

Numbers of violations, accidents and the amount of fines
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Environmental Problem and Importance of the Indicator

Recording conformance to laws and regulations of the whole business activities is a necessary indicator for an organization in order to maintain conformity and to explain it to interested groups such as local residents.

(7) Safety and Health

- | |
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| <ul style="list-style-type: none">● Frequency of industrial accidents occurrence, the number of industrial accidents (Number of disasters)● Frequency rate of accidents● Number of days lost by industrial accidents.● Severity rate● Amount of expenses for occupational health and safety, expenses per capita |
|--|

Environmental Problem and Importance of the Indicator

Organizations are expected to provide working environment in which employees can work healthy and safely. Therefore, indicators shown above need to be measured and recorded.

Definitions of the Terms

(a) Industrial Accidents

Accidents occurred on duty, including injury and sickness caused by work (one or more days of absence from the work or loss of a part (or a function) of the body) and death. However, sickness caused by work does not include late-onset sickness (sickness which does not come from accidents or disasters but gradually progresses, such as pneumoconiosis, lead addiction, damage by violation, etc.), food poisoning and contagious diseases.

Injury, sickness and death occurred during commuting are excluded (“Survey on the Trend of Occupational Disaster 2001” by the Ministry of Health and Labor).

(b) Frequency Rate of Accidents

Shows frequency of disasters. The number of injuries and deaths caused by industrial accidents per million hours of actual labor. (“Survey on the Trend of Occupational Disaster 2001” by the Ministry of Health and Labor)

(c) Severity Rate

Shows seriousness of industrial disasters. The number of lost working-days caused by industrial accidents per thousand hours of actual labor. (“Survey on the Trend of Occupational Disaster 2001” by the Ministry of Health and Labor)

(8) Social Contribution Concerning the Environment

- Amounts of monetary supports and amounts of supports in goods and services for trade organizations and NPOs which promote environmental protection.
- Number of employees who have involved in volunteer activities paid by the organization.
- Commendation for environmental conservation activities.
- Amounts of supports, etc. given by foundations which the organizations are involved.

Environmental Problem and Importance of the Indicator

It is desirable that organizations make environmental efforts, and at the same time, make efforts to build a sustainable society through cooperation with various other sectors. One of the specific methods of cooperation is to make social contributions such as contribution to voluntary activities for the environment and society by employees and businesses and support for environmental NPOs and efforts of trade groups. Organizations should voluntarily engage in these social contributions. Therefore, it is important for organization to measure and record their social contributions to the environment.

Social contributions to the environmental may largely be different by kinds and sizes of organizations. Organizations may include indicators that are considered to be necessary by the organizations.

3. Management Related Indicators (Sub-Indicators)

Category	Indicator	Unit
Management Indicators (Examples)	Amount of sales	Yen
	Amount of sales of products and services	Yen
	Total floor area	Square meter
	Number of employees (listed)	People
	Others	
Management Related Indicators	Indicators that measure eco-efficiency	-
	Integrated indicator of various environmental burdens	-

(1) Indicators for Management Efficiency

Organizations are expected to reduce the amount of environmental burden released to the environment. On the other hand, they are expected to perform their environmental efforts with higher economic efficiency from the viewpoint of business management.

For this purpose, when organizations measure and record environmental burden, it is important to use indicators that show efficiency of environmental activities (hereinafter called “indicators for eco-efficiency”), while reflecting their economic values of the business organizations, as well as to use indicators that show the total amount of environmental burden.

These indicators for eco-efficiency are combinations of independent indicators in environmental performance and financial performance. In these Guidelines, environmental performance indicators mean operational indicators such as the total amount of energy input and the amount of greenhouse gas emissions, and financial performance indicators mean management indicators.

Indicators that show eco-efficiency are under development by several institutions; however, general agreement on how they should be combined has not been reached yet. However, they can be categorized into two groups.

- a. Value of products or services per unit of environmental burden
- b. Environmental burden per unit of products or services

Even if eco-efficiency in an organization improves, environmental burden as the

society at large could increase. It is necessary to switch to a business model of lower environmental burden. For this purpose, it is needed to evaluate environmental performance of organizations with environmental performance indicators that include both the total amount of environmental burden and eco-efficiency.

Value of Products or Services Per Unit of Environmental Burden

The value of products or services per unit of environmental burden can be obtained by dividing management indicators with the total amount of environmental burden (a value of operation indicator).

$\text{Value of products or services per unit of environmental burden} \\ = \text{Management indicators} / \text{Total amount of environmental burden}$

This indicator is generally called eco-efficiency, which feature is that the value of the indicator increases as eco-efficiency improves. The World Business Council for Sustainable Development (WBCSD), which proposed the concept of eco-efficiency in 1992, explains the reason of the choice of this combination that an eco-efficiency indicator would be easily recognized if it reflects progressive environmental performance as same as the increase of financial indicators (sales and profits) reflects progressive financial performance (“Eco-efficiency Indicators & Reporting, “2000).

The numerator can be economic added values, amount of production, net profits after tax, etc. as well as management indicators. If the denominator is the data representing environmental burden from a business site, then the numerators should be the net value added by the corresponding business site in order to keep the areas of the numerator and denominator identical.

The eco-efficiency of the World Business Council for Sustainable Development (WBCSD) is used as an example of the cross cutting indicator, which is one of two integrated measures suggested in “The Sustainability Reporting Guidelines 2002” of the Global Reporting Initiative (GRI).

Some organizations in Japan have published environmental reporting which included eco-efficiency as a measurement of environmental efficiency of the organizations.

Environmental Burden Per Unit of Products or Services

Environmental burden per unit of products or services can be obtained by dividing

the total amount of environmental burden (a value of an operation indicator) with a value of a management indicator.

Environmental burden per unit of products and services
= Total amount of environmental burden / Value of a management indicator.

The feature of this indicator is that smaller values of the indicator indicate more advanced environmental efforts.

The denominator can be the added values (the amount of sales after the costs of purchasing goods and services subtracted), the amount of production net profit after taxes, as well as a management indicator such as amounts of sales or production.

If the denominator is the data representing environmental burden from a business site, then the numerators should be the net value added by the corresponding business site in order to meet the areas of numerator and denominator.

Projects of the United Nations Conference on Trade and Development (UNCTAD) calls this indicator “eco-efficiency indicator,” which is the reciprocal of the eco-efficiency of WBCSD. UNCTAD explains the reason of this a custom from the past (Integrating Environmental and Financial Performance at the Enterprise Level,” 2000).

Some organizations in Japan have published environmental reporting which included indicators as measurements of their achievements of environmental activities of their business organization.

(2) Integrated Indicators of Environmental Burden

It is important to integrate several indicators of environmental burden in order to measure and record environmental efforts and their performance because these integrated indicators would enable organizations to know the outcomes of their environmental activities.

For example, it is possible the increase of circularly use of materials in a business site resulting an increase of energy input. By using integrated indicators, we could evaluate the total environmental burden of this kind of trade-off between the increase of the positive effect, which is decrease of material use, and the negative effect, which is

the increase of CO₂ emission.

Although domestic and overseas research institutes have made efforts to develop an integrated indicator integrating a variety of environmental indicators, a widely accepted method has not been developed yet. However, some organizations have calculated integrated indicators using techniques in LCA and other methodologies.

Closing Chapter:

Issues That Need to Be Addressed Towards the Establishment of Environmental Performance Indicators

(1) Developing Indicators that Measure Qualitative Information

In the effort of establishing an sustainable recycling-based society, the Guidelines have shown a direction to systematic management, including the core indicators that indicate the entire figure of the business activities by using quantitative measurements such as the total amount of energy input, the total amount of material input, and the total amount of products and sales. It is important to improve the efficiency of energy and material use and reduce the amount of consumption of them. At the same time, it is also important to measure qualitative aspects of environmental burden such as how we could transform the current systems to energy and material efficient and low environmental burden ones. Sub-indicators, which measure the qualitative aspects to supplement the core indicators, and the method of their estimation may not be fully developed, particularly for the total amount of material input and the total amount of production and sales.

Although best efforts to present environmental performance indicators have been made with the concept of material balance, indicators that measure circulation of materials within organizations are not sufficiently developed. It is necessary to develop indicators that can measure recycled materials and input material separately in future.

(2) Developing Indicators Using an LCA Approach

Measuring inputs and outputs of energy and materials to/from organizations is not sufficient in order to promote one of fundamental principles, i.e., recycling materials. It is necessary to measure environmental burden of energy and materials through out the life-cycle of products. Promotion of the LCA approach that includes consideration to upstream of products, such as raw materials, and downstream, such as environmental burden concerning the use of products and services, is necessary.

(3)Developing Indicators that Measure Eco-efficiency

Although indicators that measure environmental efficiency are being developed by institutions and business organizations, an indicator that can be commonly used has not been developed yet. The Guidelines have shown examples from organizations as reference; however, it is necessary to develop indicators of environmental efficiency which is not unique to individual organizations but can be commonly used many organizations.

(4)Developing Indicators that Measure Flow and Stock

There are indicators of flows (e.g., the total amount of material input and the total amount of wastes, etc generation) and indicators for stocks (the amount of chemical substances accumulated in soil) in environmental performance indicators.

The use of indicators for stocks is extremely limited, and they need to be further developed.