भारतीय मानक

Indian Standard

IS 14031 : 2024

पर्यावरण प्रबंधन — पर्यावरण कार्यकारिता मूल्यांकन — दिशानिर्देश

(पहला पुनरीक्षण)

Environmental Mangement — Environmental Performance Evaluation — Guidelines

(First Revision)

ICS 13.020.10

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

September 2024 **Price Group 12**

Environmental Management Sectional Committee, CHD 34

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Environmental Management Sectional Committee had been approved by the Chemical Division Council.

This standard sets out a process called environmental performance evaluation (EPE) which enables organizations to measure, evaluate and communicate their environmental performance using key performance indicators (KPIs), based on reliable and verifiable information.

EPE is equally applicable to small and large enterprises and may be used to support an environmental management system (EMS) or used independently. An organization with an EMS in place should assess its environmental performance against its environmental policy, objectives, targets and other environmental performance objectives.

EPE and environmental audits are complementary tools that can be used to assess environmental performance and identify areas for improvement. The key aspects, and differences, of these tools are:

a) EPE is an ongoing process of collection and assessment of data and information to provide a current evaluation of performance, as well as performance trends over time; and

b) Environmental audits may be used to gather such data and information, either as part of EPE or as part of an EMS, to verify whether objectives and targets are being met.

This standard was first published in 2003 by adopting ISO 14031 : 1999, since, ISO had revised this standard and published it as ISO 14031 : 2021, it became necessary for the committee to review and update the current Indian Standard. During the review, it was noticed that the full adoption of ISO 14031 : 2021 was not possible in Indian context and therefore the committee decided to formulate an indigenous standard taking assistance from ISO 14031 : 2021.

The composition of the Committee responsible for formulation of this standard is given in Annex B.

TABLE OF CONTENT

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ENVIRONMENTAL MANAGEMENT — ENVIRONMENTAL PERFORMANCE EVALUATION — GUIDELINES

(First Revision)

1 SCOPE

This standard gives guidelines for the design and use of environmental performance evaluation (EPE) within an organization. It is applicable to all organizations, regardless of type, size, location and complexity.

This standard does not establish environmental performance levels. It is not intended for use for the establishment of any other environmental management system (EMS) conformity requirements.

The guidance in this standard can be used to support an organization's own approach to EPE including its commitments to compliance with legal and other requirements, the prevention of pollution and continual improvement, among others.

NOTE — This standard is a generic standard and does not include guidance on specific methods for valuing or weighting different kinds of impacts in different kinds of sectors, disciplines, etc. Depending on the nature of the organization's activities, there is often a need to also go to other sources for additional information and guidance on sector-specific topics, different subject matters or different scientific disciplines.

2 TERMS AND DEFINITIONS

2.1 Terms Related to Organization and Leadership

2.1.1 *Management System* — Set of interrelated or interacting elements of an organization (2.1.4) to establish policies and objectives (2.2.5) and processes (2.3.2) to achieve those objectives.

NOTES

1 A management system can address a single discipline or several disciplines (for example, quality, environment (2.2.1), occupational health and safety, energy, financial management).

2 The system elements include the organization's structure, roles and responsibilities, planning and operation, performance evaluation and improvement.

3 The scope of a management system can include the whole of the organization, specific and identified functions (2.2.2) of the organization, specific and identified sections of the organization, or one or more functions across a group of organizations.

2.1.2 *Environmental Management System* (*EMS*) — Part of the management system (2.1.1) used to manage environmental aspects (2.2.2), fulfil compliance obligations (2.2.12), and address risks and opportunities (2.2.9).

2.1.3 *Environmental Policy* — Intentions and direction of an organization (2.1.4) related to its environmental performance (2.4.10) as formally expressed by top management (2.1.5).

2.1.4 *Organization* — Person or group of people that has its own functions (2.3.3) with responsibilities, authorities andrelationships to achieve its objectives (2.2.5).

NOTE — The concept of organization includes, but is not limited to sole-trader, company, corporation, firm, enterprise, authority, partnership, charity or institution, or part or combination thereof, whether incorporated or not, public or private.

2.1.5 *Top Management* — Person or group of people who directs and controls an organization (2.1.4) at the highest level.

NOTES

1 Top management has the power to delegate authority and provide resources within the organization.

2 If the scope of the management system (**2.1.1**) covers only part of an organization, then top management refers to those who direct and control that part of the organization.

2.2 Terms Related to Planning

2.2.1 *Environment* — Surroundings in which an organization (2.1.4) operates, including air, water, land, natural resources (2.2.10), flora, fauna, humans and their interrelationships.

NOTES

1 Surroundings can extend from within an organization to the local, regional and global system.

2 Surroundings can be described in terms of biodiversity, ecosystems, climate or other characteristics.

2.2.2 *Environmental Aspect* — Element of an organization's (2.1.4) activities or products (2.5.1) that interacts or can interact with the environment (2.2.1).

NOTE — Significant environmental aspects are determined by the organization applying one or more criteria.

2.2.3 *Environmental Condition* — State or characteristic of the environment (2.2.1) as determined at a certain point in time.

2.2.4 *Environmental Impact* — Change to the environment (2.2.1), whether adverse or beneficial, including possible consequences, wholly or partially resulting from an organization's (2.1.4) environmental aspects (2.2.2).

2.2.5 *Objective* — Result to be achieved

NOTES

1 An objective can be strategic, tactical, or operational.

2 Objectives can relate to different disciplines (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product (2.5.1), service and process (2.3.2).

3 An objective can be expressed in other ways, for example, as an intended outcome, a purpose, an operational criterion, as an environmental objective (2.2.6), or by the use of other words with similar meaning (for example, aim, goal, or target).

2.2.6 *Environmental Objective* — Objective (2.2.5) set by the organization (2.1.4) consistent with the environmental policy (2.1.3).

2.2.7 *Requirement* — Need or expectation that is stated, generally implied or obligatory.

NOTES

1 "Generally implied" means that it is custom or common practice for the organization (2.1.4) and interested parties that the need or expectation under consideration is implied.

2 A specified requirement is one that is stated, for example in documented information (2.3.4).

3 Requirements other than legal requirements become obligatory when the organization decides to comply with them.

2.2.8 *Risk* — Effect of uncertainty

NOTES

1 An effect is a deviation from the expected – positive or negative.

2 Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of, an event, its consequence, or likelihood.

3 Risk is often characterized by reference to potential "events" and "consequences", or a combination of these.

4 Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated "likelihood" of occurrence.

2.2.9 *Risks and Opportunities* — Potential adverse effects (threats) and potential beneficial effects (opportunities).

2.2.10 *Natural Resource* — Part of nature which provides benefits to humans or underpins human well-being.

2.2.11 *Prevention of Pollution* — Use of processes (2.3.2), practices, techniques, materials, products (2.5.1), or energy to avoid, reduce or control (separately or in combination) the creation, emission or discharge of any type of pollutant or waste, in order to reduce adverse environmental impacts (2.2.4).

2.2.12 *Compliance Obligations* (preferred term) — Legal requirements and other requirements (admitted term)

Legal requirements (2.2.7) that an organization (2.1.4) has to comply with and other requirements that an organization has to or chooses to comply with.

NOTES

1 Compliance obligations are related to the environmental management system (2.1.2).

2 Compliance obligations can arise from mandatory requirements, such as applicable laws and regulations, or voluntary commitments, such as organizational and industry standards, contractual relationships, codes of practice and agreements with community groups or non-governmental organizations.

2.3 Terms Related to Support and Operation

2.3.1 *Outsource* — Make an arrangement where an external organization (2.1.4) performs part of an organization's function (2.3.3) or process (2.3.2).

NOTE — An external organization is outside the scope of the management system (2.1.1), although the outsourced function or process is within the scope.

2.3.2 *Process* — Set of interrelated or interacting activities which transforms inputs into outputs.

NOTE — A process can be documented or not.

2.3.3 *Function*

Combination of processes (2.3.2), products (2.5.1) or services that achieve a specific, predetermined end, usually on a repetitive basis.

2.3.4 *Documented Information* — Information required to be controlled and maintained by an organization (2.1.4) and the medium on which it is contained.

NOTES

1 Documented information can be in any format and media, and from any source.

2 Documented information can refer to:

a) the environmental management system (2.1.2), including related processes (2.3.2);

b) information created in order for the organization to operate (can be referred to as documentation); and

c) evidence of results achieved (can be referred to as records).

2.4 Terms Related to Performance Evaluation and Improvement

2.4.1 *Indicator* — Quantitative, qualitative or binary variable that can be measured or described, representing the status of operations, management, conditions or impacts.

2.4.2 *Key Performance Indicator* (*KPI*) — Indicator (2.4.1) of performance (2.4.9) deemed by an organization (2.1.4) to be significant and giving prominence and attention to certain aspects of operations, management, conditions or impacts.

2.4.3 *Combined Indicator* — Indicator (2.4.1) that includes information on more than one aspect of operations, managementconditions or impacts.

NOTE — A combined indicator may also be referred to as a composite indicator.

2.4.4 *Environmental Condition Indicator* (*ECI*) — Indicator (2.4.1) that provides information about the local, regional, national or global environmental condition (2.2.3).

NOTE — "Regional" may refer to a state, a province, or a group of states within a country, or it may refer to a group of countries or a continent, depending on the scale of the environmental conditions that the *organization* (2.1.4) chooses to consider.

2.4.5 *Environmental Performance Indicator* (*EPI*) — Indicator (2.4.1) that provides information about an organization's (2.1.4) environmental performance (2.4.10).

2.4.6 *Management Performance Indicator* (*MPI*) — Environmental performance indicator (2.4.5) that provides information about the management efforts to influence an organization's (2.1.4) environmental performance (2.4.10).

2.4.7 *Operational Performance Indicator* (*OPI*) — Environmental performance indicator (2.4.5) that provides information about the environmental performance (2.4.10) of an organization's (2.1.4) operation.

2.4.8 *Benchmark* — Reference point against which comparisons can be made.

NOTE — Benchmarking is the process (2.3.2) for making a comparison.

2.4.9 *Performance* — Measurable result.

NOTES

1 Performance can relate either to quantitative or qualitative findings.

2 Performance can relate to the management of activities, processes (2.3.2), products (2.5.1) (including services), systems or organizations (2.1.4).

2.4.10 *Environmental Performance* — Performance (2.4.9) related to the management of environmental aspects (2.2.2).

NOTE — For an environmental management system (2.1.2), results can be measured against the organization's (2.1.4) environmental policy (2.1.2), environmental objectives (2.2.6) or other criteria, using indicators (2.4.1).

2.4.11 *Environmental Performance Evaluation* (*EPE*) — Process (2.3.2) to facilitate management decisions regarding an organization's (2.1.4) environmental performance (2.4.10) by selecting indicators (2.4.1), collecting and analysing data, assessing information against environmental performance criteria, reporting and communicating, and periodically reviewing and improving this process.

2.4.12 *Audit* — Systematic, independent and documented process (2.3.2) for obtaining audit evidence and evaluating itobjectively to determine the extent to which the audit criteria are fulfilled.

NOTES

1 An internal audit is conducted by the organization (2.1.4) itself, or by an external party on its behalf.

2 An audit can be a combined audit (combining two or more disciplines).

3 Independence can be demonstrated by the freedom from responsibility for the activity being audited or freedom from bias and conflict of interest.

4 "Audit evidence" consists of records, statements of fact or other information which are relevant to the audit criteria and are verifiable; and "audit criteria" are the set of policies, procedures or requirements (2.2.7) used as a reference against which audit evidence is compared.

2.4.13 *Conformity* — Fulfilment of a requirement (2.2.7)

2.4.14 *Nonconformity* — Non-fulfilment of a requirement (2.2.7)

2.4.15 *Corrective Action* — Action to eliminate the cause of a nonconformity (2.4.14) and to prevent recurrence.

NOTE — There can be more than one cause for a nonconformity.

2.4.16 *Continual Improvement* — Recurring activity to enhance performance (2.4.9).

NOTES

1 Enhancing performance relates to the use of the environmental management system (2.1.2) to enhance environmental performance (2.4.10) consistent with the organization's (2.1.4) environmental policy (2.1.3).

2 The activity need not take place in all areas simultaneously, or without interruption.

2.4.17 *Monitoring* — Determining the status of a system, a process (2.3.2) or an activity.

NOTE — To determine the status, there might be a need to check, supervise or critically observe.

2.4.18 *Measurement* — Process (2.3.2) to determine a value.

2.5 Terms Relating to Product System

2.5.1 *Product* — Any goods or service.

NOTES

1 In some environmental management system (2.1.2) standards, for example, IS/ISO 14001, the term "product" does not include service.

2 When using the term "product" to not include service, this needs to be expressed explicitly.

2.5.2 *Product System* — Collection of unit processes (2.6.4) with elementary flows (2.6.5) and product flows (2.5.3), performing one or more defined functions (2.3.3) and which models the life cycle (2.6.1) of a product (2.5.1).

2.5.3 *Product Flow* — Products (2.5.1) entering from or leaving to another product system (2.5.2).

2.5.4 *Raw Material* — Primary or secondary material that is used to produce a product (2.5.1).

2.6 Terms Relating to Life Cycle Assessment

2.6.1 *Life Cycle* — Consecutive and interlinked stages related to a product system (2.5.2), from raw material (2.5.4) acquisition or generation from natural resources (2.2.10) to end-of-life treatment.

2.6.2 *Life Cycle Assessment* (*LCA*) — Compilation and assessment of the inputs, outputs and the potential environmental impacts (2.2.4) of a product system (2.5.2) throughout its life cycle (2.6.1).

2.6.3 *Life Cycle Inventory Analysis* — Phase of life cycle assessment (2.6.2) involving the compilation and quantification of inputs and outputs for a product (2.5.1) throughout its life cycle (2.6.1).

2.6.4 *Unit Process* — Smallest element considered in the life cycle inventory analysis (2.6.3) for which input and output data are quantified.

2.6.5 *Elementary Flow* — Material or energy entering the system being studied that has been drawn from the environment (2.2.1) without previous human transformation (2.6.6), or material or energy leaving the system being studied that is released into the environment without subsequent human transformation.

2.6.6 *Transformation* — Change in the fundamental attributes of natural and human systems.

3 ENVIRONMENTAL PERFORMANCE EVALUATION

3.1 General Overview

3.1.1 *EPE Process*

EPE is a management process that uses KPIs to compare an organization's past and present environmental performance with its environmental objectives and targets. The information generated by EPE can help an organization to:

a) identify its environmental aspects and determine which aspects it will treat as significant;

b) set objectives and targets for improving environmental performance and assess performance against these objectives and targets;

c) identify opportunities for better management of its environmental aspects;

d) identify trends in its environmental performance;

e) review and improve efficiency and effectiveness;

f) identify strategic opportunities;

g) evaluate compliance or risk of non-compliance with compliance obligations to which the organization subscribes related to its environmental aspects; and

h) report and communicate environmental performance internally and externally.

Management commitment to EPE is essential and should be part of the regular business functions and activities of an organization. EPE should be appropriate to the size, location and type of organization, and its needs and priorities.

Internally, EPE can help the organization to achieve its environmental performance objectives and targets and also to enlist the involvement of an EMS. EPE can also be used to report and communicate information on the organization's environmental performance to external interested parties to demonstrate its commitment to improvement.

EPE, as detailed in this standard, follows a Plan-Do-Check-Act (PDCA) management model. The steps ofthis ongoing process are as follows:

a) *Plan* — preparing to implement

performance evaluation:

1) planning EPE; and

2) selecting indicators for EPE (the process of selecting indicators for objectives and targets may include both choosing from existing indicators and developing new indicators).

b) *Do* — managing data and information, which includes:

1) collecting data relevant to the selected indicators;

2) analysing and converting data into information describing the organization's environmental performance;

3) assessing information describing the organization's environmental performance in comparison with the organization's environmental performance objectives; and

4) reporting and communicating information describing the organization's environmental performance.

c) *Check* and *Act*:

1) reviewing and improving EPE. Further guidance on different steps of EPE is given at Annex A and the linkages between the text of **3** and Annex A is given at Table 1.

3.1.2 *Indicators for EPE*

3.1.2.1 *General*

This standard describes two categories of indicators for EPE:

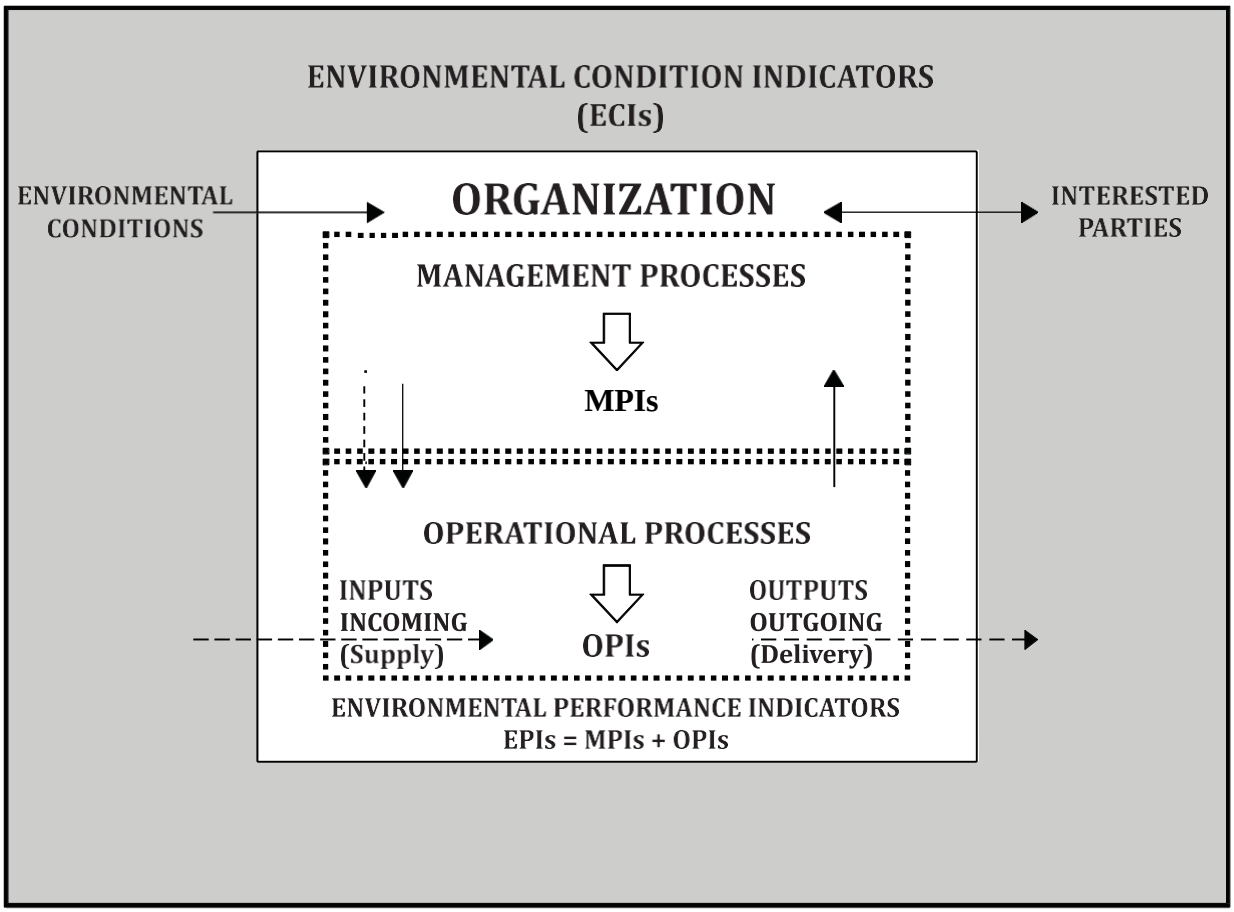
a) Environmental condition indicators (ECIs) provide information about the environmental condition which could be impacted by the organization. This information can help an organization to better understand the actual impact or potential impact of its environmental aspects (for example, process emissions). ECIs are often difficult to link directly to one organization's operations unless they are the only source emitting a particular pollutant. Care should be taken to account for any other sources or factors that might have similar impacts on the environment. ECIs can be used (for example, by regulators or other local government agencies) to calculate condition baselines, monitor trends, establish permit limits for pollutants and create incentives;

b) Environmental performance indicators (EPIs) provide information related to the organization's management of its significant environmental aspects and demonstrate the results of its environmental management programmes. These may be KPIs that an organization chooses to use for general business purposes;

c) Management performance indicators (MPIs) provide information about management efforts to influence the environmental performance of the organization's management; and

d) Operational performance indicators (OPIs) provide information about the environmental performance of the organization's operations.

Figure. 1 illustrates the interrelationships among an organization's management, operations and the environmental conditions, noting the type of indicator in brackets for EPE related to each of these elements.



Key

Information flows: ——→

Input and output flows related to the organisation's operations: — — — →

Decision flows: - - - - - →

FIG. 1 UNDERSTANDING THE ORGANIZATION AND ITS CONTEXT

3.1.2.2 *Relating EPE indicators to environmental, social and economic aspects of sustainability*

EPIs and ECIs can be used to demonstrate how an organization addresses the three dimensions of sustainability (social, economic and environmental) through the management of its significant environmental aspects.

MPIs can show improvements in the social dimension (for example, indicators that show how training is being done or will be done so as to improve certain environmental aspects) or in the economic dimension (for example, investments on new technologies so as to address environmental aspects and cost savings due to improved environmental performance).

OPIs can be linked to the context of the environment (for example, emission reductions, reduction in the use of energy and water resources).

ECIs might not be linked directly with the organization's processes but in certain instances can be linked to the success of its environmental management which itself can reflect on all three dimensions of sustainability.

Example:

a) improved quality of water resources (environmental);

b) improved quality of life: more people having access to drinking water (social); and

c) reduced costs for obtaining drinking water (economic).

The decisions and actions of an organization's management are closely related to the performance of its operations. Figure 2 provides an outline of EPE, with references to the numbers and titles of relevant sub-clauses in this standard. Annex A provides supplemental guidance to support EPE.

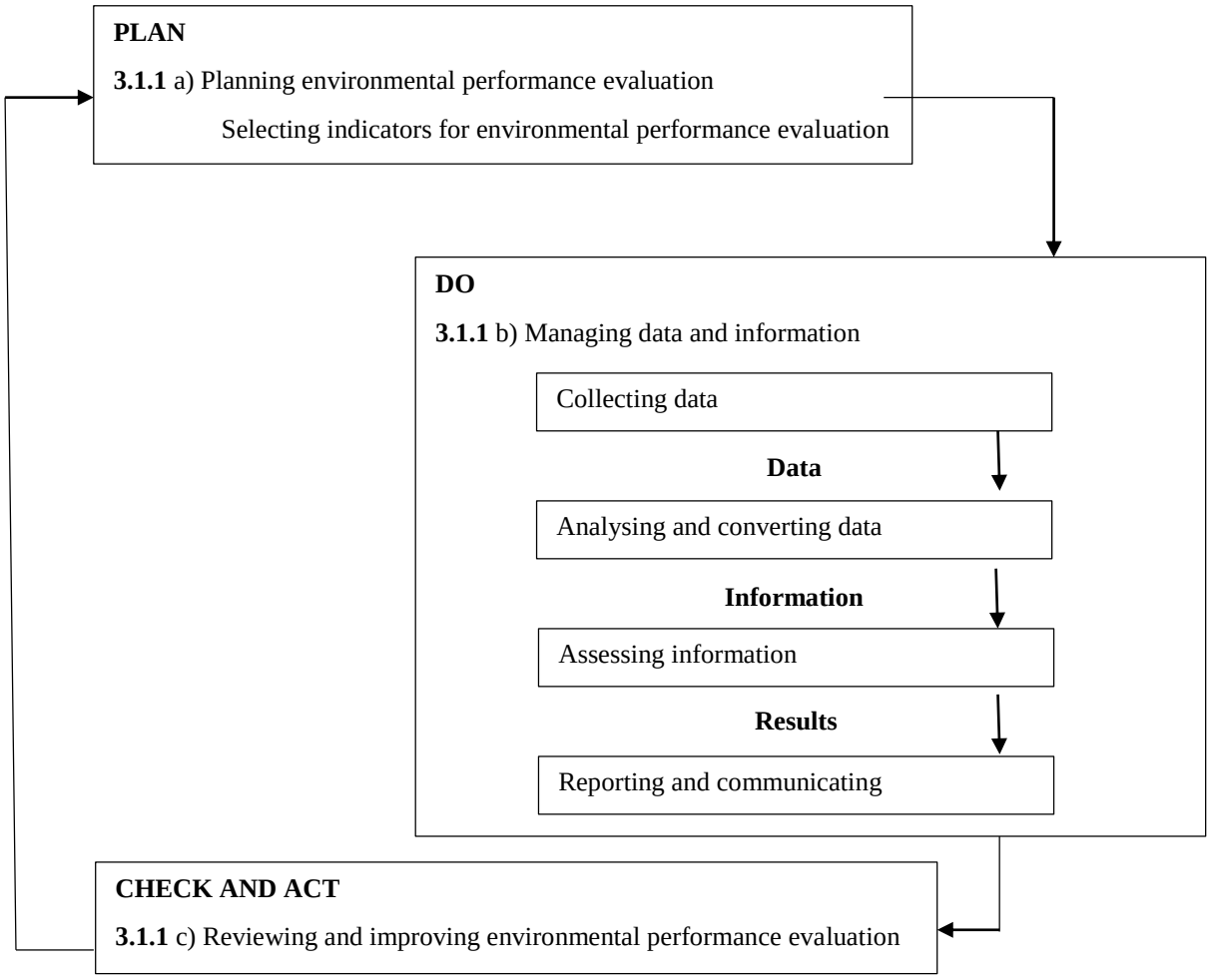


FIG. 2 OUTLINE OF EPE, WHICH FOLLOWS THE PDCA MODEL

3.1.3 *EPE Principles*

EPE principles for performance information include:

a) *Relevance* — performance information should be relevant to the organization's efforts to manage its environmental aspects;

b) *Completeness* — performance information should be complete to ensure that all factors will beaddressed;

c) *Consistency and accuracy* — performance information should be consistent and accurate to allow valid comparisons of past, present and future performance; and

d) *Transparency* — performance information should be clear and transparent so that the intended users have access and understanding of performance data to make decisions with reasonable confidence.

3.2 Planning EPE (Plan)

3.2.1 *General Guidance*

3.2.1.1 *General*

KPIs are selected by organizations as a means of presenting quantitative or qualitative data or information in a more understandable and useful form. They help to convert relevant data into concise information about management's efforts to influence the environmental performance of its operations or the environmental conditions. An organization should select a sufficient number of relevant and understandable indicators to evaluate its environmental performance and reflect the nature and scale of the organization's operations as well as their environmental impacts. The choice of indicators for EPEwill determine what data should be used. To facilitate this effort, organizations can use data already available and collected by the organization or by others.

3.2.1.2 *Applying EPE to those organizations with or without an EMS*

An organization with an EMS in place should evaluate its environmental performance against its environmental policy, objectives and targets, and applicable compliance obligations. Whether it has an EMS or not, an organization should plan EPE in conjunction with the setting of its environmental performance goals, so that the selected indicators for EPE will be appropriate for describing the organization's environmental performance against these goals.

Practical Help Box 1

This box provides examples of approaches to identify environmental aspects and their relativesignificance in the context of EPE:

a) identify activities, products and services of the organization, the specific environmental aspects and the relative significance associated with them, and the potential impacts related to significant environmental aspects;

b) use information about the environmental condition to identify activities, products and services of the organization that can have an impact on specific conditions;

c) analyse the organization's existing data on material and energy inputs, discharges, wastes and emissions, and evaluate these data in terms of risk;

d) identify the views of interested parties and use this information to help establish the organization's significant environmental aspects;

e) identify activities of the organization that are subject to environmental regulation or other requirements, for which data could have been collected by the organization;

f) consider the design, development, manufacturing, distribution, servicing, use, re-use, recycling and disposal of the organization's products, and their related environmental impacts; and

g) identify those activities of the organization having the most significant environmental costs or benefits, including outsourced activities or processes.

3.2.2 *Characteristics of EPE Indicators*

3.2.2.1 *General overview*

The information conveyed through indicators for EPE can be expressed as direct or relative measures oras indexed information. Indicators for EPE may be aggregated or weighted as appropriate to the nature of the information and its intended use. Aggregation and weighting should be done with care to ensure verifiability, consistency, comparability and understanding. There should be a clear understanding of assumptions made in the handling of data and its transformation into information and indicators for EPE.

Practical Help Box 2

This box provides examples of data characteristics for EPE indicators:

a) direct measures or calculations: basic data or information, such as tonnes of contaminant emitted;

b) relative measures or calculations: data or information compared to or in relation to another parameter (for example, production level, time, location or background condition), such as tonnes of contaminant emitted per tonne of product manufactured, or tonnes of contaminant emitted per unit of sales turnover;

c) indexed to a reference point: describing data or information converted to units or to a form which relates the information to a chosen standard or baseline, such as contaminant emissions in the current year expressed as a percentage of those emissions in a baseline year;

d) aggregated: describing data or information of the same type, but from different sources, collected and expressed as a combined value, such as total tonnes of a given contaminant emitted from production of a product in a given year, determined by summing emissions from multiple facilities producing that product; and

e) weighted: describing data or information modified by applying a factor related to its significance.

3.2.2.2 *Understanding relationships between different measures of performance*

Indicators for EPE should be selected so that management has sufficient information to understand the effect that any one environmental performance objective has on other elements of the organization's operations.

Organizations can find it cost effective to select indicators derived from a common set of data, or to use combined indicators which include information on more than one aspect. It is therefore important to ensure that the information on different aspects of such an indicator can easily be extracted and communicated to the intended audience.

Combined indicators can include information on a group of aspects [for example, from the indicator 'litres of diesel/t-km' for transports, one can calculate data on emissions of greenhouse gas (GHG) and other pollutants].

Practical Help Box 3

This box provides an example to illustrate an organization selecting several indicators for EPEderived from a common set of data, depending on the intended audiences.

An organization discharging treated wastewater to a lake selects the following indicators for EPE:

a) total amount of specific contaminant discharged per year (possible intended audience: the local community);

b) concentration of contaminant in wastewater (possible intended audience: legal and regulatory authorities);

c) amount of contaminant discharged per product produced (possible intended audiences: management and consumers); and

d) change in amount of contaminant discharged per year relative to investments in cleanertechnology or process upgrade (possible intended audiences: management and investors).

Regional, national and global condition indicators related to environmental performance or sustainable development are being developed by government agencies, non-governmental organizations, and scientific and research institutions. When selecting indicators for EPE and collecting data, organizations may wish to consider indicators being developed by such entities and compatibility with information which is provided to them.

3.2.2.3 *Selecting management performance indicators*

In the context of EPE, the management of the organization includes the policies, people, planning activities, practices and procedures at all levels of the organization, as well as the decisions and actions associated with the organization's environmental aspects. Efforts and decisions undertaken by the organization's management can affect the performance of the organization's operations, and therefore can contribute to the overall environmental performance of the organization (*see* Fig. 1).

MPIs should provide information on the organization's capability and efforts in managing matters such as training, compliance obligations, resource allocation and efficient utilization, environmental cost management, purchasing, product development, documented information or corrective action which have or can have an influence on the organization's environmental performance. MPIs should assist in evaluating management's decisions and actions to improve environmental performance.

For example, MPIs can be used to track:

a) senior level commitment to environmental management;

b) management's understanding of the relevance of environmental management to the organization's mission;

c) the effectiveness of policies and programmes;

d) resources to implement policies and programmes linked to the organization's mission;

e) the degree of engagement with external interested parties (for example, local communities) on environmental issues;

f) changes in roles and responsibilities within the organization;

g) supply chain activities and performance;

h) how end users of products and services are influenced;

j) continual improvement of systems and performance;

k) compliance with legal, regulatory and other requirements to which the organization subscribes; and

m) benefits and costs to the organization from environmental management.

In addition, effective MPIs can help to:

a) predict changes in performance;

b) identify root causes where actual performance exceeds, or does not meet, relevant environmental performance objectives; and

c) identify opportunities for preventive action.

Examples of MPIs are provided in **A-4.2.2**.

3.2.2.4 *Selecting operational performance indicators*

OPIs provide management with information on the environmental performance of the organization's operations. OPIs can be identified by listing the organization's inputs, operational processes and equipment, and outputs, as shown in Fig. 3.

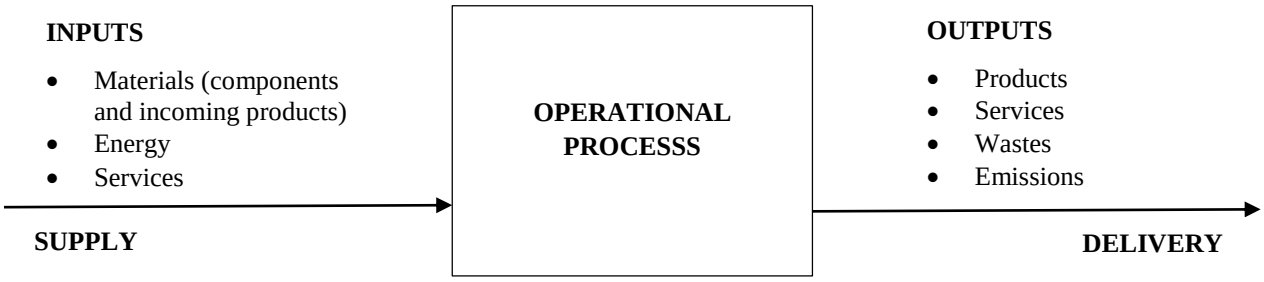


FIG. 3 THE ORGANISATION'S OPERATIONS (GENERAL OVERVIEW)

Services may be inputs, operational processes or outputs, and can have significant environmental impacts (for example, distribution).

NOTE — A mass balance or input/output analysis can be performed for the whole company, or for selected processes, services or equipment, as well as for all or single products, depending on the quality of the information systems and company needs.

OPIs can be selected from the following categories and subcategories:

a) components, incoming products (for example, reused, new) and services (direct and indirect);

b) raw and auxiliary materials, which are intended to become products as well as operating materials, which assist running the processes, for example, cleaning materials and lubricants;

c) services supporting the organization's operations (for example,. direct, indirect);

d) operational processes (for example, design of processes, operational efficiency, maintenance);

e) physical facilities and equipment (for example, design, installation, operation, maintenance, land use);

f) components and outgoing products and services (for example, design, environmental impact, by-products, used products, distribution);

g) waste (for example, hazardous, non-hazardous); and

h) emissions (for example, hazardous vapours, nuisance, GHGs, ozone-depleting substances, dust, noise, heat, thermal energy, effluent to water or land).

Examples of OPIs are provided in **A-4.2.2** of this standard.

3.2.2.5 *Selecting environmental condition indicators*

ECIs provide information about the local, regional, national or global environmental conditions, over time or with specific events. While ECIs may not be direct measures of impact on the environment, ECIs can provide useful information on the environmental outcomes of changes to an organization's activities, products and services. ECIs can be developed for environmental categories (for example, air, water, land, flora, fauna, humans, aesthetics, heritage and culture including special indicators for biodiversity or ecosystem services).

ECIs provide the organization with an environmental context to support:

a) the establishment of a baseline against which to measure change;

b) the identification and management of its significant environmental aspects;

c) the assessment of the appropriateness of environmental performance objectives;

d) the selection of EPIs (MPIs and OPIs);

e) the determination of environmental change over time in relation to an ongoing environmentalprogramme;

f) the investigation of possible relationships between environmental condition and the organization's activities, products and services; and

g) the determination of needs for action.

Development and application of ECIs is frequently the function of local, regional, national or international government agencies, non-governmental organizations, and scientific and research institutions rather than the function of an individual business organization. However, organizations that can identify a relationship between their activities and the condition of some component of the environment may choose to develop their own ECIs as an aid in evaluating their environmental performance as appropriate to their capabilities, interests and needs.

An organization that has identified a specific environmental condition that results directly from its own activities, products and services may wish to select EPIs (MPIs and OPIs) that link management efforts and operational performance to changes in environmental conditions.

Examples of ECIs are provided in **A-4.4.2**.

Practical Help Box 4

This box provides examples to illustrate an identified environmental issue with selected linkedindicators for EPE.

Example 1

A service organization located in an area where air quality is known to be unsatisfactory uses air quality information to select appropriate indicators for EPE, consistent with its objective to reduce its motor vehicle emissions.

ECIs:

a) concentration of particulates; and
b) concentration in the air of contaminants associated with motor vehicle emissions (CO, HC and NOx).

MPIs:

a) amount of money spent promoting public transportation and its use;
b) number of hours of employee training in the benefits of the use of public transportation; and
c) effectiveness of efforts to reduce fuel consumption, improve vehicle maintenance and fuelefficiency, and use alternative fuels.

OPIs:

a) reduction in motor vehicle emissions attributed to the use of alternative fuels;
b) quantity of total fuels consumption;
c) fuel efficiency by motor vehicle;
d) frequency of vehicle maintenance; and
e) number of vehicles equipped with environmental control technologies.

Example 2

In a geographical region where environmental information indicates a diminishing water supply, an organization may select indicators for EPE related to water conservation measures which it would not have chosen without that information.

ECIs:

— groundwater level; and

— rate of replenishment.

MPI:

— amount of money spent on research into methods for reduction of water consumption.

OPIs:

— quantity of water used per day; and

— quantity of water used per unit of production.

3.2.2.6 *Selecting sector-specific operational performance indicators for comparison*

OPIs are typically expressed in terms of quantities per unit of time (for example, total energy per year) relating to an entire organization or to its sub-units. Though these indicators offer insight into each individual entity, different organizations vary in size, product range, resource inputs, production processes and in many other ways so that comparisons of their performance are not normally possible by directly comparing their environmental aspects as represented by OPIs.

Similarly, while monitoring OPIs over a period of time can identify performance trends for an organization, increases or decreases of environmental burdens are not necessarily related to performance changes alone, but can be due to other reasons such as organizational expansion/reduction of production or outsourcing/relocations of certain activities. Hence, even internal performance comparisons within the same organization present difficulties that need to be taken into account when doing comparisons.

By contrast, comparisons can be made of the environmental efficiency of particular activities within processes or products (for example, quantity of energy per product unit). These relative values will allow (under specific, controlled conditions) qualified comparisons of processes, products or services from different organizations, as well as for the identification of benchmarks, and best and worst practices or ratings.

Any meaningful comparison of performance should be based on the same function. A methodology to develop comparable environmental indicators will have to focus on processes, products or services at a sector (or even sub-sector) or functional level. Such methods are usually established through joint effort that include industry sectors, standards setting bodies and governmental institutions ratherthan by an individual organization.

Often, the environmental aspects compared need to include those of the whole life cycle of a product suchas raw material acquisition/processing and the use/consumption of the product. Automobile use, for example, is of far greater importance in calculating the total life cycle CO_2 burden than is its production stage. Furthermore, comparisons can be made easier by focusing only on the most significant aspects: the KPIs. For example, the average consumption of its fleet is by far the most important indicator of an automobile company’s environmental aspects.

Practical Help Box 5

The methodology can be used to develop sector-specific environmental indicators. These are indicators for unit comparisons. Comparisons of the overall environmental performance of entire organizations is normally difficult or even impossible to achieve.

— Clearly identify the process, product or service of interest with an appropriate level of detail to ensure the comparison is based on the same function.

— Identify the significant environmental aspects associated with the process, product or service.

- Start by finding existing generic sector or sub-sector indicator listings, descriptions of state-of-the-art technologies or eco-label criteria, studies, scientific publications, regulatory requirements, media reports, public perceptions, etc that provide clues to significant aspects and impacts.
- Include life cycle data, particularly where environmental aspects and impacts occur outside the organization (for example, destruction of biodiversity during raw material extraction or during the use stage).
- Seek consensus among materially interested parties on the environmental impacts on which the comparison is to be based. Determine whether values will be weighted, aggregated into asingle score or left separately as an ingredient list where respective values for each indicatortype are compared to each other. Different methods (such as scoring and ranking systems) can be used for this comparison and need to be agreed upon by the parties involved. For mostprocesses, products and services, three to ten indicators will usually suffice to establish a sound basis for comparison.

— Metrics need to be chosen carefully to accurately value the indicators. Some examples include:

- production: energy consumption per tonne cement produced;
- fuel burning: CO_2 per kWh electricity;
- usage: water/electricity consumption of a washing machine per standard wash;
- consumption: paper consumption per employee; and
- consumption: annual energy consumption per square metre of floor space.

In some cases, percentages or yes/no indicators (for example, absence of certain chemicals/dangerous substances) can also be appropriate and useful.

— While some processes need only to consider a single stage (car emissions, for example, occur mainly in the use stage), others (such as CO_2 emissions from cement manufacturing) include the life cycle stages of quarrying, grinding raw materials, clinker production, grinding cement and storage/transport. This requires a cradle-to-gate life cycle evaluation. More complex systems could require the combination of processes relating to several products or services.

— Data collection and data quality, including quantification algorithms, need to be well defined. This includes assigning responsibilities for collecting the data, precise definition of the kind and format of data needed, measurement and test procedures, quality assurance and verification, averaging, time coverage, conversion factors, credits and deductions, and other aspects.

— The rules for reporting the results of comparisons should include at least the following elements:

- a description of the indicator, including units (for example, kg CO_2-emissions per tonne cement from cradle to factory gate);
- a sound rationale for the indicator and its relevance;
- the time coverage (for example, calendar year, fiscal year, results for one or several subsequent years);
- the geographical coverage (site, country, region, global);
- an explanation of other relevant aspects relating to organizational and indicator boundaries;
- assessment of uncertainty of results.

— When establishing scales and benchmarks, the following factors should be taken into account:

- geographical coverage (site, country, region, global);
- existing legal or best practice reference documented information;
- existing indicator systems (for example, developed for industry/sub-sectors);
- an assessment of the minimum/maximum indicator levels measured or observed at a given time;
- the format and graphical representation including the number of levels, graded scales, colour/letter codes, etc.

— Both the indicator results and the rules for the (sub-)sector indicators should be regularly reviewed and, where appropriate, updated and revised. The period for review should be predefined.

Practical Help Box 6

This box provides simplified examples of comparable indicators.

Retail Banks:

— function defined:
  - money exchange, account management, granting credits;
  - significant environmental aspects identified: energy consumption, CO_2 emissions, overall paper consumption, IT waste, travel; and
  - significant environmental aspect (randomly) selected: overall paper consumption.

— metrics defined:
  - normalized reference value (functional unit): per full time employee (FTE) per year;
  - percentage of recycled paper to overall paper consumed; and
  - indicators for comparison: kg paper per FTE per year and percentages of recycled paper to overall paper consumed.

— boundaries defined:
  - organizational: including office-based activities in one country, excluding operations in other countries and marketing materials; and
  - life cycle stages: overall paper consumed.

— data collection and calculation rules: described in retail bank procedures;

— reporting rules: paper consumption expressed in kg per FTE covering overall consumption,including the percentage of chlorine-free, recycled and certified eco-labelled paper according to retail bank procedures; and

— benchmarking: comparison of data of previous three years performance ranked against industry sector top performers.

Cement Production:

— function defined:
  - production of cement;
  - significant environmental aspects identified: resource extraction, energy consumption, CO_2 emissions, emissions of other pollutants (NOx, SO_2, particulate matter), protection and mitigation of biodiversity concerns; and
  - significant environmental aspect (randomly) selected: CO_2 emissions.

— metrics defined:
  - normalized reference value (functional unit): per tonne cement; and
  - indicator for comparison: kg CO_2 per tonne cement.

— boundaries defined
  - organizational: production facilities in all European countries including all cradle-to-gate operations outside the organizational boundaries; and
  - life cycle stages: quarrying, grinding raw materials, clinker production, grinding of cement and storage/transport
— data collection and calculation rules: described in cement industry guidance;
— reporting rules: CO_2 emission expressed in kg per tonne cement covers all CO_2 emissions from cradle to gate according to cement industry guidance; and
— benchmarking: comparison of data of previous three years' performance ranked against industry sector top performers.

3.3 Using Data and Information (Do)

3.3.1 *Overview*

The information generated by EPE can assist an organization to:

a) determine any necessary actions to achieve its environmental performance objectives;
b) identify significant environmental aspects;
c) identify opportunities for better management of its environmental aspects (for example, prevention ofpollution);
d) identify trends in its environmental performance;
e) increase the organization's efficiency and effectiveness; and
f) identify strategic opportunities.

Internal reporting and communication of information describing the organization's environmental performance is important to assist employees in fulfilling their responsibilities, thereby enabling the organization to achieve its environmental performance objectives and also to enlist the involvement of its employees in the implementation, maintenance and improvement of environmental performance. Management may also commit or be required to report or communicate such information to other (internal and external) interested parties.

An organization's EPE should be reviewed periodically to identify opportunities for improvement of the EPE process.

An organization should collect data regularly to provide input for calculating values for selected indicators for EPE. Data should be collected systematically from appropriate sources at frequencies consistent with EPE planning. The data to be considered needs to be relevant and reliable.

Data generated for performance evaluation can also be coherent, transparent and cost effective for use in the implementation of other environmental management tools and standards. This is particularly true for those standards that rely on data derived from a physical mass balance of the organization's operational system.

Fig. 4 illustrates the steps for using data and information to evaluate environmental performance. These steps are further described in **3.3.2** to **3.3.5**.

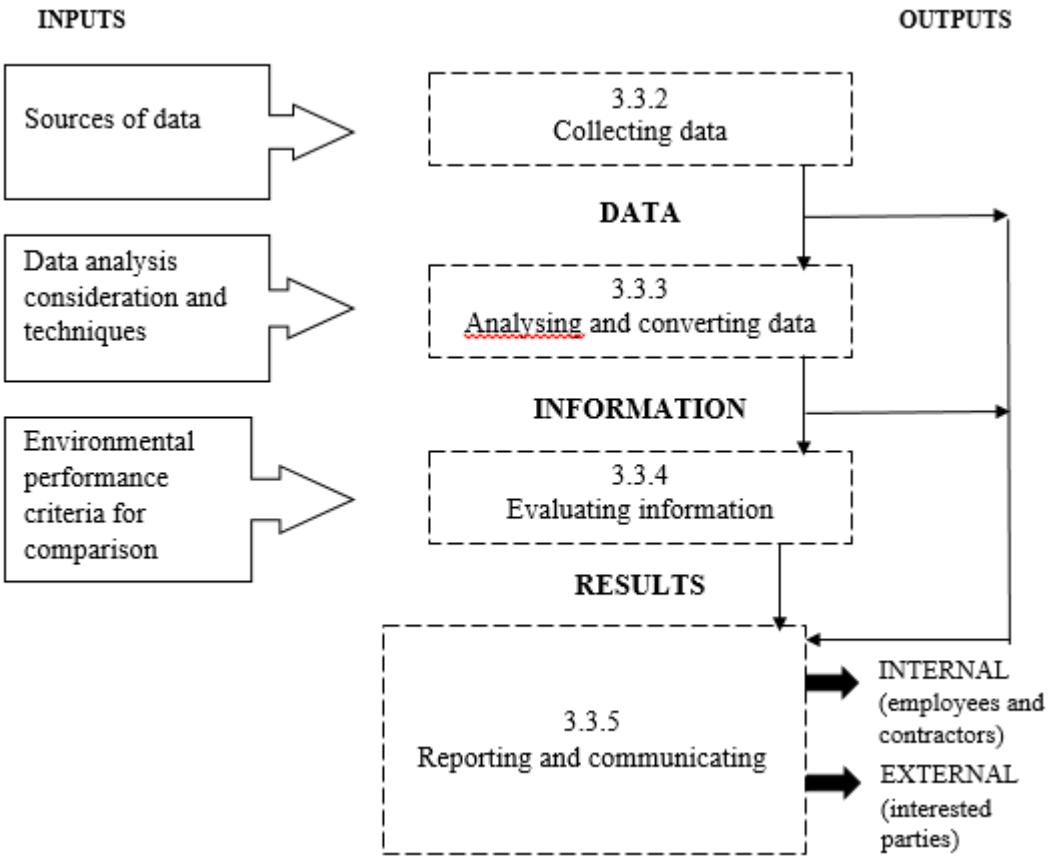


FIG. 4 USING DATA AND INFORMATION

3.3.2 *Collecting Data*

Data collection procedures should ensure data reliability; this depends on factors such as availability, adequacy, scientific and statistical validity, and verifiability. Data collection should be supported by quality control and quality assurance practices that ensure the data obtained are of the type and quality needed for EPE use. Data collection procedures should include the appropriate identification, filing, storage, retrieval and disposition of data and information (*see* IS/ISO 14040).

NOTE — For additional guidance on data collection and provision, *see* ISO 14022.

An organization may use data from its EMS or from other sources. For example, data sources could include:

a) interviews and observations;

b) documented information (for example, monitoring, measuring, inventory, production, financial, accounting, purchasing, training, emergency situations, compliance and incident records);

c) reports (for example, reviews, audits, assessments, scientific studies);

d) government agencies, academic institutions and non-governmental organizations;

e) suppliers and subcontractors;

f) customers, consumers and interested parties;

g) business associations;

h) other management systems (for example, quality, occupational health and safety, information, security);

j) corrective and preventive measures;

k) risk assessment;

m) permits and licences; and

n) innovations.

3.3.3 *Analysing and Converting Data*

The collected data should be analysed and converted into information describing the organization's environmental performance, expressed as indicators for EPE. To avoid bias in the results, all relevant and reliable data that have been collected should be considered (*see* ISO 14022).

Organizations that have developed other recognized programmes (for example, environmental product declarations) can use this information in EPE without the need for further analysis or conversion of data (*see* IS/ISO 14025).

Data analysis may include consideration of the data quality, validity, adequacy and completeness necessary to produce reliable information.

Statistical tools may be used to increase the reliability of decisions on whether or not a certain objectivewas achieved. These tools may include, as appropriate, graphical techniques, indexing, aggregating or weighting.

3.3.4 *Evaluating Information* (*Review*)

Whether it has an EMS or not, an organization should plan EPE in conjunction with the setting of its environmental performance objectives, so that the selected indicators for EPE will be appropriate for describing the organization's environmental performance against these objectives. All objectives and targets should have corresponding performance indicators.

Examples of sources from which environmental performance objectives can be derived include:

a) current and past performance;
b) compliance obligations;
c) recognized codes, standards and best practices;
d) performance data and information developed by industry and other sector organizations;
e) management reviews and audits;
f) the views of interested parties; and
g) scientific research.

The information derived from performance data, expressed in terms of OPIs, and possibly ECIs, should be compared with the organization's environmental performance objectives. Statistical tools such as test hypothesis or other comparison methods can be helpful for these comparisons. Comparisons may indicate progress or deficiencies in environmental performance. Comparisons may also be useful in understanding why the environmental performance objectives have, or have not, been met. The information describing the organization's environmental performance and the results of comparisons should be reported to management, to support appropriate management actions to improve or sustain the level of environmental performance.

3.3.5 *Reporting and Communicating*

3.3.5.1 *General guidance*

Environmental performance reporting and communicating provides useful information describing an organization's environmental performance improvements and achievements [*see* IS/ISO 14063 (will be replaced by Indian Standard based on ISO 14063)]. This information may be reported or communicated to the interested within and outside the organization, based on management's assessment of needs and its parties audiences. Communicating environmental performance should be part of the organization's communication plan.

Benefits of reporting and communicating environmental performance can include:

a) helping the organization's achievement of its environmental performance objectives;
b) increasing awareness and dialogue about the organization's environmental policies, environmental performance objectives and relevant achievements;
c) demonstrating the organization's commitment and efforts to improving environmental performance; and
d) providing the mechanism to respond to concerns and questions about the organization'senvironmental aspects.

3.3.5.2 *Internal reporting and communicating*

Management should ensure that appropriate and necessary information describing the organization's environmental performance is communicated throughout the organization on a timely basis. This can assist employees, contractors, and others related to the organization to fulfil their responsibilities, and the organization to meet its environmental performance objectives. An organization may wish to consider this information in the review of its EMS.

Examples of information describing the organization's environmental performance can include:

a) trends in the organization's environmental performance (for example, waste reduction);
b) regulatory compliance;
c) the organization's conformity with other requirements to which it subscribes;
d) natural resources availability and other operational results;
e) cost savings or other financial results; and
f) opportunities and risks.

3.3.5.3 *External reporting and communicating*

Organizations today are asked or might be required to issue environmental reports or statements

providing information describing their environmental performance to external interested parties. EPE provides information that an organization may wish to include in its environmental reports or in other communications with external audiences.

A number of factors can influence an organization's decision to voluntarily report information describing its environmental performance. These factors can include an organization's interest in improving its business position and relations with interested parties, including the communities in which it operates.

This communication should be a reliable representation of the organization's environmental performance.

3.4 Reviewing and Improving EPE (Act)

An organization's EPE should be reviewed periodically to identify opportunities for improvement. Such a review may contribute to management actions to improve the performance of the management and operations of the organization, and can result in improvements to the environmental conditions.

For those organizations that have implemented an IS/ISO 14001 EMS, recommendations to improve EPE should be included in the management review. Others should also provide for management's review of EPE data. Any periodic review should examine improvements or potential for improvements in:

a) costs versus benefits achieved;

b) progress towards environmental objectives and targets;

c) progress towards environmental performance improvements (for example, using benchmarking);

d) use of selected indicators for EPE;

e) data sources, collection methods and quality;

f) information from interested parties;

g) changes in compliance obligations, best practices and best available techniques; and

h) processes, products, services and discharges to the environment.

Practical Help Box 7

This box provides examples of information an organization can choose to include when reporting or communicating to external interested parties:

a) statement of the organization's commitment to EPE as part of environmental management;

b) compliance with legal and other requirements;

c) statement of its achievements including management and environmental improvements;

d) description of its activities, products and services;

e) statement of its significant environmental aspects (for example, GHGs) and related indicators for EPE;

f) information relative to its environmental performance objectives (for example, GHGs);

g) actions arising from EPE to achieve management and environmental improvements; and

h) contribution of environmental management and EPE to the overall success of the organization.

Practical Help Box 8 (Check)

This box provides examples of questions to assist in reviewing EPE.

Is the organization's EPE:

a) Providing adequate information to measure changes in the organization's environmental performance?

b) Providing appropriate and useful information to management?

c) Being implemented according to plan?

d) Utilizing appropriate data sources and frequencies of data collection?

e) Useful for analysing and evaluating collected data?

f) Supported by adequate resources?

g) Relevant to the organization's environmental performance objectives (KPIs) and targets?

h) Providing information for reporting and communicating environmental performance?

j) Considering or soliciting input from interested parties when appropriate?

k) Adding value to the organization?

m) Responding to change in the organization and its surroundings?

n) Addressing new environmental issues?

p) Well-integrated with other accepted organizational measures of performance?

As a result of the review mentioned above, actions can be taken in order to improve the EPE process. When taking action for improving the EPE process, the main focus should be on enhancing EPE as a tool for continual improvement of the overall environmental performance.

Practical Help Box 9 (Act)

Examples of actions to improve EPE:

a) improve data quality, reliability and availability;

b) improve analytical and evaluation capabilities;

c) develop or identify new or more useful indicators for EPE;

d) change the scope of EPE;

e) update the training of personnel involved in specific issues related to EPE;

f) improve the process for selecting indicators; and

g) improve EPE communication processes.

ANNEX A

(*Clauses* 3.1.1 *and* 3.1.2.2)

SUPPLEMENTAL GUIDANCE ON EPE

A-1 GENERAL OVERVIEW

This annex is intended to supplement the concepts presented in **3** through examples and illustrations. Table 1 illustrates linkages between elements of the text in **3** and of this annex.

A-2 GUIDANCE ON IDENTIFYING THE VIEWS OF INTERESTED PARTIES IN THE CONTEXT OF EPE

A-2.1 General

EPE planning should include establishing the means for the organization to identify and obtain information from relevant interested parties.

A-2.2 Potential Interested Parties

Interested parties differ widely in their relationship to the organization, their stake in the organization, their potential contributions to EPE planning, and how they express and communicate their interests.

Examples of interested parties:

1 management representatives;

2 employees;

3 investors and potential investors;

4 customers and suppliers;

5 contractors;

6 lending institutions and insurers;

7 regulatory and legislative bodies;

8 neighbouring and regional communities;

9 communications media;

10 business, administrative, academic and research institutions;

11 environmental groups, consumer interest groups and other non-governmental organizations;

12 general public;

13 shareholders and providers of capital; and

14 employee representatives.

This list of interested parties is illustrative only. Not all of the listed parties may be relevant to all organizations. Other parties may be identified depending on the nature, location and circumstances of the organization.

Table 1 Linkages Between Elements of the Text of Clause 3 and of this Annex

(*Clauses* 3.1.1 *and* A-1)

Sl No.	Main Body Text	Related Element of this Annex
(1)	(2)	(3)
i)	**3.2** Planning EPE (Plan)	**A-2** Guidance on identifying the views of interested parties in the context of EPE
ii)	**3.2.2** Characteristics of EPE indicators	**A-3** Supplemental guidance on selecting indicators for EPE
		A-3.1 Considerations for selecting indicators for EPE
		A-3.2 Examples of approaches for selecting indicators for EPE
		A-4 Examples of indicators for EPE
iii)	**3.2.2.5** Selecting environmental condition indicators	**A-4.4** Environmental condition indicators
iv)	**3.2.2.3** Selecting management performance indicators	**A-4.2** Management performance indicators
v)	**3.2.2.4** Selecting operational performance indicators	**A-4.3** Operational performance indicators

A-2.3 Issues and Views of Interested Parties

Issues related to financial interests can include:

a) management and amount of environmental costs;

b) financial impact related to past or present environmental liabilities;

c) positive environmental initiatives;

d) investments that improve environmental performance;

e) commercial advantages derived from environmental issues;

f) costs of compliance, or non-compliance, with environmental regulation or legislation;

g) disposal and emission treatment costs; and

h) prevention and environmental management costs.

Issues related to environmental interests or to the development of public policy can include:

a) health and safety;

b) real and perceived risks to the environment resulting from the organization's activities, including trends over time;

c) impacts on the quality of life (for example, acoustic climate, odour, visual impact);

d) environmental incidents and complaints;

e) evidence that organizations are fulfilling their environmental commitments;

f) environmental impacts;

g) environmental loads (for example, emissions, discharges, waste disposal) including trends over time;

h) biodiversity;

j) impacts on ecosystem services;

k) sustainability;

m) transboundary pollution and other global environmental issues;

n) impacts of trade on the environment;

p) harmonization of regulatory regimes;

q) environmental characteristics of products and services;

r) compliance with legal and regulatory environmental requirements; and

s) consumption of resources.

A-2.4 Methods for Identifying the Views of Interested Parties

Examples of methods to identify the views of interested parties:

a) surveys and questionnaires;

b) employee suggestions;

c) meetings and workshops;

d) citizen advisory groups and public meetings;

e) interviews;

f) review of public statements, internal programmes and initiatives of interested parties;

g) market research;

h) regulatory tracking and trending;

j) voluntary guidelines and standards;

k) electronic information exchange;

m) participation in industry and public interest groups;

n) direct communications with neighbours, regulatory bodies, customers and suppliers; and

p) information from the media and other sources of public information.

Organizations should consider the circumstances and characteristics of their interested parties in selecting and using methods to access their views and inputs, both directly and indirectly.

A-3 SUPPLEMENTAL GUIDANCE ON SELECTING INDICATORS FOR EPE

A-3.1 Considerations for Selecting Indicators for EPE

A-3.1.1 *General*

When selecting indicators for EPE, an organization should consider whether they are:

a) consistent with the organization's stated environmental policy;

b) appropriate to the management efforts, operational performance or the environmental conditions;

c) useful for measuring performance against the organization's environmental performance objectives;

d) relevant and understandable to internal and external interested parties;

e) obtainable in a cost-effective and timely manner;

f) adequate for their intended use based on the type, quality and quantity of the data;

g) representative of the organization's environmental performance;

h) measurable in units appropriate to the environmental performance;

j) responsive and sensitive to changes in the organization's environmental performance;

k) consistent with recognized programmes that enable comparisons; and

m) able to provide information on current or future trends in environmental performance.

A-3.1.2 *Considerations for Selecting KPIs*

When selecting an EPI as a KPI an organization should consider:

a) its importance to relevant interested parties (for example, customers, regulatory authorities); and

b) its relevance to business objectives.

A-3.1.3 *Considerations for Using Combined Indicators*

When considering using combined indicators the organization should consider:

a) resource efficiency (for example, effort spent on measuring and monitoring);

b) if combined indicators can provide additional valuable information; and

c) the value of the component indicators that can be extracted from the combined indicator.

An indicator for EPE does not need to satisfy all of these considerations to be useful to the organization.

A-3.2 Examples of Approaches for Selecting Indicators for EPE

A-3.2.1 *Cause and Effect Approach*

An organization may wish to develop indicators that address the fundamental or underlying cause of its significant environmental aspects. It may perform an analysis to identify such a cause and select indicators based on this analysis.

For example, an organization may determine that its high emissions of particulate matter are due to inadequate and infrequent preventive maintenance. Therefore, the organization may select an appropriate OPI, such as quantity of particulate matter emissions per day, and appropriate MPIs, such as resources allocated for preventive maintenance and frequency of preventive maintenance. It would be expected that as preventive maintenance is performed more adequately and more frequently, the organization's particulate matter emissions would decrease.

A-3.2.2 *Risk-based Approach*

A-3.2.2.1 *General*

Indicators for EPE may be selected based on consideration of the risk which the organization's management determines is associated with particular activities, products or services. Examples of different risk-based approaches are given in **A-3.2.2.2** to **A-3.2.2.4**.

An organization concerned about the risks of serious environmental damage posed by their operations may use a probabilistic risk-based approach to identify which specific process is the most likely to causean explosion or the release of contaminants to the environment. A possible MPI is hours of process- safety training conducted for workers involved with the identified specific process.

A-3.2.2.2 *Human health risk-based approach*

An organization concerned about long-term health effects may identify a particular material as having the greatest risk of posing a significant health threat to workers. A possible OPI is the quantity of the specific material to which workers are exposed from the organization's operations. A possible MPI is hours of contingency response training for handling explosions.

A-3.2.2.3 *Financial risk-based approach*

An organization may identify those elements related to its environmental performance with the most significant costs, and therefore, may choose to select appropriate indicators for EPE. Possible indicators for EPE are:

a) cost of materials used by the organization's operations;

b) quantity of this material consumed by the

organization's operations;

c) cost for reclamation and reuse of this material from waste; and

d) percentage of this material in a specified quantity of waste.

A-3.2.2.4 *Environmental risk-based approach*

An organization may be concerned about an environmental aspect which may threaten the environment or the competitiveness of the organization. An example of an MPI is the organization's investment allocation in replacements for chlorofluorocarbons.

A-3.2.3 *Life Cycle Approach*

An organization may select its indicators by considering the inputs and outputs associated with a particular product, and the significant environmental aspects and impacts at any stage of a product's life cycle.

Examples:

a) The organization has identified that fuel efficiency of a product during use might be enhanced. Possible indicators for EPE can be the number of units of energy consumed during use of the product, and the number of changes in product design to increase fuel efficiency.

b) The organization has identified that the use of a non-renewable material in manufacturing a product is the most significant environmental aspect of that product. Possible indicators for EPE can be the amount of the non-renewable material used per unit of product, and resource allocation to study possible substitutions for the non-renewable material.

c) The organization has identified that the packaging used for transporting a product could be recovered from customers and returned to the manufacturer for reuse. A possible OPI can be the percentage of packaging materials recovered from customers and reused without further processing; and

d) The organization has identified that a product does not allow for easy disassembly of parts for reuse or recycling. Therefore, possible indicators for EPE are:

1) percentage of a product's parts that can be recycled or reused;

2) percentage of a product's parts that cannot be recycled or reused; and

3) number of changes in product design to facilitate easy disassembly.

A-3.2.4 *Regulatory or Voluntary Initiative Approach*

Organizations may focus their selection of indicators for EPE on those areas for which they have identified regulatory or voluntary performance requirements. In many cases, performance measures, or the data needed to develop related performance measures, have already been developed or collected by the organization. Therefore, an organization required to report the amount of routine or accidental emissions of a specific contaminant to the environment can use that measurement as an indicator for EPE.

Possible OPIs include the number of spills of a regulated contaminant per year and the amount of a regulated contaminant emitted per year.

An organization subscribing to a voluntary initiative [for example, Responsible Care, the Sustainable Forestry Initiative, the Global Reporting Initiative (GRI), the International Chamber of Commerce (ICC) Business Charter for Sustainable Development, the Coalition of Environmentally Responsible Economies (CERES) Principles] can select indicators for EPE related to such voluntary initiatives. For example, an organization, required as part of a voluntary initiative to implement a specific programme for the prevention of pollution, may wish to track the number of relevant activities undertaken by the organization over the course of a year.

A-4 EXAMPLES OF INDICATORS FOR EPE

A-4.1 General Overview

Management may find it useful to establish logical groupings of issues or functions to assist in the selection of appropriate indicators for EPE.

Any examples of indicators for EPE provided in this subclause are for illustrative purposes only. The groupings, lists and examples given are not complete or comprehensive, and should not be construed asnecessary or even appropriate for every organization. Organizations, and their policies, objectives and structures, vary greatly. Each organization should select KPIs for EPE that it recognizes as important to achieve its environmental performance objectives.

Most of the examples presented in this subclause are expressed in the form of direct measures, events or numbers simply to illustrate the kinds of factors

that could be useful to monitor. An organization mayfind some indicators for EPE to be more useful for management's information needs and the intended use if expressed in terms of fractions or percentages, numbers per unit of time, per employee, per unitof sales, per unit of production or in other relative terms.

A-4.2 Management Performance Indicators

A-4.2.1 *General Overview*

Management efforts to improve environmental performance may include implementation of policies and programmes, conformity with requirements or expectations, financial performance and community relations. Depending on the significant environmental aspects of the organization, andthe organization's environmental performance objectives, it may choose some or none of the following examples of MPIs for use.

This subclause provides examples of MPIs that can be chosen to measure management efforts in an organization.

A-4.2.2 *Examples of MPIs*

A-4.2.2.1 *Performance indicators related to management policies and programmes*

If management's interest is in evaluating the implementation of environmental policies and programmes throughout the organization, possible MPIs include:

a) resources to implement management policies and programmes;

b) roles and responsibilities within the organization;

c) monitoring and review of effectiveness of management systems or programmes;

d) benefits and costs of environmental management to the organization;

e) the achievement of objectives and targets;

f) success of the prevention of pollution initiatives;

g) percentage of employees trained versus the percentage that need training;

h) percentage of contracted individuals trained versus the percentage that needs to be trained;

j) number of environmental improvement suggestions submitted by employees; and

k) results of employee surveys on their knowledge of the organization's environmental issues.

A-4.2.2.2 *Performance indicators related to regulatory compliance*

If management's interest is in evaluating the effectiveness of management systems in achieving compliance with requirements or expectations, possible MPIs include:

a) number and severity of compliance violations;

b) number and severity of violations against the organization's requirements;

c) time to respond to environmental incidents;

d) percentage of identified corrective actions that have been resolved or that are unresolved;

e) number of audits;

f) frequency of review of operating procedures;

g) frequency of emergency drills conducted; and

h) degree of preparedness for emergencies.

A-4.2.2.3 *Financial performance correlated with environmental performance*

If management's interest is in evaluating the relationship of environmental performance to financial performance, possible MPIs include:

a) costs (operational and capital) that are associated with a product's or process' environmentalaspects;

b) return on investment for environmental improvement projects;

c) savings achieved through reductions in resource usage, prevention of pollution or waste recycling;

d) sales revenue attributable to a new product or a by-product designed to meet environmental performance or design objectives;

e) research and development funds applied to projects with environmental significance; and

f) environmental liabilities that can have a material impact on the financial status of the organization.

A-4.2.2.4 *Performance indicators related to community relations*

If management's interest is in evaluating its programmes in local communities with respect to

environmental issues, possible MPIs include:

a) number of external inquiries or comments about environmentally related matters;

b) number of press reports on the organization's environmental performance;

c) resources applied to support of community environmental programmes;

d) number of sites with environmental reports;

e) number of sites with wildlife programmes;

f) progress on local remediation activities (for example, local clean up, recycling initiatives); and

g) approval ratings from community surveys.

NOTE — Other areas of importance for management to consider are fair trade, occupational health and safety, and human rights performance. Guidance for these issues can be found in IS/ISO 26000, the global reporting initiative and IS/ISO 45001.

A-4.3 Operational Performance Indicators

A-4.3.1 *General Overview*

This subclause provides examples of OPIs that may be appropriate to measure the environmental performance of an organization's operations. An organization's operations may be logically grouped, based on inputs to and outputs from the physical facilities and equipment of the organization. The organization's operations also include the organization's physical facilities and equipment, as well asthe supply to and delivery from them.

Figure 5 shows the concept of a mass balance of inputs and outputs. In addition, it highlights the question of system boundaries.

A-4.3.2 *Examples of OPIs*

A-4.3.2.1 *Materials*

If management's interest is in environmental performance related to the materials it uses in its operations, possible OPIs include the quantity of:

a) materials used per unit of product;

b) processed, recycled or reused materials used;

c) packaging materials discarded or reused per unit of product;

d) auxiliary materials recycled or reused;

e) raw materials reused in the production process;

f) water per unit of product;

g) water reused; and

h) toxic materials used in the production process.

A-4.3.2.2 *Energy*

If management's interest is in environmental performance related to the total energy or the types of energy used by, or the energy efficiency of, the organization's operations, possible OPIs include the amount of:

a) energy used per year or per unit of product;

b) energy used per service or customer;

c) each type of energy used (for example, renewable);

d) energy generated with by-products or process streams; and

e) energy units saved due to energy conservation programmes.

A-4.3.2.3 *Services supporting the organization's operations*

If management's interest is in environmental performance related to the services supporting its operations, possible OPIs include:

a) the amount of toxic materials used by contracted service providers;

b) the amount of hazardous cleaning agents used by contracted service providers;

c) the amount of recyclable and reusable materials used by contracted service providers; and

d) the type of wastes generated by contracted service providers.

A-4.3.2.4 *Physical facilities and equipment*

If management's interest is in environmental performance related to the organization's physical facilities and equipment, possible OPIs include:

a) the percentage of total pieces of equipment with parts designed for easy disassembly, recycling and reuse;

b) the number of hours per year a specific piece of equipment is in operation;

c) the number of emergency events (for example, explosions) or non-routine operations (for example, shut-downs) per year;

d) the total land area used for production

purposes;

e) the land area used to produce a unit of energy;

f) the carbon dioxide equivalence per unit driven; and

g) the percentage of vehicles in fleet with pollution-abatement technology.

A-4.3.2.5 *Supply and delivery*

If management's interest is in environmental performance related to the inputs and outputs of supply to the organization's operations, possible OPIs include:

a) the average fleet carbon dioxide equivalent per unit driven;

b) the number of freight deliveries by mode of transportation per unit of time;

c) the percentage of vehicles in fleet with pollution-abatement technology;

d) the percentage of business meetings conducted remotely; and

e) the number of business trips by each mode of transportation.

A-4.3.2.6 *Products*

If management's interest is in environmental performance related to its products or by-products (for example, materials other than main products, including recycled and reused materials that are generated and retained for further commercial purposes), possible OPIs include:

a) the percentage of products introduced in the market with reduced hazardous properties;

b) the number of products which can be reused or recycled;

c) the percentage of a product's content that can be reused or recycled;

d) the percentage of defective products;

e) the amount of resources consumed during product use;

f) the durability of the product;

g) the percentage of products with instructions regarding environmentally safe use and disposal.

h) the percentage of products with explicit "product stewardship" plans;

j) the percentage of products designed for disassembly, recycling or reuse; and

k) the percentage of products with instructions regarding environmentally safe use and disposal.

NOTE — Guidance on product performance related to environmental performance can be found in ISO 14006.

A-4.3.2.7 *Services provided by the organization*

If the organization provides a type of service, and management's interest is in environmental performance related to the service, possible OPIs include:

a) the resource consumption per unit of service provided;

b) the amount of carbon dioxide equivalent per unit of service provided; and

c) the amount of pollutants per unit of service provided.

A-4.3.2.8 *Wastes*

If management's interest is in environmental performance related to the wastes generated by its operations, possible OPIs include:

a) the quantity of waste per unit (for example, product, time, manpower);

b) the quantity of hazardous, recyclable or reusable waste produced per unit;

c) the total waste disposed by category;

d) the quantity of hazardous waste stored on site and/or controlled by regulation;

e) the quantity of waste converted to reusable material per unit; and

f) the quantity of hazardous waste eliminated due to prevention of pollution programmes.

A-4.3.2.9 *Emissions*

If management's interest is in environmental performance related to the emissions to air from its operations, possible OPIs include the quantity of:

a) specific emissions per year;

b) specific emissions per unit of product;

c) waste energy released to air;

d) air emissions having ozone-depletion potential; and

e) air emissions having global climate-change potential.

If management's interest is in environmental

performance related to the effluents to land or water from its operations, possible OPIs include the quantity of:

a) specific material discharged per year;

b) specific material discharged to water per unit of product;

c) waste energy released to water;

d) material sent to landfill per unit of product; and

e) effluent per service unit or customer.

If management's interest is in environmental performance related to other emissions resulting from its operations, possible OPIs include:

a) a noise indicator measured at a certain and essential locations;

b) the quantity of radiation released per unit; and

c) the amount of heat, vibration or light emitted per unit.

A-4.4 Environmental Condition Indicators

A-4.4.1 *General Overview*

This subclause provides examples of ECIs.

Development and application of ECIs is frequently the function of local, regional, national or international government agencies, non-governmental organizations, and scientific and research institutions rather than the function of an individual organization. For purposes such as scientific investigations, the development of environmental standards and regulations, or communication to the public, these agencies, organizations and institutions can supply and collect data and information, including:

a) properties and quality of major bodies of water;

b) regional air quality;

c) endangered species;

d) resource quantities or quality;

e) ocean temperatures;

f) concentration of contaminants in tissue of living organisms;

g) ozone depletion; and

h) concentration of GHGs.

Some of this information may be in the form of ECIs which could be useful to an organization inmanaging its environmental aspects or indicating specific issues that an organization should consider in its implementation of EPE.

Some organizations that can identify a relationship between their activities and the condition of some component of the local environment may choose to develop their own ECIs as an aid in evaluating their environmental performance as appropriate to their capabilities, interests and needs.

A-4.4.2 *Examples of Local, Regional, National or Global ECIs*

A-4.4.2.1 *General*

If management's interest is the organization's contribution to the local, regional, national or global environmental conditions, the organization can use indicators being investigated and developed by government agencies, non-governmental organizations, and scientific and research institutions. Examples of such indicators include the thickness of the ozone layer, average global temperature and the size of fish populations in oceans.

A-4.4.2.2 *Air*

If management's interest is in information on the condition of local or regional air, possible ECIs include:

a) concentration of a specific contaminant in ambient air at selected monitoring locations;

b) measured reduction or elimination of GHGs or removal of GHGs;

c) ambient temperature at locations within a specific distance of the organization's facility;

d) opacity levels upwind and downwind of the organization's facility;

e) frequency of photochemical smog events in a defined local area; and

f) odour measured at a specific distance from the organization's facility (for example, odours in an adjacent residential area as an indicator of its success in controlling air emissions).

A-4.4.2.3 *Water*

If management's interest is in information on the condition of groundwater or surface water, such as rivers or lakes, in the local or regional area, possible ECIs include:

a) concentration of a specific contaminant in groundwater or surface water;

b) turbidity measured in a stream adjacent to a facility upstream and downstream of a wastewater discharge point;

c) dissolved oxygen in receiving waters;

d) water temperature in a surface water body adjacent to the organization's facility;

e) change in groundwater level; and

f) number of coliform bacteria per litre of water (for example, monitor coliform bacteria upstream and downstream of sewage discharge to determine whether there is a health risk requiring action).

A-4.4.2.4 *Land*

If management's interest is in information on the condition of land in the local or regional area, possible ECIs include:

a) concentration of a specific contaminant in surface soils at selected locations in the area surrounding the organization's facility;

b) concentration of selected nutrients in soils adjacent to the organization's facility;

c) area rehabilitated in a defined local zone;

d) area dedicated to landfill, tourism or wetlands in a defined local zone;

e) paved and non-fertile area in a defined local zone;

f) protected areas in a defined local zone; and

g) measure of the erosion of topsoil from a defined local zone (for example, measure of erosion associated witha construction project).

A-4.4.2.5 *Flora*

If management's interest is in information on the condition of flora in the local or regional area, possible ECIs include:

a) concentration of a specific contaminant in tissue of a specific plant species found in the local orregional area;

b) crop yield over time from fields in the surrounding area;

c) population of a particular plant species within distance of the organization's facility;

d) number of total flora species in a defined local a area; defined

e) number and variety of crop species in a defined local area;

f) specific measures of the quality of habitat for individual species in the local area;

g) specific measure of the quantity of vegetation in a defined local area; and

h) specific measure of the diversity of vegetation in a defined local area (for example, vegetation surveys in the vicinity of a facility to monitor improvements in air emissions control).

A-4.4.2.6 *Fauna*

If management's interest is in information on the condition of fauna in the local or regional area, possible ECIs include:

a) concentration of a specific contaminant in tissue of a specific animal species found in the local or regional area;

b) population of a particular animal species within a defined distance of the organization's facility;

c) harmful noise levels;

d) specific measures of the quality of habitat for individual species in the local area; and

e) number of total fauna species in a defined local area (for example, measure of biodiversity within the region of influence).

A-4.4.2.7 *Humans*

If management's interest is in information on the condition of human populations in the local or regional area, possible ECIs include:

a) longevity data for specific populations;

b) incidence of specific diseases, particularly among sensitive populations, from epidemiology studies in the local or regional area;

c) rate of population growth in the local or regional area;

d) weighted average noise levels and noise annoyance at the perimeter of the organization's facility;

e) population density in the local or regional area; and

f) levels of toxic substances in blood of the local population (for example, monitor the lead concentration in the blood of the local population against lead released from all sources).

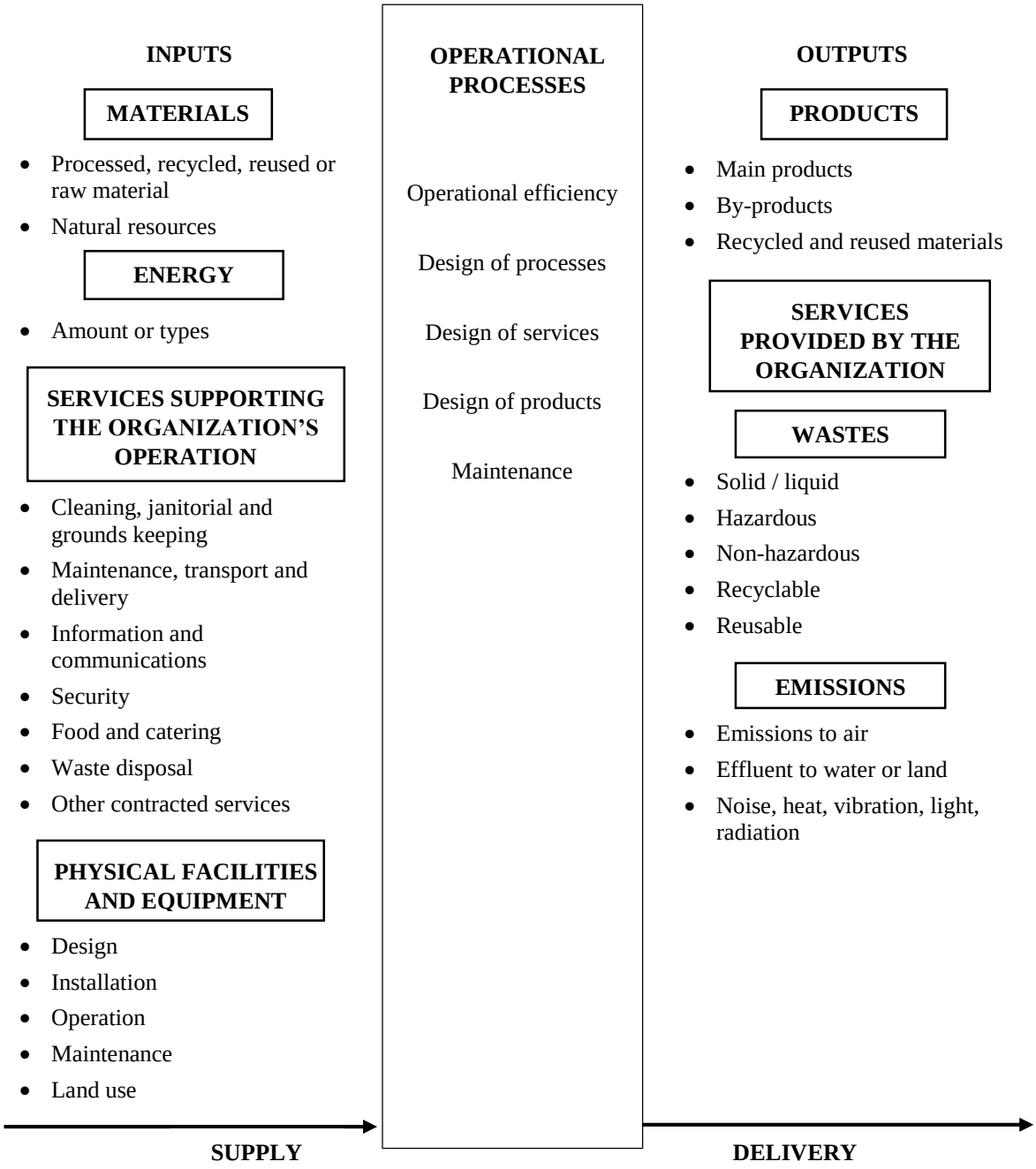
A-4.4.2.8 *Aesthetics, heritage and culture*

If management's interest is in information on aesthetic factors or the condition of historically or culturally significant structures and places in the local or regional area, possible ECIs include the measure of:

a) condition of sensitive structures;

b) condition of places considered sacred in the vicinity of the organization's facility; and

c) surface integrity of historical buildings in the local area (for example, measure the effect of air emissions on historical buildings).



NOTE — *See* Fig. 3 for a general overview

FIG. 5 THE ORGANIZATION'S OPERATIONS

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Environmental Management Sectional Committee, CHD 34

Organization	*Representative(s)*
In Personal Capacity (*769, Sector 16, Panchkula*)	DR S. K. SHARMA **(*Chairperson*)**
Aditya Birla Group, Mumbai	SHRI SANDEEP SHRIVASTAVA
Association of Certification Bodies of India, New Delhi	SHRI K. DORAISWAMY SHRI SANJAY KAUSHIK (*Alternate*)
Bhabha Atomic Research Centre, Mumbai	DR A. VINOD KUMAR DR S. K. SAHU (*Alternate*)
Bureau of Energy Efficiency, Ministry of Power, New Delhi	DR ASHOK KUMAR SHRI SUNIL KHANDARE (*Alternate*)
Carbon Minus India, New Delhi	DR SRIKANTA K. PANIGRAHI MS MEENAKSHI JAIN (*Alternate*)
Central Leather Research Institute, Chennai	DR K. SRI BALA KAMESWARI DR S. SWARNALATHA (*Alternate*)
Central Pollution Control Board, New Delhi	SHRI G. THIRUMURTHY
Confederation of Indian Industry, New Delhi	SHRI SHIKHAR JAIN MS ANJALI (*Alternate*)
Consumer Education and Research Centre, Ahmedabad	MS ANINDITA MEHTA MS DIVYA NAMBOOTHIRI (*Alternate*)
Environmental Protection Training and Research Institute, Hyderabad	DR J. SESHA SRINIVAS
Federation of Indian Chambers of Commerce & Industry (FICCI), New Delhi	SHRI M. A. PATIL SHRI MRITUNJAY KUMAR (*Alternate*)
Forest Research Institute, Dehradhun	SHRI N. BALA DR VIJENDAR KR. PANWAR (*Alternate*)
India Glycols Limited, Noida	DR R. K. SHARMA SHRI SARANG KHATI (*Alternate*)
Indian Chemical Council, Mumbai	DR MRITUNJAY CHAUBEY DR KRISH NENDU SIL (*Alternate*)
Indian Oil Corporation Ltd, Faridabad	DR DEEPAK SAXENA DR A. K. ARORA (*Alternate*)
JSW Steel Ltd., Mumbai	SHRI PRABODHA ACHARYA SHRI SWAROOP BANERJEE (*Alternate*)
Ministry of Commerce & Industry, GoI, New Delhi	SHRI K. K. SINHA SHRI M. ZAKARIA KHAN YUSUFZAI (*Alternate*)
Ministry of Environment & Forest, GoI, New Delhi	SHRI SATYENDRA KUMAR SHRI N. SUBRAHMANYAM (*Alternate*)

Organization	*Representative(s)*
National Council for Cement and Building Materials, New Delhi	SHRI ANUPAM SHRI M. V. RAMACHANDRA RAO (*Alternate*)
Quality Council of India, New Delhi	MS POONAM GUPTA SHRI ABHAY PATHAK (*Alternate*)
RITES Ltd, Gurugram	SHRI M. P. MANDAL SHRI ABHAY KUMAR SHARMA (*Alternate*)
The Fertiliser Association of India, New Delhi	SHRI MANISH GOSWAMI SHRI J. HARIHARA (*Alternate* I) DR DESH DEEPAK CHATURVEDI (*Alternate* II)
In Personal Capacity (*29/6, Jadunath Ukil Road, Kolkata*)	PROF SADHAN KUMAR GHOSH
In Personal Capacity (*101, Saarth Pratham Apartment, Pragati Nagar Road, Kotra, Ajmer*)	SHRI V. S. MATHUR
BIS Directorate General	SHRI AJAY K. LAL, SCIENTIST 'E'/DIRECTOR AND HEAD (CHEMICAL) [REPRESENTING DIRECTOR GENERAL (*Ex-Officio*)]

Member secretary
SHRI MOHIT GARG
SCIENTIST 'B'/ASSISTANT DIRECTOR
(CHEMICAL), BIS

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This Indian Standard has been developed from Doc No.: CHD 34 (19329).

Amendments Issued Since Publication

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Published by BIS, New Delhi