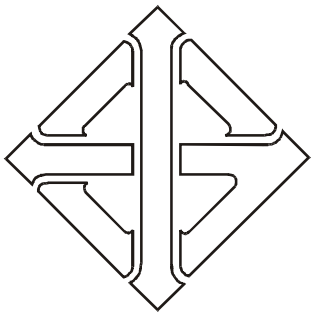

มาตรฐานผลิตภัณฑ์อุตสาหกรรม

THAI INDUSTRIAL STANDARD

มอก. 14031 – 2553

ISO 14031 : 1999

การจัดการสิ่งแวดล้อม : ข้อแนะนำในการประเมินผลการปฏิบัติงานด้านสิ่งแวดล้อม

ENVIRONMENTAL MANAGEMENT -
ENVIRONMENTAL PERFORMANCE EVALUATION -
GUIDELINES

สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

กระทรวงอุตสาหกรรม

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สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม
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ประกาศในราชกิจจานุเบกษา ฉบับประกาศและงานทั่วไป เล่ม 127 ตอนพิเศษ 144ง
วันที่ 16 ธันวาคม พุทธศักราช 2553

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้เป็นส่วนหนึ่งในอนุกรมมาตรฐานผลิตภัณฑ์อุตสาหกรรมการจัดการสิ่งแวดล้อม เป็นเรื่องเกี่ยวกับการประเมินผลการปฏิบัติงานด้านสิ่งแวดล้อม ซึ่งมาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้ รับ ISO 14031:1999 Environmental management – Environmental performance evaluation – Guidelines มาใช้ในระดับเหมือนกันทุกประการ (identical) โดยใช้ ISO ฉบับภาษาอังกฤษเป็นหลัก

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้กำหนดขึ้นตามความต้องการของผู้ใช้ และจักแปลเป็นภาษาไทยในโอกาสอันสมควร หากมีข้อสงสัยโปรดติดต่อสอบถามที่สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

คณะกรรมการมาตรฐานผลิตภัณฑ์อุตสาหกรรมได้พิจารณามาตรฐานนี้แล้ว เห็นสมควรเสนอรัฐมนตรีประกาศตามมาตรา 15 แห่งพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม พ.ศ. 2511

ประกาศกระทรวงอุตสาหกรรม

ฉบับที่ 4255 (พ.ศ. 2553)

ออกตามความในพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม

พ.ศ. 2511

เรื่อง กำหนดมาตรฐานผลิตภัณฑ์อุตสาหกรรม

การจัดการสิ่งแวดล้อม : ข้อแนะนำในการประเมินผลการปฏิบัติงานด้านสิ่งแวดล้อม

อาศัยอำนาจตามความในมาตรา 15 แห่งพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม พ.ศ. 2511 รัฐมนตรีว่าการกระทรวงอุตสาหกรรมออกประกาศกำหนดมาตรฐานผลิตภัณฑ์อุตสาหกรรม การจัดการสิ่งแวดล้อม : ข้อแนะนำในการประเมินผลการปฏิบัติงานด้านสิ่งแวดล้อม มาตรฐานเลขที่ มอก.14031-2553 ไว้ ดังมีรายละเอียดต่อท้ายประกาศนี้

ทั้งนี้ให้มีผลตั้งแต่วันประกาศในราชกิจจานุเบกษา เป็นต้นไป

ประกาศ ณ วันที่ 20 กันยายน พ.ศ. 2553

ชัยวุฒิ บรรณวัฒน์

รัฐมนตรีว่าการกระทรวงอุตสาหกรรม

มาตรฐานผลิตภัณฑ์อุตสาหกรรม
การจัดการสิ่งแวดล้อม :
ข้อแนะนำในการประเมินผลการปฏิบัติงาน
ด้านสิ่งแวดล้อม

บทนำ

หลายองค์กรกำลังหาวิธีทำความเข้าใจ การแสดงผล และปรับปรุงผลการปฏิบัติงานด้านสิ่งแวดล้อมภายในองค์กร ซึ่งสามารถประสบความสำเร็จได้โดยองค์กรมีการจัดการกิจกรรม ผลิตภัณฑ์ การบริการที่มีผลกระทบต่อสิ่งแวดล้อมอย่างมีนัยสำคัญที่มีประสิทธิผล ซึ่งการประเมินผลการปฏิบัติงานด้านสิ่งแวดล้อมเป็นกระบวนการจัดการภายในที่ใช้ข้อมูลที่เชื่อถือได้และทวนสอบได้เทียบกับเกณฑ์ที่กำหนดขึ้น

โดยองค์กรที่มีการจัดทำระบบการจัดการสิ่งแวดล้อมควรประเมินผลการปฏิบัติงานด้านสิ่งแวดล้อมเทียบกับนโยบายสิ่งแวดล้อม วัตถุประสงค์ เป้าหมาย และเกณฑ์ผลการปฏิบัติงานด้านสิ่งแวดล้อมอื่น ๆ หากองค์กรใดไม่มีระบบการจัดการสิ่งแวดล้อม การประเมินผลการปฏิบัติงานด้านสิ่งแวดล้อมสามารถช่วยองค์กรในการชี้บ่งลักษณะปัญหาสิ่งแวดล้อม การกำหนดลักษณะปัญหาสิ่งแวดล้อมที่มีนัยสำคัญ การกำหนดเกณฑ์สำหรับผลการปฏิบัติงานด้านสิ่งแวดล้อม และการประเมินผลการปฏิบัติงานด้านสิ่งแวดล้อมเทียบกับเกณฑ์ที่กำหนดขึ้นได้

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้นำไปใช้สนับสนุนข้อกำหนดในมาตรฐาน ISO 14001 และ ISO 14004 ได้ และสามารถใช้มาตรฐานนี้ได้อย่างอิสระ

ขอบข่าย

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้ระบุข้อแนะนำในการออกแบบและนำไปใช้ประเมินผลการปฏิบัติงานด้านสิ่งแวดล้อมภายในองค์กร ซึ่งสามารถประยุกต์ใช้ได้กับทุกองค์กร โดยไม่คำนึงถึงประเภท ขนาด สถานที่ตั้ง และความซับซ้อนขององค์กร

เอกสารอ้างอิง

ไม่มีเอกสารอ้างอิง

บทนิยาม

ความหมายของคำที่ใช้ในมาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้ ให้เป็นไปตามมาตรฐาน ISO 14031:1999 ข้อ 2

การประเมินผลการปฏิบัติงานด้านสิ่งแวดล้อม

การประเมินผลการปฏิบัติงานด้านสิ่งแวดล้อม ระบุไว้ 4 เรื่อง ได้แก่ ภาพรวมทั่วไป การวางแผนการประเมินผลการปฏิบัติงานด้านสิ่งแวดล้อม การใช้ข้อมูลและข่าวสาร และการทบทวนการปรับปรุงผลการปฏิบัติงานด้านสิ่งแวดล้อม

รายละเอียดให้เป็นไปตามมาตรฐาน ISO 14031:1999 ข้อ 3.1 ถึง 3.4

ภาคผนวก

ข้อแนะนำเพิ่มเติมในการประเมินผลการปฏิบัติงานด้านสิ่งแวดล้อม

รายละเอียดให้เป็นไปตามมาตรฐาน ISO 14031:1999 Annex A

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Contents

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 14031 was prepared by Technical Committee ISO/TC 207, *Environmental management*, Subcommittee SC 4, *Environmental performance evaluation*.

Annex A of this International Standard is for information only.

Introduction

Many organizations are seeking ways to understand, demonstrate and improve their environmental performance. This can be achieved by effectively managing those elements of their activities, products and services that can significantly impact the environment.

Environmental performance evaluation (EPE), the subject of this International Standard, is an internal management process and tool designed to provide management with reliable and verifiable information on an ongoing basis to determine whether an organization's environmental performance is meeting the criteria set by the management of the organization.

An organization with an environmental management system in place should assess its environmental performance against its environmental policy, objectives, targets and other environmental performance criteria. When an organization does not have an environmental management system, EPE can assist the organization in:

- identifying its environmental aspects;
- determining which aspects it will treat as significant;
- setting criteria for its environmental performance; and
- assessing its environmental performance against these criteria.

This International Standard (ISO 14031) supports the requirements in ISO 14001 and the guidance in ISO 14004 (see Bibliography), but it may also be used independently.

EPE and environmental audits help the management of an organization to assess the status of its environmental performance and to identify areas for improvement as needed. 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. In contrast, environmental audits are conducted periodically to verify conformance to defined requirements. Further guidance on environmental auditing is provided in ISO 14010 and ISO 14011 (see Bibliography).

Examples of other tools that management can use to provide additional information for EPE include environmental reviews and life cycle assessment (LCA). While EPE focuses on describing the environmental performance of an organization, LCA is a technique for assessing the environmental aspects and potential impacts associated with product and service systems. Further guidance on LCA is provided in ISO 14040, ISO 14041, ISO 14042 and ISO 14043 (see Bibliography). Relevant information derived from these and other data sources can support the implementation of EPE, as well as the implementation of other management tools.

Environmental management — Environmental performance evaluation — Guidelines

1 Scope

This International Standard gives guidance on the design and use of environmental performance evaluation within an organization. It is applicable to all organizations, regardless of type, size, location and complexity.

This International Standard does not establish environmental performance levels. It is not intended for use as a specification standard for certification or registration purposes or for the establishment of any other environmental management system conformance requirements.

2 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

2.1
environment
surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation

NOTE Surroundings in this context extend from within an organization to the global system.

[ISO 14001:1996]

2.2
environmental aspect
element of an organization's activities, products or services that can interact with the environment

NOTE A significant environmental aspect is an environmental aspect that has or can have a significant environmental impact.

[ISO 14001:1996]

2.3
environmental condition indicator
ECI
specific expression that provides information about the local, regional, national or global condition of the environment

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 condition of the environment that the organization chooses to consider.

2.4
environmental impact
any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services

[ISO 14001:1996]

2.5
environmental management system
EMS
the part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy

[ISO 14001:1996]

2.6
environmental objective
overall environmental goal, arising from the environmental policy, that an organization sets itself to achieve, and which is quantified where practicable

[ISO 14001:1996]

2.7
environmental performance
results of an organization's management of its environmental aspects

NOTE 1 Environmental performance is defined differently in this International Standard than in ISO 14001:1996 and ISO 14004:1996.

NOTE 2 In the context of environmental management systems, results may be measured against the organization's environmental policy, objectives and targets.

2.8
environmental performance criterion
environmental objective, target, or other intended level of environmental performance set by the management of the organization and used for the purpose of environmental performance evaluation

2.9
environmental performance evaluation
EPE
process to facilitate management decisions regarding an organization's environmental performance by selecting indicators, collecting and analysing data, assessing information against environmental performance criteria, reporting and communicating, and periodically reviewing and improving this process

2.10
environmental performance indicator
EPI
specific expression that provides information about an organization's environmental performance

2.10.1
management performance indicator
MPI
environmental performance indicator that provides information about the management efforts to influence an organization's environmental performance

2.10.2
operational performance indicator
OPI
environmental performance indicator that provides information about the environmental performance of an organization's operations

2.11
environmental policy
statement by the organization of its intentions and principles in relation to its overall environmental performance which provides a framework for action and for the setting of its environmental objectives and targets

[ISO 14001:1996]

2.12
environmental target
detailed performance requirement, quantified where practicable, applicable to the organization or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives

[ISO 14001:1996]

2.13
interested party
individual or group concerned with or affected by the environmental performance of an organization

[ISO 14001:1996]

2.14
organization
company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration

NOTE For organizations with more than one operating unit, a single operating unit may be defined as an organization.

[ISO 14001:1996]

3 Environmental performance evaluation

3.1 General overview

3.1.1 EPE process model

Environmental performance evaluation (EPE) is an internal management process that uses indicators to provide information comparing an organization's past and present environmental performance with its environmental performance criteria. EPE, as detailed in this International Standard, follows a "Plan-Do-Check-Act" management model. The steps of this ongoing process are the following:

a) **Plan**

1) planning EPE;

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

b) **Do**

Using 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 criteria;

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

c) **Check and Act**

Reviewing and improving EPE.

Figure 1 provides an outline of EPE, with references to the numbers and titles of relevant clauses in this International Standard. Annex A provides supplemental guidance to support EPE.

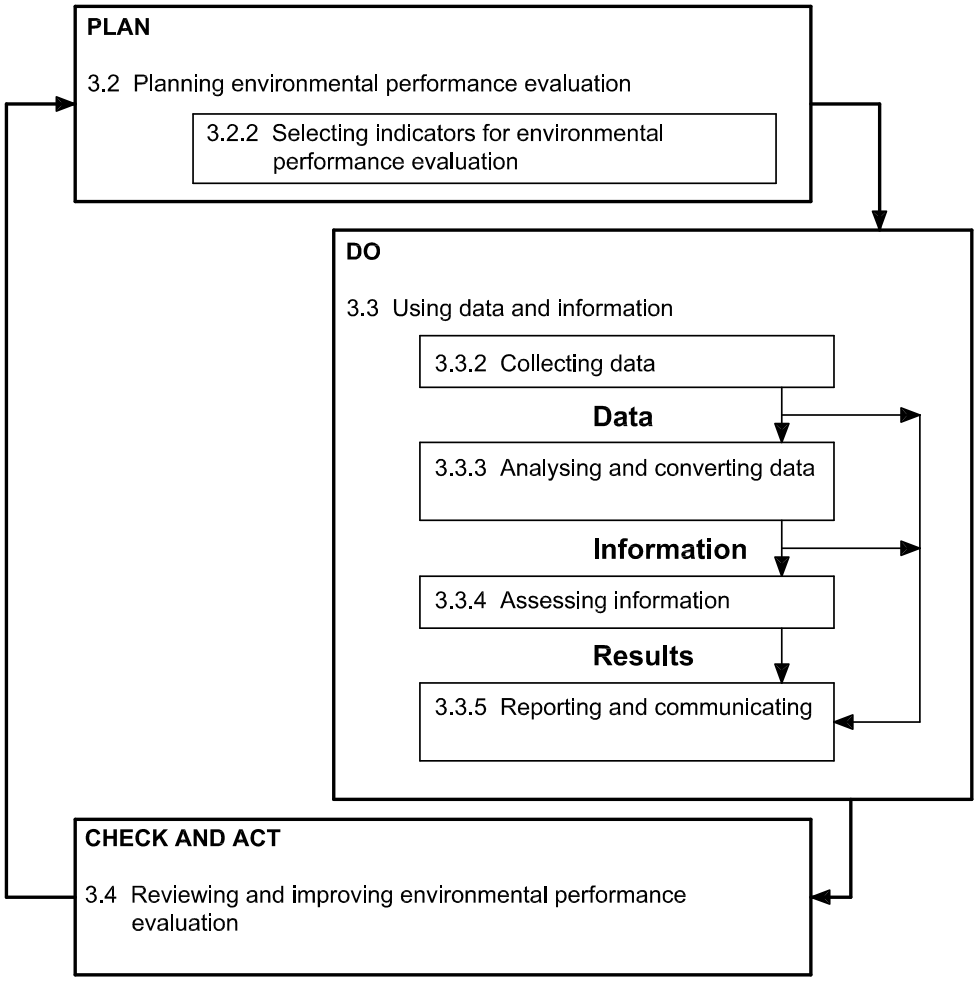


Figure 1 — Environmental performance evaluation

3.1.2 Indicators for EPE

This International Standard describes two general categories of indicators for EPE:

- environmental performance indicators (EPIs); and
- environmental condition indicators (ECIs).

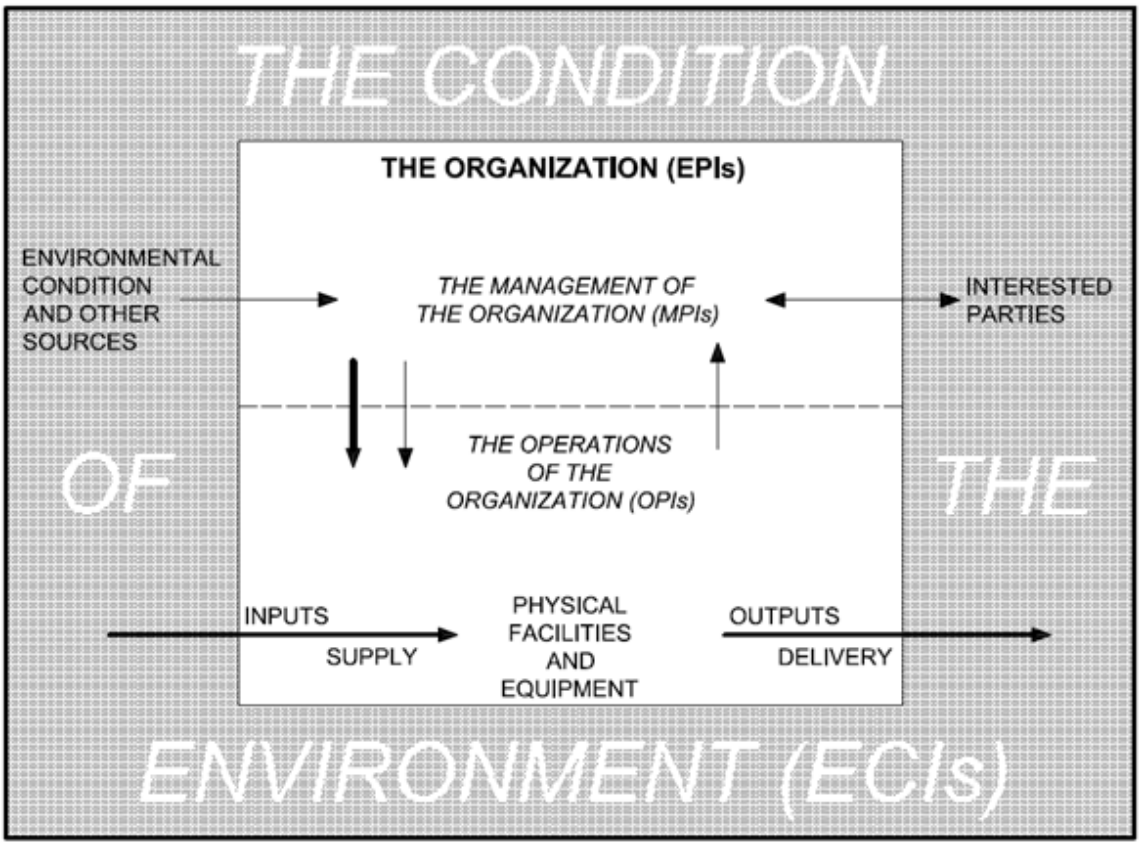
There are two types of EPI:

— Management performance indicators (MPIs) are a type of EPI that provide information about management efforts to influence the environmental performance of the organization's operations.

— Operational performance indicators (OPIs) are a type of EPI that provide information about the environmental performance of the organization's operations.

ECIs provide information about the condition of the environment. This information can help an organization to better understand the actual impact or potential impact of its environmental aspects, and thus assist in the planning and implementation of EPE.

The decisions and actions of an organization's management are closely related to the performance of its operations. Figure 2 illustrates the interrelationships among an organization's management and operations, and the condition of the environment, noting the type of indicator for EPE related to each of these elements.



Key

Information flows:
Input and output flows related to the organization's opérations:
Decision flows:

Figure 2 — Interrelationships of an organization's management and operations with the condition of the environment

3.1.3 Use of EPE

Management commitment to implement EPE is essential. EPE should be appropriate to the size, location, and type of the organization and its needs and priorities. EPE should be cost-effective and part of the regular business functions and activities of an organization. The information generated by EPE can assist an organization to:

- determine any necessary actions to achieve its environmental performance criteria;
- identify significant environmental aspects;

- identify opportunities for better management of its environmental aspects (e.g. prevention of pollution);
- identify trends in its environmental performance;
- increase the organization's efficiency and effectiveness;
- 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 criteria. Management may also report or communicate such information to other interested parties.

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

3.2 Planning EPE (Plan)

3.2.1 General guidance

An organization should base its planning of EPE (including the selection of indicators for EPE) on:

- the significant environmental aspects that it can control and over which it can be expected to have an influence;
- its environmental performance criteria;
- the views of interested parties.

NOTE Clause A.2 of this International Standard provides guidance on identifying the views of interested parties in the context of EPE.

In planning EPE, the organization can also consider:

— the full range of its activities, products and services;

— its organizational structure;

— its overall business strategy;

— its environmental policy;

— information needed to meet its legal and other requirements;

— relevant international environmental agreements;

— environmental costs and benefits;

— information needed for analysis of financial effects related to environmental performance;

— the need for consistent information related to its environmental performance from year to year;

— information about the local, regional, national or global condition of the environment;

— cultural and social factors.

The financial, physical and human resources needed to conduct EPE should be identified and provided by management.

Depending on its capabilities and resources, the initial scope of an organization's EPE may be limited to those elements of its activities, products and services given highest priority by management. Over time, the initial scope of EPE can be widened to address elements of an organization's activities, products and services that have not been previously addressed.

The identification of an organization's environmental aspects is an important input in planning EPE. This information typically is developed in the context of an environmental management system. Guidance on identifying significant environmental aspects in the context of environmental management systems can be found in ISO 14001 and ISO 14004 (see Bibliography). An organization with an environmental management system in place should assess its environmental performance against its environmental policy, objectives, targets and other environmental performance criteria.

An organization without an environmental management system may use EPE to assist in identifying environmental aspects which it will treat as significant and setting criteria for its environmental performance. To determine significant environmental aspects, such an organization should consider:

- the scale and nature of material and energy usage;
- emissions;
- risks;
- the condition of the environment;
- the possibility of incidents;
- legal, regulatory and other requirements to which the organization subscribes.

For most organizations, the review of environmental aspects will focus on the organization's operations, as described in Figure A.1.

Practical Help Box No. 1

Examples of approaches to identify environmental aspects and their relative significance in the context of EPE, for organizations without environmental management systems

- 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.
- Use information about the condition of the environment to identify activities, products and services of the organization that may have an impact on specific conditions.
- Analyse the organization's existing data on material and energy inputs, discharges, wastes and emissions and assess these data in terms of risk.
- Identify the views of interested parties and use this information to help establish the organization's significant environmental aspects.
- Identify activities of the organization that are subject to environmental regulation or other requirements, for which data may have been collected by the organization.
- Consider the design, development, manufacturing, distribution, servicing, use, re-use, recycling and disposal of the organization's products, and their related environmental impacts.
- Identify those activities of the organization having the most significant environmental costs or benefits.

Whether it has an environmental management system or not, an organization should plan EPE in conjunction with the setting of its environmental performance criteria, so that the selected indicators for EPE will be appropriate for describing the organization's environmental performance against these criteria.

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

— current and past performance;

— legal requirements;

— recognized codes, standards and best practices;

— performance data and information developed by industry and other sector organizations;

— management reviews and audits;

— the views of interested parties;

— scientific research.

3.2.2 Selecting indicators for EPE

3.2.2.1 General guidance

Indicators for EPE 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 organization's environmental performance, the environmental performance of the organization's operations, or the condition of the environment. An organization should select a sufficient number of relevant and understandable indicators to assess its environmental performance. The number of selected indicators for EPE should reflect the nature and scale of the organization's operations. The choice of indicators for EPE will determine what data should be used. To facilitate this effort, organizations may wish to use data already available and collected by the organization or by others.

The information conveyed through indicators for EPE can be expressed as direct or relative measures or as 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 understandability. 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 No. 2

Examples of characteristics of data for indicators for EPE

- *Direct measures or calculations*: basic data or information, such as tonnes of contaminant emitted.
- *Relative measures or calculations*: data or information compared to or in relation to another parameter (e.g. 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.
- *Indexed*: 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.
- *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.
- *Weighted*: describing data or information modified by applying a factor related to its significance.

There are many considerations an organization may take into account when selecting indicators for EPE, and several approaches that an organization may use to select its EPIs (OPIs and MPIs) and ECIs. Some considerations for selecting indicators for EPE are provided in A.3.1. A.3.2 provides some examples of approaches for the selection of indicators for EPE.

Some environmental aspects may be complex, and it may be beneficial to select a combination of EPIs and ECIs to provide a comprehensive assessment of performance related to such aspects.

Indicators for EPE should be selected so that management has sufficient information to understand the effect that progress toward achieving any one environmental performance criterion has on other elements of environmental performance.

Organizations may find it useful to select several indicators for EPE derived from a common set of data depending on the intended audience for each indicator.

Practical Help Box No. 3

Example to illustrate an organization selecting several indicators for EPE derived 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:

- total amount of specific contaminant discharged per year
  (possible intended audience: the local community);
- concentration of contaminant in wastewater
  (possible intended audience: legal and regulatory authorities);
- amount of contaminant discharged per product produced
  (possible intended audiences: management and consumers);
- change in amount of contaminant discharged per year relative to investments in cleaner technology or process upgrade
  (possible intended audiences: management and investors).

Regional, national and global 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.

3.2.2.2 Selecting MPIs

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 management of the organization may affect the performance of the organization's operations, and therefore may contribute to the overall environmental performance of the organization (see Figure 2).

Management performance indicators (MPIs) should provide information on the organization's capability and efforts in managing matters such as training, legal requirements, resource allocation and efficient utilisation, environmental cost management, purchasing, product development, documentation, or corrective action which have or can have an influence on the organization's environmental performance. MPIs should assist evaluation of management efforts, decisions and actions to improve environmental performance.

For example, MPIs can be used to track:

— implementation and effectiveness of various environmental management programmes;

— management actions which influence the environmental performance of the organization's operations, and possibly the condition of the environment;

— efforts of particular importance to the successful environmental management of the organization;

— environmental management capabilities of the organization, including flexibility to cope with changing conditions, accomplishment of specific objectives, effective co-ordination, or problem-solving capacity;

— compliance with legal and regulatory requirements, and conformance with other requirements to which the organization subscribes;

— financial costs or benefits.

In addition, effective MPIs can help to:

- predict changes in performance;
- identify root causes where actual performance exceeds, or does not meet, relevant environmental performance criteria;
- identify opportunities for preventive action.

Examples of MPIs are provided in A.4.2.2 of this International Standard.

3.2.2.3 Selecting OPIs

Operational performance indicators (OPIs) should provide management with information on the environmental performance of the organization's operations. OPIs relate to:

- inputs: materials (e.g. processed, recycled, reused or raw materials; natural resources), energy and services;
- the supply of inputs to the organization's operations;
- the design, installation, operation (including emergency events and non-routine operation), and maintenance of the physical facilities and equipment of the organization;
- outputs: products (e.g. main products, by-products, recycled and reused materials), services, wastes (e.g. solid, liquid, hazardous, non-hazardous, recyclable, reusable), and emissions (e.g. emissions to air, effluents to water or land, noise, vibration, heat, radiation, light) resulting from the organization's operations;
- the delivery of outputs resulting from the organization's operations.

Figure 3 illustrates the organization's operations, and Figure A.1 provides additional detail. Where multiple activities or physical facilities produce or provide a particular product or service, the organization should take them into account when evaluating environmental performance.

Examples of OPIs are provided in A.4.3.2 of this International Standard.

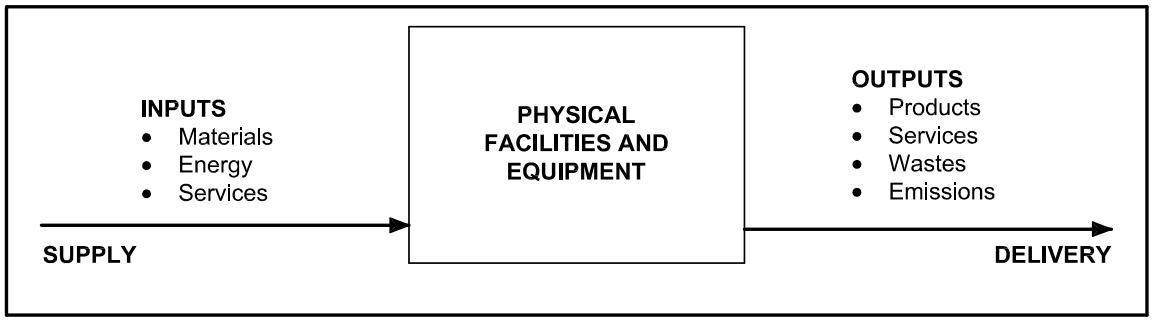


Figure 3 —The organization's operations (general overview)

3.2.2.4 Selecting ECIs

Environmental condition indicators (ECIs) provide information about the local, regional, national or global condition of the environment. The condition of the environment may change over time or with specific events. While ECIs are

not measures of impact on the environment, changes in ECIs can provide useful information on relationships between the condition of the environment and an organization's activities, products and services.

Organizations are encouraged to consider ECIs in their EPE. ECIs provide an organization with an environmental context to support the:

- identification and management of its significant environmental aspects;
- assessment of the appropriateness of environmental performance criteria;
- selection of EPIs (MPIs and OPIs);
- establishment of a baseline against which to measure change;
- determination of environmental change over time in relation to an ongoing environmental programme;
- investigation of possible relationships between environmental condition and the organization's activities, products and services;
- 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 condition in the environment 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 of this International Standard.

Practical Help Box No. 4

Examples to illustrate an identified environmental issue with selected linked indicators 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.

ECI:

- concentrations in the air of contaminants associated with motor vehicle emissions.

OPIs:

- reduction in motor vehicle emissions attributed to the use of alternative fuels;
- quantity of total fuels consumption;
- fuel efficiency by motor vehicle;
- frequency of vehicle maintenance;
- number of vehicles equipped with environmental control technologies.

MPIs:

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

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;
- rate of replenishment.

OPIs:

- quantity of water used per day;
- quantity of water used per unit of production.

MPI:

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

3.3 Using data and information (Do)

3.3.1 General overview

Figure 4 illustrates the steps of using data and information to evaluate environmental performance. These steps are further described in 3.3.2 through 3.3.5 below.

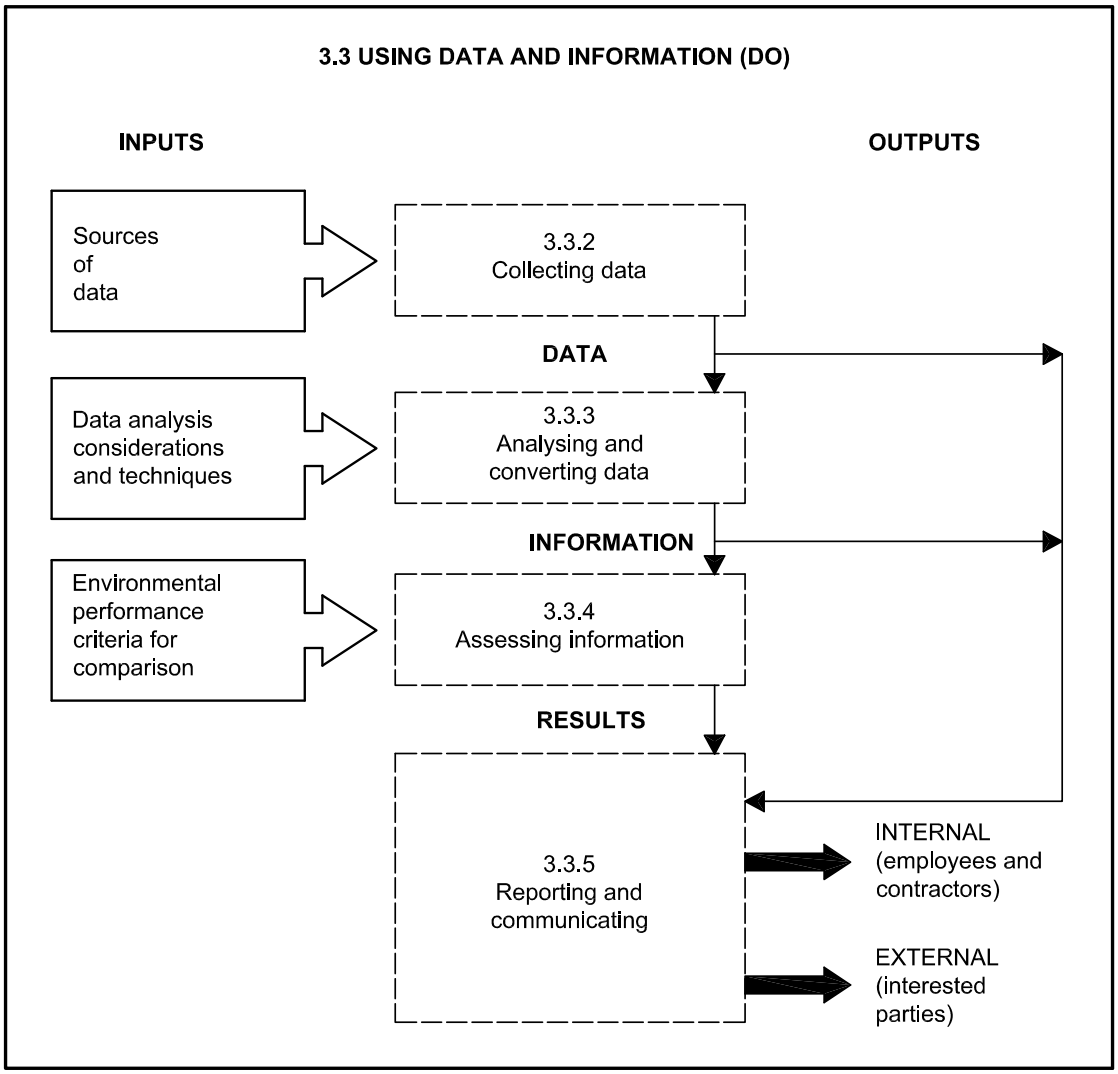


Figure 4 — Subclause 3.3

3.3.2 Collecting data

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.

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.

An organization may use its own data or data from other sources. For example, data can be collected from:

- monitoring and measuring;
- interviews and observations;
- regulatory reports;
- inventory and production records;
- financial and accounting records;
- purchasing records;
- environmental review, audit, or assessment reports;
- environmental training records;
- scientific reports and studies;
- government agencies, academic institutions and non-governmental organizations;
- suppliers and subcontractors;
- customers, consumers and interested parties;
- business associations.

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.

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

Information describing the organization's environmental performance can be developed using calculations, best estimates, statistical methods and/or graphical techniques, or by indexing, aggregating or weighting.

3.3.4 Assessing information

The information derived from analysed data, expressed in terms of EPIs and possibly ECIs, should be compared with the organization's environmental performance criteria. This comparison may indicate progress or deficiencies in environmental performance. The results of this comparison may be useful in understanding why the environmental performance criteria have, or have not, been met. The information describing the organization's environmental performance and the results of the comparison, 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. This information may be reported or communicated to interested parties within and outside the organization, based on management's assessment of needs and its audiences.

Benefits of reporting and communicating environmental performance can include:

- helping the organization's achievement of its environmental performance criteria;
- increasing awareness and dialogue about the organization's environmental policies, environmental performance criteria and relevant achievements;
- demonstrating the organization's commitment and efforts to improving environmental performance;
- providing the mechanism to respond to concerns and questions about the organization's environmental 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 may assist employees, contractors, and others related to the organization to fulfil their responsibilities, and the organization to meet its environmental performance criteria. An organization may wish to consider this information in the review of its environmental management system.

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

- trends in the organization's environmental performance (e.g. waste reduction);
- legislative and regulatory compliance;
- the organization's conformance with other requirements to which it subscribes;
- cost savings or other financial results;
- opportunities or recommendations to improve an organization's environmental performance.

3.3.5.3 External reporting and communicating

An organization may choose or may be required to issue environmental reports or statements providing information describing its 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 may influence an organization's decision to voluntarily report information describing its environmental performance. These factors may 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. Information describing the organization's environmental performance should be substantive and presented in a manner that recognizes the level of technical knowledge of the intended audience. When an organization chooses to conduct external communications, the reporting and communicating methods selected should encourage communication between the organization and interested parties.

Practical Help Box No. 5

***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;
- a description of its activities, products and services;
- a statement of its significant environmental aspects and related indicators for EPE;
- information on performance relative to its environmental performance criteria;
- actions arising from EPE;
- the contribution of environmental management and EPE to the overall success of the organization.

3.4 Reviewing and improving EPE (Check and Act)

An organization's EPE and its results 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 may result in improvements to the condition of the environment.

Steps to review EPE and its results can include a review of:

- the cost effectiveness and benefits achieved;
- progress to meet environmental performance criteria;
- appropriateness of environmental performance criteria;
- appropriateness of selected indicators for EPE;
- data sources, data collection methods and data quality.

Practical Help Box No. 6 (Check)

Examples of questions to assist in reviewing EPE

Is the organization's EPE:

- providing adequate information to measure changes in the organization's environmental performance?
- providing appropriate and useful information to management?
- being implemented according to plan?
- utilizing appropriate data sources and frequencies of data collection?
- effectively analysing and evaluating collected data?
- supported by adequate resources?
- relevant to the organization's environmental performance criteria?
- providing information for reporting and communicating its EPE information?
- considering or soliciting input from interested parties when appropriate?
- adding value to the organization?
- responding to change in the organization and its surroundings?
- addressing new environmental issues?
- well-integrated with other accepted organizational measures of performance?

Practical Help Box No. 7 (Act)

Examples of actions to improve EPE

- Improve data quality, reliability and availability.
- Improve analytical and evaluation capabilities.
- Develop or identify new or more useful indicators for EPE.
- Change the scope of EPE.

Annex A
(informative)

Supplemental guidance on EPE

A.1 General overview

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

Table A.1 — Linkages between elements of the main body text and elements of annex A

Main Body Text	Related annex A element
3.2 Planning EPE (Plan)	**A.2** Guidance on identifying the views of interested parties in the context of EPE
3.2.2 Selecting indicators for EPE	**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
3.2.2.2 Selecting MPIs	**A.4.2** Management performance indicators
3.2.2.3 Selecting OPIs	**A.4.3** Operational performance indicators
3.2.2.4 Selecting ECIs	**A.4.4** Environmental condition indicators

A.2 Guidance on identifying the views of interested parties in the context of EPE

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

A.2.1 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:

- management representatives;
- employees;
- investors and potential investors;
- customers and suppliers;
- contractors;
- lending institutions and insurers;

- regulatory and legislative bodies;
- neighbouring and regional communities;
- communications media;
- business, administrative, academic and research institutions;
- environmental groups, consumer interest groups and other non-governmental organizations;
- general public.

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.

A.2.2 Issues and views of interested parties

Issues related to financial interests can include:

- management and amount of environmental costs;
- financial impact related to past or present environmental liabilities;
- positive environmental initiatives;
- investments that improve environmental performance;
- commercial advantages derived from environmental issues;
- costs of compliance, or non-compliance, with environmental regulation or legislation.

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

- health and safety;
- real and perceived risks to the environment resulting from the organization's activities, including trends over time;
- impacts on the quality of life (e.g. noise, odour, visual impact)
- environmental incidents and complaints;
- evidence that organizations are fulfilling their environmental commitments;
- environmental impacts;
- environmental loads (e.g. emissions, discharges, waste disposal) including trends over time;
- biodiversity;
- sustainability;
- transboundary pollution and other global environmental issues;
- impacts of trade on the environment;
- harmonization of regulatory regimes;
- environmental characteristics of products and services;
- compliance with legal and regulatory environmental requirements;
- consumption of resources.

A.2.3 Methods for identifying the views of interested parties

Examples of methods to identify the views of interested parties:

- surveys and questionnaires;
- employee suggestions;
- meetings and workshops;
- citizen advisory groups and public meetings;
- interviews;
- review of public statements, internal programmes and initiatives of interested parties;
- market research;
- regulatory tracking and trending;
- voluntary guidelines and standards;
- electronic information exchange;
- participation in industry and public interest groups;
- direct communications with neighbours, regulatory bodies, customers and suppliers;
- 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

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

- consistent with the organization's stated environmental policy;
- appropriate to the management efforts of the organization, its operational performance, or the condition of the environment;
- useful for measuring performance against the organization's environmental performance criteria;
- relevant and understandable to internal and external interested parties;
- obtainable in a cost-effective and timely manner;
- adequate for their intended use based on the type, quality and quantity of the data;
- representative of the organization's environmental performance;
- measurable in units appropriate to the environmental performance;
- responsive and sensitive to changes in the organization's environmental performance;
- able to provide information on current or future trends in environmental performance.

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 amount of money 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 may 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. The following are examples of different risk-based approaches.

A.3.2.2.2 Probabilistic risk-based approach

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 cause an explosion or the release of contaminants to the environment. A possible MPI: hours of process-safety training conducted for workers involved with the identified specific process.

A.3.2.2.3 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: quantity of the specific material emitted from the organization's operations.

A.3.2.2.4 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:

- cost of the most expensive material used by the organization's operations;
- quantity of this same material consumed by the organization's operations;
- cost for reclamation and reuse of this same material from waste;
- percentage of this same material in a specified quantity of waste.

A.3.2.2.5 Sustainability 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: 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.

EXAMPLE 1 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.

EXAMPLE 2 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.

EXAMPLE 3 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.

EXAMPLE 4 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:

- percentage of a product's parts that can be recycled or reused;
- percentage of a product's parts that cannot be recycled or reused;
- 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: 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 [e.g. Responsible Care®, the Sustainable Forestry Initiative℠, 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 below are for illustrative purposes only. The groupings, lists and examples below are not complete or comprehensive, and should not be construed as necessary nor even appropriate for every organization. Organizations, and their policies, objectives and structures, vary greatly. Each organization should select indicators for EPE that it recognizes as important to achieve its environmental performance criteria.

Most of the examples presented below 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 may find 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 unit of 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, and the organization's environmental performance criteria, 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 the management efforts of an organization.

A.4.2.2 Examples of MPIs

A.4.2.2.1 Implementation of policies and programmes

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

- number of achieved objectives and targets;
- number of organizational units achieving environmental objectives and targets;
- degree of implementation of specified codes of management or operating practice;
- number of prevention of pollution initiatives implemented;
- number of levels of management with specific environmental responsibilities;
- number of employees that have environmental requirements in their job descriptions;
- number of employees participating in environmental programmes (e.g. suggestion, recycle, clean-up initiatives or others);
- number of employees who have obtained reward and recognition in comparison to the total number of employees who participated in the programme;
- number of employees trained versus the number that need training;
- number of contracted individuals trained;
- levels of knowledge obtained by training participants;
- number of environmental improvement suggestions from employees;
- results of employee surveys on their knowledge of the organization's environmental issues;
- number of suppliers and contractors queried about environmental issues;
- number of contracted service providers with an implemented or certified environmental management system;
- number of products with explicit "product stewardship" plans;
- number of products designed for disassembly, recycling or reuse;
- number of products with instructions regarding environmentally safe use and disposal.

A.4.2.2.2 Conformance

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

- degree of compliance with regulations;
- degree of conformance of service providers with requirements and expectations specified by the organization in contracts;
- time to respond to or correct environmental incidents;
- number of identified corrective actions that have been resolved or that are unresolved;
- number of or costs attributable to fines and penalties;
- number and frequency of specific activities (e.g. audits);
- number of audits completed versus planned;
- number of audit findings per period;
- frequency of review of operating procedures;
- number of emergency drills conducted;
- percentage of emergency preparedness and response drills demonstrating planned readiness.

A.4.2.2.3 Financial performance

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

- costs (operational and capital) that are associated with a product's or process' environmental aspects;
- return on investment for environmental improvement projects;
- savings achieved through reductions in resource usage, prevention of pollution or waste recycling;
- sales revenue attributable to a new product or a by-product designed to meet environmental performance or design objectives;
- research and development funds applied to projects with environmental significance;
- environmental liabilities that may have a material impact on the financial status of the organization.

A.4.2.2.4 Community relations

If management's interest is in evaluating its programmes in local communities with respect to environmental issues, possible MPIs include:

- number of inquiries or comments about environmentally related matters;
- number of press reports on the organization's environmental performance;
- number of environmental educational programmes or materials provided for the community;
- resources applied to support of community environmental programmes;
- number of sites with environmental reports;
- number of sites with wildlife programmes;

- progress on local remediation activities;
- number of local cleanup or recycling initiatives, sponsored or self-implemented;
- favourability ratings from community surveys.

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 as the supply to and delivery from them. Figure A.1 illustrates this approach.

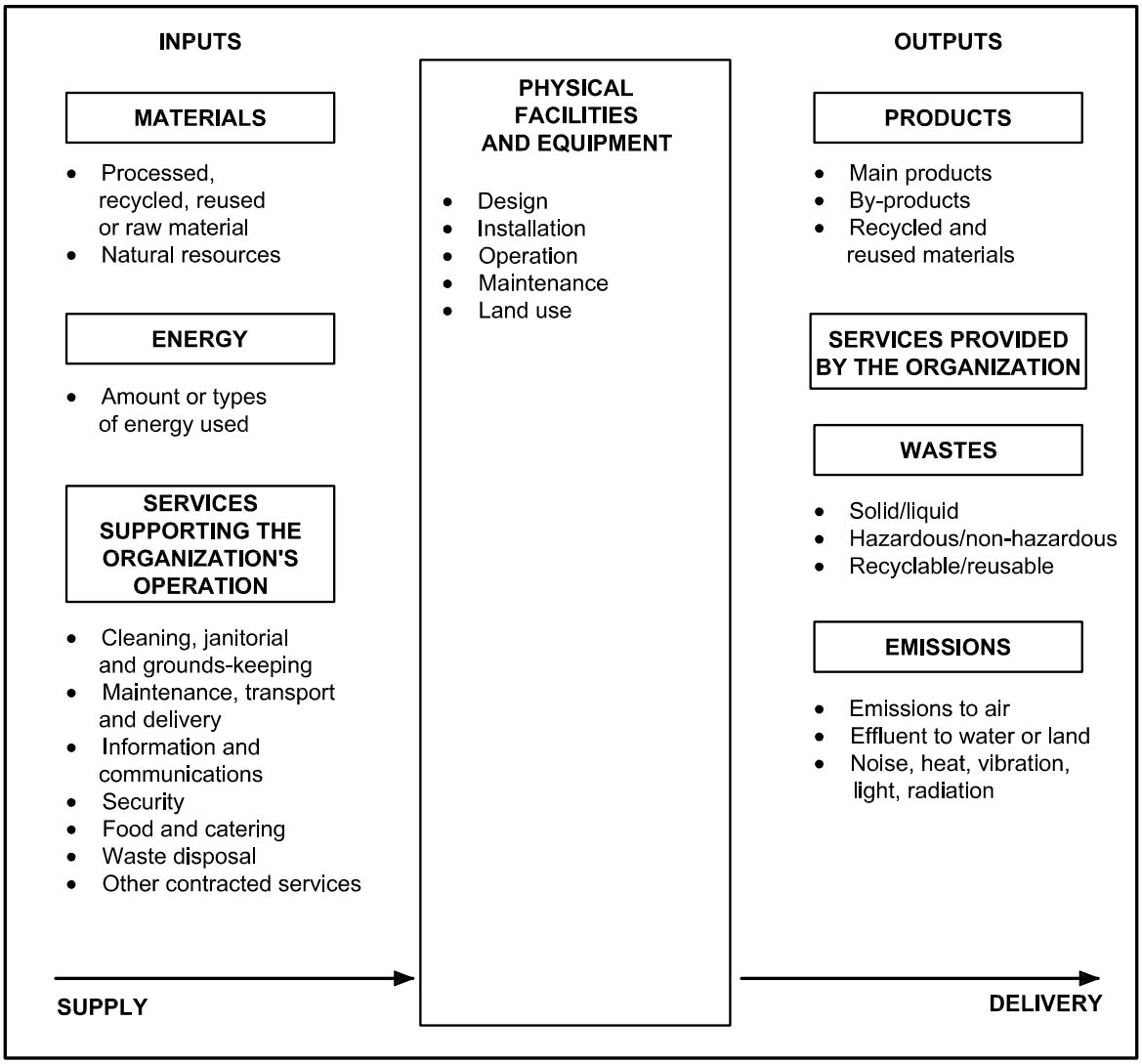


Figure A.1 — The organization's operations (with additional detail)

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:

- quantity of materials used per unit of product;
- quantity of processed, recycled or reused materials used;
- quantity of packaging materials discarded or reused per unit of product;
- quantity of auxiliary materials recycled or reused;
- quantity of raw materials reused in the production process;
- quantity of water per unit of product;
- quantity of water reused;
- quantity of hazardous 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:

- quantity of energy used per year or per unit of product;
- quantity of energy used per service or customer;
- quantity of each type of energy used;
- quantity of energy generated with by-products or process streams;
- quantity of 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:

- amount of hazardous materials used by contracted service providers;
- amount of cleaning agents used by contracted service providers;
- amount of recyclable and reusable materials used by contracted service providers;
- amount or 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:

- number of pieces of equipment with parts designed for easy disassembly, recycling and reuse;
- number of hours per year a specific piece of equipment is in operation;
- number of emergency events (e.g. explosions) or non-routine operations (e.g. shut-downs) per year;

- total land area used for production purposes;
- land area used to produce a unit of energy;
- average fuel consumption of vehicle fleet;
- number of vehicles in fleet with pollution-abatement technology;
- number of hours of preventive maintenance to equipment per year.

A.4.3.2.5 Supply and delivery

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

- average fuel consumption of vehicle fleet;
- number of freight deliveries by mode of transportation per day;
- number of vehicles in fleet with pollution-abatement technology;
- number of business trips saved through other means of communication;
- number of business trips by mode of transportation.

A.4.3.2.6 Products

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

- number of products introduced in the market with reduced hazardous properties;
- number of products which can be reused or recycled;
- percentage of a product's content that can be reused or recycled;
- rate of defective products;
- number of units of by-products generated per unit of product;
- number of units of energy consumed during use of product;
- duration of product use;
- number of products with instructions regarding environmentally safe use and disposal.

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:

- amount of cleaning agent used per square metre (for a cleaning services organization);
- amount of fuel consumption (for an organization whose service is transportation);
- quantity of licenses sold for improved processes (for a technology licensing organization);
- number of environmentally-related credit risk incidents or insolvencies (for a financial services organization);
- quantity of materials used during after-sales servicing of products.

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:

- quantity of waste per year or per unit of product;
- quantity of hazardous, recyclable or reusable waste produced per year;
- total waste for disposal;
- quantity of waste stored on site;
- quantity of waste controlled by permits;
- quantity of waste converted to reusable material per year;
- quantity of hazardous waste eliminated due to material substitution.

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:

- quantity of specific emissions per year;
- quantity of specific emissions per unit of product;
- quantity of waste energy released to air;
- quantity of air emissions having ozone-depletion potential;
- quantity of 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:

- quantity of specific material discharged per year;
- quantity of specific material discharged to water per unit of product;
- quantity of waste energy released to water;
- quantity of material sent to landfill per unit of product;
- quantity of effluent per service or customer.

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

- noise measured at a certain location;
- quantity of radiation released;
- amount of heat, vibration or light emitted.

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, development of environmental standards and regulations, or communication to the public, these agencies, organizations and institutions may collect data and information on:

- the properties and quality of major bodies of water;
- regional air quality;
- endangered species;
- resource quantities or quality;
- ocean temperatures;
- concentration of contaminants in tissue of living organisms;
- ozone depletion;
- global climate change;
- and many other parameters.

Some of this information may be in the form of ECIs which could be useful to an organization in managing 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 ECIs

A.4.4.2.1 Regional, national or global ECIs

If management's interest is the organization's contribution to the regional, national or global condition of the environment, 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 thickness of the ozone layer, average global temperature, and the size of fish population in oceans.

A.4.4.2.2 Local or regional ECIs

Examples of areas for which ECIs can be developed are air; water; land; flora; fauna; humans; and aesthetics, heritage and culture.

a) **Air**

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

- concentration of a specific contaminant in ambient air at selected monitoring locations;
- ambient temperature at locations within a specific distance of the organization's facility;

- opacity levels upwind and downwind of the organization's facility;
- frequency of photochemical smog events in a defined local area;
- weighted average noise levels at the perimeter of the organization's facility;
- odour measured at a specific distance from the organization's facility.

EXAMPLE

a) A specific situation

An organization located in a remote non-industrial area may wish to monitor odours in an adjacent residential area as an indicator of its success in controlling air emissions.

b) A possible related ECI

Odour measured at a specific distance from the organization's facility.

b) **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:

- concentration of a specific contaminant in groundwater or surface water;
- turbidity measured in a stream adjacent to its facility upstream and downstream of a wastewater discharge point;
- dissolved oxygen in receiving waters;
- water temperature in a surface water body adjacent to the organization's facility;
- change in groundwater level;
- number of coliform bacteria per litre of water.

EXAMPLE

a) A specific situation

A local government that manages a sewage treatment plant may wish to monitor coliform bacteria upstream and downstream of its sewage discharge to determine whether there is a health risk requiring action.

b) A possible related ECI

Number of coliform bacteria per litre of water.

c) **Land**

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

- concentration of a specific contaminant in surface soils at selected locations in the area surrounding the organization's facility;
- concentration of selected nutrients in soils adjacent to the organization's facility;
- area rehabilitated in a defined local area;
- area dedicated to landfill, tourism or wetlands in a defined local area;
- paved and non-fertile area in a defined local area;

- protected areas in a defined local area;
- measure of the erosion of topsoil from a defined local area.

EXAMPLE

a) A specific situation

An organization may be concerned about the loss of soil from its land.

b) A possible related ECI

Measure of the erosion of topsoil from a defined local area.

d) **Flora**

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

- concentration of a specific contaminant in tissue of a specific plant species found in the local or regional area;
- crop yield over time from fields in the surrounding area;
- population of a particular plant species within a defined distance of the organization's facility;
- number of total flora species in a defined local area;
- number and variety of crop species in a defined local area;
- specific measures of the quality of habitat for specific species in the local area;
- specific measure of the quantity of vegetation in a defined local area;
- specific measure of the quality of vegetation in a defined local area.

EXAMPLE

a) A specific situation

An organization whose air emissions include fluoride may conduct vegetation surveys in the vicinity of its facility to monitor improvements in air emissions control.

b) A possible related ECI

Specific measure of the quality of vegetation in a defined local area.

e) **Fauna**

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

- concentration of a specific contaminant in tissue of a specific animal species found in the local or regional area;
- population of a particular animal species within a defined distance of the organization's facility;
- specific measures of the quality of habitat for specific species in the local area;
- number of total fauna species in a defined local area.

EXAMPLE

a) A specific situation

A land management company may wish to evaluate the relationship between its operations and biodiversity within its region of influence.

b) A possible related ECI

Number of total fauna species in a defined local area.

f) **Humans**

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

- longevity data for specific populations;
- incidence of specific diseases, particularly among sensitive populations, from epidemiology studies in the local or regional area;
- rate of population growth in the local or regional area;
- population density in the local or regional area;
- levels of lead in blood of the local population.

EXAMPLE

a) A specific situation

An organization that uses lead in its products may wish to monitor the relationship of lead released in its emissions with the local population.

b) A possible related ECI

Levels of lead in blood of the local population.

g) **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:

- measure of the condition of sensitive structures;
- measure of the condition of places considered sacred in the vicinity of the organization’s facility;
- measure of the surface integrity of historical buildings in the local area.

EXAMPLE

a) A specific situation

An organization may be concerned about the effect of its air emissions on historical buildings in the local area.

b) A possible related ECI

Measure of the surface integrity of historical buildings in the local area.

Bibliography

[1] ISO 14001:1996, *Environmental management systems — Specification with guidance for use*.

[2] ISO 14004:1996, *Environmental management systems — General guidelines on principles, systems and supporting techniques*.

[3] ISO 14010:1996, *Guidelines for environmental auditing — General principles*.

[4] ISO 14011:1996, *Guidelines for environmental auditing — Audit procedures — Auditing of environmental management systems*.

[5] ISO/TR 14032:—[1)], *Environmental management — Examples of environmental performance evaluation (EPE)*.

[6] ISO 14040:1997, *Environmental management — Life cycle assessment — Principles and framework*.

[7] ISO 14041:1998, *Environmental management — Life cycle assessment — Goal and scope definition and inventory analysis*.

[8] ISO 14042:—[1)], *Environmental management — Life cycle assessment — Life cycle impact assessment*.

[9] ISO 14043:—[1)], *Environmental management — Life cycle assessment — Life cycle interpretation*.

[10] ISO 14050:1998, *Environmental management — Vocabulary*.

1) To be published.