MALAYSIAN STANDARD

MS ISO 14004:2017

Environmental management systems - General guidelines on implementation (Second revision) (ISO 14004:2016, IDT)

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Committee representation

The Industry Standards Committee on Environmental Management (ISC Z) under whose authority this Malaysian Standard was adopted, comprises representatives from the following organisations:

Association of Consulting Engineers Malaysia
Association of Environmental Consultants and Companies of Malaysia
Centre for Environment Technology and Development Malaysia
Department of Environment
Department of Standards Malaysia
Environmental Management and Research Association of Malaysia
Federation of Malaysian Manufacturers
Malaysian Industry-Government Group for High Technology
Malaysian Institute of Chemistry
Malaysian International Chamber of Commerce and Industry
Malaysian Palm Oil Board
Malaysian Palm Oil Council
Malaysian Plastics Manufacturers Association
Malaysian Rubber Board
Malaysian Rubber Glove Manufacturer's Association
Malaysian Textile Manufacturers Association
Ministry of Domestic Trade, Co-operatives and Consumerism
Ministry of Energy, Green Technology and Water
Ministry of Natural Resources and Environment
Ministry of Plantation Industries and Commodities
Ministry of Science, Technology and Innovation
SIRIM Berhad
SIRIM Berhad (Secretariat)
The Electrical and Electronics Association of Malaysia
The Institution of Engineers, Malaysia
Universiti Malaya
Universiti Putra Malaysia

The Technical Committee on Environmental Management Systems and Environmental Auditing and Related Environmental Investigations which recommended the adoption of the ISO Standard as Malaysian Standard consists of representatives from the following organisations:

Business Council for Sustainability and Responsibility Malaysia
Environmental Management and Research Association of Malaysia
Federation of Malaysian Manufacturers
Felda Global Ventures Holdings Berhad
Forest Research Institute Malaysia
Malaysian International Chamber of Commerce and Industry
Malaysian Palm Oil Board
Malaysian Timber Council
Ministry of Natural Resources and Environment
Sime Darby Plantation Sdn Bhd
SIRIM Berhad (Environmental Technology Research Centre)
SIRIM Berhad (Secretariat)
SIRIM QAS International Sdn Bhd

Co-opted members:

Centre for Environment Technology and Development Malaysia
Institute of Quality Malaysia
Malaysian Wood Industries Association

National foreword

The adoption of the ISO Standard as a Malaysian Standard was recommended by the Technical Committee on Environmental Management Systems and Environmental Auditing and Related Environmental Investigations under the authority of the Industry Standards Committee on Environmental Management.

This Malaysian Standard is identical with ISO 14004:2016, *Environmental management systems - General guidelines on implementation*, published by the International Organization for Standardization (ISO). However, for the purposes of this Malaysian Standard, the following apply:

a) in the source text, "this International Standard" should read "this Malaysian Standard"; and

b) the comma which is used as a decimal sign (if any), to read as a point.

This Malaysian Standard cancels and replaces MS ISO 14004:2004, *Environmental management systems - General guidelines on principles, systems and support techniques (First revision)*.

Compliance with a Malaysian Standard does not of itself confer immunity from legal obligations.

NOTE. IDT on the front cover indicates an identical standard i.e. a standard where the technical content, structure, and wording (or is an identical translation) of a Malaysian Standard is exactly the same as in an International Standard or is identical in technical content and structure although it may contain the minimal editorial changes specified in clause 4.2 of ISO/IEC Guide 21-1.

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is Technical Committee ISO/TC 207, *Environmental management*, Subcommittee SC 1, *Environmental management systems*.

This third edition cancels and replaces the second edition (ISO 14004:2004), which has been technically revised.

Introduction

Achieving a balance between the environment, society and the economy is considered essential to meet the needs of the present without compromising the ability of future generations to meet their needs. Sustainable development is a goal achieved by balancing the three pillars of sustainability: the environment, society and the economy.

Organizations, whether public or private, large or small, in developed or in emerging economies, have an impact on the environment and can be affected by the environment in return. There is a growing understanding that human development and well-being are contingent on preserving and conserving our natural resources, upon which all human activity and productivity depend. Achieving sound environmental performance requires organizational commitment to a systematic approach and to continual improvement of an environmental management system.

Societal expectations are driving the need for improved management of the resources necessary to support human development, through greater efficiency, transparency and accountability for all organizations. There are growing pressures on the environment, from climate change, over-consumption of resources and the challenges created by degradation of ecosystems and the loss of biodiversity.

The aim of this International Standard is to provide organizations with guidance for a common framework, in order to establish, implement, maintain and continually improve a system to support better environmental management. This environmental management framework should contribute to the long-term success of the organization and to the overall goal of sustainable development. The framework of a robust, credible and reliable environmental management system is shown in Figure 1. It includes:

— understanding the context in which the organization operates;

— determining and understanding the relevant needs and expectations of interested parties, as they relate to the environmental management system of the organization;

— establishing and implementing an environmental policy and environmental objectives;

— top management taking a leading role in improving environmental performance;

— identifying aspects of the organization's activities, products and services that can result in significant environmental impacts;

— identifying the environmental conditions, including events, that can affect the organization;

— considering the organization's risks and opportunities that need to be addressed in relation to its:

  — environmental aspects;

  — compliance obligations;

  — other issues (see 4.1) and requirements (see 4.2);

— increasing awareness of the organization's interaction with the environment;

— establishing operational controls, as appropriate, to manage the organization's significant environmental aspects and compliance obligations, and risks and opportunities that need to be addressed;

— evaluating environmental performance and taking actions, as necessary, for its improvement.

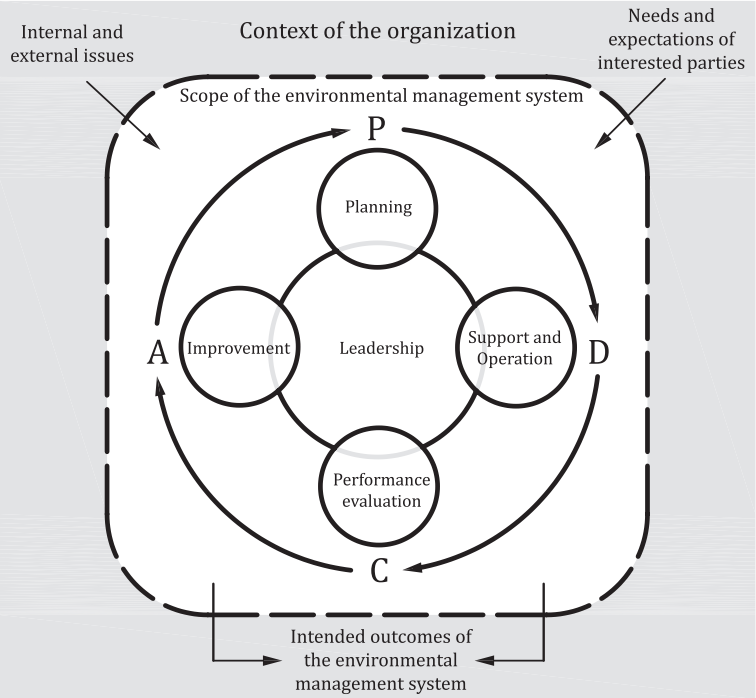

Figure 1 — Environmental management system model for this International Standard

The outcomes of a systematic approach to environmental management can provide top management with quantitative and qualitative data that enables informed business decisions that build long-term success and create options for contributing to sustainable development. The success of the environmental management system depends on commitment from all levels and functions of the organization, led by top management. The opportunities include:

— protecting the environment, including the prevention or reduction of adverse environmental impacts;

— controlling or influencing the way products and services are designed, manufactured, distributed, used and disposed;

— using a life cycle perspective to prevent environmental impacts from being unintentionally shifted elsewhere within the cycle;

— achieving financial and operational benefits that can result from implementing environmentally sound alternatives which strengthen the organization's market position;

— communicating environmental information to relevant interested parties.

In addition to enhanced environmental performance, the potential benefits associated with an effective environmental management system include:

— assuring customers of the organization's commitment to demonstrable environmental management;

— maintaining good public and community relations;

— satisfying investor criteria and improving access to capital;

— enhancing image and market share;

— improving cost control;

— preventing incidents that result in liability;

conserving input materials and energy;

— designing more environmental friendly products;

— facilitating the attainment of permits and authorizations and meeting their requirements;

— promoting environmental awareness among external providers and all persons doing work under the organization's control;

— improving relations between industry and government.

It is possible for an organization to operate an integrated management system that can align with requirements from quality, occupational health and safety and environmental management systems, for example. This approach provides opportunities to reduce duplication and builds in efficiencies.

Examples and approaches are presented throughout this International Standard for illustrative purposes. They are not intended to represent the only possibilities, nor are they necessarily suitable for every organization. In designing and implementing, or improving an environmental management system, organizations should select approaches that are appropriate to their own circumstances. Practical Help Boxes are intended to provide additional information to support the guidance contained within this International Standard.

Environmental management systems — General guidelines on implementation

1 Scope

This International Standard provides guidance for an organization on the establishment, implementation, maintenance and improvement of a robust, credible and reliable environmental management system. The guidance provided is intended for an organization seeking to manage its environmental responsibilities in a systematic manner that contributes to the environmental pillar of sustainability.

This International Standard helps an organization achieve the intended outcomes of its environmental management system, which provides value for the environment, the organization itself and interested parties. Consistent with the organization's environmental policy, the intended outcomes of an environmental management system include:

— enhancement of environmental performance;

— fulfilment of compliance obligations;

— achievement of environmental objectives.

The guidance in this International Standard can help an organization to enhance its environmental performance, and enables the elements of the environmental management system to be integrated into its core business process.

NOTE While the environmental management system is not intended to manage occupational health and safety issues, these can be included when an organization seeks to implement an integrated environmental and occupational health and safety management system.

This International Standard is applicable to any organization, regardless of size, type and nature, and applies to the environmental aspects of its activities, products and services that the organization determines it can either control or influence, considering a life cycle perspective.

The guidance in this International Standard can be used in whole or in part to systematically improve environmental management. It serves to provide additional explanation of the concepts and requirements.

While the guidance in this International Standard is consistent with the ISO 14001 environmental management system model, it is not intended to provide interpretations of the requirements of ISO 14001.

2 Normative references

There are no normative references.

3 Terms and definitions

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

3.1 Terms related to organization and leadership

3.1.1
management system
set of interrelated or interacting elements of an *organization* (3.1.4) to establish policies and *objectives* (3.2.5) and *processes* (3.3.5) to achieve those objectives

Note 1 to entry: A management system can address a single discipline or several disciplines (e.g. quality, environment, occupational health and safety, energy, financial management).

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

Note 3 to entry: The scope of a management system can include the whole of the organization, specific and identified functions of the organization, specific and identified sections of the organization, or one or more functions across a group of organizations.

3.1.2
environmental management system
part of the *management system* (3.1.1) used to manage *environmental aspects* (3.2.2), fulfil *compliance obligations* (3.2.9), and address *risks and opportunities* (3.2.11)

3.1.3
environmental policy
intentions and direction of an *organization* (3.1.4) related to *environmental performance* (3.4.11), as formally expressed by its *top management* (3.1.5)

3.1.4
organization
person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its *objectives* (3.2.5)

Note 1 to entry: 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.

3.1.5
top management
person or group of people who directs and controls an *organization* (3.1.4) at the highest level

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

Note 2 to entry: If the scope of the *management system* (3.1.1) covers only part of an organization, then top management refers to those who direct and control that part of the organization.

3.1.6
interested party
person or *organization* (3.1.4) that can affect, be affected by, or perceive itself to be affected by a decision or activity

EXAMPLE Customers, communities, suppliers, regulators, non-governmental organizations, investors and employees.

Note 1 to entry: To "perceive itself to be affected" means the perception has been made known to the organization.

3.2 Terms related to planning

3.2.1
environment
surroundings in which an *organization* (3.1.4) operates, including air, water, land, natural resources, flora, fauna, humans and their interrelationships

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

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

3.2.2
environmental aspect
element of an *organization's* (3.1.4) activities or products or services that interacts or can interact with the *environment* (3.2.1)

Note 1 to entry: An environmental aspect can cause (an) *environmental impact(s)* (3.2.4). A significant environmental aspect is one that has or can have one or more significant environmental impact(s).

Note 2 to entry: Significant environmental aspects are determined by the organization applying one or more criteria.

3.2.3
environmental condition
state or characteristic of the *environment* (3.2.1) as determined at a certain point in time

3.2.4
environmental impact
change to the *environment* (3.2.1), whether adverse or beneficial, wholly or partially resulting from an *organization's* (3.1.4) *environmental aspects* (3.2.2)

3.2.5
objective
result to be achieved

Note 1 to entry: An objective can be strategic, tactical, or operational.

Note 2 to entry: 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, service and *process* (3.3.5)).

Note 3 to entry: An objective can be expressed in other ways, e.g. as an intended outcome, a purpose, an operational criterion, as an *environmental objective* (3.2.6), or by the use of other words with similar meaning (e.g. aim, goal, or target).

3.2.6
environmental objective
objective (3.2.5) set by the *organization* (3.1.4) consistent with its *environmental policy* (3.1.3)

3.2.7
prevention of pollution
use of *processes* (3.3.5), practices, techniques, materials, products, services 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* (3.2.4)

Note 1 to entry: Prevention of pollution can include source reduction or elimination; process, product or service changes; efficient use of resources; material and energy substitution; reuse; recovery; recycling, reclamation; or treatment.

3.2.8
requirement
need or expectation that is stated, generally implied or obligatory

Note 1 to entry: "Generally implied" means that it is custom or common practice for the *organization* (3.1.4) and *interested parties* (3.1.6) that the need or expectation under consideration is implied.

Note 2 to entry: A specified requirement is one that is stated, for example in *documented information* (3.3.2).

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

3.2.9
compliance obligations (preferred term)
legal requirements and other requirements (admitted term)
legal *requirements* (3.2.8) that an *organization* (3.1.4) has to comply with and other requirements that an organization has to or chooses to comply with

Note 1 to entry: Compliance obligations are related to the *environmental management system* (3.1.2).

Note 2 to entry: 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.

3.2.10
risk
effect of uncertainty

Note 1 to entry: An effect is a deviation from the expected — positive or negative.

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

Note 3 to entry: Risk is often characterized by reference to potential *"events"* (as defined in ISO Guide 73:2009, 3.5.1.3) and *"consequences"* (as defined in ISO Guide 73:2009, 3.6.1.3), or a combination of these.

Note 4 to entry: Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated *"likelihood"* (as defined in ISO Guide 73:2009, 3.6.1.1) of occurrence.

3.2.11
risks and opportunities
potential adverse effects (threats) and potential beneficial effects (opportunities)

3.3 Terms related to support and operation

3.3.1
competence
ability to apply knowledge and skills to achieve intended results

3.3.2
documented information
information required to be controlled and maintained by an *organization* (3.1.4) and the medium on which it is contained

Note 1 to entry: Documented information can be in any format and media, and from any source.

Note 2 to entry: Documented information can refer to:

— the *environmental management system* (3.1.2), including related *processes* (3.3.5);

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

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

3.3.3
life cycle
consecutive and interlinked stages of a product (or service) system, from raw material acquisition or generation from natural resources to final disposal

Note 1 to entry: The life cycle stages include acquisition of raw materials, design, production, transportation/ delivery, use, end-of-life treatment and final disposal.

[SOURCE: ISO 14044:2006, 3.1, modified — The words "(or service)" have been added to the definition and Note 1 to entry has been added.]

3.3.4
outsource (verb)
make an arrangement where an external *organization* (3.1.4) performs part of an organization's function or *process* (3.3.5)

Note 1 to entry: An external organization is outside the scope of the *management system* (3.1.1), although the outsourced function or process is within the scope.

3.3.5
process
set of interrelated or interacting activities which transforms inputs into outputs

Note 1 to entry: A process can be documented or not.

3.4 Terms related to performance evaluation and improvement

3.4.1
audit
systematic, independent and documented *process* (3.3.5) for obtaining audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled

Note 1 to entry: An internal audit is conducted by the *organization* (3.1.4) itself, or by an external party on its behalf.

Note 2 to entry: An audit can be a combined audit (combining two or more disciplines).

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

Note 4 to entry: "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* (3.2.8) used as a reference against which audit evidence is compared, as defined in ISO 19011:2011, 3.3 and 3.2 respectively.

3.4.2
conformity
fulfilment of a *requirement* (3.2.8)

3.4.3
nonconformity
non-fulfilment of a *requirement* (3.2.8)

Note 1 to entry: Nonconformity relates to requirements in ISO 14001:2015 and additional *environmental management system* (3.1.2) requirements that an *organization* (3.1.4) establishes for itself.

3.4.4
corrective action
action to eliminate the cause of a *nonconformity* (3.4.3) and to prevent recurrence

Note 1 to entry: There can be more than one cause for a nonconformity.

3.4.5
continual improvement
recurring activity to enhance *performance* (3.4.10)

Note 1 to entry: Enhancing performance relates to the use of the *environmental management system* (3.1.2) to enhance *environmental performance* (3.4.11) consistent with the *organization's* (3.1.4) *environmental policy* (3.1.3).

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

3.4.6
effectiveness
extent to which planned activities are realized and planned results achieved

3.4.7
indicator
measurable representation of the condition or status of operations, management or conditions

[SOURCE: ISO 14031:2013, 3.15]

3.4.8
monitoring
determining the status of a system, a *process* (3.3.5) or an activity

Note 1 to entry: To determine the status, there might be a need to check, supervise or critically observe.

3.4.9
measurement
process (3.3.5) to determine a value

3.4.10
performance
measurable result

Note 1 to entry: Performance can relate either to quantitative or qualitative findings.

Note 2 to entry: Performance can relate to the management of activities, *processes* (3.3.5), products (including services), systems or *organizations* (3.1.4).

3.4.11
environmental performance
performance (3.4.10) related to the management of *environmental aspects* (3.2.2)

Note 1 to entry: For an *environmental management system* (3.1.2), results can be measured against the *organization's* (3.1.4) *environmental policy* (3.1.3), *environmental objectives* (3.2.6) or other criteria, using *indicators* (3.4.7).

4 Context of the organization

4.1 Understanding the organization and its context

In order for an organization to establish, implement, maintain and continually improve an environmental management system, it should determine the context within which it operates. The context includes the external and internal issues, including environmental conditions, relevant to its purpose and that affect its ability to achieve the intended outcomes of the environmental management system. The organization's purpose is reflected in its vision and mission.

The term "intended outcome" means what the organization intends to achieve by implementing its environmental management system. Intended outcomes include enhancement of environmental performance, fulfilment of compliance obligations and achievement of environmental objectives. These are the minimal, core outcomes. However, the organization can set additional intended outcomes, such

as going beyond the environmental management system requirements. For example, the organization can benefit from adopting social and environmental principles to support a broader sustainability initiative.

Understanding the context is important, as organizations do not operate in isolation but are influenced by external and internal issues, such as the availability of resources and the involvement of their employees. The context of the organization can include the organization's complexity, structure, activities and geographical locations of its functional units for the entire organization, as well as at a local level.

The context of the organization includes the natural environment in which it operates. The natural environment can create conditions and events, which affect the organization's activities, products and services. Conditions can be existing or subject to gradual change, whereas an event can involve a sudden change, which is typically explained by an extreme situation. Preparing for, and managing the consequences of, such conditions and events supports business continuity.

Issues are important topics for the organization, problems for debate and discussion, or changing circumstances that affect the organization's ability to achieve the intended outcomes it sets for its environmental management system.

To understand which issues are important, the organization can consider those that:

— are key drivers and trends, for example, in relation to environmental conditions or interested party concerns;

— can present problems for the environment or the organization;

— can be leveraged for beneficial effect, including innovation leading to improved environmental performance;

— offer competitive advantage, including cost reduction, value for customers, or improvement of the organization's reputation and image.

An organization implementing or improving its environmental management system or integrating its environmental management system within its existing business processes should review its context in order to gain knowledge of the relevant issues that can affect the environmental management system. This review can benefit from taking a life cycle perspective and cross-functional involvement, including procurement, finance, human resources, engineering, design and sales and marketing. The review can include the following key areas:

a) identification of the relevant external and internal issues, including environmental conditions, and events, which relate to the organization's activities, products and services;

b) consideration of how these issues can affect the organization's purpose and ability to achieve the intended outcomes of its environmental management system;

c) understanding of how a) and b) can be addressed in planning (see 6.1.1);

d) identification of opportunities to improve its environmental performance (see 10.3).

A life cycle perspective involves consideration of the control and influence the organization has over the stages of its product and service life cycle. This approach enables the organization to identify those areas where, considering its scope, it can minimize its impact on the environment while adding value to the organization.

Practical Help Boxes 1 to 3 provide examples of considerations for determining external issues, environmental conditions, including events, and internal issues.

Practical Help Box 1 — External issues

Considerations can include:

— political: type of political system in place, e.g. democracy, dictatorship, level of political interference in business development, and willingness of politicians to exercise power effectively;

— economic: availability of utilities, such as fuel, gas and water, infrastructure and transportation, including housing, road, rail, sea and airports;

— financial: recognized financial system, and availability and access to financial resources;

— competition: other local organizations with a similar purpose and concepts that can be adopted to maintain a competitive position when necessary, such as sustainability, eco-design and eco-labelling;

— supply chain management: supplier availability, capacity and capability, level of technology and customer requirements;

— social: ethnic values, gender issues, bribery and corruption, availability of workforce, access to education and medical facilities, level of workforce education and levels of criminal activity;

— cultural: indigenous burial or sacred sites, heritage buildings/property, availability of specific resources, such as herbal/medicinal plants, craft materials, food used in a cultural context for ceremonial purposes, religious system and aesthetic values;

— market and public demand: current and future market trends for products and services, including those that are energy and resource efficient;

— technological: availability and access to technology relevant to the organization;

— legislative: the legislative framework within which the organization operates;

NOTE Legislative framework includes statutory, regulatory and other forms of legal requirements.

— natural: current and future climatic and other conditions, physical conditions, biodiversity, rare and endangered species, ecosystems, resource availability, including quantity, quality and access, renewable and non-renewable energy, and the specific environmental sector/industry profile.

External sources of information that can contribute to the organization's knowledge of external issues can include:

— customers, suppliers and partners;

— business councils;

— sector organizations;

— chambers of commerce;

— government bodies;

— international agencies;

— consultants;

— academic research;

— local news media;

— local community groups.

Practical Help Box 2 — Environmental conditions, including events

An environmental condition that can affect the organization's activities, products and services can include, for example, a climatic temperature change that can prevent the organization from growing particular types of agricultural products.

An example of an environmental event could be flooding as a result of extreme weather, which can affect the organization's activities, such as storage of hazardous substances, in order to prevent pollution.

Consideration of some of the following sources of information can assist the organization to identify its environmental conditions, including events:

a) meteorological, geological, hydrological and ecological information;

b) historical disaster information related to the organization's location;

c) reports from previous audits, assessments, or reviews, such as initial environmental reviews or life cycle assessments, when available;

d) environmental monitoring data;

e) environmental permit or licence applications;

f) reports on emergency situations and incidents with environmental consequences.

Practical Help Box 3 — Internal issues

Considerations can include:

— organizational governance and structure: national and contractual governance frameworks, including registration and reporting; type of structure, including hierarchical, matrix, flat, project based; joint ventures and contracted services; and parent company relationships, roles and responsibilities and authorities;

— legal compliance: status and trends;

— policies, objectives and strategies: purpose, vision, business, other objectives and strategies and resources that are needed to achieve them;

— capacity and capability: organizational capacity, capability and knowledge in terms of resources and competence (e.g. capital, time, people, language, processes, systems and technologies, and their maintenance);

— information systems: information flows and decision-making processes (both formal and informal) and the time taken for their completion;

— relationships with, and perceptions and values of, internal interested parties;

— management systems and standards: strengths and weaknesses of existing management system(s) of the organization, and guidelines and models adopted by the organization, such as those for accounting and finance, quality, health and safety;

— organizational style and culture: family business, public or private company, management and leadership style, open or closed culture, and decision-making processes;

— contracts: form, content and extent of contractual relationships.

Methods that can be used to examine relevant internal factors include gathering information related to the current management system as considered above, including interviews with persons previously or currently working under the organization's control, and review of internal and external communications.

The process followed by an organization to develop an understanding of its context should result in knowledge that can be used by the organization to guide its efforts to plan, implement and operate its environmental management system. The process should be approached in a practical manner that adds value to the organization and yields a general, conceptual understanding of the most important issues. It can be useful to document and periodically update the process and its results as needed.

The results can be used to assist the organization in:

— setting the scope of its environmental management system;

— determining its risks and opportunities that need to be addressed;

— developing or enhancing its environmental policy;

establishing its environmental objectives;

— determining the effectiveness of its approach to fulfil its compliance obligations.

4.2 Understanding the needs and expectations of interested parties

4.2.1 General

Interested parties are also part of the context in which an organization operates and should be considered when the organization is reviewing its context. Determining interested parties and developing a relationship with them enables communication, which can lead to the potential for building mutual understanding, trust and respect. This relationship need not be formal.

The organization should determine its interested parties and their needs and expectations, related to their environmental management system. The organization can benefit from a process that identifies the relevant needs and expectations of relevant interested parties, in order to determine those that it has to comply with and those it chooses to comply with (i.e. its compliance obligations). The methods used and resources applied can vary depending on, for example, the size and nature of the organization, the finances available, the risks and opportunities that need to be addressed and the organization's experience with environmental management.

The organization is expected to gain a general (i.e. high-level, not detailed) understanding of the expressed needs and expectations of those internal and external interested parties that have been determined to be relevant, so that the knowledge gained can be considered when determining its compliance obligations.

4.2.2 Determining relevant interested parties

Interested parties can be internal or external to an organization. The organization should determine which interested parties are relevant to the organization's environmental management system. Interested parties can change over time and can depend on the sector or industry or the geographic location in which the organization operates. Changes in the internal or external issues that are part of the organization's context can also result in a change in interested parties.

4.2.3 Determining relevant needs and expectations of relevant interested parties

An organization should determine the relevant needs and expectations of its relevant interested parties as an input towards the design of the environmental management system. Examples of interested parties and their needs and expectations are provided in Practical Help Box 4. It is important to identify not only those that are obligatory and stated, but also those that are generally implied (i.e. expected as normal). Relevant interested parties, those that have been identified as having a role in the context, may have some needs that are not relevant to the organization's environmental management system and thus not all their needs are necessarily considered.

Practical Help Box 4 — Examples of interested parties and their needs and expectations

Relationship	Examples of interested parties	Examples of needs and expectations
By responsibility	Investors	Expect the organization to manage its risks and opportunities that can affect an investment
By influence	Non-governmental organizations (NGOs)	Need the organization's cooperation to achieve the NGO's environmental goals
By proximity	Neighbours, the community	Expect socially acceptable performance, honesty and integrity
By dependency	Employees	Expect to work in a safe and healthy environment
By representation	Industry membership organization	Need collaboration on environmental issues
By authority	Regulatory or statutory agencies	Expect demonstration of legal compliance

4.2.4 Determining compliance obligations

An organization should determine which of the relevant interested parties' needs and expectations it has to comply with, and then which of the remaining needs and expectations it chooses to adopt, which become its compliance obligations. This broad-level knowledge can contribute to an understanding of its compliance obligations as further detailed in 6.1.3.

There is no single approach to determining needs and expectations. The organization should use an approach that is appropriate to its scope, nature and scale, and is suitable in terms of detail, complexity, time, cost and availability of reliable data.

The organization can determine the needs and expectations of its relevant interested parties through other processes or for other purposes.

Where requirements are set by a regulatory body, the organization should gain knowledge of those broad areas of legislation that are applicable, such as air quality standards, discharge limits, waste disposal regulations, licensing requirements for operating the facility, etc.

In the case of voluntary commitments, the organization should gain broad knowledge of the relevant needs and expectations, such as customer requirements, voluntary codes and agreements with community groups or public authorities. This knowledge enables the organization to understand the implications these can have on the achievement of the intended outcomes of its environmental management system.

4.2.5 Use and application of the needs and expectations of interested parties

The outputs from 4.2.1 to 4.2.4 can assist in setting the scope of the organization's environmental management system, establishing its environmental policy, determining its environmental aspects, compliance obligations and risks and opportunities that need to be addressed by the organization. These are considerations when establishing its environmental performance objectives. The organization can find it useful to document this information to facilitate its use to meet other elements in this International Standard.

4.3 Determining the scope of the environmental management system

An organization should determine the boundaries and applicability of the environmental management system in order to establish its scope. The scope is specific to each organization. It is the responsibility of each organization to identify the inputs derived from an understanding of the internal and external issues determined in 4.1 and 4.2. The determination of the scope also includes the physical boundaries for one or more locations, and organizational sphere of control and influence, considering a life cycle perspective. The scope is intended to clarify the physical, functional and organizational boundaries to which the environmental management system applies.

The top management of the organization retains the freedom and flexibility to define the scope of the environmental management system. It may include the entire organization or specific operating units of the organization. The organization should understand the extent of control or influence that it can exert over activities, products and services. It is critical to the success of the environmental management system and to the credibility of the organization's reputation to ensure that the scope is not defined in a way that excludes activities, products, services or facilities that have or can have significant environmental aspects, or in a way that evades its compliance obligations, or misleads interested parties. An inappropriately narrow or exclusive scope could undermine the credibility of the environmental management system with its interested parties and reduce the organization's ability to achieve the intended outcomes of its environmental management system. The scope is a factual and representative statement of the organization's operations or business processes included within its environmental management system boundaries.

Where the scope is limited to a subset of a larger organization, top management generally refers to the top management of that part of the organization. However, top management at the higher level of the organization can retain responsibility for directing and supporting the environmental management

system. If the organization changes its sphere of control or influence, expands its operations, acquires more property, or divests business lines or property, the scope should be reconsidered, along with other changes likely to affect the environmental management system.

The organization should consider externally-provided activities, products and services when determining the scope of the environmental management system. Organizations can have control of externally provided activities, products and services, which have or can have significant environmental impacts through the organization's leadership, or organizations can have influence over them by contractual arrangement or other agreement.

The organization should maintain the scope as documented information and make it available to interested parties. There are several methods for doing so, e.g. using a written description, inclusion on a site map, an organizational diagram, a webpage, or posting a public statement of its conformity. When documenting its scope, the organization can consider using an approach that identifies the activities involved, the products and services that result, and their application and/or the location where they occur. Examples of using this approach to document the scope are:

— manufacturing machines and spare parts for combustion engines at site A (geographical boundary); or

— marketing, design and execution of online training intended for individuals and organizations (functional boundary).

4.4 Environmental management system

4.4.1 General

An environmental management system should be viewed as an organizing framework that should be continually monitored and periodically reviewed to provide effective direction for an organization's response to changing external and internal issues.

The environmental management system model and the ongoing process of continual improvement are illustrated in Figure 1. A commonly used model for a management system is referred to as the Plan-Do-Check-Act (PDCA) approach. For more information on the PDCA model, see Practical Help Box 5.

Practical Help Box 5 — The environmental management system model

PDCA is an ongoing, iterative process that enables an organization to establish, implement and maintain its environmental policy and continually improve its environmental management system in order to enhance environmental performance. The steps of this ongoing process are as follows:

a) Plan:

1) understand the organization and its context, including the needs and expectations of interested parties (see Clause 4);

2) determine the scope of (see 4.3) and implement the environmental management system (see 4.4)

3) ensure leadership and commitment from top management (see 5.1);

4) establish an environmental policy (see 5.2);

5) assign responsibilities and authorities for relevant roles (see 5.3);

6) determine environmental aspects and associated environmental impacts (see 6.1.2);

7) identify and have access to compliance obligations (see 6.1.3);

8) determine the risks and opportunities that need to be addressed related to bullets 1), 6) and 7) above (see 6.1.1);

9) plan to take actions to address risks and opportunities determined in 8) above, and evaluate effectiveness of these actions (see 6.1.4);

10) establish environmental objectives (see 6.2.2) and define indicators and a process to achieve them (see 6.2.3 and 6.2.4);

b) Do:

1) determine the resources required to implement and maintain the environmental management system (see 7.1);

2) determine the necessary competence of person(s) and ensure these persons have the competency (see 7.2) and awareness (see 7.3) as determined;

3) establish, implement and maintain the processes needed for internal and external communications (see 7.4);

4) ensure an appropriate method for creating and updating (see 7.5.2) and controlling (see 7.5.3) documented information;

5) establish, implement and control operational control processes needed to meet the environmental management system requirements (see 8.1);

6) determine potential emergency situations and the necessary response (see 6.1.1 and 8.2);

c) Check:

1) monitor, measure, analyse and evaluate environmental performance (see 9.1.1 and 9.1.2);

2) evaluate fulfilment of compliance obligations (see 9.1.2);

3) conduct periodic internal audits (see 9.2);

4) review the organization's environmental management system to ensure continuing suitability, adequacy and effectiveness (see 9.3);

d) Act:

1) take action to deal with nonconformity (see 10.2);

2) take action to continually improve the suitability, adequacy and effectiveness of the environmental management system to enhance environmental performance (see 10.3).

4.4.2 Establishing, implementing, maintaining and continually improving an environmental management system

To achieve the intended outcomes, an organization should establish, implement, maintain and continually improve an environmental management system. The benefits include enhanced

environmental performance derived from the knowledge gained in 4.1 and 4.2 when establishing, implementing and maintaining the environmental management system.

Developing a complete environmental management system all at once can prove difficult for some organizations. For these organizations, a phased approach could offer several advantages. How a phased implementation could be carried out is shown in Annex B.

An organization retains the authority and accountability, to determine the way in which it satisfies the environmental management system requirements.

5 Leadership

5.1 Leadership and commitment

Top management sets an organization's mission, vision and values, considering its context, the needs and expectations of its interested parties, and business objectives. These are reflected in its strategic plans. Top management's commitment, accountability and leadership are vital for the successful implementation of an effective environmental management system, including the capability to achieve intended outcomes. Top management should therefore take accountability for the effectiveness of the organization's environmental management system and ensure that its intended outcomes are achieved. Top management's commitment means providing physical and financial resources, as well as direction. It includes active involvement that supports the environmental management system and communicates the importance of effective environmental management.

Top management's commitment should ensure that the environmental management system:

— is not managed in isolation, or separately from the core strategy of the business;

— is considered when strategic business decisions are made;

— is aligned with business objectives;

— benefits from the appropriate level of resources (see 7.1), provided in a timely and efficient manner;

— receives the appropriate involvement from across the business;

— provides real value to the organization;

— continually improves and remains successful in the long term.

The environmental policy and environmental objectives are aimed at meeting the environmental component of the organization's strategic plans and form the basis for its environmental management system. Top management has the potential to realize greater value by considering the environmental performance of its activities, products or services at the earliest stage in the life cycle, when planning or reviewing its strategy. For example, the opportunity for improving the environmental performance of a building or product is greater if environmental criteria are considered at the design stage rather than deferring it until the construction or manufacturing stage.

The environmental management system will be more effective and enduring if it is intrinsic to the strategic direction of the organization and integrated into other business processes (see Practical Help Box 6).

Practical Help Box 6 — Integrating the environmental management system into business processes

The leadership and commitment of top management are critical to the integration of the environmental management system into business processes. It is up to the organization to decide the level of detail and extent to which it integrates environmental management system requirements into its various business functions. Integration is an ongoing process, and benefits can increase over time in line with continual improvement.

Integration of the environmental management system into the organization's business processes can enhance its ability to:

— operate more effectively and efficiently, through sharing of processes and resources;

— deliver increased value by being more closely associated with those processes that the organization depends upon to operate.

The organization can consider opportunities for integrating environmental management activities into its business processes, including incorporation of:

— intended outcomes or environmental objectives of the environmental management system in the organization's vision or strategy (explicitly or implicitly), e.g. in relation to innovation and competitiveness;

— environmental policy commitments into the governance of the organization;

— environmental management system responsibilities within job descriptions;

— environmental performance indicators within the organization's business performance systems, which could include department or employee appraisals, e.g. KPIs;

— environmental performance in external reporting, e.g. financial or sustainability reports;

— processes for determining significant environmental aspects and other risks and opportunities affecting the environmental management system into its standard business risk management process(es);

— environmental criteria in business process planning, product or service design, and procurement processes;

— environmental communication into business communication, engagement channels and processes, e.g. public relations.

Top management should communicate the importance of effective environmental management and conformance to the environmental management system requirements through direct involvement or delegation of authority, as appropriate. The communication can be formal or informal, and can take many forms, including visual and verbal.

Top management should support others in the organization in relevant management roles so they in turn can apply leadership to their own area of responsibility, relative to the environmental management system. This can allow the value of top management's leadership and commitment to disseminate down through the organization. By demonstrating leadership and commitment, top management is able to direct and support employees of the organization and others doing work under the organization's control to achieve its intended outcomes for its environmental management system.

The organization is in a good position to achieve its environmental objectives and identify opportunities for improvement when top management creates a culture that encourages people, at all levels, to actively participate in the environmental management system.

5.2 Environmental policy

An environmental policy defines the strategic direction of an organization with respect to the environment within the defined scope of the environmental management system. The environmental policy should provide a framework for establishing environmental objectives and sets the level of environmental responsibility and performance required of the organization, against which subsequent actions can be judged. The environmental policy establishes the principles of action for the organization.

The environmental policy should be specific to the organization and appropriate to the organization's purpose and the context in which it operates, including the nature and scale of the organization's environmental impacts that result from its activities, products and services. The environmental policy should include the organization's commitment to fulfil its compliance obligations and its commitments

related to protection of the environment, prevention of pollution, and continual improvement. Practical Help Boxes 7 and 8 provide additional information related to environmental policy commitments.

When developing its environmental policy, the organization should consider:

a) its vision, mission, core values and beliefs;

b) guiding principles;

c) the needs and expectations of, and communication with, interested parties;

d) the internal and external issues that are relevant to the environmental management system, including specific local or regional conditions;

e) coordination with other organizational policies (e.g. quality, occupational health and safety);

f) the actual and potential effects on the organization's activities from external environmental conditions, including events.

The responsibility for establishing the environmental policy rests with the organization's top management. The environmental policy should be maintained as documented information and be consistent with, and can be included in or linked with, other policy documents of the organization, such as those associated with quality, occupational health and safety and social responsibility. Top management is responsible for implementing the environmental policy and for providing input to the formulation and modification of the environmental policy. The environmental policy should be communicated to all persons working under the organization's control and should be made available to interested parties. The organization can decide to make the environmental policy available in an unrestricted manner, such as posting it on a website, or it can make it available, as appropriate, after information about the identity, needs and expectations of the interested party is provided, or upon request.

Practical Help Box 7 — Protection of the environment and prevention of pollution

Organizations are increasingly becoming aware of the environment in which they operate, for example, by availability of resources, air and water quality and the effects and impacts associated with climate change related to their organization. Therefore, by committing to protection of the environment, including prevention of pollution, the organization is contributing to the sustainability of its business and society.

Protection of the environment

An organization's commitment to protection of the environment is connected to its activities, products and services and its location(s). It can be achieved within the organization or through supply chain management, product use, or disposal. Some organizations should, as appropriate, make specific commitments to protecting the environment because of the nature, scale and environmental impact of their activities. For example, if their activities are associated with deforestation, commitment to protect biodiversity or ecosystem services should be considered.

Practical measures to protect the environment can include:

— improved efficiency in use of natural resources, such as water and fossil fuels, for example, through reducing the use, or engaging in re-use or recycling of, natural resources relative to production.

— protection of biodiversity, habitats and ecosystems through direct on-site conservation, or indirectly through procurement decisions, such as buying materials from verified sustainable sources.

— climate change mitigation through avoiding or reducing emissions of greenhouse gases, or adopting carbon neutrality policies in order to reduce its net contribution to climate change.

— improvement in air and water quality through avoidance, substitution or reduction.

Prevention of pollution

Prevention of pollution can be incorporated throughout the life cycle of products or services, including design and development, manufacture, distribution, use and end of life. Such strategies can help an organization to not only conserve resources and reduce waste and emissions but also reduce cost and produce more competitive products and services. Guidance on integrating environmental aspects into product design and development can be found in ISO/TR 14062 and ISO 14006.

Source reduction can often be the most effective practice because it avoids the generation of waste and emissions and simultaneously saves resources. However, prevention of pollution through source reduction is not practical in some circumstances. The organization can consider using a hierarchy of approaches for prevention of pollution, giving preference to preventing pollution at its source, as follows:

a) source reduction or elimination (including environmentally conscious design and development, material substitution, process, product or technology changes, and conservation of energy and material resources);

b) reuse or recycling of materials within the process or facility;

c) offsite reuse or recycling of materials;

d) recovery and treatment (recovery from waste streams on or offsite, treatment of emissions, and releases of wastes on or offsite to reduce their environmental impacts);

e) control mechanisms, such as incineration or controlled disposal, where permissible, however, the organization should use these methods only after other options have been considered.

Practical Help Box 8 — Environmental policy and sustainability

A growing number of international organizations, as well as government, professional associations and citizens' groups, have developed guiding principles intended to support environmental sustainability. These guiding principles help organizations to define the overall scope of their commitment to the environment as one of the three pillars of sustainability and provide a common set of values. Guiding principles can assist an organization in developing its environmental policy, which should be unique to the organization for which it is developed.

The environmental policy can include other commitments, such as:

a) sustainable development and associated guiding principles (e.g. UN Agenda 21/Global Compact, Equator Principles);

b) minimization of significant adverse environmental impacts of new developments through the use of integrated environmental management processes and planning;

c) design of products taking into account environmental aspects and principles of sustainable development.

5.3 Organizational roles, responsibilities and authorities

Successful establishment, implementation and maintenance of an environmental management system and improvement of environmental performance depend on how top management defines and assigns responsibilities and authorities within the organization (see Practical Help Box 9).

Top management should assign (a) representative(s) or function(s) with sufficient authority, awareness, competence and resources to:

a) ensure the establishment, implementation and maintenance of the environmental management system at all applicable levels of the organization;

b) report back to top management on the environmental management system, including environmental performance and its opportunities for improvement.

These responsibilities and authorities can be combined with other functions or responsibilities.

Top management should ensure that responsibilities and authorities of persons working under the organization's control whose work affects the environmental management system are defined and communicated within the organization, as appropriate, to ensure effective implementation of the environmental management system. Environmental management system responsibilities should not be seen as confined to the environmental function and can include other functions within the organization, such as design, procurement, engineering or quality. The resources provided by the top management should enable the fulfilment of the responsibilities assigned. The responsibilities and authorities should be reviewed when a change in structure of the organization occurs.

Practical Help Box 9 illustrates examples of environmental management system roles and responsibilities.

Practical Help Box 9 — Examples of roles and responsibilities	
Environmental management system responsibilities	**Typical person(s) responsible**
Establish overall direction (intended outcomes)	President, chief executive officer (CEO), Board of directors
Develop environmental policy	President, CEO and others, as appropriate
Develop environmental objectives and processes	Relevant managers and others, as appropriate
Consider environmental aspects during the design process	Product and service designers, architects and engineers
Monitor overall environmental management system performance	Environmental manager
Assure fulfilment of compliance obligations	All managers
Promote continual improvement	All managers
Identify customers' expectations	Sales and marketing staff
Identify requirements for suppliers and criteria for procurement	Purchasers, buyers
Develop and maintain accounting processes	Finance/accounting managers
Conform to environmental management system requirements	All persons working under the organization's control
Review the operation of the environmental management system	Top management
NOTE Companies and institutions have different organizational structures and need to define environmental management responsibilities based on their own work processes. In the case of small and medium enterprises, for example, the owner can be the person responsible for all of these activities.	

6 Planning

6.1 Actions to address risks and opportunities

6.1.1 General

Planning is critical for determining and taking the actions needed to ensure the environmental management system can achieve its intended outcomes. It is an ongoing process, used both to establish and implement elements of the environmental management system and to maintain and improve them, based on changing circumstances and inputs and outputs of the environmental management system itself. The planning process can help an organization identify and focus its resources on those areas that are most important for protecting the environment. It can also assist the organization in fulfilling its compliance obligations and other environmental policy commitments, and establishing and achieving its environmental objectives.

The organization should have (a) process(es) to determine risks and opportunities that need to be addressed. The process starts with applying an understanding of the context in which the organization operates, including issues that can affect the intended outcomes of the environmental management system (see 4.1) and relevant needs and expectations of relevant interested parties, including those the organization adopts as compliance obligations (see 4.2). Along with the scope of the environmental management system, these become inputs that should be considered in determining the risks and opportunities that need to be addressed. Information generated in the planning process is an important input for determining operations that have to be controlled. This information can also be used in the establishment and improvement of other parts of the environmental management system, such as identifying training, competency, monitoring and measurement needs.

The environmental management system provides value for the organization, its interested parties and the environment by addressing risks and opportunities. A robust, credible and reliable environmental management system can support the long-term viability of the organization. Without managing its risks and opportunities that need to be addressed, the organization may not achieve its intended outcomes nor be able to respond to environmental conditions, including events. Examples of risks and opportunities that need to be addressed are provided in Practical Help Box 10. Compliance obligations, views of interested parties and other sources of risks and opportunities that need to be addressed, such as environmental conditions, including events, should be taken into account.

Practical Help Box 10 — Examples of risks and opportunities affecting the organization that need to be addressed

Risks and opportunities can affect the organization and its ability to achieve the intended outcomes of the environmental management system. Adverse effects on the organization can be caused by, for example:

a) environmental aspects, e.g. a very small spill that hardly contaminates soil or groundwater, and is therefore not determined as significant from an environmental perspective, can nevertheless harm the organization's image as being an environmentally conscious enterprise;

b) significant environmental aspects, such as where a pollution incident raises doubt on the organization's ability to manage its significant environmental aspects and thus weakens its credibility;

c) non-fulfilment of compliance obligations, which can result in fines, costs for corrective action, and potentially losing the social license to operate;

d) environmental conditions, including events impacting the environment, such as where climate change causes reduced water availability, which can affect the operation of the organization's waste water treatment plant;

e) a customer need that requires a rapid expansion of the organization's capacity without a commensurate increase in skilled employees, which can lead to a potential for mistakes that can result in environmental harm;

f) views of interested parties on the organization's environmental performance, which can mobilize broader opposition;

g) an action taken to address risks and opportunities without considering any unintended consequence that this can create, e.g. an opportunity to use waste water to irrigate the organization's recreational areas can create human health issues for those using the areas.

NOTE Guidance on potential emergency situations is provided in 8.2.

Potential beneficial effects for the organization can include:

a) identifying new technology, such as control equipment that can reduce polluting discharges;

b) optimizing resource conservation, such as recycling water; or

c) working with interested parties to defuse opposition to a proposed waste disposal method.

There are three possible sources of risks and opportunities that need to be addressed in order to give assurance that the environmental management system can achieve its intended outcomes, prevent or reduce undesired effects, and achieve continual improvement:

a) environmental aspects (see 6.1.2);

b) compliance obligations (see 6.1.3);

c) other issues and requirements identified in 4.1 and 4.2.

The organization has the freedom to choose its approach when determining risks and opportunities that need to be addressed. For example, the organization can:

— determine environmental aspects, compliance obligations and other issues and requirements, and then determine associated risks and opportunities that need to be addressed for each of these; or

— integrate the determination of risks and opportunities that need to be addressed into its determination of significant environmental aspects, and apply a similar approach to the other sources of risks and opportunities that need to be addressed; or

— follow an alternative approach where two or more of the sources of risks and opportunities that need to be addressed are considered in combination.

The organization can use existing business processes for determining risks and opportunities that need to be addressed. The approach chosen may involve a simple qualitative process or a full quantitative assessment (e.g. applying criteria in a decision matrix), depending on the context in which the organization operates. For examples of approaches, see Practical Help Box 11.

The resulting risks and opportunities that need to be addressed are inputs for planning actions (see 6.1.4), for establishing the environmental objectives (see 6.2) and for controlling relevant operations in order to prevent adverse environmental impacts and other undesired effects (see 8.1). Annex A gives examples of activities, products and services and their associated environmental aspects and environmental impacts, as well as actions to be taken to address these.

The results can also have implications for other areas of the environmental management system, for example determining competency needs and communications related to the environmental management system, determining monitoring and measurement needs, establishing the internal audit programme, and developing emergency preparedness and response processes.

Emergency situations are unplanned or unexpected events that create the need for an immediate response in order to mitigate their actual or potential consequences. Emergency situations may create adverse effects to an organization, for example through fires, explosions, spills or releases of hazardous substances, or natural events, such as flash floods, storms, typhoons, tsunamis, etc. They may also create secondary impacts on the environment or effects to the organization, such as the off-site release of contaminated fire water during the fire-fighting process and the need to dispose of fire damaged material which may be hazardous as a result of the fire. The organization should, within the scope of the environmental management system, determine potential emergency situations, including those that can have environmental consequences.

Practical Help Box 11 — Examples of approaches to determine risks and opportunities that need to be addressed		
Examples of inputs	**Examples of process**	**Examples of outputs**
Environmental aspects (see 6.1.2)		
— Environmental aspects and environmental impacts — Criteria for determining significant environmental aspects	Evaluation of significance using criteria (see 6.1.2.5)	— Significant environmental aspects — Risks and opportunities that need to be addressed relating to the significant environmental aspects (see Note below)
Compliance obligations (see 6.1.3)		
— Determination of relevant needs and expectations of relevant interested parties that become compliance obligations (see 4.2) — Communication with interested parties, including complaints, awards and recognition — Internal and external audits of compliance obligations — Review of emerging regulatory trends	Evaluation of results to determine if there are risks and opportunities that need to be addressed	Risks and opportunities that need to be addressed relating to compliance obligations
Internal and external issues (see 4.1)		
— Results of review of context, including internal and external issues (see Practical Help Boxes 1 and 3) — Management review results — Top management and other cross-functional management input	Evaluation of results to determine if there are risks and opportunities for the organization that need to be addressed	Risks and opportunities that need to be addressed relating to other issues in 4.1
Environmental conditions affecting the organization (see Practical Help Box 2)		Risks and opportunities that need to be addressed relating to environmental conditions
Determined environmental aspects (other than significant environmental aspects)		Risks and opportunities that need to be addressed relating to environmental aspects
Other requirements (see 4.2) Requirements other than legal requirements and those the organization has chosen to adopt		
— Management review results — New or changed circumstances — New information — Communication with interested parties	Evaluation of results to determine if there are risks and opportunities for the organization that need to be addressed	Risks and opportunities that need to be addressed relating to other requirements
NOTE It is possible that there will be no risks and opportunities that need to be addressed by the organization, resulting from its significant environmental aspects or from other issues and requirements identified in 4.1 and 4.2.		

6.1.2 Environmental aspects

6.1.2.1 Overview

In order to establish an effective environmental management system, an organization should develop its understanding of how it can interact with the environment, including the elements of its activities, products and services that can have an environmental impact (see 6.1.2.2). The elements of the organization's activities, products and services that can interact with the environment are called environmental aspects. Examples include a discharge, an emission, use or reuse of a material, or generation of noise. The organization implementing an environmental management system should determine the environmental aspects it can control and those that it can influence (see 6.1.2.3), considering a life cycle perspective. Practical Help Box 12 provides additional information on this concept.

Changes to the environment, either adverse or beneficial, that result wholly or partially from environmental aspects are called environmental impacts. Examples of adverse impacts include pollution of air and depletion of natural resources. Examples of beneficial impacts include improved water or soil quality. The relationship between environmental aspects and associated environmental impacts is one of cause and effect. The organization should have an understanding of those aspects that have or can have significant impacts on the environment, i.e. significant environmental aspects (see 6.1.2.4) that it may find necessary to address to protect the environment.

Determining significant environmental aspects and associated environmental impacts is necessary in order to determine where control or improvement is needed and to set priorities for management action (see 6.1.2.5) based primarily on environmental factors. The organization's environmental policy, environmental objectives, training, communications, operational controls and monitoring processes should be developed primarily based on knowledge of its significant environmental aspects. The determination of significant environmental aspects is an ongoing process. It enhances the organization's understanding of its relationship with the environment and contributes to continual improvement of the organization's environmental performance through enhancement of its environmental management system.

As there is no single approach for determining environmental aspects and environmental impacts and determining significance that suit all organizations, the guidance in 6.1.2.5 serves to explain key concepts for those organizations seeking to implement or improve an environmental management system. Each organization should choose an approach that is appropriate to its scope, the nature and scale of its environmental impacts and that meets its needs in terms of detail, complexity, time, cost and availability of reliable data. The implementation of (a) process(es) to apply the approach selected can help to achieve consistent results.

Practical Help Box 12 — Life cycle perspective

A life cycle perspective includes consideration of the environmental aspects of an organization's activities, products and services that it can control or influence. Stages in a life cycle include acquisition of raw materials, design, production, transportation/delivery, use, end-of-life treatment and final disposal.

When applying a life cycle perspective to its products and services, the organization should consider the following:

— the stage in the life cycle of the product or service;

— the degree of control it has over the life cycle stages, e.g. a product designer may be responsible for raw material selection, whereas a manufacturer may only be responsible for reducing raw material use and minimizing process waste and the user may only be responsible for use and disposal of the product;

— the degree of influence it has over the life cycle, e.g. the designer may only influence the manufacturers production methods, whereas the manufacturer may also influence the design and the way the product is used or its method of disposal;

— the life of the product;

— the organization's influence on the supply chain;

— the length of the supply chain;

— the technological complexity of the product.

The organization can consider those stages in the life cycle over which it has the greatest control or influence, as these may offer the greatest opportunity to reduce resource use and minimize pollution or waste.

6.1.2.2 Understanding activities, products and services

All activities, products and services have some impact on the environment, which can occur at any or all stages of the life cycle, i.e. from raw material acquisition and distribution, to use and disposal. An organization should understand its activities, products and services that fall within the scope of its environmental management system, in order to be able to identify the associated environmental aspects and environmental impacts. It can be useful to group its activities, products and services to assist in the identification and evaluation of the associated environmental aspects and environmental impacts. A grouping or category could be based on common characteristics, such as organizational units, geographical locations and operations workflow.

6.1.2.3 Determining environmental aspects

When determining its environmental aspects within the scope of its environmental management system, the organization should consider a life cycle perspective and those aspects associated with its past, current and planned activities, products and services. In all cases, the organization should consider normal and abnormal operating conditions, including start-up and shut-down, maintenance and reasonably foreseeable emergency situations.

In addition to those environmental aspects the organization can control directly, it should also consider aspects that it can influence, e.g. those related to products and services used by the organization and those related to products and services it provides. When evaluating its ability to influence the environmental aspects, the organization should give consideration to its compliance obligations, its policies and local or regional issues. The organization should also consider the implications on its own environmental performance, for example by the purchase of products containing hazardous materials, activities carried out by external providers, including contractors or subcontractors, design of products and services, materials, goods or services supplied and used, and the transport, use, reuse, or recycling of products placed on the market.

To determine and have an understanding of its environmental aspects, the organization can collect quantitative and/or qualitative data on the characteristics of its activities, products and services, such

as inputs and outputs of materials or energy, processes and technology used, facilities and locations, and transportation methods. In addition, it can be useful to collect information on:

a) cause and effect relationships between elements of its activities, products and services and possible or actual changes to the environment;

b) environmental concerns of interested parties;

c) possible environmental aspects identified in government regulations and permits, in other standards, or by industry associations, academic institutions, etc.

The process of determining environmental aspects benefits from the participation of those individuals who are familiar with the organization's activities, products and services. Although there is no single approach for determining environmental aspects, the approach selected can consider:

— emissions to air;

— releases to water;

— releases to land;

— use of raw materials and natural resources;

— use of energy;

— energy emitted (e.g. heat, radiation, vibration (noise) and light);

— generation of waste and/or by-products;

— use of space.

Consideration should therefore be given to environmental aspects related to the organization's activities, products and services, including:

— design and development of its facilities, processes, products and services;

— acquisition of raw materials, including extraction;

— operational or manufacturing processes, including warehousing;

— operation and maintenance of facilities, organizational assets and infrastructure;

— environmental performance and practices of external providers;

— product transportation and service delivery, including packaging;

— storage, use and end-of-life treatment of products;

— waste management, including reuse, refurbishing, recycling and disposal.

NOTE Guidance on environmental aspects of product design is provided in ISO/TR 14062, and guidance on eco-design is provided in ISO 14006.

6.1.2.4 Understanding environmental impacts

An understanding of an organization's environmental impacts related to determined environmental aspects is necessary when determining significance, especially those aspects that can lead to emergency situations. Many approaches are available. The organization should choose one that suits its needs.

Readily available information on the types of environmental impacts associated with the organization's environmental aspects can be adequate for some organizations. Other organizations can choose to use

cause-and-effect diagrams or flowcharts illustrating inputs, outputs or mass/energy balances or other approaches, such as environmental impact assessments or life cycle assessments.

NOTE 1 Guidance on life cycle assessments is provided in ISO 14040 and ISO 14044.

The approach chosen should be capable of recognizing:

— positive (beneficial) environmental impacts, as well as negative (adverse) environmental impacts;

NOTE 2 Environmental aspects with potential beneficial environmental impacts can present opportunities for the organization to improve environmental conditions. Environmental aspects with adverse environmental impacts can pose a threat to the organization which can undermine its ability to achieve its environmental policy commitments.

— actual and potential environmental impacts;

— the part(s) of the environment that can be affected, such as air, water, soil, flora, fauna, or cultural heritage;

— the characteristics of the location that can affect the magnitude of the environmental impact, such as local weather conditions, height of water table, soil types, etc.;

— the nature of the changes to the environment (such as global versus local issues, length of time for which the environmental impact occurs, or potential for the environmental impact to accumulate in strength over time).

Practical Help Box 13 provides possible sources of information that can help an organization to determine its environmental aspects and environmental impacts.

Practical Help Box 13 — Possible information sources for determining environmental aspects and environmental impacts

Possible information sources include:

a) general information documents, such as brochures, catalogues and annual reports;

b) operations manuals, process flowcharts, or quality and product plans;

c) reports from previous audits, assessments, or reviews, such as initial environmental reviews or life cycle assessments;

d) information from other management systems, such as quality or occupational health and safety;

e) technical data reports, published analyses or studies, or lists of toxic substances;

f) compliance obligations;

g) codes of practice, national and international policies, guidelines and programmes;

h) procurement data;

i) product specifications, product development data, Safety Data Sheets (SDS/MSDS/CSDS), or energy and material balance data;

j) waste inventories;

k) monitoring data;

l) environmental permit or licence applications;

m) views of, requests from, or agreements with interested parties;

n) reports on emergency situations.

6.1.2.5 Determining significant environmental aspects

Significance is a concept that is relative to an organization and its context. What is significant for one organization is not necessarily significant for another. Evaluating significance can involve both

technical analysis and judgement, as determined by the organization. The use of criteria can help the organization establish which environmental aspects and associated environmental impacts it considers significant. Establishing and applying such criteria should provide consistency in the assessment of significance.

Since the organization can have many environmental aspects and associated environmental impacts, it should establish criteria and a method to determine those that it considers significant. Criteria can relate to the environmental aspect (e.g. type, size, frequency) or the environmental impact (e.g. scale, severity, duration, exposure). Other inputs may also be considered when establishing significance criteria, including information on compliance obligations, and the concerns of internal and external interested parties. However, the selection of these criteria should not be done in a way that downgrades an environmental aspect that is significant.

The organization can set levels (or values) of significance to be associated with each criterion. For example, the evaluation of significance could be based on a combination of likelihood (probability/frequency) of an occurrence and its consequences (severity/intensity). Some type of scale or ranking can be helpful in assigning significance, for example quantitatively in terms of a numeric value, or qualitatively in terms of levels, such as high, medium, low, or negligible.

The organization can find it useful to evaluate the significance of an environmental aspect and associated environmental impacts by combining results from the criteria. It should decide which environmental aspects are significant, e.g. by using a threshold value. However, if such an approach is applied, the organization should be able to justify the threshold value. Significant environmental aspects can result in risks and opportunities that need to be addressed to ensure that the organization can achieve the intended outcomes of its environmental management system and prevent or reduce undesired effects.

To facilitate planning, the organization should maintain appropriate documented information on the environmental aspects and associated environmental impacts identified, the criteria used to determine its significant environmental aspects and those determined significant, including those that can occur in potential emergency situations. The organization should use this information to understand the need for, and to determine, operational controls, including those necessary to mitigate or respond to actual emergency situations. Information on identified environmental impacts should be included, as appropriate. This information should be reviewed and updated periodically, and when circumstances change, it should be ensured that the information is up to date. It can be helpful to maintain this information in a list, register, database, or other form.

NOTE The determination of significant environmental aspects does not require an environmental impact assessment.

6.1.3 Compliance obligations

6.1.3.1 General

Compliance obligations can result in risks and opportunities that need to be addressed. Identifying and having access to compliance obligations and understanding how they apply to the organization is the first stage in ensuring fulfilment of compliance obligations. Using the knowledge gained in 4.2.4, the organization should establish, implement and maintain a process to identify and have access to compliance obligations that are related to the environmental aspects of its activities, products and services. This process should enable the organization to consider and prepare for new or changing needs and expectations from interested parties, so that preparatory action can be taken, as appropriate, to maintain conformity. The organization should also consider how planned or new developments and new or modified activities, products and services can affect its compliance status.

An organization should ensure that appropriate information about compliance obligations is communicated to persons working under the organization's control (including external providers, such as contractors or suppliers) whose responsibilities relate to, or whose actions can affect, fulfilment of compliance obligations.

For more information on compliance obligations in relation to environmental management systems, see Practical Help Box 14.

Practical Help Box 14 — Compliance obligations

The recommended components of the environmental management system related to compliance obligations are summarized in the following list. An organization should establish, implement and maintain processes needed and provide adequate resources to:

a) establish an environmental policy that includes a commitment to fulfil compliance obligations (see 5.2);

b) identify, have access to, and understand how these compliance obligations apply to the organization (see 4.2 and 6.1.3);

c) establish environmental objectives with consideration of compliance obligations (see 6.2);

d) achieve environmental objectives related to compliance obligations, through:

— identified roles, responsibilities, processes, means and timeframes to achieve environmental objectives related to fulfilment of compliance obligations (see 6.1.4);

— operational controls (including procedures, as necessary) to implement the commitment to compliance and environmental objectives related to compliance obligations (see 8.1);

e) ensure that all persons working under the organization's control are aware of related processes that apply to them, and the consequences of failing to fulfil compliance obligations (see 7.3);

f) ensure that all persons working under the organization's control have the necessary competence regarding its compliance obligations, related processes that apply to them, and the importance of fulfilling its compliance obligations, on the basis of appropriate education, training, or experience (see 7.2);

g) establish processes for communication relevant to the environmental management system, taking into account the organization's compliance obligations (see 7.4);

h) periodically evaluate fulfilment of compliance obligations (see 9.1.2);

i) identify any instances of non-compliance or nonconformity and foreseeable potential non-compliance or non-conformity and take prompt action to identify, implement and follow up corrective actions (see 10.1);

j) retain documented information as evidence of results of its evaluation of compliance (see 9.1.2);

k) address features related to fulfilment of compliance obligations when conducting periodic audits of the environmental management system (see 9.2);

l) consider changes in compliance obligations when undertaking the management review (see 9.3).

The commitment to compliance obligations reflects an expectation that an organization employs a systematic approach to achieve and maintain fulfilment of compliance obligations.

6.1.3.2 Legal requirements

An organization can access one or more information sources as a means to identify legal requirements related to its environmental aspects. Such sources can include governmental, regulatory agencies, industry associations, or trade groups, commercial databases and publications, and professional advisors and services. The process should enable the organization to anticipate and prepare for new or changed legal requirements, so that it can maintain conformity.

6.1.3.3 Other requirements

An organization should also determine how other compliance obligations it has adopted, originating from other interested parties as identified in 4.2, relate to the organization's environmental aspects.

6.1.3.4 Documented information

An organization should maintain documented information of its compliance obligations, which could be in the form of a register or a list. This can help to maintain awareness and transparency with regard to

applicable requirements. This register should be reviewed periodically to ensure it remains up to date. This register or list could include:

— the origin of the compliance obligation, including the relevant interested party;

— an overview of the compliance obligation;

— how the compliance obligation relates to the organization's aspects and/or relevant requirements of interested parties.

6.1.4 Planning action

An organization should consider and plan how to take action to address significant environmental aspects, compliance obligations and risks and opportunities that need to be addressed, as determined in 6.1.1. The organization should plan to take action in a variety of ways using its environmental management system processes or other business processes. The organization should also determine the effectiveness of the actions taken.

Planning to take action can include a single action, such as establishing an environmental objective, operational control, emergency preparedness, or another business process, e.g. supplier evaluation. Alternatively, the organization can use a combination of actions that include environmental objectives and operational controls involving a combination of control hierarchies. In planning actions, the organization should consider technological options and feasibilities, and financial, operational and business requirements. As with any planned action, the potential for any unintended consequence should be considered, e.g. short or long term adverse impacts on the environment within the product or service life cycle.

Organizations can adopt a variety of methods and techniques to evaluate the effectiveness of the actions taken, ranging from statistical techniques to comparisons of monitoring and measuring results with expected performance levels (see 9.1). Some legal requirements can specify the need for validation or verification of performance capability and actual performance of some controls. In some instances, organizations choose to evaluate the effectiveness of the actions outside of the environmental management system. This can be done, for example, through occupational health and safety management systems or engineering or business processes. Where these actions are taken outside the environmental management system, this can be referenced within the environmental management system.

Table A.1 shows examples of environmental aspects, environmental impacts and risks and opportunities that need to be addressed and the planned action to address them for several activities.

Table A.3 shows examples of risks and opportunities that need to be addressed and actions to address them, associated with compliance obligations.

Table A.4 shows examples of risks and opportunities that need to be addressed and actions to address them, associated with other issues and requirements.

6.2 Environmental objectives and planning to achieve them

6.2.1 General

In the planning process, an organization establishes environmental objectives to fulfil the commitments established in its environmental policy and achieve other organizational goals. The process of establishing and reviewing environmental objectives and implementing processes to achieve them provides a systematic basis for the organization to improve environmental performance in some areas, while maintaining its level of environmental performance in others.

6.2.2 Establishing environmental objectives

In establishing environmental objectives, an organization should consider inputs, including:

— principles and commitments in its environmental policy;

— its significant environmental aspects (and information developed in determining them);

— its compliance obligations;

— risks and opportunities that need to be addressed as determined in 6.1.1, related to other issues and requirements affecting the environmental management system.

The organization can also consider:

— effects of achieving environmental objectives on other activities and processes;

— possible effects on the public image of the organization;

— findings from environmental reviews;

— other organizational goals.

Environmental objectives should be established at the top level of the organization and at other levels and functions where activities important to achieving the environmental policy commitments and overall organizational goals are carried out. Environmental objectives should be consistent with the environmental policy and commitments to the protection of the environment, including the prevention of pollution, fulfilment of compliance obligations, and continual improvement.

An environmental objective can be expressed directly as a specific performance level, or can be expressed in a general manner and further defined by one or more targets, i.e. a detailed performance requirement that should be met in order to achieve an environmental objective. When targets are set, they should be measurable. Targets may need to include a specified time frame.

The environmental objectives the organization establishes should be considered as part of its overall management objectives. Such integration can enhance the value of not only the environmental management system, but also business processes to which the integration applies.

Environmental objectives can be applicable across the organization, or more narrowly to site-specific or individual activities. For example, a manufacturing facility may have an overall energy-reduction objective that can be achieved by conservation activities in one individual department. In other situations, however, all parts of the organization should contribute in some way to achieve the organization's overall objective. It is also possible that different parts of the organization, pursuing the same overall objective, may need to implement different actions to achieve their departmental objectives.

An organization should identify the contributions of different levels and functions of the organization in achieving its environmental objectives, and make the individual members of the organization aware of their responsibilities.

Documentation and communication of environmental objectives improves the organization's ability to achieve its environmental objectives. The organization should maintain documented information on its environmental objectives, and information concerning environmental objectives should be provided to those responsible for achieving them and to other personnel who need such information to carry out related functions, such as operational control.

6.2.3 Planning actions to achieve environmental objectives

Part of the planning process can include (a) programme(s) for achieving an organization's environmental objectives.

The programme should address roles, responsibilities, processes, resources, timeframes, priorities, and the actions necessary for achieving the environmental objectives. These actions can deal with individual processes, projects, products, services, sites, or facilities within a site. Organizations can integrate programmes to achieve environmental objectives with other programmes within their strategic planning process. Programmes to achieve environmental objectives help the organization to improve its environmental performance. They should be dynamic. When changes in processes, activities, services and products within the scope of the environmental management system occur, the environmental objectives and associated programmes should be revised as necessary.

6.2.4 Performance indicators

The organization's environmental performance indicators are an important tool for monitoring its progress in achieving environmental objectives and continual improvement. An organization should establish environmental performance indicators that can produce objective, verifiable and reproducible results. The indicators should be appropriate to the organization's activities, products and services, consistent with its environmental policy, practical, cost-effective and technologically feasible. These indicators can be used to track the organization's progress in achieving its environmental objectives. They can also be used for other purposes, such as part of an overall process for evaluating and improving environmental performance. The organization can consider the use of environmental condition indicators (ECIs), management performance indicators (MPIs) and operational performance indicators (OPIs) appropriate to its significant environmental aspects. Additional information on performance indicators is provided in Practical Help Box 15.

NOTE Guidance on the selection and use of environmental performance indicators is provided in ISO 14031 and ISO/TS 14033.

Table A.2 gives examples of environmental objectives, targets and indicators for selected activities.

Practical Help Box 15 — Performance indicators

Progress towards an environmental objective can generally be measured using environmental performance indicators, such as:

- quantity of raw material or energy used;
- quantity of emissions, such as CO_2;
- waste produced per quantity of finished product;
- efficiency of material and energy used;
- number of environmental incidents (e.g. excursions above limits);
- number of environmental accidents (e.g. unplanned releases);
- percentage waste recycled;
- percentage recycled material used in packaging;
- number of service vehicle kilometres per unit of production;
- quantities of specific pollutants emitted, e.g. NOx, SOx, CO, VOCs, Pb and CFCs;
- investment in environmental protection;
- number of prosecutions;
- land area set aside for wildlife habitat;
- number of persons trained in environmental aspect identification;
- percentage of budget spent on low emission technology.

7 Support

7.1 Resources

An organization should determine the necessary resources for establishing, implementing, maintaining and improving the environmental management system. When determining the resources needed, the organization should consider:

— infrastructure;

— externally provided resources;

— information systems;

— competence;

— technology;

— financial, human and other resources specific to its activities, products and services.

Resources should be provided in a timely and efficient manner.

Resource allocations should consider the organization's current and future needs. In allocating resources, the organization can track the benefits as well as the capital and operational costs of its environmental or related activities. Issues such as the cost of pollution control equipment (capital outlay) and the time spent by persons working under the organization's control on making the environmental management system effective (operational outlay) can be included. Resources and their allocation should be reviewed periodically, including in conjunction with the management review to ensure their adequacy. In evaluating adequacy of resources, consideration should be given to planned changes and/or new projects or operations. Additional information on resources is provided in Practical Help Box 16.

Practical Help Box 16 — Human, physical and financial resources

The resource base and organizational structure of smaller organizations can present certain limitations on environmental management system implementation. To overcome these limitations, the organization can consider cooperative strategies. Options can include cooperation with:

— larger client and supplier organizations, to share technology and knowledge;

— other organizations in a supply chain or local basis to define and address common issues, share experiences, facilitate technical development, use facilities jointly, and collectively engage external resources;

— standardization organizations, associations, or chambers of commerce, for training and awareness programmes;

— universities and other research centres, to support performance improvements, the application of life cycle perspective and innovation.

Knowledge is an important resource for establishing or improving the environmental management system. When addressing future challenges, the organization should take into account its current knowledge base and determine how to acquire or access the necessary additional knowledge.

7.2 Competence

Knowledge, understanding, skills, or abilities enable an individual to gain the necessary competence with regard to environmental performance. All persons doing work under the control of an organization that affect or can affect its environmental performance, including its ability to fulfil compliance obligations, should be competent based on training, education, experience, or a combination of these, as determined by the organization. These persons include the organization's own employees, as well as others working under its control, such as external providers.

The competence requirements for these persons are not limited to those doing work that have or can have significant impacts on the environment, but also those who manage a function or undertake a role which is critical to achieving the intended outcomes of the environmental management system. Practical Help Box 17 provides examples of competence needs.

Many organizations do not have access to all of these competencies and they may procure competent service providers to ensure environmental performance and the achievement of the intended outcomes of the environmental management system.

Practical Help Box 17 — Examples of competence needs

Potential areas of competence	Typical organizational roles	Examples of competences/capabilities needed	Examples of the means for establishing competence
Environmental technology	Environmental technicians	— Proficiency in environmental sampling — Ability to operate monitoring equipment	— Training and assessment on collection requirements and practices — Certification or license for equipment use
	Environmental programme managers	— Proficiency in applicable environmental regulations	— Degree in environmental field — Training on applicable regulations
Environmental operations	Persons whose work activities involve significant environmental aspects	— Awareness of how their work affects environmental performance — Knowledge of operating criteria that needs to be met in order to minimize adverse environmental impact	— Training on environmental impacts associated with their work — Training on operating criteria to ensure processes are controlled
Environmental management systems	Environmental managers	— The ability to establish, implement and improve an environmental management system — The ability to determine risks and opportunities that need to be addressed to ensure the environmental management system can achieve its intended outcomes, and to plan appropriate actions — The ability to analyse and act upon the results of environmental performance and the organization's compliance obligations	— Experience in environmental management system implementation — Training on environmental management system requirements
	Audit programme managers	— The ability to develop and manage audit programmes to determine the effectiveness of the organization's environmental management system	— Programme management training — Experience in programme implementation
	Top management	— Knowledge and understanding of the implications of establishing and implementing an environmental policy — Knowledge and understanding of resource availability and its application to an environmental management system, including the assignment of responsibilities and authorities	— Training on environmental management systems and establishing environmental policy — Experience in business management

The organization should identify the necessary competencies to achieve the intended outcome of the environmental management system and address gaps, including taking actions when needed to acquire the necessary competence. Documented information can be useful to ensure that identified competency needs are addressed, track progress on closing any gaps, and to enable communication of relevant information to interested parties. At a minimum, appropriate documented information should be retained as evidence of competence.

NOTE Guidance on auditor competence is provided in 9.2.

When competence is acquired through training, the organization's training process(es) can include:

— identification of training needs;

— design and development of a training plan or programme to address identified training needs;

— delivery of the training;

— evaluation of the training result;

— documentation and monitoring of training received.

Where applicable, the organization should evaluate the effectiveness of the training and other actions taken to acquire the necessary competence to confirm the intended result is being achieved.

7.3 Awareness

Top management has a key responsibility for building awareness in an organization in relation to the environmental management system and environmental performance, in order to enhance knowledge and promote behaviour that supports the organization's environmental policy commitments. This includes making employees and other persons working under the organization's control aware of the organization's environmental values, and how these values can contribute towards the organization's business strategy (see 5.1).

Top management should ensure persons working under the organization's control are encouraged to:

— enhance environmental performance;

— contribute toward achieving the intended outcomes of the environmental management system;

— accept the importance of achieving the environmental objectives for which they are responsible or accountable.

Top management should also ensure that all persons working under the organization's control are made aware of:

— the organization's environmental policy and its commitment to the environmental policy;

— the importance of conforming to the requirements of the environmental management system;

— their contribution to the effectiveness of the environmental management system;

— the benefits of improved environmental performance;

— their responsibilities and accountabilities within the environmental management system;

— the significant actual or potential environmental aspects and associated environmental impacts of their work activities;

— identified risks and opportunities that need to be addressed in relation to their work activities, if applicable;

— the consequences of the departure from applicable environmental management system requirements, including the organization's compliance obligations.

Examples of methods to increase awareness can include internal communication, visual signs and banners, campaigns, training or education, and mentoring.

7.4 Communication

7.4.1 General

An organization should establish processes for communication relevant to the environmental management system, taking into account the organization's compliance obligations. These processes should identify:

— what information needs to be communicated;

— when or under what circumstances it needs to be communicated;

— to whom it needs to be communicated;

— how it will be communicated.

The organization can consider the potential costs and benefits of different approaches in developing processes for communication that are appropriate for its particular circumstances.

Communication of environmental information should be based on, and consistent with, the information generated within the environmental management system, including the internal evaluation of the organization's environmental performance (see 9.1).

NOTE Additional information on communication is provided in ISO 14063.

In determining how it intends to communicate, the organization should consider different communication methods that can encourage understanding and acceptance of the organization's environmental management efforts and promote dialogue with interested parties. Methods of communication include, for example, informal discussions, organization open days, focus groups, community dialogue, involvement in community events, websites and e-mail, press releases, advertisements and periodic newsletters, annual or other periodic reports, and telephone hotlines.

The organization should consider and respond to relevant questions, concerns, or other communicated inputs to its environmental management system. It can be beneficial to establish a process for receiving and responding to such internal and external communications.

Organizations should retain documented information as evidence of its communications, as appropriate, in order to:

— recall the history of specific interested party communication, inquiries, or concerns;

— understand the nature of various interested party engagements over time;

— improve the organization's effectiveness in developing future communication and in following up and addressing the concerns of specific interested parties as needed.

Some communications need not be documented if there is no added benefit to the environmental management system, e.g. informal communications. The organization should take into account its nature and size, its significant environmental aspects, and the nature and needs and expectations of its interested parties when establishing its communications process(es).

The organization should consider the following process steps:

— gather information, or make inquiries, including from relevant interested parties (see 4.2);

— determine the target audience(s) and their needs for information or dialogue;

— select information relevant to the audience's interests;

— decide on the information to be communicated to the target audience(s);

— determine which methods and formats are appropriate for communication;

— evaluate and periodically determine the effectiveness of the communications process.

The principal communication components of an environmental management system are summarized in Practical Help Box 18. These components are recommended as the core, minimum components, and an organization can go beyond these as necessary for effective communication relevant to the environmental management system.

Practical Help Box 18 — Environmental management system communication

Principal communication components:

Top management should communicate the importance of effective environmental management and of conforming to the environmental management system requirements (see 5.1).

Top management should ensure that the following are communicated within the organization:

— the environmental policy (see 5.2);

— the responsibilities and authorities for relevant roles (see 5.3).

The organization should communicate:

— its significant environmental aspects among the various levels and functions of the organization, as appropriate (see 6.1.2.5);

— its environmental objectives (see 6.2.2);

— its relevant environmental requirement(s) to external providers, including contractors (see 8.1);

— relevant environmental performance information both internally and externally, as determined by its communication process(es) and as required by its compliance obligations (see 9.1.1).

The organization should ensure that the results of internal audits are reported to relevant management (see 9.2).

Top management's review of the organization's environmental management system should include consideration of communication(s) from interested parties (see 9.3).

7.4.2 Internal communication

Communication between and among the levels and functions within an organization is crucial to the effectiveness of the environmental management system. For example, communication is important for problem solving, coordination of activities, follow up on action plans, and further development of the environmental management system. The provision of appropriate information to those working under the organization's control serves to motivate them and encourage acceptance of the organization's efforts to improve its environmental performance. This can assist employees and external providers working under the organization's control to fulfil their responsibilities and can help the organization to achieve its environmental objectives. The organization should have a process which allows communication from all levels of the organization. This can allow comments and suggestions to be made to improve the environmental management system and the environmental performance of the organization. Results from environmental management system monitoring, audit and management review should be communicated to appropriate persons within the organization.

7.4.3 External communication

Communication with external interested parties can be an important and effective tool for environmental management. An organization should take into account communication requirements associated with its compliance obligations and its communication processes (see 7.4.1), and communicate information relevant to the environmental management system externally, as required. It can also consider whether to communicate externally to its interested parties about its environmental aspects, including those that relate to the distribution, use and disposal of products.

The organization should have in place a process for communicating with external interested parties in case of emergency situations that could affect or concern them. An organization can also find it useful to document its processes for external communication.

NOTE See also 8.2 on emergency preparedness and response.

Communications to external interested parties regarding the organization's environmental performance should be accurate, reliable and verifiable (see ISO/TS 14033). Claims related to environmental performance can, for example, be in the form of organizational sustainability reports, promotional literature or advertising campaigns. Organizations can consider approaches to verification of its environmental performance claims.

See ISO 14031 for guidance regarding an organization's performance. For guidance on product related environmental claims, see ISO/TS 14033 and ISO 14020.

7.5 Documented information

7.5.1 General

An organization should develop and maintain adequate documented information to ensure that its environmental management system is operating effectively, is understood by persons working under the control of the organization and other relevant interested parties, and that processes associated with the environmental management system are carried out as planned. Documented information should be collected and maintained in a way that reflects the culture and needs of the organization.

Documented information in the form of processes, plans and programmes, for example, should be maintained, as appropriate, to ensure consistency, timeliness and repeatability of outcomes. Documented information in the form of records should be retained as evidence of the results achieved or activities performed, in order to demonstrate effective implementation of the environmental management system requirements. Information that serves as a record of results achieved or evidence of activities performed is part of the organization's documented information, but may be controlled through different management processes.

For effective management of its key activities (e.g. those associated with its identified risks and opportunities that need to be addressed), the organization can specify how to carry out the activities by establishing (a) process(es) that can be documented, and can describe in appropriate detail how the activities are managed. If the organization decides not to document a process, affected persons working under the control of the organization should be informed of the requirements to be met, as appropriate, through communication or training.

The organization can choose to document its management system in the form of a manual, which constitutes an overview or summary of the system with a description of the main elements, and can provide direction to related documented information. The structure of any such environmental management system manual need not follow the clause structure of ISO 14001 or any other standard (see Practical Help Box 19).

The extent of the documented information can differ from one organization to another. Creating unnecessary or complicated documented information can diminish the effectiveness of the environmental management system. When considering the extent of documented information it creates, the organization can therefore consider the benefits of documented information for effectiveness, continuity and continual improvement of the environmental management system.

Documented information can be controlled in any medium (paper, electronic, photos and posters) that is useful, legible, easily understood and accessible to those needing the information contained therein.

If processes of the environmental management system are aligned with those from other management systems, the organization can combine relevant environmental documented information with documented information of these other management systems.

The principal documented information related to an environmental management system is summarized in Practical Help Box 19. This is the core, minimum information that should be documented, and the organization can go beyond this as necessary for the effectiveness of the environmental management system.

Practical Help Box 19 — Documented information

The organization should maintain the following as documented information:

— the scope of the environmental management system (see 4.3);

— the environmental policy (see 5.2);

— its identified risks and opportunities that need to be addressed (see 6.1.1);

— the processes needed in 6.1.1 to 6.1.4, to the extent necessary to have confidence that these processes are carried out as planned (see 6.1.1);

— its environmental aspects and associated environmental impacts, the criteria used to determine its significant environmental aspects, and its significant environmental aspects (see 6.1.2);

— its compliance obligations (see 6.1.3);

— information on the environmental objectives (see 6.2.1);

— information related to the operational control processes needed to meet environmental management system requirements, to the extent necessary to have confidence that the processes have been carried out as planned (see 8.1);

— the processes needed to prepare for and respond to potential emergency situations identified in 6.1.1, to the extent necessary to have confidence that the processes are carried out as planned (see 8.2).

The organization should retain documented information as evidence (records) of the following:

— competence, as appropriate (see 7.2);

— its communications, as appropriate (see 7.4.1);

— monitoring, measurement, analysis and evaluation results, as appropriate (see 9.1.1);

— compliance evaluation result(s) (see 9.1.2);

— implementation of the audit programme, and the audit results (see 9.2);

— the results of management reviews (see 9.3);

— the nature of identified nonconformity and any subsequent actions taken, and the results of any corrective action (see 10.2).

Other examples of documented information include descriptions of programmes and responsibilities, procedures, process information, organizational charts, internal and external standards, and site emergency plans.

7.5.2 Creating and updating

When creating and updating documented information related to the environmental management system, the organization should ensure appropriate:

— identification and description (e.g. a title, date, author, or reference number);

— format (e.g. language, software version, graphics) and media (e.g. paper, electronic);

— internal review and approval for suitability and adequacy.

7.5.3 Control of documented information

Control of environmental management system documented information is important to ensure that:

— information can be identified with the appropriate organization, division, function, activity, or contact person;

— information maintained by the organization is regularly reviewed, revised as necessary and approved by authorized personnel prior to issue;

— current versions of relevant documented information are available at all locations where operations essential to the effective functioning of the system are performed, including those necessary to ensure requirements are met;

NOTE Where the availability of documented information is not practicable, actions that conform to prescribed practices can be considered adequate.

— information that is obsolete is promptly removed from all points of issue and from places and situations of use (in some circumstances, e.g. for legal and/or knowledge preservation purposes, documented information that is obsolete can be retained as evidence of the results achieved).

Documented information can be effectively controlled by:

— developing an appropriate format that includes unique titles, numbers, dates, revisions, revision history and authority;

— assigning the review and approval of documented information maintained by the organization to individuals with sufficient technical capability and organizational authority;

— maintaining an effective distribution system.

8 Operation

8.1 Operational planning and control

8.1.1 General guidance: Operational control

An organization should ensure that its operations and associated processes are conducted in a controlled way in order to fulfil the commitments of its environmental policy, achieve its environmental objectives and manage its significant environmental aspects, compliance obligations and its risks and opportunities that need to be addressed. To plan for effective and efficient operational controls, the organization should determine where such controls are needed and for what purpose. It should establish the types and levels of controls that meet the organization's needs. The operational controls selected should be maintained and evaluated periodically for their continuing effectiveness.

When determining necessary controls, or considering changes to existing controls, consideration should be given to risks and opportunities that need to be addressed, and to any unintended consequences that can result. The organization should control planned changes and review the consequences of unintended changes, taking action to mitigate any adverse effects, as necessary.

When considering controls for adverse environmental impacts, the organization can refer to the following hierarchy:

— elimination, such as banning the use of PCBs, CFCs, etc.;

— substitution, such as change of solvent-based paint to water-based paint;

— engineering controls, such as emission controls, abatement technology, etc.;

— administrative controls, such as procedures, visual controls, work instructions, Safety Data Sheets (SDS/MSDS/CSDS), etc.

To avoid deviations that can occur from the environmental policy, environmental objectives and compliance obligations, documented information can be developed, as appropriate, to explain, for example:

— a specific sequence of activities that should be carried out;

— necessary qualifications of the personnel involved, including any workmanship required;

— key variables that should be kept within certain limits, e.g. time, physical, biological;

— characteristics of the materials to be used;

— characteristics of the infrastructure to be used;

— characteristics of the products resulting from the process.

8.1.2 Identifying needs for operational controls

An organization can use operational controls to:

— manage identified significant environmental aspects;

— ensure fulfilment of compliance obligations;

— achieve environmental objectives and ensure consistency with its environmental policy, including the commitment to protection of the environment, the prevention of pollution and continual improvement;

— avoid or minimize adverse impacts to the environment or adverse effects to the organization;

— maximize opportunities.

Based upon the scope of its environmental management system and the actions determined in 6.1 and 6.2, the organization should determine the necessary operational controls (see 6.1 and 6.2), using a life cycle perspective, including for operations related to functions, such as research and development, design; sales, marketing, procurement and facility management.

The type and extent of control or influence to be applied during the life cycle stages should be defined within the environmental management system.

A life cycle perspective should be considered as early as possible, i.e. in the design and development process. This will provide a better opportunity to make improvements to the overall environmental performance of activities, processes, products or services, and help the organization reduce the potential for transferring adverse environmental impacts to other stages. This will result in greater value to the organization and protection of the environment.

Many organizations can have their significant environmental aspects in the use phase or in the application of information provided by the organization. Examples of methods to influence significant environmental aspects could then include:

— providing education on how to manage relevant environmental impacts;

— providing easy access to information (e.g. on websites, like FAQ);

— establishing user groups for sharing information, and keeping users updated.

As applicable, the organization should consider how external providers and outsourced processes can affect its ability to manage its environmental aspects and fulfil its compliance obligations. An organization should establish operational controls that are needed, such as documented procedures, contracts or supplier agreements, or end user instructions, and communicate them to its contractors, suppliers and users, as appropriate. An outsourced process can be subject to control or influence. An outsourced process is one that fulfils all of the following criteria:

a) the function or process is integral to the organization's functioning;

b) the function or process is needed for the environmental management system to achieve its intended outcome;

c) the liability for the function or process conforming to requirements is retained by the organization;

d) the organization and the external provider have a relationship, e.g. one where the process is perceived by interested parties as being carried out by the organization.

NOTE 1 Design could mean the development of a new product, whereas existing products can be subject to redesign or improvement.

NOTE 2 Additional information on life cycle perspective during the design process is provided in ISO 14006 and ISO/TR 14062.

NOTE 3 Additional information on product information is provided in ISO 14020, ISO 14021, ISO 14024, ISO 14025, ISO 14046 and ISO/TS 14067.

8.1.3 Establishing operational controls

Operational controls can take various forms, such as procedures, work instructions, physical controls, use of competent personnel, or any combination of these. The choice of the specific control methods depends on a number of factors, such as the skills and experience of people carrying out the operation and the complexity and environmental significance of the operation itself. An organization can choose to plan and establish processes to enhance its ability to implement controls in a consistent manner.

A common approach to establishing operational controls can include:

a) choosing a method of control;

b) selecting acceptable operating criteria, e.g. operating features of machines and measurements or weight or temperature;

c) establishing processes, as needed, that define how identified operations are to be planned, carried out and controlled;

d) documenting these processes, as needed, in the form of instructions, signs, forms, videos, photos, etc.;

e) applying technological options, such as automated systems, materials, equipment and software.

Operational controls can also include provisions for measurement, monitoring and evaluation, and for determining whether operating criteria are being met.

Once operational controls have been established, the organization should monitor the continuing application and effectiveness of these controls, as well as plan and take any action needed.

8.2 Emergency preparedness and response

In preparing a response to an emergency situation, consideration should be given to the initial environmental impact that can result and any secondary environmental impact that can occur as a result of responding to the initial environmental impact. For example, in responding to a fire, the potential for air pollution should be considered.

When preparing a response to reasonably foreseeable emergency situations, special attention should be paid to start-up and shutdown and abnormal operating conditions. See 6.1.1 for the determination of emergency situations.

An organization should be prepared for different types of situations, such as small scale spillages of chemicals, failure of emission abatement equipment, or serious environmental situations endangering humans and environment to a broad extent. The organization should be prepared for each type of reasonably foreseeable emergency situation.

It is the responsibility of each organization to establish emergency preparedness and response plans that suits its own particular needs. In establishing its plans, the organization should include consideration of:

— actual and potential external environmental conditions, including natural disasters;

— the nature of on-site hazards, e.g. flammable liquid, storage tanks, compressed gases, and measures to be taken in the event of spillages or accidental releases;

— the most likely type and scale of an emergency situation;

— equipment and resources needed;

— the potential for (an) emergency situation(s) at a nearby facility (e.g. plant, road, railway line);

— the most appropriate method(s) for responding to an emergency situation;

— the actions required to minimize environmental damage;

— emergency organization and responsibilities;

— evacuation routes and assembly points;

— a list of key personnel and aid agencies, including contact details, e.g. fire department and spillage clean-up services;

— the possibility of mutual assistance from neighbouring organizations;

— internal and external communication processes;

— mitigation and response action(s) to be taken for different types of emergency situation(s);

— process(es) for a post-emergency evaluation, including evaluation of the planned response, to establish and implement corrective and preventive actions;

— periodic testing of emergency response procedure(s);

— information on hazardous materials, including each material's potential impact on the environment, and measures to be taken in the event of accidental release;

— training or competency requirements, including those for emergency response personnel and testing its effectiveness.

In planning for emergency preparedness, the links with other management systems relating to business continuity and occupational health and safety can be considered.

The organization should maintain documented information to the extent necessary to have confidence that the processes needed for emergency preparedness and response are carried out as planned.

9 Performance evaluation

9.1 Monitoring, measurement, analysis and evaluation

9.1.1 General

An organization should have a systematic approach for monitoring, measurement, analysis and evaluation of its environmental performance on a regular basis. This can enable the organization to report and communicate accurately on its environmental performance.

Monitoring generally refers to processes where observations are made over time, without necessarily using monitoring equipment. Measurement generally refers to processes where equipment is typically used to determine quantitative or qualitative properties. Measurement therefore can imply the need for additional controls to ensure the sustained reliability of such equipment (e.g. calibration), where appropriate.

An organization should determine what needs to be monitored and measured taking into account its environmental objectives, significant environmental aspects, compliance obligations and operational controls. This should include determining the frequency and the methods used to collect the data.

In order to focus its resources on the most important measurements, the organization should select relevant indicators that are easy to understand and that provide useful information for evaluation of its environmental performance. The selection of indicators should reflect the nature and scale of the organization's operations and be appropriate to its environmental impacts. Examples of indicators include physical parameters, such as temperatures, pressures, pH and material usage, energy efficiency, choice of packaging and transportation. For guidance on selecting indicators, see ISO 14031.

Monitoring and measuring can serve many purposes in an environmental management system, such as:

— tracking progress on achieving environmental policy commitments, and environmental objectives, and continual improvement;

— providing information to determine significant environmental aspects;

— collecting data on emissions and discharges to fulfil compliance obligations;

— collecting data on use of water, energy, or raw materials to achieve environmental objectives;

— providing data to support or evaluate operational controls;

— providing data to evaluate the organization's environmental performance;

— providing data to evaluate the performance of the environmental management system.

NOTE 1 Further guidance on environmental performance evaluation is provided in ISO 14031.

NOTE 2 Guidance on quantitative environmental information is provided in ISO/TS 14033.

Monitoring and measuring should be conducted under controlled conditions with appropriate processes for assuring the validity of results, such as:

— selection of sampling and data collection techniques;

— provision of adequate calibration or verification of measuring equipment;

— use of measuring standards traceable to international or national measuring standards;

— use of competent personnel;

— use of suitable quality control methods that includes data interpretation and trend analysis.

Organizations should consider, where appropriate, using laboratories whose testing techniques have been either accredited by a national accreditation body or approved by the regulators. If accreditation or approval is not possible or available, then the organization can consider other suitable methods to verify the accuracy of results, such as split sample analysis, testing of certified reference materials and proficiency test programmes.

The results of monitoring and measuring should be analysed and used to identify nonconformity, adherence to limits specified by compliance obligations, performance trends and opportunities for continual improvement. Data analysis can include consideration of the data quality, validity, adequacy and completeness necessary to produce reliable information. Statistical tools can be used to increase the reliability of decisions on whether or not a desired result was achieved. These tools can include, as appropriate, graphical techniques, indexing, aggregating, or weighting.

Written procedures for conducting monitoring, measurement, analysis and evaluation can help to provide consistency, reproducibility and reliability of the data produced. The results of monitoring, measurement analysis and evaluation should be retained as documented information.

9.1.2 Evaluation of compliance

An organization should establish a process to evaluate the extent to which its compliance obligations are fulfilled, by monitoring, measuring, analysing and reviewing its performance against its compliance obligations, as determined in 4.2 and 6.1.3. This process can help the organization demonstrate its commitment to fulfil compliance obligations, understand its compliance status, reduce the potential for regulatory violations and avoid adverse action from its interested parties.

Performance against all compliance obligations should be evaluated periodically, although the frequency and the timing of each can differ depending on:

— the organization's legal requirements;

— relevance of other requirements adopted as compliance obligations;

— changes to the compliance obligations;

— the organization's past performance relating to a compliance obligation, including the potential adverse effects associated with non-compliance;

— expected variations in performance of a process or activity, e.g. the performance of a waste water treatment plant can vary depending on the volume of waste water received.

Evaluation of compliance should be an iterative process which uses the output from other areas of the environmental management system to determine whether the organization is fulfilling its compliance obligations. Methods used for evaluation of compliance can include gathering information and data, for example through:

— facility tours or inspections;

— direct observations or interviews;

— project or work reviews;

— review of sample analysis or test results, and comparison to regulatory limits;

— verification sampling or testing;

— review of legally required documented information (e.g. hazardous waste manifests, regulatory submittals).

Internal audits (see 9.2) can be used to determine the effectiveness of the process(es) established and implemented to evaluate fulfilment of compliance obligations, but they cannot be used to demonstrate that the organization's compliance obligations have been fulfilled. However, auditing techniques can be applied by the organization to evaluate the fulfilment of its compliance obligations.

Compliance obligations can be taken into account in a variety of environmental management system processes, such as:

— determination of significant environmental aspects (see 6.1.2.5) and risks and opportunities that need to be addressed (see 6.1.1);

— planning of actions (see 6.1.4);

— establishing environmental objectives (see 6.2.2);

— development of processes for awareness (see 7.3), external communication (see 7.4.3), operational planning and control (see 8.1) and monitoring and measurement (see 9.1).

The effectiveness of these processes and the results achieved can also provide evidence of fulfilment of compliance obligations.

The organization can choose to review reports and communication provided by interested parties (e.g. regulatory site inspection reports or customer audits), or communicate with interested parties specifically in relation to its compliance obligations.

Where a failure or potential failure to fulfil a compliance obligation is identified, the organization should take action. The organization's nonconformity and corrective action process (see 10.2) could be used to deal with needed corrections. Where appropriate and as required, the organization should communicate or report on failure to fulfil a compliance obligation to the relevant interested party/parties (see 7.4).

A non-compliance is not necessarily elevated to a management system nonconformity if, for example, it is identified and corrected by the environmental management system processes.

By evaluating compliance, the organization gains knowledge and understanding of its compliance status. The frequency of compliance evaluations should be appropriate to keep this knowledge and understanding up to date. Evaluations should be conducted in a manner that provides timely input to the management review (see 9.3) so that top management can review the organization's fulfilment of its compliance obligations and maintain awareness of the organization's compliance status.

The organization should retain documented information as evidence of its evaluation of compliance. This could include:

— reports of the results of compliance evaluations;

— internal and external audit reports;

— internal and external communications and reports.

9.2 Internal audit

Internal audits of an organization's environmental management system should be conducted at planned intervals to determine and provide information to management on whether the system conforms to planned arrangements and has been properly implemented and maintained. The results can be used to identify opportunities for improving the organization's environmental management system.

The organization should establish an internal audit programme to direct the planning and conduct of internal audits and to identify the audits needed to achieve the audit programme objectives. The audit programme, and the frequency of internal audits, should be based on the nature of the organization's operations, in terms of its environmental aspects and potential environmental impacts, risks and opportunities that need to be addressed, the results of previous internal and external audits, and other relevant factors (e.g. changes affecting the organization, monitoring and measurement results and previous emergency situations). Outsourced processes that have audit provisions as controls should be considered in the planning of the audit programme.

The organization should determine the frequency of the internal audits. The audit programme can, for example, cover one year or multiple years, and can consist of one or more audits.

Each internal audit need not cover the entire system, so long as the audit programme ensures that all organizational units and functions, system elements and the full scope of the environmental management system are audited periodically.

The internal audits should be planned and conducted by an objective and impartial auditor or audit team, aided by technical expert(s), where appropriate, selected from within the organization or from external sources. Their collective competence should be sufficient to achieve the audit objective and to meet the scope of the particular audit and provide confidence as to the degree of reliability that can be placed on the results.

The results of an internal audit can be provided in the form of a report as the basis for verification and used to correct or prevent specific nonconformities, or to achieve one or more audit programme objectives, and to provide input to the management review.

The organization should retain documented information as evidence of implementation of the audit programme and the audit results.

NOTE Guidance on environmental management system auditing is provided in ISO 19011.

9.3 Management review

An organization's top management should, at intervals that it determines, conduct a review of its environmental management system to evaluate the system's continuing suitability, adequacy and effectiveness. This review should cover the environmental aspects of activities, products and services that are within the scope of the environmental management system.

A management review can coincide with other management activities (e.g. board meetings, operational meetings) or can be conducted as a separate activity. Management review can be coordinated with the organization's planning and budgeting cycle, and environmental performance can be evaluated during top management's review of its overall business performance, so that decisions on priorities and resources for the environmental management system are balanced with other business priorities and resource needs.

Inputs to the management review can include:

— results of audits and evaluations of fulfilment of compliance obligations;

— communication from external interested parties, including complaints;

— the environmental performance of the organization;

— the extent to which the organization's environmental objectives have been achieved;

— status of corrective actions;

— follow-up actions from previous management reviews;

— changing circumstances, including:

  — the organization's context;

  — changes in the organization's activities, products and services;

  — results of the evaluation of significant environmental aspects and risks and opportunities that need to be addressed from planned or new developments;

  — changes in the organization's compliance obligations;

  — the views of interested parties;

  — advances in science and technology;

  — lessons learned from emergency situations;

— adequacy of resources;

— recommendations for improvement.

Outputs from the review of the environmental management system should include decisions on:

— the system's suitability, adequacy and effectiveness;

— opportunities for continual improvement;

— the need for changes to physical, human and financial resources;

— actions if needed when environmental objectives have not been achieved;

— actions related to possible changes to the environmental policy, environmental objectives and other elements of the environmental management system;

— actions related to improving integration of the environmental management system with other business processes, if needed;

— implications for the strategic direction of the organization.

Examples of documented information retained as evidence of the results of management review include copies of meeting agenda items, lists of attendees, presentation materials or hand-outs, and management decisions recorded in reports, minutes, or tracking systems.

Top management can decide who should participate in the management review. Typically, this includes environmental staff, managers of key units, and top management. Representatives of other management systems (e.g. quality, occupational health and safety, energy, business continuity) may also participate for integration purposes.

10 Improvement

10.1 General

Improvement is integral to an effective environmental management system. The organization should identify opportunities for improvement as a result of:

— monitoring, measurement, analysis and evaluation related to environmental performance and fulfilment of compliance obligations (see 9.1);

— audits of its environmental management system (see 9.2);

— management review (see 9.3).

In order to achieve the intended outcomes of the environmental management system, the organization should take actions necessary to address identified opportunities for improvement, including controlling and correcting nonconformity, and enhance its environmental performance through continual improvement of the suitability, adequacy and effectiveness of its environmental management system.

10.2 Nonconformity and corrective action

For an environmental management system to be effective on an ongoing basis, an organization should have a systematic approach for identifying nonconformity, taking action(s) to mitigate any adverse environmental impact, analysing the cause of the nonconformity, and taking corrective action. This approach helps the organization implement and maintain the environmental management system.

Nonconformity is non-fulfilment of a requirement which can be stated in relation to the environmental management system or in terms of environmental performance. Situations can occur where part of the environmental management system cannot function as intended or environmental performance requirements are not met.

Examples of such situations include:

— environmental management system performance nonconformity, such as:

  — the environmental aspects of products are not evaluated for significance;

  — responsibilities for emergency preparedness and response are not assigned;

  — failure to periodically evaluate fulfilment of compliance obligations.

— environmental performance nonconformity, such as:

  — energy reduction objectives are not achieved;

— maintenance requirements are not performed as scheduled;

— operating criteria (e.g. permitted limits) are not met.

The internal audit process described in 9.2 is one way of periodically identifying nonconformities. Another way is to assign responsibility for identification of nonconformities, and reporting potential or actual problems to all persons working under the organization's control.

Once a nonconformity is identified, it should be investigated to determine the cause(s), so that corrective action can be focused on the appropriate part of the environmental management system. In developing a plan for addressing a nonconformity, the organization should consider what actions it should take to resolve the problem, what changes should be made to correct the situation and restore normal operation(s), and what should be done to eliminate the cause(s) and prevent the problem from recurring or occurring elsewhere. The character and timing of such actions should be appropriate to the nature and scale of the nonconformity and the environmental impact.

If a potential problem is identified but no actual nonconformity exists, action can be taken to prevent a nonconformity from occurring. Potential problems can be identified using methods such as extrapolating corrective action of actual nonconformities to other applicable areas where similar activities occur, trend analysis, or hazard operability studies, and should be considered when planning actions to address risks and opportunities identified in 6.1.1.

When the actions result in changes to the environmental management system, related documented information and competence needs should be updated, as applicable, and the changes should be communicated to those who need to know. Management should ensure that corrective actions and actions to prevent problems before they occur have been implemented, and that there is systematic review and follow-up to ensure the effectiveness of the actions taken.

The organization should retain documented information as evidence of the nature of the nonconformities and subsequent actions taken, and the results of corrective actions taken.

10.3 Continual improvement

10.3.1 Opportunities for improvement

Continual improvement is a key attribute of an effective environmental management system to enhance environmental performance. It can be accomplished through the achievement of environmental objectives and the overall enhancement of the environmental management system or any of its components. An organization can encourage all employees to contribute ideas for improvement.

The organization should continually evaluate its environmental performance and the performance of its environmental management system processes to identify opportunities for improvement. Top management should be involved directly in this evaluation through the management review process.

The identification of environmental management system deficiencies also provides significant opportunities for improvement. To realize such improvements, the organization should know what deficiencies exist and understand why they exist. This can be achieved by analysing the root causes(s) of environmental management system deficiencies.

Some useful sources of information for continual improvement include:

— experience gained from nonconformities and related corrective actions;

— external benchmarking against best practices;

— trade associations and peer groups;

— new legislation or proposed changes to existing legislation;

— environmental management system and other audit results;

— evaluation and analysis of monitoring and measurement results;

— literature on advancements in technology;

— views of interested parties, including employees, customers and suppliers.

10.3.2 Implementation of continual improvement

When opportunities for improvement are identified, they should be evaluated to determine what actions should be taken. The actions for improvement should be planned and changes to the environmental management system should be implemented accordingly.

Improvements need not take place in all areas simultaneously (see 4.4.1). Continual improvement of the environmental management system can become increasingly difficult to achieve as the system's performance is enhanced. Examples of improvement actions are provided in Practical Help Box 20.

Practical Help Box 20 — Examples of improvement

Some examples of improvement include:

— establishing a process for evaluating new materials to promote the use of less harmful materials;

— improving employee training on materials and handling to reduce the organization's generation of waste;

— introducing waste water treatment processes to allow water reuse;

— implementing changes in default settings on reproduction equipment to print two-sided copies at a printing office;

— redesigning delivery routes to reduce fossil fuel use by transportation companies;

— establishing environmental objectives to implement fuel substitution in boiler operations and reduce particulate emissions;

— developing a culture of environmental improvement within the organization;

— developing partnerships with interested parties;

— considering sustainability in the organization's business processes.

Annex A
(informative)

Examples of activities, products and services and their associated environmental aspects and environmental impacts, risks and opportunities, and actions

Table A.1 — Examples of activities, products and services and their associated environmental aspects and environmental impacts, risks and opportunities, and actions

Activity/product/ service	Environmental aspects	Actual and potential environmental impacts	Risks and opportunities that need to be addressed	Planning to take action
Activity: Oil-fired boiler operations				
Operation of boiler	Use of heating oil	Depletion of non-renewable natural resources	**Risks (potential adverse effects)** — Heating oil not available — Cost of heating oil increases **Opportunities (potential beneficial effects)** — Replace boiler heating source by solar energy — Reduce operating costs	Finance department asked to monitor fuel prices, compare future cost scenarios and conduct cost benefit analysis Establish an environmental objective to replace boiler heating source by solar energy
	Emission of sulphur dioxide, nitrogen oxides and CO_2 (i.e. greenhouse gas)	Respiratory impacts on local residents Acid rain impacts on surface water Global warming and climate change	**Risks (potential adverse effects)** — Failure to fulfil compliance obligations — Possible fine — Negative publicity received **Opportunities (potential beneficial effects)** — Reduce emission: install flue gas desulphurisation unit	Put in place operational controls to ensure compliance obligations are fulfilled Establish an environmental objective to install appropriate emission abatement equipment
	Discharge of heated water	Changes to water quality (e.g. temperature)	**Opportunities (potential beneficial effects)** — Recover heat from wastewater — Reduce operating costs	Establish an environmental objective to install a heat recovery system
Storage of boiler fuel in underground tanks	Release of oil to land (emergency situation)	Pollution of soil Pollution of groundwater	**Risks (potential adverse effects)** — Clean-up costs — Fines **Opportunities (potential beneficial effects)** — Replace boiler heating source by solar energy	Develop emergency plans to deal with tank leakage and clean-up response Put in place operational controls to test tank for leakage periodically Establish an environmental objective to replace boiler heating source by solar energy

Table A.1 *(continued)*

Activity/product/ service	Environmental aspects	Actual and potential environmental impacts	Risks and opportunities that need to be addressed	Planning to take action
Delivery and transfer of heating oil	Uncontrolled release of heating oil to surface water drain (emergency situation)	Surface water pollution Bioaccumulation of toxic substances in fauna	**Risks (potential adverse effects)** — Clean-up costs — Fines — Negative publicity leading to reduction in company value	Develop delivery process Develop emergency plans to deal with uncontrolled release and clean-up response
Activity: Road construction				
Construction during heavy rains	Storm water runoff (abnormal condition)	Soil erosion Surface water pollution Degradation of wetland habitat	**Risks (potential adverse effects)** — Clean-up costs — Fines — Negative publicity (due to habitat degradation) leading to loss of future construction projects	Implement operational controls to retain silt runoff Develop emergency plans to mitigate uncontrolled runoff Develop a clean-up response
Activity: Agriculture: Rice cultivation				
Flooding and preparation of paddy fields	Water use	Depletion of groundwater supply	**Risks (potential adverse effects)** — Climate change (e.g. reduced rainfall) — Increased reliance on artesian wells and aquifers — Higher cost of water **Opportunities (potential beneficial effects)** — Find low water intensity rice species (i.e. more drought resistant) — Grow alternative crop	Undertake water availability modelling based on future climate change scenarios Invest in research opportunities
	Pesticide use	Pollution of soil Bioaccumulation of toxic substances in fauna resulting in chronic adverse health effects or species loss	**Risks (potential adverse effects)** — Groundwater pollution — Pesticide resistant organisms — Increased use of pesticides — Increased costs **Opportunities (potential beneficial effects)** — Use organic farming methods — Integrated pest management — Reduce pesticide costs	Investigate potential to minimize/substitute pesticide use Operational control of pesticide application Research current organic farming methods
	Emission of CO_2 and methane (i.e. greenhouse gases)	Global warming and climate change	**Risks (potential adverse effects)** — Detrimental to image of organization and industry	Research potential to offset carbon

Table A.1 *(continued)*

Activity/product/ service	Environmental aspects	Actual and potential environmental impacts	Risks and opportunities that need to be addressed	Planning to take action
Product: Boiler				
High-efficiency boiler design	Reduction in fuel usage	Conservation of non-renewable energy sources (beneficial impact)	**Opportunities (potential beneficial effects)** — Increased sales — Improved reputation due to innovative designs	Marketing campaign relating to cost and carbon savings
Non-hazardous material substitution in the design phase	Reduction in hazardous waste generation at end of life	Reduction in hazardous waste to landfill (beneficial impact)	**Opportunities (potential beneficial effects)** — Increased sales — Reduced fines from producer responsibility legislation	Provide information with product on appropriate recovery
Product: Printer toner cartridge				
Toner cartridge designed for reuse	Reduction in the use of raw materials and energy Reduction in solid waste generation at the end of life	Conservation of non-renewable energy sources (beneficial impact) Reduction in waste to landfill (beneficial impact)	**Opportunities (potential beneficial effects)** — Offer service activities — Longer term relationships with customers	Provide information at point of sale of product on how to recycle cartridge
Product: Air conditioner				
Consumer operation of unit	Use of electricity (organization may be able to "influence" aspect)	Depletion of non-renewable natural resources	**Risks (potential adverse effects)** — Loss of sales to more competitive manufacturers	Benchmark performance against other competitors Invest in more research and development in relation to energy efficiency
	Use of refrigerants	Global warming and potential ozone depletion when air condition system leaks	**Risks (potential adverse effects)** — Negative publicity from using refrigerants with high global warming and ozone depletion potential **Opportunities (potential beneficial effects)** — New service offering qualified engineers	Establish partnership with research institute on alternatives to refrigerants
	Solid waste generation (organization may be able to "influence" aspect)	Increased waste to landfill	**Risks (potential adverse effects)** — Increased cost on tipping fees — Landfill bans	Research recycling or reuse options
Service: Maintenance and repair services				
Chemical handling and use	Uncontrolled release during fire or explosion (emergency situation)	Air pollution Pollution of soil Injury to humans	**Risks (potential adverse effects)** — Clean-up costs — Fines — Detrimental publicity	Establish environmental objective to eliminate chemical use
Subcontracted air conditioner repair	Release of ozone depleting substances (i.e. refrigerant) (abnormal condition)	Ozone depletion	**Risks (potential adverse effects)** — Fines — Detrimental publicity	Retender contract to ensure improved maintenance

Table A.1 *(continued)*

Activity/product/ service	Environmental aspects	Actual and potential environmental impacts	Risks and opportunities that need to be addressed	Planning to take action
Service: Office support services				
Document printing	Use of electricity Use of paper	Depletion of natural resources	**Risks (potential adverse effects)** — Loss of business to more competitive paperless office technology	Research opportunities to provide paperless office technology
Two-sided copying	Reduction in natural resource use (organization may be able to "influence" aspect)	Conservation of natural resources (beneficial impact)	**Opportunities (potential beneficial effects)** — Reduced costs	Develop marketing literature to promote environmental and cost benefits to potential customers
Recycling waste paper	Reduction of solid waste generation (organization may be able to "influence" aspect)	Reduction in waste to landfills (beneficial impact)	**Opportunities (potential beneficial effects)** — Reduced costs — Positive publicity	
Service: Transportation and distribution of products and services				
Routine fleet maintenance (including oil changes)	Reduced emission of nitrogen oxides Discharge of oily wastes	Reduced air pollution (beneficial impact) Pollution of soil	**Risks (potential adverse effects)** — Fines — Clean-up costs **Opportunities (potential beneficial effects)** — Recycle oily wastes — Reduced operating costs	Communicate environmental benefits to those undertaking maintenance Develop operational control process to manage waste Consider switching to vehicles powered by electricity during re-capitalization
Fleet operation	Fuel use	Depletion of non-renewable fossil fuels	**Risks (potential adverse effects)** — Fuel availability — Higher fuel costs **Opportunities (potential beneficial effects)** — Use alternative fuel (CNG/LNG) — Reduce fuel costs	Establish environmental objective to reduce fuel use
	Emission of nitrogen oxides	Air pollution Global warming and climate change	**Risks (potential adverse effects)** — Introduction of stricter fuel emission standards	Research methods to reduce emissions
	Generation of noise	Discomfort or inconvenience to local residents	**Risks (potential adverse effects)** — Detrimental to image of organization	Provide driver training Impose strict operating hours
Packaging	Take back of packaging	Reduced waste to landfill	**Opportunities (potential beneficial effects)** — Improved relationship with client	Promote service as part of contract negotiations

Table A.2 — Examples of activities, products and services and their associated environmental aspects, environmental objectives, targets, programmes, indicators, operational control, and monitoring and measurement

Aspects	Objectives	Targets	Programmes	Indicators	Operational control	Monitoring and measurement
Activity: Oil-fired boiler operations						
Use of heating oil	Reduce the use of non-renewable resources	Reduction of the use of heating oil (based on current year use) by 20 % within 1 year	Installation of more efficient fuel burners	Project plan milestones Use of heating oil per working hour of the boiler	Processes for installation of modified burners Processes for recording oil use	Quarterly evaluation of progress on project plan Monthly tracking of oil use rates
Discharge of heated water	Minimize the negative environmental impacts to watershed quality from elevated effluent temperature	Reduce mean daily temperature of discharge water by 5°C by 2018.	Facility and design engineers reengineer operations to extract and reuse heat from wastewater (i.e. cogeneration).	Daily mean temperature of water discharge Watershed water quality parameters Number and diversity of fish/fauna species in watershed	Water quality sampling and analysis processes Fish/fauna sampling plan Cogeneration operational processes Engineering controls	Continuous monitoring of discharge temperature Quarterly monitoring of watershed water quality
Product: Air conditioner						
Use of electricity	Encourage the consumer to conserve energy	Reduce the operating temperature by 5 % based on last year's operating temperature by end of current year	Educate consumer on environmental impacts of excessive energy use through distribution of energy-efficient materials with product (e.g. cost savings, reduced adverse environmental impacts)	Increased customer interest in energy conservation Increased customer interest in new energy efficient products	Design of effective product material Use of electrical energy Consideration of customer energy efficiency requests in new product design	Survey of users
Generation of solid waste	Reduce consumer solid waste generation from disposal of packaging by reducing quantity of packaging materials used	Achieve 5 % reduction in packaging material for current product line by 2018	Redesign product packaging (engineering dept., 6 months) Implement production changes (6 months) Test run and full production	Quantity of packaging material per unit % reduction in packaging material used for product line Estimated reduction in consumer solid waste generation, volume/unit	Design control processes Product packaging processes	Quarterly monitoring of quantity of packaging material used, e.g. purchased minus scrap Product units shipped in product line

Table A.2 *(continued)*

Aspects	Objectives	Targets	Programmes	Indicators	Operational control	Monitoring and measurement
Service: Transportation and distribution of products and services (fleet maintenance)						
Emission of nitrogen oxides (NOx)	Increase positive environmental impact on air quality by improving effectiveness of fleet maintenance	Achieve 25 % reduction of NOx by 2018	Identify key maintenance parameters for NOx reduction Revise maintenance programmes to incorporate key NOx reduction tasks Optimize fleet maintenance schedule through computer programme	% on-time maintenance NOx emissions/km	Maintenance processes Training of maintenance technicians Computerized notification of scheduled maintenance	Tracking of maintenance frequency versus schedule Monitoring of vehicle fuel NOx efficiency Quarterly testing of vehicle NOx emissions Annual assessment of NOx reductions achieved
Generation of waste oil	Manage oily wastes in conformity with requirements	Achieve conformity with oily waste disposal requirements at service centres within one year	Develop and implement waste management training programme at service centres	% of service centre employees trained Number of waste disposal nonconformities % of oily waste disposed per requirements	Waste management processes Training programme for service centre employees	Monitoring of service-centre employee training conducted Tracking of oily waste disposal quantities and disposal methods

Table A.3 — Examples of risks and opportunities that need to be addressed and actions to address them associated with compliance obligations

Compliance obligations	Risks and opportunities that need to be addressed	Planning to take action
Emerging legal requirement	**Risks (potential adverse effects)** Failure to identify and comply with new or changing compliance obligations can damage the organization's reputation and can lead to fines	Develop control process(es) to ensure that the monitoring of the regulatory landscape is effective to improve the identification of emerging requirements
Regulator request for information	**Risks (potential adverse effects)** Failure to respond, delayed response, or inaccurate response can lead to greater scrutiny from regulatory agency **Opportunities (potential beneficial effects)** Timely, pro-active and transparent communication can strengthen the organization's relationship with regulators	Develop more effective communication process(es) for receiving and responding to communication from regulatory officials, including reporting schedules Apply the internal audit programme to make recommendations to improve timeliness and transparency of communication, and take action for continual improvement of communication processes if needed
Regional customer requirement for end-of-life product take-back	**Risks (potential adverse effects)** Increase in required resources and logistics to support regional product take-back can significantly increase cost per unit of production **Opportunities (potential beneficial effects)** Implementing product take-back for all customers worldwide can enhance the organization's reputation as an environmental steward, and can lead to new business opportunities	Establish objectives to develop and implement design for remanufacture of products in support of take-back programme, in order to conserve resources and reduce cost for raw materials

Table A.4 — Examples of risks and opportunities that need to be addressed and actions to address them associated with other issues and requirements

Other issues and requirements	Risks and opportunities that need to be addressed	Actions to address risks and opportunities
Taxes on carbon (asset management / financial services organizations)	**Risks (potential adverse effects)** Stranded assets, such as known reserves of coal that may remain unburned, due to the transition to a low carbon economy **Opportunities (potential beneficial effects)** Higher financial return realized by investment in renewables / clean technology	Establish objectives to diversify portfolios by increasing investments in renewables and decreasing investments in emissions intensive sectors
Water scarcity (food and beverage sector organizations)	**Risks (potential adverse effects)** Production constraints due to limited availability of water **Opportunities (potential beneficial effects)** Increased efficiency realized through process optimization	Apply engineering controls to reduce water loss in the production process Establish performance indicators and monitor/measure water use per unit of production

Annex B
(informative)

Phased approach to implementing an environmental management system (based on ISO 14005)

An organization can develop a complete environmental management system when the scope of the environmental management system includes all of the organization's activities, products and services and these are addressed using all the elements of an environmental management system to their full extent. Developing a complete environmental management system all at once can prove difficult for some organizations. For these organizations, a phased approach offers several advantages, such as the ability to readily evaluate how the time and money put into an environmental management system provides a return. The organization can see how environmental performance improvements can help to reduce costs, improve their community relations, enable them to live up to customer expectations and assist them in demonstrating fulfilment of compliance obligations. The organization can track the benefits of their environmental management system while they implement the system step-by-step, adding or expanding elements that provide value to the organization. Possible approaches to the phased development of an environmental management system include the following.

a) Undertake a single project focusing on just one or a limited number of environmental aspects. This would provide familiarity with the basic elements of an environmental management system, allow the organization to experience some of the benefits of managing environmental aspects in a systematic way and help improve environmental performance, and thus secure management support for implementing an environmental management system.

b) Use fixed steps to follow a progression of elements (see Figure B.1). This approach can suit organizations which, after carrying out an initial environmental project, decide to adopt this structured approach to managing their environmental aspects.

c) Use a selection of steps that may be implemented consecutively or concurrently. This selection of steps may be chosen to address specific environmental issues, such as fulfilment of compliance obligations, including meeting the needs of interested parties, or improving environmental performance. This approach may suit organizations that wish to develop the environmental management system at their own pace, within the resources available to them to ensure the effectiveness of their environmental management system.

An implementation plan may be useful, as it can identify:

— the approach to be adopted;

— the timescale in which it should be achieved;

— the resources required;

— the roles and responsibilities of those implementing the plan;

— the documented information required;

— the methods by which progress can be consistently monitored and measured.

Progress can be measured in terms of achievement of the outcomes specified at the end of each phase and conformance with the implementation plan. Measuring progress towards implementing an environmental management system is useful to ensure the efficient use of resources and achievement of the organization's environmental objectives.

Figure B.1 shows an implementation of an environmental management system in five phases. Phase 1 corresponds to the implementation of a specific project. Phases 2, 3, 4 and 5 correspond to a sequential implementation of the main elements of an environmental management system. When an organization has sufficient commitment to begin implementation of an environmental management system, it can start at phase 2.

The extent to which the supporting elements develop grows as the environmental management system is implemented is demonstrated by the shape of the triangle. The extent to which the supporting elements are needed grows as the environmental management system is implemented.

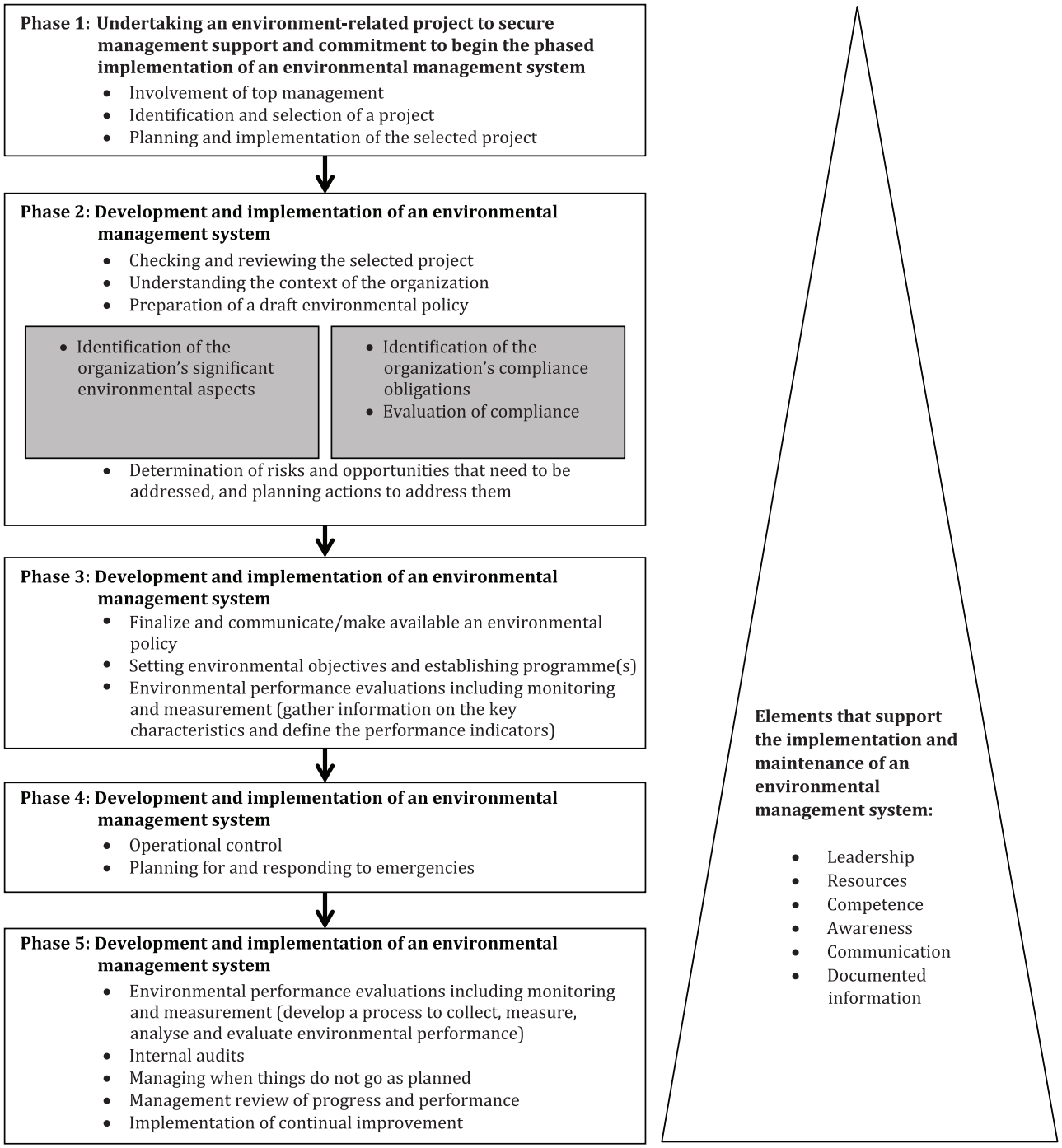

Figure B.1 — Example of implementation in five phases

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