# 2 Overview of Environmental Standards

## 2.1. Introducing the EMS Standards

### 2.1.1 The ISO 14000 Series, EMAS, and Other International Standards

Since an EMS cannot be implemented in a random manner, standards have been developed to enable well structured and comparable EMSs. This chapter presents both past and current standards in environmental management.

In the early 1990s, several countries developed their own EMS standards, with British BS7750 probably being the most prominent. However, They were all withdrawn in favour of ISO 14001, which was implemented in 1996 and updated in November 2004, and which then became the global EMS standard. As well, the EU member states have EMAS (Eco-Management and Audit Scheme), a European Union regulation that incorporates the ISO 14001 standard. Organisations applying an EMS according to these standards build up a system through which environmental protection can be integrated into both long-term strategy and day-to-day management. These standards benefit the organisations themselves and the economy as a whole. Adopting the standards can lead to natural resources and the biosphere being used in a more sustainable way, and enhancement of economic performance.

**Main Contents of this Chapter**

- Detailed information on the ISO 14000 series (with an emphasis on ISO 14001).
- Detailed information on EMAS
- A comparison of ISO 14001 and EMAS.
- Other international standards that are directly or indirectly linked to environmental management.
- Other elements that can be included in an environmental management system.

### 2.1.2 The ISO 14000 Series

ISO 14000 is a series of internationally recognized standards for structuring an organisation's EMS and managing the environmental performance of the system to induce environmental improvement and cost savings. The series of standards are managed by the International Organisation for Standardization (ISO). There are 22 standards, guides, technical reports and documents under development of which 16 have were released as of December 2005. These documents, illustrated in Figure 2.1, address the following subjects:

- EMS (ISO 14001, ISO 14004 and ISO/TR 14061).
- Environmental Auditing and EMS Auditing (ISO 19011).
- Guidelines for Environmental Auditing – Audit Programmes, Reviews & Assessments (ISO 14015).
- Environmental Labelling (ISO 14020 and ISO 14021).

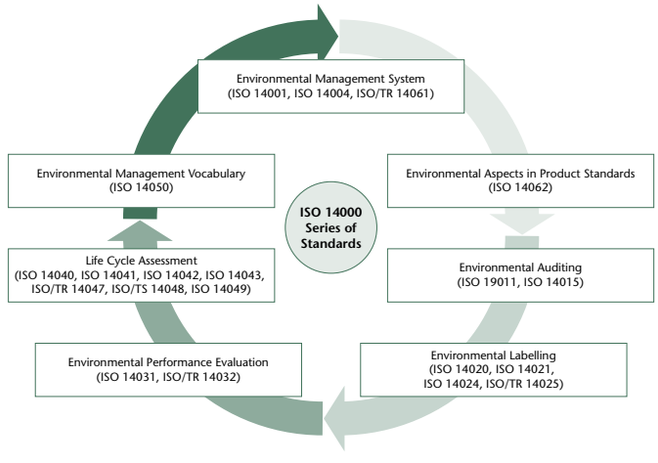


**Figure 2.1** *The ISO 14000 Series of Standards [International Network for Environmental Management (INEM)].*

- Environmental Labelling – Practitioner Programmes – Guiding Principles, Practices and Certification Procedures of Multiple Criteria Programmes (ISO 14024 and ISO/TR 14025).
- Environmental Performance Evaluation (ISO 14031 and ISO/TR 14032).
- Environmental Management through Life Cycle Assessment (ISO 14040, ISO 14041, ISO 14042, ISO 14043, ISO/TR 14047, ISO/TS 14048 and ISO/TR 14049).
- Vocabulary of Environmental Management Terms (ISO 14050).
- Guide for the Inclusion of Environmental Aspects in Product Standards (ISO 14062).

This book focuses mainly on the ISO 14001 standard. It is the only standard in the ISO 14000 series that is auditable using the conformity assessment process. Thus, it is the only standard in the series for which an organisation can be certified.

### 2.1.3 A Short History of EMS Standards and ISO 14001

The world's first standard for EMS was BS 7750. It was developed and published by the British Standards Institution (BSI) in 1992. This standard was the model for the ISO 14000 series.

The ISO 14000 series of standards was introduced due to the ISO's commitment to sustainable business development. In 1991, ISO formed a Strategic Advisory Group on the Environment (SAGE) to assess the need for international environmental management standards and to recommend an overall strategic plan for such standards. The 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro carried the discussion on environmental management further. In 1992, based on the SAGE findings, ISO formed Technical Committee 207 for Environmental Management Standards (TC 207). Finally, in 1996, ISO 14001 was introduced as a means to support self-regulation measures in contrast to public regulation. ISO 14001 was then adopted in developed and developing countries. As of December 2005, the number of organisations that had introduced an EMS according to ISO 14001 was over 90,000. The countries with the largest number of organisations that have introduced ISO 14001, in absolute figures, are Japan, Germany, Spain, UK and Sweden [Peglau, R. and Tsujii, K., April 2005], see Figure 2.5.

**Figure 2.2** *The ISO logotype.*

## 2.2. The ISO 14000 Series of Standards

### 2.2.1.Organisation-based and Product-based Standards

The standards in the ISO 14000 series fall into *two major groups*: organisation-based standards and product-based standards, as follows:

**Organisation Evaluation:**

- Environmental Management Systems (ISO 14001 and ISO 14004).
- Environmental Performance Evaluation (ISO 14031 and ISO/TR 14032).
- Environmental Auditing (ISO 19011 and ISO 14015).

**Products, Services and Processes:**

- Life Cycle Assessment (ISO 14040, ISO 14041, ISO 14042, ISO 14043, ISO/TR 14047, ISO/TS 14048 and ISO/TR 14049).
- Environmental Labelling (ISO 14020, ISO 14021, ISO 14024 and ISO/TR 14025).
- Environmental Aspects in Product Standards (ISO 14062).

The organisation-based standards provide comprehensive guidance for establishing, maintaining and evaluating an EMS. They are also concerned with other organisation-wide environmental systems and functions.

The product-based standards are concerned with determining the environmental impacts of products and services over their life cycles, and with environmental labels and declarations. These standards help an organisation gather information needed to support its planning and decisions, and to communicate specific environmental information to consumers and other interested parties.

### 2.2.2 Structure of ISO 14001

It is important to note that ISO 14001 is an environmental management standard – not an environmental performance standard. The standard is general and no precise requirements concerning environmental objectives are set. This means that improved environmental performance is not guaranteed. The ISO 14001 standard is voluntary and is meant to be applicable anywhere in the world. Though ISO 14001 is not regulated by law, there are strict rules on legal compliance. Improving efficiency of resource consumption and control of environmental impacts are about equally important issues in this standard.

Each of the *five key principle sections* (see Figure 2.3) of the ISO 14001 standard mentioned above consist of one or more parts. The **Environmental Policy section** contains a single principle that does not consist of further parts.

The **Planning section** is subdivided into:
- Environmental aspects.
- Legal and other requirements.
- Objectives and targets.
- Environmental management programme(s).

The **Implementation and Operation section** consists of:
- Structure and responsibility.
- Training, awareness and competence.
- Communication.
- EMS documentation.
- Document control.
- Operational control.
- Emergency preparedness and response.

The **Checking and Corrective Action section** contains:
- Monitoring and measurement.
- Non-conformance and corrective and preventive action.
- Records.
- EMS audits [ISO 14001:1996, p. 3].

The **Management Review section** is another section that consists of one element only.

Requirements are made in some of the parts. For example, an environmental policy is required to be:

- Appropriate to the nature, scale and environmental impacts of an organisation's activities, products or services.
- A commitment to continuous improvement and prevention of pollution.

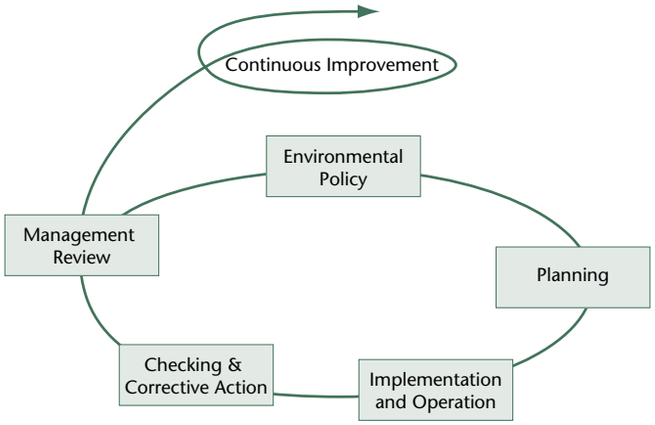


**Figure 2.3** *Model of the ISO 14001 environmental management system [European Committee for Standardization, 1996-08-21, Introduction].*

- A commitment to comply with relevant environmental legislation and regulations, and with other requirements to which the organisation subscribes.
- The framework for setting and reviewing environmental objectives and targets.
- Documented, implemented, maintained and communicated to all employees.
- Available to the public.

### 2.2.3. Environmental Impacts and Legal Requirements

The main chapters of ISO 14001 are briefly explained below.

According to ISO 14001 an environmental impact is: "any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services." [ISO 14001:1996, section 3.4] Environmental impacts could be for instance:

- Air pollution.
- Resource depletion.
- Noise.
- Water pollution.

Environmental impacts need to be identified in the course of implementing an EMS. The procedures on how to do this are addressed later.

Legal and other requirements need to be identified and assessed on a regular basis to ensure legal compliance. The environmental objectives and targets arise from the environmental policy. To ensure that the objectives and targets set can be achieved, the organisation needs to establish and maintain one or more (depending on the size of the organisation) environmental management programmes. These programmes are supposed to determine responsibilities, means, and a time-frame by which the targets and objectives are to be achieved.

### 2.2.4 Implementation

The section 5.1.2 "Structure and Responsibility,", explains how an EMS needs to be structured. Accordingly, roles, and responsibilities need to be:

- Defined.
- Documented.
- Communicated.

Top management has to supply the resources necessary for implementation and appoint one or more management representatives as responsible for the EMS.

ISO 14001 requires all staff whose work may create a significant impact on the environment and all personnel involved in the EMS to be trained appropriately. Furthermore, establish-

ment of communication procedures are required with respect to internal and external concerns. The EMS needs to be documented. This documentation can either be on paper or in the form of a computer file. A document control system needs to be established so that no relevant information is lost. To keep track of all previously identified operations associated with environmental aspects, establishment of an operational control system is required. Furthermore, procedures for identification of potential for and response to accidents need to be implemented.

### 2.2.5. Maintenance of an EMS

The section 5.6 "Checking and Corrective Action" explains how an already implemented EMS can be maintained and improved. First of all, a system needs to be established on a regular basis to monitor and measure the key characteristics of an organisation's operations and activities. Based on this system, procedures concerning non-conformance and corrective and preventive action have to be established and maintained. All actions related to the EMS have to be recorded to enable demonstration of conformance with ISO 14001. To ensure continuous improvement, EMS audits need to be conducted on a regular basis. The results of the audits have to be reported to the organisation's top management.

Top management then has to, at intervals it determines itself, review the EMS to ensure its continuing suitability, adequacy and effectiveness. To carry out this evaluation, top management needs to be provided with all necessary information, which is all data collected on the performance of the EMS. This information is usually provided by the person responsible for the EMS, who collects the information from the EMS representatives or the specific employees.


**Figure 2.4** *Bus with the EMAS logotype. © European Communities, 1995-2005.*

## 2.3. EMAS

### 2.3.1. Implementing EMAS

EMAS (Eco-Management and Audit Scheme) is a management tool for organisations to "evaluate, report and improve their environmental performance." (See Internet Resources: EMAS – What is EMAS?). It is a voluntary scheme that aims at promoting on-going improvements in environmental performance of organisations and the provision of environmental information to the public. Private and public organisations operating in the European Union and the European Economic Sphere – Iceland, Liechtenstein and Norway – can participate in EMAS.

To achieve EMAS certification an organisation has to:

1. Develop an environmental policy.
2. Make an initial environmental review.
3. Develop an environmental programme.
4. Establish an EMS.
5. Carry out an internal environmental audit.
6. Review once more.
7. Develop an environmental statement.
8. Get validation and register.

A qualified third party checks the system and statement to see if EMAS requirements are met. If so, the system and statement are validated and the site can be registered. When it has been registered, the site receives a declaration of participation which can be used to promote its participation in the scheme.

EMAS became operative in April 1995. It was restricted to industrial sites only until March 2001, when it became open to all private and public organisations of all sectors. The version of EMAS after the March 2001 revision is called EMAS II [Regulation (EC) No 761/2001 of the European Parliament and of the Council of 19 March 2001]. However, current common use of the term EMAS (i.e. without the "II") refers to the revised version.

### 2.3.2. Changes in EMAS II

As noted above, EMAS II was introduced in 2001. The most important changes compared to EMAS 1995 are:

- EMAS II is fully compatible with ISO 14001. All of the requirements of ISO 14001 are integrated in EMAS II.
- External validation of an EMS ensures that all relevant legal requirements are met.
- Employees are more integrated in the EMS via a suggestion book system or project based group work.
- The term "site" was replaced by "organisation" as used in ISO 14001:1996.

- The possibility of using the EMAS logo in public relations and advertising is improved, though the logo can only be used on products and their packages if the logo is clearly connected to information validated [Office for Official Publications of the European Communities. 2001, p. 6] (for more information regarding the logo see section 6.2).
- New logos were introduced.
- The requirements for the environmental statement have been altered.
- Environmental statements need to be updated and validated annually.
- Indirect environmental aspects also need to be considered when identifying environmental aspects (i.e. those aspects occurring somewhere else but not at the site of the organisation; e.g. triggered by planning or investment decisions of the organisation).
- There is no longer a restriction on the business sector, now any organisation can participate in EMAS.

The restriction to the business sector was not only lifted, but the European Commission (EC) actively supports the implementation of EMAS in both the service and financial sectors. The EC realized that the demand from stakeholders for environmentally-friendly products and services has increased more and more. The service sector consumes large amounts of energy, water and office materials, with much room for improvement of resource efficiency. In the financial sector, services and products may have great influence on the environment (e.g. when a bank finances building a dam). The environmental aspects and risks of these activities need to be managed, which can best be achieved by implementing an EMS.

### 2.3.3. EMAS is a Governmental Regulation

Another important fact about EMAS is that it is a government regulation, not an international standard. This means that it is the member state's governments that have to organise the registration process of sites within their territory. They designate the Accreditation Body, who is an independent and impartial institution or organisation responsible for the accreditation and supervision of environmental verifiers. Environmental verifiers, on the other hand, are experts on the field of EMAS and need to be both independent of the organisation being verified and that organisation's auditor or consultant. They ensure that organisations seeking registration are in compliance with EMAS requirements. In particular they check that an organisation:

- Is in legal compliance.
- Has carried out an initial environmental review (if appropriate).
- Has a fully operational EMS which is audited in a systematic, objective and periodic way.
- Has prepared an environmental statement in accordance with the EMAS regulation. (See Internet Resources: EMAS – How does EMAS work?)

Furthermore they verify that that all data and information in the environmental statement and other information provided by an organisation is reliable, credible and correct.

After having acquired some background information on both EMAS and ISO 14001, the questions are: Are there any significant differences between EMAS and ISO 14001? Why choose the one or the other? The following section will give answers to these questions.

**Table 2.1** *Comparison between EMAS and ISO 14001 [European Commission, April 2001].*

| | EMAS | ISO/EN ISO 14001 |
|---|---|---|
| **Preliminary environmental review** | Verified initial review | No review |
| **External communication and verification** | Environmental policy, objectives, EMS and details of organisation's performance made public | Environmental policy made public |
| **Audits** | Frequency and methodology of audits of the EMS and of environmental performance specified | Audits of the EMS (frequency or methodology not specified) |
| **Contractors and suppliers** | Required influence over contractors and suppliers | Relevant procedures are communicated to contractors and suppliers |
| **Commitments and requirements** | Employee involvement, continuous improvement of environmental performance and compliance with environmental legislation | Commitment of continual improvement of the EMS rather than a demonstration of continual improvement of environmental performance |

## 2.4. Comparison Between EMAS and ISO 14001

### 2.4.1. Similarities and Differences

Generally, the main difference between EMAS and ISO 14001 is that EMAS has a strong focus on provision of information to the public, external communication and responsibility outside of the organisation, and on environmental performance, that ISO 14001 does not have. Table 2.1 summarises the differences.

Figure 2.5 below shows the world-wide distribution of ISO 14001 and EMAS certifications. The data is updated regularly (See Internet Resources: Number of ISO 14001/EMAS certification of the world). Obviously ISO 14001 is in more widespread use than EMAS. The number of EMAS certifications has in fact been decreasing over a number of years now, while the number of ISO 14001 certifications is increasing rapidly.

The ISO 14000 series of standards is a set of voluntary instruments that was adapted to the needs of a large variety of interest groups worldwide. The documents in the series are intended to be applicable in all countries, regardless of the type of government.

EMAS is a regulation developed to meet the needs and expectations of governments, citizens and consumers in the EU member states and European Economic Area. The EMAS Helpdesk notes that:

*"Within this series, 'EN ISO 14001:1996 environmental management systems – specifications with guidance for use' is the only certifiable standard, the remainder being supportive guidelines. The aims of EN ISO 14001:1996 is to promote environmental protection in light of socio-economic concerns. It is very similar to EMAS but because EMAS has legal status within Member States, it can take a more prescriptive approach to environmental management issues; the ISO 14000 standards, by contrast, rely on voluntary acceptance by all interested parties, and therefore must maintain a balance between the needs and expectations of each of these parties."* (See Internet Resources: EMAS – What is environmental management?)

For most organisations there is no difference between implementing an EMS according to ISO 14001 or EMAS, or even both together depending on the organisational objectives. However, ISO 14001 was written *"with more clarity and with a flexibility which is increasingly appreciated by industry."* [Gelber, M. 1998] (See also Internet Resources: INEM – EMAS and ISO 14001) What is meant is that EMAS is often viewed by industry as too strict, and more costly to implement. The results can been seen in Figure 2.5. However, EMAS has a major advantage when it comes to communicating with stakeholders using the environmental statement.

### 2.4.2. Implementing Both EMAS and ISO 14000

In general, conformance with one of the international standards can lead to the implementation of other standards. For example, once an organisation has implemented ISO 14001, it can later satisfy the requirements of EMAS (and also of other

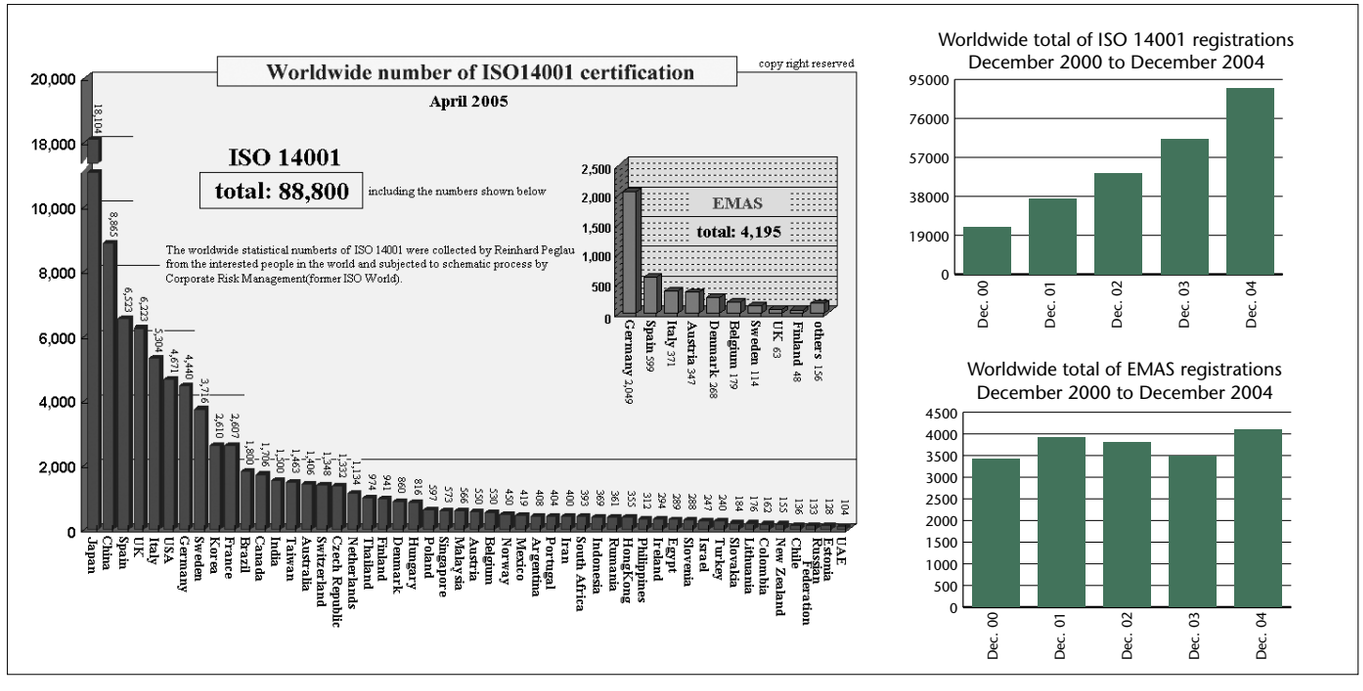


**Figure 2.5** *The Number of ISO 14001/EMAS registrations of the world [Peglau, R. and Tsujii, K. April 2005].*

management system standards such as ISO 9001 for quality management systems). Figure 2.6 is a comparison of the steps to achieve ISO 14001 and EMAS registration.

Step 1 (initial environmental review) shown in Figure 2.6 is not required to be performed as long as the environmental aspects as set out in Annex VI of the EMAS regulation are fully considered in the certified EMS.

EMAS is stricter than ISO 14001. ISO 14001 includes only a commitment to compliance with relevant environmental legislation. EMAS on the other hand requires compliance with all relevant legislation. As mentioned above, the requirements on the type of environmental aspects to be addressed is more specific with EMAS. The great emphasis on active employee participation in the implementation process is not included in ISO 14001. Last but not least, for EMAS the frequency of the audit cycle must be at intervals of no longer than three years, while there is no specification in ISO 14001. The strictness of the EMAS regulation is a problem for many organisations.

## 2.5. Other International Standards

In this section some additional standards are described. More and more organisations recognize the benefits of integrated and process-based management systems that cover more than a single aspect (such as environment or quality). Following are the most important international standards.

### 2.5.1. The Occupational Health and Safety Assessment Series OHSAS 18001

OHSAS 18001:1999 is an Occupation Health and Safety Assessment Series (OHSAS) for occupational health and safety (OH&S) management systems to enable an organisation to control OH&S risks and to improve performance (see section 9.4 for more details). OHSAS 18001:1999 was released in April 1999. OHSAS 18002:2000 is the occupational health & safety management systems guideline for the implementation of OHSAS 18001.

The specification takes a structured approach to OH&S management. The emphasis is placed on practices being pro-active and preventive by the identification of hazards and the evaluation and control of work related risks. OHSAS 18001:1999 is compatible with ISO 9001:2000 as well as ISO 14001:2004.

OHSAS 18001 features include BS8800 and SCC, which are explained below.

### 2.5.2. The British guidance standard BS 8800

The British guidance standard BS 8800 provides non-certifiable guidance based on occupational health and safety management systems. It was developed by the British Standards


**Figure 2.6** *Comparison of Steps Required for Registration Between ISO14001 and EMAS [EMAS Helpdesk Frequently Asked Questions].*

Institution. The distinctive feature of BS 8800 is that it enables the integration of OH&S management into an overall management system that includes quality management and environmental management. The primary objective of an OH&S management system is to help organisations manage health and safety risks associated with their business activities. BS 8800 is compatible to OHSAS 18001.

### 2.5.3. The Security Certificate Contractors (SCC)

The Security Certificate Contractors (SCC) standard applies to the evaluation and certification of the safety management system used by contractors, based on the requirements of SCC. The standard was initially developed for the petrochemical industry together with DNV (Det Norske Veritas – a worldwide risk manager and registrar), but is now an accredited public standard used by many other industries. The SCC concept describes a general procedure for certification of a safety, health and environmental protection system. SCC is currently widely accepted within the petrochemical industry. SCC basically consists of a checklist that evaluates safety, health and environment in ten categories with 64 questions. There are two types of SCC certificates: SCC*, for organisations with up to 35 employees; and SCC**, for organisations with more than 35 employees.

### 2.5.4 Standard on Quality Management ISO 9001:2000

ISO 9001:2000 is an international standard on quality management. This standard explicitly supports process based integrated management systems because business processes need to be described, reviewed, evaluated and continuously improved (see section 9.3 for more details). Even processes that are not part of production have to be built up, controlled and developed. According to ISO 9001:2000 an organisation is required to:

- Identify processes necessary for quality management.
- Define succession and interaction of these processes.
- Define criteria and required methods to ensure effective execution and control of these processes.
- Ensure availability of information required for execution and control of these processes.
- Measure, control and analyse these processes and to take measures to achieve the anticipated targets and continuous improvement.

The intent of ISO 9001 is to *"enhance customer satisfaction by meeting customer requirements."* [ISO 9001]. ISO 9001 is very closely related to ISO 14001. Many elements that exist in ISO 14001 also exist in ISO 9001, such as documentation, document control, communications, continual improvement, etc. Therefore management systems that are certified to one of the two standards can be "upgraded" without too much effort to also meet the requirements of the other standard. The "Plan-Do-Check-Act" principle is also well known in quality management.

Currently there are close to 800,000 (2005) organisations worldwide certified according to ISO 9001/2/8:94 and ISO 9001:2000.

## Study Questions

1. What is the key difference between ISO 14001 and EMAS and in what way does that affect the implementation process?
2. EMAS is said to be more comprehensive than ISO 14001. Why is that so and what are advantages or disadvantages?
3. An organisation can choose to implement both ISO 14001 and EMAS. This causes greater implementation costs. Why do you think many organisations still implement both? What are the benefits?
4. Why has the number of EMAS certifications constantly been decreasing the past years?
5. Older, domestic environmental management standards were removed in favour of ISO 14001 and EMAS, the only ones remaining. This is generally seen as a positive development. But what could be some negative impacts, especially when it comes to applicability of the standards in different countries?

## Internet Resources

EMAS – What is EMAS?

http://europa.eu.int/comm/environment/emas/about/summary_en.htm

EMAS – How does EMAS work?

http://europa.eu.int/comm/environment/emas/about/work_en.htm

EMAS – What is environmental management?

http://europa.eu.int/comm/environment/emas/about/enviro_en.htm

INEM – EMAS and ISO 14001 (Gelber, M.)

http://www.inem.org/htdocs/eco-baltic/workshop-texts/gelber.html

Number of ISO14001/EMAS certification of the world

http://www.ecology.or.jp/isoworld/english/analy14k.htm

International Organisation for Standardization

http://www.iso.org

ISO 14000 Information Center

http://www.iso14000.com/

ISO 14000 Toolkit

http://www.14000-toolkit.com/

NSF-ISR, International Strategic Registrations

http://www.nsf-isr.org

ISO 9000 and ISO 14000 Introduction

http://www.iso.org/iso/en/iso9000-14000/index.html

OHSAS 18001 Occupational Health and Safety Zone

http://www.ohsas-18001-occupational-health-and-safety.com