

Environmental Management System (EMS)



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Environmental Management System (EMS)

“An Environmental Management System (EMS) is a set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency.”

<https://www.epa.gov/ems>

Environmental Management System (EMS)

EMS involves:

- ❖ Identifying and listing of relevant environmental legislations
- ❖ Identifying environmental impacts of all the activities
- ❖ Setting up environmental goals and action plans
- ❖ Maintaining proper records
- ❖ Regular reviews of the system

Kulkarni and Ramachandra (2006)

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Goals of EMS

- ❖ To meet the regulatory requirements
- ❖ To have better control on operation to reduce adverse environmental impacts
- ❖ To convince customers that organization is serious about environment and products/processes are environment friendly
- ❖ To adjust proactively for the market dynamics and to gain advantage over competitors
- ❖ To reduce the liabilities and insurance costs for environment

Kulkarni and Ramachandra (2006)

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Costs and Benefits of an EMS

Internal Costs

- Staff/manager time
- Other employee time

External Costs

- Potential consulting assistance
- Outside training of personnel

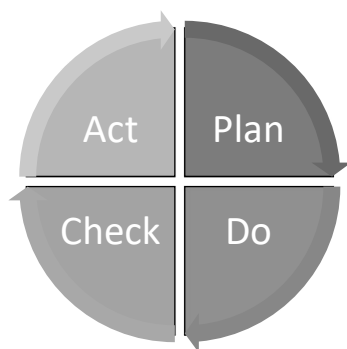
Potential Benefits

- Improved environmental performance
- Enhanced compliance
- Pollution prevention
- Resource conservation
- New customers/markets
- Increased efficiency/reduced costs
- Enhanced employee morale
- Enhanced image with public, regulators, lenders, investors
- Employee awareness of environmental issues and responsibilities

<https://www.epa.gov/ems/learn-about-environmental-management-systems#what-is-an-EMS>

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The PDCA Model of EMS



Plan: Planning, including identifying environmental aspects and establishing goals

Do: Implementing, including training and operational controls

Check: Checking, including monitoring and corrective action (internal audits)

Act: Reviewing, including progress reviews and acting to make needed changes to the EMS

<https://www.epa.gov/ems>

- ❖ Systematic identification and remediation of environmental matters
- ❖ Systematic improvement in EMS itself

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ISO 14000 Series of Standards for EMS

- ❖ A need for widely acceptable framework and EMS standards to avoid trade barriers
- ❖ Strategic Action Group on the Environment (SAGE) in 1991 by ISO: *to check usefulness of drafting of EMS standards*
- ❖ Technical Committee 207 (TC 207) in 1993 by ISO: *responsible for drafting ISO 14000 series of standards*
- ❖ A sub-committee of TC 207 prepared the draft EMS Standard
- ❖ Draft of the standard was agreed in Oslo (June 1995)

Kulkarni and Ramachandra (2006)

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Principles of ISO 14000 Series Standards

- 1) Understand all activities and processes in an organisation
- 2) Identify potential impact of these activities and processes on the environment
- 3) Determine the steps that can eliminate or minimise the occurrence of the adverse impact
- 4) Identify the regulatory requirements on environment and establish targets on operations so that regulations are met
- 5) Establish a monitoring mechanism
- 6) Establish corrective actions when things are not under control
- 7) Establish a system of emergency preparation
- 8) Establish procedures for verification of proper functioning of EMS
- 9) Establish documentation concerning all procedures and records

Kulkarni and Ramachandra (2006)
(Tech Monitor, Vol 12, No. 5, Sep-Oct 1995)

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Structure of ISO 14000 Series Standards

Classification based on the focus

- **Organisation or process standards**
These include environmental management system (EMS), environmental auditing (EA), and environmental performance evaluation (EPE)
- **Product-oriented Standards**
These include life-cycle-assessment (LCA), environmental labelling (EL), and environmental aspects in product standards (EAPS)

Classification based on compulsion

- **Normative standards**
These indicate the requirements that must be met and can be audited for certification (only ISO 14001)
- **Informative Standards**
These provide guidance and the requirements need not be audited for certification (all other standards)

Kulkarni and Ramachandra (2006)

ISO 14000 Series Standards

64

published ISO standards *
related to the TC and its SCs

of which 4 under the direct responsibility
of ISO/TC 207

13

ISO standards under
development *
related to the TC and its SCs

of which 1 under the direct responsibility
of ISO/TC 207

78

Participating members

42

Observing members

* number includes updates

Structure Liaisons Meetings

Reference ↑	Title	Type
ISO/TC 207/SC 1	Environmental management systems	Sub committee
ISO/TC 207/SC 2	Environmental auditing and related environmental investigations	Sub committee
ISO/TC 207/SC 3	Environmental labelling	Sub committee
ISO/TC 207/SC 4	Environmental performance evaluation	Sub committee
ISO/TC 207/SC 5	Life cycle assessment	Sub committee
ISO/TC 207/SC 7	Greenhouse gas and climate change management and related activities	Sub committee

<https://www.iso.org/committee/54808.html>

ISO 14000 Series Standards

Subcommittee ↑	Subcommittee Title	Published standards	Standards under development
ISO/TC 207/SC 1	Environmental management systems	10	3
ISO/TC 207/SC 2	Environmental auditing and related environmental investigations	3	1
ISO/TC 207/SC 3	Environmental labelling	8	1
ISO/TC 207/SC 4	Environmental performance evaluation	9	0
ISO/TC 207/SC 5	Life cycle assessment	16	3
ISO/TC 207/SC 7	Greenhouse gas and climate change management and related activities	14	4

Filter : ☒ Published ☐ Under development ☐ Withdrawn ☐ Deleted

Search in the list

Standard and/or project under the direct responsibility of ISO/TC 207 Secretariat ⁽¹⁰⁾ ↑

	Stage	ICS
<input checked="" type="checkbox"/> ISO Guide 64:2008 Guide for addressing environmental issues in product standards	90.93	01.120 13.020.01
<input checked="" type="checkbox"/> ISO 14050:2020 Environmental management — Vocabulary	60.60	01.040.13 13.020.10
<input checked="" type="checkbox"/> ISO 14051:2011 Environmental management — Material flow cost accounting — General framework	90.93	13.020.10
<input checked="" type="checkbox"/> IEC 62430:2019 Environmentally conscious design (ECD) — Principles, requirements and guidance	60.60	13.020.01

<https://www.iso.org/committee/54808/x/catalogue/p/1/u/0/w/0/d/0>

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ISO 14000 Series Standards

← TC ← ISO/TC 207

Standards by ISO/TC 207/SC 1
Environmental management systems

Standard and/or project under the direct responsibility of ISO/TC 207/SC 1 Secretariat ⁽¹⁰⁾ ↑

☒ ISO 14001:2015
Environmental management systems — Requirements with guidance for use

☒ ISO 14002-1:2019
Environmental management systems — Guidelines for using ISO 14001 to address environmental aspects and conditions within an environmental topic area — Part 1: General

☒ ISO 14004:2016
Environmental management systems — General guidelines on implementation

☒ ISO 14005:2019
Environmental management systems — Guidelines for a flexible approach to phased implementation

☒ ISO 14006:2020
Environmental management systems — Guidelines for incorporating ecodesign

☒ ISO 14007:2019
Environmental management — Guidelines for determining environmental costs and benefits

☒ ISO 14008:2019
Monetary valuation of environmental impacts and related environmental aspects

☒ ISO 14009:2020
Environmental management systems — Guidelines for incorporating material circulation in design and development

☒ ISO 14052:2017
Environmental management — Material flow cost accounting — Guidance for practical implementation in a supply chain


☒ ISO 14053:2021
Environmental management — Material flow cost accounting — Guidance for phased implementation in organizations

<https://www.iso.org/committee/54818/x/catalogue/p/1/u/0/w/0/d/0>

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ISO 14000 Series Standards

← TC ← ISO/TC 207

Standards by ISO/TC 207/SC 2 
Environmental auditing and related environmental investigations

Standard and/or project under the direct responsibility of ISO/TC 207/SC 2 Secretariat ⁽³⁾ ↑

- ✔ ISO 14015:2022
Environmental management — Guidelines for environmental due diligence assessment
- ✔ ISO 14016:2020
Environmental management — Guidelines on the assurance of environmental reports
- ✔ ISO 14017:2022
Environmental management — Requirements with guidance for verification and validation of water statements

<https://www.iso.org/committee/54824/x/catalogue/>

ISO 14000 Series Standards

← TC ← ISO/TC 207

Standard and/or project under the direct responsibility of ISO/TC 207/SC 3 Secretariat ⁽⁸⁾ ↑

Standards by ISO/TC 207/SC 3
Environmental labelling

- ✔ ISO 14020:2000
Environmental labels and declarations — General principles
- ✔ ISO 14021:2016
Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling)
- ✔ ISO 14021:2016/Amd 1:2021
Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling) — Amendment 1: Carbon footprint, carbon neutral
- ✔ ISO 14024:2018
Environmental labels and declarations — Type I environmental labelling — Principles and procedures
- ✔ ISO 14025:2006
Environmental labels and declarations — Type III environmental declarations — Principles and procedures
- ✔ ISO 14026:2017
Environmental labels and declarations — Principles, requirements and guidelines for communication of footprint information
- ✔ ISO/TS 14027:2017
Environmental labels and declarations — Development of product category rules
- ✔ ISO/TS 14029:2022
Environmental statements and programmes for products — Mutual recognition of environmental product declarations (EPDs) and footprint communication programmes

<https://www.iso.org/committee/54836/x/catalogue/>

ISO 14000 Series Standards

Standard and/or project under the direct responsibility of ISO/TC 207/SC 4 Secretariat ⁽⁹⁾ ↑

← TC ← ISO/TC 207

Standards by ISO/TC 207/SC 4 Environmental performance evaluation

☑ ISO 14030-1:2021

Environmental performance evaluation — Green debt instruments — Part 1: Process for green bonds

☑ ISO 14030-2:2021

Environmental performance evaluation — Green debt instruments — Part 2: Process for green loans

☑ ISO 14030-3:2022

Environmental performance evaluation — Green debt instruments — Part 3: Taxonomy

☑ ISO 14030-4:2021

Environmental performance evaluation — Green debt instruments — Part 4: Verification programme requirements

☑ ISO 14031:2021

Environmental management — Environmental performance evaluation — Guidelines

☑ ISO 14033:2019

Environmental management — Quantitative environmental information — Guidelines and examples

☑ ISO 14034:2016

Environmental management — Environmental technology verification (ETV)

☑ ISO 14063:2020

Environmental management — Environmental communication — Guidelines and examples

☑ ISO 14100:2022

Guidance on environmental criteria for projects, assets and activities to support the development of green finance

<https://www.iso.org/committee/54846/x/catalogue/>

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ISO 14000 Series Standards

Standard and/or project under the direct responsibility of ISO/TC 207/SC 5 Secretariat ⁽¹⁵⁾ ↑

← TC ← ISO/TC 207

Standards by ISO/TC 207/SC 5 Life cycle assessment

☑ ISO 14040:2006

Environmental management — Life cycle assessment — Principles and framework

☑ ISO 14040:2006/Amd 1:2020

Environmental management — Life cycle assessment — Principles and framework — Amendment 1

☑ ISO 14044:2006

Environmental management — Life cycle assessment — Requirements and guidelines

☑ ISO 14044:2006/Amd 1:2017

Environmental management — Life cycle assessment — Requirements and guidelines — Amendment 1

☑ ISO 14044:2006/Amd 2:2020

Environmental management — Life cycle assessment — Requirements and guidelines — Amendment 2

☑ ISO 14045:2012

Environmental management — Eco-efficiency assessment of product systems — Principles, requirements and guidelines

☑ ISO 14046:2014

Environmental management — Water footprint — Principles, requirements and guidelines

☑ ISO/TR 14047:2012

Environmental management — Life cycle assessment — Illustrative examples on how to apply ISO 14044 to impact assessment situations

☑ ISO/TS 14048:2002

Environmental management — Life cycle assessment — Data documentation format

☑ ISO/TR 14049:2012

Environmental management — Life cycle assessment — Illustrative examples on how to apply ISO 14044 to goal and scope definition and inventory analysis

<https://www.iso.org/committee/54854/x/catalogue/p/1/u/0/w/0/d/0>

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ISO 14000 Series Standards

← TC ← ISO/TC 207

Standards by ISO/TC 207/SC 5 Life cycle assessment

- ✔ ISO 14055-1:2017
Environmental management — Guidelines for establishing good practices for combatting land degradation and desertification — Part 1: Good practices framework
- ✔ ISO/TR 14055-2:2022
Environmental management — Guidelines for establishing good practices for combatting land degradation and desertification — Part 2: Regional case studies
- ✔ ISO/TS 14071:2014
Environmental management — Life cycle assessment — Critical review processes and reviewer competencies: Additional requirements and guidelines to ISO 14044:2006
- ✔ ISO/TS 14072:2014
Environmental management — Life cycle assessment — Requirements and guidelines for organizational life cycle assessment
- ✔ ISO/TR 14073:2017
Environmental management — Water footprint — Illustrative examples on how to apply ISO 14046
- ✔ ISO/TS 14074:2022
Environmental management — Life cycle assessment — Principles, requirements and guidelines for normalization, weighting and interpretation

<https://www.iso.org/committee/54854/x/catalogue/p/1/u/0/w/0/d/0>

ISO 14000 Series Standards

← TC ← ISO/TC 207

Standards by ISO/TC 207/SC 7 Greenhouse gas and climate change management and related activities

Standard and/or project under the direct responsibility of ISO/TC 207/SC 7 Secretariat (13) ↑

- ✔ ISO 14064-1:2018
Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals
- ✔ ISO 14064-2:2019
Greenhouse gases — Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements
- ✔ ISO 14064-3:2019
Greenhouse gases — Part 3: Specification with guidance for the verification and validation of greenhouse gas statements
- ✔ ISO 14065:2020
General principles and requirements for bodies validating and verifying environmental information
- ✔ ISO 14066:2011
Greenhouse gases — Competence requirements for greenhouse gas validation teams and verification teams
- ✔ ISO 14067:2018
Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification
- ✔ ISO/TR 14069:2013
Greenhouse gases — Quantification and reporting of greenhouse gas emissions for organizations — Guidance for the application of ISO 14064-1
- ✔ ISO 14080:2018
Greenhouse gas management and related activities — Framework and principles for methodologies on climate actions
- ✔ ISO 14090:2019
Adaptation to climate change — Principles, requirements and guidelines
- ✔ ISO 14091:2021
Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment

<https://www.iso.org/committee/546318/x/catalogue/p/1/u/0/w/0/d/0>

ISO 14000 Series Standards

← TC ← ISO/TC 207

Standards by ISO/TC 207/SC 7[®]

Greenhouse gas and climate change management and related activities

☑ ISO/TS 14092:2020

Adaptation to climate change — Requirements and guidance on adaptation planning for local governments and communities

☑ ISO 14093:2022

Mechanism for financing local adaptation to climate change — Performance-based climate resilience grants — Requirements and guidelines

☑ ISO 14097:2021

Greenhouse gas management and related activities — Framework including principles and requirements for assessing and reporting investments and financing activities related to climate change

☑ ISO 19694-1:2021

Stationary source emissions — Determination of greenhouse gas emissions in energy-intensive industries — Part 1: General aspects

<https://www.iso.org/committee/546318/x/catalogue/p/1/u/0/w/0/d/0>

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ISO 14001 Standard

Environmental Management Systems — Requirements with guidance for use

- ❖ ISO 14001: 1996 (1st version)
- ❖ ISO 14001: 2004 (revision)
- ❖ ISO 14001: 2015 (revision)
- ❖ It specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance.
- ❖ It 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.
- ❖ It does not state specific environmental performance criteria.
- ❖ It can be used in whole or in part to systematically improve environmental management.
- ❖ Claims of conformity to ISO 14001:2015, however, are not acceptable unless all its requirements are incorporated into an organization's environmental management system and fulfilled without exclusion.

<https://www.iso.org/standard/60857.html?browse=tc>

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ISO 14001 Standard

ISO 14001:2015(en) Environmental management systems –

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<https://www.iso.org/obp/ui/#iso:std:iso:14001:ed-3:v1:en>

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ISO 14001 Standard

An EMS conforming to ISO 14001 contains the following elements:

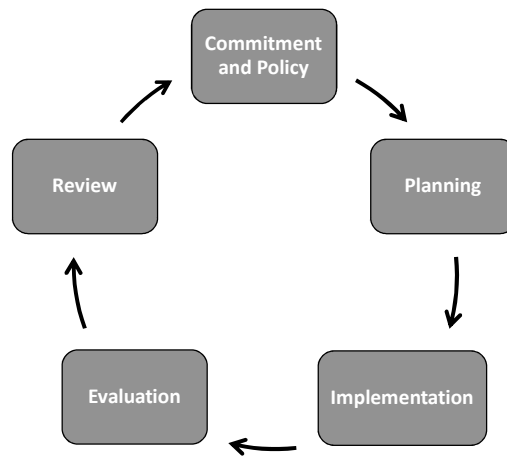
- ❖ An environmental policy supported by senior management
- ❖ Identification of environmental aspects and significant impacts
- ❖ Identification of legal and other requirements
- ❖ Environmental goals, objectives and targets that support the policy
- ❖ An environmental management programme
- ❖ Definition of roles, responsibilities and authorities
- ❖ Training and awareness procedures
- ❖ Process for communication of the EMS to all interested parties
- ❖ Document and operational control procedures
- ❖ Procedures for emergency response
- ❖ Procedures for monitoring and measuring operations that can have a significant impact on the environment
- ❖ Procedures to correct non-conformance
- ❖ Record management procedures
- ❖ A programme for auditing and corrective action
- ❖ Procedures for management review

Kulkarni and Ramachandra (2006)

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ISO 14001 Standard

Five main stages of an EMS, as defined by ISO 14001



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Certification for ISO 14001

- Self Declaration
- Third party assessment

Generalized Process for Third party assessment

- ❖ Identify consultant
- ❖ Internal training, identification of gaps, and corrective measures
- ❖ Application for certification
- ❖ Audit by the agency
- ❖ Address the gaps identified
- ❖ Re-audit by the agency
- ❖ Close the gaps as found in audit
- ❖ ISO 14001 2015 certification if no major deviations found

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References

- Kulkarni, V., Ramachandra, T.V. 2006. Environmental Management. Capital Publishing Company, New Delhi.

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Questions

- What is EMS? What are its goals?
- What is PDCA model of EMS?
- Why are ISO 14000 standards needed, and what are their basic principles?
- What important elements should be present in an EMS as per ISO 14001 standard?

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Thank You!