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Gap analysis of the documents in the ISO 14000-series with regard to quality management of environmental data and information

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Göteborg, Sweden 2004

CPM Report 2004:3

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Summary

A gap analysis has been performed to assess the need for new standardization work within ISO on quality management of environmental data and information. The purpose of the analysis is to identify what is already in the existing documents within the ISO 14000-series and what is missing.

The results from the analysis show that there is a need for support on quality management of data and information. The existing documents within the ISO 14000-series do not provide sufficient guidance on how to manage data and information quality. The different documents address and specify data and information requirements and considerations, but they generally do not specify how to manage the data and information in order to fulfil the requirements.

The documents may be more efficiently and effectively applied if data and information requirements were more coherent and if there were practical guidance and support on how to manage data and information in order to fulfill the requirements.

The results from the review of each document in the ISO 14000-series are presented in the report, as well as an overview of the results and overall conclusions.

Introduction

In May 2004 a small expert workshop was held in Frankfurt to discuss the need for standardization work in the area of quality management of environmental data for the ISO 14000-series, and to prepare a workshop on the issue at the ISO/TC 207 meeting in Buenos Aires in September 2004. The background and the conclusions from the Frankfurt workshop are described in a workshop report[1].

During the discussions it was proposed that a gap analysis needs to be performed of the existing documents in the ISO 14000-series, to find out what is included in the documents regarding data quality management and to identify what is missing.

Based on this proposal, this preliminary gap analysis has been carried out. The work has been financed by the Center for Environmental Assessment of Product and Material Systems (CPM)[2] at Chalmers University of Technology and has been performed by the department of Industrial Environmental Informatics (IMI)[3] at Chalmers.

The results from the analysis were presented at the workshop "Quality Assurance of Environmental Information (data) in the ISO 14000 series" on the 31st of August at the ISO/TC 207 meeting in Buenos Aires in September 2004.

Quality management of environmental data and information

According to ISO 9000:2000[4], *quality* is defined as "degree to which a set of inherent characteristics fulfils requirements" and *quality management* is defined as "coordinated activities to direct and control an organization with regard to quality". Direction and control with regard to quality generally includes establishment of the quality policy and quality objectives, quality planning, quality control, quality assurance and quality improvement. *Quality control* is the part of quality management which is focused on fulfilling quality requirements, and *quality assurance* the part which is focused on providing confidence that quality requirements are fulfilled.

Quality management of environmental data and information is needed for improving, simplifying and reducing costs for data collection, quality assessment, verification and validation of environmental data and information. It is a necessity for reducing costs and increasing credibility for all quantitative ISO 140ff reports, tools, methods and procedures. Difficulties associated with environmental data quality ranges from secrecy barriers, lack of data, unclear definitions for which data to use, weak specification of how to document specific uncertainties, complexity of information etc. A common accepted solution is equally important and needed whether addressing the areas of e.g. environmental management systems (EMS), eco-labelling, life cycle assessment (LCA), design for environment (DfE), or supply chain management.

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[1] "Is there a need for an Operational Guide for Managing Data Quality in the ISO 14000 Series? Conclusions from a preparatory workshop in Frankfurt, Germany May 6-7, 2004, arranged by SIS, Swedish Standards Institute", compiled by Lars Jonsson, SIS

[2] CPM is a Swedish national competence center at Chalmers University of Technology. CPM is jointly funded by 12 industrial companies, VINNOVA (the Swedish Agency for Innovation Systems) and Chalmers. Web-site: http://www.cpm.chalmers.se

[3] IMI works on different aspects of the information needed for environmental management in the industrial society. Web-site: http://www.imi.chalmers.se

[4] ISO 9000:2000 "Quality management systems – Fundamentals and vocabulary

A standard or an operational guide for quality management of environmental data and information in the ISO 14000-series may be expected to provide support for how to collect, compile, prepare and report environmental data so that the quality of the result is sufficiently high when applying environmental management systems and tools for different industrial purposes.

This may include a description of processes, activities, procedures and responsibilities regarding data and information quality management. For example, such a standard or guide could describe the steps one has to undergo to be certain about what data represents, how data has been sampled, how data has been statistically treated, and how numerical data are compiled to describe e.g. production units and processes, or products or functional units. Also, formats to use for documenting and communicating the data and information may be addressed, but are not specified. The standard or guide may also provide some requirements regarding communication and dialogues between data providers and data users, to ensure that understanding is preserved during reporting.

A standard or guide in this area could be used by organizations for improving data quality management in existing data collection systems and when establishing new such systems, and for aiding with defining and fulfilling appropriate data quality requirements for their purposes.

Purpose and scope of the gap analysis

The purpose of this gap analysis is to assess the need for an operational guide or standard for managing data quality in the ISO 14000-series, by reviewing requirements in existing documents within the 14000-series and identifying any gaps.

The analysis is intended as basis for both discussion and development of quality management application and support for environmental data and information.

The review has been practically and pragmatically performed. The documents have been reviewed and interpreted in terms of requirements, recommendations or guidance on environmental data and information and management of environmental information and data, with regard to quality. The review has focused on quantitative data and information, but also qualitative data and information are considered to some extent.

No supporting material on how to interpret and apply the systems and tools has been reviewed, such as guides and handbooks. Related standards, e.g. management of data quality for measurement systems, have also not been included.

It needs to be stressed that the results presented in this report reflects the interpretation made by the authors, and that requirements, recommendations or guidance in the documents may have been overlooked or misinterpreted in the analysis.

ISO 14000-series documents included in the analysis

Below is a list of the documents that have been included in the analysis:

Environmental management systems

ISO 14001:1996 Environmental management systems - Specification with guidance for use
ISO/DIS 14001 Environmental management systems - Requirements with guidance for use
ISO 14004:1996 Environmental management systems - General guidelines on principles, systems and supporting techniques
ISO/DIS 14004 Environmental management systems - General guidelines on principles, systems and supporting techniques

Revision and assessment

ISO 19011:2002 Guidelines for quality and/or environmental management systems auditing
ISO/IEC Guide 66:1999 General requirements for bodies operating assessment and certification/registration of environmental management systems (EMS)
ISO 14015:2001 Environmental management - Environmental assessment of sites and organizations (EASO)

Environmental labels and declarations

ISO 14020:2000 Environmental labels and declarations - General principles
ISO 14021:1999 Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling)
ISO 14024:1999 Environmental labels and declarations - Type I environmental labelling -- Principles and procedures
ISO/TR 14025:2000 Environmental labels and declarations - Type III environmental declarations

ISO/CD 14025.2 Environmental labelling and declarations - Type III environmental declarations - Principles and procedures

Environmental performance evaluation

ISO 14031:1999 Environmental management - Environmental performance evaluation - Guidelines

Life cycle assessment

ISO 14040:1997 Environmental management - Life cycle assessment - Principles and framework

ISO 14041:1998 Environmental management - Life cycle assessment - Goal and scope definition and inventory analysis

ISO 14042:2000 Environmental management - Life cycle assessment - Life cycle impact assessment

ISO 14043:2000 Environmental management - Life cycle assessment - Life cycle interpretation

ISO/TS 14048:2002 Environmental management - Life cycle assessment - Data Documentation Format

Vocabulary

ISO 14050:2002 Environmental management - Vocabulary

Product design and development

ISO/TR 14062:2002 Environmental management - Integrating environmental aspects into product design and development

ISO Guide 64:1997 Guide for the inclusion of environmental aspects in product standards

Environmental communication

ISO/CD 14063.2 Environmental management - Environmental communications - Guidelines and examples

GHG emissions

ISO/CD 14064-1.2 Environmental management - Part 1. Specification for the quantification, monitoring and reporting of organization emissions and removals

ISO/CD 14064-2.2 Environmental management - Part 2. Specification for the quantification, monitoring and reporting of project emission reduction and removal enhancements

ISO/CD 14064-3.2 Environmental management – Part 3. Specification with guidance for validation and verification

ISO 14000-series documents not included in the analysis

ISO/TR 14032:1999 Environmental management - Examples of environmental performance evaluation (EPE)

ISO/TR 14047:2003 Environmental management - Life cycle impact assessment - Examples of application of ISO 14042

ISO/TR 14049:2000 Environmental management - Life cycle assessment - Examples of application of ISO 14041 to goal and scope definition and inventory analysis

ISO/CD 14040.1 Environmental management - Life cycle assessment - Principles and framework

ISO/CD 14044.1 Environmental management - Life cycle assessment - Requirements and guidelines

ISO/TR 14061:1998 Information to assist forestry organizations in the use of Environmental Management System standards ISO 14001 and ISO 14004

Overview of results from the analysis

In the gap analysis the following aspects have been distinguished:

- *Data and information* quality definitions and requirements, i.e. quality aspects of the information that is used or reported in the system or tool.
- *Management of data and information* to fulfill the stated data quality requirements, i.e. processes and procedures to define, collect, prepare and communicate data.
- *Documentation*, i.e. requirements on documentation of procedures and results.
- *Evaluation, assessment, review, verification or validation of data and information,* i.e. processes and procedures to review, validate etc. that data and information quality requirements are fulfilled.

Almost all documents contain data and information quality aspects that should be considered or addressed when applying the document, as well as requirements on different evaluations and assessments to be performed on the data. There is however little or no guidance on how to practically perform the data collection to ensure that the data quality aspects are fulfilled. Below is an overview of the findings of the analysis. The details on the review of each specific document are described the Appendix.

Data and information

The starting point for quality management of data and information is a common and accepted definition of quality and requirements on data and information quality.
A definition of data quality is stated in ISO 14041:1998, which defines data quality as "characteristic of data that bears on their ability to satisfy stated requirements".
There is a variety of different quality aspects on data and information that are required, recommended or stated in the different documents. Definitions or guidance on how to interpret these aspects for the purpose of the specific tool is however often lacking. Below is a list of the aspects, together with in which document they are found:

- Accuracy:14015, -20, -21, -24, -25, -62, -63, -64 part 1-3
- Adequacy: 14031
- Adequately explained: 14004
- Appropriateness: 14004, -15, -63
- Availability: 14025, -31
- Comparability: 14025
- Completeness: 14025, -40, -41, -43, -64 part 1,2,3
- Consistency: 14025, -40, -41, -64 part 1,2,3
- Credibility: 14025, -63
- Data precision: 14025, -40, -41
- Known quality: 14024
- Not misleading: 14020, -21, -24, -25, -63
- Objective: 14004
- Presented in consistent form: 14004
- Relevance: 14015, -20, -21, -24, -25, -63, -64 part 1-3
- Reliability: 14015, -31
- Representativeness: 14040, -41
- Reproducible: 14004, -20, -21, -24, -25, -40, -41, -63, -64 part 1
- Responsive: 14063
- Scientific and statistical validity and verifiability: 14031
- Substantive: 14063
- Sufficient: 14015, -25
- Traceable: 14063
- Transparency: 14040, -41, -42, -63, -64 part 1-3
- Truthful: 14063
- Unbiased: 14043
- Uncertainty: 14040
- Understandable: 14004, -63
- Verifiable: 14004, 19011, 14015, -20, -21, -24, -25

Management of data and information

A relationship between requirements on data and information on the one hand, and how to manage data and information in order to ensure that the requirements are fulfilled on the other hand, is generally lacking in all documents.

Specific data management procedures for the system or the tool as such may be described, but there is generally little or no practical guidance on how to collect and prepare the input data to be used for the different systems and tools. It seems that all documents more or less presuppose that some type of data collection systems are in place that can supply the systems and tools with data. Parts of data collection and information management are described in different documents, but the entire task of establishing and maintaining a data collection system for an organization or production facility is not described in full, even when combining requirements, recommendations and guidance in all 14000-series documents.

Below are some examples of data and information management in the reviewed documents:

- The GHG documents (ISO 14064 part 1-3) that are still under development provide some guidance on information quality management, but they do not supply much guidance on which steps that should be included when establishing a data collection system and when collecting and preparing quantitative data and information.
- ISO/DIS 14004 and ISO 14031 recommends that quality management procedures should be applied, but they do not provide any specific guidance or requirements on how such procedures should be applied, implemented or maintained.
- Procedures for data collection are mentioned in e.g. ISO 14031, -40 and -41, but there is no guidance on how such procedures should be designed.
- Procedures for measuring and monitoring are required in environmental management systems (ISO 14001 and ISO 14004), but there is no guidance on how to design such procedures. There is also no mention of the processes between measuring and monitoring and the use of the information for different purposes in the system such as operational control, management review, i.e. preparations that is made to transfer the information into a form suitable for the user.
- Preparation of information to transfer it into a form suitable for communication is addressed in ISO/CD 14063.2, but there is no guidance on how to ensure the quality of the preparations, e.g. that the information is not misinterpreted or distorted.

Documentation

Documentation requirements in the different documents concern both procedures and results. There are however not much guidance on how to design and develop this documentation, or recommendation on the level of detail of the documentation, e.g. in order to facilitate verification and validation. With regard to support for documentation, the ISO/TS 14048 data documentation format provides a format that structures and defines relevant information to be documented for LCA-data, which can also be used for other purposes. Also, some general guidance on document control is provided in the environmental management system documents.

Evaluation, assessment, review, verification or validation of data and information

All documents include some element of evaluation, assessment, review, verification or validation of data and information. However there is not much guidance on how to perform these in practice.

In general the different evaluations and assessments that are recommended are performed *after* data collection and concern different checks on the data as such, e.g. mass-balances, sensitivity analysis (ISO 14041-43). They are not performed *during* the actual data collection, or concern review of how the data have been collected and prepared.

Documents that specify that data and information shall or should be validated or verified (e.g. ISO 19011, 14024, 14025, 14064) generally only define the term validation or verification, but do not provide requirements or much guidance on how to practically perform the validation or verification.

Conclusions

The analysis shows that there is a need for support on quality management of data and information for the ISO 14000-series. The existing documents in the ISO 14000-series do not provide sufficient guidance.

- The different quality requirements stated in different documents and the lack of specific guidance on interpretation of the requirements implies that organizations using the documents may need to establish their own interpretation of the quality requirements. This may lead to that the same quality requirement is interpreted differently by different organizations, which can lead to incomparable results.
- The lack of guidance regarding data and information management implies that the organization needs to establish their own interpretation of how to collect, prepare, and communicate data, and develop their own quality management routines for data and information.
- Evaluation, assessment, review, verification or validation of data and information may be difficult and costly due to that information requirements are unclear and information management procedures are not sufficiently specified.

The lack of support make it difficult for an organization when planning, implementing and maintaining their environmental information systems to provide the different tools within the ISO 14000-series with data of appropriate quality. The documents may be more efficiently and effectively applied if data and information requirements were more coherent and if there were practical guidance and support on how to manage data and information in order to fulfill the requirements.

A common approach for data and information quality management to support all documents in the ISO 14000-series would reduce costs for data collection and improve credibility and verifiability. The organizations would not have to review all documents to ensure that data and information requirements are fulfilled. This would facilitate for organizations to apply the systems and tools in the ISO 14000-series.

Appendix: Review result of each document

In the following, identified requirements, recommendations or guidance in each document have been recorded, together with any impression of gaps. The reporting of each document is divided into five subheadings:

- *Overview*
  Short introduction to the content of the document and a brief general impression.
- *Data and information*
  Quality aspects of data and information used or reported in the system or tool.
- *Management of data and information*
  Processes and procedures to collect, compile, and communicate data and information.
- *Documentation*
  Documentation of processes and procedures, and results.
- *Evaluation, assessment, review, verification or validation of data and information*

Environmental management systems

ISO 14001:1996 Environmental management systems -- Specification with guidance for use

Overview

The standard provides requirements and guidance for the implementation of an environmental management system, including formulation of environmental policy, planning, implementation and operation, checking and corrective action and management review.

The standard does not contain any specific data and information requirements in terms of quality, and it does also not provide much guidance regarding management of data and information that is used for the operation and maintenance of the system, except for some general guidance regarding measuring and monitoring, documentation and document control.

Data and information

The standard does not specifically mention data quality or any specific requirements related to data quality. There are requirements that environmental aspects shall be identified and that "key characteristics" shall be monitored and measured. The relationship between a key characteristic and a significant environmental aspect is however not explicitly specified.

Management of data and information

The standard requires that procedures for measuring and monitoring "key characteristics" shall be established and maintained and that monitoring equipment shall be calibrated and maintained. Except from these requirements there are no requirements or guidance on how the procedures should be designed or implemented, or which specific routines that should be in place, e.g. routines for documentation of results etc.

There are also no requirements or guidance regarding data management that may be performed after the measuring and monitoring in order to use the information for environmental management, e.g. for operational control, to determine nonconformance, for management review etc. For example, the data may need to be recalculated and further prepared to adapt the information to the needs of the user.

It is stated that procedures for internal and external communication should be established, but there are no requirements or recommendations on how to establish these procedures.

Also, it is stated that the organization shall have documented procedures for evaluating compliance with relevant environmental legislation and regulations. There are however no requirement or guidance on how to ensure the quality of this evaluation.

There are requirements that roles, responsibilities and authority shall be clearly defined. However, it will be up to the implementation whether roles and responsibilities regarding information management are defined, since it is not clearly specified in the standard which roles and responsibilities that should be in place.

Documentation

Requirements on documentation are specified, but the requirements are predominantly concerned with documentation of the system as such. It is not clearly stated which specific documents that are required by the standard; only that the core elements of the environmental management system should be documented and that records should be kept. There are some specific requirements that procedures regarding information management should be documented, e.g. procedures for measuring and monitoring shall be documented and records of the calibration and maintenance of monitoring equipment shall be retained. The level of detail of this documentation is however not specified. This flexibility in documentation requirements implies that the specific documentation will depend on the specific implementation.

There are requirements for document control of the documents required by the standard, including a requirement that documents shall be periodically reviewed and approved for adequacy prior to use. This may be considered as some sort of quality control/assurance of the documents, but there is no guidance on how to perform this adequacy check.

Evaluation, assessment, review, verification or validation of data and information

The standard requires an audit to be performed, but the audit only concerns the system as such. There is no explicit mentioning that the information that is used as basis for the control of the activities, products and service, etc should be audited.

It is also stated that the EMS should be periodically reviewed, but there is no guidance on how to perform this review.

ISO/DIS 14001 Environmental management systems — Requirements with guidance for use

Overview

In the DIS document some explicit requirements regarding documentation have been introduced. For instance it is required that the environmental aspects must be documented (it does however not specify what information that should be documented) and that the procedure for monitoring and measurement shall include documenting. In addition, it is required that that the scope of the EMS must be defined.

ISO 14004:1996 Environmental management systems - General guidelines on principles, systems and supporting techniques

Overview

The standard provides general guidelines for environmental management systems. The principles and elements include commitment and policy, planning, implementation, measurement and evaluation and review and improvement.

Some general requirements on indicators used for measuring performance and information that is communicated is provided, together with some general recommendations regarding data and information management in terms of measuring and monitoring, and documentation. The standard does not however provide much support for how to establish data and information management.

Data and information

The standard gives some recommendations regarding information, but it does not specifically mention data quality. Targets should be measurable and it is recommended to use measurable environmental performance indicators for measuring performance. Requirements on the indicators are given; they should be "objective, verifiable and reproducible". They should also be "relevant to the organization's activities, consistent with its environmental policy, practical, cost-effective and technologically feasible". In measuring and monitoring "reliability" of data is mentioned.

In communication and reporting it is stated that "appropriate information" should be communicated to employees and other interested parties, but it is not explained what "appropriate information" means and how to determine the appropriate information. Some recommendations on the information used in communication are however given; it should be understandable and adequately explained, verifiable, and presented in a consistent form.

Management of data and information

Key features of good information management are mentioned, but the features mentioned only concern document control of EMS documentation and records, e.g. identification, filing, storage, etc.

There are recommendations that a system should be in place for measuring and monitoring actual performance against the organization´s environmental objectives and targets, but there is no guidance for how to establish and maintain such a system. It is also recommended that processes to ensure reliability of data should be in place, such as calibration of instruments, test equipment and software and hardware handling.

The standard recommends that operational processes and procedures should be defined, but there is however no examples or guidance on how to design or implement such processes and procedures.

The processes and procedures between the monitoring and measurement system and the actual measurement of performance with environmental performance indicators (which may be different from the results delivered by the system) are not mentioned, e.g. data preparation and communication that is performed to transform the information from measuring and monitoring equipment into a form that describes environmental performance.

It is recommended that responsibilities of relevant personnel are clearly defined. Some examples of responsibilities regarding information management are given e.g. monitor overall EMS performance.

Documentation

The standard recommends that operational processes and procedures should be appropriately documented and updated as necessary.

Also, it is recommended that the organization defines the various types of documents which establish and specify effective operational control. There are however no examples or guidance regarding which types of documents that may be.

Some guidance is provided on document control.

Evaluation, assessment, review, verification or validation of data and information

It is recommended that an audit is periodically performed on the EMS to determine whether the system conforms to planned arrangements. Whether planned arrangements include information management will be up to the implementation. The audit is only concerned with the system as such.

Also, it is recommended that the management conduct a review of the EMS to ensure suitability and effectiveness, but no further guidance is given on what to include in the review.

For continual improvement it is recommended that the environmental performance is continually evaluated against its environmental policies, objectives and targets. Thus, information is required to perform the evaluation, but no guidance is given regarding the evaluation as such, or the information that is used as basis for the evaluation.

ISO/DIS 14004 Environmental management systems — General guidelines on principles, systems and supporting techniques

Overview

In the DIS document of ISO 14001 some further specification of information and information management is introduced:

- It is stated that the organization should "collect quantitative and/or qualitative data on the characteristics of its activities, products and services". The organization should maintain appropriate information on identified and significant environmental aspects and use this information to determine the need for operational control.
- A more detailed specification of effective document control is supplied which includes development of an appropriate document format, assignment of review and approval of documents, and maintenance of an effective document distribution system. There is however no further guidance on any of these tasks.
- Regarding monitoring and measuring it is stated that the organization should
    - have "a systematic approach" for measuring and monitoring its environmental performance on a regular basis, but there is no requirements or guidance regarding how to establish a systematic approach.
    - "plan what will be measured, where and when it should be measured, and what methods should be used". The required quality of the information is however not mentioned.

- conduct measurement under controlled conditions "with appropriate processes for assuring the validity of results, such as….use suitable quality control methods" There is however no further guidance regarding quality control methods.
- It is also stated that "Written procedures for conducting measurement and monitoring can help provide consistency in measurements and enhance the reliability of data produced"

Revision and assessment

ISO 19011:2002 Guidelines for quality and/or environmental management systems auditing

Overview

The standard provides requirements for auditing quality and/or environmental management system. The standard includes principles for auditing and requirements for managing an audit programme and for the audit activities. It also includes requirements on competence and evaluation of auditor.

The audit concerns the systems as such, and does not provide any requirements on environmental data and information and the management of data and information.

Data and information

The audit is based on the objective, scope and criteria set for the audit. Thus, the objectives, scope and criteria may be quite different at different audits.

Audit conclusions are based on audit evidence, which is required to be verifiable information. Except for this, there are no further requirements on the evidence.

Management of data and information

The audit evidence is based on samples of the information available, and the appropriate use of sampling is closely related to the confidence that can be placed in the audit conclusions. Some examples of information sources are provided.

Documentation

There are some general requirements on content of documents for recording audit proceedings and reporting of the audit.

Evaluation, assessment, review, verification or validation of data and information

There is some guidance for the collection and management of audit evidence, but not for the verification of the information. The performance of this task would be facilitated if there were some further guidance both in ISO 14001 and in this standard.

The auditee´s documentation is reviewed prior to on-site audit activities. Based on this review a sampling plan is prepared. There is no specification on minimum requirements on the documentation, or guidance on how the document review should be performed.

During the audit, verification should be performed of information that is relevant to the audit objectives, scope and criteria. There is however no guidance on how to perform this verification in practice.

ISO/IEC Guide 66:1999 General requirements for bodies operating assessment and certification/registration of environmental management systems (EMS)

Overview

The standard provides requirements for certification/registration bodies for EMS, both in terms of requirements on the organization, including personnel, and in terms of requirements on certification/registration procedures.

The standard is intended to provide assurance of the certification/registration. No specific requirements or guidance regarding environmental information and data is specified.

ISO 14015:2001 Environmental management - Environmental assessment of sites and organizations (EASO)

Overview

The standard provides requirements on environmental assessment of sites and organizations in terms of roles and responsibilities of the different participating parties, the assessment process which includes planning, information gathering and validation and evaluation. Also reporting requirements are specified.

The standard presupposes, without mentioning it, that information management and data collection systems are in place at the sites to be assessed, which can be used in the information gathering and validation of the information. When such systems fails, the assessor need to rely on expert/qualified judgments of an expert. The confidence in the assessment will be dependent on the quality of the information that is used as basis. This is however not clearly described.

Data and information

The assessment shall be based on validated information on environmental aspects. In absence of validated information it is stated that the assessor may exercise professional judgement.

It is recommended that the assessor ensure that the information is “sufficient, relevant and accurate for the purpose of the assessment”. In the validation of the information it is stated that “accuracy, reliability, sufficiency and appropriateness” of the information should be considered.

Management of data and information

The information used in the assessment is gathered through reviewing existing documents and records, observations and interviews. Some examples of sources and some guidance on how to perform observations and interviews are provided, but there is no specific guidance on how to ensure that the information is “sufficient, relevant and accurate” for the assessment.

Responsibilities of the different actors participating in the assessment are specified; the client, representative of the assessee and the assessor. The assessor is responsible for gathering and validating information in accordance with the assessment plan.

Documentation

During gathering and review of information it is stated that the assessor should record "the type, source, quality and reliability of the information". There is however no further guidance or examples on how the quality and reliability of the information should be determined.

Some guidance on the reporting of the assessment is given. It is stated that the assessor should "clearly identify the basis for the findings and indicate the relative uncertainty". How the relative uncertainty may be indicated is not described.

Evaluation, assessment, review, verification or validation of data and information

It is recommended that the gathered information is validated for "accuracy, reliability, sufficiency and appropriateness for the purposes of meeting the assessment objectives", but there is no guidance on how to practically perform this validation.
It is also recommended that multiple sources should be reviewed. This can provide some quality assurance, but it seems difficult to achieve in practice.

Environmental labels and declarations

ISO 14020:2000 Environmental labels and declarations — General principles

Overview

The standard provides requirements on general principles to be applied for environmental labels and declarations.

General requirements on the information as well as on the methods to be used are specified. Also, general requirements regarding availability of information to support the label are specified.

Data and information

Environmental declarations and labels shall be "accurate, verifiable, relevant and not misleading". In addition, the information shall be reproducible.

It is also stated that administrative requirements or information demands shall be "limited to those necessary to establish conformance with applicable criteria and standards of the labels and declarations".

Management of data and information

Requirements on methodology are specified. The environmental labels and declarations shall be based on "scientific methodology that is sufficiently thorough and comprehensive to support the claim and that produces results that are accurate and reproducible". It is stated that methods should follow standards that are recognized and have international acceptability or be industry or trade methods that have been subjected to peer review.

Documentation

Information to support the labels and declarations shall be available and provided upon request to all interested parties. The information should be sufficient to allow users to evaluate and compare labels and declarations in terms of "scientific principles, relevance and overall validity". No details on how to ensure this is specified, e.g. regarding documentation, responsibilities etc.

Evaluation, assessment, review, verification or validation of data and information

A periodic review of the basis for environmental labels and declarations should occur.

ISO 14021:1999 Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling)

Overview

The standard provides requirements on self-declared environmental claims, including requirements on evaluation and verification of the claim. Also, some specific requirements for selected claims are given, e.g. designed for disassembly, etc.

Data and information

The information requirements specified in ISO 14020:2000 applies in this standard, i.e. the claim shall be "accurate, verifiable, relevant and not misleading" and "reproducible". Reliability of results is also mentioned.

Management of data and information

Evaluation measures shall be implemented, in order to achieve reliable and reproducible results necessary to verify the claim. Some references to guidance on reproducibility and reliability are provided, but there is no specific guidance or requirements on how to design these evaluation measures. The claimant is responsible for evaluation and provision of data that is necessary to verify the claim.

There are no specific requirements or guidance on how to collect or compile information to fulfil the information requirements.

Documentation

The evaluation shall be "fully documented and the documentation retained by the claimant for the purpose of the information disclosure". There are no further requirements or guidance on the documentation.

Evaluation, assessment, review, verification or validation of data and information

Environmental claim verification is defined as "confirmation of the validity of an environmental claim using specified predetermined criteria and procedures with assurance of data reliability". There is however no guidance on how to perform this verification.

A claim is only considered verifiable if "verification can be made without access to confidential business information"

ISO 14024:1999 Environmental labels and declarations — Type I environmental labelling — Principles and procedures

Overview

The standard provides requirement on principles, procedures, certification and compliance and documentation for Type I environmental labelling programmes.

Data and information requirements are addressed together with general guidance on how to develop criteria for the claim, including test procedures. There are however no examples or further specification of the design of the test procedures.

Data and information

The information requirements specified in ISO 14020:2000 applies in this standard; i.e. the claim shall be "accurate, verifiable, relevant and not misleading" and "reproducible".

In addition, it is stated that "all data shall be of known and verifiable quality", but there is no guidance or requirements on how to interpret this.

Specific requirements on Type I environmental claims is expressed as product environmental criteria. The criteria shall be based on sound scientific and engineering principles, and derived from data that support the claim of environmental preferability.

Transparency is also stressed.

Management of data and information

Procedures for testing and verification of the claim should be addressed. The testing and verification requirements should consider organizational, technical and economic feasibility. No further guidance regarding testing and verification procedures is provided.

Documentation

Transparency of programme is stressed; information shall be available to interested parties and a list of information that should be included is supplied.

Documentary evidence is required from the applicant, in order for the eco-labelling body to assess compliance with programme requirements. A list of minimum requirements on the documentation is supplied.

Evaluation, assessment, review, verification or validation of data and information

The methodology for assessing and verifying compliance with criteria shall be documented and have sufficient rigour to maintain confidence in the programme. Methods should be repeatable and reproducible and make use of recognized standards.

ISO/TR 14025:2000 Environmental labels and declarations — Type III environmental declarations

Overview

The report provides principles and procedures for Type III environmental declarations. It specifies principles and procedures for development of the declaration, including technical considerations, interested party input, and declaration format. It also specifies procedures for establishing Type III declarations and programmes.

Quality requirements on the information from both ISO 14020 and ISO 14041 are addressed. Also verification of the declaration should be performed. There is however not much guidance on how to collect and compile data to ensure that the requirements are fulfilled, and how to perform the verification.

Data and information

Data and information used in Type III environmental declarations should be of "sufficient quality" to ensure the credibility of the information contained and presented in the declaration. Further, the quality of data used to develop a type III environmental declaration

is dependent upon its "credibility or availability or by data precision and accuracy". The interpretation and meaning of each of these terms for the purpose of this standard is not explained, but a list of minimum data quality requirements for LCA from ISO 14041:1998, 5.3.6 is presented and the reader is referred to explanations of the concepts in ISO 14041:1998.

Consistency, comparability and completeness for the pre-set categories across the product´s life cycle should be ensured.

The quality of any additional environmental information in the declaration should be verifiable.

It is stressed that declarations should be developed based on the needs of the users, acquired through input from interested parties. However, there is no mention of that user's requirements on quality of the information should be acquired.

Management of data and information

The requirements and recommendations in the report predominantly concern assessment of data as such. There are no requirements that the actual data collection process should be assessed, or how data should be collected to fulfil the quality requirements.

Quality assurance of data is dealt with in a separate clause, but the description does not supply much guidance to quality assurance. Data quality requirements are mentioned, and it is stated that it is important to "assure the quality of methods used to convert raw data into information provided on a Type III environmental declaration". There is no guidance on how to perform this in practice. Statistical techniques (such as uncertainty, sensitivity) are mentioned as means to better understand the results from the LCA.

Documentation

Some requirements on formatting and communication of the declaration are specified. External communication shall follow general principles and formats determined during the open consultation with interested parties. The design and format shall be developed with the needs of the end user in mind.

Evaluation, assessment, review, verification or validation of data and information

A type III environmental declaration should undergo verification that the proper methods were used and certification that not only were the methods proper, but that the information is correct. There is however not much guidance on how to perform this.

Evaluation shall be in accordance with the critical review process in 14040:1997. There are no specific additional requirements on the critical review for the purpose of type III eco-labelling.

ISO/CD 14025.2 Environmental labelling and declarations — Type III environmental declarations — Principles and procedures

Overview

The document, which is still under development, specifies principles and procedures for Type III environmental declarations, including requirements on both programme and declaration.

Quality requirements on the information from both ISO 14020 and ISO 14041 are addressed. Also verification requirements are specified. There is however not much guidance on how to collect data to ensure that the requirements are fulfilled, or how to practically perform the validation. Such guidance could be provided in the PCR (that is used as basis for development of declarations) but the level of detail of guidance in the PCR is not specified.

Data and information

The information requirements specified in ISO 14020:2000 applies in this standard; i.e. the claim shall be "accurate, verifiable, relevant and not misleading".

The goal and scope, including data quality requirements, of the LCA to be used as basis for the declaration shall be specified in the Product Category Rules (PCR).

Management of data and information

Specific requirements on the LCA that is used as basis for the declaration is described in Product Category Rules (PCR). Requirements on the development and content of the PCR document are specified. For example, the PCR shall include instructions for producing the data required to create the declaration (LCA and additional information). The level of detail of the instructions is however not specified.

It is also stated that quantitative data shall be produced using the same test methodologies, and that details on these (e.g. PCR) shall be available. What is meant by "test methodologies" is not stated, and there are also no requirements on the methodologies.

It is stated that all product declarations in a product category shall "follow the same format and include the same data as identified in the PCR". How to ensure that the same data is included is not described, as well as how to determine comparability of data.

Documentation

Programme instructions shall be prepared by the programme operator, including procedures for development and maintenance of PCR and procedures for independent verification. The programme operator is also responsible for disseminating information about the general methodological aspects of type III eco-labelling.

Evaluation, assessment, review, verification or validation of data and information

The programme operator shall specify appropriate verification procedures. The procedures shall include format for verification and its documentation, and access to verification rules and results.

The independent verifiers shall validate the "quality and accuracy of the data", based on all information given.

General requirements on independent verification are specified; for the PCR, for the LCA data in the declaration and for the declaration as such:

- The PCR shall be critically reviewed according to ISO 14040:1997
- Verification of LCA-data shall confirm compliance with the PCR and ISO 14040 series and conformity with general programme instructions.
- Verification of the declaration shall confirm compliance with ISO 14020 and ISO 14025, general programme instructions and the PCR.

There are only documentation requirements for the verification of the declaration.

There is no further guidance as to the verification of LCA-data, and what should be included in the verification.

Environmental performance evaluation

ISO 14031:1999 Environmental management -- Environmental performance evaluation – Guidelines

Overview

The standard provides guidelines for environmental performance evaluation (EPE), and includes general description on using data and information, what to include in the reporting and also suggestions on data sources and requirements of what to consider when selecting indicators for EPE.

Data and information

There are no explicit requirements on data quality of the information used when developing indicators. Data reliability is mentioned, and that this depends on factors such as "availability, adequacy, scientific and statistical validity and verifiability".

It is stated that the choice of indicators determines what data should be used. But it is not mentioned that the definition of the indicator should include quality requirements on the information that is used as basis.

Management of data and information

Data should be collected regularly to provide input for calculating indicators. The data collection procedures should ensure data reliability and it is recommended that "data collection should be supported by quality control and quality assurance practices". There is however no further guidance or recommendations on how to establish and maintain such data collection procedures.

The collected data should be analysed and converted into indicators. Data analysis may include consideration of "data quality, validation, adequacy and completeness necessary to produce reliable information". There are no further specific guidance on the analysis and the conversion.

Some guidance regarding communication is supplied, e.g. appropriate and necessary information about the performance should be communicated throughout the organization, and external communication should be a reliable representation of the performance and substantive.

Documentation

There is no specific guidance on the documentation of the different types of indicators (environmental condition, operational performance or management performance indicators), or the information that is used as basis for the indicators.

Evaluation, assessment, review, verification or validation of data and information

Environmental performance evaluation should be periodically reviewed, and it is stated that this can include a review of "data sources, data collection methods and data quality". No further guidance on how to perform the review is provided.

Life cycle assessment

ISO 14040:1997 Environmental management - Life cycle assessment - Principles and framework

Overview

The standard describes the general methodological framework for LCA, i.e. the different phases that is included when performing an LCA, and some general requirements regarding reporting and critical review.

The standard contains data quality requirements, and procedural elements when performing LCA, but provides no guidance on how to acquire data in order to fulfill the defined data quality requirements. Also, general requirements for critical review of the study are specified, but there is no detailed guidance on how to perform this review in practice.

Data and information

Data quality requirements shall be considered in the goal and scope of the study and a list of issues that should be addressed concerning data quality are provided:
"- time-related coverage
- geographical coverage
- technology coverage
- precision, completeness and representativeness of the data
- consistency and reproducibility of the methods used throughout the LCA
- sources of data and their representativeness
- uncertainty of the information"
The issues concern both requirements on which data to include e.g. time related, geographical and technology coverage, as well as on detailed individual data level, e.g. precision, uncertainty.

The standard also contains requirements on the reporting; "the results shall be fairly, completely and accurately reported". Also, it is stated that "the results, data, methods, assumptions and limitations shall be transparent and presented in sufficient detail.

Management of data and information

The standard supplies the general framework for LCA, and only general guidance regarding each phase of the LCA is provided; Goal and scope, Inventory, Impact Assessment and Interpretation.

In the inventory analysis it is stated that the procedures for data collection may vary depending on the scope, unit process and intended application of the study. There is however no further guidance or examples on data collection procedures.

In the impact assessment transparency is stressed due to the subjectivity in the assessment.

Documentation

Requirements on the reporting of the study are specified (see above). Type and format of the report shall be defined in the scope phase. When results are to be communicated to a third-party, a third-part report shall be prepared; and a list of aspects to be included in such a report is provided.

Evaluation, assessment, review, verification or validation of data and information

The standard specifies some general requirements and processes for critical review. The review shall e.g. ensure that:
- the data used are appropriate and reasonable in relation to the goal of the study;
- the interpretations reflect the limitations identified and the goal of the study;
- the study report is transparent and consistent"

Critical review can be considered to provide some form of quality assurance of the study and the data used in the study. There are however no guidance on how to perform the review in practice, e.g. how to ensure that data are appropriate and reasonable with the goal of the study. The review will therefore include an element of subjectivity and be dependent on the person performing the review.

ISO 14041:1998 Environmental management - Life cycle assessment - Goal and scope definition and inventory analysis

Overview

The standard provides requirements and guidance for the definition of goal and scope, including definition of data quality requirements, and inventory analysis phases in LCA. The inventory phase includes preparing for data collection, data collection, calculation procedures and allocations. Also, some guidance on interpretation and reporting of these phases is included.

The standard contains a definition of data quality and data quality requirements but there is not much guidance on how to fulfill the requirements, i.e. how the data should be originally collected and prepared.

Data and information

The standard contains a definition of data quality; data quality is defined as "characteristic of data that bears on their ability to satisfy stated requirements". Furthermore it is stated that "Data quality should be characterized by both quantitative and qualitative aspects as well as by the methods used to collect and integrate those data".

In the goal and scope data quality requirements shall be specified, and a list of issues that should be addressed and considered when defining data quality requirements for a specific study is included:
"Data quality requirements should be included for the following parameters:
- time-related coverage: ..
- geographical coverage: ..
- technology coverage: …
Further descriptors which define the nature of the data…shall also be considered."

"the following additional data quality requirements shall be considered in a level of detail depending on the goal and scope definition:
- precision: …
- completeness: ..
- representativeness:…
- consistency: ..
- reproducibility: .."

Management of data and information

The description of the inventory analysis includes preparing for data collection, data collection, and calculation procedures. Allocation principles and procedures are also described. The description of data collection does however not provide any practical guidance on how the actual data collection should/may be performed at the reporting locations. See below for details.

- Preparations: it is mentioned that data collection and calculation techniques for each data category should be described, to assist personnel at reporting locations to understand information needs, and that instructions should be provided. There are however no examples of such techniques or instructions. In the informative Annex there are examples of data collection sheets to illustrate the nature of the information which can be collected from a reporting location. There is however no guidance regarding how to collect the data to complete the data collection sheets.
- Data collection: It is stated that data collection procedures may vary, but there is no requirements, guidance or examples on such procedures.
- Calculation procedures: includes a number of steps to be performed on the collected data in order to arrive at the quantitative inventory result. The steps include guidance on validation and aggregation of data.

Documentation

Procedures used for data collection should be documented. Also general recommendations on the content of the study report are provided.

Evaluation, assessment, review, verification or validation of data and information

During the data collection it is required that a check for data validity is conducted.
Some procedures for validation are suggested, including mass- and energy balances, and comparison. The suggested procedures thus only concern different checks on the data as such and none of the procedures concern analysis of how the data have actually been collected.

The interpretation of results shall include a data quality assessment and a sensitivity assessment. It is also recommended to perform an uncertainty analysis. There is however no practical guidance on how to perform the assessment and these analyses.

ISO 14042:2000 Environmental management - Life cycle assessment - Life cycle impact assessment

Overview

The standard describes mandatory and optional elements for performing life cycle impact assessment. The mandatory elements include selection of impact categories, category indicators and characterization models, assigning LCI results to category indicators (classification) and calculation of category indicator results (characterization). Optional elements include normalization, grouping and weighting. The standard also includes

considerations on data quality analysis, limitations of LCIA and requirements on reporting and critical review of impact assessment.

The standard contains no specific data quality requirements for the impact assessment data, except for transparence, and no guidance on how to collect input data to be used in the impact assessment. Still data quality analysis is addressed.

Data and information

The standard does not mention any specific data quality requirements, except that the procedures, assumptions and other operations should be transparent.

Management of data and information

The standard describes the different steps to be performed when performing a life cycle impact assessment, but it provides no guidance on how to collect the input data to be used for the impact assessment.

Documentation

The standard stresses that all methods, operations etc. shall be documented to ensure transparency of the impact assessment. Some specific recommendations on elements to include in the reporting of the LCIA are provided.

Evaluation, assessment, review, verification or validation of data and information

The standard has a specific clause for data quality analysis. Three techniques are suggested; gravity, uncertainty and sensitivity analysis. Except for a brief description of the different methods, there is no guidance on how to practically perform the different analyses. The techniques that are suggested only concern calculation procedures on the data used, and are not concerned with the actual collection of data.

ISO 14043:2000 Environmental management - Life cycle assessment - Life cycle interpretation

Overview

The standard provides guidance for interpreting the results from an LCA. The interpretation includes identification of significant issues and evaluation of the results. The identification of significant issues includes identification and structuring of information and determination of significant issues. The evaluation may include check for completeness, sensitivity and consistency. Also considerations for conclusions and recommendations are provided as well as reporting requirements.

Data and information

It is stated that the report shall give a complete and unbiased account of the study, but no other specific quality requirements are described.

Management of data and information

The identification of significant issues includes identification and structuring of information and determining the significant issues. Some further guidance is provided in the informative Annex. The different information that is required from the preceding phases of the LCA in order to perform the interpretation is mentioned; findings from LCI and LCIA together with information on data quality, methodological choices, value-choices and roles and responsibilities.

Documentation

The results from the interpretation shall be documented in the study report.

Evaluation, assessment, review, verification or validation of data and information

In the evaluation, three techniques are suggested to be used; a completeness check, a sensitivity check and a consistency check. A brief description of each of these techniques and some general guidance are provided. All these checks would partly rely on information on the collection, compilation and preparation of data used in the study, but it is not mentioned that information about the data used should be reviewed.

ISO/TS 14048:2002 Environmental management - Life cycle assessment - Data Documentation Format

Overview

The specification provides a specification of a format for documentation of LCA data, together with requirements on data types and nomenclatures. Also, some requirements for formatting and reporting of data are provided.

The specification is the only document in the ISO 14000 series that supplies a format for the information. There is however no requirements on completeness of documentation, e.g. which data fields that must be addressed, or guidance on how to collect the data before entering it into the format.

Data and information

The format supplies guidance on relevant information to document for LCA studies, and it is also stated that the format may be used to support data documentation when applying the other standards in the ISO 14000-series. The specification does however not include any quality requirements on which information that shall be documented for a specific LCA data set.

Management of data and information

The specification contains no guidance for how data to be entered into the format should be collected. However, the specification contains some requirements for the formatting of information when transferring it into the format.

Evaluation, assessment, review, verification or validation of data and information

The format is intended to facilitate evaluation, assessment, review, verification or validation of data and information, when applying the other standards in the ISO 14040-series.

Vocabulary

ISO 14050:2002 Environmental management -- Vocabulary

The standard contains definitions of fundamental concepts related to environmental management, published in the ISO 14000 series of standards. The relevant definitions are included in the analysis of each standard.

Product design and development

ISO/TR 14062:2002 Environmental management – Integrating environmental aspects into product design and development

Overview

The report describes strategic, management and product considerations for inclusion of environmental issues in product design and development. The report also includes guidance for the product design and development process regarding common issues, integration of environmental aspects and general review.

The report highlights the importance of data quality and data management, but supplies no guidance on these issues.

Data and information

The importance of data quality for assessing the product and for decision making is stressed, but the report provides no specific requirements on data quality. Credibility of results is mentioned and it is stated that the information used as basis in communication should be accurate and careful, but there is no common definition of the terms in the report.

Management of data and information

The report mentions that credibility of results can be increased through efficient information management, data management software, open and agreed data formats and traceability of results, but there is no further guidance on any of these issues.

It is also mentioned that QFD or FMEA can assist designers and developers, but no further description of the use of these methods exist.

It is stated that a database may be established and maintained to provide environmental data to support the product design and development process, but no further specification of this database can be found.

Documentation

There are no explicit requirements on documentation in this report.

Evaluation, assessment, review, verification or validation of data and information

In the review of the product development and its results it is described that data sources, data collection methods and data quality can be covered, but there is no description on how to perform the review in practice.

It is also stated that improvements of the product design and development process can be achieved by e.g. information management.

ISO Guide 64:1997 Guide for the inclusion of environmental aspects in product standards

Overview

The guide is intended for standard writers, and includes consideration of environmental impacts in product standards.

It contains general information regarding environmental impact of products, and no recommendations regarding environmental information and data.

Environmental communication

ISO/CD 14063.2 Environmental management – Environmental communications - Guidelines and examples

Overview

The standard describes principles and procedures for environmental communication, including development of policy and strategy for the communication, and planning, performing and evaluating communication activities.

The standard includes requirements on the information but does not supply guidance on how to fulfill the requirements in terms of collection and preparation of data. The document presupposes that some sort of data collection process is in place, from which data and information can be identified, selected and prepared.

Data and information

The standard states five principles that shall be applied to environmental communication:

- Transparency: "procedures, methods, data sources, and assumptions … shall be available to all participants"
- Appropriateness: information shall be "relevant to interested parties, using formats, language and media that meets their interests and needs"
- Credibility: information shall be "provided in an honest and fair manner and be truthful, accurate, traceable, reproducible, substantive and not misleading to interested parties. Information and data shall be developed using recognised and reproducible methods and indicators."
- Responsiveness: communication shall be "sensitive to the needs of interested parties"
- Clarity: communication shall use "understandable approaches and language"

These principles put requirements on the information to be used as basis for the communication and on the information itself.

In the development of the communication strategy it is stated that this should include identification of interested parties, and an indication of when and what it plans to communicate. There is however no mention that the data quality requirements of the interested parties should be addressed.

It is stated that environmental communication activities have to be "flexible enough to accommodate and consider ways to address and respond to different and often conflicting demands from target groups" and that common information may have to be presented in different ways. There is however no guidance on how to achieve this flexibility.

It is also stated that the organization should "understand the expectations and perceptions of target groups with respect to the organization's environmental performance.", but there is no guidance on how to acquire the understanding of expectations and perceptions.

In evaluation of data "accuracy, consistency, integrity and applicability" of data is mentioned.

Management of data and information

The document describes different steps in planning, performing and evaluating environmental communication activities.

It is stated that based on targets of an environmental communication activity, appropriate quantitative and qualitative data and information can be selected or generated, but there is no guidance on how to select or generate this information.

It is also stated that information may have to be prepared, due to that available information often not is in a form suitable for communication. There is however no requirements or guidance on how to ensure the quality of these preparations, e.g. that the information is not distorted or misinterpreted in the preparation.

Specific responsibility should be assigned for an environmental communication activity. Defining roles and responsibilities in the communication is one component in achieving some level of quality assurance. There is however not sufficient guidance on how to ensure this.

Documentation

Regarding the material that is used for communication activities, it is stated that it should be documented so that it can be "organized, maintained and easily used". Fast access to the information should be provided. There is no further guidance on what information about the material that should be documented.

Evaluation, assessment, review, verification or validation of data and information

It is stated that evaluation of data for use in communication activities should include checks for "accuracy, consistency, integrity and applicability", but there is no guidance on how to perform such checks.

Evaluation of the effectiveness of environmental communication should consider the "quality and appropriateness" of the information provided to the target groups, and whether the information needs of the target group have been addressed, but there is no guidance on how to consider this.

It is also stated that the data collection process should be assessed when determining needs for revision of environmental communication policy, but there is no guidance on how to perform this assessment, and the data collection process is also not mentioned in the formulation of the policy.

GHG emissions

ISO/CD 14064-1.2 Environmental management – Part 1: Specification for the quantification, monitoring and reporting of organization emissions and removals

Overview

The standard provides principles and requirements for the quantification, monitoring and reporting of organization GHG emissions and removals. It includes requirements on the design and development, the components and the quality management of GHG inventories, and requirements on reporting and verification.

The principles supplies quality requirements on the information. The document contains some guidance on quality management of GHG emissions both in terms of necessary activities and in terms of general management of information.

Data and information

It is stated that to provide a faithful, true and fair account, GHG quantification, monitoring, reporting, validation and verification shall be based on and apply the following principles:

- Completeness: All GHG emissions and removals within the chosen boundaries are included
- Consistency: consistent methodologies are used to permit comparisons
- Accuracy: Sufficient accuracy is achieved. Uncertainties are reduced as far as possible.
- Transparency: All relevant issues are documented [and disclosed] in a factual and coherent manner
- Relevance: methodologies are appropriately selected

Reproducibility of the result is also mentioned.

Management of data and information

The document describes the steps to be completed when quantifying and documenting GHG emissions and removals.

It is stated that the organization shall "select and use quantification methodologies that will reasonably minimize uncertainty and yield accurate, consistent and reproducible results"

A separate clause is devoted to quality management. The clause includes a number of issues that shall be considered for information management procedures:
"a) Identification and review of responsibility and authority of those responsible for GHG inventory development;
b) Identification, implementation and review of appropriate training for inventory development team members;
c) Identification and review of organizational boundaries;
d) Identification and review of GHG sources and sinks;
e) Selection and review of quantification methodologies, including activity data and emission factors, that are consistent with the intended use of the GHG inventory;
f) Review of the application of quantification methodologies to ensure consistency across multiple facilities;
g) Use, maintenance and calibration of measurement equipment (if applicable);

h) Development and maintenance of a robust data collection system;
i) Regular accuracy checks*;*
j) Periodic internal audits and technical reviews;
k) Periodic management reviews of GHG information;
l) Periodic review of opportunities for improving information management processes."

There is no further guidance on any of these issues, e.g. how to develop and maintain a robust data collection system, how to perform accuracy checks, how to conduct internal audits and technical reviews etc.

Documentation

The organization shall retain and maintain all documents and records relating to the establishment and compilation of the GHG inventory, whether in paper, electronic media or other format, in secure archives to enable relevant verification.

It is stated that organization should determine the content, structure, public availability and methods of dissemination of GHG reports. No further guidance for this is provided.

Evaluation, assessment, review, verification or validation of data and information

It is stated that an uncertainty assessment may be performed, and refers to the ISO, Guide to the Expression of Uncertainty; 1995 (GUM) for completing the assessment.

It is also stated that the conformance to the requirements of the standard should be verified.

ISO/CD 14064-2.2 Environmental management – Part 2: Specification for the quantification, monitoring and reporting of project emission reduction and removal enhancements

Overview

The standard provides principles and requirements for quantification, monitoring and reporting of GHG project emission reduction and removal enhancements. Project requirements include description of project, and identifying and selecting GHG sources, sinks and reservoirs for monitoring and quantification, establishing baseline scenario, quantifying GHG, managing data quality and monitoring the project. Also, requirements on documentation, validation or verification, and reporting of the project are provided.

The standard states that data quality management procedures shall be established and maintained and provides some further guidance in the informative Annex. It also specifies some requirements on monitoring procedures.

Data and information

The same principles as in part 1 is included (see above).

Management of data and information

The procedures and requirements for GHG projects are described, which include:

- Identifying GHG sources, sinks and reservoirs for the project: criteria and procedures shall be established, justified and applied.
- Selecting which sources sinks and reservoirs that should be monitored and quantified: criteria and procedures shall be established, justified and applied.

- Quantifying the GHG gases:
  criteria and methodologies for quantifying emissions, removals and/or storage shall be established, justified and applied.
- Managing data quality:
  quality management procedures to manage data and information, including uncertainty assessment, shall be established, maintained and applied.
- Monitoring the GHG project: criteria and procedures for obtaining, recording, compiling and analyzing data and information shall be established, maintained and applied. A list of issues to include in the monitoring procedure is included; purpose of monitoring, types of data and information to be reported, origin of data, monitoring methodologies, times and periods, roles and responsibilities, and information management systems. It is also stated that monitoring equipment shall be calibrated and maintained, as appropriate, and that records of this shall be stored and maintained.
- Documenting the project (see documentation below)

There are some further guidance on quantification and management of data quality in an informative Annex.

Documentation

It is stated that documentation that demonstrates conformance with the standard shall be prepared and maintained, and that the documentation shall be consistent with or consider validation and verification needs. There is however no specific guidance on how to design this documentation.

Reporting procedures shall or should be established and applied.

Evaluation, assessment, review, verification or validation of data and information

It is stated that the GHG project proponent shall validate or verify the GHG project, as appropriate.

ISO/CD 14064-3.2 Environmental management – Part 3: Specification with guidance for validation and verification

Overview

The document provides principles and requirements on validation and verification of GHG assertions. It includes requirements on competence of validator or verifier, the objectives, scope, criteria, and level of assurance and the approach for validation or verification. The validation or verification includes assessments of GHG information system and information system controls, of GHG data and information, and against validation or verification criteria, and evaluation of the GHG assertion. There are also requirements on validation or verification statements and records.

The document is largely based on ISO 19011:2002 Guidelines for auditing quality and/or environmental management systems.

Data and information

In addition to the principles in part 1 and Part 2, principles concerning validation and verification have been included. The additional principles are "independence, ethical conduct, fair presentation and due professional care". They are derived from ISO 19011:2002, and have been adapted to reflect the context of this International Standard.

In the validation or verification, the level of assurance is defined in agreement with the client. The level of assurance is the degree to which validation or verification conclusions are free from material misstatement.

Management of data and information

Validation or verification is based on evidence collected in the assessment of controls, GHG data and information and applicable GHG programme criteria. The validator or verifier shall evaluate whether this evidence supports the GHG assertion. There is however no guidance on how to perform this evaluation in practice. Also, the validator or verifier shall conclude whether the assertion is free from material misstatement.

Responsibilities of the validator or verifier are described.

Documentation

The validator or verifier shall issue a validation or verification statement and maintain records to demonstrate conformance to the requirements in the standard.

Evaluation, assessment, review, verification or validation of data and information

It is stated that the validator or verifier shall "assess sources and magnitude of potential error to establish a sampling plan for further audit investigation". How to assess the sources and potential error in practice is however not described.

A validation or verification plan shall be developed by the validator or verifier. The plan shall include objectives, scope, criteria, level of assurance, and the verification and validation activities to be undertaken, including the sampling plan.

In the verification or validation, an assessment of GHG information system or information system controls shall be performed. The assessment shall consider:
"a) Selection and management of the GHG data and information;
b) Processes for collecting, processing, consolidating, and reporting GHG data and information;
c) Systems and processes that ensure the accuracy of the GHG data and information;
d) Design and maintenance of the GHG information system;
e) Systems and processes that support the GHG information system."

Further details of how to practically perform the assessment of each of these steps are however not provided.