
Greenhouse gases — Quantification and reporting of greenhouse gas emissions for organizations — Guidance for the application of ISO 14064-1

Gaz à effet de serre — Quantification et rapport des émissions de gaz à effet de serre pour les organisations — Directives d'application de l'ISO 14064-1

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

ISO/TR 14069 was prepared by Technical Committee ISO/TC 207, *Environmental management*, Subcommittee SC 7, *Greenhouse gas management and related activities*.

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Introduction

ISO 14064-1 enables organizations around the world to quantify greenhouse gas (GHG) emissions and removals. This Technical Report uses the principles and process from ISO 14064-1 to develop guidance on quantification and reporting of GHG for organizations.

This Technical Report is consistent with the objective of building on existing International Standards and protocols on corporate GHG inventories, and incorporates many of the key concepts and requirements stated in the GHG Protocol by the World Business Council for Sustainable Development/World Resources Institute in References [4] and [5]. Some of these concepts have been adapted to suit this Technical Report. Users of this Technical Report are encouraged to refer to References [4] and [5] for additional guidance on applying the relevant concepts and requirements.

ISO 14064-1 identifies three types of emissions:

- a) direct emissions;
- b) energy indirect emissions (associated with purchases of electricity and heat);
- c) “other indirect emissions”.

Direct emissions correlate to “scope 1”, energy indirect emissions to “scope 2” and other indirect emissions to “scope 3” as defined by the GHG Protocol corporate standard (see Reference [4]).

In tackling climate change, there is a convergence of interests between organizations, national and regional regulators and international negotiators on the need to develop methods of quantifying GHG emissions and providing reliable tools to do so.

This Technical Report is intended to assist users in the application of ISO 14064-1, using guidelines and examples and to provide transparency in the quantification of emissions and their reporting.

This Technical Report enables an organization to do the following:

- enhance the transparency and consistency of reported GHG emissions (direct, energy indirect and other indirect), establish a classification of categories for all emissions, especially the indirect emissions, and recommend this classification for all ISO 14064-1 inventories;
- choose or develop the method of calculating emissions;
- differentiate, whenever necessary, the three main types of organization that are addressed in this Technical Report:
 - a facility or production site (spatially delimited) providing goods (industry) and/or services (tertiary), belonging to a private or public organization;
 - a private or public organization with several facilities/sites and/or subsidiaries, and needing consolidation procedures;
 - a local authority that produces both direct and indirect emissions, from both its own operations and services provided within a specific territory: the services provided to a community (roads, cleaning, transport, gardens, etc.) can be delivered directly by the public authority or under mixed forms (outsourced activities, delegations, concession, etc.);
- report GHG emissions and removals, using a simplified format to make the report easier to understand.

This Technical Report is intended to give guidance on the quantification of a GHG emissions inventory within the selected boundaries of an organization. It differs from the process of product carbon footprinting (see ISO 14067), whose primary focus are the emissions from the life cycle of a product.

The objective of this Technical Report is to offer organizations guidance on the quantification and reporting of their GHG inventory, using a process that incorporates the principles of relevance,

completeness, consistency, accuracy and transparency. This kind of GHG inventory is expressed as net global warming potential in carbon dioxide equivalent (CO₂e).

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Greenhouse gases — Quantification and reporting of greenhouse gas emissions for organizations — Guidance for the application of ISO 14064-1

1 Scope

This Technical Report describes the principles, concepts and methods relating to the quantification and reporting of direct and indirect greenhouse gas (GHG) emissions for an organization. It provides guidance for the application of ISO 14064-1 to greenhouse gas inventories at the organization level, for the quantification and reporting of direct emissions, energy indirect emissions and other indirect emissions.

This Technical Report describes for all organizations, including local authorities, the steps for:

- establishing organizational boundaries, in accordance with either a control approach (financial or operational) or an equity share approach;
- establishing operational boundaries, by identifying direct emissions and energy indirect emissions to be quantified and reported, as well as any other indirect emissions the organization chooses to quantify and report; for each category of emission, guidance is provided on specific boundaries and methodologies for the quantification of GHG emissions and removals;
- GHG reporting: guidance is provided to promote transparency regarding the boundaries, the methodologies used for the quantification of direct and indirect GHG emissions and removals, and the uncertainty of the results.

A table of correspondence between the numbering of ISO 14064-1:2006 and this Technical Report is provided in [Annex A](#).

The examples and case studies presented in this Technical Report are not exclusive and non-exhaustive. The values of the emission or removal factors mentioned in the examples are given for illustrative purposes only. A non-exhaustive list of database references is provided in [Annex B](#).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14064-1:2006, *Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14064-1 and the following apply.

3.1 Terms relating to greenhouse gases emission

3.1.1

direct greenhouse gas emission

GHG emission from greenhouse gas sources owned or controlled by the organization

Note 1 to entry: ISO 14064-1 uses the concepts of financial and operational control to establish an organization's operational boundaries.

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[SOURCE: ISO 14064-1:2006, 2.8]

3.1.2

energy indirect greenhouse gas emission

GHG emission from the generation of imported electricity, heat or steam consumed by the organization

[SOURCE: ISO 14064-1:2006, 2.9]

3.1.3

other indirect greenhouse gas emission

GHG emission, other than energy indirect GHG emissions, which is a consequence of an organization's activities, but arises from greenhouse gas sources that are owned or controlled by other organizations

[SOURCE: ISO 14064-1:2006, 2.10]

3.1.4

greenhouse gas emission or removal factor

factor relating activity data to GHG emissions or removals

Note 1 to entry: A greenhouse gas emission or removal factor could include an oxidation component.

[SOURCE: ISO 14064-1:2006, 2.7]

3.1.5

avoided emission

GHG emission reduction that occurs outside the organizational boundaries of the reporting organization as a direct consequence of changes in the organization's activity, including but not necessarily limited to the emission reductions associated with increases in the generation and sale of electricity, steam, hot water or chilled water produced from energy sources that emit fewer greenhouse gases per unit than other competing sources of these forms of distributed energy

Note 1 to entry: Based on definition in Code of Federal Regulations — Title 10: Energy, Chapter II: Department of Energy, Subchapter B: Climate change, § 300.2.

3.1.6

downstream emission

other indirect GHG emission from goods and services subsequent to the sale and/or delivery by the organization and to the end of life of such goods and services

3.1.7

out of stream emission

other indirect GHG emission not included either in upstream or in downstream emission

Note 1 to entry: Out of stream emissions are limited to employee activities, e.g. commuting, which are neither purchased nor sold.

3.1.8

upstream emission

energy indirect GHG emission and other indirect GHG emission from goods and services acquired by the organization

3.1.9

double counting

accounting for GHG emissions or removals more than once

Note 1 to entry: Double counting can occur between organizations, i.e. two or more reporting organizations take ownership of the same GHG emissions or removals. Double counting can also occur inside an organization when GHG emissions or removals are taken into account in different categories (this type of double counting should not occur).

3.1.10 offsetting

mechanism for compensating for all or part of the GHG inventory of an organization that can occur directly through the prevention of the release of, reduction in, or removal of, an amount of greenhouse gas emissions in a process outside the operational boundaries of the organization or indirectly through the purchase of GHG reductions (in the form of carbon credits) generated by a third party

Note 1 to entry: A carbon credit is a generic term for any tradable certificate or permit representing the right to emit one tonne of carbon dioxide or the mass of another greenhouse gas with a carbon dioxide equivalent (tCO₂e) equivalent to one tonne of carbon dioxide.

3.2 Terms relating to biomass and land use

3.2.1 biomass

material of biological origin, excluding material embedded in geological formations and material transformed to fossilized material and excluding peat

Note 1 to entry: Biomass includes organic material (both living and dead), e.g. trees, crops, grasses, tree litter, algae, animals, and waste of biological origin, e.g. manure.

[SOURCE: ISO 14067:—¹⁾, 3.1.8.1]

3.2.2 biogenic carbon

carbon derived from biomass

[SOURCE: ISO 14067:—, 3.1.8.2] (standards.iteh.ai)

3.2.3 biogenic CO₂

CO₂ obtained by the oxidation of biogenic carbon

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3.2.4 direct land use change dLUC

change in human use or management of land within the organizational boundaries and as part of upstream or downstream activities

[SOURCE: ISO 14067:—, 3.1.8.4, modified]

3.2.5 indirect land use change iLUC

change in the use or management of land which is a consequence of direct land use change not taking place within the operational boundaries of the GHG inventory

[SOURCE: ISO 14067:—, 3.1.8.5, modified]

3.3 Terms relating to data

3.3.1 greenhouse gas activity data

quantitative measure of activity that results in a GHG emission or removal

Note 1 to entry: Examples of GHG activity data include the amount of energy, fuels or electricity consumed, material produced, service provided or area of land affected.

[SOURCE: ISO 14064-1:2006, 2.11]

1) To be published.

3.3.2

site-specific data

data obtained from a direct measurement or a calculation based on direct measurement at its original source within the established operational boundaries of the GHG inventory

Note 1 to entry: All site-specific data are "primary data".

[SOURCE: ISO 14067:—, 3.1.7.2, modified]

3.3.3

secondary data

data obtained from sources other than a direct measurement or a calculation based on direct measurements at the original source

Note 1 to entry: Such sources can include databases, published literature, national inventories and other generic sources.

[SOURCE: ISO 14067:—, 3.1.7.3, modified]

3.3.4

disaggregation of activity data

subdivision of activity data into parts that are more closely related to the real emissions of the activity

EXAMPLE General activity data for goods transport is the number of tonnes per kilometre operated each year. A useful disaggregation of this activity data could be a distinction between the modes of transport (air, road, train, water, etc.) because of an important difference between related emission factors. More disaggregated activity data can be used consecutively, e.g. with a distinction between small and big trucks.



3.4 Other terms

3.4.1

local authority

public body given the authority by legislation or directives of a higher level of government to set general policies, plans or requirements

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Note 1 to entry: Common names for a public body organization that operates within a nation-state include state, province, region, department, county, prefecture, district, city, township, town, borough, parish, shire, village.

4 Principles

The principles given in ISO 14064-1 apply.

4.1 General

ISO 14064-1:2006, Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals	
3	Principles
3.1	General
The application of principles is fundamental to ensure that GHG-related information is a true and fair account. The principles are the basis for, and will guide the application of, requirements in this part of ISO 14064.	

4.2 Relevance

ISO 14064-1:2006, Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals	
3.2	Relevance
Select the GHG sources, GHG sinks, GHG reservoirs, data and methodologies appropriate to the needs of the intended user.	

For the relevance of appropriate GHGs taken into account: the organization should determine, as appropriate to the needs of intended user, the greenhouse gases taken into account, by using the GHG definition (see ISO 14064-1:2006, 2.1) in the same way that is used for the selection of GHG sources, sinks and reservoirs.

This selection of GHGs should also be consistent with completeness principle (see 4.3). This GHG selection is notified, and possibly explained in the report (see Clause 8). Selection of GHG sources, sinks and reservoirs is independent from greenhouse gases taken into account. This selection of gases should also be consistent throughout all the emission categories considered inside operational boundaries (see 5.2).

Subclauses 5.3 and 5.4 provide guidance to the intended user on the relevance and selection of data and methodologies, category by category.

4.3 Completeness

ISO 14064-1:2006, **Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals**

3.3 Completeness

Include all relevant GHG emissions and removals.

Completeness refers to the need for the organization to have identified and understood all its emissions and removals and included them within its organizational and operational boundaries. This requires an organization to have the necessary competencies, capacity and processes in place to ensure the effective achievement of identification and understanding.

The principle of completeness is used with the principle of relevance to explain the choice of the GHGs taken into account in the GHG inventory.

4.4 Consistency

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ISO 14064-1:2006, **Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals**

3.4 Consistency

Enable meaningful comparisons in GHG-related information.

Consistency is necessary both for organization internal and external comparisons.

Internal comparisons deal with period to period comparisons, in order to evaluate the potential results of decided and/or implemented directed actions. It also deals with internal comparisons between departments or subsidiaries within the organization.

For external comparisons, the GHG inventory should be presented in a manner that enables the users to analyse the changes in the organization's levels of emissions and removals over time.

4.5 Accuracy

ISO 14064-1:2006, **Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals**

3.5 Accuracy

Reduce bias and uncertainties as far as is practical.

Accuracy refers to the need for an organization to provide information regarding its emissions and removals that has a degree of accuracy, a low margin of uncertainty and is free of bias as far as is practicable in order for users to make decisions with a high degree of confidence. The accuracy of quantitative information may depend on specific sampling methods and qualitative information but is subject to a level of uncertainty.

4.6 Transparency

ISO 14064-1:2006, Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals	
3.6	Transparency
Disclose sufficient and appropriate GHG-related information to allow intended users to make decisions with reasonable confidence.	

Transparency refers to the need for an organization to disclose sufficient and appropriate GHG related information relevant to the processes, procedures, and assumptions embodied in the reported information to allow users to make decisions with reasonable confidence.

5 GHG inventory design and development

5.1 Organizational boundaries

5.1.1 General

ISO 14064-1:2006, Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals	
4	GHG inventory design and development
4.1	Organizational boundaries
<p>The organization may comprise one or more facilities. Facility-level GHG emissions or removals may be produced from one or more GHG sources or sinks.</p> <p>(...)</p> <p>The organization shall consolidate its facility-level GHG emissions and removals by one of the following approaches:</p> <p>a) control: the organization accounts for all quantified GHG emissions and/or removals from facilities over which it has financial or operational control; or</p> <p>b) equity share: the organization accounts for its portion of GHG emissions and/or removals from respective facilities.</p> <p>The organization may use a different consolidation methodology where specific arrangements are defined by a GHG programme or legal contract.</p> <p>When a facility is controlled by several organizations, these organizations should adopt the same consolidation methodology.</p> <p>The organization shall document which consolidation method it applies.</p> <p>The organization shall explain any change to the selected consolidation method.</p>	

An organization engaged in setting its organizational boundaries first establishes the objective of the GHG inventory and then examines its mission, goals, operations and facilities to determine the GHG sources which it can control and those which it may influence. The objective of its inventory is used to determine the organizational boundaries.

If the objective is to calculate the GHG inventory of the whole organization, the organization should carefully analyse its current organizational boundaries and consolidation methods, already in place for their financial accounting. If these organizational boundaries are suitable for the GHG inventory objectives, and are explained and followed consistently, the organization should consider using these financial boundaries and consolidation methods.

- If the organization wholly owns and operates all its operations, its organizational boundaries are the same whichever consolidation method is used. In this case, the organization simply quantifies and reports all emissions from each of its wholly owned operations.
- For organizations with jointly owned operations, however, the organizational boundaries differ depending on the consolidation method used (control or equity share).

In relation to the inventory of GHG emissions from a local authority's own or delegated operations, ISO 14064-1 applies and further guidance can be found in this Technical Report (see 5.1.3). GHG inventory of emissions within the community, determined by the geopolitical boundaries of the administration (also known as "territorial approach") may need a specific methodology that is outside the scope of this Technical Report.

5.1.2 Selecting and applying the consolidation method

5.1.2.1 General

Each consolidation method (equity share or control) has advantages and disadvantages. The operational and financial control methods may best facilitate performance tracking of GHG management policies. However, these may not fully reflect the financial risks and opportunities associated with climate change, compromising financial risk management. On the other hand, the equity share method best facilitates financial risk management by reflecting the full financial risks and opportunities associated with climate change, and is less subject to interpretation, but may be less effective at tracking the operational performance of GHG management policies.

If both methods are equally applicable and meet the organization's objectives, preference should be given to the control method that follows the financial accounting rules already in place, in order to link GHG emissions reporting with actions to improve GHG management.

In some cases, the consolidation methods already in place for the organization's financial accounting may not be suitable for determining the GHG inventory of the organization. In these circumstances a specific definition of financial or operational control may be needed and reported in the GHG inventory.

The concepts described in 5.1.2.2 and 5.1.2.3 are issued from the International Financial Reporting Standards (IFRS) Guide "Presentation of Consolidated Financial Statements" [6].

5.1.2.2 Equity share consolidation method

Using equity share consolidation method leads to account emissions of consolidated entities up to the ownership percentage of the reporting organization.

Equity share reflects the extent of the rights an organization has to the risks and rewards from an operation based on its equity interest. Equity share is therefore the same as the ownership percentage.

NOTE In special cases, if the ownership percentage is below the economic interest, equity share is re-evaluated (see IFRS rules).

A subsidiary is identified by the share of equity held in it by its parent organization. The equity share communicates the stewardship of management in carrying out its responsibilities related to the subsidiary more clearly than if the investments were accounted for on the basis of direct equity interest.

A parent organization should determine the degree of equity investment (more than 1 %) it has in its subsidiaries to assist in defining its organizational boundaries.

The legal status of a subsidiary is independent of the control affiliation for the purposes of defining the organization's boundaries. Any change in equity share is a reason to reconsider the organizational boundaries. When a subsidiary is excluded from consolidation, its shares are recorded as "equity" in category 15 (Investments) of other indirect emissions (see 5.4.15).

Once the organizational boundaries are defined, the GHG inventory of the organization includes the equity share portion of GHG emissions of the consolidated subsidiaries. This includes in the GHG inventory of the parent organization and the emissions from its subsidiaries up to the representative portion of its interests.

EXAMPLE Parent organization A holds 30 % of the shares from organization B. The emissions from organizations A and B are shown in Table 1. The consolidated results are shown in Table 2.

Table 1 — Values of emissions from parent organization A and subsidiary B

Emissions	Parent organization A (emissions in t CO ₂ e)	Subsidiary B (emissions in t CO ₂ e)	30 %
Direct emissions	1 000	500	150
Energy indirect emissions	500	20	6
Other indirect emissions	8 000	7 000	2 100

Table 2 — Consolidated results for the GHG inventory of organization A (equity share consolidation method)

Consolidation	Emissions t CO ₂ e
Direct emissions	1 150
Energy indirect emissions	506
Other indirect emissions	10 100

5.1.2.3 Control consolidation method

Using control consolidation method leads to account 100 % of emissions of consolidated entities which are under the control of the reporting organization.

IFRS defines control as “the power to govern the financial and operating policies of an organization so as to obtain benefits from its activities”.

This definition of control encompasses both the notion of governance and the economic consequence of that governance (i.e. benefits and risks). “Power to govern” implies having the capacity or ability to govern the decision-making process through the selection of financial and operational policies.

As a general rule, control of an entity is presumed when the parent organization owns more than half of the voting power of the entity either directly or indirectly through subsidiaries.

When the parent organization owns half or less of the shares of an entity, control may occur in the following cases:

- extended voting rights over passing the majority by virtue of an agreement with other investors;
- power to govern the financial and operating policies of the entity under a statute or an agreement; (e.g. local authorities’ sharing entities or joint venture company);
- power to cast, appoint or remove the majority of the members of the board of directors (and other stewardship committees);
- control based on contracts: control means the right under contractual or statutory provisions, to exercise authority in an organization, whether the authority is a majority or minority shareholder of this organization; a parent organization has the ability to use or direct the use of assets in the same way it controls its own assets;

EXAMPLE 1 The parent organization can be a shareholder or a minority shareholder and be entrusted with the effective management of an entity.

- control *de facto*

In some cases, the organization can run sustainable financial and operating policies of another organization, although it does not hold majority voting rights or does not have a formal contract to exercise a dominant influence. The basis for the control should be explained.

An example of *de facto* control applies when the representatives of the parent organization are the top management leaders of an entity. In such a case, entity should be consolidated even if the parent organization has no majority voting rights.

Explanation and disclosure should be provided in determining whether an organization controls another. Once the organizational boundaries of the organization are defined, the parent organization should include 100 % of GHG emissions of the consolidated entities.

EXAMPLE 2 Parent organization A holds 70 % of voting rights from organization B (control explained). The emissions from organizations A and B are shown in [Table 3](#). The consolidated results are shown in [Table 4](#).

Table 3 — Values of emissions from parent organization A and subsidiary B

Emissions	Parent organization A (emissions in t CO ₂ e)	Subsidiary B (emissions in t CO ₂ e)
Direct emissions	1 000	500
Energy indirect emissions	500	20
Other indirect emissions	8 000	7 000

Table 4 — Consolidated results for the GHG inventory of organization A (control consolidation method)

Consolidation	Emissions t CO ₂ e
Direct emissions	1 500
Energy indirect emissions	520
Other indirect emissions	15 000

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5.1.3 Case of a local authority

5.1.3.1 General

A local authority provides services to organizations and persons residing, transiting or working in an area under its jurisdiction. The scope of these services may differ from one local authority to another and, while normally restricted to a geographical area may, in certain circumstances, extend into another authority's area. Wherever they occur, these services are under the direct control of the local authority.

A local authority GHG inventory may also be established on the concept of "territoriality", namely the physical area or region over which it has control. In this case, all GHG emissions generated within the territory are taken into account, including those from private housing and transport, commercial and industrial organizations and any of the local authority's services' embedded emissions for products consumed by persons or activities in a territory may also be included.

Therefore, two different inventories may be established, one for the local authority's own operations (as for any other organization) and one for all the emissions within the community, determined by the geopolitical (territorial) boundaries of its jurisdiction. This territorial approach needs a specific methodology, which is outside the scope of this Technical Report.

The key differences between a local authority and other organizations are listed below. As described in [5.1.3.2](#), these differences should be considered when setting organizational boundaries and selecting consolidation methods.

- Aggregation of different social functions: a local authority has a broad spectrum of activities, from general administration to the maintenance of parks and gardens or the provision of public transport. All these activities (see [5.2.2.2](#)) provided by a local authority may have very different operational boundaries.