PD ISO/TR 14069:2013

BSI Standards Publication

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

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National foreword

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TECHNICAL REPORT

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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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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is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.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,

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completeness, consistency, accuracy and transparency. This kind of GHG inventory is expressed as net global warming potential in carbon dioxide equivalent (CO_2e).

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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).

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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 (tCO_2e) 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]

3.2.3
biogenic CO_2
CO_2 obtained by the oxidation of biogenic carbon

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]

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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

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.

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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

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.

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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** 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. (...) The organization shall consolidate its facility-level GHG emissions and removals by one of the following approaches: a) control: the organization accounts for all quantified GHG emissions and/or removals from facilities over which it has financial or operational control; or b) equity share: the organization accounts for its portion of GHG emissions and/or removals from respective facilities. The organization may use a different consolidation methodology where specific arrangements are defined by a GHG programme or legal contract. When a facility is controlled by several organizations, these organizations should adopt the same consolidation methodology. The organization shall document which consolidation method it applies. The organization shall explain any change to the selected consolidation method.

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).

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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.

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

Emissions	Parent organization A (emissions in t CO_2e)	Subsidiary B (emissions in t CO_2e)	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_2e
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.

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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_2e)	Subsidiary B (emissions in t CO_2e)
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_2e
Direct emissions	1 500
Energy indirect emissions	520
Other indirect emissions	15 000

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.

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— Legally provided services: many local authorities' activities and functions are defined in legislation. For example, in some countries, local authorities are responsible for traffic regulation and waste management. In these circumstances, actions for reducing GHG emissions cannot include ceasing to perform this function.

— Shared services: in order to perform services such as waste management or water treatment, a local authority often shares the means of providing these services with other local, regional or national authorities.

— Outsourced services: local authorities may have a legal responsibility to provide a service such as water supply and water treatment, but have outsourced the delivery of the service to an alternative provider through a concession or contract. These concessions or contracts may have many terms and conditions, which include arrangements for GHG emission reductions.

5.1.3.2 Setting organizational boundaries and selecting consolidation methods

Organizational boundaries of a local authority include the authority itself and, and as applicable, shared services, outsourced services and its concessions. The main objective chosen by a local authority to complete its GHG inventory is to identify the actions it can take to reduce its GHG emissions.

The potential to reduce GHG emissions should be taken into account in setting the organizational boundaries, along with any contractual conditions associated with outsourced or shared services.

Services provided or organized by a local authority may be free of charge (i.e. paid by local or national taxes), or be paid for at market or non-market prices, to the same or another local authority, or to any delegated public or private organization. This should not be a criterion to exclude services provided by organizations from the organizational boundaries. Consolidation methods used by companies such as equity share or control may be used or adapted by a local authority, paying special attention to any legal links between the local authority and the final service provider. Three main cases are described below: a) shared services, b) outsourced and c) equity share with another organization.

a) Example of shared services split between several local authorities includes waste or water management or school transportation. In most cases, those local authorities responsible for the service do not share capital, but provide human and/or financial resources to manage the burden equitably between them. Burden sharing should be used by a local authority if it selects equity share consolidation. Alternatively operational control consolidation may be selected where, for instance, one local authority provides the majority of the human and/or financial resources.

b) Outsourcing is another common way for a local authority to provide services. If services are provided on a shared basis, see a). If one single authority provides outsourced services to others, relevant GHG emissions should be incorporated into that local authority's organizational boundaries. In these circumstances, operational control should be selected as the consolidation method. Where for legal or contractual reasons, the local authority is unable to change its role as an outsourced provider, the relevant GHG emissions may be excluded from its organizational boundaries.

c) Local authorities may create or participate with a private organization in order to provide services. Where this occurs, one local authority may hold a majority equity share or the equities could be shared between several local authorities and private organizations. In either cases, the service provider may be considered as a subsidiary, and the consolidation method should be selected from equity share or control depending on the circumstances. The same rules as those described in 5.1.2 apply.

5.1.3.3 Case of special entities

Where contractual relationships exist between a local authority and a private organization, the organizational boundaries should be based on the control principle.

A Joint Powers Authority (JPA) is an institution authorized under the laws of some states, where two or more local authorities (e.g. utility districts or transport districts) can operate collectively. JPAs have separate operating boards of directors, and these boards can be given any of the powers inherent in all

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of the participating agencies. The joint authority can employ staff and establish policies independently of the constituent authorities.

As a JPA is considered a distinct organization from its member authorities, emissions from JPAs should not be reported as part of a local authority's inventory.

If the collection service and waste treatment has been entrusted to a cooperative structure (i.e. city association), it is necessary to define a rule for allocating emissions between the various members of the structure. This can be done in proportion to the billing, collected volumes, weight, etc.

5.2 Operational boundaries

5.2.1 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**
4.2.1 Establishing operational boundaries The organization shall establish and document its operational boundaries. The establishment of operational boundaries includes identifying GHG emissions and removals associated with the organization's operations, categorizing GHG emissions and removals into direct emissions, energy indirect emissions and other indirect emissions. It includes choosing which of the other indirect emissions will be quantified and reported. The organization shall explain any changes to its operational boundaries.

Emissions can be divided into "upstream", "downstream" and "out of stream" in order to help the organization to understand better those emissions, to avoid double counting between organizations in a supply chain and to make reported GHG data more useful to interested parties (See also definitions 3.1.6, 3.1.7 and 3.1.8). Figure 1 shows the different emissions. Further details about upstream, downstream and out of stream categories are given in Table C.1.

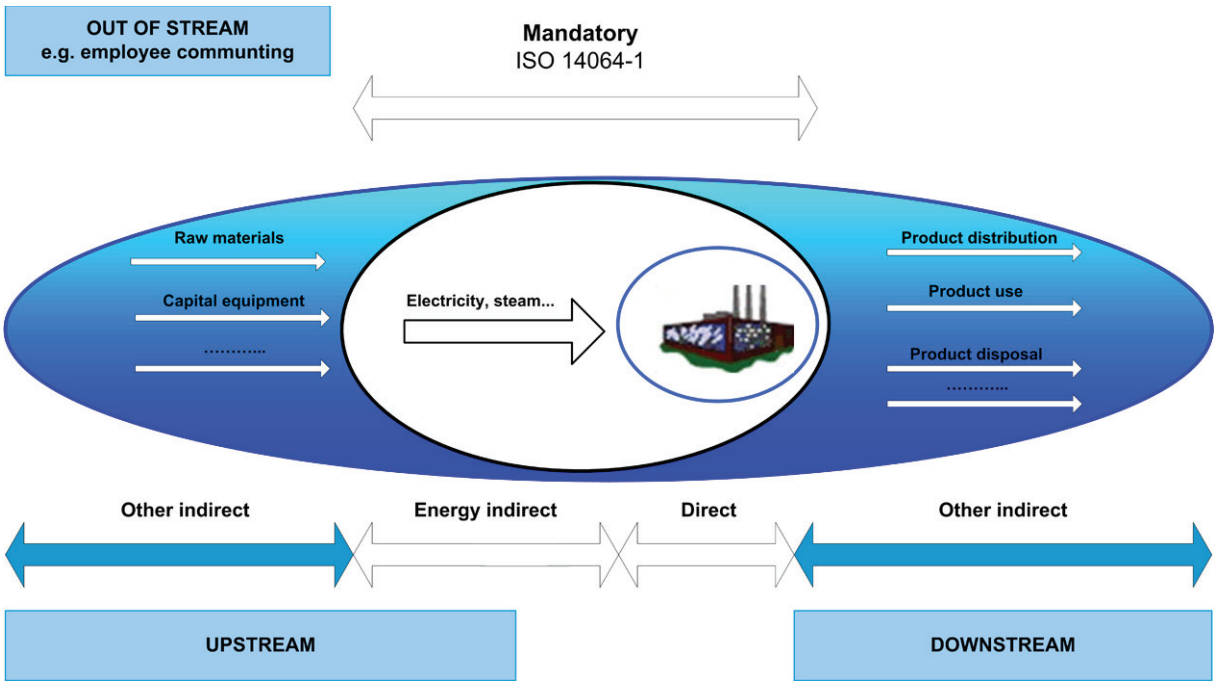

Figure 1 — Upstream emissions, downstream emissions and out of stream emissions

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5.2.2 Categorization of emissions and removals

5.2.2.1 General

GHG emissions and removals are classified into the 23 categories listed below. Each emission can only belong to one category (see Table C.1, which presents the categories and examples of emission sources).

Additional information on sector specific requirements regarding monitoring and reporting of GHG emissions may be available from sector specific guidelines or standards and could help to achieve the principles of completeness, relevance and consistency.

— **Direct GHG emissions and removals** from facilities within its organizational boundaries related to:

1) direct emissions from stationary combustion;
2) direct emissions from mobile combustion;
3) direct process related emissions;
4) direct fugitive emissions;
5) direct emissions and removals from Land Use, Land Use Change and Forestry (LULUCF) (excluding combustion); according to ISO 14064-1, the quantification of direct removals is optional.

— **Energy indirect GHG emissions:**

6) indirect emissions from imported electricity consumed;
7) indirect emissions from consumed energy imported through a physical network (steam, heating, cooling, compressed air) excluding electricity.

— **Other indirect GHG emissions and removals:**

8) energy-related activities not included in direct emissions and energy indirect emissions;
9) purchased products;
10) capital equipment;
11) waste generated from organizational activities;
12) upstream transport and distribution;
13) business travel;
14) upstream leased assets;
15) investments;
16) client and visitor transport;
17) downstream transport and distribution;
18) use stage of the product;
19) end of life of the product;
20) downstream franchises;
21) downstream leased assets;
22) employee commuting;
23) other indirect emissions or removals not included in the other 22 categories.

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NOTE 1 Some categories, mostly the upstream ones, might include emissions that occurred before the reporting year (e.g. emissions from previously made purchased products). With a view to account for all emissions related to the activities of the reporting organization, these emissions are also considered in the reporting year in which the activity is recorded.

NOTE 2 Some categories, mostly the downstream ones, might include emissions that will occur after the reporting year. With a view to account for all emissions related to the activities of the reporting organization, these emissions are also considered in the reporting year in which the activity is recorded.

5.2.2.2 Specific case of local authorities

A local authority provides services that generate emissions from sources which may be classified into the 23 categories listed in Table C.1. In order to establish the GHG inventory, local authorities may quantify emissions associated with the services they provide. A list of some potential generic services which could be provided by local authorities is presented below. The organization of services and the responsibility of local authorities depend on the context of each country:

— general administration: emissions from administrative activities and from buildings of the administration;

— education: emissions from teaching activities;

— housing: emissions from the housing provided by the local authority. this may include staff accommodation and social housing;

— transport: emissions from transport services and infrastructures (bus, motor vehicle, metro/light rail or train, port and airport).

— water sanitation: emissions for the management of water supply and sanitation services (network, collectors, water treatment plants, sludge treatment);

— waste: emissions for the collection, processing and disposal of household waste and waste treatment;

— sports facilities: emissions from sport service and infrastructures such as swimming pools, sports halls, sailing bases, climbing facilities, equestrian centres, driving circuits, etc.;

— cultural facilities: emissions from cultural services and infrastructures such as museums, theatres, infrastructures for festivals, historic sites, libraries, media centres, religious sites, etc.;

— health and social: emissions from activities and facilities to help senior citizens, facilities for persons with disabilities (physical, mental), nurseries and early childhood centres, etc.;

— green spaces: emissions from activities and facilities associated with public parks, forests, coastal sites, protected areas, roadside trees, including maintenance and management;

— streets and roads: emissions from roads construction and maintenance and from street lighting.

Table C.2 gives an example of the application of the 23 categories to the specific case of an education service.

Special attention should be paid to the risks of double counting throughout the consolidation of the GHG inventory of the local authority. Further guidance may be found in 5.3.2 and in several categories.

To avoid any double counting, the local authority should take care to instruct departments on the nature of the emissions to be considered and their allocation.

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5.2.3 Prioritizing relevant emissions

5.2.3.1 General

According to ISO 14064-1, the organization:

— includes in its inventory 100 % of its direct and energy indirect emissions, however, absolute completeness in reporting may not be possible and exceptions may be made for trivial emission sources;

— chooses which of the other indirect emissions are quantified and reported.

Regarding "other indirect emissions", the organization may decide to concentrate its effort on quantification and reporting of a limited number of categories instead of spreading its efforts on all categories. In some organizations or sectors, the other indirect emissions may be more significant than the direct emissions. For this reason, it is important to approximate the magnitude of other indirect emissions, in order to be able to better decide which categories of these emissions should be considered.

In order to determine which other indirect emissions the organization includes in its inventory, as a minimum two factors should be taken in consideration:

a) to reduce the risk of overlooking/ignoring some significant sources of GHGs, a wide estimate of the potential sources of "other indirect emissions" is carried out defining, when possible, a quantitative threshold, in order to decide which sources should be defined and which can be excluded or estimated in the GHG inventory,

b) to ensure a transparent approach for the interested parties, the criteria and the consequent decision about which "other indirect emissions" and sources are taken into consideration or excluded should be explained and reported.

The assessment of the relevance and the prioritization of other indirect emissions are made by each reporting organization, in line with the objective for the GHG inventory, with a view to prioritizing those activities where the most significant GHG reduction opportunities lie. For example, a professional services company may determine business travel to be a significant "other indirect emissions" category, while an electric utility may not determine business travel to be significant compared to its other sources of emissions.

Relevant other indirect emissions may also be prioritized based on other factors such as the organization ability to influence/reduce the emissions, stakeholder concerns, and GHG program requirements.

If the organization chooses the criteria of relevance based on size, guidance for the prioritizing is provided in 5.2.3.2.

5.2.3.2 Prioritizing relevant other indirect emissions based on size

"Other indirect emissions" categories are considered relevant if they are large (or expected to be large) compared to the reporting organization's other sources of emissions.

The organization should estimate emissions from all sources to gain a basic understanding of the relative contributions of various "Other indirect emissions". Whether an individual "Other indirect emissions" is relevant in size is a function of:

a) total anticipated "other indirect emissions", and

b) the emissions from any single "other indirect emissions" category.

Initial estimates should be conducted for each individual "other indirect emissions" category and rolled up to obtain an estimate of total anticipated "Other indirect emissions".

Each category of "other indirect emissions" requires a separate screening method to estimate emissions.

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To determine which "other indirect emissions" categories are most relevant in size, the organization should follow these steps.

— Use screening methods to individually estimate the emissions from all "other indirect emissions" categories. This estimate may be based on very rough hypotheses or expert judgment.

— Express each category of emissions of "other indirect emissions" as a fraction of total anticipated "other indirect emissions".

— Rank all "other indirect emissions" activities from largest to smallest to determine which activities are most relevant.

Then, the organization should select a significance threshold that defines the percentage of total anticipated "Other indirect emissions" to be included into the GHG inventory. The organization should disclose in the public report the percentage of total anticipated "other indirect emissions" that have been accounted for and reported. While the organization should strive for the GHG inventory to be as complete as possible, it is acknowledged that many small activities are likely to contribute only to a small portion of total "other indirect emissions".

5.3 Generalities on the quantification of emissions and removals

5.3.1 Selection of quantification methodologies

ISO 14064-1:2006, 4.3, identifies three GHG quantification methodologies that may be used for organizations:

a) calculation;

b) measurement;

c) combination of measurement and calculation.

In many cases, it is not practical to measure directly the GHG emissions resulting from an activity. Exceptions would include continuously collecting, recording and reporting the required emission data from factory stack or exhaust pipe. This subclause focuses mainly on the calculation methodology as it is most commonly used. An organization mainly assesses its GHG emissions resulting from its activities by calculation, using methodologies such as:

— GHG activity data multiplied by GHG emission or removal factors;

— the use of models.

This Technical Report focuses mainly on the most commonly used calculation methodology. To calculate the GHG emissions of a category, the organization should follow these steps:

— identify the GHG sources and sinks for each category (see 5.3.2);

— for these sources and sinks, collect activity data at the appropriate disaggregation level (see 5.3.3);

— the activity data should be multiplied with appropriate emission or removal factors to obtain the GHG emissions or removals (see 5.3.4 and 5.3.5).

Those three steps are described as a flow chart in Figure 2. This general flow chart allows seeing the steps all together. The flow chart is divided into 5 boxes for which detailed explanation are given in 5.3.2 to 5.3.5.

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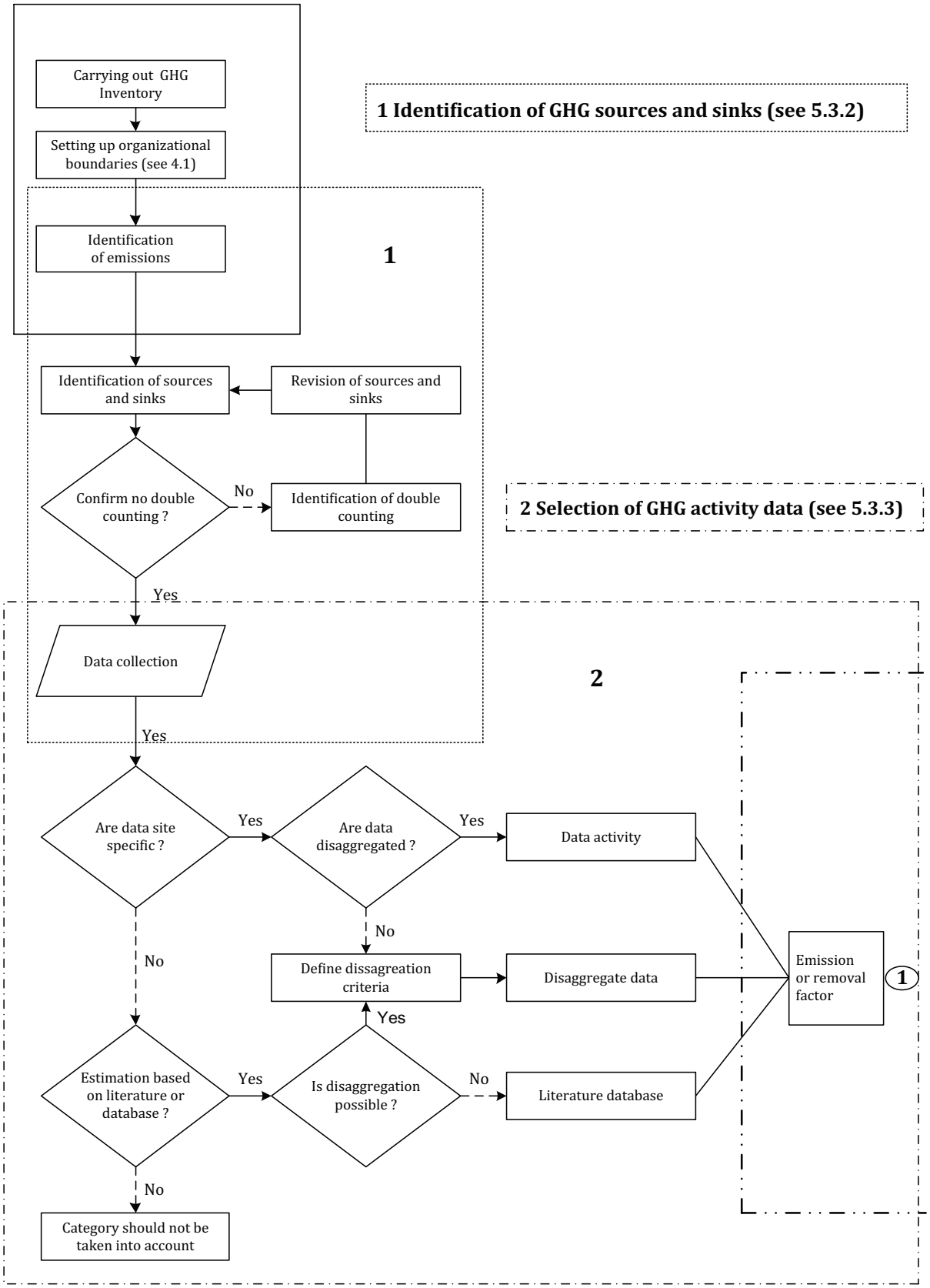

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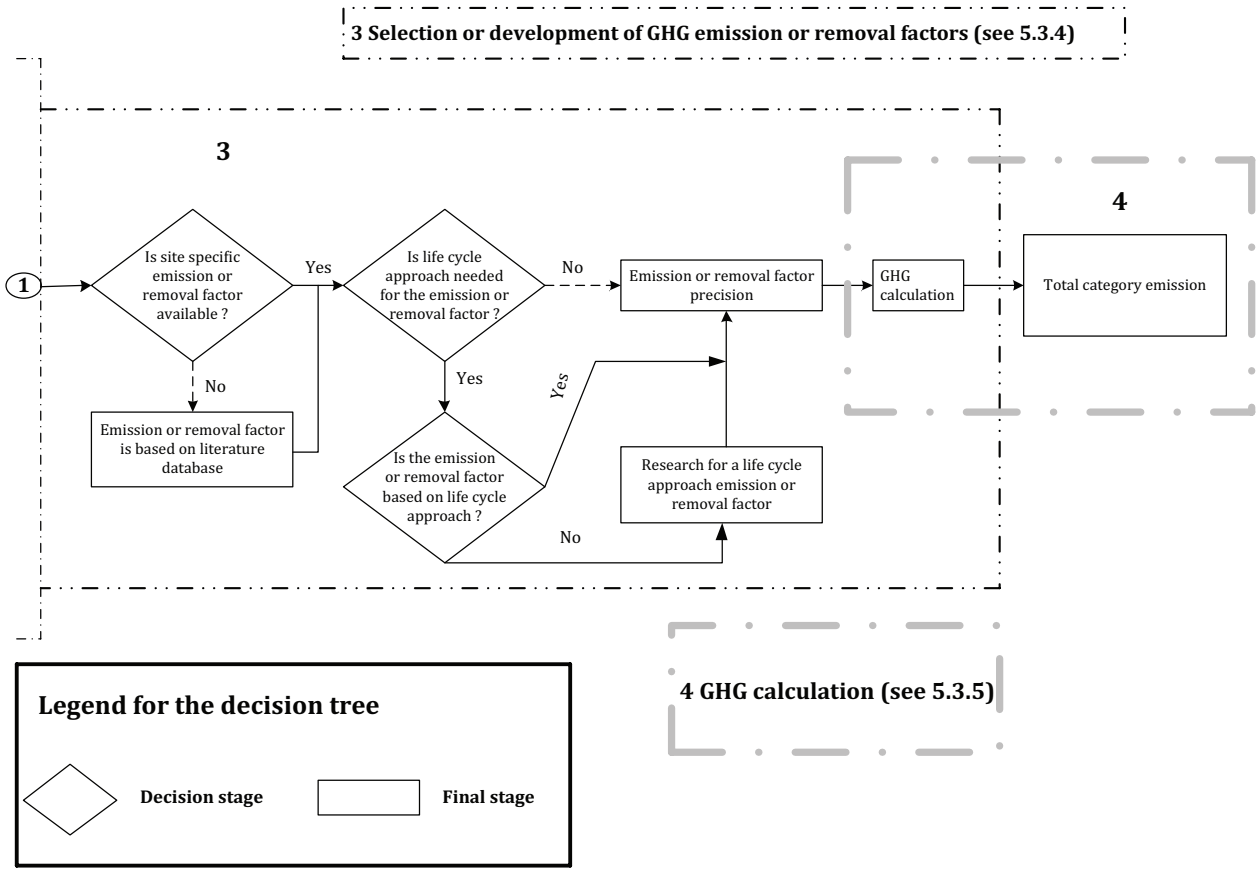

b)

Figure 2 — Flow chart

5.3.2 Identification of GHG sources and sinks

The organization clearly identifies all relevant sources and sinks for each emission category. The most relevant GHG sources and sinks for each emission category are described in the "paragraph a)" of each category (see 5.4.1 to 5.4.23).

The organization should pay attention to avoid double counting of emissions between different categories. When there is a risk for double counting, the organization should describe the sources and sinks of each category as well as a description of the boundaries of the different emission or removal factors.

For example, Figure 3 shows the risk of double counting between category 9 (Purchased products) and 12 (Upstream transport and distribution).

The two diagrams in Figure 3 deal with the GHG emissions related to category 9 (Purchased products) and category 12 (Upstream transport) for the same organization.

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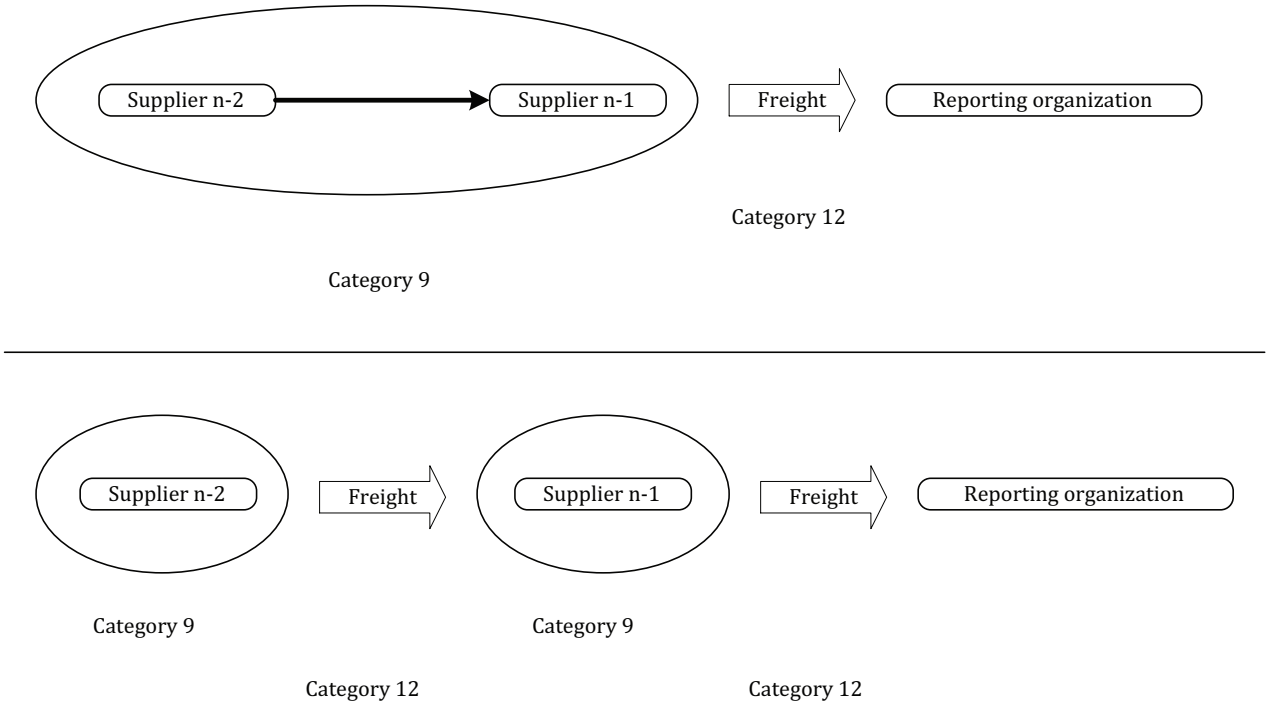

Figure 3 — Example of double counting issue between categories

In the first diagram, the organization takes into account the transport step between its last supplier and its site in category 12. For the calculation of the emissions of category 9, the organization takes into account very large boundaries for the emission factor. The emission factor is based on life cycle approach, taking into account upstream suppliers and all the upstream transport and distribution steps from the raw material to supplier *n*-1.

When there is not any emission factor based on life cycle approach available for the purchased products (category 9), then a second approach can be used as described in the second diagram. The organization takes into account all the transport steps (freight) from its supplier and upstream, in category 12. The products bought by its supplier are also taken into account as purchased products in category 9.

When both approaches are mixed, there is a risk of double counting.

5.3.3 Selection of GHG activity data

Once GHG sources and sinks are clearly identified, the organization collects or estimates activity data for each of the sources and sinks.

GHG activity data used to quantify GHG emissions or removals should be consistent with the requirements of the selected quantification methodology.

For the methodology using GHG activity data multiplied by GHG emission or removal factors, two types of GHG activity data are available:

— site-specific data (see 3.3.2), e.g. volume of fuel consumed, kWh of electricity bought, number of km travelled, units of purchased goods, weight of each type of waste produced by the organization, etc.;

— secondary data (see 3.3.3): whatever the origin of data, the organization should report the source of the secondary data, i.e. assumptions and key parameters used or a recognized study or national or sector inventory; secondary data are mainly used for other indirect emissions.

The type of activity data the organization chooses has a strong influence on the accuracy of the GHG inventory. The accuracy is linked with the site-specificity of the data and its disaggregation level.

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Disaggregated site-specific data (see 3.3.4) provide the greatest accuracy. If there is no clear view on site-specific data, estimation should be done based on literature or recognized database. In this case, accuracy is lower. If it is not possible to collect or to estimate quality data, the category should not be taken into account. Such exclusion should be clearly stated in the report.

Non-exhaustive guidelines for the selection of activity data are given in subclauses relating to each emission category.

In those subclauses (5.4.1 to 5.4.23), a best scenario and a minimum scenario are defined for each emission category. The best scenario represents high quality data collection. By contrast, the minimum scenario represents the lowest acceptable level of accuracy of activity data. Between the best and minimum scenario, there is a range of possible intermediate scenarios that might be selected depending upon cost, time spent and other consideration. Guidelines are given on key parameters that should be considered for the disaggregation of activity data.

5.3.4 Selection or development of GHG emission or removal factors

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**
4.3.5 Selection or development of GHG emission or removal factors If GHG activity data are used to quantify GHG emissions and removals, the organization shall select or develop GHG emission and removal factors that a) are derived from a recognized origin, b) are appropriate for the GHG source or sink concerned, c) are current at the time of quantification, d) take account of quantification uncertainty and are calculated in a manner intended to yield accurate and reproducible results, and e) are consistent with the intended use of the GHG inventory The organization shall explain its selection or development of GHG emission or removal factors, including identification of their origin and appropriateness for the intended use for the GHG inventory. The organization shall explain any changes to GHG emission or removal factors previously used by the organization and, where appropriate, recalculate the base-year GHG inventory (...).

Once activity data have been clearly identified, the organization should collect or estimate emission and removal factors for each of the sources and sinks. Emission or removal factors should be selected according to the activity data and should be in line with the disaggregation level of the activity data.

The organization should first look for site-specific emission or removal factors or underlying data used to develop a site-specific emission factor. When no site-specific emission or removal factors (or the underlying data) are available, estimated emission or removal factors from literature or recognized databases should be used. System boundaries of the process(es) generating GHG emissions should be taken into account when selecting the emission or removal factor. For example, emission factor of motor vehicle transport may be restricted to the CO_2 emission of the combustion of the fuel or may include the GHG emissions associated with fuel extraction and refining, and/or amortized emissions of road and motor vehicle construction and maintenance.

For direct GHG emissions and energy GHG indirect emissions, the system boundary for the emission factor covers only one stage (for example, the combustion of fossil fuels in categories 1 and 2).

For other indirect emissions, emission or removal factors should be based on life cycle approach. For example, for purchased products category, the emission or removal factor should take into account the emissions from cradle to gate. When no emission or removal factor based on a life cycle assessment is available, the organization should try to set up an emission or removal factor which covers the most relevant stages of the life cycle. This is called the boundaries for the emission or removal factor and the description of the boundaries should be reported.

NOTE The concept of boundaries of the emission or removal factor is derived from the concept of the system boundary, as defined in ISO 14040:2006, 3.32.

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The most important stages to include in the system boundary for the emission or removal factor are given in the descriptions of the different emission categories (5.4.1 to 5.4.23).

5.3.5 GHG calculation

There are two steps for calculation.

The first step is to convert activity data into GHG emissions:

GHG emissions or removals = activity data × emission or removal factor

The second step considers the Global Warming Potential (GWP) of each GHG and allows the conversion of GHG emissions or removals into climatic impact, identified in tonnes equivalent of CO_2 (tCO_2e):

$$\text{GHG emissions} = \sum_{\text{gas}} \left(emissions_{\text{gas}} \times GWP_{\text{gas}} \right)$$

where GHG emissions are expressed in CO2 equivalent units.

NOTE 1 It is advisable to use GWP values from the latest version of IPCC for conversion of emissions in CO_2-equivalents (see Annex D)

NOTE 2 Emission or removal factors can sometimes directly be given into CO_2 equivalent units, and then GWP is equal to 1.

The accuracy of the final calculation depends on the accuracy of the activity data and emission or removal factor. It is important to disclose considerations related to the accuracy level for data activity and emission or removal factors (see Clause 8 for the reporting).

5.3.6 Specific issues applicable to several categories

5.3.6.1 GHG emissions and removals from biomass

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**
4.2.2 Direct GHG emissions and removals (…) The organization should quantify GHG removals from facilities within its organizational boundaries. (…) CO_2 emissions from the combustion of biomass shall be quantified separately.

Other anthropogenic biogenic CO_2 emissions (excluding biomass combustion) may occur from e.g. land use change, degradation process (e.g. fermentation), reversal of removals (for example, through deforestation).

Non anthropogenic biogenic CO_2 emissions caused by force majeure (e.g. wildfire, or infestation by insects) should be quantified and reported separately.

These other biogenic CO2 emissions should be quantified in the relevant direct categories: category 3 (Direct process related emissions), category 5 [Direct emissions and removals from Land Use, Land Use Change and Forestry (LULUCF)] and other indirect emissions within the relevant categories such as category 9 (Purchased products) or category 19 (End of life of the product). Additional guidance is provided in the relevant subclauses of 5.4.

Thus, biogenic CO_2 emissions from an organization should be reported separately as follows:

— CO_2 emissions from the combustion of biomass;

— other CO_2 emissions from biomass.

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Other GHGs emissions from biomass (such as CH_4, N_2O) should be calculated in CO_2e. These quantities should be reported with that of similar GHG emissions from other sources e.g. combustion or industrial process, etc., thus differentiating the climatic impact between CO_2 and other GHG emissions.

5.3.6.2 Specific cases of emission factors

Some emission factors for processes or goods or services are still difficult to assess scientifically. In some cases, values may vary across a very large range, from one-to three-fold for instance. Two examples are listed below.

a) Aircraft emissions

According to IPCC (see Reference [10], Chapter 2), condensation trail and cirrus effects caused by global aircraft operations could influence significantly the radiative forcing due to emissions from aircraft. The organization could take into account this fact for its GHG quantification with a correction factor applied to the GHG direct emissions factor of fuel combustion. In this case, the organization indicates the correction factor applied to the emission factor to account for the higher radiative forcing (GWP) aircraft emissions associated with fuel combustion.

b) Nitrous oxide emissions from fertilizer use in agricultural practices

N_2O emissions are strongly dependent on regional and organizational specificities, such as fertilizer type and regime, temperature and humidity, and cultivation practices. In addition, understanding of nitrogen cycle through soil and atmosphere is still under scientific discussions.

As with the selection of all emission factors, the organization should indicate clearly the value of the emission factor used, explain this chosen value and document the used sources.

5.3.6.3 Avoided emissions

Avoided emissions (see 3.1.5) should be quantified only for energy generation or material recovery from waste treatment (see for example 5.4.9 and 5.4.11). Any other avoided emissions (e.g. from use stage of sold products) should not be taken into account. In this case, those emissions are quantified and reported separately.

NOTE When selecting emission factors for waste treatment, it is advisable that the organization identifies if avoided emissions are included or excluded.

5.4 Quantification of GHG emissions and removals for each category

5.4.1 Category 1 — Direct emissions from stationary combustion

a) Identification of GHG sources and sinks

Direct emissions from stationary combustion are due to on-site combustion of fuel burnt in stationary (fixed) equipment included within the organizational boundaries of the reporting organization (such as for example heaters, gas turbines, boilers, etc.) to generate heat, mechanical work and steam.

b) Selection of GHG activity data

1) Best scenario

The most accurate activity data are the total quantities of each fuel. The quantity of each fuel can be collected by reading out energy meters or by a follow-up of the amounts on the bills over the considered period.

2) Minimum scenario

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The total energy consumed by the organization from stationary combustion per type of fuel is estimated. As a minimum, the organization could separate energy consumption from heating and from process as this could be useful for further energy efficiency.

3) Intermediate scenarios

All stationary combustion sources are identified and the quantity of fuel is normally available. Where the fuel used is not known, then an estimate of the consumption of fuel related to stationary combustion can be obtained by disaggregation using the following main key parameters:

For the heating of buildings, key parameters that should be considered are:

— floor area and age of building;

— type of energy used;

— climatic zone;

— operating hours and the use of the building.

For machinery, key parameters that should be considered are:

— type and size of machine;

— period of use per year;

— type of fuel;

— nominal input power and yield;

— efficiency and equipment rating.

c) Selection of emission factors

The emission factor takes into account only the direct emissions due to the stationary source.

GHG emission factors are expressed in GHG emissions per quantity of fuel used or per total energy consumed (kWh).

d) Examples

EXAMPLE 1: An organization has a central heating system using gas. There is an energy meter and the quantity (in kWh) each year on January 1 at noon is registered. Total quantity is 6 107 888 kWh. The quantity is expressed in higher heating value (HHV). Emission factor for natural gas (HHV) is 0,201 kg CO_2e/kWh. Total emissions = (6 107 888 × 0,201) = 1 227 685,488 kg CO_2e= 1 228 t CO_2e

EXAMPLE 2: An organization does not know its fuel consumption. The organization is composed of an office with 1 500 m^2 and uses heating oil. The organization has noted in recognized database that the average rate for offices is 248 kWh/m^2 heated. All 1 500 m^2 are heated. With this parameter of 248 kWh/m^2, the emission factor (kg CO_2/m^2) is 50 kg CO_2/m^2. Total emissions = (1 500 × 50) = 75 000 kg CO_2e = 75 t CO_2e

e) Other indirect emissions potentially linked to category 1 emissions

Other emissions of GHG are related to direct emissions from stationary combustion, without being direct emissions, and are classified in the corresponding other indirect emissions categories.

Considering a boiler belonging to and used by an organization, category 1 emissions are restricted to fuel combustion emissions. Other indirect emissions take into account, for example, GHG emissions due to fuel transport from refinery and/or due to boiler construction. These related processes are necessary to stationary combustion, but are not classified as direct emissions from stationary combustion.

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