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## Greenhouse gases —

### Part 1:

## Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals

*Gaz à effet de serre —*

*Partie 1: Spécifications et lignes directrices, au niveau des organisations, pour la quantification et la déclaration des émissions des gaz à effet de serre et leur suppression*

ICS 13.020.40

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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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 14064-1 was prepared by Technical Committee ISO/TC 207, *Environmental Management*, Working Group 5 on Climate Change.

ISO 14064 consists of the following parts:

- *Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals*
- *Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements*
- *Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions*

## Introduction

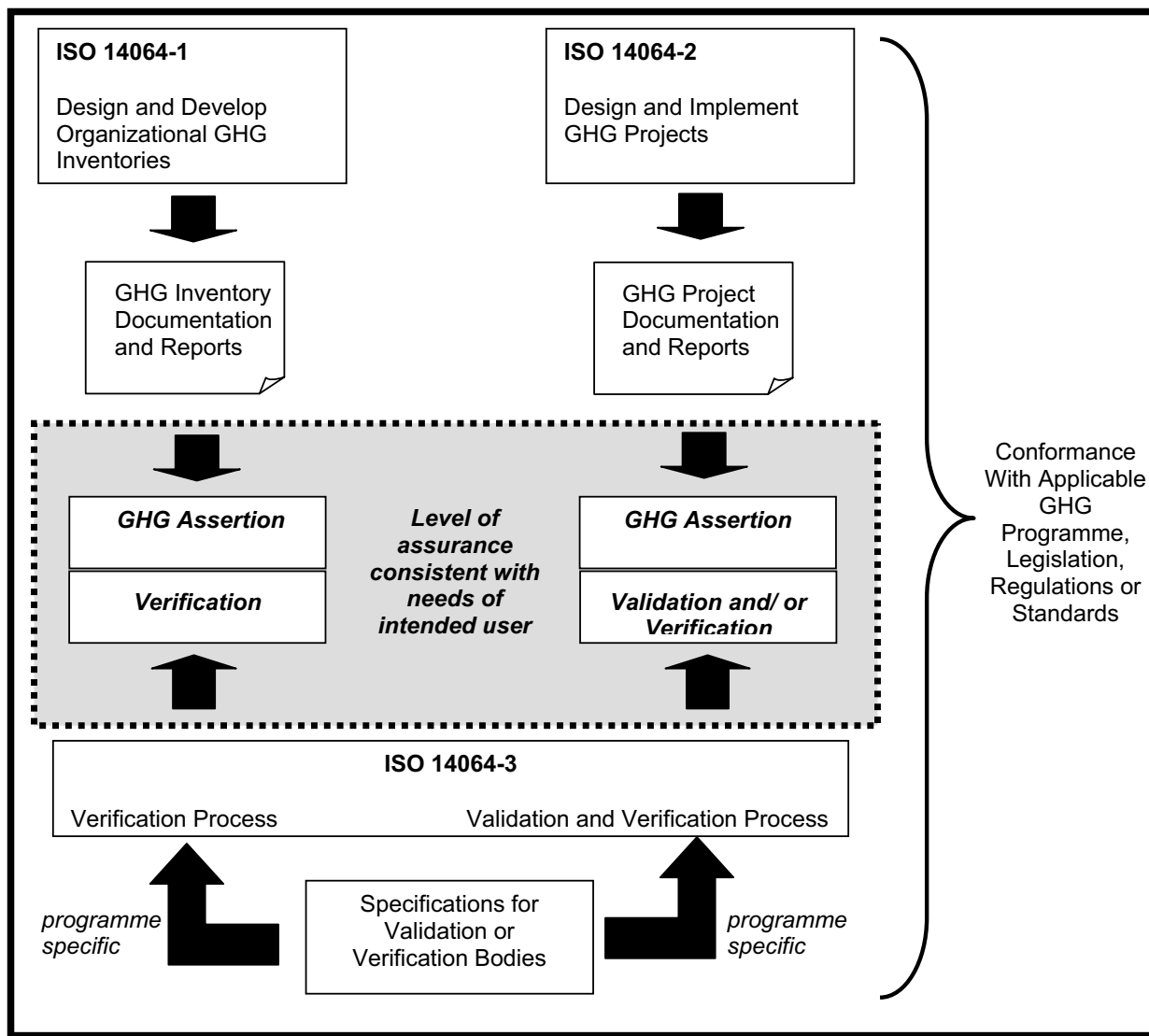
Climate change has been identified as one of the greatest challenges facing nations, governments, business and citizens over upcoming decades. Climate change has implications for both human and natural systems and could lead to significant changes in resource use, production and economic activity. In response, international, regional, national, and local initiatives are being developed and implemented to limit greenhouse gas (GHG) concentrations in the Earth's atmosphere. Such GHG initiatives rely on the quantification, monitoring, reporting and verification of GHG emissions and/or removals.

This part of ISO 14064 details principles and requirements for designing, developing, managing and reporting organization or company-level GHG inventories. This part of ISO 14064 includes requirements for determining GHG emission boundaries, quantifying an organization's GHG emissions and removals and identifying specific company actions or activities aimed at improving GHG management. It also includes requirements and guidance on inventory quality management, reporting, internal auditing and the organization's responsibilities in verification activities.

ISO 14064-2 focuses on GHG projects or project-based activities specifically designed to reduce GHG emissions or increase GHG removals. ISO 14064-2 includes principles and requirements for determining project baselines and for monitoring, quantifying and reporting project performance relative to the baseline and provides the basis for GHG projects to be validated and verified.

ISO 14064-3 details principles and requirements for verifying GHG inventories and validating or verifying GHG projects. ISO 14064-3 describes the process for GHG-related validation or verification and specifies components such as validation or verification planning, assessment procedures and the evaluation of organization or project GHG assertions. ISO 14064-3 can be used by organizations or independent parties to validate or verify GHG assertions.

Figure 1 displays relationships among the three parts of ISO 14064.



**Figure 1 — Relationships among parts of ISO 14064**

ISO 14064 is expected to benefit organizations, governments, project proponents and stakeholders worldwide by providing clarity and consistency for quantifying, monitoring, reporting and validating or verifying GHG inventories or projects. Specifically, use of ISO 14064 may:

- enhance the environmental integrity of GHG quantification;
- enhance the credibility, consistency, and transparency of GHG quantification, monitoring and reporting, including GHG project emission reductions and removal enhancements;
- facilitate the development and implementation of organization GHG management strategies and plans;
- facilitate the development and implementation of GHG projects;
- facilitate the ability to track performance and progress in the reduction of GHG emissions and/or increase in GHG removals;

## ISO/DIS 14064-1

— facilitate the crediting and trade of GHG emission reductions or removal enhancements.

Users of ISO 14064 may find benefit in some of the following applications:

- corporate risk management; for example, the identification and management of risks and opportunities;
- voluntary initiatives; for example, participation in voluntary GHG registry or reporting initiatives;
- GHG markets; for example, the buying and selling of GHG allowances or credits;
- regulatory/government reporting; for example, credit for early action, negotiated agreements or national reporting programmes.

Consistent with the objective of building on existing international standards and protocols on corporate GHG inventories, this part of ISO 14064 incorporates many key concepts and requirements of [3]. Users of this part of ISO 14064 are encouraged to refer to [3] for additional guidance on applying relevant concepts and requirements.



# Greenhouse gases —

## Part 1:

# Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals

## 1 Scope

This part of ISO 14064 specifies principles and requirements at the organization level for quantification and reporting of GHG emissions and removals. This part of ISO 14064 includes requirements for the design, development, management, reporting and verification of an organization's GHG inventory.

ISO 14064 is GHG programme neutral. If a GHG programme is applicable, the requirements of that policy or programme are additional to the requirements of ISO 14064. If a requirement of ISO 14064 prevents an organization or GHG project proponent from complying with applicable GHG policy or programme requirements, the requirement of the GHG policy or programme takes precedence.

## 2 Definitions

For the purposes of this document, the following terms and definitions apply.

### 2.1

#### **base year**

historic period specified for the purpose of comparing GHG emissions or removals or other GHG-related information over time

NOTE – Base year emissions or removals may be quantified based on a specific period (eg, year) or averaged from several periods (eg, years).

### 2.2

#### **carbon dioxide equivalent**

#### **CO<sub>2</sub>-e**

unit for comparing the radiative forcing of a GHG to carbon dioxide

NOTE The carbon dioxide equivalent is calculated using the mass of a given GHG multiplied by its global warming potential.

### 2.3

#### **client**

organization or person requesting validation or verification

### 2.4

#### **directed action**

specific activity or initiative, not organized as a GHG project as defined in Part 2 of ISO 14064, implemented by an organization to reduce or prevent direct or indirect GHG emissions or increase GHG removals

NOTE 1 Directed actions can be continuous or discrete.

NOTE 2 GHG emission or removal differences that result from directed actions may occur within or outside of organizational boundaries.

**2.5  
facility**

single installation, set of installations, or production processes, stationary or mobile, which can be defined within a single geographical boundary, organizational unit or production process

**2.6  
greenhouse gas  
GHG**

gas that absorbs visible light and re-emits infrared radiation

NOTE Common GHGs include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>).

**2.7  
greenhouse gas source**

physical unit or process that releases a GHG into the atmosphere

**2.8  
greenhouse gas sink**

physical unit or process that removes a GHG from the atmosphere

**2.9  
greenhouse gas reservoir**

physical unit or component of the biosphere, geosphere or hydrosphere with the capability to store or accumulate a GHG removed from the atmosphere by a GHG sink or a GHG captured from a GHG source

NOTE 1 The total mass of carbon contained in a GHG reservoir at a specified point in time may be referred to as the carbon stock of the reservoir.

NOTE 2 A GHG reservoir can transfer GHGs to another GHG reservoir.

NOTE 3 The collection of a GHG from a GHG source before it enters the atmosphere and storage of the collected GHG in a GHG reservoir may be referred to as GHG capture and storage.

**2.10  
greenhouse gas emission**

total mass of a GHG released to the atmosphere over a specified period of time

**2.11  
greenhouse gas removal**

total mass of a GHG removed from the atmosphere over a specified period of time

**2.12  
direct greenhouse gas emission**

GHG emission from GHG sources owned or controlled by the organization

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

**2.13  
energy indirect greenhouse gas emission**

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

**2.14  
indirect greenhouse gas emission**

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

**2.15****greenhouse gas activity data**

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

NOTE Examples of GHG activity data include the amount of energy, fuels or electricity consumed, material produced, service provided or biomass accumulated.

**2.16****greenhouse gas emission or removal factor**

factor relating activity data to GHG emissions or removals

**2.17****greenhouse gas assertion**

declaration or factual and objective statement of performance made by the responsible party of actual or expected performance

NOTE 1 The GHG assertion may be presented at a point in time or may cover a period of time.

NOTE 2 The GHG assertion provided by the responsible party must be clearly identifiable, capable of consistent evaluation or measurement against suitable criteria and in a form that can be subjected to testing methodologies for gathering evidence to support that evaluation or measurement.

NOTE 3 The GHG assertion may be provided in the form of a GHG report or GHG project plan.

**2.18****greenhouse gas information system**

policies, processes and procedures to establish, manage and maintain GHG information

**2.19****greenhouse gas inventory**

list of an organization's GHG sources, sinks, emissions and removals

**2.20****greenhouse gas project**

activity or activities that alter the conditions identified in the baseline scenario intended to cause GHG emission reductions or removal enhancements

NOTE In the case of GHG removal enhancement projects, the specific conditions altered by the project will include all relevant changes in GHG stocks due to project activities.

**2.21****greenhouse gas programme**

voluntary or mandatory international, national or sub-national system or scheme that registers, accounts or manages GHG emissions, removals, emission reductions or removal enhancements outside the organization or GHG project

NOTE Regulatory GHG programmes are established by law, such as a treaty, statute or regulation.

**2.22****greenhouse gas report**

stand-alone document intended to communicate an organization or project's GHG-related information to its intended user

NOTE A GHG report may include a GHG assertion.

**2.23****global warming potential****GWP**

factor describing the radiative forcing impact of one mass-based unit of a given GHG relative to an equivalent unit of carbon dioxide over a given period of time

**2.24**

**intended user**

individual or organization identified by those reporting GHG-related information that relies on that information to make decisions

**2.25**

**level of assurance**

degree of assurance the intended user requires in a validation or verification statement

NOTE 1 The level of assurance is used to determine the depth of detail that a validator or verifier designs into their validation or verification plan to determine if there any material errors, omissions or misrepresentations.

NOTE 2 There are two levels of assurance, either high or moderate, which result in a positive or neutral validation or verification statement.

**2.26**

**materiality**

concept that individual or the aggregation of errors, omissions and misrepresentations may affect the GHG assertion and could influence the intended user's decisions

NOTE The concept of materiality is also used when designing the validation or verification plan in determining the type of substantive processes to use to ensure that the detection risk is minimized.

**2.27**

**material discrepancy**

individual or the aggregate of actual errors, omissions and misrepresentations in the GHG assertion that will affect the decisions of the intended user

**2.28**

**monitoring**

continuous or periodic assessment of GHG emissions and removals or other GHG-related data

**2.29**

**organization**

company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration

**2.30**

**responsible party**

person or persons responsible for the provision of the GHG assertion and the supporting GHG information

NOTE The responsible party can be either individuals or representatives of an organization or project and may or may not be the party who engages the validation or verification body. The validation or verification body may be engaged by the client or by other parties, such as the GHG programme administrator.

**2.31**

**uncertainty**

parameter associated with the result of quantification which characterizes the dispersion of the values that could be reasonably attributed to the quantified amount

NOTE Uncertainty information typically specifies quantitative estimates of the likely or perceived dispersion of values and a qualitative description of the likely causes of the dispersion.

**2.32**

**validation**

systematic, independent and documented process for the evaluation of a proposed GHG assertion against agreed to validation criteria

NOTE In some cases, such as in first-party validations, independence can be demonstrated by the freedom from responsibility for the development of GHG data and information.

**2.33****validation or verification criteria**

policy, procedure or requirement used as a reference against which evidence is compared.

NOTE Validation or verification criteria may be established by governments, GHG programs, voluntary reporting initiatives, standards or good practice guidance.

**2.34****validation or verification statement**

formal written declaration to the intended user that provides assurance on the statements in the responsible party's GHG assertion

NOTE Declaration by the validator or verifier may cover claimed GHG emissions, removals, emission reductions or removal enhancements.

**2.35****validator**

competent and independent person or persons with responsibility for performing and reporting on the results of a validation

NOTE This term can be used to refer to a validation body.

**2.36****verification**

systematic, independent and documented process for the evaluation of a proposed GHG assertion against agreed to verification criteria

NOTE In some cases, such as in first-party verifications, independence can be demonstrated by the freedom from responsibility for the development of GHG data and information.

**2.37****verifier**

competent and independent person or persons with responsibility for performing and reporting on the verification process

NOTE This term can be used to refer to a verification body.

## **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.

### **3.2 Completeness**

Include all relevant GHG emissions and removals.

### **3.3 Consistency**

Enable meaningful comparisons in GHG-related information.

### **3.4 Accuracy**

Reduce bias and uncertainties as far as practical.

### 3.5 Transparency

Disclose sufficient and appropriate GHG-related information to allow intended users to make decisions with reasonable confidence.

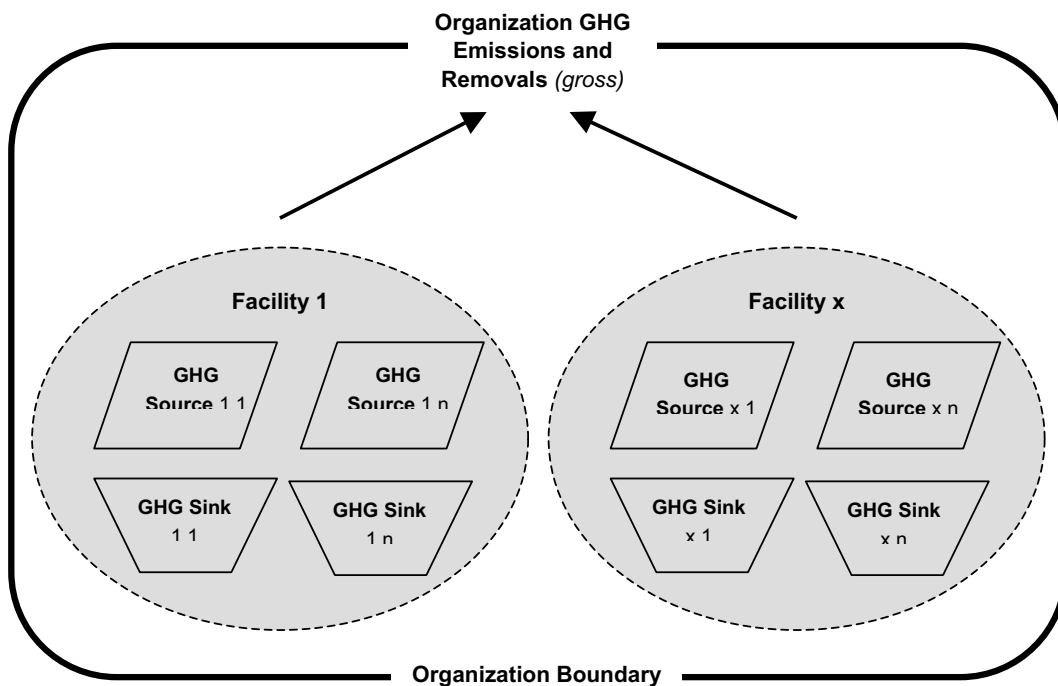
### 3.6 Relevance

Select GHG sources, GHG sinks, GHG reservoirs, data and methodologies appropriate to the needs of the intended user.

## 4 GHG inventory design and development

### 4.1 Organizational boundaries

The organization will comprise one or more facilities. Facility-level GHG emissions or removals will be produced from one or more GHG sources or sinks. Figure 2 shows the relationship between GHG sources, sinks and facilities.



#### Key

x = number of facilities within the organizational boundary

n = number of GHG sources or sinks at the facility

NOTE Organization GHG emissions and removals are aggregated from facility-level quantification of GHG sources and sinks.

**Figure 2 — Relationship between GHG sources, sinks and facilities**

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;
- 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.

The organization shall document which consolidation method it applies.

The organization shall document with reasons any change to the selected consolidation method.

Guidance on applying control and equity share approaches to consolidate facility-level GHG emissions and removals to the organization is included in Annex A.

## 4.2 Operational boundaries

### 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 indirect emissions and choosing which of the indirect emissions will be quantified, monitored and reported. The organization shall document with reason any changes to its operational boundaries.

### 4.2.2 Direct GHG emissions and removals

The organization shall quantify direct GHG emissions from facilities within its organizational boundaries.

The organization should quantify GHG removals from facilities within its organizational boundaries.

Direct GHG emissions from electricity, heat and steam generated and exported or distributed by the organization may be reported separately, but shall not be deducted from the organization's total direct GHG emissions.

### 4.2.3 Energy indirect GHG emissions

The organization shall quantify indirect GHG emissions from the generation of imported electricity, heat or steam used by the organization.

NOTE Imported refers to electricity, heat or steam that is supplied from sources outside of organizational boundaries.

The organization may justify the exclusion of energy indirect GHG emissions from quantification based on requirements of the applicable mandatory GHG programme.

The organization may document with reasons the exclusion of energy indirect GHG emissions from quantification based on the materiality of relevant GHG sources (4.3.1).

### 4.2.4 Indirect GHG emissions

The organization may quantify indirect GHG emissions based on requirements of the applicable GHG programme, internal reporting needs or the intended use for the GHG inventory. Examples of organizational activities that might result in indirect emissions are included in Annex B.

## 4.3 Quantification of GHG emissions and removals

### 4.3.1 Quantification steps and exclusions

The organization shall quantify and document GHG emissions and removals by completing, as applicable, the following steps:

- a) identification of GHG sources and sinks (4.3.2);
- b) selection of quantification methodology (4.3.3);
- c) selection and collection of GHG activity data (4.3.4);
- d) selection or development of GHG emission or removal factors (4.3.5);
- e) calculation of GHG emissions and removals (4.3.6).

The organization may exclude from quantification GHG sources or sinks whose contribution to GHG emissions or removals is not material and whose quantification would not be technically feasible or cost effective.

The organization shall document with reasons GHG sources or sinks excluded from quantification.

### 4.3.2 Identification of GHG sources and sinks

The organization shall identify and document GHG sources contributing to its direct GHG emissions.

If the organization quantifies GHG removals, the organization shall identify and document GHG sinks contributing to its GHG removals.

The organization should separately document suppliers of imported electricity, heat or steam used by the organization.

If the organization quantifies other indirect GHG emissions, the organization should separately identify and document GHG sources contributing to its other indirect GHG emissions.

The organizations shall, as appropriate, categorize identified GHG sources and sinks.

The detail to which sources and sinks are identified and categorized should be consistent with the quantification methodology used.

### 4.3.3 Selection of quantification methodologies

The organization shall select and use quantification methodologies that will reasonably minimize uncertainty and yield accurate, consistent and reproducible results.

NOTE Quantification methodologies are often prescribed by GHG programmes and can be classified into the following types:

- a) Calculation based on:
  - GHG activity data multiplied by GHG emission or removal factors;
  - the use of models;
  - site-specific correlations;
  - mass balance approach.



- b) Measurement
  - continuous;
  - intermittent.
- c) Combination of measurement and calculation.

The organization shall document with reasons the selection of quantification methodologies.

The organization shall document with reasons any changes to quantification methodologies previously used by the organization.

#### **4.3.4 Selection and collection of GHG activity data**

If GHG activity data are used to quantify GHG emissions and removals, the organization shall select and collect GHG activity data consistent with the requirements of the selected quantification methodology.

#### **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.
- e) are consistent with the intended use of the GHG inventory.

The organization shall document with reasons the selection or development of GHG emission or removal factors, including identification of their origin and appropriateness to the intended use for the GHG inventory.

The organization shall document with reasons any changes to GHG emission or removal factors previously used by the organization and, where appropriate, recalculate the base year GHG inventory (5.3).

#### **4.3.6 Calculation of GHG emissions and removals**

The organizations shall calculate GHG emissions and removals in accordance with the quantification methodology selected (4.3.3).

Where GHG activity data are used to quantify GHG emissions or removals, GHG emissions and removals shall be calculated by multiplying GHG activity data by GHG emission or removal factors.

## **5 GHG inventory components**

### **5.1 GHG emissions and removals**

The organization shall document, where quantified in accordance with Clause 4, separately for each facility:

- direct GHG emissions for each GHG;
- GHG removals;
- energy indirect GHG emissions;
- indirect GHG emissions.

The organization should quantify and document separately for each facility:

- GHG emissions from the combustion of biologically sequestered carbon expressed as CO<sub>2</sub>-e;
- other categories of GHG emissions and removals as appropriate.

The organization shall aggregate quantified facility-level GHG emissions and removals to calculate and document separately total:

- direct GHG emissions;
- GHG removals;
- energy indirect GHG emissions;
- indirect GHG emissions.

The organization shall use tonnes as the unit of measure and shall convert the quantity of each type of GHG to tonnes of CO<sub>2</sub>-e using appropriate GWPs.

NOTE GWPs are available from the Intergovernmental Panel on Climate Change. GWPs current at the time of publication are included in Annex C.

## **5.2 Organizational activities to reduce GHG emissions or increase GHG removals**

### **5.2.1 Directed actions**

The organization may plan and implement directed actions to reduce or prevent GHG emissions or increase GHG removals.

The organization may quantify GHG emission or removals differences attributable to the implementation of directed actions. GHG emission or removal differences resulting from directed actions will usually be reflected in the organization's GHG inventory, but may also result in GHG emissions or removal differences outside of GHG inventory boundaries.

If quantified, the organization should document its directed actions.

If reported, the organization shall report directed actions and associated GHG emission or removal differences separately and shall describe the:

- a) directed action;
- b) spatial and temporal boundaries of the directed action;
- c) approach used to quantify GHG emission or removal differences;
- d) determination and classification of GHG emission or removal differences attributable to directed actions as direct, indirect or other types of GHG emissions or removals.

EXAMPLE Directed actions might include the following types of initiatives:

- energy demand and use management;
- energy efficiency;
- technology or process improvements;
- GHG capture and storage;
- transport and travel demand management; .
- fuel switching or substitution.

### **5.2.2 GHG emission reduction or removal enhancement projects**

The organization shall list separately GHG emission reductions or removal enhancements from GHG projects quantified using quantification methodologies such as ISO 14064-2.

## **5.3 Base year GHG inventory**

### **5.3.1 Base year selection and establishment**

The organization should establish an historic base year for GHG emissions and removals for comparative purposes or to meet GHG programme requirements or other intended uses for the GHG inventory.

If the organization establishes a base year, the organization shall quantify base year GHG emissions and removals using single year data, a multi-year average or a rolling average.

If the organization establishes a base year, the organization shall:

- a) select a base year for which verifiable GHG emissions and/or removals data are available;
- b) document with reasons the selection of the base year.

If the organization establishes a base year, the organization shall develop a GHG inventory for the base year consistent with the provisions of this part of ISO 14064.

The organization may change its base year. The organization shall document with reasons any change to the base year.

### **5.3.2 GHG inventory recalculation**

If the organization chooses to maintain a base year or report other historical GHG data, the organization shall develop, apply and document a recalculation procedure.

The organization shall recalculate its base year or historical GHG inventory to account for:

- a) changes to operational boundaries;
- b) the ownership and control of GHG sources or sinks transferred into or out of organizational boundaries;
- c) changes to GHG quantification methodologies that result in significant changes to quantified GHG emissions or removals.

The organization shall not recalculate its base year or historical GHG inventory to account for changes in facility production levels including the closing or opening of facilities.

The organization should document recalculations in subsequent GHG inventories.

## 5.4 Assessing and reducing uncertainty

The organization should complete and document an uncertainty assessment for GHG emissions and removals including the uncertainty associated with emission and removal factors.

The organization shall demonstrate an understanding of the impact of uncertainties on the accuracy of GHG emissions and removals data.

NOTE The organization may apply the principles and methods of [4] in completing the uncertainty assessment.

## 6 GHG inventory quality management

### 6.1 GHG information management and monitoring

The organization shall establish and maintain GHG information management procedures to monitor GHG inventory development and maintenance to:

- a) ensure conformance with the principles of this part of ISO 14064;
- b) ensure consistency with the intended use of the GHG inventory;
- c) provide routine and consistent checks to ensure accuracy and completeness of the GHG inventory;
- d) identify and address errors and omissions;
- e) document and archive relevant GHG inventory records, including information management activities.

The organization's GHG information management procedures should consider:

- identification and review of responsibility and authority of those responsible for GHG inventory development;
- identification, implementation and review of appropriate training for inventory development team members;
- identification and review of organizational boundaries;
- identification and review of GHG sources and sinks;
- selection and review of quantification methodologies, including GHG activity data and GHG emission and removal factors that are consistent with the intended use of the GHG inventory;
- review of the application of quantification methodologies to ensure consistency across multiple facilities;
- use, maintenance and calibration of measurement equipment (if applicable);
- development and maintenance of a robust data collection system;
- regular accuracy checks;
- periodic internal audits and technical reviews;
- periodic review of opportunities to improve information management processes.

## 6.2 Document retention and record keeping

The organization shall establish and maintain document retention and record keeping procedures.

The organization shall retain and maintain documentation supporting the design, development and maintenance of the GHG inventory to enable verification. The documentation, whether in paper, electronic or other format, shall be handled in accordance with the organization's GHG information management document retention and record keeping procedures.

## 7 GHG reporting

### 7.1 General

The organization should prepare a GHG report to facilitate GHG inventory verification, participation in a GHG programme or to inform external or internal users. GHG reports should be complete, consistent, accurate, relevant and transparent. The organization should determine the content, structure, public availability and methods of dissemination of GHG reports based on requirements of the applicable GHG programme, internal reporting needs and the needs of intended users of the report.

If the organization makes a GHG assertion claiming conformance to this part of ISO 14064, the organization shall make available to intended users a GHG report prepared in accordance with this part of ISO 14064 or an independent verification statement related to the GHG assertion. If the organization's GHG assertion has been independently verified, the verification statement shall be available to intended users.

### 7.2 GHG report planning

The organization should consider and document the following in planning its GHG report:

- a) report purpose and objectives in the context of the organization's GHG policies, strategies or programmes and applicable GHG programmes;
- b) intended use and users of the report;
- c) overall and specific responsibilities for preparing and producing the report;
- d) report frequency;
- e) period for which the report is valid;
- f) report format;
- g) data and information to be included in the report;
- h) policy on report availability and methods of dissemination.

### 7.3 GHG report content

The organization's GHG report shall describe the organization's GHG inventory and include:

- a) description of the reporting organization;
- b) authorship of the report;
- c) reporting period covered;
- d) documentation of organizational boundaries (4.1);

- e) direct GHG emissions, quantified separately for each GHG in tonnes and CO<sub>2</sub>-e (4.2.2);
- f) if quantified, GHG removals, quantified in tonnes of CO<sub>2</sub>-e (4.2.2);
- g) documentation with reasons for the exclusion of any GHG sources or sinks from quantification (4.3.1);
- h) energy indirect GHG emissions associated with the generation of imported electricity, heat, or steam quantified separately in tonnes of CO<sub>2</sub>-e or justification for their exclusion (4.2.3). ;
- i) if established, the historic base year selected and the base year GHG inventory, 5.3.1);
- j) documentation with reasons of any change to the base year or other historical GHG data and any recalculation of the base year or other historical GHG inventory (5.3.2);
- k) documentation of quantification methodologies and reasons for their selection (4.3.3);
- l) documentation with reasons of any change to quantification methodologies previously used (4.3.3);
- m) referencing or documentation of emissions or removal factors used (4.3.5);
- n) description of the impact of uncertainties on the accuracy of the GHG emissions and removals data (5.4);
- o) a statement that the GHG report has been prepared in accordance with this part of ISO 14064;
- p) a statement describing whether the GHG inventory, report or assertion has been verified, including the type of verification and level of assurance achieved.

The organization should consider the following additional information for inclusion in the GHG report:

- description of the organization's GHG policies, strategies or programs;
- if quantified, CO<sub>2</sub> emissions from the combustion of biologically sequestered carbon, quantified separately in tonnes of CO<sub>2</sub> ;
- if appropriate, description of directed actions and attributable GHG emissions or removals differences, including GHG emission or removal differences occurring outside organizational boundaries, quantified in tonnes of CO<sub>2</sub>-e (5.2.1);
- if appropriate, GHG emission reductions and removal enhancements from emission reduction and removal enhancement projects, quantified in tonnes of CO<sub>2</sub>-e (5.2.2);
- as appropriate, description of applicable GHG programme requirements;
- GHG inventory GHG emissions or removals disaggregated by facility;
- if quantified, indirect GHG emissions quantified in tonnes of CO<sub>2</sub>-e (4.2.4);
- uncertainty assessment description and results , including measures to manage or reduce uncertainties (5.4);
- description and presentation of additional indicators, such as efficiency or GHG emission intensity (emissions per unit of production) ratios;
- assessment of performance against relevant internal and/or external benchmarks where they exist;
- description of GHG information management and monitoring procedures (6.1);

## 8 Organization's role in verification activities

### 8.1 General

The overall aim of verification is to impartially and objectively review the reported GHG emissions and removals or GHG assertion against the requirements of this part of ISO 14064. The organization should:

- a) conduct verification on a regular basis in accordance with 8.2 and 8.3;
- b) determine an appropriate level of assurance based on requirements of the GHG programme in which it is operating, internal reporting needs or the intended use for the GHG inventory;
- c) complete verification consistent with the principles and requirements of ISO 14064-3.

### 8.2 Preparing for verification

In preparing for verification, the organization should:

- a) develop a verification scope and objectives ;
- b) review, as applicable, requirements of this part of ISO 14064;
- c) review applicable organizational or GHG programme verification requirements;
- d) determine the level of assurance required;
- e) agree to verification objectives, scope and criteria with the verifier;
- f) ensure that the roles and responsibilities of appropriate staff are clearly defined and communicated;
- g) ensure that the organization's GHG information, data and records are complete and accessible;
- h) ensure that the verifier has appropriate competence and qualifications;
- i) consider the content of the verification statement.

### 8.3 Verification management

#### 8.3.1 Verification plan

The organization should develop and implement a verification plan that includes:

- a) the verification process, scope, criteria, level of assurance and activities;
- b) roles and responsibilities for implementing and maintaining the plan;
- c) resources necessary to achieve planned outcomes;
- d) data sampling and custody procedures;
- e) maintenance of necessary documentation and records;
- f) processes for monitoring and reviewing the plan;
- g) appointment of competent verifiers.

### **8.3.2 Verification process**

The organization's verification activities should address:

- a) agreement r to the scope, objectives, criteria and level of assurance with the verifier;
- b) assessment of GHG data sampling and custody procedures;
- c) assessment of the GHG assertion against criteria;
- d) verification reporting.

### **8.3.3 Competence of verifiers**

The organization should ensure that any personnel involved in the verification process:

- a) are aware of GHG management issues;
- b) understand the operations and processes that they verify;
- c) have the necessary technical expertise to support the verification process;
- d) are familiar with the contents and intent of this part of ISO 14064.

The organization should ensure that the verifier has appropriate competences as defined in ISO 14064-3.

The organization should select verification personnel who are administratively independent of the operations subject to verification to ensure objectivity and impartiality in the verification process.

### **8.3.4 Verification statement**

The organization should request from the verifier a statement that includes as a minimum:

- a) description of the objectives, scope, and criteria of the verification activities;
- b) description of the level of assurance;
- c) the verifier's conclusion indicating any qualification or limitations.



## **Annex A** **(informative)**

### **Consolidating facility-level data to the organization**

#### **A.1 General**

In developing its GHG quantification and reporting system, an organization should ensure the data system is capable of meeting a range of reporting requirements. GHG data should be recorded and quantified by source, sink and type at least to the facility level. Such data should be retained in its disaggregated form to provide maximum flexibility in meeting a range of reporting requirements. Consolidation of the information can then be carried out as required.

With GHG emissions and removals quantified at the facility level (see 4 and 5), and the purpose and GHG programme requirements of the organization's GHG reporting known, one of the two approaches outlined below should be selected to guide and assist in the consolidation of facility data to the organization level.

Where possible, organizations should follow the organizational boundaries already in place for their financial accounting, provided these are explicitly explained and followed consistently. When applying these concepts the underlying assumption of "substance over form" should be followed. That is, GHG emissions and removals should be quantified and reported in accordance with the organization's substance and economic reality and not merely its legal form.

#### **A.2 Consolidation based on control**

Control is defined as the ability of a company to direct the operating and financial policies and practices of a facility. Usually, if the company owns more than 50% of the voting interest, this implies control. The holder of the operating license is not a sufficient criterion for being able to direct the operating policies of a facility. In practice, the actual exercise of dominant influence itself is enough to satisfy the definition of control without requiring any formal power or ability through which it arises.

Consolidating to the organization level based on control requires accounting for 100% of GHG emissions and removals from facilities that are defined as being controlled.

#### **A.3 Consolidation based on equity share**

Equity share is the percentage of economic interest in or benefit derived from a facility. This consolidation approach increases the usability of GHG information for different users and aims to mirror as far as possible the approach adopted by financial accounting and reporting standards. The equity share approach may be particularly useful for multinational companies with operations in a number of different jurisdictions aiming to determine their GHG "footprint".

Consolidating to the organization level based on equity share requires establishing the ownership percentage of each facility, and accounting for that percentage of GHG emissions and removals from respective facilities, including through the use of production share agreements.

Organizations are encouraged to refer to [3] for additional guidance in applying consolidation approaches.

## **Annex B** (informative)

### **Examples of indirect greenhouse gas emissions**

#### **B.1 General**

Examples of an organization's activities that may result in indirect GHG emissions, other than GHG emissions from the generation of imported electricity, heat or steam consumed by the organization, may include, but are not limited to:

- Employee commuting and business travel;
- Transportation of an organization's products, materials, people or waste by another organization;
- Outsourced activities, contract manufacturing and franchises;
- Emissions from waste generated by the organization but managed by another organization;
- Emissions from the use and end-of-life phases of organization's products and services;
- Emissions arising from the production and distribution of energy products, other than electricity, steam and heat, consumed by the organization.

## Annex C (informative)

### Greenhouse gas global warming potentials

Global Warming Potential (GWP) is an index used to convert relevant non-carbon dioxide gases to a carbon dioxide equivalent (CO<sub>2</sub>-e) by multiplying the mass-based quantity of the gas by its GWP. The table below provides various GWPs for a 100-year time horizon published by the Intergovernmental Panel on Climate Change (IPCC) in [5]. Users are encouraged to obtain the most recent GWPs from the IPCC.

Gas	Chemical Formula	IPCC 1996 Global Warming Potential
Carbon dioxide	CO <sub>2</sub>	1
Methane	CH <sub>4</sub>	21
Nitrous oxide	N <sub>2</sub> O	310
<b>Hydrofluorocarbons HFCs*</b>		
HFC-23	CHF <sub>3</sub>	11,700
HFC-32	CH <sub>2</sub> F <sub>2</sub>	650
HFC-41	CH <sub>3</sub> F	150
HFC-43-10mee	C <sub>5</sub> H <sub>2</sub> F <sub>10</sub>	1,300
HFC-125	C <sub>2</sub> HF <sub>5</sub>	2,800
HFC-134	C <sub>2</sub> H <sub>2</sub> F <sub>4</sub> (CHF <sub>2</sub> CHF <sub>2</sub> )	1,000
HFC-134a	C <sub>2</sub> H <sub>2</sub> F <sub>4</sub> (CH <sub>2</sub> FCF <sub>3</sub> )	1,300
HFC-143	C <sub>2</sub> H <sub>3</sub> F <sub>3</sub> (CHF <sub>2</sub> CH <sub>2</sub> F)	300
HFC-143a	C <sub>2</sub> H <sub>3</sub> F <sub>3</sub> (CF <sub>3</sub> CH <sub>3</sub> )	3,800
HFC-152a	C <sub>2</sub> H <sub>4</sub> F <sub>2</sub> (CH <sub>3</sub> CHF <sub>2</sub> )	140
HFC-227ea	C <sub>3</sub> HF <sub>7</sub>	2,900
HFC-236fa	C <sub>3</sub> H <sub>2</sub> F <sub>6</sub>	6,300
HFC-245ca	C <sub>3</sub> H <sub>3</sub> F <sub>5</sub>	560
<b>Hydrofluoroethers (HFEs)</b>		
HFE-7100	C <sub>4</sub> F <sub>9</sub> OCH <sub>3</sub>	500
HFE-7200	C <sub>4</sub> F <sub>9</sub> OC <sub>2</sub> H <sub>5</sub>	100
<b>Perfluorocarbons PFCs</b>		
Perfluoromethane (tetrafluoromethane)	CF <sub>4</sub>	6,500
Perfluoroethane (hexafluoroethane)	C <sub>2</sub> F <sub>6</sub>	9,200
Perfluoropropane	C <sub>3</sub> F <sub>8</sub>	7,000
Perfluorobutane	C <sub>4</sub> F <sub>10</sub>	7,000
Perfluorocyclobutane	c-C <sub>4</sub> F <sub>8</sub>	8,700
Perfluoropentane	C <sub>5</sub> F <sub>12</sub>	7,500
Perfluorohexane	C <sub>6</sub> F <sub>14</sub>	7,400
<b>Sulphur hexafluoride</b>	SF <sub>6</sub>	23,900
NOTE From [5]		

## Bibliography

- [1] ISO 14064-2: Specification with guidance at the project level for the quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements.
- [2] ISO 14064-3: Specification with guidance for validation and verification of greenhouse gas assertions.
- [3] World Business Council for Sustainable Development / World Resources Institute, Greenhouse Gas Protocol – Corporate Module, Revised Edition, 2004.
- [4] ISO, Guide to the Expression of Uncertainty in Measurement (GUM), 1995.
- [5] Intergovernmental Panel on Climate Change, Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories Reporting Instructions, 1997.