



Secretariat: Canada (SCC)  
Secretary: A. Hussein

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November 10, 2003

**Subject: Circulation of Committee Draft 1 of ISO 14064 Greenhouse Gases Part 1**

Dear Sir/Madam:

I am pleased to send you for comment, the first Committee Draft of *ISO 14064: Greenhouse gases - Part 1: Specification for the quantification, monitoring and reporting of organization emissions and removals*. Please return comments using the ISO comments template no later than February 10, 2004 to the ISO TC207 Working Group 5 on Climate Change Secretary Kevin Boehmer (kevin.boehmer@csa.ca).

ISO TC207 Working Group 5 on Climate Change has scheduled a meeting from March 8 to 12, 2004 in the United Kingdom to discuss and resolve Committee Draft comments. The Convenor of ISO TC207 Working Group 5, Dr. Chan Kook Weng, would like to sincerely thank all experts who have contributed to the development of the attached Committee Draft.

Yours Sincerely,

Ahmad Hussein  
ISO TC207 Secretary





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**Greenhouse gases – Part 1: Specification for the quantification, monitoring and reporting of organization emissions and removals**

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88 **Foreword**

89

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

98

99 International Standards are drafted in accordance with the rules given in the ISO/IEC  
100 Directives, part 3.

101

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

106

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

110

111 ISO 14064-1.1 was prepared by Technical Committee ISO/TC 207, Environmental  
112 management, Working Group 5 on Climate Change.

113

114

## 114 Introduction

115

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

124

125 *ISO 14064 Greenhouse gases* is comprised of three Parts:

- 126 • *ISO 14064 Greenhouse gases – Part 1: Specification for the quantification,*  
127 *monitoring and reporting of organization emissions and removals;*
- 128 • *ISO 14064 Greenhouse gases - Part 2: Specification for the quantification,*  
129 *monitoring and reporting of project emissions and removals;*
- 130 • *ISO 14064 Greenhouse gases - Part 3: Specification and guidance for*  
131 *validation, verification and certification.*

132

133 This International Standard is expected to benefit entities, governments, project  
134 proponents and stakeholders worldwide by providing clarity and consistency for  
135 quantifying, monitoring, reporting and verifying greenhouse gases. Specifically, this  
136 standard will:

- 137 • Enhance the environmental integrity of GHG quantification;
- 138 • Enhance the credibility, consistency, and transparency of GHG quantification,  
139 monitoring and reporting, including GHG project emission reductions and  
140 removal enhancements;
- 141 • Facilitate the development and implementation of organization GHG  
142 management strategies and plans;
- 143 • Facilitate the development and implementation of GHG projects;
- 144 • Allow entities to track performance and progress in the reduction of GHG  
145 emissions and/or increase in GHG removals;
- 146 • Assisting in the identification of GHG risks or liabilities;
- 147 • Increase investor confidence;
- 148 • Facilitate the crediting and trade of GHG emission reductions or removal  
149 enhancements.

150

151 Users of this International Standard may find benefit in some of the following  
152 applications:

- 153 • Corporate risk management; for example, the identification and management of  
154 GHG-related liabilities and assets;
- 155 • Voluntary initiatives; for example, participation in voluntary GHG registry or  
156 reporting initiatives;
- 157 • GHG markets; for example, the buying and selling of GHG allowances or credits;
- 158 • Regulatory/government reporting; for example, credit for early action or national  
159 reporting/inventory schemes.

160 Many countries conduct national-level GHG inventories to comply with international  
161 obligations or as part of domestic activities. National inventories are, to a large extent,  
162 top-down exercises relying on national activity data and emissions factors.  
163 Organization-level GHG inventories, on the other hand, are typically conducted from the  
164 bottom-up – accounting for facility-specific GHG emissions and/or removals. National-  
165 level GHG inventories are guided by national or international protocols. *ISO 14064*  
166 *Greenhouse gases – Part 1: Specification for the quantification, monitoring and*  
167 *reporting of organization emissions and removals* details requirements for designing and  
168 developing organization-level GHG inventories.

169  
170 *ISO 14064 Greenhouse gases – Part 1: Specification for the quantification, monitoring*  
171 *and reporting of organization emissions and removals* specifies requirements for first  
172 party (self) verification of an organization's GHG inventory. The Standard does not  
173 specify requirements for second or third party validation/verification bodies and  
174 validators/verifiers in providing assurance against GHG claims from organizations. Such  
175 requirements may be the authority of the applicable GHG scheme(s) or may be found in  
176 *ISO 14064 Greenhouse gases - Part 3: Specification and guidance for validation,*  
177 *verification and certification.*

178  
179 Users of this International Standard are encouraged to reference *The Greenhouse Gas*  
180 *Protocol: A Corporate Accounting and Reporting Standard* produced by World Business  
181 Council for Sustainable Development (WBCSD)/World Resources Institute (WRI) for  
182 additional guidance on applying relevant concepts and requirements.  
183

184 **Greenhouse gases – Specification for the quantification,**  
185 **monitoring and reporting of organization emissions and**  
186 **removals**

187

188

189 **1. Scope**

190

191 This International Standard specifies requirements for quantifying, monitoring and  
192 reporting an organization's GHG emissions and removals.

193

194 This International Standard is GHG policy and scheme neutral. Where a GHG policy or  
195 scheme is applicable, the requirements of that policy or scheme shall be additional to the  
196 requirements of this International Standard. Where a requirement of this International  
197 Standard prevents an organization from complying with applicable GHG policy or  
198 scheme requirements, the requirement of the GHG policy or scheme shall take  
199 precedence.

200

201

202 **2. Normative References**

203

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

207

208 *Secretary's Note: Need for normative references to be determined.*

209

210

211 **3. Definitions**

212

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

214

215 **3.1 base year**

216 a historic datum for comparing GHG emissions or removals over time

217

218 NOTE – Base year emissions or removals could be quantified based on a specific year  
219 or averaged from several years

220

221 **3.2 carbon dioxide equivalent (CO<sub>2</sub>-e)**

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

223

224 NOTE - Generally calculated using the quantity of a given GHG multiplied by its global  
225 warming potential

226

227 **3.3 facility**

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

230

231 NOTE - Typically a distinct production site, individual unit or series of processes at a  
232 specific location

233

234 **3.4 [full fuel cycle]**

235 [GHG emissions associated with the manufacture and post-manufacture distribution of  
236 an energy product

237

238 NOTE – Does not include GHG emissions associated with exploration and primary  
239 production.]

240

241 **3.5 greenhouse gas (GHG)**

242 any gaseous constituent of the atmosphere that absorb and re-emit infrared radiation

243

244 NOTE – Common GHGs include Carbon dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Nitrous oxide  
245 (N<sub>2</sub>O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur hexafluoride  
246 (SF<sub>6</sub>)

247

248 **3.6 GHG activity level**

249 quantity or level of an activity that results in a GHG emission or removal

250

251 NOTE – Examples could include the amount of energy consumed, material produced,  
252 service provided or biomass accumulated.

253

254 **3.7 GHG source**

255 process or mechanism that releases GHG into the atmosphere

256

257 **3.8 GHG sink**

258 process or mechanism that absorbs GHG from the atmosphere or that captures and  
259 stores a GHG from an emission source

260

261 **3.9 GHG emissions**

262 release of GHGs to the atmosphere by GHG sources

263

264 NOTE – GHG emissions may be captured from a GHG source and stored in a GHG  
265 sink.

266

267 **3.10 GHG removals**

268 absorption of GHGs from the atmosphere by biological GHG sinks

269

270 **3.11 GHG emission or removal factor**

271 factor relating activity data to absolute GHG emissions or removals

272

273 **3.12 GHG emission reduction**

274 difference (decrease) of GHG emissions between a baseline and project

275

276 **3.13 GHG removal enhancement**

277 difference (increase) of GHG removals between a baseline and project

278

- 279 **3.14 direct GHG emissions**  
280 GHG emissions from GHG sources that are owned or controlled by the organization  
281
- 282 **3.16 energy indirect GHG emissions**  
283 GHG emissions associated with the import and use of electricity, heat, steam or other  
284 fossil fuel-derived energy products.  
285
- 286 **3.17 other indirect GHG emissions**  
287 GHG emissions attributable to an organization's activities, but occurring from GHG  
288 sources that are owned or controlled by another organization  
289
- 290 **3.18 GHG inventory**  
291 detailed list of an organization's GHG sources, sinks, emissions, removals, emission  
292 reductions and removal enhancements quantified in accordance with ISO 14064 Part 1  
293
- 294 **3.19 GHG project**  
295 project that intends to cause GHG emission reductions and/or GHG removal  
296 enhancements  
297
- 298 NOTE – A GHG project occurs within a finite spatial and temporal boundary.  
299
- 300 **3.20 GHG report**  
301 self-contained document (in printed or electronic form) prepared in accordance with ISO  
302 14064 Part 1 or Part 2 intended to communicate the organization's or project's GHG  
303 emissions, removals, emission reductions or removal enhancements during a specified  
304 period of time and other related issues to its intended users  
305
- 306 **3.21 GHG scheme**  
307 voluntary or mandatory international, national, sub-national governmental or non-  
308 governmental policy or regulatory authority that registers, accounts or manages GHG  
309 emissions or removals  
310
- 311 **3.22 global warming potential (GWP)**  
312 factor describing the radiative forcing impact of one unit of a given GHG relative to one  
313 unit of carbon dioxide  
314
- 315 **3.23 internal targeted action**  
316 internal activity or initiative implemented by the organization to reduce GHG emissions  
317 or increase GHG removals  
318
- 319 NOTE – Organizations may describe targeted actions by quantifying actual GHG  
320 emissions or removals before implementation of the initiative or activity to actual GHG  
321 emissions or removals following implementation of the initiative or activity. This  
322 approach differs from a GHG project where GHG emissions reductions or removal  
323 enhancements may be created as the difference between a hypothetical and  
324 counterfactual baseline and actual, post-implementation GHG emissions or removals.  
325

326 **3.24 monitoring**  
327 assessment of GHG emissions and removals

328  
329 NOTE – Assessments can be continuous or periodic and could include assessment of  
330 inputs or outputs of GHG sources and sinks and/or the general conditions that may  
331 influence GHG emissions and removals

332  
333 **3.25 organization**  
334 company, corporation, firm, enterprise, authority or institution, or part or combination  
335 thereof, whether incorporated or not, public or private, that has its own functions and  
336 administration

337  
338 [ISO 14001:1996]

339  
340 **3.26 uncertainty**  
341 parameter, associated with the result of measurement or estimation, which characterizes  
342 the dispersion of the values that could be reasonably attributed to the measured or  
343 estimated quantity

## 344 345 346 **4. Principles**

347  
348 Organization-level GHG quantification, monitoring and reporting is based on a number of  
349 principles to ensure reported data, information and related disclosures are:

- 350 • Free from material misstatement, avoid bias in their selection and presentation  
351 and provide a credible and balanced account;
- 352 • Capable of being depended upon by users to represent faithfully that which they  
353 either purport to represent or could reasonably be expected to represent.

354  
355 The organization shall apply the following principles in quantifying, monitoring and  
356 reporting GHG emissions and removals:

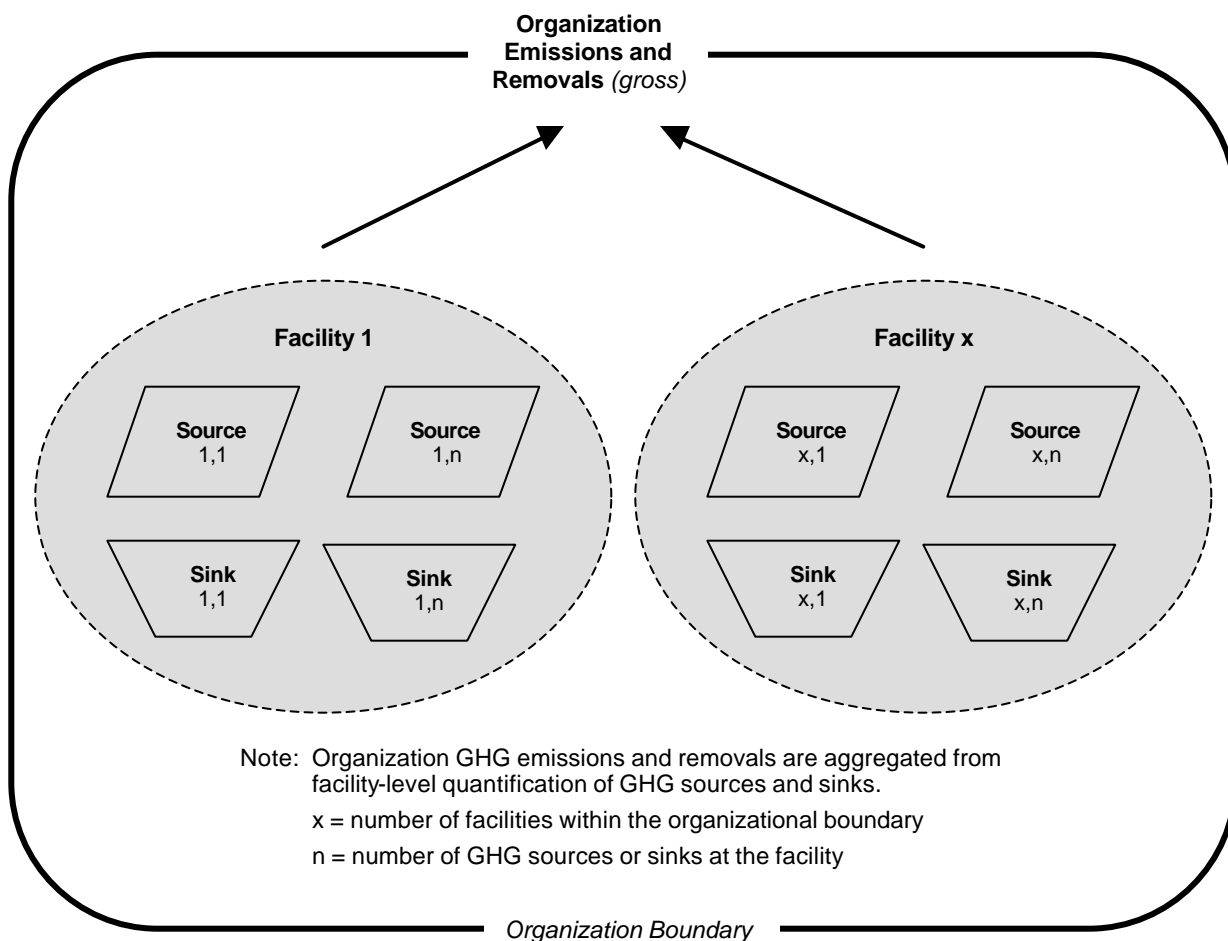
- 357 a) **Completeness:** Include all GHG emissions and removals within organizational  
358 boundaries. Estimate and justify GHG sources or sinks not quantified. Ensure  
359 that all information material to users appears in reported GHG data or information  
360 in a manner consistent with the established organizational GHG boundaries,  
361 scope, time period and objectives of reporting.
- 362 b) **Consistency:** Ensure that quantification, monitoring and reporting procedures for  
363 GHG emissions and removals are comparable over time. Clearly justify any  
364 changes to the basis of quantification, monitoring or reporting, and the  
365 consequences of such changes. In cases where specific measurement data for  
366 GHG sources and sinks or other evidence is not available, ensure consistency in  
367 the application of expert judgment, internally and externally, over time.
- 368 c) **Accuracy:** Ensure that quantification is systemically neither over nor under true  
369 GHG emissions or removals, as far as can be judged, and that uncertainties are  
370 reduced as far as practicable. Ensure that sufficient accuracy is achieved to  
371 enable users to make decisions related to reported GHG data or information with  
372 reasonable assurance.

373 d) Transparency: Report GHG data and information on a regular basis in a clear,  
374 factual, neutral and coherent manner cognizant of the needs and backgrounds of  
375 users of the reported data or information. Obtain, record, compile, analyze and  
376 document GHG data and information in a manner that enables verification.  
377 Document assumptions, references and methodologies such that another party  
378 may reproduce reported data.  
379  
380

## 381 5.0 GHG inventory design and development

### 382 5.1 Organizational boundaries

383 The organization shall comprise one or more facilities. Facility-level GHG emissions or  
384 removals will be produced from one or more GHG sources or sinks (Figure 1).  
385  
386  
387



416 **Figure 1: Relationship between sources, sinks and facilities**

417  
418  
419

420 The organization shall consolidate its facility level GHG emissions and removals by one  
421 of the following methods:

- 422 a) Control: The organization accounts for 100 percent of GHG emissions and/or  
423 removals from facilities over which it has management or operational control;
- 424 b) Equity Share: The organization accounts for its portion of GHG emissions and/or  
425 removals from respective facilities;
- 426 c) Financial Boundaries: The organization accounts for GHG emissions and/or  
427 removals on the basis of financial, tax or business number boundaries defined by  
428 the country or jurisdiction in which the organization operates;
- 429 d) [Production Share: The organization accounts for its share of GHG emissions  
430 and/or removals based on the percentage of the facility's production that the  
431 organization receives.]

432  
433 The organization may use a different consolidation methodology where specific  
434 arrangements are defined by a legal contract.

435  
436 The organization shall document which consolidation method it applies to individual  
437 facilities.

438  
439 The organization shall justify and document any change to the consolidation method  
440 applied to individual facilities.

441  
442 Guidance on applying various methods to consolidate facility level GHG emissions and  
443 removals to the organization is included as Annex A.

## 444 **5.2 GHG emission and removal boundaries**

### 445 **5.2.1 Greenhouse gases**

446  
447  
448  
449 The organization's GHG inventory shall include emissions and removals of the following  
450 types of GHGs as appropriate:

- 451 a) Carbon dioxide (CO<sub>2</sub>);
- 452 b) Methane (CH<sub>4</sub>);
- 453 c) Nitrous Oxide (N<sub>2</sub>O);
- 454 d) Hydrofluorocarbons (HFCs);
- 455 e) Perfluorocarbons (PFCs);
- 456 f) Sulphur hexafluoride (SF<sub>6</sub>).

457  
458 The organization's GHG inventory may include emissions and removals of other types of  
459 GHGs as appropriate.

### 460 **5.2.2 Direct GHG emissions and removals**

461  
462  
463 The organization shall quantify all direct GHG emissions from facility GHG sources.

464  
465 The organization should quantify all direct GHG removals from facility GHG sinks.

466

467 Direct emissions from generated and exported electricity, heat, steam or other fossil fuel-  
468 derived energy products may be reported separately, but shall not be deducted from the  
469 organization's total direct emissions.

470  
471 The organization may exclude, from facility-level quantification, specific GHG sources or  
472 sinks whose quantification is technically not feasible or would result in excessively high  
473 costs. The organization shall justify, estimate and document GHG emissions or  
474 removals from GHG sources or sinks not quantified.

475  
476 **5.2.3 Indirect GHG emissions from imported energy products**

477  
478 The organization [shall] [should] quantify indirect GHG emissions associated with the  
479 import and use of electricity, heat, steam or other fossil fuel-derived energy products [on  
480 a full fuel cycle basis].

481  
482 If the organization chooses not to quantify energy indirect emissions or to exclude  
483 specific energy indirect emission GHG sources, the organization shall [explain] [justify]  
484 and document why all or specific indirect GHG emissions associated with the import and  
485 use of electricity, heat, steam or other fossil fuel-derived energy products were not  
486 quantified.

487  
488 **5.2.4 Other indirect GHG emissions**

489  
490 The organization [should] [may] quantify other indirect GHG emissions that are a  
491 consequence of the organization's activities, but occur from GHG sources that are  
492 owned or controlled by another organization, based on requirements of the GHG  
493 scheme in which they are operating, internal reporting needs or the intended use for the  
494 GHG inventory.

495

**EXAMPLE - Other indirect emissions**

Examples of facility-level activities that may result in other indirect GHG emissions may include, but are not limited to,:

- Employee business travel;
- Transportation of products, materials or waste by third parties;
- Outsourced activities, contract manufacturing and franchises;
- Emissions from waste generated by the facility when the point of GHG emissions occurs at sources or facilities outside of the facility boundary;
- Emissions from the use and end-of-life phases of products and services produced by the facility;
- Employees commuting to and from work;
- Emissions embodied in non-energy raw materials.

496  
497  
498  
499  
500

501 **5.3 Quantification of GHG emissions and removals**

502  
503 **5.3.1 Quantification approach**  
504

505 The organization shall quantify and document facility-level GHG emissions and removals  
506 by completing the following steps:

- 507 a) Identification of all GHG emission sources and removal sinks;
- 508 b) Selection or development of GHG emissions and removals quantification  
509 methodologies;
- 510 c) If applicable, selection and collection of relevant activity data;
- 511 d) If applicable, selection or development of appropriate emission factors;
- 512 e) Application of quantification methodologies to determine GHG emissions from  
513 sources and GHG removals from sinks;
- 514 f) Consolidation of GHG source and sink data to facility level GHG emissions and  
515 removals.

516  
517 **5.3.2 Identification of GHG sources and sinks**  
518

519 The organization shall identify and document all GHG sources and sinks contributing to  
520 its direct GHG emissions and removals.

521  
522 If the organization chooses to quantify its direct GHG removals, the organization shall  
523 identify and document all GHG sources and sinks contributing to its direct GHG  
524 removals.

525  
526 [If the organization chooses to quantify its indirect GHG emissions from imported energy  
527 products,] the organization shall identify and document all GHG sources and sinks  
528 contributing to its indirect GHG emissions from energy products.

529  
530 [If the organization chooses to quantify its other indirect GHG emissions,] the  
531 organization shall identify and document all GHG sources and sinks contributing to its  
532 other indirect GHG emissions.

533  
534 Examples of GHG source and sink categories are included in Annex B.

535  
536 **5.3.3 Quantification methodologies**  
537

538 The organization shall select a quantification methodology or methodologies that will  
539 minimize uncertainty and yield accurate and reproducible results for their GHG sources,  
540 GHG sinks and types of GHGs.

541  
542 The organization shall justify and document the selection of established source, sink or  
543 other specific quantification methodologies.

544  
545 When using established quantification methodologies, the organization shall justify and  
546 document any departure from the methodologies. When using source- or sink- specific  
547 quantification methodologies, the organization shall provide documentation sufficient to  
548 allow for reproduction of quantifications.

549 The organization shall justify and document any changes to quantification methodologies  
 550 previously used by the organization.

551  
 552

<b>EXAMPLE - Relationship between GHG information types and sources and relative accuracy</b>	
<b>GHG information type or source</b>	<b>Relative Level of Accuracy</b>
Continuous direct measurement	Highest Accuracy
Site-specific correlations	
Intermittent (periodic) direct measurement	
Use of models	
Use of default emissions factors	
Use of default emissions factors	Lowest Accuracy

553

554

555 **5.3.4 Activity data**

556

557 If applicable, the organization shall select and collect activity data consistent with the  
 558 requirements of quantification methodologies and that will minimize uncertainty and yield  
 559 accurate and reproducible results.

560

561 **5.3.5 GHG emission factors**

562

563 If applicable, the organization shall select or develop GHG emission factors that:

564

565

566

567

568

569 The organization shall justify and document emission factor selection, including  
 570 identification of their origin and appropriateness to the intended use for the GHG  
 571 inventory.

572

573 The organization shall justify and document any changes to emissions factors previously  
 574 used by the organization.

575

576

577

578

579

580

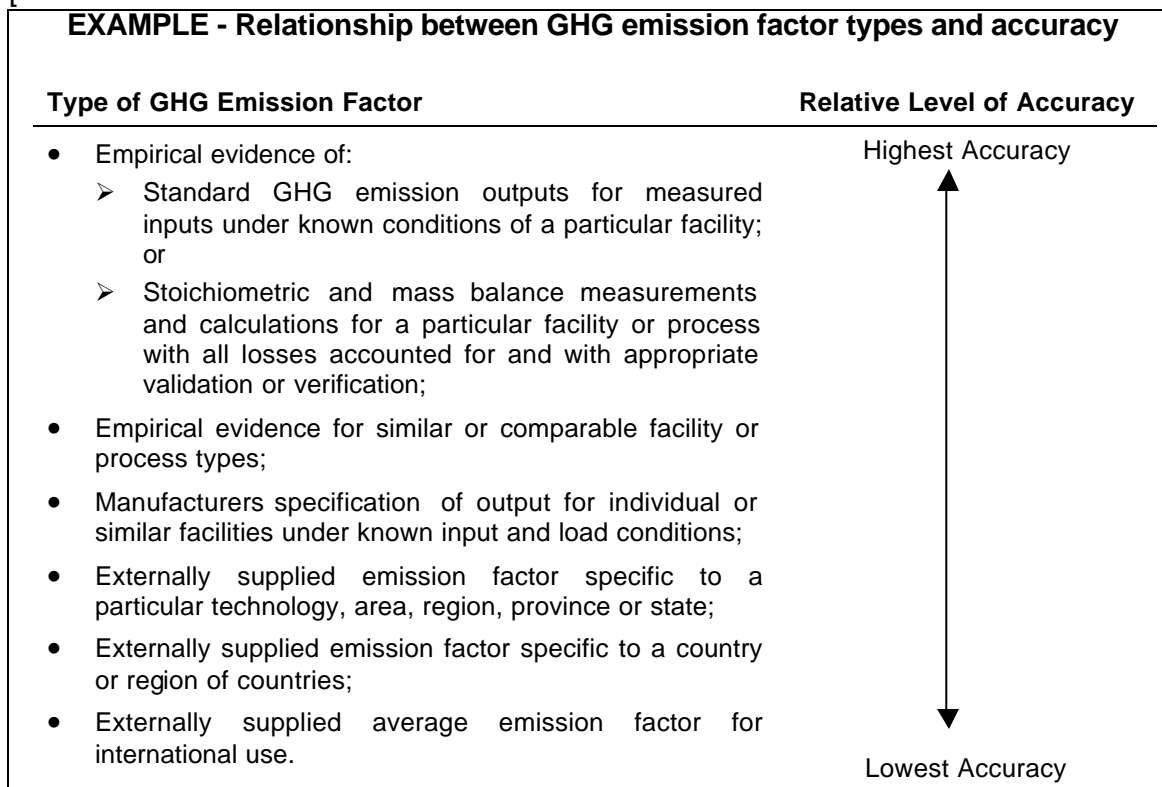
581

582

583

584

585



586

**5.3.6 GHG emissions and removal calculations**

587

588

589

The organization shall apply the selected quantification methodology or methodologies to quantify GHG emissions and removals.

590

591

592

The organization shall quantify GHG emissions and removals separately for each source and type of GHG.

593

594

595

**5.4 GHG inventory components**

596

597

**5.4.1 Gross GHG emissions and removals**

598

599

The organization's GHG inventory shall list separately for each facility gross:

600

- a) Direct GHG emissions by GHG source and GHG type;
- b) Direct GHG removals (as appropriate) by GHG sink and GHG type;
- c) Energy indirect GHG emissions (as appropriate) by GHG source and GHG type;
- d) Other indirect GHG emissions (as appropriate) by GHG source and GHG type.

601

602

603

604

605

The organization's GHG inventory shall aggregate facility-level GHG emissions and removals to calculate total gross:

606

607

- a) Direct GHG emissions;
- b) Direct GHG removals (as appropriate);
- c) Energy indirect GHG emissions (as appropriate);

608

609

610 d) Other indirect GHG emissions (as appropriate).

611

612 The organization shall use metric tonnes as the unit of measure and shall convert the  
613 quantity of each type of GHG to metric tonnes of carbon dioxide equivalent (CO<sub>2</sub>e) using  
614 current Global Warming Potentials determined by the Intergovernmental Panel on  
615 Climate Change (see Annex C).

616

#### 617 **5.4.2 Internal GHG emission reduction or removal enhancement projects**

618

619 The organization's GHG inventory shall list separately GHG emission reductions or  
620 removal enhancements from GHG projects quantified within organizational boundaries  
621 (Figure 2).

622

623 Requirements and guidance for quantifying GHG projects are contained in ISO 14064  
624 *Greenhouse Gases - Part 2: Specification for the quantification, monitoring and*  
625 *reporting of project emissions and removals.*

626

#### 627 **5.4.3 External GHG emission reduction or removal enhancement projects**

628

629 The organization's GHG inventory shall list separately GHG emission reductions or  
630 removal enhancements from GHG projects quantified outside of organizational  
631 boundaries (Figure 2).

632

633 Requirements and guidance for quantifying GHG projects are contained in ISO 14064  
634 *Greenhouse Gases - Part 2: Specification for the quantification, monitoring and*  
635 *reporting of project emissions and removals.*

636

#### 637 **5.4.4 Internal targeted actions to reduce GHG emissions or increase GHG** 638 **removals**

639

640 The organization may quantify GHG emissions or removals differences attributable to *ex*  
641 *post* internal targeted actions.

642

643 In such cases, the organization shall quantify and document GHG emission or removal  
644 differences attributable *ex post* internal targeted actions in accordance with the  
645 requirements of this International Standard.

646

647 The organization shall list GHG emission or removal differences attributable to internal  
648 targeted actions separately in the GHG inventory.

649

650 The organization shall not characterize GHG emission or removal differences  
651 attributable to internal targeted actions as GHG emission reductions or removal  
652 enhancements.

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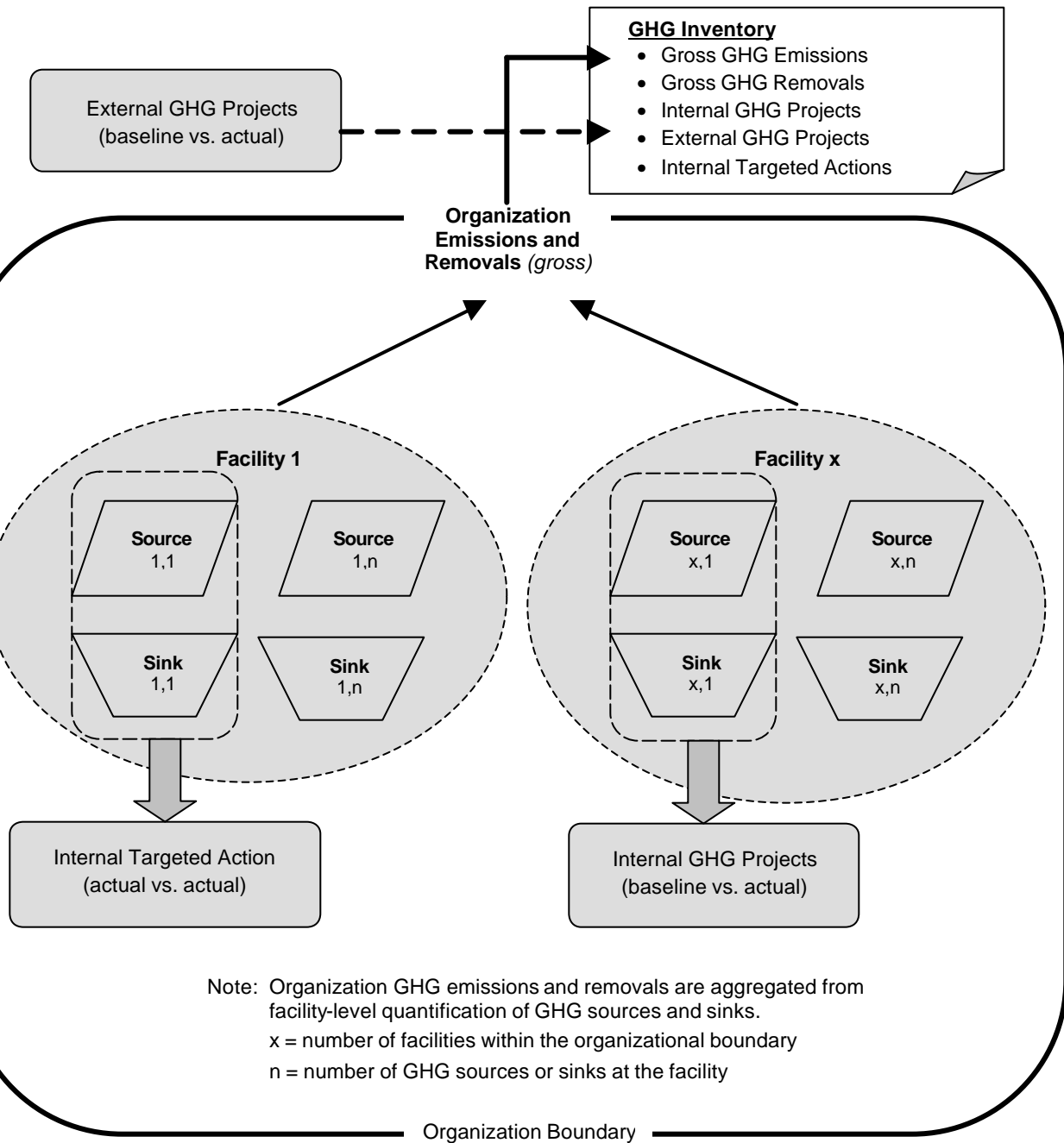


Figure 2: The organization GHG inventory

705 **5.4.4 GHG inventory matrix**

706

707 The organization may use a GHG inventory matrix to guide development of the  
708 organization's GHG inventory. An example GHG inventory matrix showing inventory  
709 boundaries and components and quantification requirements of this International  
710 Standard is provided as Table 1.

711

712

713

**Table 1 - GHG inventory matrix with standard provisions<sup>1</sup>**

GHG Emissions / Removals	Inside Organization Boundary				Outside Organization Boundary	
	Organization and Facility <sup>2</sup>	Targeted actions	Internal Projects		External Projects	
		Emission or removal difference <sup>3</sup>	Emission Reduction <sup>4</sup>	Removal Enhancement <sup>5</sup>	Emission Reduction <sup>4</sup>	Removal Enhancement <sup>5</sup>
Direct GHG Emissions <sup>6</sup>	shall	may	may	na	may	na
Direct GHG Removals <sup>6</sup>	should	may	na	may	na	may
Energy Indirect GHG Emissions <sup>7</sup>	[shall] [should]	may	may	na	may	na
Other Indirect GHG Emissions <sup>8</sup>	[should] [may]	may	may	na	may	na
<i>na</i> not applicable NOTE 1 Refer to this Standard's expression of provisions; "shall" = requirement, "should" = recommendation, "may" = permission". NOTE 2 Reported as gross GHG emissions or removals; see Clause 5.4.1. NOTE 3 See Clause 5.4.4. NOTE 4 See Clause 5.4.2. NOTE 5 See Clause 5.4.3. NOTE 6 See Clauses 5.2.2 and 5.4.1. NOTE 7 See Clauses 5.2.3 and 5.4.1. NOTE 8 See Clauses 5.2.4 and 5.4.1.						

714

715 **5.5 Base year GHG inventory**

716

717 **5.5.1 Base year selection and establishment**

718

719 The organization [should] [may] establish an historic base year for GHG emissions and  
720 removals for comparative purposes or to meet GHG scheme requirements and other  
721 intended uses for the GHG inventory.

722

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

726

727 Where a base year is established, the organization shall:

728

- a) Select a base year for which verifiable GHG emissions and/or removals data is available;

729

- b) [Explain] [justify] and document selection of the base year.

730

731 The organization may change its base year and shall justify and document the change.

732

733 Where established, the organization shall develop a GHG inventory for the base year  
734 consistent with the provisions of this International Standard.

735

### 736 **5.5.2 Base year GHG inventory adjustment**

737

738 The organization shall develop, apply and document a base year GHG inventory  
739 adjustment policy to allow the base year GHG inventory to remain valid as a  
740 comparative tool.

741

742 The base year GHG inventory shall be adjusted for the base year and all subsequent  
743 years if:

744

a) Significant change occurs in organizational boundaries;

745

b) The ownership and control of GHG sources or sinks is transferred into or out of  
746 organizational boundaries;

747

c) Changes to GHG quantification methodologies will result in significant changes to  
748 GHG emissions or removals.

749

750 The base year GHG inventory shall not be adjusted to account for changes in facility  
751 production levels.

752

### 753 **5.6 Assessing and reducing uncertainty**

754

755 The organization [shall] [should] complete and document an uncertainty assessment for  
756 GHG emissions and removals from each of its activities [using established methods].

757

758 The organization should be able to demonstrate an understanding of the impact of  
759 uncertainties on the accuracy of GHG emissions and removals data and have measures  
760 in place to manage and reduce uncertainties.

761

762 The organization [should] [may] apply the principles and methods of the ISO 1995,  
763 *Guide to the Expression of Uncertainty* in completing the uncertainty assessment.

764

765

## 766 **6 GHG inventory quality management**

767

### 768 **6.1 GHG information management and monitoring**

769

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

772

a) Ensure conformance with the Principles of this International Standard;

773

b) Ensure consistency with the intended use of the GHG inventory;

774

c) Provide routine and consistent checks to ensure data integrity, correctness, and  
775 completeness;

776

d) Identify and address errors and omissions;

777

e) Document and archive relevant GHG inventory records, including information  
778 management activities.

- 779 The organization's GHG information management procedures shall consider:
- 780 a) Identification and review of responsibility and authority of those responsible for
- 781 GHG inventory development;
- 782 b) Identification, implementation and review of appropriate training for inventory
- 783 development team members;
- 784 c) Identification and review of organizational boundaries;
- 785 d) Identification and review of GHG sources and sinks;
- 786 e) Selection and review of quantification methodologies, including activity data and
- 787 emission factors, that are consistent with the intended use of the GHG inventory;
- 788 f) Review of the application of quantification methodologies to ensure consistency
- 789 across multiple facilities;
- 790 g) Use, maintenance and calibration of measurement equipment (if applicable);
- 791 h) Development and maintenance of a robust data collection system;
- 792 i) Regular accuracy checks;
- 793 j) Periodic internal audits and technical reviews;
- 794 k) Periodic management reviews of GHG information;
- 795 l) Periodic review of opportunities for improving information management
- 796 processes.

## 797 **6.2 Document retention and record keeping**

- 798 The organization shall retain and maintain all documents and records relating to the
- 799 establishment and compilation of the GHG inventory, whether in paper, electronic media
- 800 or other format, in secure archives to enable relevant verification. The organization shall
- 801 establish and maintain procedures to ensure that:
- 802
- 803
- 804 a) Documents and records can be located;
- 805 b) Current versions are available at all locations where operations essential to the
- 806 effective development and maintenance of the GHG inventory are performed;
- 807 c) Obsolete documents are promptly removed from all points of issue and points of
- 808 use, or otherwise assured against unintended use;
- 809 d) Any obsolete records retained for legal or regulatory purposes are suitably
- 810 identified;
- 811 e) Only designated personnel are authorized to create, modify or amend various
- 812 types of documents or records.

813 Documents and records shall be legible, dated and readily identifiable, maintained in an

814 orderly manner and retained for a specified period.

815 Copies of electronic media shall be held in secure storage, suitably protected from

816 interference or retrieval by unauthorized persons.

## 817 **7 GHG reporting**

818 Complete, consistent, accurate and transparent reporting of GHG emissions and

819 removals is essential for GHG inventory verification and organization participation in

820 GHG schemes or other initiatives. The organization should determine the content,

821 structure, public availability and methods of dissemination of GHG reports based on

822

823

824

825

826

827 requirements of the applicable GHG scheme, internal reporting needs and the needs of  
828 intended report users.

## 830 **7.1 GHG report planning**

831  
832 The organization [shall] [should] consider and document the following as appropriate in  
833 planning its GHG report:

- 834 a) Report purpose and objectives in the context of the organization's GHG policies,  
835 strategies or programs and applicable GHG schemes;
- 836 b) Intended usage and potential users of the report;
- 837 c) Overall and specific responsibilities for preparing and producing the report;
- 838 d) Report frequency;
- 839 e) Period for which the report is valid;
- 840 f) Report format;
- 841 g) Data and information to be included in the report;
- 842 h) Policy on report availability and methods of dissemination;
- 843 i) If applicable, procedures for second or third party verification of the GHG report.

## 845 **7.2 GHG report content**

846  
847 The organization's GHG report shall describe the organization's GHG inventory and, as  
848 a minimum, include:

- 849 a) Description of the reporting organization;
- 850 b) Responsibility for reporting;
- 851 c) Reporting period covered;
- 852 d) Description and justification of organizational boundaries (see Section 5.1);
- 853 e) The organization's gross direct GHG emissions, separately quantified in tonnes  
854 of CO<sub>2</sub>-e;
- 855 f) If quantified, the organization's gross GHG removals, separately quantified in  
856 tonnes of CO<sub>2</sub>-e;
- 857 g) Description and justification for the estimation of any GHG sources or sinks  
858 excluded from monitoring and quantification (see Clause 5.2.2);
- 859 h) [If quantified,] the organization's indirect GHG emissions associated with the  
860 import or purchase of electricity, heat, steam or other fossil fuel-derived energy  
861 products separately quantified in tonnes of CO<sub>2</sub>-e (see Clauses 5.2.3 and 5.4.1);
- 862 i) If quantified, the organization's other indirect GHG emissions separately  
863 quantified in tonnes of CO<sub>2</sub>-e (see Clauses 5.2.4 and 5.4.1);
- 864 j) As appropriate, GHG emission reductions and removal enhancements from  
865 internal GHG projects, separately quantified in tonnes of CO<sub>2</sub>-e (see Clause  
866 5.4.2);
- 867 k) As appropriate, GHG emission reductions and removal enhancements from  
868 external projects, separately quantified in tonnes of CO<sub>2</sub>-e (see Clause 5.4.3);
- 869 l) If established, description and justification of the base year selected or any  
870 change to the base year selected (see Clause 5.5.1);
- 871 m) If established, the base year GHG inventory (see Clause 5.5.1);
- 872 n) Description and justification for any adjustment to the base year GHG inventory,  
873 including application of the base year GHG inventory adjustment policy (see  
874 Clause 5.5.2);

- 875 o) Description and justification of quantification methodologies (see Clause 5.3.3);  
876 p) Description and justification of any change to quantification methodologies  
877 previously used (see Clause 5.3.3);  
878 q) Description and justification for the selection of emissions factors (see Clause  
879 5.3.5);  
880 r) Declaration that the GHG report has been prepared in accordance with ISO  
881 14064, *Greenhouse gases - Part 1: Specification for the quantification and*  
882 *reporting of organization emissions and removals*;  
883 s) A statement describing whether the GHG inventory or report has been verified,  
884 including type of verification and level of assurance achieved.  
885

886 The organization's GHG report should contain the following additional information:

- 887 a) The organization's mission statement;  
888 b) Description of the organization's GHG policies, strategies or programs;  
889 c) As appropriate, description of applicable GHG scheme requirements;  
890 d) Description of GHG report planning information;  
891 e) The organization's GHG inventory emissions or removals disaggregated by  
892 facility;  
893 f) Description and results of an uncertainty assessment, including measures to  
894 manage or reduce uncertainties (see Clause 5.6);  
895 g) Description and presentation of additional indicators, such as productivity,  
896 efficiency or GHG emission intensity (emissions per unit of production) ratios;  
897 h) Where relevant, an assessment of performance against internal and/or external  
898 benchmarks;  
899 i) Description of the organization's GHG information management and monitoring  
900 procedures (see Clause 6.1);  
901 j) A statement of faithful representation from the Chief Executive Officer or  
902 designated representative of the organization;  
903 k) If applicable, verification statement for the GHG assertion from an independent  
904 verifier.  
905

### 906 **7.3 GHG report format**

907  
908 The organization's GHG report should present information in a concise and logical  
909 format that enables users to locate and understand information. The GHG report should  
910 be written in language appropriate to the intended users and should include an executive  
911 summary and graphical information or other illustrative material where appropriate.  
912

### 913 **7.4 GHG report dissemination**

914  
915 The organization should make available its policy on the dissemination and availability of  
916 its GHG report.  
917

918 The organization should publish its GHG report in the media that is most accessible to  
919 the intended users.  
920  
921

922 **8 Verification**

923

924 The organization should verify conformance to requirements of this International  
925 Standard on a regular basis. The organization should determine the need for first party  
926 (internal), second party (GHG scheme administrator, client) or third party (independent  
927 external) verification based on requirements of the GHG scheme in which they are  
928 operating, internal reporting needs or the intended use for the GHG inventory.

929

930 The organization should complete first party verification in accordance with Section 8.2  
931 of this International Standard and may consult guidance contained in ISO 14064  
932 *Greenhouse gases - Part 3: Specification and guidance for validation, verification and*  
933 *certification.*

934

935 **8.1 Preparing for third party verification**

936

937 In preparing for third party verification, the organization should:

- 938 a) Identify requirements of this International Standard;
- 939 b) Identify applicable organizational or GHG scheme verification requirements;
- 940 c) Determine the level of assurance required;
- 941 d) Agree to verification objectives, scope and criteria with the verification body;
- 942 e) Ensure that the roles and responsibilities of appropriate staff are clearly defined  
943 and communicated;
- 944 f) Ensure that the organization GHG information, data and records are complete  
945 and accessible;
- 946 g) Ensure that the verification body conforms with the requirements of ISO 14064  
947 *Greenhouse gases - Part 3: Specification and guidance for validation, verification*  
948 *and certification.*

949

950 **8.2 First party verification**

951

952 **8.2.1 Verification program**

953

954 The organization should develop and implement a first party verification program that  
955 includes:

- 956 a) The verification process, scope and activities;
- 957 b) Roles and responsibilities for implementing and maintaining the program;
- 958 c) Resources necessary to achieve planned outcomes;
- 959 d) Appropriate program controls;
- 960 e) Maintenance of necessary documentation and records;
- 961 f) Processes for monitoring and reviewing the program.

962

963 **8.2.2 Verification process**

964

965 The organization should develop and implement first party verification processes that  
966 include:

- 967 a) Review of requirements of this International Standard;
- 968 b) Review of applicable organization or GHG scheme verification requirements;
- 969 c) Description of verification objectives;

- 970 d) Definition of the verification scope;  
971 e) Development of a verification plan defining verification activities and data sample  
972 design;  
973 f) Appointment of competent staff as internal verifiers;  
974 g) Implementation of the verification;  
975 h) Review, assessment and improvement of verification processes;  
976 i) Preparation of a verification report to management.  
977

### 978 **8.2.3 Verification scope**

- 979  
980 The organization should develop its verification scope and objectives to include:  
981 a) Requirements of this International Standard;  
982 b) Applicable organizational or GHG scheme verification requirements;  
983 c) Legal, geographical, operational and physical boundaries of the organization and  
984 its facilities;  
985 d) Facilities, activities, technologies and processes to be included in the verification;  
986 e) Emission and removal types and sources to be verified;  
987 f) The time period(s) to be covered by the verification;  
988 g) The frequency of the verification process.  
989

### 990 **8.2.4 Verification activities**

- 991  
992 The organization's verification activities should address:  
993 a) Conformance to the Principles of this International Standard (see Clause 4);  
994 b) Assessment of the organization GHG inventory (see Clause 5);  
995 c) Assessment of information management, monitoring and record keeping (see  
996 Clause 6);  
997 d) Confirmation of materiality thresholds if applicable;  
998 e) Level of confidence in the verified data;  
999 f) Verification reporting.  
1000

### 1001 **8.2.5 Competence of internal verifiers**

1002  
1003 The organization should ensure that internal verification personnel are competent, as  
1004 demonstrated through appropriate education, training, skills and experience.  
1005

- 1006 The organization should establish and implement criteria to ensure that internal  
1007 verification personnel:  
1008 a) Are aware of GHG management issues;  
1009 b) Understand the operations and processes that they verify;  
1010 c) Have the necessary technical expertise to carry out the functions assigned to  
1011 them in the verification process;  
1012 d) Are familiar with the contents and intent of this International Standard.  
1013

1014 The organization should select internal verification personnel who are administratively  
1015 independent of the operations subject to verification to ensure objectivity and impartiality  
1016 in the verification process.  
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**Annex A  
(informative)**

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

In developing a 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 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 Clauses 5 and 6), and the purpose and GHG scheme requirements of the organization's GHG reporting known, one of the three approaches outlined below should be selected to guide and assist in the consolidation of facility data to the organization level.

Where possible, entities should follow distinctions 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.

**Consolidation based on control**

Control is defined as the ability of a company to direct the operating 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.

**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 and attempts 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.

1066 **Consolidation based on financial boundaries**

1067

1068 Most organization operations within a specific country are required to pay taxes  
1069 according to a specific tax file number or business number and must meet specific  
1070 legal/financial regulatory requirements for that jurisdiction. Issues of equity share, degree  
1071 of control and double counting of emissions may be overcome by adopting the reporting  
1072 boundaries of the tax liability framework in which basic responsibility for assets is pre-  
1073 agreed.

1074

1075 In addition, where a price is attached to emitting GHGs, it is likely that emissions  
1076 acquittal and/or carbon tax liability will rest with the company that actually pays the direct  
1077 tax liability. Thus there are potential administrative benefits of this approach (from a  
1078 government policy implementation perspective) and reduced transaction and  
1079 verification/audit costs (from a company perspective).

1080

1081 **[Consolidation based on production share]**

1082

1083 [Production share is the percentage of production that an organization receives based  
1084 on ownership and production-sharing arrangements established for a facility. This  
1085 approach may be useful for companies that have agreements for sharing production  
1086 among the owners of a jointly-owned facility.

1087

1088 Consolidating to the organization level based on production share would require  
1089 establishing the percentage of production received by the organization from each facility,  
1090 and accounting for that percentage of GHG emissions and removals from the respective  
1091 facilities.]

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**Annex B**  
**(informative)**  
**Example of GHG Source and Sink Categories<sup>1</sup>**

**1. Energy**

- A. Fuel Combustion (Sectoral Approach)
  - 1. Energy Industries
  - 2. Manufacturing Industries and Construction
  - 3. Transport
  - 4. Other Sectors
  - 5. Other
- B. Fugitive Emissions from Fuels
  - 1. Solid Fuels
  - 2. Oil and Natural Gas

**2. Industrial Processes**

- A. Mineral Products
- B. Chemical Industry
- C. Metal Production
- D. Other Production
- E. Production of Halocarbons and SF<sub>6</sub>
- F. Consumption of Halocarbons and SF<sub>6</sub>
- G. Other

**3. Solvent and Other Product Use**

**4. Agriculture**

- A. Enteric Fermentation
- B. Manure Management
- C. Rice Cultivation
- D. Agricultural Soils
- E. Prescribed Burning of Savannas
- F. Field Burning of Agricultural Residues
- G. Other

**5. Land-Use Change and Forestry**

- A. Changes in Forest and Other Woody Biomass Stocks
- B. Forest and Grassland Conversion
- C. Abandonment of Managed Lands
- D. CO<sub>2</sub> Emissions and Removals from Soil
- E. Other

**6. Waste**

- A. Solid Waste Disposal on Land
- B. Waste-water Handling
- C. Waste Incineration
- D. Other

**7. Other (*please specify*)**

- 1. From Intergovernmental Panel on Climate Change 1997, *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories Reporting Instructions (Volume 1)*. As of September 2003, found at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

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**Annex C**  
**(informative)**  
**Greenhouse gas global warming potentials**

Global Warming Potential (GWP) is an index used to convert relevant non-CO<sub>2</sub> gases to a CO<sub>2</sub> equivalent (CO<sub>2</sub>-e) by multiplying the quantity of the gas by its GWP. The table below provides various GWPs published by the Intergovernmental Panel on Climate Change (IPCC) current at time of publication. Users are encouraged to obtain the most recent GWPs from the IPCC.

Gas	Chemical Formula	IPCC 1996 Global Warming Potential <sup>1</sup>
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> H <sub>2</sub> F <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> H <sub>2</sub> F <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
Sulfer hexafluoride	SF <sub>6</sub>	23,900

1. Intergovernmental Panel on Climate Change 1997, *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories Reporting Instructions*. As of September 2003, found at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

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