United Nations
Climate Change

UNFCCC BTR REVIEW TRAINING: COURSE B

TECHNICAL REVIEW OF NATIONAL INVENTORY REPORTS OF ANTHROPOGENIC EMISSIONS BY SOURCES AND REMOVALS BY SINKS OF GHG

SUB COURSE B1: GENERAL AND CROSS-CUTTING ISSUES OF THE GHG INVENTORY REVIEW

FIRST EDITION
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BTR Review Training Programme

Technical review of national inventory reports of anthropogenic emissions by sources and removals by sinks of GHG

Sub Course B1: General and cross-cutting issues of the GHG inventory review

United Nations Framework Convention on Climate Change

Abbreviations and acronyms

2006 IPCC Guidelines	2006 IPCC Guidelines for National Greenhouse Gas Inventories
2019 Refinement to the 2006 IPCC Guidelines	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
AD	activity data
AFOLU	Agriculture, forestry and other land use
Annex I Party	Party included in Annex I to the Convention
BTR	biennial transparency report
C	confidential
CCS	carbon dioxide capture and storage
CH_4	methane
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
CO	carbon monoxide
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
CRT	common reporting tables
EF	emission factor
Eurostat	statistical office of the European Union
FAOSTAT	database of the Food and Agriculture Organization of the United Nations
FX	flexibility
GHG	greenhouse gas
HFC	hydrofluorocarbon
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
MPGs	modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement, set out in the annex to decision 18/CMA.1

NA	not applicable
NDC	nationally determined contribution
NE	not estimated
NF_3	nitrogen trifluoride
NID	national inventory document
NMVOC	non-methane volatile organic compound
NO	not occurring
NOx	nitrogen oxides
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
REDD+	reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks (decision 1/CP.16, para. 70)
SF_6	sulfur hexafluoride
TACCC	transparency, accuracy, completeness, consistency and comparability
TERR	technical expert review report
TERT	technical expert review team
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*

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Introduction to the course B

Enhanced transparency framework technical expert review

1. Background

The CMA requested the SBSTA to develop a training programme for technical experts participating in the TER.[1]

As part of the new training programme, course B is part of the training programme for review experts conducting the technical review of national inventory reports of anthropogenic emissions by sources and removals by sinks of GHGs, reported in accordance with the MPGs. It covers the elements of the review of the national inventory report submitted by each Party as part of its BTR or as a stand-alone submission.

While this course is aimed at providing the necessary information in a practical format to help you better understand the essential steps and processes of the TER of anthropogenic emissions by sources and removals by sinks of GHGs, it is important to remember that relevant decisions and the Paris Agreement remain the authoritative sources of information on the ETF.

All courses in the training programme will be available online and will include an examination available only for experts included on the UNFCCC roster of experts (RoE). [2]

Expected time needed to complete sub-course B1: general and cross-cutting issues of the GHG inventory review.

- For readers with experience: 270 minutes
- For readers with less experience: 540 minutes

[1] Decision 18/CMA.1, para. 12(c).

[2] Decision 5/CMA.3, annex VII, paras. 5-8.

Lesson 1: Introduction

1. Overview of the course

Welcome to the general and cross-cutting issues of the GHG inventory review sub-course. This sub-course covers the information that all review experts, regardless of the inventory sector they are assigned to review, should know before participating in a TERT.

The lesson consists of two key topics:

1. Overview and learning objectives
2. Basic documentation

At the end of this lesson, you should be conversant with:

- The objectives of the general guidance and cross-cutting course and how the lessons are structured;
- The documentation that will provide the basis for your tasks as a review expert.

Expected time needed to complete lesson 1:

- For readers with experience: 15–30 minutes
- For readers with less experience: 60 minutes

1.1. Course objectives

Article 13, paragraph 7, of the Paris Agreement establishes that each Party is to regularly provide information including a national inventory report of anthropogenic emissions by sources and removals by sinks of GHGs. Paragraph 12 of the MPGs establishes that the national inventory report may be submitted as a stand-alone report or as a component of a Party's BTR. Paragraph 11 of Article 13 stipulates that the information submitted by each Party under paragraph 7 shall undergo a technical expert review.

This course is primarily intended for experts nominated by their countries or intergovernmental organizations to participate in the technical expert review specifically to review the national inventory report.

As an expert nominated to participate in the review process, you need to fully understand Parties' reporting requirements and the review process. The main objective of this course is to provide you with that knowledge.

If you have participated in the technical review of the GHG inventories of Annex I Parties you will notice many similarities and a few differences between the guidelines for the reporting and review of inventories of Annex I Parties, namely the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories" and the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention" (decisions 24/CP.19 and 13/CP.20, respectively), and the MPGs. Among the differences, two are particularly notable:

- The guidance now applies for both developed and developing country Parties;
- The enhanced transparency framework provides flexibility in the implementation of the provisions of Article 13 to those developing country Parties that need it in the light of their capacities. You will learn more about the flexibility provisions in lesson 2 of this course.

1.2. Course content

The lessons in this course provide the information that you need to be familiar with as a review expert, regardless of the inventory sector you are assigned to review, and that you must be particularly aware of as a generalist in an expert review team. This information covers:

- General and cross-cutting inventory issues;
- The process of preparing a national inventory and the technical guidance available (IPCC guidelines);
- The content of inventory submissions: the CRTs and the NID;
- The review process, including the different steps and tasks involved;
- The institutional arrangements that Parties must have in place for planning and managing the development of their GHG inventories on a continuous basis;
- The review tools and templates available to aid your work.

1.3. Course structure

The list below illustrates the different lessons in the course and how you will progress through them.

- **Lesson 1** provides an introduction to the course, including an overview, learning objectives and basic documentation.
- **Lesson 2** introduces the GHG inventory, its history and the technical terms you will be dealing with.
- **Lesson 3** covers reporting requirements for all Parties, including the inventory preparation process and the relevant IPCC guidance, particularly for the cross-cutting requirements.
- **Lesson 4** focuses on the CRTs.
- **Lesson 5** focuses on the NID as part of the inventory submission.
- **Lesson 6** provides an overview of the review process, including the timeline.
- **Lesson 7** covers the fundamentals of assessing Parties' reporting on national GHG inventories and the review of cross-cutting issues.
- **Lesson 8** presents the institutional arrangements that Parties must, or are encouraged to, have in place for planning, developing and managing their GHG inventories.
- **Lesson 9** describes the review tools that are available to aid your work and the report templates that you will be using (noting that these will be further developed over time).

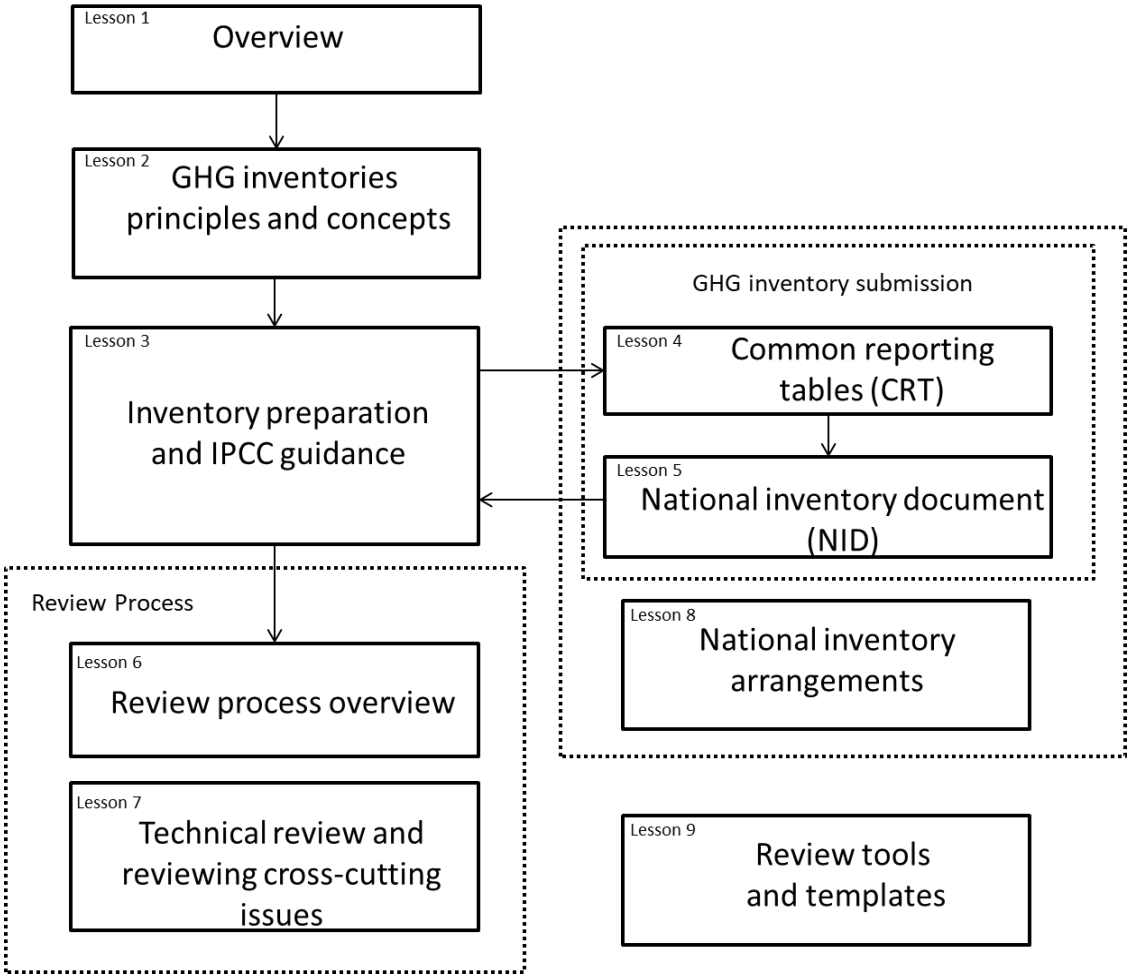


Figure 1. Course structure

2. Basic documentation

2.1. Modalities, procedures and guidelines

The MPGs set the rules for the enhanced transparency framework under the Paris Agreement. They include the requirements for reporting GHG inventories submitted by Parties (chapter II) and the approaches for the technical expert review of the submissions (chapter VII). These chapters are the most relevant for this course.

They also include other elements of the enhanced transparency framework:

- information necessary to track progress made in implementing and achieving NDCs (chapter III);
- information related to climate change impacts and adaptation (chapter IV);
- information on financial, technology development and transfer and capacity-building support provided and mobilized (chapter V); and
- information on financial, technology development and transfer and capacity-building support needed and received (chapter VI) that is included in Parties' BTRs.

Download decision 18/CMA.1 here

Chapter VII of the MPGs on the technical expert review explains how to review a GHG inventory. It covers objectives, approach, procedures, scope, the composition and functions of the TERT, the timing of the review and reporting elements.

This course will take you through the various elements of section VII. This knowledge will be essential for completing your tasks. During the course you are recommended to take the time to read and familiarize yourself with chapter VII of the MPGs.

When you have downloaded decision 18/CMA.1, navigate to chapter VII of the MPGs, which are contained in the annex to that decision, on technical expert review and familiarize yourself with it.

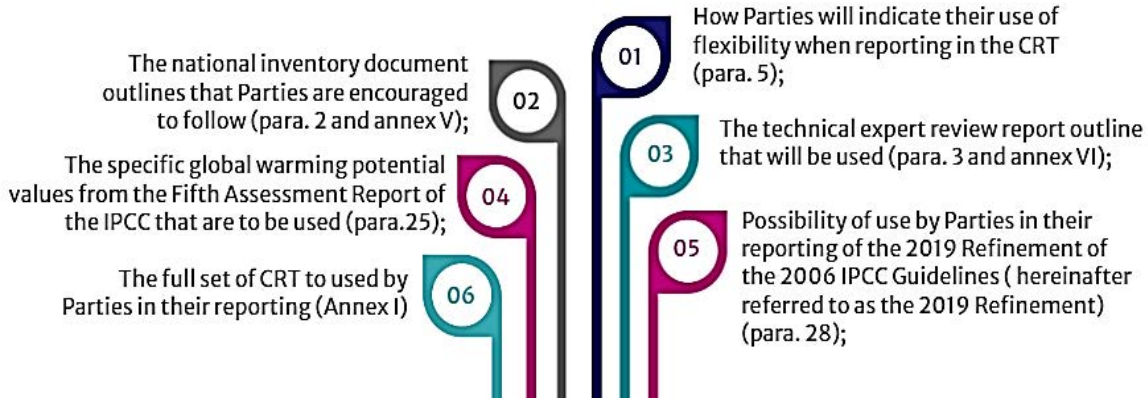
Of equal importance is chapter II. Your job as a review expert is to assess the adherence of Parties' submissions to the requirements of inventory reporting described in chapter II. Study them in detail and familiarize yourself with these requirements. This is particularly important for generalists.

Navigate to chapter II of the MPGs ("National inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases") and familiarize yourself with it.

2.2. Operationalizing the MPGs

Decision 5/CMA.3 provides further guidance for operationalizing the MPGs for the ETF referred to in Article 13 of the Paris Agreement, which is essential background information for you as a technical

expert reviewer. This decision includes overarching guidance as well as seven annexes. Of particular relevance for technical expert reviewers of the GHG inventory is information on:



2.3. 2006 IPCC Guidelines for National Greenhouse Gas Inventories

The MPGs establish that each Party shall use the 2006 IPCC Guidelines and any subsequent version or refinement of the 2006 IPCC Guidelines agreed upon by the CMA.

The 2006 IPCC Guidelines detail the general principles and methods for compiling GHG inventories, as well as information on good practice for reporting and QA/QC procedures. You should be familiar with the 2006 IPCC Guidelines, in particular the sections that relate to the inventory sector you are assigned to review.

The MPGs provide information on the use, and clarify certain provisions, of the 2006 IPCC Guidelines and also provide guidance on the different approaches that can be taken in relation to, for example, key category analysis and uncertainty analysis.

Figure 2. 2006 IPCC Guidelines

Note: on the rare occasion that information in the MPGs differs from that in the 2006 IPCC Guidelines, the former takes precedence. For example, while the 2006 IPCC Guidelines refer to agriculture, forestry and other land use as a single sector, the MPGs refer to the agriculture sector and the LULUCF sector separately.

You should refer to the MPGs and the 2006 IPCC Guidelines as you follow the lessons in this course and your sectoral courses.

To refresh your knowledge on the 2006 IPCC Guidelines click here

2.4. 2019 Refinement to the 2006 IPCC Guidelines

The 2019 Refinement to the 2006 IPCC Guidelines provides supplementary methodologies for GHG sources and sinks where gaps have been identified, new technologies and production processes have emerged requiring elaborated methodologies or certain sources and sinks are not well covered by the 2006 IPCC Guidelines. It also provides updated default values of EFs and other parameters based on the latest available science.

In accordance with decision 5/CMA.3, Parties may use on a voluntary basis the 2019 Refinement to the 2006 IPCC Guidelines. As a reviewer, you may encounter Parties that have used guidance from the 2019 Refinement to the 2006 IPCC Guidelines for one or more categories. Although the use of the 2019 Refinement to the 2006 IPCC Guidelines is not mandatory, if a Party has elected to use it, you should assess whether the Party's reporting is consistent with the MPGs as supplemented by category-specific guidance in the 2019 Refinement.

If you would like to learn more about the 2019 Refinement to the 2006 IPCC Guidelines click here

Lesson 2: Introduction to greenhouse gas inventory principles and concepts

1. Introduction

To master your role as a review expert, you need to know the precise meaning of a number of terms used in the MPGs and the 2006 IPCC Guidelines. While most, if not all, of these terms are likely to be familiar to you, many have special definitions within the context of the TERT.

The lesson consists of three key topics:

1. Important concepts
2. Terms and references
3. GHG inventories

At the end of this lesson, you should be able to:

- Describe the fundamental concepts related to the reporting and review of GHG inventories;
- Understand how the fundamental terms and concepts can be applied during a review and how the references are to be used;

Expected time needed to complete lesson 2:

- For readers with experience: 15–30 minutes
- For readers with less experience: 60 minutes

2. Greenhouse gas inventories

2.1. What is a GHG inventory?

GHG emission and removal inventories are quantifications of the GHGs emitted into and removed from the atmosphere over a given territory in amounts per unit of time (e.g. per day or year). GHG inventories generally specify:

- The chemical identity of the GHG concerned;
- The geographic area covered;
- The time period over which the emissions and removals are estimated;
- The sectors and activities that cause the emissions and removals.

A well-constructed GHG inventory includes sufficient documentation and data to allow readers to understand the underlying assumptions and methodologies and to reconstruct the calculations for each of the estimates included. In other words, a robust inventory ensures and promotes transparency.

2.2. Why do Parties develop and submit national GHG inventories?

National GHG inventories are developed for a variety of reasons. Inventories of natural and anthropogenic emissions and removals are used by scientists as inputs for models, by policymakers to develop strategies and policies and track progress towards GHG emissions targets, and by facilities and regulatory agencies to establish compliance records with allowable emission rates. GHG inventories can be prepared not only at the national level, but also by communities, states, regional organizations or international organizations such as the International Energy Agency.

Parties to the Convention commit to develop, periodically update, publish and make available national GHG inventories of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol, using comparable methodologies (Article 4, para. 1(a), of the Convention).

Under the procedures in place before the adoption of the Paris Agreement, Annex I Parties to the Convention were required to submit annual GHG inventories and non-Annex I Parties to the Convention were required to submit GHG inventories as part of their national communications and biennial update reports.

All Parties to the Paris Agreement are now required to submit a national GHG inventory report as part of their BTRs, while developed country Parties are required to also submit a GHG inventory in the years when a BTR is not due, i.e., developed country Parties continue to be required to submit a GHG inventory annually.

2.3. GHG inventory submission

The MPGs under the Paris Agreement require all Parties to provide a national GHG inventory report as part of their BTRs, comprising the NID and the CRTs. The national GHG inventory report may be submitted as a stand-alone report or as a component of a BTR. Developed country Parties are required to submit a stand-alone GHG inventory in the years when a BTR is not due.

The GHG inventory submission should cover all emissions and removals of GHGs not covered by the Montreal Protocol that occur in the territory of the country.

2.4. GHG inventory reviews

GHG inventories are subject to review as part of the technical expert review of the BTRs submitted by Parties. Reviews are conducted by a TERT. The TERT then prepares a draft report of its findings, which is sent to the Party under review for comments. A final version, taking into account the comments by the Party is then prepared by the TERT and subsequently posted on the UNFCCC website.

3. Important concepts

3.1. Guiding principles of the MPGs

You learned about the guiding principles of the MPGs in the BTR overview course. Here you will learn how these principles are relevant for GHG inventories.

Table 1. Guiding principles of the MPGs

Guiding principles of the MPGs
Building on and enhancing the transparency arrangements under the Convention Developed country Parties and developing country Parties have been submitting GHG inventories at different frequencies and levels of detail under the Convention (and for most developed country Parties, the Kyoto Protocol). The MPGs build on these requirements. GHG reporting and review will be implemented in a facilitative, non-intrusive, non-punitive manner, respecting national sovereignty and avoiding placing undue burden on Parties.
Facilitating improved reporting and transparency over time No GHG inventory is perfect. The system is designed to enable Parties to prepare a GHG inventory with the information available at the time of its development. The review process is designed to help to identify areas of improvement, and if appropriate, for developing country Parties that need it in light of their capacities, identify capacity-building needs, and provide guidance to the Party to support this improvement.
Providing flexibility to developing country Parties The enhanced transparency framework provides flexibility for developing country Parties that need it in the light of their capacities, including in the scope, frequency and level of detail of reporting and in the scope of the review.
Promoting TACCC principles The fundamental principles for developing a GHG inventory are transparency, accuracy, completeness, consistency and comparability. These principles are described further below.

Avoiding duplication of work and undue burden on Parties and the secretariat The MPGs are designed to streamline all reporting and review processes to the extent possible, avoiding duplication of efforts under the different reporting and review requirements under the Convention and its processes.
Ensuring that Parties maintain the frequency and quality of reporting under the Convention Reporting and review requirements under the Paris Agreement build on the current measurement, reporting and verification system and are designed to promote the continuous improvement by all Parties over time. There should be no backsliding from the current requirements.
Ensuring that double counting is avoided By following the methodologies and guidance on allocation in the 2006 IPCC Guidelines, Parties can avoid double counting of emissions and removals.
Ensuring that the GHG inventory is neither overestimated nor underestimated By following the methodologies in the 2006 IPCC Guidelines, Parties can develop a GHG inventory that is neither overestimated nor underestimated as far as can be judged, with uncertainties reduced as far as practicable, thereby enhancing environmental integrity.

3.2. GHG inventory principles

The GHG inventory should be prepared and reported in accordance with the MPGs, following the good practice provided in the 2006 IPCC Guidelines.

Good practice consists of a set of methodological principles, actions and procedures intended to ensure that GHG inventories are accurate in the sense that they are systematically neither overestimated nor underestimated as far as can be judged, and that uncertainties are reduced as far as possible.

The concept of good practice is also broadly understood as a set of principles geared to improving the quality of inventories over time. These principles, as reaffirmed in the MPGs, are intended to promote **transparency**, **accuracy**, **completeness**, **consistency** and **comparability**. The MPGs also establish that the definitions of the GHG inventory principles used shall be as provided in the 2006 IPCC Guidelines.

Table 2. Principles of GHG inventories

Principles of GHG inventories
Transparency: the national GHG inventory is transparent if there is sufficient and clear documentation such that individuals or groups other than the inventory compilers can understand how the inventory was compiled and can assure themselves that it meets the good practice requirements for national GHG inventories.
Accuracy: the national GHG inventory is accurate if it contains neither overestimates nor underestimates so far as can be judged. This means making every endeavour to remove bias from the inventory estimates.
Completeness: the national GHG inventory is complete if estimates are reported for all relevant categories of sources and sinks, and gases across the entire geographic area of the Party. Where elements are missing their absence should be clearly documented together with a justification for exclusion.

Consistency: the national GHG inventory is consistent if estimates for different inventory years, gases and categories are made in such a way that differences in the results between years and categories reflect real differences in emissions and removals. Inventory annual trends, as far as possible, should be calculated using the same method and data sources in all years and should aim to reflect the real annual fluctuations in emissions or removals and not be subject to changes resulting from methodological differences.
Comparability: the national GHG inventory is comparable if it is reported in a way that allows it to be compared with national GHG inventories for other countries. Comparability is reflected in the appropriate choice of key categories and in the use of the reporting guidance tables and definitions of categories of emissions and removals contained in volumes 2–5 of the 2006 IPCC Guidelines, as implemented through the MPGs.

3.3. Exercise: applying the TACCC principles

When reviewing a Party's GHG inventory you come to the conclusions shown below. Match the scenarios on the left with the principles on the right.[3]

1 - A Party selected an EF for cool temperate zones (5 t carbon/ha/year) provided in the 2006 IPCC Guidelines for estimating CO_2 emissions from cropland on organic soils. The ERT noted that most of the Party's territory is in temperate, warm and tropical zones, for which the EFs are 10 and 20 t carbon/ha/year, respectively. The Party could not justify the EF applied.	Transparency
2 - The Party estimated emissions for lead production for 1990–2000 using a tier 1 method and for 2000–2022 using a tier 2 method.	Accuracy
3 - The Party did not estimate N_2O emissions from manure management of swine in 2015.	Consistency
4 - The Party has not provided the reference in the NID for annual AD on the amount of solid fuels used in the cement industry.	Completeness
5 - In estimating emissions from the iron and steel industry, the Party reported all combustion and industrial process related emissions under the energy sector. The Party reported emissions from iron and steel under the industrial processes sector as "IE".	Comparability

[3] The correct answer is: scenario 1 = accuracy, as the EF used is not appropriate thus resulting in emissions that are not accurate; scenario 2 = consistency, as the Party uses two different methods in the same time series which will generate an inconsistency time series; scenario 3 = completeness, as the Party does not estimate emissions for which a method is provided in the 2006 IPCC Guidelines; scenario 4 = transparency, as the Party does not provide information on the source of AD used to estimate emissions; scenario 5 = comparability, to allow comparisons across Parties, emissions must be allocated to the correct sectors/categories.

3.4. Flexibility

According to Article 13, paragraph 2, of the Paris Agreement "the transparency framework shall provide flexibility in the implementation of the provisions of this Article to those developing country Parties that need it in the light of their capacities. The modalities, procedures and guidelines referred to in paragraph 13 of this Article shall reflect such flexibility."

These flexibility provisions are designed to enable the preparation and reporting of GHG inventories in line with the MPGs and facilitate improved reporting over time.

The MPGs describe the specific flexibilities available to developing country Parties. Most of the flexibility provisions for developing country Parties that need it in the light of their capacities are for the reporting of GHG inventories.

Download the list of flexibility provisions for GHG inventories here

Paragraphs 6 and 149(e) of the MPGs describes how the Party must transparently document its use of flexibility and defines your role as a reviewer when a Party has applied flexibility.

As a reviewer, you must recognize when a Party has applied flexibility and conduct the review of the reported information, as appropriate. We will learn more about this in the next section.

As a reviewer it is important to remember:

- A developing country Party's decision to apply flexibility is self-determined. You cannot judge whether the Party has the capability of meeting the provision without use of flexibility;
- You must ensure that the Party has clearly indicated its decision to apply flexibility, identified its capacity constraints and provided a time frame for improvements related to those constraints.

3.5. How does a Party indicate its use of flexibility?

When applying flexibility in reporting, the developing country Party shall clearly indicate the provision to which flexibility is applied, concisely clarify capacity constraints and provide self-determined estimated time frames for improvements in relation to those capacity constraints (MPGs, para. 6). Decision 5/CMA.3 guides Parties in how to operationalize flexibility in their reporting.

You will know that a Party has applied flexibility when you see one or more of the following in the inventory submission:

1) Use of the notation key "FX" in the CRT, which indicates that the Party has applied flexibility for the category, gas and/or reporting year;

In the example below, the Party indicated its use of flexibility for the electronics industry. In this case, you can deduce that the industry may exist in the country (if a Party knows for certain the industry does not exist in the country it should have used the notation key "NO").

TABLE 2(II).B-H SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES AND PRODUCT USE
Sources of fluorinated substances
(Sheet 1 of 2)
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Year
Submission
Country

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Gas *(please specify)* One row per substance	ACTIVITY DATA		IMPLIED EMISSION FACTORS [1]	Emissions [2]	Recovery [3](4)
		Description	(t)	(kg/t)	(t)	(t)
2.E. Electronics industry [8]						
2.E.1. Integrated circuit or semiconductor	e.g. CF_4, C_2F_6, CHF_3, C_3F_8, NF_3 and SF_6	Consumption per substance	FX		FX	FX
2.E.2. TFT flat panel display	e.g. CF_4, NF_3 and SF_6	Consumption per substance	FX		FX	FX
2.E.3. Photovoltaics	e.g. CF_4 e.g. C_2F_6	Consumption per substance	FX		FX	FX
2.E.4. Heat transfer fluid	e.g. C_6F_{14}	Consumption per substance	FX		FX	FX
2.E.5. Other [9]						
Drop-down list:						
2.E.5.a. Microelectromechanical systems (MEMS)		Consumption per substance	FX		FX	FX
2.E.5.b. Other *(please specify) - one row per substance)*						
		Consumption per substance	FX		FX	FX

2) Indication in CRT 7 of the use of a threshold between 85 and 95 per cent for the key category analysis;

If a Party applies flexibility in the key category analysis (i.e. uses a threshold below 95 per cent but no lower than 85 per cent), the Party will have fewer key categories to consider in its GHG inventory. This flexibility enables Parties to focus limited resources on enhancing the TACCC principles on the most important contributors to emissions and removals. You will know when a Party has applied flexibility in the key category analysis on the basis of the threshold selected in CRT 7.

TABLE 7 SUMMARY OVERVIEW FOR KEY CATEGORIES [1]
(Sheet 1 of 1)

Year
Submission
Country

Threshold used in identifying key categories: [85% - 95%]

KEY CATEGORIES OF EMISSIONS AND REMOVALS	Gas	Criteria used for key source		Key category excluding	Key category including LULUCF
		L	T		
1.A.1 Fuel combustion - Energy Industries - Liquid Fuels	CO_2				
1.A.1 Fuel combustion - Energy Industries - Liquid Fuels	CH_4				
1.A.1 Fuel combustion - Energy Industries - Liquid Fuels	N_2O				
1.A.1 Fuel combustion - Energy Industries - Solid Fuels	CO_2				
1.A.1 Fuel combustion - Energy Industries - Solid Fuels	CH_4				
1.A.1 Fuel combustion - Energy Industries - Solid Fuels	N_2O				
1.A.1 Fuel combustion - Energy Industries - Gaseous Fuels	CO_2				

3) Use of a higher threshold of significance in CRT 9;

The extract from CRT 9 below demonstrates how a Party may indicate that it has applied flexibility in the level of the significance threshold in line with paragraph 32 of the MPGs. The Party has assumed a threshold for significance of 0.1 per cent of the national total GHG emissions, excluding LULUCF, or 1,000 kt CO_2 eq, whichever is lower. For all but the largest economies, the 0.1 per cent of emissions will be the lowest value. When this flexibility is applied, Parties may exclude from their reporting the emissions and removals from categories that, in total, must remain below 0.2 per cent of the national total GHG emissions, excluding LULUCF.

TABLE 9 COMPLETENESS - INFORMATION ON NOTATION KEYS
(Sheet 1 of 1)

Year
Submission
Country

Sources and sinks not estimated ("NE")[1]			
GHG	Sector[2]	Source/sink category[3]	Explanation
CO_2	Industrial Processes and Product Use	2.A Mineral Industry/2.A.4 Other Process Uses of Carbonates/2.A.4.b Other uses of Soda Ash	see NID chapter 4.2.2.4: Potential CO2 emissions from 2.A.4.b Other uses of soda ash are estimated to be clearly below the significance threshold of 0.1% of the national total GHG emissions (excluding LULUCF) as contained in paragraph 32 of the MPGs.

4) Completion of the "Flex_Summary" table in the CRT;

The example below shows how a Party may complete the "Flex_Summary" table in the CRT to describe its use of flexibility when reporting in accordance with the requirements of paragraphs 25, 34 and 58 of the MPGs.

SUMMARY TABLE ON THE USE OF FLEXIBILITY PROVISIONS

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MPG flexibility provision	Year	Sector	Category	Gas	Description of the application of flexibility	Clarification of capacity constraint	Timeframe for improvement	Progress made in addressing areas of improvement
Para. 25 Key category analysis	All	All	All	All	The Party has elected to use a threshold for the key category analysis of 85%	The Party chooses to focus limited resources to improve reporting on the most important key categories	Estimated BTR3 (2028 submission)	This is the first BTR submission. Progress will be documented in BTR2
Para. 34 QA/QC plan	All	All	All	All	The Party has identified the inventory agency responsible for implementing QA/QC, but consistent with the flexibility offered, has not yet developed a QA/QC plan	The Party does not have sufficient financial resources to develop a QA/QC plan but has included this scope of work in its funding proposal for the next BTR	Estimated BTR2 (2026 submission)	This is the first BTR submission. Progress will be documented in BTR2
Para. 58 Time series	All	All	All	All	The Party has included the most recent year of 2021 in its 2024 BTR submission (i.e. three years prior to the year of submission)	The data collection system does not allow for the collectino of data for all sectors for two years prior to the year of submission	Estimated BTR3 (2028 submission)	This is the first BTR submission. Progress will be documented in BTR2

- Use of "Flex_Summary" table is not mandatory. The information on the use of flexibility provisions, which is a mandatory requirement, may be included in the NID or the BTR as an alternative to using the "Flex_Summary" table;
- As you can see, through inclusion of paragraph 34, this table may also include use of flexibility that is not otherwise evident in the CRT.

5) Information is included by the Party in the documentation box of the CRT to describe its application of flexibility;
6) The Party has included a section on information on flexibility in chapter VII of the BTR or in the relevant sections of the NID, remembering that the use of the outlines for the BTR and the NID is encouraged, not required;

7) The Party has included in its section on areas of improvement in the BTR information related to the flexibility provisions used, again recalling that Parties are not required to follow this outline.

Parties that have applied flexibility that results in the notation key "FX" being included in all cells in a row or a column of a table, or in an entire table, may also collapse the corresponding row(s), column(s) and/or table(s). As a reviewer, you may expand the hidden information.

The notation key "FX" is one of six notation keys that may be used by Parties in their reporting. Definition of all six notation keys are found here.

The definitions of the notation keys are also included in the terms and references accessible throughout all GHG inventory courses.

3.6. Exercise: review of flexibility

Decide whether the following statements are true or false.[4]

1. Parties may indicate use of further flexibilities other than those specifically described in the MPGs.

2. A Party has applied a flexibility provision and does not report SF_6 emissions. As a reviewer, you have found a national data source that would allow it to report these emissions. As a reviewer you can recommend that the Party report SF_6 emissions using the data source you identified.

3. A Party has applied a threshold for the key category analysis of 80 per cent. As a reviewer, you can recommend that the Party apply at least a threshold of 85 per cent.

3.7. Improvement over time

The transparency, accuracy, completeness, comparability and consistency of a GHG inventory is expected to improve over time.

Your task as a review expert is to assess the consistency of the Party's submission with the MPGs, paying particular attention to the respective national capabilities and circumstances of developing country Parties. You will be working with the entire TERT to prepare a review report that provides practical guidance to the Party to help it to manage its limited resources and prioritize improvements.

For those countries just beginning to develop a GHG inventory, many of the efforts may be related to improving institutional arrangements for data collection, inventory preparation and data management so that Parties may build a robust and sustainable system.

As you identify areas of improvement for developing country Parties, you should work closely with them to identify specific capacity-building needs that would be highlighted in the TERR to support them in their improvement efforts.

[4] The correct answers are as follows: 1 = false. The MPGs specifically describe the flexibilities that may be applied; 2 = false. In accordance with para. 6 of the MPGs, when a developing country Party applies flexibility provided for in the MPGs, the TERT shall not review the Party's determination to apply such flexibility or whether the Party possesses the capacity to implement that specific provision without flexibility. This is reiterated in para. 149(e) of the MPGs; 3 = true. Although you cannot review a Party's choice to apply flexibility, you must ensure that the Party has followed the flexibility provision correctly. In this case, a Party must choose a threshold no lower than 85 per cent. You would include a recommendation to the Party to conduct the key category analysis using a threshold no lower than 85 per cent.

4. Terms and references

Terms and references that are important for reporting and review purposes are listed in Table 3 for quick reference. Their meaning in the context of the requirements established in the MPGs will be explained in detail in the lessons of this course.

Table 3. Terms and references

Term	Description
National inventory report	Composed of a CRT and an NID.
National inventory document	A set of detailed and complete information on the inventory that should ensure transparency and contain sufficiently detailed information to enable the inventory to be reviewed.
Common reporting tables	A standardized format for reporting estimates of GHG emissions and removals and other relevant information, facilitating the review of inventory data and trends and comparability across Parties.
Modalities, procedures and guidelines	Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement, set out in the annex to decision 18/CMA.1.
Greenhouse gases	Gases which, in increased atmospheric concentrations, contribute to the rise in global average surface temperature. These include CO_2, CH_4, N_2O, HFCs, chlorofluorocarbons, PFCs, SF_6 and NF_3.
2006 IPCC Guidelines	An IPCC report providing methodologies for estimating national inventories of anthropogenic GHG emissions by sources and removals by sinks. The use of these guidelines is mandatory for all Parties in the preparation of their GHG inventories. Note that Parties are encouraged to use the Wetlands Supplement to estimate relevant emissions and removals. Parties may use on a voluntary basis the 2019 Refinement to the 2006 IPCC Guidelines.
CRT notation keys	In the CRTs, Parties are required to use the standard notation keys “NO”, “NE”, “NA”, “IE”, “C” and "FX", where no numerical values are available, to ensure that their inventories are complete.
Key category	A source or sink category that is prioritized within the national inventory system because its estimate has a significant influence on a country’s total inventory of direct GHGs in terms of the absolute level of emissions, the trend in emissions or the uncertainty of emissions or removals (see vol. 1, chap. 4 of the 2006 IPCC Guidelines).
Quality control	A system of routine technical activities to assess and maintain the quality of the inventory as it is being compiled.
Quality assurance	A planned system of review procedures conducted by personnel not directly involved in the inventory compilation or development process.

Verification	Activities and procedures conducted during the planning and development or after completion of an inventory that can help to establish its reliability.
Uncertainty	Lack of knowledge of the true value of a variable. Estimates of uncertainty are needed for all relevant source and sink categories, GHGs, inventory totals as a whole and their trends.

5. Lesson Summary

- In addition to their reporting obligations under the Convention and the Paris Agreement, Parties may prepare national GHG inventories for a variety of reasons, including to support domestic policymaking.
- GHG inventories are required to be submitted by all Parties on a biennial basis, either as a component of the BTR or as a stand-alone document. Developed country Parties must continue to submit an annual GHG inventory (including in the years a BTR is not due) to meet requirements under the Convention.
- The national inventory report is prepared in accordance with chapter II of the MPGs
- The GHG inventory consists of a descriptive NID and a set of CRTs.
- The MPGs include, among the guiding principles, the importance of building on the transparency arrangements under the Convention, providing flexibility to those developing country Parties that need it in the light of their capacities and promoting the TACCC principles geared towards improving the quality of the inventory over time.
- Developing countries that need flexibility in the light of their capacities have the opportunity to apply the specific flexibility provisions offered by the MPGs, consistent with the guidance in decision 5/CMA.3.
- A developing country's decision to apply flexibility is self-determined. As a reviewer, you cannot judge whether the Party has the capacity to implement a specific provision without use of flexibility.
- You must ensure that the Party has clearly indicated its decision to apply flexibility, identifies its capacity constraints, and provides a time frame for improvements related to those constraints.

6. Self-check quiz

You are now invited to take a self-check quiz to test your understanding of the concepts discussed before moving on to the next lesson.

For each question, select your answer and then click “submit” to see the correct answer.

Question 1

What does the CRT notation key “NA” mean?

Select one:

A. Not applicable

B. Not available

C. Not appropriate

D. None of the above

Question 2

Should the notation key “0” (zero) be used in the CRTs where the emissions for a category are insignificant?

Select one:

A. Yes

B. No

Question 3

Which elements make up a Party’s GHG inventory as part of its BTR submission?

Select one:

A. NID

B. CRTs

C. TERR

D. A and B

E. A and C

Question 4

The concept of good practice is broadly understood as a set of principles geared towards improving the quality of inventories over time. Which of the following is not one of these principles?

Select one:

A. Transparency

B. Consistency

C. Comparability

D. Completeness

E. Correctness

Question 5

All developing country Parties may choose to apply flexibility in their reporting it in the light of their capacities.

Select one:

A. True

B. False

Question 6

Which of the following statement(s) is/are true?

A. Developing country Parties applying flexibility must describe in the NID, CRT or BTR the provision to which flexibility is applied, concisely clarify capacity constraints and provide self-determined estimated time frames for improvements in relation to those capacity constraints
B. Developing country Parties applying flexibility must complete the “Flex_Summary” table in the CRT
C. Parties are encouraged to include a discussion of flexibility in their NID
D. A and C
E. B and C

6.1. Answers to self-check quiz

Question 1

The correct answer is A. The notation key "NA" means that the emissions category exists within the Party but emissions of a specific gas do not occur.

Question 2

The correct answer is B. Zero should not be used in the CRTs. This is to avoid confusion with the reporting of very small numbers (seen as 0.00 in a printed CRT). Parties should provide the actual value or the notation key "NE" if emissions or removals are insignificant.

Question 3

The correct answer is D. The TERR is the technical expert review report, an output of the review.

Question 4

The correct answer is E. The missing principle is accuracy (in the sense that the estimates are neither overestimated nor underestimated as far as can be judged).

Question 5

The correct answer is A. All developing country Parties that need flexibility in the light of their capacities may apply flexibility in their reporting assuming that they meet the relevant requirements in paragraphs 4–6 of the MPGs, and the specific flexibility provisions. The TERT may not make a judgment as to whether the developing country Party has the capacity to implement the provision without flexibility.

Question 6

The correct answer is D. When a Party applies flexibility, it must describe the provision to which flexibility is applied, concisely clarify capacity constraints and provide self-determined estimated time frames for improvements in relation to those capacity constraints. However, where this information is included, whether in the NID, CRT or BTR is for the Party to decide. They are encouraged to include this in the BTR outline (chapter VII ("Information on flexibility") of annex IV to decision 5/CMA.3) and the relevant sections of the NID outline (see annex V to decision 5/CMA.3). They are not required to complete the "Flex_Summary" table in the CRT.

Lesson 3: Inventory preparation and Intergovernmental Panel on Climate Change guidance

1. Introduction

This lesson briefly discusses key concepts in the overall process of national GHG inventory preparation and addresses the cross-cutting issues of GHG inventories and the guidance provided in the 2006 IPCC Guidelines.

As a member of a TERT, you will be expected to have a thorough knowledge of all these topics.

The lesson consists of six key topics:

1. Reporting requirements
2. Inventory preparation
3. Key category analysis
4. Time-series consistency and recalculations
5. Quality assurance/quality control and verification
6. Uncertainty

At the end of this lesson, you should be conversant with:

- The key guiding principles of preparing a GHG inventory and how they should be applied during your review;
- The key cross-cutting activities of key category analysis, methodological choice, time-series consistency, QA/QC and uncertainty, and be able to articulate how these activities apply for all Parties, including developing country Parties that need flexibility in the light of their capacities.

Expected time to complete lesson 3:

- For readers with experience: 15–30 minutes
- For readers with less experience: 60 minutes

2. Reporting requirements

2.1. GHG emissions and removals

Inventories submitted by Parties as part of their BTRs must meet the requirements established by the MPGs. A short description of the main requirements is given below.

- Parties are required to report anthropogenic GHG emissions by sources and removals by sinks (i.e. emissions and removals resulting from human activity).
- Parties must report estimates of emissions and removals for all categories, gases and carbon pools considered in the inventory throughout the reported period on a gas-by-gas basis in units of mass at the most disaggregated level, in accordance with the MPGs, using the CRTs.
- A minimum level of aggregation may be needed to protect confidential business and military information.
- Emissions and removals must be reported separately, except in cases where it may be technically impossible to separate the information on emissions and removals in the LULUCF sector.

2.2. Sectors and categories

GHG estimates are reported for the following main sectors:

- Energy;
- IPPU;
- Agriculture;
- LULUCF;
- Waste;
- Other (if applicable).

Within each sector, the categories to be reported are those defined in the relevant CRT, noting that Parties have an opportunity to report country-specific categories.

In the 2006 IPCC Guidelines, the agriculture and LULUCF sectors are merged into one sector, namely agriculture, forestry and other land use. Although determining that the 2006 IPCC Guidelines is the main source of technical guidance (principles, methods, parameters and data), the MPGs established that agriculture and LULUCF must be treated as separate sectors for the purpose of estimating and reporting emissions and removals. Hence, although the estimation methods used are those included in the 2006 IPCC Guidelines, further guidance on where to report each category is included in the outline of the NID (see lesson 4) and the CRTs (see lesson 5).

2.3. Gases to be reported

Parties must report the direct gases CO_2, CH_4, N_2O, HFCs, PFCs, SF_6 and NF_3.

Parties must report actual emissions (not potential emissions) of HFCs, PFCs, SF_6 and NF_3. Emissions of HFCs and PFCs must be reported disaggregated by species of gas (e.g. HFC-134a).

In accordance with paragraph 48 of the MPGs, developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead report at least three gases (CO_2, CH_4 and N_2O) as well as any of the additional four gases (HFCs, PFCs, SF_6 and NF_3) if one or more of the following applies:

- The gas (or species of gas in the case of HFCs or PFCs) is included in its NDC under Article 4 of the Paris Agreement;
- The gas (or species of gas in the case of HFCs or PFCs) is covered by an activity under Article 6 of the Paris Agreement;
- The gas has been previously reported.

Refer back to lesson 2 to learn more about the reporting and review requirements related to flexibility.

Parties should provide information on emissions of CO, nitrogen oxides, NMVOCs and sulfur oxides.

Parties may report indirect CO_2 emissions resulting from the atmospheric oxidation of CH_4, CO and NMVOCs. In such cases, the national total GHG emissions must be presented with and without the indirect CO_2 emissions.

Parties should report indirect N_2O emissions from sectors other than agriculture and LULUCF. These should be reported only as memo items and must not be included in national totals.

2.4. Units and metrics for reporting emissions and removals

Emissions and removals should be reported on a gas-by-gas basis in units of mass.

In addition, when reporting aggregate emissions and removals of different GHGs, in accordance paragraph 37 of the MPGs, emissions and removals must be expressed in CO_2 eq using 100-year time-horizon global warming potential values from the IPCC Fifth Assessment Report, or 100-year time-horizon global warming potential values from a subsequent IPCC assessment report.

Paragraph 25 of decision 5/CMA.3 clarifies that the 100-year time-horizon global warming potential values shall be those listed in table 8.A.1 of the IPCC Fifth Assessment Report, excluding the value for fossil methane.[5]

A Party may in addition also use other metrics (e.g. global temperature potential) to report supplemental information on aggregate emissions and removals of GHGs, expressed in CO_2 eq. In such cases, the Party must provide in the NID information on the values of the metrics used and the IPCC Assessment Report from which they were sourced.

[5] https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf#page=73

2.5. General reporting guidance

A complete national inventory includes GHG emissions and removals occurring within the geographical boundaries of the Party (see principle of completeness in lesson 2, chapter 3.2). Depending on the national circumstances, this could mean including emissions and removals from national (including administered) territories and offshore areas over which the Party has jurisdiction.

Parties are required to report inventory results on a yearly basis starting from 1990.

Developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead to report data covering, at a minimum, the reference year/period for their NDCs under Article 4 of the Paris Agreement and, in addition, a consistent annual time series from at least 2020 onwards (MPGs, para. 57).

The latest reporting year shall be no more than two years prior to the submission of the Party's national inventory report.

Developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead have their latest reporting year as three years prior to the submission of their national inventory (MPGs, para. 58).

Because of their function in the UNFCCC process, national inventories must provide a single estimate of emissions and removals for each category and not a range of values. However, Parties should also evaluate the uncertainties associated with the estimates.

The MPGs and the 2006 IPCC Guidelines outline a number of other fundamental sectoral specific rules for reporting national GHG inventories, which will be covered in the sectoral courses.

Other general guidance on methodologies for uncertainty calculations, key category analysis, recalculations, time-series consistency and QA/QC is provided in volume 1 of the 2006 IPCC Guidelines.

3. Inventory preparation

3.1. Methodology: the basics

The simplest and most common methodological approach to prepare GHG inventory estimates is to combine information on the extent to which a human activity takes place (AD) with coefficients that quantify the emissions or removals per unit of activity (EFs).

The basic equation is:

Emissions = AD x EF

This equation is widely used in the 2006 IPCC Guidelines, except in the case of some specific categories which call for different methodological approaches (such as solid waste disposal on land in the waste sector, manure management in the agriculture sector). This matter is discussed in greater detail in the sectoral sub-courses of this training course.

3.2. Tiers, default data, parameters and EFs

The IPCC estimation methods are structured into tiers, with each tier representing a different level of methodological complexity. The 2006 IPCC Guidelines generally provide three tiers for each category. Tier 1 is the basic method, tier 2 the intermediate and tier 3 the most demanding in terms of complexity and data requirements. Tiers 2 and 3 are generally considered to be more accurate.

Tier 1 methods for all categories are designed to use readily available national or international statistics in combination with the default EFs and additional parameters provided in the 2006 IPCC Guidelines, and should therefore be feasible for all countries. As Parties' experience and capacity improve, they will be able to apply more elaborate methods and country-specific EFs and parameters, particularly for key categories.

3.3. Key categories

Categories are considered key if they have a significant influence on a country's total GHG inventory in terms of one or more of the following criteria:

- Absolute level of emissions and removals;
- Trend in emissions and removals;
- Uncertainty of emissions and removals.

To identify key categories, Parties need to perform a key category analysis (see the key category analysis section later in this lesson).

Because key categories have a significant influence on national GHG inventories, the MPGs contain provisions that apply specifically to them.

The 2006 IPCC Guidelines generally distinguishes between key and non-key categories. Parties should make every effort to use a recommended method (tier level) for key categories in accordance with those IPCC guidelines.

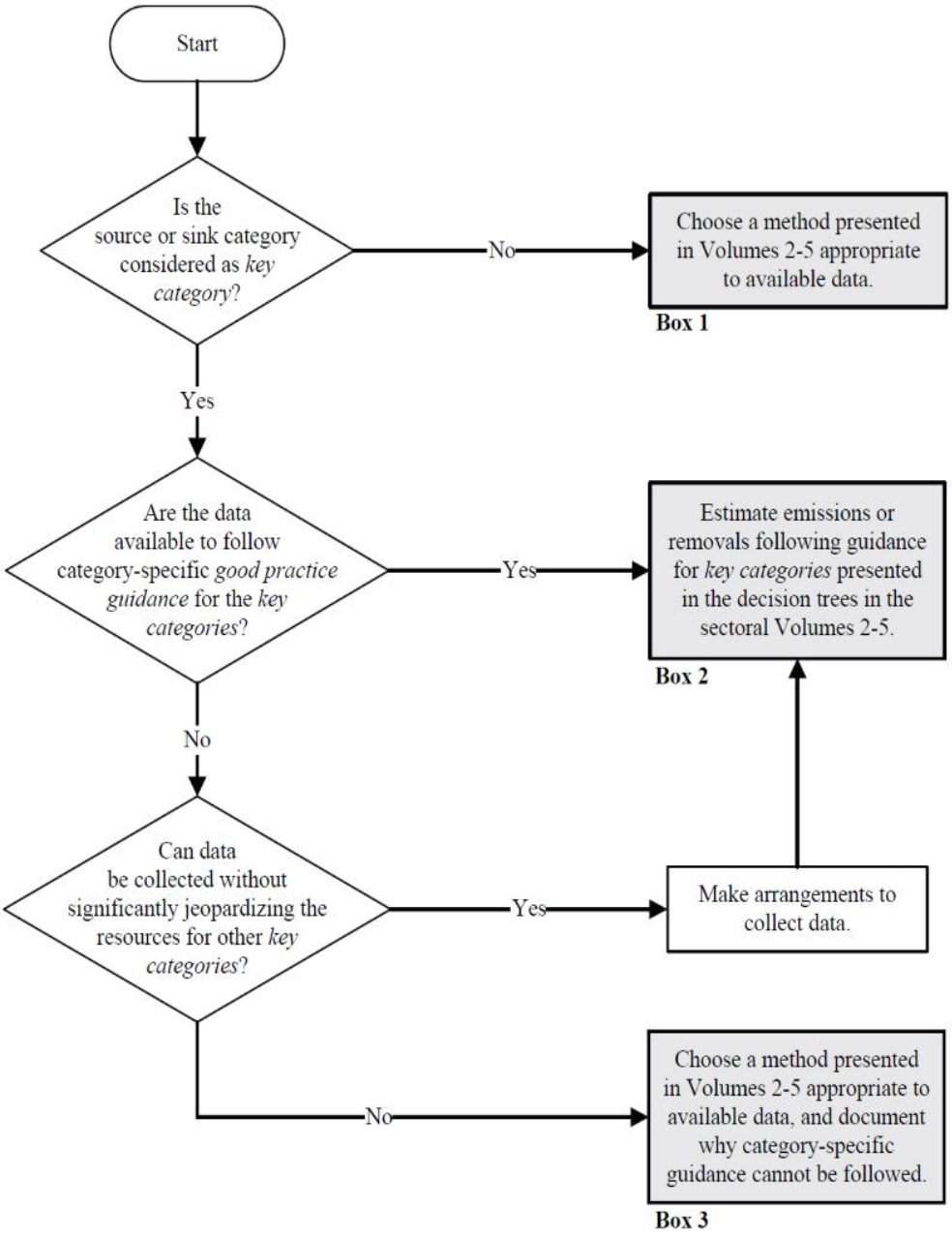
A Party may use nationally appropriate methodologies if they better reflect its national circumstances and are consistent with the 2006 IPCC Guidelines (MPGs, para. 22). In these cases, each Party shall transparently explain national methods, data and/or parameters selected in the NID.

3.4. Decision trees

Decision trees, provided in the sectoral chapters of the 2006 IPCC Guidelines for each category, help the Party to choose the best method and data for emission estimates.

Decision trees will also help you to check whether the inventory compiler has selected the appropriate methodology for the Party's circumstances.

Figure 3. Decision tree from the 2006 IPCC Guidelines

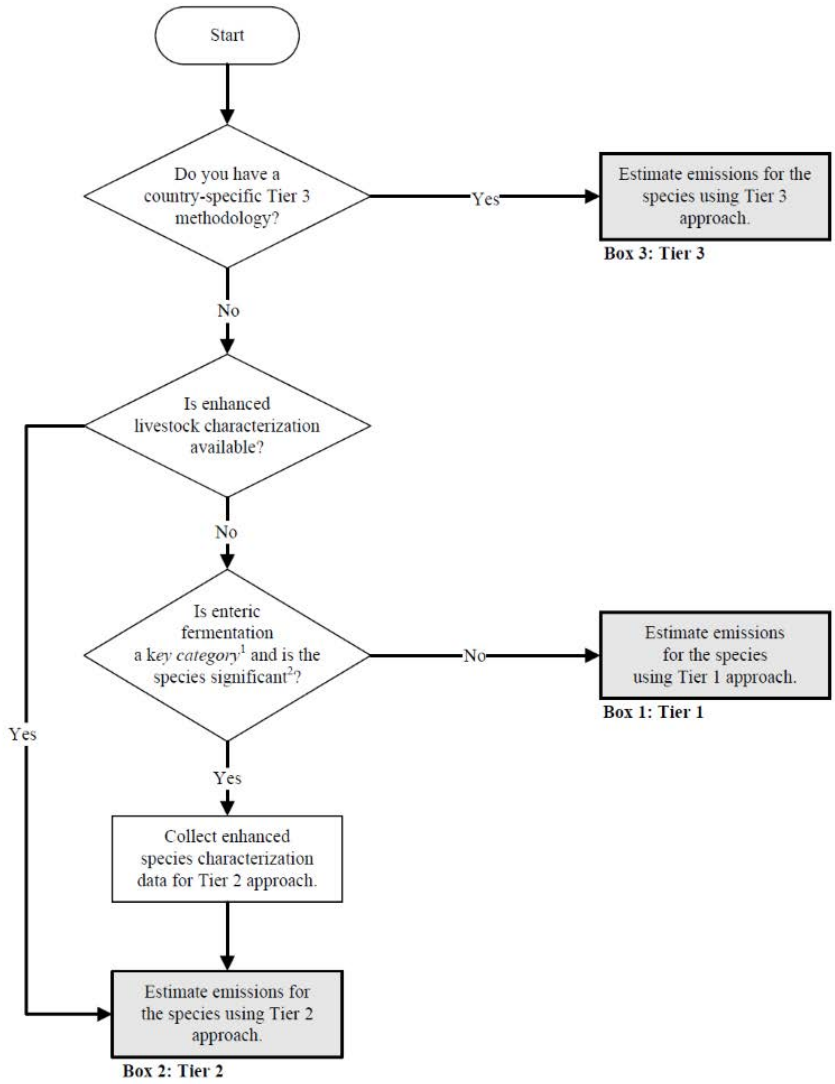


Decision trees generally suggest the use of tier 2 or tier 3 methodologies for key categories. A Party may be unable to adopt a higher-tier method for a particular key category owing to lack of resources. In such cases, the Party may use a tier 1 approach, but must clearly document why the methodological choice was not in line with the corresponding decision tree.

The Party should prioritize for future improvement any key categories for which the good practice method elaborated in the 2006 IPCC Guidelines cannot be used.

A decision tree for CH_4 emissions from enteric fermentation is provided below to study as an example.

Figure 4. Decision tree for CH_4 emissions from enteric fermentation



4. Key category analysis

4.1. Approaches to the key category analysis: quantitative

The 2006 IPCC Guidelines (vol. 1, chap. 4) set out different methodological approaches to performing a key category analysis. These include two quantitative approaches, both of which identify key categories in terms of their contribution to the absolute level of and trend in emissions and removals. The MPGs establish that Parties must identify key categories for the starting year and the latest reporting year, including and excluding LULUCF categories, using approach 1 of the 2006 IPCC Guidelines, for both level and trend assessment.

In approach 1 categories are sorted in descending order of magnitude, and key categories are identified using a 95 per cent cumulative threshold.

The 2006 IPCC Guidelines encourage inventory compilers to use approach 2 for identifying key categories if category-level uncertainties are available.

Developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead identify key categories using a threshold no lower than 85 per cent in place of the 95 per cent threshold.

In approach 2 categories are sorted according to their contribution to uncertainty. The results of approach 2, if applied, are considered supplementary to those of approach 1.

Approach 1	Approach 1 to identifying key categories assesses the influence of source and sink categories on the level of and trend in national emissions. When using approach 1 for the emission level, a predetermined cumulative emission threshold is used to identify key categories. When categories are sorted in order of decreasing emissions, those at the top of the list which cumulatively account for 95 per cent of emissions are considered key categories (that is, the highest emission categories). The 95 per cent threshold was established based on an evaluation of several inventories and was designed such that the key category analysis covered 90 per cent of inventory uncertainty. When LULUCF categories are included, absolute values of the removals are considered in the analysis instead of the negative original values. Note that in that case the cumulative value of all categories may exceed 100 per cent. The approach 1 method uses a simple spreadsheet analysis based on equations for both level and trend assessment.

Approach 2	Approach 2 is a more detailed analysis that builds on approach 1 by multiplying the results of the approach 1 analysis by the relative uncertainty of each category. This method generally reduces the number of key categories under consideration. Under approach 2, key categories represent 90 per cent of the quantified uncertainty contribution, as opposed to those that add up to the predetermined cumulative emission or trend threshold (i.e. 95 per cent). Categories identified as key under approach 2 that were not identified as such under approach 1 should be added to the key categories identified under approach 1.

4.2. Exercise: review of key category analysis

In the key category analysis, when categories are sorted in order of decreasing emissions, those at the top of the list which cumulatively account for 95 per cent of emissions are considered key categories. The table below shows a partial view of a key category analysis near the threshold of 95 per cent. Which of these categories should be considered to be key categories?[6]

Category	Gas	Cumulative threshold	Key category?
Road transportation	N_2O	0.948	Yes/No
Other transportation	CO_2	0.953	Yes/No
Forest land converted to cropland	CO_2	0.956	Yes/No

4.3. Approaches to the key category analysis: qualitative

Where the Party considers that the results of approaches 1 and 2 do not identify all categories that should be prioritized in the inventory system, a qualitative evaluation may be performed in line with the 2006 IPCC Guidelines.

Figure 5. Key category analysis approaches

[6] Road transportation/N_2O – yes; other transportation/CO_2 – yes; forest land converted to cropland/CO_2 – no. CO_2 from forest land converted to cropland is not a key category as the previous categories (sorted in order of decreasing emissions) already account for 95 per cent of emissions.

Qualitative criteria
Examples of criteria a Party could consider: • Use of mitigation technologies/policies led to decreased emissions/enhanced removals; • A category is expected to grow; • A quantitative assessment of uncertainty was not possible; • When the current GHG inventory is missing estimates (i.e. is not complete) it should be considered whether the missing categories could be key.

4.4. Level of disaggregation

One of the most important considerations when reviewing the results of a key category analysis is how the categories should be grouped or disaggregated.

This is because the size of emissions and removals (i.e. the level) and the trend in a given category can be significantly influenced by which subcategories are included or excluded.

Disaggregation should not be too extensive, otherwise it could split an important aggregated category into several small subcategories that will no longer be key.

While the 2006 IPCC Guidelines provide a suggested categorization level (vol. 1, chap. 4, table 4.1) for the purpose of identifying key categories, Parties may consider the most appropriate level taking into account their national circumstances and must provide this information in the NID.

5. Time-series consistency and recalculations

5.1. Time-series consistency

The time series is a central component of the GHG inventory because it provides information on historical emission trends and tracks the effects of strategies to reduce emissions at the national level. All Parties must report a consistent time series, meaning that a Party should use the same methods and a consistent approach to underlying AD and EFs for each reported year, starting from 1990 through to the year two years prior to the year of submission.

Developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead report data covering, at a minimum, the reference year/period for its NDC under Article 4 of the Paris Agreement and, in addition, a consistent annual time series from at least 2020 onwards (MPGs, para. 57)

Developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead have their latest reporting year as three years prior to the submission of their national inventory report. (MPGs, para. 58).

Note: adding a new category or subcategory to the inventory calls for the calculation of an entire time series. Estimates must be included in the inventory from the year that the emissions or removals started to occur in the country.

5.2. Recalculations

As inventory capacity and data availability improve, the methods used to prepare emission and removal estimates are likely to be updated and refined. Such changes or refinements are desirable when they result in more accurate and complete estimates. Both methodological changes and refinements over time are an essential part of improving inventory quality.

According to the 2006 IPCC Guidelines, it is good practice to change or refine methods when:

- Available data have changed;
- The previously used method is not consistent with the 2006 IPCC Guidelines for a specific category;
- A category has become key;
- The previously used method is insufficient to reflect mitigation activities transparently;
- Capacity for inventory preparation has increased;
- New inventory methods become available;
- Errors require corrections.

When methodologies or underlying AD and EFs have been changed, Parties need to recalculate their inventories for the starting year and subsequent years of the times series.

A Party must perform recalculations in accordance with the 2006 IPCC Guidelines ensuring that incorrect emission trends are not introduced as a result of changes in methods or assumptions across the time series.

5.3. Bridging data gaps

Where data are missing for one or more previous years, it will be difficult to recalculate estimates for previous years using a higher-tier method or to develop estimates for new categories to ensure time-series consistency.

When it is not possible for a Party to use a completely consistent data set for the entire time series owing to limitations in historical data (e.g. where data were not collected in the past but are collected now) that Party should use surrogate data, extrapolation, interpolation or other methods consistent with the splicing techniques contained in the 2006 IPCC Guidelines to estimate missing emissions in order to recalculate the emissions and removals estimates and ensure a consistent time series.

To learn more about these splicing techniques, see section 5.3.3 of volume 1 of chapter 5 of the 2006 IPCC Guidelines.

6. Quality assurance/quality control and verification

6.1. Quality control, quality assurance and verification

Three important building blocks of developing a high-quality inventory are quality control, quality assurance and verification.

Quality control	QC is a system of routine technical activities to assess and maintain the quality of the inventory while it is being compiled. It is performed by the personnel compiling the inventory. The QC system is designed to: • Provide routine and consistent checks to ensure data integrity, correctness and completeness; • Identify and address errors and omissions; • Document and archive inventory material and record all QC activities. General QC procedures include generic quality checks related to calculations, data processing, completeness and documentation, which are applicable to all inventory source and sink categories.
Quality assurance	QA is a planned system of review procedures conducted by personnel not directly involved in the inventory compilation and development process. Reviews, preferably by independent third parties, are performed on a completed inventory following the implementation of QC procedures. These ensure that the inventory represents the best possible estimate of emissions and removals given the current state of scientific knowledge and data availability.
Verification	Verification refers to activities and procedures conducted during the planning and development or after completion of an inventory that can help to establish its reliability. It concerns specifically those methods that are external to the inventory and apply independent data, including comparisons with inventory estimates made by other bodies or through alternative methods. Verification activities may be constituents of both QA and QC, depending on the methods used and the stage at which independent information is used.

To learn more about quality assurance and quality control activities for GHG inventory preparation, see volume 1 of chapter 6 of the 2006 IPCC Guidelines.

6.2. Elements of a QA/QC system

The major elements to be included in a Party's QA/QC system, as described in the 2006 IPCC Guidelines (vol. 1, chap. 6), are as follows:

- Definition and allocation of QA/QC and verification roles/responsibilities, and cooperation between government agencies and other entities involved in the preparation of the inventory;
- QA/QC plan;
- General QC procedures applicable to all inventory categories;
- Category-specific QC procedures;
- QA and review procedures;
- QA/QC system interaction with uncertainty analysis;
- Verification activities.

According to the MPGs, each Party must elaborate an inventory QA/QC plan in accordance with the 2006 IPCC Guidelines, including information on the inventory agency responsible for implementing QA/QC. In addition, each Party must implement and provide information on general inventory QC procedures in accordance with its QA/QC plan and the 2006 IPCC Guidelines.

Developing country Parties that need flexibility in the light of their capacities with respect to this provision are instead encouraged to elaborate an inventory QA/QC plan in accordance with the 2006 IPCC Guidelines and encouraged to provide information on general inventory QC procedures.

Parties should apply category-specific QC procedures for key categories and for those individual categories in which significant methodological changes and/or data revisions have occurred. In addition, Parties should implement QA procedures by conducting a basic expert peer review of their inventories.

The QA/QC processes are relevant procedures under the functions of the national inventory arrangements and are further described in lesson 8.

7. Uncertainty

According to the MPGs, each Party must quantitatively estimate and qualitatively discuss the uncertainty of the emission and removal estimates for all source and sink categories, including inventory totals, for at least the starting year and the latest reporting year of the inventory time series. Each Party must also estimate the trend uncertainty of emission and removal estimates for all source and sink categories, including totals, between the starting year and the latest reporting year of the inventory time series using at least approach 1, as provided in the 2006 IPCC Guidelines.

Developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead provide, at a minimum, a qualitative discussion of uncertainty for key categories, using the 2006 IPCC Guidelines, where quantitative input data are unavailable to quantitatively estimate uncertainties, and are encouraged to provide a quantitative estimate of uncertainty for all source and sink categories of the GHG inventory.

Before national uncertainty can be estimated, the uncertainty of EFs, AD and other parameters must be estimated for each category.

National statistics, which most Parties use for their inventories, may not have rigorous statistical uncertainty information associated with them. Moreover, although default EFs from the 2006 IPCC Guidelines often do have associated uncertainty information, many of the other variables used may not have detailed or quantitative uncertainty information associated with them. Therefore, expert judgment is often required in the development of quantified uncertainty estimates for emission and removal estimates based on proxy data.

However, such judgments are inherently subjective and must be interpreted cautiously. For this reason, it should not be assumed that an uncertainty distribution or analysis from one Party is directly applicable as an input or comparable with analyses of other Parties.

The 2006 IPCC Guidelines (vol. 1, chap. 3) present a structured approach to estimating inventory uncertainty, including methods for:

- Determining uncertainties in individual variables used in the inventory (for example, estimates of emissions from specific categories, EFs or AD);
- Aggregating the component uncertainties to obtain the total inventory uncertainty;
- Determining the uncertainty in the trend;
- Identifying significant sources of uncertainty in the inventory to help to prioritize data collection and efforts to improve the inventory.

To learn more about uncertainties and approaches to the uncertainty analysis, read chapter 3 of volume I of the 2006 IPCC Guidelines.

8. Lesson Summary

- A GHG inventory is a quantification of the amount of each GHG emitted to or removed from the atmosphere over a territory over a given period of time.
- Emissions and removals should be reported on a gas-by-gas basis in units of mass.
- Reporting requirements are set out in the MPGs. Guidance on methodologies is provided in the 2006 IPCC Guidelines.
- Key categories are those that have a significant influence on a country's total GHG inventory in terms of the absolute level of, and/or trend or uncertainty in, emissions and removals.
- Decision trees, provided in the 2006 IPCC Guidelines for each category, help the inventory compiler to select the appropriate methodology for the Party's circumstances.
- All emission estimates in a time series should be consistent, meaning that as far as possible, emissions and removals should be estimated using the same method and data sources for all years.
- Quality control is a system of routine technical activities to assess and maintain the quality of the inventory while it is being compiled. It is performed by the personnel compiling the inventory.
- Quality assurance is a planned system of review procedures conducted by personnel not directly involved in the inventory compilation and development process.
- Uncertainty estimates are an essential element of a complete inventory of GHG emissions and removals and should be derived both for the national level and for the trend estimate.

9. Self-check quiz

You are now invited to take a self-check quiz to test your understanding of inventory preparation and application of the 2006 IPCC Guidelines and see if you need to review the subject before moving on to the next lesson.

For each question, select your answer and then click "submit" to see the correct answer.

Question 1

The following are essential characteristics of an annual inventory submission, except for:

A. It should include natural and anthropogenic sources and sinks of GHG emissions

B. It should include the direct GHGs (CO_2, CH_4, N_2O, HFC, PFCs, SF_6 and NF_3)

C. It should include the emissions of island territories administered by the Party

D. B and C

E. A and C

Question 2

Which emissions should not be taken into account in the Party's key category analysis?

A. CH_4 emissions from solid waste disposal
B. SF_6 emissions from magnesium metal processing
C. CO_2 emissions from cement production
D. Nitrogen oxide emissions from iron and steel production
E. CO_2 removals from forest land
F. B and D
G. D and E

Question 3

All of the following situations result in the need for a recalculation, except one. In which situation should Parties not recalculate estimates for a particular source or sink category?

A. New research has led to an improved method
B. A new subcategory has been identified and added to the inventory
C. A category has become a key category
D. A category is no longer a key category
E. New and previously unavailable data have been collected
F. Errors were found in previous calculations and corrected

Question 4

According to the 2006 IPCC Guidelines, Parties must apply the same method over the entire time series in calculating emissions for categories.

A. True
B. False

Question 5

QA is a system of routine technical activities to assess and maintain the quality of the inventory as it is being compiled

Select one:

A. True
B. False

Question 6

All Parties must develop a QA/QC plan.

A. True
B. False

Question 7

Which of the following statements is incorrect?

A. Parties may report indirect CO_2 emissions resulting from the oxidation of CH_4, CO and NMVOCs. In such a case, the national totals should be presented only with indirect CO_2 emissions
B. Parties must report indirect N_2O emissions from the agriculture and LULUCF sectors. If Parties choose to report indirect N_2O emissions from other sectors, these should be reported only as memo items and must not be included in the totals
C. Emissions and removals should be reported on a gas-by-gas basis in units of mass
D. Except for developing countries applying flexibility, emissions of HFCs and PFCs should be reported for each chemical species on a disaggregated basis, except where a minimum level of aggregation may be required to protect confidential and military information
E. A and B
F. B and D

9.1. Answers to self-check quiz

Question 1

The correct answer is A. Parties are required to report only anthropogenic emissions and removals.

Question 2

The correct answer is D. Only categories with direct GHG emissions should be considered in the key category analysis.

Question 3

The correct answer is D. If a category that was not previously a key category becomes one, then Parties should re-evaluate whether they are duly following the 2006 IPCC Guidelines in their choice of method and data. However, if a category is no longer a key category, then Parties should not change the methods or data for that reason alone.

Question 4

The correct answer is B. The 2006 IPCC Guidelines allow Parties to use different methods in any period of a time series when improved data become available and cannot be collected historically. However, the Party should demonstrate that it has recalculated for the earlier years (if necessary) to rule out bias and inconsistencies in the emission trend.

Question 5

The correct answer is B. The description given is of QC. QA is a planned system of review procedures conducted by personnel not directly involved in the inventory compilation or development process.

Question 6

The correct answer is B. Developing country Parties that need flexibility in the light of their capacities with respect to this provision are only encouraged to elaborate an inventory QA/QC plan.

Question 7

The correct answer is A. Where indirect CO_2 emissions are reported by Parties, the aggregated national totals need to be presented with and without indirect CO_2 emissions.

Lesson 4: Common reporting tables

1. Introduction

This lesson introduces the CRTs, which, together with the NID, constitute a Party's GHG inventory submission.

The lesson consists of three key topics:

1. Introduction to CRTs
2. Overview of the CRTs
3. Use of CRT data

At the end of this lesson, you should be able to:

Understand the structure of the information presented in the CRTs, how it is reported and how it is organized.

Expected time needed to complete lesson 4:

- For readers with experience: 15–30 minutes
- For readers with less experience: 60 minutes.

2. Introduction to the common reporting tables (CRTs)

2.1. What are the CRTs?

The CRTs are a standardized set of reporting tables that all Parties must submit under the reporting requirements of the MPGs. Their development builds on the CRF tables used by Annex I Parties to report their annual GHG inventories in accordance with decision 24/CP.19.

If you have participated in the review of annual national GHG inventory submissions from Annex I Parties, or if you are from a developed country and have been engaged in the inventory preparation process for your country, you are probably already familiar with the basic structure of the tables.

The CRTs reflect the requirements of the 2006 IPCC Guidelines, as implemented by the MPGs.

TABLE 2(I) SECTORAL REPORT FOR INDUSTRIAL PROCESSES AND PRODUCT USE
(Sheet 1 of 1)

Year
Submission
Country

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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	HFCs [1]	PFCs [1]	Unspecified mix of HFCs and PFCs [1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_x	Total GHG emissions
	(kt)			CO_2 equivalent (kt) [2]			(kt)						CO_2 equivalents (kt) [2]
2. Total industrial processes													
2.A. Mineral industry													
2.A.1. Cement production													
2.A.2. Lime production													
2.A.3. Glass production													
2.A.4. Other process uses of carbonates													
2.B. Chemical industry													
2.B.1. Ammonia production													
2.B.2. Nitric acid production													
2.B.3. Adipic acid production													
2.B.4. Caprolactam, glyoxal and glyoxylic acid production													
2.B.5. Carbide production													
2.B.6. Titanium dioxide production													
2.B.7. Soda ash production													
2.B.8. Petrochemical and carbon black production													
2.B.9. Fluorochemical production													
2.B.10. Other *(as specified in tables 2(I).A-H and 2(II))*													
2.C. Metal industry													
2.C.1. Iron and steel production													
2.C.2. Ferroalloys production													
2.C.3. Aluminium production													
2.C.4. Magnesium production													
2.C.5. Lead production													
2.C.6. Zinc production													
2.C.7. Other *(as specified in tables 2(I).A-H and 2(II))*													
2.D. Non-energy products from fuels and solvent use [3]													
2.D.1. Lubricant use													
2.D.2. Paraffin wax use													
2.D.3. Other													
2.E. Electronics industry													
2.E.1. Integrated circuit or semiconductor													
2.E.2. TFT flat panel display													
2.E.3. Photovoltaics													
2.E.4. Heat transfer fluid													
2.E.5. Other *(as specified in table 2(II))*													
2.F. Product uses as substitutes for ODS													
2.F.1. Refrigeration and air conditioning													
2.F.2. Foam blowing agents													
2.F.3. Fire protection													
2.F.4. Aerosols													
2.F.5. Solvents													
2.F.6. Other applications													
2.G. Other product manufacture and use													
2.G.1. Electrical equipment													
2.G.2. SF_6 and PFCs from other product use													
2.G.3. N_2O from product uses													
2.G.4. Other													
2.H. Other (as specified in tables 2(I).A-H and 2(II)) [4]													

Some CRTs contain documentation boxes with background information and references to relevant sections of the NID.

Whereas the CRTs contain the reported figures, the NID should contain the full description of the methods, assumptions, data (e.g. AD, EFs), references and sources of information used to estimate emissions and removals.

Some tables also leave space for reporting memo items and data which, while relevant, are not to be added to emission and removal totals (e.g. international bunkers, CO_2 emissions from biomass combustion and indirect N_2O emissions from sectors other than agriculture and LULUCF).

The key characteristic of the CRTs is its commonality. The CRTs ensure the use of consistent categories and definitions by all Parties. Without them, it would be almost impossible to review the transparency, accuracy, consistency, completeness and comparability of Parties' emissions and removals, except at the national aggregated level.

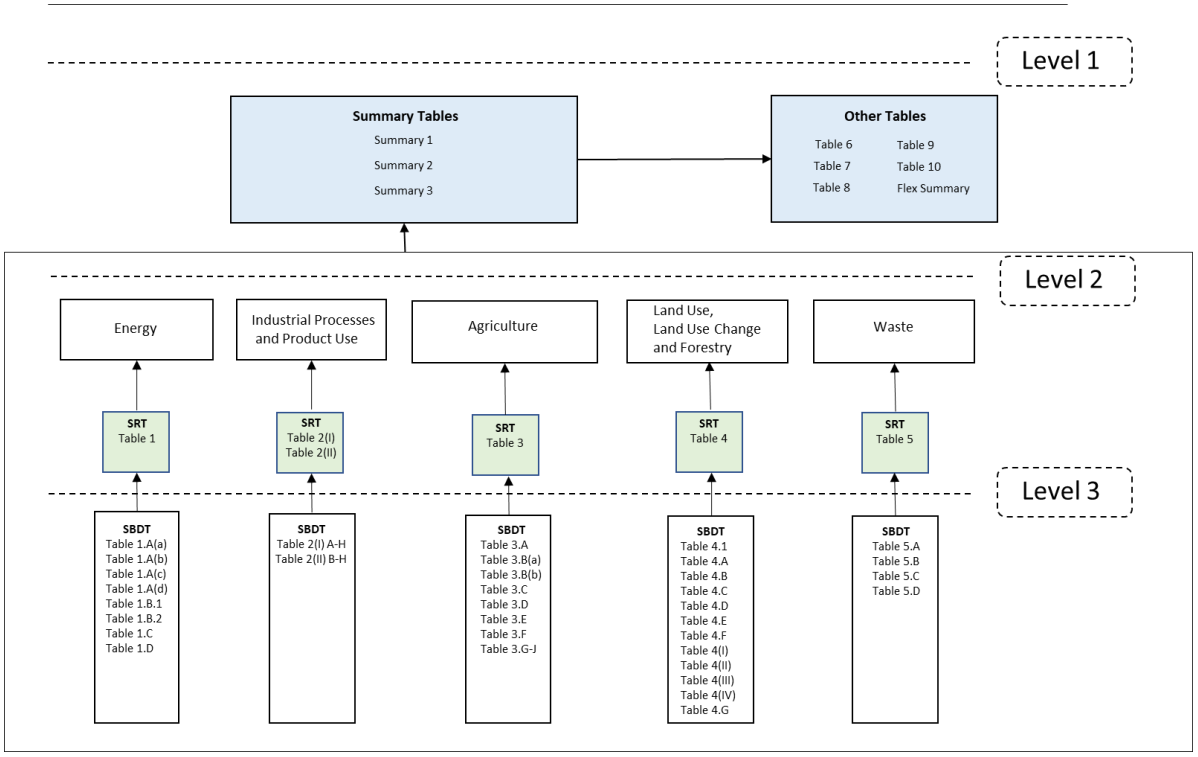
3. Overview of the CRTs

3.1. Structure of the CRTs

The CRTs contain data for all sectors and categories defined in the MPGs. The source and sink definitions are based on categorization in the 2006 IPCC Guidelines, with some modifications defined in the MPGs. Parties may also add country-specific categories to the CRTs.

The CRTs can be broadly split into three distinct levels of aggregation. Click on the thumbnail to enlarge it and study them.

Level 3 information (background data tables) is aggregated into sectoral reporting tables (level 2), which are then aggregated into national summary reports and cross-cutting information tables (level 1).



3.2. CRT reporting software

Parties prepare the CRTs using a reporting tool developed by the secretariat.

The secretariat initiated the development of the reporting tool for GHG inventories in 2022, following decision 5/CMA.3 (paras. 5–17). As a reviewer, you will not need to know the details of how the reporting software works. Rather you must understand how to read the final reporting tables generated by that software. This course focuses on understanding the generated reporting tables.

The secretariat will make further information on the reporting tool available in due course, and as relevant to complete your work as a reviewer.

3.3. The tables

The CRTs are composed of 49 separate tables (some of which span multiple spreadsheets because of their size). Each set of tables includes data for one inventory reporting year (except for table 10 on emission trends).

The CRTs are colour coded to help you to navigate the information. The general rule is:

- Coloured cells are automatically completed by the software when Parties submit their data;
- Grey shaded cells should not be filled as information is not expected to exist or be provided there;
- All unshaded cells must be filled by the Party. They should contain either data (i.e. figures) or one of the standard CRT notation keys. You will find out more about notation keys in lesson 7.

In addition, the secretariat will develop electronic tools to help to focus your review; you will not need to review every single spreadsheet. You will learn preliminary information about the review tools in lesson 9. More information will be provided by the secretariat prior to your participation in an actual review.

3.4. Level 3: sectoral background data tables

Tables can be categorized in three levels, level 1 are summary and cross-cutting tables, level 2 are sectoral reporting tables and level 3 are sectoral background tables. Let's start with looking at level 3 table.

Most of the data in the CRTs fall under level 3, that is, sectoral background data. The background data tables require detailed information on emissions, removals, AD and other relevant information at the category and subcategory level.

The summary tables as well as many of the cross-cutting tables, which contain higher-level information, are automatically completed by the reporting software tool based on the data provided in the background data tables (level 3).

Most of the data in the sectoral background tables are filled in by the inventory compiler. The exceptions are the cells in which emissions are summed at the category level, along with IEFs or implied carbon stock change factors. These are automatically calculated by the CRT software.

The figure below contains an example of a sectoral background table, namely table 2(I).A-H, "Sectoral background data for industrial processes and product use".

TABLE 2(I).A-H SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES AND PRODUCT USE
Emissions of CO_2, CH_4 and N_2O
(Sheet 1 of 1)

Year
Submission
Country

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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA		IMPLIED EMISSION FACTORS			EMISSIONS			Recovery/Capture			
	Production/Consumption quantity		CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	CO_2 fuel	CO_2 ippp	CH_4	N_2O
	Description	(kt)	(t/t)			(kt)			(kt)			
2.A. Mineral industry												
2.A.1. Cement production	(e.g. cement or clinker production)											
2.A.2. Lime production												
2.A.3. Glass production												
2.A.4. Other process uses of carbonates												
2.A.4.a. Ceramics												
2.A.4.b. Other uses of soda ash												
2.A.4.c. Non-metallurgical magnesium production												
2.A.4.d. Other												
2.B. Chemical industry												
2.B.1. Ammonia production												
2.B.2. Nitric acid production												
2.B.3. Adipic acid production												
2.B.4. Caprolactam, glyoxal and glyoxylic acid production												
2.B.4.a. Caprolactam												
2.B.4.b. Glyoxal												
2.B.4.c. Glyoxylic acid												
2.B.5. Carbide production												
2.B.5.a. Silicon carbide												
2.B.5.b. Calcium carbide												
2.B.6. Titanium dioxide production												
2.B.7. Soda ash production												
2.B.8. Petrochemical and carbon black production												
2.B.8.a. Methanol												
2.B.8.b. Ethylene												
2.B.8.c. Ethylene dichloride and vinyl chloride monomer												
2.B.8.d. Ethylene oxide												
2.B.8.e. Acrylonitrile												
2.B.8.f. Carbon black												
2.B.8.g. Other												
Drop-down list:												
2.B.8.g.i. Styrene												
2.B.8.g.ii. Other (*please specify*)												
2.B.10. Other												
Drop-down list:												
2.B.10.a. Hydrogen production												
2.B.10.b. Other (*please specify*)												
2.C. Metal industry												
2.C.1. Iron and steel production												
2.C.1.a. Steel												
2.C.1.b. Pig iron												
2.C.1.c. Direct reduced iron												
2.C.1.d. Sinter												
2.C.1.e. Pellet												
2.C.1.f. Other (*please specify*)												
2.C.2. Ferroalloys production												
2.C.3. Aluminium production												
2.C.4. Magnesium production												
2.C.5. Lead production												
2.C.6. Zinc production												
2.C.7. Other												
Drop-down list:												
2.C.7.a. Rare earths production												
2.C.7.b Other (*please specify*)												
2.D. Non-energy products from fuels and solvent use												
2.D.1. Lubricant use												
2.D.2. Paraffin wax use												
2.D.3. Other (*please specify*)												
Drop-down list:												
2.D.3.a. Solvent use												
2.D.3.b. Road paving with asphalt												
2.D.3.c. Asphalt roofing												
2.D.3.d. Other (*please specify*)												
2.E. Electronics industry												
2.E.1. Integrated circuit or semiconductor												
2.E.2. TFT flat panel display												
2.E.3. Other (*please specify - one row per substance*)												
2.G. Other product manufacture and use												
2.G.3. N_2O from product uses												
2.G.3.a. Medical applications												
2.G.3.b. Other												
Drop-down list:												
2.G.3.b.i. Propellant for pressure and aerosol products												
2.G.3.b.ii. Other (*please specify*)												
2.G.4. Other												
2.H. Other (*please specify*)												
Drop-down list:												
2.H.1. Pulp and paper												
2.H.2. Food and beverages industry												
2.H.3. Other (*please specify*)												

3.5. Level 2: sectoral reporting tables

Level 2 CRTs essentially aggregate the data from the sectoral background data tables at the sectoral level. There is, therefore, one level 2 table for each sector. These tables serve as a summary of the Party's emissions if you are focusing on one sector during your review.

Note: emissions are reported in the sectoral reporting tables on both a molecular mass basis (kt) and a total CO_2 eq basis.

A table for sectoral reporting for energy is shown below.

TABLE 1 SECTORAL REPORT FOR ENERGY
(Sheet 1 of 1)

Year
Submission
Country

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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	NO_x	CO	NMVOC	SO_x	Total GHG emissions
	(kt)							CO_2 equivalents (kt)[1]
Total Energy								
1.A. Fuel combustion activities (sectoral approach)								
1.A.1. Energy industries								
1.A.1.a. Public electricity and heat production								
1.A.1.b. Petroleum refining								
1.A.1.c. Manufacture of solid fuels and other energy industries								
1.A.2. Manufacturing industries and construction								
1.A.2.a. Iron and steel								
1.A.2.b. Non-ferrous metals								
1.A.2.c. Chemicals								
1.A.2.d. Pulp, paper and print								
1.A.2.e. Food processing, beverages and tobacco								
1.A.2.f. Non-metallic minerals								
1.A.2.g. Other *(please specify)*								
1.A.3. Transport								
1.A.3.a. Domestic aviation								
1.A.3.b. Road transportation								
1.A.3.c. Railways								
1.A.3.d. Domestic navigation								
1.A.3.e. Other transportation								
1.A.4. Other sectors								
1.A.4.a. Commercial/institutional								
1.A.4.b. Residential								
1.A.4.c. Agriculture/forestry/fishing								
1.A.5. Other *(as specified in table 1.A(a) sheet 4)*								
1.A.5.a. Stationary								
1.A.5.b. Mobile								
1.B. Fugitive emissions from fuels								
1.B.1. Solid fuels								
1.B.1.a. Coal mining and handling								
1.B.1.b. Fuel transformation								
1.B.1.c. Other *(as specified in table 1.B.1)*								
1.B.2. Oil and natural gas and other emissions from energy production								
1.B.2.a. Oil								
1.B.2.b. Natural gas								
1.B.2.c. Venting and flaring								
1.B.2.d. Other *(as specified in table 1.B.2)*								
1.C. CO_2 Transport and storage								
1.C.1. Transport of CO_2								
1.C.2. Injection and storage								
1.C.3. Other								
1.D. Memo items:[2]								
1.D.1. International bunkers								
1.D.1.a. Aviation								
1.D.1.b.Navigation								
1.D.2. Multilateral operations								
1.D.3. CO_2 emissions from biomass								
1.D.4. CO_2 captured								
1.D.4.a. For domestic storage								
1.D.4.b. For storage in other countries								

3.6. Level 1: summary and cross-cutting tables

Level 1 CRTs cover a wide range of summary and cross-cutting information, including:

- Summary 1: summary report of total emissions by sector and category on a molecular mass basis (CO_2, CH_4 and N_2O) and a CO_2 eq basis (fluorinated gases, indirect emissions and total emissions);
- Summary 2: summary report for CO_2 eq emissions;

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Year
Submission
Country

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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	Unspecified mix of HFCs and PFCs	SF_6	NF_3	Total
	CO_2 equivalents (kt) [2]								
Total (net emissions) [3]									
1. Energy									
1.A. Fuel combustion									
1.A.1. Energy industries									
1.A.2. Manufacturing industries and construction									
1.A.3. Transport									
1.A.4. Other sectors									
1.A.5. Other									
1.B. Fugitive emissions from fuels									
1.B.1. Solid fuels									
1.B.2. Oil and natural gas and other emissions from energy production									
1.C. CO_2 transport and storage									
2. Industrial processes and product use									
2.A. Mineral industry									
2.B. Chemical industry									
2.C. Metal industry									
2.D. Non-energy products from fuels and solvent use									
2.E. Electronic Industry									
2.F. Product uses as ODS substitutes									
2.G. Other product manufacture and use									
2.H. Other									
3. Agriculture									
3.A. Enteric fermentation									
3.B. Manure management									
3.C. Rice cultivation									
3.D. Agricultural soils									
3.E. Prescribed burning of savannahs									
3.F. Field burning of agricultural residues									
3.G. Liming									
3.H. Urea application									
3.I. Other carbon-containing fertilizers									
3.J. Other									
4. Land use, land-use change and forestry [1]									
4.A. Forest land									
4.B. Cropland									
4.C. Grassland									
4.D. Wetlands									
4.E. Settlements									
4.F. Other land									
4.G. Harvested wood products									
4.H. Other									
5. Waste									
5.A. Solid waste disposal									
5.B. Biological treatment of solid waste									
5.C. Incineration and open burning of waste									
5.D. Waste water treatment and discharge									
5.E. Other									
6. Other *(as specified in summary 1)*									

Memo items: [3]									
1.D.1. International bunkers									
1.D.1.a. Aviation									
1.D.1.b. Navigation									
1.D.2. Multilateral operations									
1.D.3. CO_2 emissions from biomass									
1.D.4. CO_2 captured									
5.F.1. Long-term storage of C in waste disposal sites									
Indirect N_2O									

Indirect CO_2 [4]									

Total CO_2 equivalent emissions without LULUCF	
Total CO_2 equivalent emissions with LULUCF	
Total CO_2 equivalent emissions, including indirect CO_2, without LULUCF	
Total CO_2 equivalent emissions, including indirect CO_2, with LULUCF	

- Summary 3: summary report for methods and EFs that the Party used for its estimates (e.g. IPCC tier 1 or tier 2 methods);

- Other summary and cross-cutting tables, as follows:
  - Table 6: indirect emissions of N_2O and CO_2;
  - Table 7: key categories;
  - Table 8: recalculations in the Party's inventory relative to its previous submission;
  - Table 9: categories or subcategories that were not estimated, including the reasons, or reported elsewhere, including a reference to where the emissions were reported. This table is useful for checking the completeness of source and sink coverage;
  - Table 10: summary of emission trends over the entire time series (e.g. 1990–2022).

3.7. Displaying data in the CRTs

The CRTs displayed so far in this lesson are the common tables agreed for use through decision 5/CMA.3. As discussed in lesson 2, developing country Parties that need flexibility in the light of their capacities may collapse relevant row(s), column(s) and/or table(s) in cases where they have applied flexibility (e.g. if they do not have the capacity to report on HFCs, PFCs, SF_6 or NF_3). The Party should explain in any corresponding documentation boxes their application of flexibility.

As a reviewer, you will have the ability to expand these tables to review the information in all cells.

Read carefully paragraph 5 of decision 5/CMA.3:

> 5. *Decides* that those developing country Parties that need flexibility in the light of their capacities may, when reporting on a provision for which they have a capacity constraint, choose one or more of the following options, as applicable, to reflect the application of the specific flexibility provisions included in the annex to decision 18/CMA.1 in the common reporting tables and common tabular formats, as contained in annexes I and II, respectively:
>
> (a) Use the new notation key "FX" (flexibility) in the relevant common reporting tables or common tabular formats, providing an explanation of how the specific flexibility provision has been applied in the corresponding documentation box;
>
> (b) Collapse relevant row(s) or column(s) where "FX" is reported in each cell in the row or column and expand them again for display purposes, providing an explanation of how the specific flexibility provision has been applied in the corresponding documentation box;
>
> (c) Collapse tables related to the four additional gases included in decision 18/CMA1, annex, paragraph 48, where "FX" is reported in each cell in the row or column and expand it again for display purposes, providing an explanation of how the specific flexibility provision has been applied in the corresponding documentation box; indicate the first year and last year of the inventory time series, consistent with decision 18/CMA.1, annex, paragraphs 57–58, and generate columns and tables consistent with this selection, providing an explanation of how the specific flexibility provision has been applied in the corresponding documentation boxes; and indicate the thresholds selected, consistent with decision 18/CMA.1, annex, paragraphs 25 and 32, providing an explanation of how the specific flexibility provision has been applied in the corresponding documentation box;

4. Use of common reporting table data

4.1. Making GHG inventory data publicly available in a common format

← *MPG, para. 15*

The information that Parties provide to the secretariat in their CRT submissions is the foundation for many of the tools used in the review process. CRT data from all Parties are processed by the secretariat and imported into its data warehouse. The data warehouse is then used by the secretariat to generate a variety of reports and review tools.

The data warehouse is also used as an input for other tools, including public data on the UNFCCC website accessed through a data interface and other tools to conduct specific queries. The Locator tool was developed to support such queries for the review of Annex I Parties' submissions. The Locator tool was a user-friendly search engine that helped experts to locate specific data in the CRF tables, especially to enable comparisons across Parties. Similar tools will be developed to support the review of the CRTs under the enhanced transparency framework. These tools are covered in lesson 9.

4.2. Analysing Parties' reported GHG data

As the compilation of GHG emissions and removals for each gas and category in each year of the time series, the CRTs allows you as a reviewer to review the transparency, accuracy, consistency, completeness and comparability of information reported by the Party. The CRTs provides a comparable format for reporting emissions and removals so you can quickly identify the key contributors to emissions, analyse and evaluate trends over time, and compare the emissions and removals reported across Parties.

This general guidance and cross-cutting course provides an overview of the CRTs. You will learn more about how to use the CRTs to review emissions and removals reported for an individual sector (energy, IPPU, agriculture, LULUCF or waste) in the sector-level course(s) you engage with. As a generalist, the key tables you may be interested in are the summary and cross-cutting tables (including key category analysis, recalculations, completeness and trends).

For those countries that have a GHG emissions or removals target as part of their NDC, the CRTs provide reported emissions and removals information in a concise manner that will help you and your colleagues in the TERT to assess the Party's reporting on tracking of progress made in implementing and achieving the NDC.

5. Lesson Summary

- The CRTs submitted by Parties are essential material for the review, together with the NID.
- The CRT essentially contains the emissions and removals estimates and other essential numeric data used in the calculations, whereas the NID describes how those emissions and removals estimates were obtained.
- The CRTs show emission and removal data, information on the underlying AD, recalculations since the last submission, results of the key category analysis and emission trends for all years in the time series.
- In the CRTs, unshaded cells show data completed by Parties; in the grey shaded cells information is not expected to exist or be provided; and coloured shaded cells are automatically completed by the software when Parties submit their data.
- In the CRTs, unshaded cells should be completed with either data (i.e. numbers) or notation keys to meet the completeness requirement.
- You should spend sufficient time reading the information reported in the NID and in CRTs, including documentation boxes, when you start the review.
- The CRTs can be split into three distinct levels of aggregation: sectoral background data tables (level 3), more detailed information aggregated into sectoral reporting tables (level 2) and summary and cross-cutting tables (level 1).

6. Self-check quiz

You are now invited to take a self-check quiz to test your understanding of CRTs and see if you need to review the subject before moving on to the next lesson

For each question, select your answer and then click "submit" to see the correct answer.

Question 1

For each scenario, indicate whether you would find this in a sectoral background table, a sectoral report table or a summary and cross-cutting table.

A. This type of table contains information on all sectors:
_____
B. This type of table provides you an overview of the emissions for the sector:
_____
C. In this type of table you will find the CH_4 IEF for manure management:
_____
D. Here you will find which tier a Party used to estimate CH_4 emissions from manure management: _____
E. The key category analysis table is an example of a:
_____
F. The Party directly inputs data into these tables:
_____
G. This type of table will provide the underlying AD that are generally, but not always, used by Parties to estimate emissions:
_____

Question 2

Where in the CRTs might you find additional explanations by the Party or references to the NID?

Select one:

A. Annexes to the CRTs
B. Background tables
C. Documentation boxes
D. Flex summary tables
E. Level 1 sectoral tables

Question 3

Parties may leave cells blank or report zero in cases where a category does not exist in the country.

Select one:

A. True
B. False

Question 4

Imagine you are the generalist in the TERT and have been asked to review the Party's reporting in CRT 7. Please answer the following questions set out below.

TABLE 7 SUMMARY OVERVIEW FOR KEY CATEGORIES Year
(Sheet 1 of 1) Submission
Back to Index Country
Threshold used in identifying key categories[1]: 90%

KEY CATEGORIES OF EMISSIONS AND REMOVALS[2]	Gas	Criteria used for key source identification		Key category excluding LULUCF	Key category including LULUCF
		L	T		
1.B.2.c Fugitive Emissions from Fuels - Venting and flaring	N_2O				
1.B.2.d Fugitive Emissions from Fuels - Other	CO_2				
1.B.2.d Fugitive Emissions from Fuels - Other	CH_4				
1.B.2.d Fugitive Emissions from Fuels - Other	N_2O				
1.C CO_2 Transport and Storage	CO_2				
1. Energy (indirect CO_2 emissions)	CO_2				
2.A.1 Cement Production	CO_2	X	X	X	X
2.A.2 Lime Production	CO_2				
2.A.3 Glass Production	CO_2				
2.A.4 Other Process Uses of Carbonates	CO_2				
2.B.1 Ammonia Production	CO_2				
2.B.1 Ammonia Production	CH_4				
2.B.1 Ammonia Production	N_2O				
2.B.2 Nitric Acid Production	N_2O				
2.B.3 Adipic Acid Production	CO_2				
2.B.3 Adipic Acid Production	N_2O				
2.B.4 Caprolactam, Glyoxal and Glyoxylic Acid Production	CO_2				
2.B.4 Caprolactam, Glyoxal and Glyoxylic Acid Production	N_2O				
2.B.5 Carbide Production	CO_2				
2.B.5 Carbide Production	CH_4				
2.B.6 Titanium Dioxide Production	CO_2				
2.B.7 Soda Ash Production	CO_2				
2.B.8 Petrochemical and Carbon Black Production	CO_2				
2.B.8 Petrochemical and Carbon Black Production	CH_4				
2.B.9 Fluorochemical Production	Aggregate F-gases				
2.B.10 Other	CO_2				
2.B.10 Other	CH_4				
2.B.10 Other	N_2O	X	X	X	X
2.B.10 Other	Aggregate F-gases				
2.C.1 Iron and Steel Production	CO_2				
2.C.1 Iron and Steel Production	CH_4				
2.C.2 Ferroalloys Production	CO_2				
2.C.2 Ferroalloys Production	CH_4				
2.C.3 Aluminium Production	CO_2		X	X	X
2.C.3 Aluminium Production	PFCs		X	X	X
2.C.3 Aluminium Production	SF_6				
2.C.4 Magnesium Production	CO_2				
2.C.4 Magnesium Production	HFCs				

4.1. Should the Party be applying a higher-tier method for SF_6 emissions from aluminium production?

Select one:

A. Yes
B. No

4.2. Is cement production a key category?

Select one:

A. Yes
B. No

4.3. The Party has reported in summary table 3 that it applied a tier 1 method for CO_2 emissions from gaseous fuels in category 1.A.4 other. As a reviewer, what question might you ask the Party?

4.4. In response to the question from the TERT, the Party explained that it did not have country-specific values to prepare a higher-tier estimate. Would you include a finding in the TERR?

Select one:

A. Yes
B. No

6.1. Answers to self-check quiz

Question 1

A. Summary and cross-cutting table
B. Sectoral report table
C. Sectoral background table
D. Summary and cross-cutting table
E. Summary and cross-cutting table
F. Sectoral background table
G. Sectoral background table

Question 2

The correct answer is C, documentation boxes.

Question 3

The correct answer is B. Each Party shall use notation keys where numerical data are not available when completing the CRTs, indicating the reasons why emissions from sources and removals by sinks and associated data for specific sectors, categories and subcategories or gases are not reported. If a category does not exist in a country, the Party should report "NO".

Question 4

4.1

The correct answer is B. The Party does not need to apply a higher-tier method for SF_6 emissions, as this is not a key category. According to CRT 7, only CO_2 and PFC emissions from aluminium production are key categories.

4.2

The correct answer is A, CO_2 emissions from cement production in a key category for both level and trend.

4.3

Possible answer: The ERT has identified in summary table 3, and as confirmed in the NID (p.X) that Party X applies a tier 1 method for CO_2 emissions from gaseous fuels in category 1.A.4 other sectors. However, this is a key category. No information is provided in the NID regarding why a tier 1 method has been chosen or if there are any plans to move to use of a higher-tier method. Can you please comment on this observation?)

4.4)

The correct answer is A. According to the MPGs (paras. 20–23) Parties should make every effort to use a recommended method (tier) for key categories. If the Party cannot use a higher tier, they must clearly document why they have not used a recommended method. As this is a key category, you would expect the Party to have used a higher-tier method. In the report, you would encourage them to use a higher-tier method (encourage because the Party "should make every effort") and recommend that the Party document the reason for the choice of methodology in the NID (recommend because the documentation is a 'shall' requirement).

Lesson 5: National inventory document

1. Introduction

As part of their BTRs, Parties' GHG inventory submissions consist of an NID and CRTs.

The CRTs and the NID are complementary. You learned about the CRTs in lesson 4. Lesson 5 takes a closer look at the NID.

While the CRTs present all the quantitative information on emissions and removals in a common format, the NID contains comprehensive and detailed information on how emissions and removals were estimated.

The NID can be submitted as part of the BTR or as a stand-alone report.

To ensure comparability and ease of understanding, the NID should follow the common outline and structure that is provided in annex V to decision 5/CMA.3. In accordance with paragraph 2 of that decision, Parties are encouraged to prepare their NID in accordance with the outline.

Note that that the NID can be submitted in any one of the six official languages of the United Nations: Arabic, Chinese, English, French, Russian and Spanish.

The outline and general structure of the NID can be downloaded click here

The lesson consists of two key topics:

1. General requirements
2. Content of the NID

At the end of this lesson, you should be able to:

- Understand the relationship between the NID and the CRTs and how they are used together as the primary materials during the review;
- Recognize the basic elements of the NID outline, which is encouraged for use by Parties, and the general requirements for including information in the NID;
- Be able to locate relevant information in the NID to support your review of a Party's submission.

Expected time needed to complete lesson 5:

- For readers with experience: 15-30 minutes
- For readers with less experience: 60 minutes.

2. General requirements of the national inventory document (NID)

The purpose of the NID is to provide the underlying information necessary for an external person to understand the contents of a Party's GHG inventory (whether a reviewer, a policymaker in the country or the general public). This descriptive information, which may be both qualitative and quantitative in nature, is complementary to the detailed numerical data that are provided in the CRTs.

The information in the NID should be transparent and sufficiently detailed to enable the inventory to be reviewed. As noted in the introduction, annex V to decision 5/CMA.3 provides the outline that Parties are encouraged to use when preparing their NIDs. This outline provides a good overview of the type of information that is to be included in the NID; however, as a reviewer, you must remember that the use of this outline is not mandatory. Your job in the TERT is to consider whether the Party has fulfilled the mandatory requirements for reporting in the NID, consider the extent to which they have provided elements in the NID that are encouraged, but not required, and finally the extent to which the information provided meets the inventory TACCC principles.

2.1. NID outline

The types of information included in each chapter of the NID are presented below.

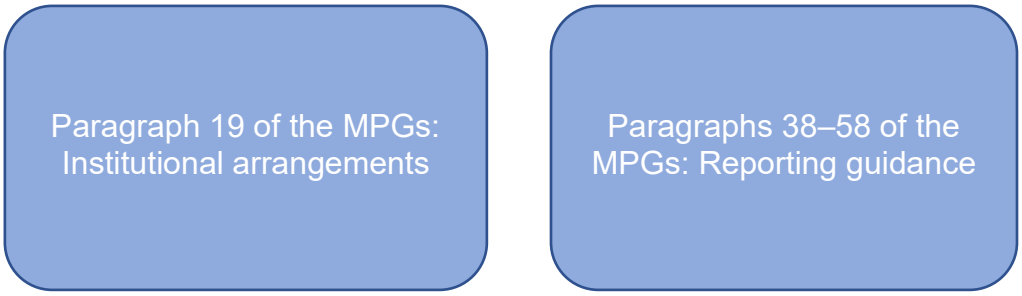
Executive summary	This section includes an overall summary of the national emissions and removals and trends, the key categories in the country, national circumstances affecting emissions and key improvements.
Chapter 1	This section includes a discussion on major drivers of climate in the country (e.g. weather, economy), the processes established to prepare the GHG inventory and an overview of cross-cutting information (e.g. methodological tiers used, key categories, QA/QC processes and plan, overview of uncertainty assessment, general assessment of completeness and the metrics used). This section also includes a summary of flexibilities applied.
Chapter 2	This section provides an overview of GHG emissions and removals by total national level, by sector and by gas.
Chapter 3	This section presents a disaggregated outline to be used for the energy sector only. Parties may elect to use the same less detailed outline used for the other sectors (presented in chaps. 4–7 of the NID). The more detailed outline includes an overview of the sector, and then separate detailed descriptions for fuel combustion, fugitive emissions and CO_2 transport and storage. For each of these three broad categories the outline includes a description of the category, methodological issues, description of flexibility, uncertainty assessment, category-specific QA/QC, recalculations and planned improvements. In addition, there is a section on the reference approach, international bunkers and feedstocks.

Chapter 4 to 7	For each sector, the same general outline applies, covering, for each category, a description of the category, methodological issues, description of any flexibility applied, uncertainty assessment, category-specific QA/QC, recalculations and planned improvements. In practice, Parties may include this discussion at different levels of aggregation, depending on the approach, methods used and institutional arrangements in the country. For example, some Parties may include a section on mineral industry, covering each of the elements listed here above, while others (often larger countries) may report this information separately for cement, lime and glass production.
Chapter 8	This section is not elaborated in the outline and few countries report emissions/removals here. One might expect that, if reported, this section would be organized in a similar, but likely less detailed manner than chapters 3–7 of the NID.
Chapter 9	This section includes a description of the indirect emissions considered in the inventory, including methodological issues, uncertainty assessment, QA/QC, recalculations and planned improvements.
Chapter 10	This section explains the overall impact of the recalculations in the inventory, including those made in response to the review process. The discussion could look at reasons for the recalculations, the quantitative impact on trends, and planned areas of improvements in response to the review process and in areas where flexibility has been applied.
Annex 1	This section would highlight the country's key category analysis, including the approach used, the level of disaggregation and the results.
Annex 2	This section would highlight the country's uncertainty analysis, including the methodology used and the results.
Annex 3	This section would highlight the country's reference approach, including inputs and how the results compare with emission estimates calculated using the sectoral approach.
Annex 4	This section could contain the QA/QC plan developed by the Party. Remember that developing countries that need flexibility in light of their capacities with respect to the provision on elaboration of a QA/QC plan are encouraged but not required to provide such a plan.
Annex 5	This section provides space for the inclusion of any additional information, as applicable, including detailed methodological description of categories and the national energy balance.
Annex 6	Some Parties attach their CRTs to the NID submission or provide a link to the CRTs, but this is not necessary. The CRTs will also be available on the UNFCCC website.

3. Content of the national inventory document

3.1. NID requirements

You have learned that the outline is not mandatory but encouraged for use by Parties. As a reviewer, what you must do is to check the Party's reporting in the NID against the 'should' and 'shall' requirements contained in decision 18/CMA.1. The primary sections of the MPGs that are relevant are shown in the figure below.



Consult the MPGs and go to the indicated sections (paras. 19 and 38–58) to read what 'should' and 'shall' be reported.

Consider that the decision is not always explicit as to what is to be reported in the NID, versus what is to be reported in the CRTs. The most important task as a reviewer is to determine that the information is reported, and is reported in a manner that is transparent, accurate, consistent, comparable and complete. You should also check if the information reported in the NID and in the CRT are consistent.

3.2. Reporting methodologies

Methodologies used to estimate emissions and removals of GHGs from all sources and sinks must be transparently documented in the NID, including the rationale for their selection.

A clear reference to the methods used must be provided in the NID, although the description of the methodologies contained in the 2006 IPCC Guidelines need not be duplicated.

The reporting of transparent information on the higher-tier methods and models used is particularly important, and assumptions must be transparently described, along with sources of data used and all assumptions made. The rationale for the selection of EFs and AD must be included.

Where the Parties use country-specific methodologies that they consider better able to reflect their national situation, they must show that these are compatible with the 2006 IPCC Guidelines and are well documented and scientifically based.

3.3. Reporting cross-cutting issues

In addition to the information on how emissions and removals are estimated, the MPGs require Parties to report the following in the NID:

- A description of the key categories, including information on the approach used for their identification and the level of disaggregation used;
- An assessment of the completeness of the inventory, including the reasons for lack of completeness and information on any methodological or data gaps;
- Results of the uncertainty analysis, including Information on methods used and underlying assumptions;
- Information on the recalculations performed since the previous submission, including explanatory information and justifications for recalculations and indication of impact on emission trends;
- Information on changes in response to the review process.

The NID should also include information on the national inventory arrangements and functions (lesson 8 covers the requirements for national inventory arrangements).

Remember that several of the elements mentioned above include a provision for flexibility for those developing country Parties that need it in the light of their capacities. Whenever a Party applies a flexibility provision described in the MPGs, they must (1) document the provision to which flexibility was applied; (2) concisely clarify the capacity constraints; and (3) provide a self-determined time frame for improvement in relation to those constraints.

The MPGs do not necessarily indicate that this information must be in the NID. Information on the Party's use of flexibility could be:

1. In the NID, either in a separate section or integrated into the relevant chapters of the NID;
2. Included in the BTR in a separate section (e.g. chapter VII as contained in the BTR outline);
3. In the "flex summary" table of the CRT.

4. Lesson Summary

- The NID submitted by Parties is essential material for the review, together with the CRTs.
- The NID contains the necessary descriptions of the methods, data sources, assumptions and references to understand the derivation of the GHG emissions and removals included in the CRTs.
- The NID will be a key resource for you to assess the principles of transparency, accuracy, completeness, consistency and comparability, with transparency being particularly relevant.
- Parties are not required to follow a particular outline, but may find it helpful to follow the outline contained in annex V to decision 5/CMA.3.
- As a reviewer, your task is to consider which elements Parties 'should' and 'shall' report on, in accordance with the MPGs, and then assess the TACCC of what they have reported.

Lesson 6: Review process overview

1. Introduction

This lesson explains the GHG inventory review process. You will learn how to conduct an inventory review as a member of a TERT. Practical examples and exercises are included to help you better understand each topic.

Important supporting documents for this lesson are the MPGs, in particular chapter VII, which establishes the overall approach for the technical expert review of GHG inventories. You may like to refresh your memory of the basic documents described in the introduction to this course (lesson 1).

The lesson consists of three key topics:

1. Types of review and role and composition of TERTs
2. Overall approach to review applied to GHG inventories
3. Review steps

At the end of this lesson, you should be able to:

- Describe the overall approach to reviewing a GHG inventory:
- Identify your key tasks as a member of the TERT before, during and after the review week.

Expected time needed to complete lesson 6:

- For readers with experienced: 15–30 minutes
- For readers with less experienced: 60 minutes.

1.1. Objectives of the review

The review of GHG inventories is part of the technical expert review of the BTRs submitted by Parties. Its objectives are:

- To review the consistency of the information included by Parties in the national inventory report with the MPGs, taking into account the flexibility accorded to the developing country Parties that need it in the light of their capacities;
- To identify areas of improvement to assist Parties in improving their reporting of information in GHG inventories;
- To assist developing country Parties that need it in the light of their capacities in identifying capacity-building needs.

2. Types of review and role and composition of technical expert review teams

2.1. Types of review

In lesson 3 of the BTR overview course, you learned about the four different types of review, including for the review of GHG inventories: centralized, in-country, desk and simplified reviews. You also learned about the roles of the various actors, the TERT, the secretariat and the lead reviewers.

Next there are a few exercises to refresh your knowledge on what you learned in the BTR overview course.

2.2. Practice exercises

Exercise 1

Please match the type of review with its description.[7]

A - The most intensive approach to a review, when the TERT have the possibility to interact personally with the Party's inventory experts.	**Simplified review**
B - When the TERT conducts the review from a single location and communicates with the Party's experts by exchanging questions and answers in an inventory virtual team room.	**Centralized review**
C -The type of review that is conducted when a national inventory report is submitted by a Party in a year in which a BTR is not due.	**In-country review**
D - When members of a TERT conduct the review remotely from their respective countries.	**Desk review**

[7] The correct answer is: A = in-country review; B = centralized review; C = simplified review; D = desk review.

Exercise 2

Depending on the type of review, your engagement with the TERT and the Party may differ. Please complete the following sentences.[8]

A - In a/an _____ or a/an _____I may be asked to review more than one Party so it is particularly important that I am well prepared for the review.	**Simplified review**
B - A/an _____ provides me with a great opportunity to really learn the national circumstances of the Party under review. I will have a good opportunity to examine institutional arrangements for inventory development and management, including QA/QC, record-keeping and documentation procedures.	**Centralized review**
C - I would not personally take part in conducting a/an _____but may have to consider findings from such a review report.	**In-country review**
D - In a/an _____ I do not have the chance to sit next to the TERT members or speak directly with the Party. All communications are electronic.	**Desk review**

[8] The correct answer is: A = desk review, centralized review (answer may be provided in either order); B = in-country review; C -=simplified review; D = desk review.

2.3. Role of the TERT

Except for the simplified review approach all technical expert reviews are performed by a TERT.

Lesson 3 of the BTR overview course described the role and composition of the TERT for the BTR. Importantly, for the review of the GHG inventory, each TERT comprises experts assigned to cover the following areas:

- General and cross-cutting inventory elements;
- Energy;
- IPPU;
- Agriculture;
- LULUCF;
- Waste.

Depending on the format of the review, the size of the TERT can vary from one to two or more experts per area.

You will learn more in the subsequent courses on the specific activities you will carry out as a reviewer of the GHG inventory for each of these areas. As part of the larger TERT reviewing the BTR, you may also be asked to provide your technical advice to other TERT members on other areas of the review; for example, related to the review of GHG projections of the Party, tracking progress made in implementing and achieving the NDCs, Article 6 activities or other reporting on LULUCF (e.g. REDD+).

If you are a non-experience reviewer, you may require a little more time to prepare for the review, but the secretariat, experienced reviewers and lead reviewers will be there to guide and support the TERT. By continuing to participate in reviews, you will become more experienced and more familiar with the MPGs and the 2006 IPCC Guidelines and collectively help colleagues from other Party's in improving their reporting.

3. Overall approach to reviewing GHG inventories

3.1. Overall approach

The scope of a technical expert review applied to GHG inventories that is performed by a TERT is the same regardless of its format (desk, centralized or in-country).

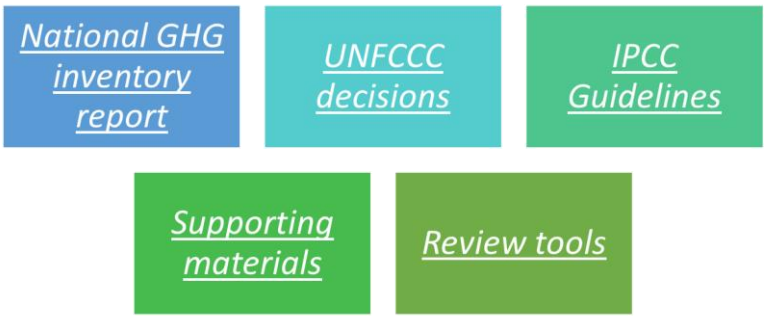
The work of the TERT can be logically divided into three phases: prepare, assess and draft. Different elements of the preparation, assessment and drafting may happen before, during and/or after the review week.

The figure below shows the tasks to be performed in each of the phases.

	Prepare	Assess	Draft
Before review week	• Refresh knowledge of 2006 IPCC Guidelines, latest decisions and LR conclusions • Read submission (CRT and NID) • Identify previous recommendations and encouragements • Familiarize self with latest review tools	• Evaluate whether Party addressed findings contained in previous review report • Detailed analysis of submission against TACCC principles, including AD, EF and parameters, beginning with key categories and using review tools to facilitate work • Assess institutional arrangements for sector • Assess other cross-cutting issues (QA/QC, uncertainty, time-series consistency, recalculations, planned improvements) • If relevant, identify possible capacity building needs • Discuss questions and issues with expert team, as needed	• Draft preliminary questions, and follow up questions as necessary • Begin drafting review report based on findings
During review week	• All preparations should be done prior to the review week		• Finalize questions to Party early in week • Draft assessment of implementation of previous recommendations • Draft new recommendations/ encouragements, as appropriate • Fully complete first draft of your report, responding to comments from team • If relevant, consult with Party to draft capacity building needs
After review week			• Finalize draft report • Respond to UNFCCC and Party comments

3.2. Prepare

In preparing for the review, you should examine all documents that are available to inform your assessments. It is essential that you are well prepared prior to the review week.



National GHG inventory report	As part of its BTR each Party to the Paris Agreement shall submit a national inventory report consisting of a NID and a set of CRTs, which are reviewed by the TERT. The contents of these documents are described in lessons 5 and 4, respectively.
UNFCCC decisions	• MPGs (decision 18/CMA.1): the legal framework for your assessment is established in the MPGs, in particular its chapter II. • Decision 5/CMA.3: this decision provides further guidance and clarification on the reporting requirements, including related to flexibility, the agreed CRTs for GHG inventory reporting and the reporting outlines for the BTR and the NID that Parties are encouraged to use.
IPCC guidelines	With respect to methodologies, parameters and data, the MPGs establish that Parties shall use the 2006 IPCC Guidelines and any subsequent version or refinement of these guidelines agreed upon by the CMA. Parties are also encouraged to use the Wetlands Supplement. Parties may use the 2019 Refinement to the 2006 IPCC Guidelines on a voluntary basis. The MPGs establish that the definitions of the GHG inventory principles used shall be as provided in the 2006 IPCC Guidelines, volume 1, chapter 1, section 1.4.
Supporting materials	• TERRs of previous BTRs submitted by Parties. As the review process is cumulative, previous BTRs are particularly important because they highlight the issues that previous TERTs identified and the recommendations made to the Party; • Simplified review report from the review of annual GHG inventories in the year in which a BTR is not due, as produced by the secretariat; • Assessment based on other relevant international statistics (FAOSTAT, Eurostat, United Nations, International Energy Agency, literature search, etc.); • Any other guidance provided by the secretariat, such as conclusions from the lead reviewers meetings.
Review tools	You will learn more about review tools in lesson 9. They are also important in helping you to analyse Parties' submissions.

3.3. Assess

Broadly speaking, the TERT must examine the adherence of the Party's information submitted under Article 13, paragraph 7(a), of the Paris Agreement (GHG inventory) to the MPGs, chapter II ("National inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases").

The issues you identify can be subdivided into those related to principles referred to in the MPGs, paragraph 17, and provided in the 2006 IPCC Guidelines, volume 1, chapter 1, section 1.4: TACCC or other adherence issues.

Sectoral experts will check if the emissions and removals have been estimated in accordance with good practice. In particular, they will assess the transparency of the report (i.e. if the data sources, assumptions and methodologies used are clearly explained). They should pay particular attention to:

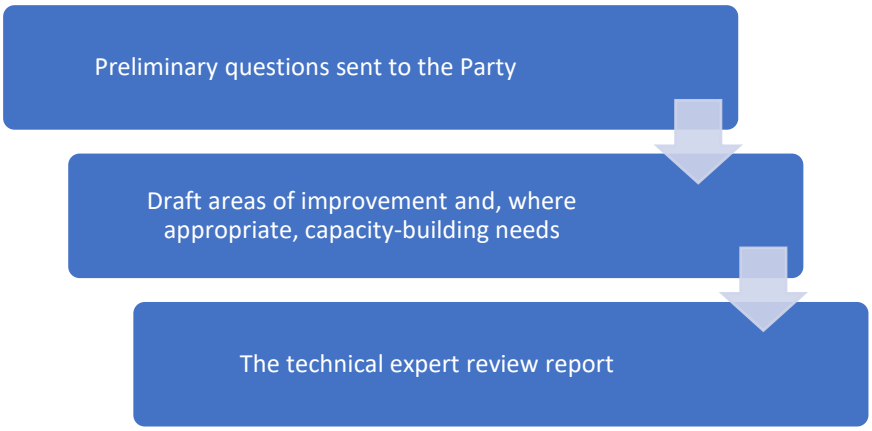
- The key categories identified by the Party;
- Areas of the inventory where issues have been identified and recommendations made in previous reviews;
- Areas of the inventory where issues have been identified by the application of review tools (either by the secretariat or the TERT);
- Categories for which recalculations or other changes have been reported by the Party;
- Issues that have an impact on the level and/or trend of GHG emissions and removals;
- Progress in the implementation of the planned improvements;
- The completeness of the emissions and removals reported, identifying whether any subcategory is missing or partially reported (including in a geographical sense).

Generalists are responsible for assessing the national inventory arrangements and cross-cutting issues, taking into account the assessment conducted by the sectoral experts.

The assessment process is continuous, happening primarily before and during the review week. After the review week, the TERT will have to assess any comments from the Party in preparing their final draft report.

3.4. Draft

The outputs of the review consist of a series of documents completed at different stages of your work. Remember that a as member of the TERT responsible for the review of the GHG inventory, you will be providing your contributions to a larger report covering all elements of the BTR review. The TERT will be responsible for drafting the following:



3.5. Preliminary questions sent to the Party

Based on your preparations and assessment as an expert, you are likely to have questions to the Party to seek clarification prior to the review week. Your questions should be clear so that the Party understands the exact nature of the issue you identified and should not be judgmental. Questions, for example, may ask about the choice of EF, representativeness of AD or methodological choice. You may ask here for a reference document mentioned by the Party so you can conduct further analysis. You will send preliminary questions to the lead reviewers and the secretariat for consideration prior to them being sent to the Party.

It is very important that you prepare any questions prior to the review week. This provides the Party with sufficient time to consider the questions and provide responses. It also allows you to follow up on any questions on the first day or two of the review week.

Electronic communications are the primary means of communication with the Party, particularly in centralized and desk reviews. In an in-country review, an electronic record of questions and answers is also kept, but you will have the benefit in this type of review to talk face to face with the Party's experts.

It is important to ensure that your questions are clear, complete and written in a polite and neutral manner. It is critical that you are not making any political judgments in your questions or challenging a Party in their application of flexibility.

Remember also, although the review is conducted in English, English is not everyone's native language.

3.6. How to draft questions to the Party

Effective communication between the TERT and the Party is one key to a successful review process. Although the questions and answers sent back and forth between the TERT and the Party are never made public, nor are they considered a formal deliverable of the process, it is important that the TERT makes the necessary effort to ensure that the communications are clear and concise.

Before sending a question to the Party, the TERT (through the lead reviewers) should consider the following:

- Is the question drafted in a clear and concise manner (i.e. free from ambiguity) so that the Party understands the underlying issue? For example, is it clear to the Party to which category, gas and years the question refers? Is it clear where in the NID/CRT the TERT has identified the problem? Is it clear to the Party to which reporting requirement in the relevant guidelines or decisions the question refers? It is not necessary to always specify the reporting requirement; however, it is recommended to do so in case it may not be evident to the Party what the relevant requirement is;
- Does the question convey a polite and neutral tone, asking a question and not suggesting or prejudging the TERT's final recommendation?
- Have all related answers already provided by the Party been reviewed to ensure that the same question is not asked twice?
- Have any follow-up questions been clearly linked to the original question and the Party's subsequent response(s)?

3.7. Exercises: preliminary questions to the Party

This exercise consists of identifying problems in the preliminary questions sent to the Party. There are four poorly phrased questions for you to consider.

Exercise 1

Consider the following preliminary question to a Party:

The EF for solid fuels used in households is lower than that used by other countries. Please explain why.

There are several problems regarding this preliminary question. Can you identify them? Select one or more options:

A. Solid fuels in households is normally a non-key category, therefore the question is not important
B. Households is not an inventory category in the MPGs
C. The relevant gas or gases are not identified
D. The year(s) in which the problem occurs is/are not identified
E. The EFs used by other Parties are not relevant as the circumstances may be different
F. The Party does not need to explain because of flexibility provisions

Exercise 2

Consider the following preliminary question to a Party:

You have not changed the method for enteric fermentation even though the need to move to tier 2 was discussed during the in-country review two years ago. When will you move to tier 2?

There are several problems regarding this preliminary question. Can you identify them? Select one or more options:

A. Issues identified in the inventory two years ago are not relevant for the current review
B. The question is prescriptive instead of looking for the reasons why tier 2 was not implemented
C. The question suggests what the final recommendation will be
D. The years for which tier 2 should be implemented is not identified
E. The subcategory is not identified

Exercise 3

Consider the following preliminary question to a Party:

In the NID the N_2O EFs for composted waste are presented as kg N_2O/t wet waste. The TERT recommends that these values be converted to g N_2O/kg dry matter in line with the CRT.

There are several problems regarding this preliminary question. Can you identify them? Select one or more options:

A. It is the information in the CRT that should be corrected, not the information in the NID
B. It is not relevant whether the N_2O EFs are reported on a wet or dry basis as long as the information is clear
C. There is no indication where in the NID the incorrect information is reported
D. The preliminary question does not seek a clarification, rather provides a recommendation
E. The NID does not need to include EFs because they are already reported in the CRT

Exercise 4

Consider the following preliminary question to a developing country Party:

Why is the QA/QC plan not included in the NID as an annex?

Now try to identify the problems with this preliminary question and draft a new question to the Party.

Please submit your question here:

3.8. Answers to exercises on preliminary questions to the Party

Exercise 1

The correct answer is B, C and D. The TERT is using category names not consistent with the MPGs. The gas and year of the problem identified by the TERT are not specified. Finally, the TERT is asking the Party to explain why an EF is different from that used by other Parties, without telling the Party the range of values identified. In principle, the Party is not required to know the EFs used by other Parties; instead, the TERT should use the identified difference as an indication of a problem.

Here's how the preliminary question could be drafted:

The TERT noted that, for 1990–2022, the CO_2 IEF for solid fuels reported for the category residential – stationary combustion (1.A.4.b.i), 72.2–75.3 t CO_2/TJ, is lower than the values reported by other Parties. Which fuels are reported under solid fuels for the category? Which EFs are used and what are the sources of those EFs? It would also be helpful if you could send the fuel use by fuel type, for example for 2022.

This question is improved because it is specific (gas, category and years are identified), the TERT is asking the Party to only explain issues related to its own submission, and the TERT is trying to think in advance about the rationale for the low EF (fuel mix or sources of EFs) and elaborates the question on that basis.

Exercise 2

The correct answer is B, C and E. The question is not specific, as the subcategory (livestock) is not indicated, the TERT is not giving the Party a chance to explain (e.g. based on national circumstances) why it has not implemented the recommendation or whether it is addressing the recommendation and the ERT is suggesting the final recommendation. A is not correct because issues identified in previous reviews should be considered. D is not correct because it suggests that different tiers could be used in different years for the same category.

A possible preliminary question could be:

The TERT noted that in the previous review report (para. XX) the TERT recommended that you implement a tier 2 method for enteric fermentation of cattle. The present TERT noted that tier 1 is still used, and did not identify any indication in the NID regarding whether you have plans to move to a tier 2 method. Could you elaborate on the current status of addressing the recommendation? Are you planning to move to tier 2 and if so, when? Please elaborate on any possible constraints, such as availability of data, knowledge or resources.

This question is improved because it is specific to the category and references a specific recommendation from the previous review report. The TERT is not suggesting the outcome but giving the Party a chance to explain the situation. Further, the TERT is trying to anticipate the Party response and potential follow-up questions in order to save time.

Exercise 3

The correct answer is C and D. The question does not specify where in the NID the problematic value was found. Further, there is no question (just a recommendation), so the Party may not understand that the TERT is expecting a response.

A possible preliminary question could be:

In NID table 7.20, N_2O EFs for composting are provided in the unit kg N_2O/t wet waste. Dry matter fractions are not reported. The disaggregation of waste types is different from that provided in CRT 5.B, in which the IEF is presented as g N_2O/kg dry matter. The TERT finds there is lack of transparency in NID table 7.20 on how emissions in CRT 5.B are derived using country-specific EFs. The TERT would like to receive information on (1) the applied dry matter contents for waste fractions included in NID table 7.20 and (2) which waste fractions in NID table 7.20 are allocated to each subcategory in CRT 5.B.

The question is an improvement because it specifies where in the NID the problematic value was found. The question specifies why the TERT is asking for more information (replication of the calculation) and asks for additional information that would allow the TERT to replicate the calculation.

Exercise 4

Problems: the question has a harsh tone and could sound argumentative to the Party. The question suggests that the Party has not met a requirement; however, there is no requirement to include a QA/QC plan in an annex (remember, although there is a place to include the QA/QC plan in annex 4 to the NID, use of the NID outline is encouraged, not required.) Further, as a developing country Party, it may have applied flexibility in accordance with paragraph 34 of the MPGs, and therefore is only encouraged, not required, to provide a QA/QC plan. Given the harsh tone, the response from the Party may not provide the information the TERT needs for its review.

Possible preliminary question:

According to the MPGs (paras. 35 and 46) Parties shall report on a QA/QC plan and general inventory QC procedures in accordance with that plan. The TERT did not find this information in the NID. Do you have a QA/QC plan in place? If so, could you please provide the plan to the TERT or a short summary of it? If you do not have a QA/QC plan, have you applied flexibility for this provision? Please describe any constraints you may have had in preparing a plan.

This question is improved because it refers to a specific reporting requirement. The question is posed in such a way as to generate a response which is likely to allow the TERT to determine whether the Party's QA/QC procedures are in line with the MPGs, allowing for follow-up questions, as necessary.

3.9. Areas of improvement and, where appropriate, capacity-building needs

At the end of the review week, the TERT will prepare a list of reporting areas identified for improvement based on the TERT's assessment of the GHG inventory submission against the reporting requirements. The list contains preliminary recommendations (for 'shall' reporting provisions) and encouragements (for other provisions).

A key role you will have as a reviewer is to work with developing country Parties to identify capacity-building needs that will help the countries to improve their reporting over time. This preliminary list of capacity-building needs, when developed, would be included with the draft areas of improvement to the Party at the end of the review week.

3.10. Technical expert review report

The TERR is the main output of the review process and is produced under the collective responsibility of the TERT and will cover all areas of the review of the BTR.

The members of the TERT responsible for the review of the GHG inventory will provide an objective assessment of the inventory's adherence to the MPGs and decision 5/CMA.3. It must be free of any political judgment. It also must not question the self-determination of a developing country Party's decision to apply flexibility to their reporting in the light of their capacities or whether a Party possesses the capacity to implement some specific provision without flexibility.

The TERR includes the recommendations and encouragements of the TERT as to how the Party might improve its inventory, and the status of implementation of previous review recommendations.

You will be expected to have a complete first order draft of your part of the report at the end of the review week. The more progress you can make with your report during the review week, when your fellow TERT members and the secretariat are also focused on the report, the quicker and easier your job will be to finalize the report and send it to the Party.

3.11. Elements of the technical expert review report

The outline for the TERR can be found in annex VI to decision 5/CMA.3.

The following specific elements regarding the review of the GHG inventory must be included in the TERR:

- A technical review of the consistency of the reporting requirements with those described in the MPGs, chapter II, including:
    - A summary of the results of the inventory review and a general assessment of the inventory;
    - An assessment of the overall organization of the national inventory arrangements;
- Recommendations or encouragements to improve GHG inventory reporting where inconsistencies are identified;
- Identification of capacity-building needs for those developing country Parties that need it in the light of their capacities to help them to improve their GHG inventory reporting, based on the consultations between the TERT and the Party during the review week.

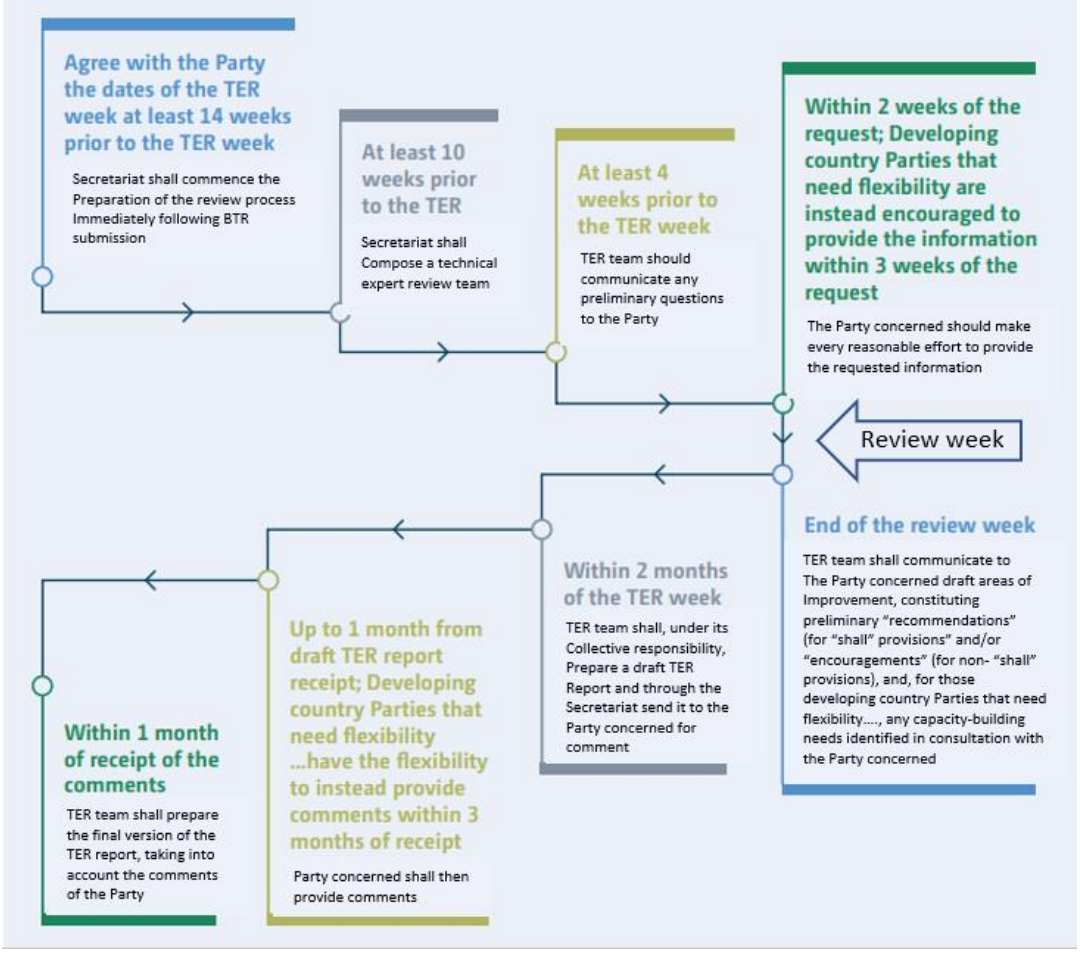
These elements are further discussed later in this lesson.

The report should be as concise as possible and should not extensively duplicate information that is already publicly available, such as excerpts from CRTs, the NID and the 2006 IPCC Guidelines.

The depth of information you provide will be guided by a review report template to be provided by the secretariat. For consistency and comparability, the TERT must use the review report templates prepared by the secretariat. You will learn more about the review report template and how it facilitates the drafting work of the TERT in lesson 9.

3.12. Timeline

Specific timelines for individual steps in the review process are established in paragraph 162 of the MPGs. As a refresher on the timeline for review, please refer to lesson 4 of the BTR overview course.



Procedures and timelines for in-country, centralized and desk reviews

The review cycle can basically be separated into three periods: before, during and after the review week.

4. Review steps

4.1. Before the review week

Start early.

The secretariat composes the TERT at least 10 weeks prior to the review week.

To kick off the review, the lead reviewers will discuss the distribution of tasks with the TERT. In a centralized review and possibly a desk review, where more than one Party's inventory is reviewed and more than one expert is assigned per sector, the team may allocate tasks by Party. In such cases, you will review some Parties' inventories and act as an alternate expert for others. You will dedicate most of your time to the Parties for which you are primarily responsible but will also support your colleagues in their work.

The work of the TERT begins when it receives the documentation for the review, including the Parties' GHG inventory submission and the results of applying preliminary assessment tools by the secretariat. The TERT will receive these documents several weeks before the preliminary questions are due to the Party to allow time for further clarification or additional data and documentation to be requested from the Party.

The sooner you begin to assess the Party's submission and other materials and identify issues, the better. To start your review, you should prioritize issues already identified in the previous review reports and the results of applying preliminary assessment tools by the secretariat. In particular, if the previous year's inventory submission would have been subject to a simplified review by the secretariat the TERT should carefully assess its findings.

Dedicate sufficient time to reading review materials, analyse reported information and prepare questions for the Party under review.

Send preliminary questions to your lead reviewers before the deadline decided by the team. The lead reviewers will check your questions and ask you to revise them where necessary. They and the secretariat will then forward your questions to the Party no later than four weeks before the review week. It is important that you do not ask the Parties questions about issues that have already been resolved.

If you think that you need to obtain information on confidential data, this is a good moment to ask for it. The MPGs and decision 5/CMA.3 include provisions on confidentiality for use by the Party and related to the disclosure of confidential information to the TERT.

Download the relevant provisions related to confidentiality click here.

Check the completeness of the reporting in the CRTs and the NID – are all categories reported? Does the reporting cover the entire geographic area?

Check the notation keys in the CRTs ("NE", "NO", "NA", "IE", "C" and "FX"), particularly where they have changed since the last submission. Identify unjustified missing categories, focusing on "NE", "NO" and "NA".

You should also prioritize assessing:

- Key categories identified by the Party;
- Categories that have been recalculated since the last submission;
- Issues that have an impact on the level and/or trend of total national GHG emissions and removals.

Start recording your assessment

Before the review week starts:

You will hopefully have received answers from the Party or Parties.

You should record your findings and prepare a zero draft of the review report, particularly with respect to issues already identified in previous reviews.

To facilitate the drafting of the report and promote consistency and comparability between reports, the secretariat will provide you with a report template (see lesson 9).

4.2. During the review week

The review week is central to the process. In the review week, the TERT continues to prepare and send follow-up and additional questions to obtain clarification from the Party or Parties. During an in-country review, you will have the advantage to sitting side by side with the country under review and gaining an in-depth understanding of what they have done to prepare the inventory. There are typically opportunities to hear presentations from the Party during the week; moreover, you will have the opportunity to present your preliminary findings. During centralized and desk reviews, you will be communicating entirely virtually, typically through the question and answer functions. Conference calls with the Party may be organized if that would facilitate understanding and support the Party. benefit

By the end of the review week, you must finish your assessment and clarify all the pending questions and issues with the Party or Parties.

You may remember learning about the different formats of review in lesson 3 of the BTR overview course.

For an in-country review, the review week is the period when the TERT visits the Party, meets the country experts and discusses the details of the inventory with them, and examines the archived documentation.

For the centralized review, the review week is when the TERT convenes at a single location, usually the headquarters of the secretariat, and has the opportunity to discuss among its members the inventory issues and the findings of the individual assessments.

For the desk review, the review week is when all the review experts concentrate on the review, work more closely together and interact with the Party experts.

Remember that the review report is the collective responsibility of the TERT.

- In the introductory briefing to the TERT, share your preliminary findings with your colleagues.
- Actively participate in daily wrap-up meetings to exchange views with your TERT colleagues, the lead reviewers and the secretariat on your and other members' findings, thus ensuring:
    - That the lead reviewers, your TERT colleagues and the secretariat are aware of your review issues and their progress;
    - The consistency of the review approach in the whole report and across sectors.
- Be critical of the findings presented by other experts for their own sectors and work constructively.

Finalize your assessment and complete recording.

- Complete your review, covering all categories and striking a balance between the issues identified according to their importance.
- Consult with other experts about cross-sector issues (e.g. the agriculture sector expert may need to check with the LULUCF expert on some issues, and the energy expert may need to check with the IPPU expert on some issues).
- Assess the cross-cutting issues for your sector (transparency, completeness, time-series consistency, uncertainty and QA/QC).
- Share the information on the cross-cutting issues for your sector, which will be the basis of the overall assessment to be carried out by the generalist expert (see lesson 3 for further guidance).
- All findings leading to recommendations (for 'shall' reporting provisions) or encouragements (for 'should' report provisions) are finalized in the review week, and should be summarized by the TERT in a list of draft areas of improvement to be sent to the Party. For the in-country review, you will present the areas of improvement directly to the Party.
- Finalize the first draft of your section of the review report. Transparency is an important principle in the review report in the same way that it is an important principle in the NID under your assessment. Always try to be clear in your description of the issues identified.
- For those developing country Parties that need flexibility in the light of their capacities, identify, in conjunction with the Party, capacity-building needs.

4.3. After the review week

You will be focused on finalizing your section of the TERR in close collaboration with your TERT colleagues and under the coordination of the lead reviewers, with support from the secretariat.

In finalizing the draft report, the TERT must reflect:

- The information provided by the Parties during the review week;
- Further clarifications by the Party related to the preliminary areas of improvement provided to the Party at the end of the review week.

The draft report will be submitted to a QA process by the secretariat in order to improve consistency among reports. The TERT will need to respond to the secretariat's suggestions with support from the lead reviewers.

The draft report will be sent to the Party within two months of the review week. The Party concerned will be given up to one month from its receipt to provide comments. Developing country Parties that need flexibility in the light of their capacities with respect to this provision have instead the flexibility to provide comments within three months of receipt of the draft report.

The TERT will prepare the final version of the review report within one month of receipt of the comments from the Party.

4.4. Practice exercise

Please indicate when you believe the following activities best take place -- before, during or after the review week.[9]

	Before	During	After
A - Determine whether the Party has addressed previous GHG inventory recommendations			
B - Respond to comments from the Party on your draft report			
C - Draft questions to the Party			
D - Participate in a wrap-up meeting with the entire team			
E - As an energy expert, sit down with the TERT member responsible for IPPU and discuss possible areas of double counting			
F - Conduct an initial review of the Party's CRT for the waste sector			

[9] Answer to the exercise: A = before; B = after; C = before; D = during; E = during; F = before.

5. Lesson Summary

- The primary objectives of the review are to:
    - Review the consistency of the information reported with reporting requirements set out in the MPGs;
    - Identify areas of improvement for the Party to assist them in improving their inventory;
    - Where applicable, assist developing countries that need it in the light of their capacities in identifying capacity-building needs;
- Reviews conducted by a TERT may happen in-country, in a centralized manner or as a desk review;
- Simplified reviews are conducted for a GHG inventory submission of developed country Parties in the years in which a BTR is not due. A simplified review is done by the secretariat, not a TERT. Findings from this assessment will form part of TERTs review of the subsequent national inventory report;
- Although your task on the TERT may focus on a single sector of the GHG inventory, the drafting of the review report is a collective responsibility of the entire TERT;
- The key steps of the review process are prepare, assess and draft, with various activities taking place before, during and after the review week;
- It is essential that you are well prepared BEFORE the review week even starts;
- You should be clear and concise in your questions or other communications to the Party, avoiding judgment. Remember you are there to help the Party to improve its reporting over time.

6. Self-check quiz

Question 1

Except for simplified reviews, who is responsible for the technical expert review of the inventory?

Select one:

A. The TERT together with the secretariat

B. The secretariat together with the Party

C. Members of the TERT

Question 2

Which of the following are the two main documents from each Party that will be available to you at the beginning of a review?

A. The NID

B. The assessment report

C. The CRTs

D. The Party's comments on the draft review report

E. Original databases

Question 3

For which parts of the final review report is the secretariat responsible?

Select one:

A. Generalist findings

B. Summary of the recommendations

C. None of the above

Question 4

Which of the following statements are among the objectives of the technical review of the GHG inventories?

A. Assisting developing country Parties to identify capacity-building needs

B. Identifying areas of improvement in the reporting of information in GHG inventories

C. Verifying emissions data for IPCC scenario analyses

D. Reviewing the consistency with the MPGs of the information reported

Question 5

The lead reviewers coordinate the TERT and so do not have a specific sector to review.

Select one:

A. True

B. False

Question 6

Which of these functions are among the lead reviewers' responsibilities?

A. Work together with the secretariat in the initial assessment of the inventory

B. Provide technical advice to the members of the TERT

C. Coordinate the submission of queries of the TERT to the Party under review and coordinate the inclusion of the answers in the review report

D. Ensure that the TERT only raises issues that are really important

6.1. Answers to self-check quiz

Question 1

The correct answer is C.

Question 2

The correct answer is A (the NID) and C (the CRTs). The assessment report was used before the introduction of MPGs; it included comments from the Parties on implementation of previous recommendations and on preliminary findings by the secretariat and would be made available to the ERT sometime after the start of the review. Parties comments to the draft review report will take place after the review week. Original databases will not be provided to the TERT at the beginning of a review; such information will only be provided by the Party if requested by the TERT.

Question 3

The correct answer is C. The TERT is responsible for the whole report.

Question 4

A	True
B	True
C	False
D	True

Question 5

The correct answer is B. A lead reviewer also acts as a regular expert and is assigned to cover one of the sectors of the inventory or act as a generalist.

Question 6

A	No. The TERT, including the lead reviewers, does not participate in the initial assessment.
B	Yes
C	Yes
D	No. The lead reviewers shall ensure that the review is performed and the review report is prepared in accordance with the MPGs. This does not include an assessment of the importance of issues.

Lesson 7: Fundamentals of the inventory review and reviewing cross-cutting issues

1. Introduction

Now that you have learned the different elements of what is reviewed in a GHG inventory, and the overall approach, this lesson explains the fundamentals of how to assess the estimation of GHG emissions and removals reported by the Party and how to review the cross-cutting issues.

The lesson consists of four key topics:

1. Fundamentals
2. Assessing emissions and removals
3. Reviewing cross-cutting issues
4. Practical exercise

At the end of this lesson, you should be conversant with:

- All the elements of your assessment of the consistency of a Party's GHG inventory with the MPGs, regardless of the sector you are reviewing;
- All the cross-cutting issues you will be required to review as a sectoral expert or a generalist.

Expected time needed to complete lesson 7:

- For readers with experience: 15–30 minutes
- For readers with less experience: 60 minutes

2. Fundamentals

2.1. Basic tasks

As we have seen in lesson 6, the role of the technical expert review is to assess the consistency of the information submitted by the Party with the MPGs and their guiding principles. The GHG inventory review will be particularly important in facilitating improved reporting and transparency over time (MPGs, para. 3(b)) and promoting transparency, accuracy, completeness, consistency and comparability (MPGs, para. 3(d)).

The basic task of a sectoral expert is to assess whether emissions and removals have been estimated in accordance with the 2006 IPCC Guidelines and relevant information is reported in the NID. This is done for each category and subcategory and by gas.

In addition, the TERT must assess issues named "cross-cutting" reporting requirements, including uncertainty, key category analysis, time-series consistency, recalculations and QA/QC. You were introduced to these concepts in lessons 2 and 3. This assessment is conducted by the generalist with the support of the sectoral experts.

2.2. Requirements

You must be aware of the difference between reporting requirements as indicated by the use of 'shall', 'should' or 'may' in the MPGs.

Shall	This refers to a requirement of a **mandatory** nature.	When a 'shall' requirement is not fulfilled, it is considered an issue and the TERT makes a recommendation to the Party in the review report with advice on how the Party can fulfil that requirement.
Should	This refers to a requirement of a **non-mandatory** nature.	When a 'should' requirement is not fulfilled, the TERT makes an encouragement in the review report with advice on how the Party can fulfil that requirement.
May	This refers to an action of a **voluntary** nature.	When a 'may' action is identified as undertaken by the Party, the TERT needs to assess its consistency with the MPGs.

2.3. Identification of areas of improvement

If the Party does not follow a reporting requirement specified in the MPGs, it should be identified as an inconsistency with the reporting guidance, with the corresponding recommendation or encouragement to the Party on how to address the issue included in your final report.

The areas of improvement identified can be subdivided as related to transparency, accuracy, completeness, consistency, comparability or other matter concerning consistency with the MPGs.

You must examine the information reported by the Party for each category and gas, as well as the overall inventory, in the light of each individual requirement of the MPGs.

The review of the consistency of the information submitted by the Party must take into account a developing country Party's decision to apply flexibility in the light of their capacities. For such Parties, the TERT should identify, in conjunction with the Party, any capacity-building needs, including those related to provisions for which flexibility has been applied.

Here's an example:

According to paragraph 25 of the MPGs:

Parties shall identify key categories for the starting year and the latest reported year, including and excluding LULUCF categories, using approach 1, for both level and trend assessment

Party A reported its key categories for the starting year and the latest reported inventory year, using approach 1, level and trend assessment, but only for its inventory including LULUCF

The ERT recommends that Party A report its key categories including and excluding LULUCF

3. Assessing emissions and removals

3.1. Elements to assess

In reviewing each category and gas for which emissions can occur, you should assess:

- **Completeness:** has a value been reported? Does it reflect emissions from the whole of the Party's territory? Has a notation key such as "NE" been used? If "NO" or "NA" is used, is this appropriate taking into consideration the information in the NID?
- **Methodological choice:** has the choice of method (i.e. tier 1, tier 2 or tier 3) been made in accordance with the corresponding decision tree in the 2006 IPCC Guidelines? If not, has the Party included justification in the NID for the deviation?
- **Data collection and reporting:** are the data used appropriate for the method employed? Are the data sources described transparently? Can the calculations be reproduced from the information provided by the Party?

Let's dive into each of these a bit more and learn how the basic assessment of these factors applies to all categories and gases. During the sectoral courses, you will have the opportunity to look in even more detail at these steps for relevant categories and gases and gain practice in assessing the factors.

3.2. Completeness

Completeness refers to whether an annual GHG inventory covers at least all sources and sinks, as well as all gases, for which methodologies are provided in the 2006 IPCC Guidelines, and to the extent of the geographical coverage of the sources and sinks of the Party.

Failure to provide a full set of annual CRTs starting from 1990 up to the most recent inventory year is also considered a completeness issue.

Those developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead report data covering, at a minimum, the reference year/period for its NDC and in addition, a consistent time series from 2020 onwards.

The latest reported inventory year must be two years prior to the submission of the national inventory report (i.e. an inventory submitted in 2024 must contain inventory data up to 2022).

Those developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead have their latest reporting year as three years prior to the submission of their national inventory report (i.e. the inventory submitted in 2024 must contain inventory data up to 2021).

3.3. Completeness: review points

In order to assess completeness:

- Check the CRTs for your sector. Every non-grey cell in a Party's CRT submission should contain either a data entry (i.e. a number) or one of the standard CRT notation keys (see the notation keys in the box below);
- Check the NID to ensure that the reported emissions/removals in the CRTs reflect activities across the whole territory of the country;
- If GHG emissions/removals estimates are reported as "NE" but you know there is a method in the 2006 IPCC Guidelines, check whether the category has been determined to be insignificant by the Party and if this assessment has been documented and justified (see the insignificancy criteria in the box below). If the category is insignificant, has the Party applied flexibility in this determination?
- Check CRT 9 and the NID for appropriate justifications for use of notation keys.

CRT notation keys		
Each Party must use notation keys in the CRTs where numerical data are not available, indicating the reasons why emissions from sources and removals by sinks and associated data for specific sectors, categories and subcategories or gases are not reported. These notation keys are listed below.		
NO	(not occurring)	For categories or processes, including recovery, that do not occur within a Party.
NE	(not estimated)	For AD and/or emissions by sources and removals by sinks of GHGs that have not been estimated but for which a corresponding activity may occur within a Party; where "NE" is used by a Party to report emissions or removals of CO_2, N_2O, CH_4, HFCs, PFCs, SF_6 or NF_3, the Party must indicate in both the NID and CRT 9 why such emissions or removals have not been estimated.
NA	(not applicable)	For activities under a given category that do occur within the Party but do not result in emissions or removals of a specific gas; if the cells for categories in the CRTs for which "NA" is applicable are shaded in grey they do not need to be filled in.
IE	(included elsewhere)	For GHG emissions by sources and removals by sinks estimated but reported elsewhere in the inventory instead of under the expected category. Where "IE" is used, the Party should indicate in CRT 9 where in the inventory the emissions or removals for the displaced source or sink category have been included, and explain the deviation.
C	(confidential)	For GHG emissions by sources and removals by sinks where the reporting would involve the disclosure of confidential information.
FX	(flexibility)	For cells where data are not available or reported because of a flexibility provision applied by a Party that needed flexibility in the light of its capacities.

Insignificancy criteria
A Party may use the notation key "NE" when the emissions/removals estimates would be insignificant in terms of level according to the following considerations: emissions from a category should be considered insignificant only if the likely level of emissions is below 0.05 per cent of the national total GHG emissions, excluding LULUCF, or 500 kt CO_2 eq, whichever is lower. For the purposes of assessing insignificance, a category is considered the category/gas combination at the level which data are entered into the CRT (e.g. CO_2 emissions from solid fuels in iron and steel (category 1.A.2) or CH_4 emissions from continuously flooded rice cultivation (category 3.C.1)). The total national aggregate of estimated emissions for all gases from categories considered insignificant must remain below 0.1 per cent of the national total GHG emissions, excluding LULUCF. Parties should use approximated AD and default IPCC EFs to derive a likely level of emissions for the respective category.
Those developing country Parties that need flexibility in the light of their capacities with respect to this provision have the flexibility to instead consider emissions insignificant if the likely level of emissions is below 0.1 per cent of the national total GHG emissions, excluding LULUCF, or 1,000 kt CO_2 eq, whichever is lower. The total national aggregate of estimated emissions for all gases from categories considered insignificant, in this case, shall remain below 0.2 per cent of the national total GHG emissions, excluding LULUCF.

3.4. Completeness: CRT table 9 and explanation in the NID

For each cell filled in with "NE", the Party must include in CRT table 9 an explanation for not estimating emissions/removals for the gas/category. This information is typically further supported by information in the NID. In particular, if a category is not estimated because it is judged that it would be insignificant in terms of the overall level of national emissions, the Party should justify its assertion that the likely level of emissions would be below the threshold established.

For each cell filled in with "IE", the Party is to indicate in CRT table 9 the sector to which the source or sink is allocated in the submitted inventory and include an explanation for reporting the source or sink under a sector or category different from that indicated in the 2006 IPCC Guidelines.

As a reviewer, you should confirm that the emissions reported as "IE" are actually reported elsewhere, where the Party states. Such an assessment may require coordination among TERT members. Often Parties use the notation key "IE" because of the way national statistics are collected, and this results in the inability to allocate emissions according to the 2006 IPCC Guidelines. If this is the case, the TERT should consider whether a recommendation to report emissions consistent with the allocation in the 2006 IPCC Guidelines is appropriate.

TABLE 9 COMPLETENESS - INFORMATION ON NOTATION KEYS
(Sheet 1 of 1)

Year
Submission
Country

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Sources and sinks not estimated ("NE") [1,2]			
GHG	**Sector** [3]	**Source/sink category** [3]	**Explanation**
CO_2			
CH_4			
N_2O			
HFCs			
PFCs			
Unspecified mix of HFCs and PFCs			
SF_6			
NF_3			

Sources and sinks reported elsewhere ("IE") [4]				
GHG	**Source/sink category**	**Allocation as per IPCC Guidelines**	**Allocation used by the Party**	**Explanation**
CO_2				
CH_4				
N_2O				
HFCs				
PFCs				
Unspecified mix of HFCs and PFCs				
SF_6				
NF_3				

[1] Clearly indicate any sources and sinks which are considered in the 2006 IPCC Guidelines but are not considered in the submitted inventory. Explain the reason for not reporting these sources and sinks, in order to avoid arbitrary interpretations. An entry should be made for each source/sink category for which "NE" is entered in the sectoral tables.
[2] Developing country Parties that need flexibility in the light of their capacities have the flexibility to instead consider emissions insignificant in accordance with the relevant provision in decision 18/CMA.1, annex, para. 32. The total national aggregate of estimated emissions for all gases from categories considered insignificant, in this case, shall remain below 0.2 per cent of the national total GHG emissions, excluding LULUCF.
[3] Indicate omitted source/sink category.
[4] Clearly indicate any sources and sinks in the submitted inventory that are allocated to a sector other than that indicated by the 2006 IPCC Guidelines. Show the sector indicated in the 2006 IPCC Guidelines and the sector to which the source or sink is allocated in the submitted inventory. Explain the reason for reporting these sources and sinks in a different sector/category. An entry should be made for each source/sink for which the notation key "IE" (included elsewhere) is used in the sectoral tables.

Note: Minimum level of aggregation is needed to protect confidential business and military information, where it would identify particular entity's/entities' confidential data.

3.5. Completeness: confidentiality

Each Party shall report estimates of emissions and removals for all categories, gases and carbon pools considered in the GHG inventory throughout the reported period on a gas-by-gas basis in units of mass at the most disaggregated level, in accordance with the 2006 IPCC Guidelines. A minimum level of aggregation may be needed to protect confidential business and military information (MPGs, para. 47).

Parties may use the notation key "C" in the CRTs for reporting GHG emissions by sources and removals by sinks where the reporting would involve the disclosure of confidential information (MPGs, para. 31(e)), indicating under which category these emissions have been reported.

For each category reported as "C", the Party must explain in the NID why the category is considered confidential and under which category the corresponding emissions or removals are aggregated. In addition, each Party is required to provide the TERT with information on the methods used to estimate emissions and removals for these categories, as well as the descriptions, assumptions, references and sources of information used (decision 5/CMA.3, para. 26).

The reporting and review requirements related to confidentiality that you learned about in lesson 6 can be downloaded here.

3.6. Completeness: review points for confidentiality

In response to requests from the TERT to provide information, the Party may indicate whether such information or data are confidential, and should provide the basis for protecting such information, including any domestic law, if applicable.

Upon receipt of assurance that the data will be kept confidential by the TERT, the Party may provide confidential information in accordance with domestic law. Further discussion may be required between the Party and the TERT to enable provision of information that meets the Party's requirement and in a manner that allows the TERT access to sufficient information or data for the assessment of the implementation of the Party's commitments under the MPGs and conformity with the methodological guidance provided by the 2006 IPCC Guidelines.

Any confidential information or data submitted by a Party shall be kept confidential by the TERT in accordance with any decisions on the matter and the UNFCCC code of practice for the treatment of confidential information. This code of practice applies to the secretariat's processing and handling of the information designated as confidential by the Party and the TERT's access to and handling of this information. The secretariat will provide you with the latest code of practice. As a reviewer, you will also be expected to sign a statement agreeing that you will abide by this code of practice.

Questions you may consider asking the Party when assessing confidentiality include:

- Is use of the notation key "C" justified (i.e. is its use required to protect confidential business or military information)?
- Has the Party provided the basis for protecting such information, including any domestic law?
- Is the TERT confident that the emissions or removals reported as "C" are included in sectoral (or, if necessary, national) totals?

You should assess whether the explanations provided by the Party are justified and in accordance with good practice.

3.7. Completeness: notation keys "NO" and "NA"

For categories and gases reported as "NO" you should check whether a related activity could occur in the Party, and for "NA" whether the assumption that no emissions or removals occur from that activity is valid. You should also check if this reporting is consistent with the Party's reporting under international authoritative sources or other categories.

As a review expert, you will have electronic tools available to you to help in assessing completeness by identifying where notation keys have been used in the CRT (see lesson 9).

Example:

Party A reported emissions for the subcategory other organic fertilizers applied to soils under the agriculture sector as "NO" in CRT X.

The TERT notes that the 2006 IPCC Guidelines indicate that other organic nitrogen additions can be included in the calculation if sufficient information is available.

During the review, the Party agreed that compost and other organic amendments are used in the country, but were not estimated because of lack of information.

The TERT recommends in the review report that Party A change the notation key from "NO" to "NE" in CRF table X for reporting emissions from other organic fertilizers applied to soils (3.D.a.2.c). This is identified as a completeness and transparency issue.

3.8. Methodological choice

In lesson 3 you learned about the use of IPCC methodologies and data in inventory preparation, and that the 2006 IPCC Guidelines provide, for each category, a decision tree to help the Party with methodological choice and data collection (download an example here).

You also learned about methodological tiers in lesson 3; the 2006 IPCC Guidelines provide advice on estimation methods at three levels of detail, called tiers, from tier 1 (the default method) to tier 3 (the most advanced method), with accuracy usually increasing from tier 1 to tier 3. In general, higher-tier methods (with the associated more detailed data) should be used for key categories.

A Party may be unable to adopt a higher-tier method for a particular key category owing to lack of resources. In such cases, the Party may use a tier 1 approach, but must clearly document why a method not in line with the corresponding decision tree of the 2006 IPCC Guidelines was chosen. The Party should prioritize for future improvement any key categories for which the good practice method elaborated in the 2006 IPCC Guidelines cannot be used.

If you are reviewing the inventory of a developing country Party, you may consult with the Party to see if there are capacity-building needs to support improving the accuracy of the estimates for this category.

During the review, for each category, you should check in the NID whether the Party's choice of method and use of data are in accordance with the relevant decision tree. If the choice of method is not clearly documented in the NID, you must ask the Party to provide you with relevant information.

If the method chosen deviates from the IPCC guidance, the Party needs to provide a justification based on its national circumstances.

A Party may use nationally appropriate methodologies if they better reflect its national circumstances and are consistent with the 2006 IPCC Guidelines. In such cases, each Party must transparently explain national methods, data and/or parameters selected.

Parties may also use the 2019 Refinement to the 2006 IPCC Guidelines to estimate emissions/removals. If a Party has used the 2019 Refinement, this should be clearly documented in the NID (in the same manner as if the 2006 IPCC Guidelines were used). If the Party does apply a method from the 2019 Refinement to the 2006 IPCC Guidelines, it is important that you check the Party's method for consistency with the 2019 Refinement.

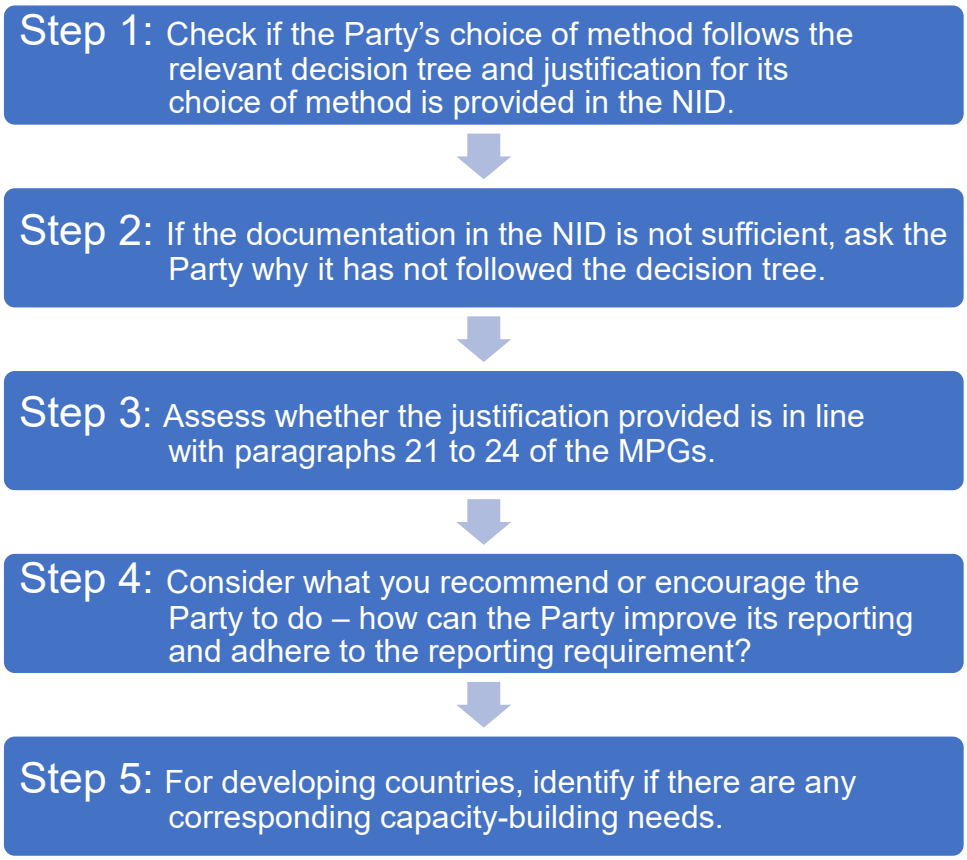
To learn more about methodological choice and the identification of key categories, refer to the 2006 IPCC Guidelines (vol. 1, chap. 4).

To learn more about the 2019 Refinement to the 2006 IPCC Guidelines, please click here.

Remember, Parties are not required to use the 2019 Refinement to the 2006 IPCC Guidelines, but they may choose to do so. If used, you will be required to assess the Party's reporting against the method in the 2019 Refinement. You may never encourage the Party to use or recommend that the Party use the 2019 Refinement to the 2006 IPCC Guidelines if they have reported using the 2006 IPCC Guidelines, as it is not mandatory for reporting.

3.9. Methodological choice: review points

Before starting the review for a category, you must check if it is a key category. Then follow the steps below.



3.10. Methodological choice: exercise

You learned in the previous section the general steps for evaluating methodological choice. Let's take a closer look at step 4, "Consider what you recommend or encourage the Party to do – how can the Party improve its reporting and adhere to the reporting requirement?".

How would you complete your finding in the TERR for the following example?

The TERT noted that the Party applied a tier 1 method to estimate CO_2 emissions from cement production, even though cement production is a key category. No information was provided in the NID to explain the Party's national circumstances leading to the choice of method. During the review the Party noted that it is developing its GHG inventory system, and as resources are limited, it has focused on the energy sector in its 2024 submission.

Drag the words from the right to the right location in the sentence.[10]

[10] Answer to exercise: According to paragraph 23 of the MPGs, a Party may be unable to adopt a higher-tier method for a particular key category owing to lack of resources. In such cases, the Party may use a tier 1 approach, and shall clearly document why the methodological choice was not in line

The TERT _____ the Party to apply a higher-tier method for the key category of cement production and, if this is not possible, _____ that the Party describe in its NID the national circumstances leading to use of a lower-tier method.	recommends encourages

3.11. Data collection and reporting

Good data are fundamental to the overall quality of an inventory. Therefore, reviewing the data used in preparing the inventory, either AD or parameters and EFs, is an important task.

Unavailability of data and lack of resources for collecting the necessary data are often what prevents a Party from using a higher-tier method even when a category is identified as key.

Parties should be making continuous efforts to improve the quality and availability of their inventory data, taking into consideration their national circumstances.

Each Party must provide information on the methodologies, EFs and AD used at the most disaggregated level (see the definition in the box below) and in accordance with the 2006 IPCC Guidelines. Where the Party is not able to report information in accordance with the CRT, they must explain this in the NID and/or documentation boxes of the CRT.

Each Party is encouraged to use country-specific and regional EFs and AD, where available, or to propose plans to develop them, in accordance with the good practice elaborated in the 2006 IPCC Guidelines.

Disaggregation level
Disaggregated data means that AD, EFs and other parameters must, to the extent possible, be provided at the level of data entry in the CRT. Where data cannot be provided at the most disaggregated level, the proper notation key (e.g. “IE” or, if flexibility is applied, “FX”, must be included by the Party). In some cases, Parties may provide even further disaggregation in the NID. For example, in the LULUCF sector, emissions/removals may be reported for specific strata or, in the energy sector, for specific equipment and processes from natural gas and petroleum operations). When further disaggregation is provided in the NID, you should ensure consistency between the NID and the CRT.

3.12. Data collection and reporting: review points

Assess and review the characteristics of the data, collection methods, caveats, assumptions, etc., used to determine their quality and appropriateness for the method used.

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with the corresponding decision tree of the 2006 IPCC Guidelines. The Party should prioritize for future improvement any key categories for which the good practice method elaborated in the 2006 IPCC Guidelines cannot be used. Therefore, the sentence should read “The TERT encourages Party X to apply a higher-tier method for the key category of cement production and if this is not possible, recommends that the Party describe in its NID the national circumstances leading to use of a lower-tier method.”

- Consider the institutional arrangements in place to acquire data. Are there formal arrangements? Are data available in a timely manner? Are statistics used for AD consistent with the requirements in the 2006 IPCC Guidelines (e.g. types of fuels, animal population).
- All assumptions, data sources and data processing must be transparently reported by the Party in its NID.
- Archived data should be made available to the TERT when requested.

4. Reviewing cross-cutting issues

4.1. Overview

The cross-cutting issues include:

- **Key category analysis;**
- **Uncertainty analysis;**
- **Recalculations and time-series consistency;**
- **QA/QC.**

Assessing the overall completeness and transparency of a Party's submission also requires a cross-cutting approach.

The review of cross-cutting issues requires close cooperation between the sectoral and generalist experts in the TERT. The sectoral experts assess cross-cutting issues at the sectoral level and provide sectoral-level assessment to the generalist experts, who perform an overall review of the cross-cutting issues.

4.2. Key category analysis

As you have seen in lesson 3, categories are considered key if they have a significant influence on a country's GHG inventory in terms of their absolute level, trend and/or uncertainty of emissions and removals.

To identify key categories, Parties need to perform a key category analysis. The TERT should assess if the key category analysis follows the provisions of the MPGs.

4.3. Key category analysis: review points

- Has the Party implemented an approach 1 for key category analysis, with and without LULUCF, for the starting year and latest reporting year, for both level and trend, and reported the results in the NID?
- Is the analysis technically correct in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 4)?
- Has the Party described the level of disaggregation used?
- In cases where a developing country Party is applying flexibility in the light of its capacities with respect to this provision, has it applied a threshold no lower than 85 per cent in place of the 95 per cent threshold defined in the 2006 IPCC Guidelines?
- Are there significant differences between the Party's national key category analysis reported in the NID and the key category analysis in CRF table 7?

4.4. Uncertainty

In lesson 3 you learned about the requirements of the uncertainty analysis.

To learn more about conducting and reporting an uncertainty analysis, refer to the 2006 IPCC Guidelines (vol. 1, chap. 3).

The sectoral experts check, for each category, if the uncertainty values associated with the EFs, the AD and other parameters used were derived and reported in accordance with the good practice guidance provided in each sectoral chapter of the 2006 IPCC Guidelines.

The generalist experts review the method used to combine uncertainties and its reporting.

4.5. Uncertainty: review points

Overall

- Has the Party performed and reported an uncertainty analysis in accordance with the provisions of the MPGs and the technical guidance in the 2006 IPCC Guidelines for at least the starting year, the latest reporting year and the trend?
- Have the uncertainties of the data used for all source and sink categories been reported, including the methods used and assumptions?
- Does the Party consider the results of the uncertainty analysis in targeting future inventory improvements? If so, how?

Quantitative estimates

- Is the analysis technically correct in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 3)?
- In cases where no quantitative estimates are provided, has the developing country Party clearly stated application of the flexibility provision in accordance with paragraph 6 of the MPGs?

Qualitative information

- Is the qualitative discussion, including on the sources of uncertainty, in the inventory in accordance with the 2006 IPCC Guidelines (vol, 1, chap. 3.5, volume 1)? This qualitative discussion is important because considering the reasons for uncertainty in an inventory (not just which parameters are uncertain) leads to future improvements.
- In cases where a developing country Party is applying flexibility, has it provided, at a minimum a qualitative discussion of uncertainty for key categories?
- Has detailed information on assumptions and sources of input data, including the documentation of any expert judgment, been provided in the NID?

4.6. Time-series consistency

According to the MPGs (para. 26), all emission estimates in a time series should be estimated consistently, which means that, as far as possible, the time series should be calculated using the same method and data sources for all years.

Where the same data sources or methods cannot be applied for the entire time series, Parties should use methods from the 2006 IPCC Guidelines to estimate missing values due to lack of data.

4.7. Time-series consistency: review points

Documentation

- Check for significant discontinuities in the time series of AD, EF or emissions or removals for each category (including subcategories).
- Check if the Party explains how it ensures time-series consistency.
- When the Party has not used the same methodology or the same data source throughout the time series, check the Party's explanation of how it has ensured time-series consistency in accordance with the technical guidance in chapter 5 of volume 1 of the 2006 IPCC Guidelines and paragraphs 26–28 of the MPGs.

Techniques used

- Check that the techniques and approach used for ensuring time-series consistency are appropriate.
- Check that potential inconsistencies have been correctly handled and that no bias has been introduced. Such biases are especially critical if they affect the base-year estimate or the most recent year estimate because they are used to calculate the emission trend.
- Are AD prepared on a calendar year basis and consistently across time? Use of calendar year data is good practice whenever the data are available. However, if calendar year data are unavailable, then other types of annual year data (e.g. non-calendar fiscal year data, April to March) can be used for certain categories provided that they are used consistently over the time series and the collection period for the data is documented.

To learn more about non-calendar year data, refer to the 2006 IPCC Guidelines (vol. 1, chap. 2)

You may be familiar with the review tool Locator if you are currently involved in the review of Annex I Parties' GHG inventories, which is useful for assessing time-series consistency. The secretariat will provide similar review tools useful for detecting issues with time-series consistency for reviews under the Paris Agreement (see lesson 9).

4.8. Recalculations

Parties must carry out recalculations, as required in the 2006 IPCC Guidelines, ensuring that changes in emission trends are not introduced as a result of changes in methods or assumptions across the time series.

You have already seen in lesson 3 the list of reasons for performing recalculations. See the box below to recall these reasons.

Key reasons leading to recalculations
• Available data have changed. • A category has become key and therefore the Party applies a higher-tier method to estimate emissions/removals. • The previously used method is insufficient to reflect mitigation activities in a transparent manner and the Party chooses to apply a higher-tier method. • The capacity for inventory preparation has increased. • New inventory methods become available. • Correction of errors.

To learn more about the underlying reasons for recalculations and the relationship with ensuring time-series consistency, refer to the 2006 IPCC Guidelines (vol. 1, chap. 5)

4.9. Recalculations: review points

Transparency

- Have the recalculations been reported for the starting year and all subsequent years of the time series up to the latest year for which the recalculations are made?
- Has the Party provided in its NID detailed and transparent documentation of all the changes and recalculations made in its inventory since its last submission?
- Have all changes in emission estimates been explained and justified in the NID (note: minor changes due to rounding are not considered recalculations)?

Reasons for recalculations

- Does the NID include sufficient information as to why a recalculation has been conducted (e.g. error correction, statistical reason or reallocation of categories, changes in methodologies, sources of information and assumptions)?
- Have changes and recalculations led to improvements in accuracy?

Time-series consistency

- Is the same methodology used for the entire time series?
- Have the underlying AD and EFs been obtained and used in a consistent manner?
- If the same methods, source of AD and/or EFs are not used for the entire time series, has the Party applied techniques consistent with the 2006 IPCC Guidelines to ensure time-series consistency?

Impact of recalculations

- Does the NID include a discussion on the impact of the recalculations on the trend in emissions?
- Has time-series consistency been ensured? Keep in mind that recalculations are often a source of time-series inconsistency.

CRT 8: recalculations

- CRT 8 provides quantitative information on the difference between the current submission and the previous submission for each category and gas.
- References to the relevant sections of the NID should be provided.
- Verify that the reporting of recalculations is transparent.

You may be familiar with the review tool Comparison tool if you are currently involved in the review of Annex I Parties' GHG inventories, which is useful for assessing recalculations. The secretariat will provide similar review tools helpful for identifying changes in data (see lesson 9).

4.10. QA/QC

Each Party must have a QA/QC plan, which includes general inventory QC procedures and outlines the agency/agencies responsible for implementing those procedures. Parties should conduct category-specific quality checks (particularly for key categories or categories undergoing large methodological changes) and QA activities, including a basic review of the GHG inventory. The QA/QC plan must be documented in the NID, including how it was implemented for the most recently submitted inventory and plans for implementation in the future.

Those developing country Parties that need flexibility in the light of their capacities with respect to this provision are instead encouraged to elaborate a QA/QC plan, including information on the inventory agency responsible for QA/QC, and implement and report on general inventory QC procedures in accordance with this plan.

To learn more about QA/QC activities, refer to the 2006 IPCC Guidelines (vol. 1, chap. 6).

4.11. QA/QC: review points

- Has the Party developed a QA/QC plan? Is it described in its NID? You may wish to ask to see this plan and try to determine if checks are carried out consistently with the plan.
- Are category-specific QC procedures implemented in accordance with the QA/QC plan? Are the outcomes and planned improvements described in the NID?
- Have specific QC procedures been applied for key categories and for individual categories where significant methodological changes or data revisions occurred?
- Has the inventory been subject to QA? Have the results of any QA procedures (e.g. expert peer review) been incorporated into the final inventory submission and considered in the improvement plan for future submissions?
- In cases where the developing country Party applied a flexibility provision, has the Party clearly stated application of flexibility in the NID in accordance with paragraph 6 of the MPGs?

5. Practical exercise

Consider the following scenario:

A developing country Party estimates CO_2 emissions from ammonia production, reports the estimates in the CRT and includes a description of the category in its NID. The category is not a key category. In the NID, the Party reports that it applies a tier 1 method to this category, since the category is not key. In your assessment, the Party reports the AD and EFs used, as well as the sources of these factors. The information is reported in the NID for the entire time series, from 2000 onwards. The Party does not report on its QA/QC plan but does report the QC checks done for ammonia production. The Party does not quantify the uncertainty of this category, and a qualitative discussion of uncertainty is not provided in the NID. The Party explained in the NID that it is applying flexibility for the time series of estimates as well as the uncertainty assessment. The Party's NDC has a reference year of 2020.

Please answer the following questions, based on the information provided.

Question 1

Has the Party met all mandatory requirements for the reporting of the time series?

A. Yes
B. No

Question 2

Has the Party met all mandatory requirements for the reporting of QA/QC activities?

A. Yes
B. No

Question 3

As a reviewer, what questions might you ask the Party regarding its QA/QC activities?

Submit your question here:

Question 4

Assuming the Party does not elect to apply flexibility for the reporting of the QA/QC plan, would you include a recommendation or an encouragement in your final report to develop and report on a QA/QC plan?

A. Recommendation
B. Encouragement

Question 5

Has the Party met all mandatory requirements for the reporting of uncertainty?

A. Yes
B. No

5.1. Answers to practical exercises

Question 1

The correct answer is A. The Party has reported a time series from 2000 onwards. Generally, emissions must be reported from 1990 onwards. However, developing countries who need it in the light of their capacities may report this information from the starting year of their NDC, and then annually from 2020 onwards. The Party has explained in the NID that it is applying flexibility for this provision. As the NDC start year is 2020, reporting the annual time series from 2000 onwards is consistent with the MPGs.

Question 2

The correct answer is B. Parties are required to develop a QA/QC plan and implement QC checks in accordance with the plan. There is no information in the NID on the Party's QA/QC plan. Although developing country Parties may apply flexibility with respect to this provision, in light of their capacities, and are not required to provide a plan, application of this flexibility must be noted in the NID. The Party did not provide this information.

Question 3

There are a number of questions you may ask the Party. Below are some examples:

- The TERT noted that the Party included the results of its QC checks for ammonia production in the NID. However, there is no further discussion of the overall QA/QC plan. Does the Party have a QA/QC plan?
- Are there any capacity-building needs related to development of the QA/QC plan?
- The TERT notes that there is no reference to QA activities for ammonia production in the NID. Is there any external review of the CO_2 emission estimates from ammonia production?

Question 4

The correct answer is A. According to paragraphs 34 and 46 of the MPGs, Parties must elaborate and report a QA/QC plan.

Question 5

The correct answer is A. The developing country Party noted that it applied a flexibility provision for uncertainty. In this case, quantitative estimates of uncertainty are not required to be reported. Further, a qualitative assessment of uncertainty is only required for key categories. CO_2 emissions from ammonia production is not a key category.

6. Lesson Summary

The core of your work will be assessing whether emissions and removals for each category have been estimated in accordance with good practice, including:

- Assessing completeness, particularly the use of notation keys;
- Assessing whether methods follow the decision trees in the 2006 IPCC Guidelines;
- Assessing whether data sources are transparently described and if data used are appropriate for the method employed;
- Assessing the cross-cutting issues for the relevant sector and each category, including key category analysis, uncertainty, recalculations, time-series consistency and QA/QC procedures.
- The sectoral assessments of cross-cutting issues are provided to the generalist experts for the overall assessment of cross-cutting issues.

7. Self-check quiz

You are now invited to take a self-check quiz to test your understanding of the individual review process and see if you need to review the subject before moving on to the next lesson.

For each question, select your answer and then click "submit" to see the correct answer.

Question 1

During the review, you should pay particular attention to all of the following, except:

A. Key categories

B. Areas of the inventory where issues have been identified in previous reviews

C. Areas where you have more expertise

D. Areas where recalculations or other changes have been reported by the Party

E. Progress in the implementation of planned improvements

Question 2

The tasks performed by the TERT during a review include all of the following, except:

A. Assessing whether the national inventory arrangements are performing the required functions

B. Assessing the extent to which issues and questions raised by previous TERTs have been resolved

C. Identifying any missing categories and examining any explanatory information relating to their exclusion from the GHG inventory

D. Assessing, for key categories only, the consistency of the information in the CRT with that in the NID

Question 3

The issues related to the consistency of the Party's submission with the requirements of the MPGs can be subdivided into issues related to transparency, accuracy, completeness, consistency, comparability and comparability.

A. True

B. False

Question 4

The meanings of all the following CRT notation keys are true, except:

A. "NO" – not occurring
B. "NE" – not estimated
C. "NA" – not available
D. "IE" – included elsewhere
E. "C" – confidential
F. "IN" – insignificant
G. C and E
H. C and F

Question 5

What should you do as a reviewer if a Party reports "C" in the CRT for confidential AD information?

A. You should include a finding in your report noting that use of "C" is not a valid notation key
B. You do not need to do anything further; the Party's reporting is valid
C. You draft a question to the Party requiring them to submit the confidential data to support the review process
D. You draft a question to the Party asking if they can provide confidential data to support the review process, and if not, identify other means to assess the TACCC of the Party's reporting

Question 6

For which reporting element do the MPGs provide a flexibility provision?

A. Uncertainty
B. QA/QC
C. Insignificant categories
D. All of the above
E. None of the above

7.1. Answers to self-check quiz

Question 1

The correct answer is C. You must be able to assess all issues and categories in relation to your assigned sector.

Question 2

The correct answer is D. During the review, all tasks shall be performed for all categories and not only for key categories.

Question 3

The correct answer is A. Parties are required to apply these principles from the 2006 IPCC Guidelines when developing their GHG inventory. As a reviewer you must therefore assess consistency with these principles during your review.

Question 4

The correct answer is H. "NA" means not applicable and the notation key "IN" does not exist. Any category considered insignificant by the Party must be reported as "NE".

Question 5

The correct answer is D. A Party can report the notation key “C” to avoid confidential data from being disclosed. As a reviewer, you need to assess the Party’s reporting further to ensure that the emissions are still included in the national totals. To do this, you may ask the Party to provide the confidential information. If they cannot provide this information in accordance with domestic law, you may work with the Party to identify ways to ensure the TACCC of the Party’s reporting.

The NID and the CRT should also clearly indicate where in the inventory these confidential emissions/removals are included. Even though the emissions/removals are considered confidential they must be included in the national total. Typically, Parties will report a combination of “C”, “IE” and then indicate in CRT 9 and the NID where the confidential emissions/removals are reported.

Question 6

The correct answer is D. Flexibility provisions are available for uncertainty (MPGs, para. 29), QA/QC (MPGs, paras. 34 and 35) and insignificant categories (MPGs, para. 32). In all cases where flexibility is applied, the Party must describe this in the NID and/or CRT.

Lesson 8: National inventory arrangements

1. Introduction

Each Party should implement and maintain national inventory arrangements in accordance with the MPGs.

This lesson explains the institutional arrangements that each Party should put in place for planning and managing the GHG inventory process on a permanent basis, and also explains how to review the related information provided in the NID.

The lesson consists of two key topics:

1. General requirements for Parties
2. Reviewing national inventory arrangements

At the end of this lesson, you should be able to:

- Identify the requirements related to implementing and reporting on national inventory arrangements;
- Assess the consistency of the Party's reporting on national inventory arrangements with the requirements in the MPGs;
- Draft your findings in a review report, including recommendations and encouragements and, for those developing country Parties that need flexibility in the light of their capacities, capacity-building needs.

Expected time needed to complete lesson 8:

- For readers with experience: 15–30 minutes
- For readers with less experience: 60 minutes

2. General requirements for Parties

2.1. National inventory arrangements

The national inventory arrangements include all of a Party's institutional, legal and procedural arrangements for estimating anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol, and for reporting and archiving inventory information.

The objective of a Party's inventory arrangements is to ensure the production of a high-quality GHG inventory that is transparent, accurate, complete, consistent and comparable as established in paragraph 3(d) of the MPGs.

The functions of the national inventory arrangements are established in paragraphs 18–19 of the MPGs. However, Parties design their national inventory arrangements in line with their national circumstances and preferences.

A Party shall report on:

- Its national entity or focal point with overall responsibility for the national inventory;
- Its inventory preparation process, including division of specific responsibilities of institutions participating in the inventory preparation to ensure that sufficient AD collection, choice and development of methods, EFs and other parameters are in accordance with the 2006 IPCC Guidelines;
- Its archiving of all information for the reported time series, including all disaggregated EFs and AD, all documentation about generating and aggregating data, including QA/QC, review results and planned inventory improvements;
- Its processes for the official consideration and approval of the inventory.

3. Reviewing national inventory arrangements

3.1. Approaches and national circumstances

Each Party is likely to have its own approach to the institutional design of its national inventory arrangements taking into consideration national circumstances.

Specific situations you may encounter during the review include the following:

- The inventory is prepared almost entirely by government employees within a single agency;
- The Party has formed an advisory or oversight board composed of representatives of multiple agencies and ministries (and possibly other organizations) that make decisions and oversee the inventory preparation process;
- A small team of government employees oversees the preparation of the inventory by a number of external consultants and researchers;
- The Party has completely outsourced the inventory preparation process to an outside organization such as a consulting company, university or research institute;
- The preparation of the inventory has been delegated to the country's provinces or states. The separate provincial inventory data are aggregated at the national level before being submitted to the secretariat.

Explore the various types of institutional arrangements reported by Parties, available here. Notice the different organizations involved and the relationships among the organizations.

Many other situations are possible; there is no definitive correct approach. Whatever the approach, you should review whether it ensures that the necessary functions are effective in maintaining the quality of the Party's inventory and improving it over time and that decisions are made in an effective and timely manner.

The main test of whether the institutions that make up the Party's national inventory arrangements are functioning properly is to determine whether the Party is able to compile the GHG inventory in a timely manner and consistently with the MPGs.

Whatever the approach or arrangements, the MPGs require Parties to designate a national entity or national focal point with overall responsibility for the national inventory (MPGs, para. 19(a)).

3.2. Roles and responsibilities

Parties must report on the division of specific responsibilities of institutions participating in the inventory preparation, ensuring that the following functions are in accordance with the 2006 IPCC Guidelines (MPGs, para. 19(b)):

- Collection of sufficient AD;
- Choice and development of methods;
- Application of EFs and other parameters.

In reviewing the Party's institutional arrangements, you should determine:

- Whether there are well-understood agreements between the Party's national entity or national focal point and each data supplier. These agreements may take the form of memorandums of understanding or legal arrangements, or more informal understandings. Although formal arrangements are not a requirement, such arrangements should be encouraged to promote a more sustainable inventory system that allows for continued estimation and improvement over time;
- Whether formal or informal, there should be a common understanding of the roles and responsibilities of each institution in the inventory planning, preparation and data management process.

3.3. Review points

The following are examples of questions that you may wish to ask representatives of the Party's national entity or national focal point:

- Do you have formal agreements or memorandums of understanding with any companies or other government ministries or agencies for the collection of AD?
- If you do not have formal memorandums of understanding, what types of agreement do you have with data suppliers?
- Do you have different types of agreement with other government agencies from those with private companies or trade associations? What are the differences?
- Do you coordinate the collection of data with other national or provincial policies, such as reporting under an emissions trading system or the Convention on Long-Range Transboundary Air Pollution?
- What specific responsibilities have you delegated to the institutions that collect data for the inventory?
- Who has the authority to decide when there are insufficient data to estimate emissions or removals for a particular category (i.e. categories reported as "NE")?
- What specific processes do you and your data suppliers have in place for dealing with confidential information?
- Have your data suppliers incorporated appropriate QA/QC procedures into their data-collection processes to ensure that the quality of their data meets the needs of the national inventory and the 2006 IPCC Guidelines?
- How is it decided what data to collect and how to collect it?
- Do you need any assistance in identifying capacity-building needs related to enhancing institutional arrangements?

3.4. Inventory preparation process

When assessing whether a Party's reporting is consistent with paragraph 19(b) of the MPGs, you should consider whether the specific institutions, procedures and timelines for developing the GHG inventory achieve the functions described in lesson 3, in particular if the Party described the institutions and procedures for:

- The key category analysis, and the resulting process for determining application of tier 1, tier 2 or tier 3 methods for key categories;
- Identifying relevant institutions and timelines for data collection, calculation of emissions and removals and compilation of the inventory;
- Development of the QA/QC plan, and identification of who is responsible to undertake QA/QC checks and when;
- Collection of information to assess uncertainty;
- Improving the GHG inventory over time.

The actual institutions, procedures and timelines may differ from Party to Party. What is important is that sufficient information is provided in the NID for you as a reviewer to assess that the Party has in place procedures to select appropriate methods, and collect the necessary AD, EFs and other parameters in accordance with the 2006 IPCC Guidelines.

3.5. Review points

Once you have analysed the information provided by the Party in its NID you should then investigate, by collecting information and evidence, whether the national entity or national focal point and other institutions involved in the inventory preparation are adequately and effectively implementing the appropriate functions.

You should review whether the Party:

- Ensured sufficient capacity for the timely collection of AD for estimating anthropogenic GHG emissions and removals for all sectors (energy, IPPU, agriculture, LULUCF and waste) consistent with results of the key category analysis;
- Ensured sufficient arrangements for the technical competence of the staff involved in inventory development;
- Has a process for implementing the QA/QC checks, consistent with the QA/QC plan, and for ensuring that checks undertaken consistently across the entire inventory;
- Utilizes some type of QA process and whether the results of the process are addressed by the national entity or national focal point in cases where improvements to the inventory are called for. If it is not possible to make immediate improvements, revisions should be scheduled for future inventory years.

3.6. Archiving and documentation

The amount of inventory data will continue to increase. Parties will be managing an enormous amount of inventory data to cover the whole time series since 1990. Therefore, it is essential that the Party has in place a systematic process for managing and archiving all information used in the preparation of the inventory, which is likely to include an electronic data management system for storing computer files, as well as a document archiving system.

Parties shall report on their archiving procedures for all information for the reported time series (MPGs, para. 19(c)), including:

- All disaggregated EFs and AD;
- All documentation about generating and aggregating data, including QA/QC procedures;
- Review results;
- Planned inventory improvements.

3.7. Review points

To review the archiving system, you should consider whether the Party is can, for example:

- Provide specific documents referenced in current and past inventory reports, upon request;
- Provide documentation that provides justification for assumptions made in the current and past inventories;
- Explain the structure of the archive (e.g. is it in a centralized location or distributed across institutions?);
- Describe any procedures to ensure the security of the archive (e.g. who has access? What are the backup procedures?).

Inability to produce this type of historical information, particularly during an in-country review, may be indicative of inadequate documentation and archiving processes.

The Party's archiving and documentation processes may have been reviewed by in-country review teams in the past. However, you should recheck the processes to ensure that they remain adequate to support the assessment by the TERT.

3.8. Inventory approval

You should ensure that the Party has elaborated and reported on an approval process for the final inventory submission, including acceptance by the relevant ministers or other government officials (MPGs, para. 19(d)). The process should include clear lines of authority for responding to questions from the TERT during the review; a process for finalizing the inventory; and procedures for dealing with recalculations resulting from QA/QC findings (e.g. calculation errors) in the process of finalizing the inventory.

Remember, the GHG inventory may be submitted as a stand-alone document, or with the BTR.

A good indicator of the Party's ability to implement this function of national inventory arrangements is the ability to submit the GHG inventory on time, no later than 31 December of the year a BTR is due, or 15 April of every year for developed country Parties.

3.9. Inventory improvement

A Party's national inventory arrangements should be designed with a focus on the continuous improvement and continuous attention to maintaining the quality of the inventory.

3.10. Review points

During your review, you should investigate whether the Party:

- Is making efforts to ensure that the most suitable methodological guidance and data are used for estimating emissions and removals;
- Has a schedule for ensuring that the inventory is completed, officially approved and submitted on time to the secretariat, including timing for completing the CRTs and the NID, implementing QC procedures, completing QA reviews (if applicable) and making any necessary recalculations or revisions;
- Has a system in place for tracking planned improvements resulting from QA/QC or previous review findings;
- Has an improvement plan and is prioritizing improvements for future implementation as time and resources permit;
- Has established, where a developing country Party has applied a flexibility provision, whether it has provided a self-determined estimated time frame for improvements in relation to those capacity constraints.

4. Lesson Summary

Each Party should implement and maintain national inventory arrangements in accordance with the MPGs.

National inventory arrangements can vary by Party depending on their national circumstances and preferences, and change over time.

The national inventory arrangements include all of a Party's institutional, legal and procedural arrangements for developing the national inventory.

Each Party shall report on:

- Its national entity or national focal point with overall responsibility for the inventory;
- Its inventory preparation process, including division of responsibilities of the participating institutions;
- Its archiving of all information used and developed, including EFs, ADs, documentation on generating and aggregating data, QA/QC procedures, review results and planned improvements;
- Its processes of official consideration and approval of the inventory.
- Strongly linked to the institutional arrangements and the functions of developing, managing and improving the national inventory are undertaking and reporting on the key category analysis, data collection procedures, QA/QC activities, uncertainty analysis and the improvement plan.

5. Self-check quiz

You are now invited to take a self-check quiz to test your understanding of national inventory arrangements and see if you need to review the subject before moving on to the next lesson.

Question 1

Which of the following is among the functions of a Party's national inventory arrangements?

A. Designating a national entity or national focal point with overall responsibility for the national inventory
B. Establishing and maintaining the institutional, legal and procedural arrangements between the government agencies and other entities responsible for the performance of all its functions
C. Ensuring that sufficient AD collection, choice and development of methods, EFs and other parameters are in accordance with the 2006 IPCC Guidelines
D. Archiving all information used for the reported time series, including all disaggregated EFs and AD, all documentation about generating and aggregating data, including QA/QC, review results and planned inventory improvements
E. All of the above. All are functions of national inventory arrangements

Question 2

The national inventory arrangements should ensure that the national inventory is transparent, accurate, complete, consistent and comparable.

A. True
B. False

Question 3

Which of the inventory management functions below are correctly formulated?

I. Archive in a single centralized location all information for the reported time series, including all disaggregated EFs and AD, all documentation about generating and aggregating data, including QA/QC procedures, review results and planned inventory improvements;

II. Provide review teams with access to all archived information used by the Party;

III. Respond, in a timely manner, to requests for clarifying inventory information resulting from the different stages of the process of the review of the inventory information and information on the national inventory arrangements.

Select one:

A. I and II

B. II and III

C. I

D. II

E. III

5.1. Answers to self-check quiz

Question 1

The correct answer is E. All functions described in A–D are functions of the national inventory arrangements.

Question 2

The correct answer is A. True in accordance with paragraph 3(d) of the MPGs.

Question 3

The correct answer is B. I is not fully correct because the information does not need to be archived in a single centralized location.

Lesson 9: Review tools and templates

1. Introduction

During the review, you will be working primarily with two sets of documentation:

The submission from the Party (CRTs and the NID); and

The guidelines:

- MPGs and decision 5/CMA.3
- 2006 IPCC Guidelines
- 2019 Refinement to the 2006 IPCC Guidelines, for those Parties that use it on a voluntary basis.

In order to help you navigate through all this information, particularly the huge amount of data contained in the CRTs, the secretariat will make available a set of tools, hereinafter referred to as "review tools". These tools mainly extract from the CRTs the information necessary to help you check if the requirements of the guidelines have been met.

At the time of the preparation of this course, the review tools for the review of submissions under the Paris Agreement had not yet been developed. This lesson provides only introductory information on the types of activities you will be able to conduct with these tools. The secretariat will provide you with more specific information on the tools available prior to your first review.

The lesson consists of one key topic:

1. Review tools and templates

At the end of this lesson, you should be able to:

- Understand the types of review tools available to help you to identify possible issues in a Party's submission;
- Understand the types of templates available to document your review findings.

Expected time needed to complete lesson 9:

- For readers with experience: 15–30 minutes
- For readers with less experience: 60 minutes

2. Review tools and templates

The secretariat will make available to you a variety of tools to help to support you in the review process. The tools will help you to:

- Communicate with the Party;
- Organize your review findings;
- Identify possible issues with the Party's submission, in particular related to time-series consistency, accuracy, comparability and completeness;
- Document your findings in the review report.

At the time of the preparation of this lesson, the review tools and templates for review of the GHG inventories submitted under the Paris Agreement were not yet available. This lesson will provide you with a brief introduction to the various types of review tools and templates, based on the types of review tools available to support the review of GHG inventories from developed and developing countries Parties under the Convention.

Prior to your participation in an actual review of a GHG inventory submitted under the Paris Agreement, the secretariat will make the relevant review tools available, along with specific instructions on their use.

2.1. Virtual team room

A virtual team room will be made available as a documentation hub for the review. For reviews under the Convention, this virtual team room included all the materials used in the review and was used to store and exchange review documents between expert review team members, the secretariat and the Parties whose inventories were being reviewed.

The virtual team room for reviews under the Convention included the following functionalities:

Reference library, including the background materials commonly used by all expert review teams (e.g. relevant decisions, guidance from lead reviewers, links to relevant review tools, 2006 IPCC Guidelines).

Workspace, including:

- Inventory submissions for the Parties under review by the expert review team (for the year under review and two previous years);
- General working space, in which the team can upload documents;
- Early review materials for the Parties under review, including any results of statistical tests, and recently published review reports.

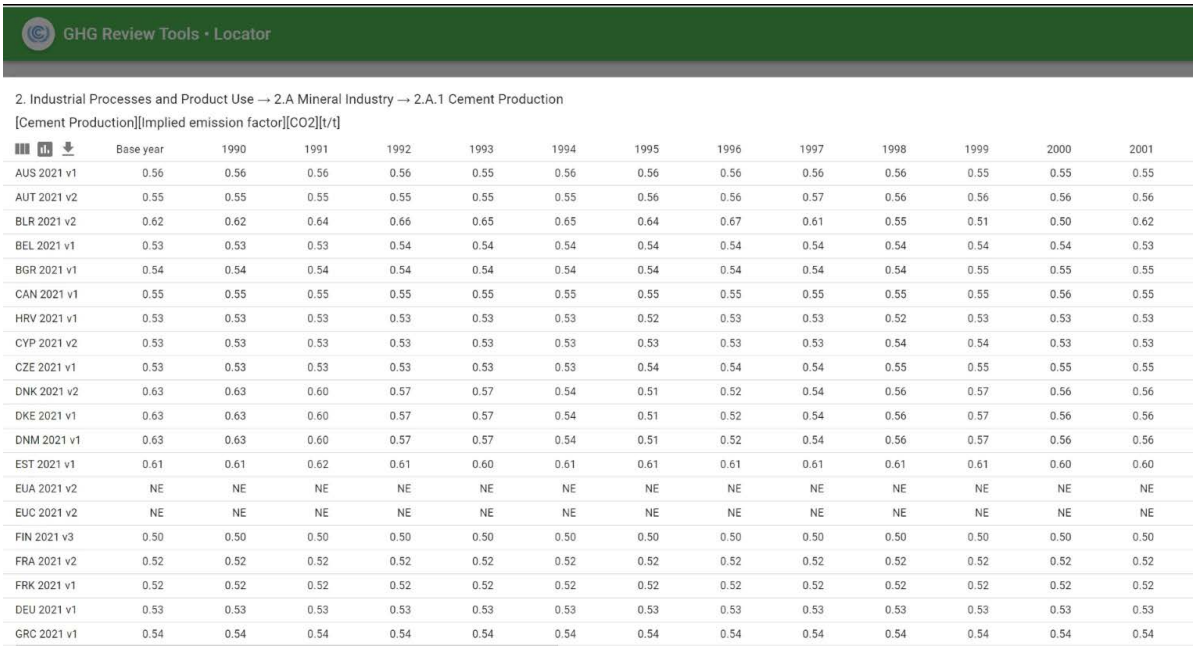
Question and answer module, which manages, stores and tracks the questions and answers sent between the review team and the Party. This module provides an interactive interface that allows all review team members to put questions to the Party in support of their GHG inventory review tasks.

Report preparation function, which allows the expert review team to simultaneously work with a shared version of the draft review report.

2.2. Locator tool

For reviews under the Convention, experts had available a Locator tool. It is envisioned that a similar tool will be made to support the review process under the Paris Agreement, although the specific functionalities remain to be determined.

The Locator tool was a user-friendly search engine that provided access to the data submitted by developed countries in their CRF tables. Expert review team members could sort or search data according to Party, submission year, category, GHG, CRF table and specific data type (e.g. emissions, AD, EFs) by scrolling down a category tree. The Locator gives experts quick access to data with maximum flexibility and is often the most efficient way to find inventory data while performing a review. The Locator allows you to search data for a particular Party or for all Parties, for one year or for the entire time series.


GHG Review Tools • Locator

2. Industrial Processes and Product Use → 2.A Mineral Industry → 2.A.1 Cement Production

[Cement Production][Implied emission factor][CO2][t/t]

	Base year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
AUS 2021 v1	0.56	0.56	0.56	0.56	0.55	0.56	0.56	0.56	0.56	0.56	0.55	0.55	0.55
AUT 2021 v2	0.55	0.55	0.55	0.55	0.55	0.55	0.56	0.56	0.57	0.56	0.56	0.56	0.56
BLR 2021 v2	0.62	0.62	0.64	0.66	0.65	0.65	0.64	0.67	0.61	0.55	0.51	0.50	0.62
BEL 2021 v1	0.53	0.53	0.53	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.53
BGR 2021 v1	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.55	0.55	0.55
CAN 2021 v1	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.56	0.55
HRV 2021 v1	0.53	0.53	0.53	0.53	0.53	0.53	0.52	0.53	0.53	0.52	0.53	0.53	0.53
CYP 2021 v2	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.54	0.54	0.53	0.53
CZE 2021 v1	0.53	0.53	0.53	0.53	0.53	0.53	0.54	0.54	0.54	0.55	0.55	0.55	0.55
DNK 2021 v2	0.63	0.63	0.60	0.57	0.57	0.54	0.51	0.52	0.54	0.56	0.57	0.56	0.56
DKE 2021 v1	0.63	0.63	0.60	0.57	0.57	0.54	0.51	0.52	0.54	0.56	0.57	0.56	0.56
DNM 2021 v1	0.63	0.63	0.60	0.57	0.57	0.54	0.51	0.52	0.54	0.56	0.57	0.56	0.56
EST 2021 v1	0.61	0.61	0.62	0.61	0.60	0.61	0.61	0.61	0.61	0.61	0.61	0.60	0.60
EUA 2021 v2	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
EUC 2021 v2	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
FIN 2021 v3	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
FRA 2021 v2	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
FRK 2021 v1	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
DEU 2021 v1	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
GRC 2021 v1	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54

Search results from the Locator for the CO_2 implied EF for cement production from developed country Parties (based on review cycle 2021)

2.3. Comparison tool

The Comparison tool is used for reviews under the Convention to enable the expert review team to review the recalculations for all years in the time series without opening individual CRF tables. It is a tool for comparing different submissions from a Party. Recalculations are provided in both absolute and percentage terms and for the entire inventory and for individual categories.

The expert review team is able to use the Comparison tool to identify differences between two submissions, including differences in numerical data and changes from a notation key to number and vice versa.

A tool enabling this type of analysis will be made available to reviewers under the Paris Agreement. This tool could be stand-alone, as was the case under the Convention, or could be integrated into the statistical tool introduced on the previous page.

2.4. Methods tool

A tool will be made available to provide you with an overview of the categories and gases for which methods and/or EFs are provided in the 2006 IPCC Guidelines.

The worksheet for each sector contains information on the availability of methods and EFs. For some categories, the values of default EFs are shown. On the worksheet for the LULUCF sector, information on mandatory reporting categories is shown.

Be aware that the Methods tool should be used as a quick reference only. You, as a sectoral reviewer, should study the methodological guidance set out in the 2006 IPCC Guidelines when reviewing the information provided by the Party for each category/subcategory.

2.5. Templates

The secretariat will develop templates in order to facilitate the drafting of your findings in the output documents established in the MPGs. These templates are intended to promote:

- Consistency in the reviews among different Parties;
- Consistency in the contents among the outputs of the review (i.e. draft areas of improvement, capacity-building needs identified in consultation with the Party concerned (if appropriate), and the draft review report).

It is important to adhere to any templates provided by the secretariat. These templates will provide you with the space to include your findings that are specific to the review.

3. Lesson Summary

- The review tools to support the review process under the Paris Agreement are not yet available. They will be made available prior to your participation in your first review.
- The goal of the review tools is to enhance the efficiency of your review.
- Review tools can help you to identify outliers in trends for emissions, AD, IEFs for the Party itself, or compared with what is reported by other Parties. They can also help you to visualize recalculations.