



U.S. EPA Templates for Creating a National GHG Inventory System Manual

3. Methods and Data Documentation



1: How to Use the Templates



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Introduction to Template 3. Methods and Data Documentation

In the U.S. EPA's *Templates for Creating a National GHG Inventory System Manual*, this is Template 3. Its purpose is to help inventory compilers document and report the methodologies, datasets (e.g., activity data and emission factors), and assumptions used to estimate emissions and removals from each category in accordance with the 2006 IPCC Guidelines and good practice. This template facilitates compiling disaggregated data encouraged in current reporting requirements (e.g., Biennial Update Report). Compiling disaggregated data will be required in future reporting (i.e., under the Enhanced Transparency Framework¹ for National GHG Inventories) to the United National Framework Convention on Climate Change (UNFCCC). Use of the Methods and Data Documentation (MDD) template will:

- help current inventory compilers in drafting a National Inventory Report;
- support future inventory compilers in their compilation effort as they will be able to better understand previously used data, and data collection approaches and methodologies, thus increasing compilation efficiency and consistency; and
- allow users to reproduce past estimates, increasing the transparency of reporting, which can be particularly valuable for peer review processes.

Sector or category leads (see roles documented in Template 2. Institutional Arrangements), with the support of other key inventory team members as required, are encouraged to complete this template for all categories included in the inventory. Where resources are limited, the template should be prioritized for each key category identified in the country's most recent Key Category Analysis (e.g., the one the country performed for its previous inventory). Where this is the case or where all categories are covered, but sector or category leads find it more convenient to have separate documents for different sectors/categories, indicate the

¹ See 18/CMA.1, Modalities, Procedures and Guidelines (MPGs), Annex Chapter II, Section A. Definitions, [Section B. National Circumstances and institutional arrangements](#), [Section C. Methods](#), and [Section E. Reporting guidance](#) for National Greenhouse Gas Inventory Report (available at <http://unfccc.int/decisions>).



sectors/categories covered in the title on page 1 as well as in the filename of the document. The instructions below also provide guidance on how to use this template if you are using inventory software tools such as *IPCC Inventory Software*.

A category, according to the 2006 IPCC Guidelines, is either a defined source of GHG emissions or a defined sink storing GHGs. Each sector, for example, Energy, is divided into categories. Some categories are divided into subcategories. For example, “1A3bi Cars” is a subcategory of “1A3 Transport,” a category in the Energy sector.

To complete this template and document your methodology, activity data, and emission factors or stock change factors for each emission or removal category, carry out the steps listed below by following the instructions above each table in this template.

When the tables are complete, delete the green text throughout this template. You may use the remaining text or tables for reporting or for your National GHG Inventory System Manual.



Step

Purpose

1. During the data collection stage of the GHG inventory cycle, complete one set of Tables 3-1 to 3-4 for each source or sink category by following the instructions for each variable within the tables. The instructions are in green italic font. Table 3-1 is for general information about the category. Table 3-2 is for information on the methodology you will use to estimate emissions or removals for that category. Tables 3-3 and 3-4 are for specific information on the activity data and emission factors/carbon stock change factors (EF/SCF) you are using. If more than one GHG, type of activity data, or EF/SCF will be reported for a given category, you will need to complete Table 3-2, Table 3-3, or Table 3-4 for each GHG, type of activity data, or EF/SCF, respectively.

As an alternative to recording activity data and EF/SCF for each category in Tables 3-3 and 3-4, you may record this information in the *IPCC Inventory Software* to help streamline the inventory data compilation process, in case you intend to use that software to estimate GHG emissions and removals. The *IPCC Inventory Software* provides a stepwise framework to build an inventory, can handle multiple years of data easily, allows multiple users, includes built-in IPCC defaults, and allows automatic data archiving. Refer to the *IPCC Inventory Software* website¹ for more information on what the software includes and a user manual that provides a step-wise walkthrough. If you use the IPCC software and do not wish to duplicate the information you will input into the IPCC Software (i.e., your activity data and EF/SCF for each category), then you may opt to skip the Activity Data Values and EF/SCF Values segments of Tables 3-3 and 3-4. Do note in the tables where and how to access those data.

If you decide to not use the IPCC Software, for example, because you are unable to download, install, run, or otherwise use the software, or you would simply prefer not to use it, then enter activity data and emission factors or stock change factors in Tables 3-3 and 3-4, respectively. Extend or modify the years included in the tables provided as necessary to cover your time series. Note, for any given category, the emission factor or stock change factor might be the same for all years of the time series.

2. After the GHG inventory compilation cycle has ended, use Table 3-5 to record ways to improve the emission or removal estimates for each category. If resources are limited, you may wish to focus on the categories that you have identified as key categories in Template 5, Key Category Analysis. For example, you may wish to note that in the next inventory, key categories should be estimated using Tier 2 or 3 methodologies where possible.

Tables 3-1 to 3-4 facilitate transparent and consistent data collection. Consistent with IPCC good practices, Tables 3-3 and 3-4 specifically allow activity data and emission factors to be transparently recorded and consistently archived with the description of each category. This can help you draft the inventory report in that you may copy these tables directly into the report.

Identifying improvements will help build inventory quality over time. Template 7 covers the prioritization of improvements and the development of an improvement plan.



Step 1: Complete one set of Tables 3-1 to 3-4 for each source or sink category.

✚ The title above the first set will be “Category 1” plus the category sector, code, and name, as indicated below. For the second set, follow the same procedure but change “Category 1” to “Category 2.” Continue in this manner until you have created a set of Tables 3-1 to 3-4 for each category. When you have completed this step, collate the sets of tables by sector.

Category 1: [Insert category sector, code, and name, e.g., “Energy: 1A3Bi Cars”]

Table 0-1. General information

Key category in the <u>previous</u> GHG inventory: <i>Record Yes or No</i>			
Greenhouse gases and tiers, as reported in the <u>previous</u> inventory:			
<i>Gases reported</i> <i>Record the GHG emitted/removed.</i> <i>Example: CO₂, CH₄, or N₂O</i>	<i>Key category</i> <i>Record Yes if the GHG named at left was a key category.</i> <i>Otherwise, record No.</i>	<i>Activity data Tier</i> <i>Record the tier level used for activity data.</i> <i>Example: Tier 1, 2, or 3</i>	<i>Emission factor Tier</i> <i>Record the tier level relating to the emission factor.</i> <i>Example: Country-specific, or default factor</i>
Category description/definition: <i>Record the (sub)category description in line with the 2006 IPCC Guidelines and a clear reference to the section or table in the 2006 IPCC Guidelines.</i> <i>Example: Emissions from automobiles so designated in the vehicle registering country primarily for transport of persons and normally having a capacity of 12 persons or fewer. (Source: Volume 2, Energy, Mobile Combustion, Table 3.1.1 https://www.ipcc-nggip.iges.or.jp/public/2006Guidelines/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf)</i>			
Relevant national circumstances: <i>Record relevant national circumstances, e.g. relevance of source to the national economy and in day-to-day life, development of emissions of GHGs and/or removals of CO₂ over time. Information about national circumstances, particularly category’s share in total emissions might not be available where a GHG inventory is compiled for the first time or information from previous compilation cycles have been lost or are known to be inaccurate. In this case, a simplified estimation or a qualitative assessment of the category’s likely share in total emissions and its trends might be sufficient.</i>			



Example: Emissions from this category have been increasing steadily over the last 5 years and had a share of 15% of total GHG emissions (without FOLU) in the 2014 inventory submission.

Table 0-2. Methodology

<p>Greenhouse gas: <i>Record the specific gas or gases to which the below methodology relates. Example: CH₄</i></p>	
<p>Equation and parameters: <i>Present the equation for the estimation of emissions/removals under this category and describe variables and describe its key parameters. Where several equations apply or equations are complex, a reference to the source complemented by any relevant assumptions about its application will suffice. Example: First order decay model as in Equation 3.1 of Chapter 3 of Volume 5 (Waste) of the 2006 IPCC Guidelines using default activity data and default parameters. Assumptions: No CH₄ capture takes place.</i></p>	
<p>Reference: <i>List the source of the equation, including full title, chapter, and page number/equation number. Example: Equation 3.1 of Chapter 3 of Volume 5 (Waste) of the 2006 IPCC Guidelines.²</i></p>	
<p>How and why this method was chosen: <i>Describe why this methodology is most appropriate for your country and how it was chosen. Appropriateness should be based on the IPCC decision trees, including considerations like data availability and cost-effectiveness. Describe the institutions/departments involved in the choice. Example: There is very little information on historical waste disposal amounts and waste composition available, therefore, a Tier 1 approach was chosen, allowing the use of default factors.</i></p>	

² http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf



Known limitations:

Describe any known limitations to the methodology. Example: Using a Tier 1 approach will not allow accurate estimation of CH₄ generation from historical or current waste disposal.

Table 0-3. Activity data general information, values, and QA/QC

Type of Activity data:	
Reporting unit: <i>This should be the unit in which the data are reported for estimating emissions/removals. Example: metric tons.</i>	
Appropriateness to national circumstances: <i>State how these specific activity data were chosen. Example: The National Cement Association compiles production data from all of its members.</i>	
Time series covered: <i>Record the years for which the activity data are available. Example: 2001-2013</i>	
Reference (if applicable): <i>If the activity data are from a publication, record the full reference. Example: 2013. National Cement Association Annual Report</i>	
Date of provision <i>Record the date of receipt of the activity data. Example: August 29, 2016</i>	
Source of data <i>Record the source of the activity data, e.g. the institution and department that provided it. Example: National Cement Association</i>	
Contact details <i>Record the name, email address, and phone number of the contact person at the entity which provided the data. If applicable, ensure that this information is recorded in Template 2. Institutional Arrangements, or that Template 2 refers to this template. Example: John Smith, john.smith@example.com, +12 3456 7890</i>	
Basis for data provision: <i>State the basis upon which data are provided, e.g., voluntary provision, legal requirement, data sharing agreement, or a memorandum of cooperation or understanding. (If you used the Confidential Business Information (CBI) Agreement or Memorandum of Cooperation (MoC) supporting templates from EPA's Toolkit for Building a National GHG Inventory System, cite the final MoC or CBI agreement developed from use of those or other templates here.) Example: Voluntary provision</i>	
Coverage:	



State whether the activity data cover all emissions or removals in the category. Example: The national cement association claims to cover all clinker production at the national level.

Adjustments applied to activity data:
Explain any adjustments applied to the original activity data received from the data source to make it usable for the calculation, e.g., unit conversion or gap-filling. Example: The data were provided in kg and recalculated to t.

Activity data values:
Extend or modify the years as necessary to cover your time series.

1990	1991	1992	1993	1994	1995	1996	1997	1998
1999	2000	2001	2002	2003	2004	2005	2006	2007
2008	2009	2010	2011	2012	2013	2014	2015	2016
2017	2018	2019	<i>[insert as needed]</i>					

The activity data values in the rows above are derived from the files listed here: *List all files from which the activity data values above come, and indicate where these files are located, and whom to contact in order to access these files.*

Quality control measures
Indicate in the following rows what quality control measures you have applied to the activity data indicated above. Add additional rows if you need to describe additional QC activities. Before adding any additional quality control measures, refer to Template 4. QA/QC. For suggestions about quality control activities, see chapter six of volume 1 of the 2006 IPCC Guidelines.³ In case of data gaps or problems with time series consistency, refer to chapter five of volume 1 of the 2006 IPCC Guidelines.⁴

Comparison with trend:

³ https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_6_Ch6_QA_QC.pdf

⁴ http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_5_Ch5_Timeseries.pdf



<p>Describe the results of the comparison of the new activity data with the previous trend, e.g. what developments were expected based on projecting the trend of past activity data values, what developments happen in the real activity data? Example: Trend indicated a further increase by 3%. Real development is an increase by 5%.</p>	
<p>Comparison with other datasets (e.g., IEA or FAO) Compare both level and trend of your activity data with the data in other datasets. Describe the result of the comparison, e.g. to which extent your data deviates from the level and trend of the other dataset. Example: Good alignment of trend with the International Energy Agency (IEA) or Food and Agriculture Organization of the United Nations (FAO) database(s)</p>	
<p>Are all data entered correctly into models, spreadsheets, etc.? Record Yes or No. If No, describe the corrective actions taken. Example: No, 2013 value contained typo. Corrected.</p>	

Table 0-4. Emission factors/carbon stock change factors (EF/SCF) general information, values, and QA/QC

Type of EF/SCF: <i>Record a descriptive title for the EF/SCF.</i>								
Reporting unit: <i>This should be the unit in which the EF/SCF is reported for estimating emissions/removals.</i>								
Appropriateness to national circumstances: <i>State how this specific EF/SCF was chosen.</i>								
Time series covered: <i>Record the years for which the EF/SCF is available.</i>								
Reference (if applicable): <i>If the EF/SCF is from a publication, record the full reference.</i>								
Date of provision: <i>Record the date of receipt of the EF/SCF.</i>								
Source of EF/SCF: <i>Record the source of the EF/SCF, e.g., the institution and department that provided it.</i>								
Contact details: <i>Record the name, email address, and phone number of the contact person at the entity which provided the EF/SCF.</i>								
EF/SCF values: <i>Extend or modify the years as necessary to cover your time series.</i>								
1990	1991	1992	1993	1994	1995	1996	1997	1998



1999	2000	2001	2002	2003	2004	2005	2006	2007
2008	2009	2010	2011	2012	2013	2014	2015	2016
2017	2018	2019	[insert as needed]					
The EF/SCF values in the rows above are derived from the files listed here:				<i>List all files from which the EF/SCF values above come, and indicate where these files are located, and whom to contact in order to access these files.</i>				
Quality control measures <i>Indicate in the following rows what quality control measures you have applied to the EF/SCF values indicated above. Add additional rows if you need to describe additional QC activities. For suggestions about quality control activities, see chapter six of volume 1 of the 2006 IPCC Guidelines.⁵ Before adding any additional quality control measures, refer to Template 4. QA/QC. In case of data gaps or problems with time series consistency, refer to chapter five of volume 1 of the 2006 IPCC Guidelines.⁶</i>								
Comparison to IPCC default factor: <i>If not using an IPCC default factor, compare the EF/SCF to the 2006 IPCC Guidelines default factor, and explain any differences.</i>								
Are all data entered correctly into models, spreadsheets, etc.? <i>Record Yes or No. If No, describe the corrective actions taken.</i>								

Step 2: Complete Table 3-5 to document improvement options for methodologies and data.

Table 3-5 below provides a list of suggested improvements on a category-by-category basis. These improvements will be incorporated into the national inventory improvement plan (see Template 7).

⁵ https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_6_Ch6_QA_QC.pdf

⁶ http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_5_Ch5_Timeseries.pdf



Table 0-5. Improvement options related to methodologies and data

Improvement No.	Category sector <i>Example: Energy, AFOLU, IPPU, or Waste</i>	Category code and name <i>Example: 1A3Bi Cars</i>	Key category in the <u>previous</u> GHG inventory: <i>Record Yes or No</i>	Relevant GHG inventory principle <i>Example: Transparency, Accuracy, Completeness, Consistency, or Comparability</i>	Potential Improvement <i>Record in detail what the improvement entails, i.e. what will be changed and what impact this will have. Example: Replace proxy activity data (projected clinker production) with actual time series activity data collected from a recently completed industrial sector survey covering years 2012-2018.</i>
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