

Template I: Key Source Category Analysis

Instructions

The Key Source Category Analysis is the first step in documenting a country's national inventory management system. Each country should prepare its "Final Report on IPCC Key Source Categories" using this template. The template can be used in combination with the appropriate Key Source Category Software provided by U.S. EPA or with the UNFCCC GHG Inventory Software. Countries with only one inventory year will not have to complete Tables I.2 or I.4.

The CD-ROM accompanying this handbook contains two versions of the templates. The first is the electronic version of this document with all sample text and instructions included in light green. The second version, without the light green text, is the one in which countries should enter country-specific data, and which they should use for preparing final reports. In the final plan, all green text should be deleted.

Step-by-step instructions are listed to the right. Each step is explained in detail in the corresponding section of the template.

- STEP 1: Complete the key source category "level analysis" using the U.S. EPA software. Enter the results of this analysis in Table I.1.
- STEP 2: IF your country has GHG inventories for more than one year, complete the key source category "Trend Analysis" using the U.S. EPA software (KEYSOURCE_software.xls). Enter the results from the software in Table I.2, and proceed to Step 3.
- STEP 3: IF your country has prepared a Land-Use Change and Forestry (LUCF) inventory using *IPCC Good Practice 2003* categories, complete the key category LUCF level analysis using the U.S. EPA software. Enter the results in Table I.3. If your country used the *Revised 1996 IPCC Guidelines* categories for the most recent LUCF inventory, proceed to STEP 5.
- STEP 4: IF your country has an LUCF inventory for more than one year, complete the key category LUCF trend analysis using the U.S. EPA software. Enter the results in Table I.4.
- STEP 5: Determine which parts of the "Methodology" section are relevant for your country. Delete any section that is not relevant (e.g., delete the LUCF trend analysis methodology if your country has an LUCF inventory for only one year).
- STEP 6: Ensure that the "References" section is complete.
- STEP 7: Countries can add more detailed quantitative results to the Annex if they choose.

For technical assistance, contact U.S. EPA at GHGinventory@epa.gov.

Key Source Category Analysis

Background

The concept of "Key Source Categories" was created by the IPCC as a tool to help countries prioritize resources for improving national greenhouse gas inventories. Key source categories have the greatest contribution to the overall level of national emissions. Key source categories can also be those categories that have a large influence on the trend of emissions over time.³

To improve the national greenhouse gas inventory, it may be necessary to consider more accurate methodologies, develop country-specific emission factors, or collect more detailed activity data. These activities all require additional resources, and it is not possible to make improvements for every source category. The primary purpose of this analysis is to provide a quantitative tool for the national greenhouse gas inventory team to use to develop an inventory improvement plan. A secondary purpose is to provide more complete and transparent information for the National Communication.

This report presents the results of the IPCC Tier 1 methodology for determining key source categories. The Tier 1 methodology does not take into consideration uncertainty estimates for source categories.⁴

I.1 Level Analysis

[INSTRUCTIONS: Complete Table I.1 using the results from the "2) Level Assessment Results" page in the key source software provided by U.S. EPA. Enter the largest key source category first, and continue to add the next largest source categories until the cumulative total is greater than 95% of national emissions. The software should also indicate which sources are key sources in the "Status" column.]

Table I.1 presents the results of the IPCC key source category level analysis for the year XXXX (e.g., 1994). The key source categories are listed in order of decreasing magnitude. Together they account for over 95% of total national emissions. There are a total of X (e.g., 5) key source categories based on the level assessment.

³ The IPCC's *Good Practice Guidance* (IPCC 2000) defines a key source category as a "[source category] that is prioritized within the National Inventory System because its estimate has a significant influence on a country's total inventory of direct greenhouse gases in terms of the absolute level of emissions, the trend in emissions, or both. . ." See Chapter 7, "Methodological Choice and Recalculation," in IPCC 2000 for more information. < <http://www.ipcc-nggip.iges.or.jp/public/gp/gpgaum.htm>>

⁴ The Tier 2 methodology does incorporate uncertainty estimates. Please see chapter 7 "Methodological Choice and Recalculation" in IPCC 2000 for more information.

Table I.1: Key Source Categories Based on Contribution to Overall Level

Source Category	Gas	Inventory Sector	Emission Level (Gg CO ₂ Equivalent)	Cumulative Total (Gg CO ₂ Equivalent)	Cumulative Percent of National Emissions
Mobile combustion – road vehicles	CO ₂	Energy	5,000	5,000	50%
Stationary combustion – solid fuels	CO ₂	Energy	2,500	7,500	75%
Livestock enteric fermentation	CH ₄	Agriculture	1,500	9,000	90%
Solid waste disposal sites	CH ₄	Waste	400	9,400	94%
Rice production	CH ₄	Agriculture	200	9,600	96%
Total Emissions (All Source Categories)				10,000	100%

I.2 Trend Analysis

[INSTRUCTIONS: [STEP 2 is optional for those countries that have emission inventories for more than one year.] Complete Table I.2 using the results from the "3) Trend Assessment Results" page in the key source software provided by U.S. EPA. Enter the largest key source category first in terms of contribution to the overall trend, and continue to add the next largest source categories until the cumulative total is greater than 95% of the total national trend in emissions. The software should also indicate which sources are key sources in the "Status" column.]

Table I.2 presents the results of the IPCC key source category trend analysis for the years XXXX to XXXX (e.g., 1994-2000). The key source categories are listed in order of decreasing contribution to the overall trend. Together they account for over 95% of the overall trend in national emissions. There are a total of X (e.g., 6) key source categories based on the trend analysis.

Table I.2: Key Source Categories Based on Contribution to Overall Trend

Source Category	Gas	Inventory Sector	Base Year Emissions (Gg CO ₂ Equivalent)	Current Year Emissions (Gg CO ₂ Equivalent)	Contribution to Overall Trend	Cumulative Contribution to Overall Trend
Solid waste disposal sites	CH ₄	Waste	100	400	24%	24%
Mobile combustion – road vehicles	CO ₂	Energy	4,000	5,000	21%	45%
Livestock manure management	CH ₄	Agriculture	100	20	18%	63%
PFC emissions from aluminum production	PFCs	Industrial Processes	1	15	16%	79%
Cement production	CO ₂	Industrial Processes	5	10	12%	91%
Rice production	CH ₄	Agriculture	230	200	6%	97%
Total Emissions (All Source Categories)						100%

I.3 LUCF Level Analysis

[INSTRUCTIONS: Table I.3 is only for those countries that have estimated emissions and sequestration from Land-Use Change and Forestry according to IPCC Good Practice Guidance (2003). Complete Table I.3 using the level assessment results from the "4 LULUCF LA Results" page in the key source software provided by U.S. EPA. Enter only LULUCF sources noted as key sources in the "Status" column.]

The key categories for LUCF are determined through a separate analysis as outlined in IPCC's *Good Practice Guidance for Land-Use Change and Forestry* (2003).⁵ The LUCF sector requires a separate analysis because individual LUCF categories can have net emissions (positive emissions) or net sequestration (negative emissions).

Table I.3 presents the results of the IPCC key source category level analysis for the Land-Use Change and Forestry sector for the year XXXX (e.g., 1994). There are a total of X (e.g., 3) key source categories based on the level analysis for LUCF.

Table I.3: Key LUCF Categories Based on Contribution to Overall Level

LUCF Category	Gas	Inventory Sector	Current Year Net Emission Level (Gg CO ₂ Equivalent)
Forest land converted to cropland	CO ₂	LUCF	1,500
Forest land remaining forest land	CO ₂	LUCF	-2,500
Cropland converted to settlements	CO ₂	LUCF	800

⁵ The IPCC's *Good Practice Guidance for Land-Use Change and Forestry* (IPCC 2003) includes a methodology for determining key categories of Land-Use Change and Forestry. Please see chapter 7 "Methodological Choice and Recalculation" in IPCC 2000 for more information.
< <http://www.ipcc-nggip.iges.or.jp/public/gp/gpgaum.htm>>

I.4 LUCF Trend Analysis

[INSTRUCTIONS: Table I.4 is only for those countries that have estimated LUCF inventories for more than one year. Complete Table I.4 using the results from the "5) LULUCF TA Results" page in the key source software provided by U.S. EPA. The software should also indicate which sources are key sources in the "Status" column.]

Table I.4 presents the results of the IPCC key source category trend analysis for the Land-Use Change and Forestry sector for the years XXXX to XXXX (e.g., 1994-2000). There are a total of X (e.g., 2) key source categories based on the trend analysis for LUCF.

Table I.4: Key LUCF Categories Based on Contribution to Overall Trend

Source Category	Gas	Inventory Sector	Base Year Net Emissions (Gg CO ₂ Equivalent)	Current Year Net Emissions (Gg CO ₂ Equivalent)
Forest land converted to cropland	CO ₂	LUCF	850	1,500
Forest land remaining forest land	CO ₂	LUCF	-1,640	-2,500

I.5 Methodology

The methodologies used in this report are taken from *IPCC Good Practice (2000)* and *IPCC Good Practice Guidance for Land-Use Change and Forestry (2003)*. More detailed descriptions of the methodologies can be found in these two documents.

I.5.1 Level Assessment

For a Level Assessment of key sources, calculate the contribution of each source category's emissions to the total national inventory level, according to Equation 1:

EQUATION 1

$$\text{Source Category Level Assessment} = \text{Source Category Estimate} / \text{Total Estimate}$$
$$L_{x,t} = E_{x,t} / E_t$$

Where:

$L_{x,t}$ = the Level Assessment for source x in year t.
Source Category Estimate ($E_{x,t}$) = the emission estimate of source category x in year t.
Total Estimate (E_t) = the total inventory estimate in year t.

This equation determines the contribution of each source's greenhouse gas emissions to the national total. Key source categories are those that, when added together in descending order of magnitude, constitute more than 95% of the total emissions for a given year.

I.5.2 Trend Assessment

[INSTRUCTIONS: Countries that have emission inventories for more than one year should include this section.]

The contribution of each source category's emission trend to the trend in the total inventory can be assessed if more than one year of inventory data are available, according to Equation 2:

EQUATION 2

$$\begin{aligned} \text{Source Category Trend Assessment} &= (\text{Source Category Level Assessment}) \\ &\bullet (\text{Source Category Trend} - \text{Total Trend}) \\ T_{x,t} &= L_{x,t} \bullet \{[(E_{x,t} - E_{x,0})/E_{x,t}] - [(E_t - E_0)/E_t]\} \end{aligned}$$

Where:

- $T_{x,t}$ = the contribution of the source category trend to the overall inventory trend, called the Trend Assessment. The Trend Assessment is always recorded as an absolute value; i.e., a negative value is always recorded as the equivalent positive value.
- $L_{x,t}$ = the Level Assessment for source x in year t (derived in Equation 1).
- $E_{x,t}$ and $E_{x,0}$ = the emissions estimates of source category x in years t and 0, respectively.
- E_t and E_0 = the total inventory estimates in years t and 0, respectively.

The Source Category Trend is the change in the source category emissions over time, computed by subtracting the base year (year 0) estimate for source category x from the current year (year t) estimate, and dividing by the current year estimate. The Total Trend is the change in the total inventory emissions over time, computed by subtracting the base year (year 0) estimate for the total inventory from the current year (year t) estimate, and dividing by the current year estimate.

The Trend Assessment will identify source categories that have a trend different from the trend of the overall inventory. As differences in trend are more significant to the overall inventory level for larger source categories, the result of the trend difference (i.e., the source category trend minus the total trend) is multiplied by the result of the level assessment ($L_{x,t}$ from Equation 1) to provide appropriate weighting. Thus, key source categories will be those where the source category trend diverges significantly from the total trend, weighted by the emission level of the source category.

This type of key source analysis is only applicable to those countries that have emission inventories for more than one year.

I.5.3 LUCF Level Assessment

[INSTRUCTIONS: Countries that have performed a LUCF Category Level Assessment should include this section.]

The contribution of each LUCF source or sink category to the total national inventory level is calculated according to Equation 3:

EQUATION 3

Key Category Level Assessment =
| Source or Sink Category Estimate | / Total Contribution

$$L_{x,t^*} = E_{x,t^*} / E_t$$

Where:

L_{x,t^*} = Level Assessment for source or sink x in year t. The asterisk (*) indicates that contributions from all categories (including LULUCF categories) are entered as absolute values.

E_{x,t^*} = $|E_{x,t}|$: Absolute value of emission or removal estimate of source or sink category x in year t.

E_t = $\sum |E_{x,t}|$: Total Contribution, which is the sum of the absolute values of emissions and removals in year t. The asterisk (*) indicates that contributions from all categories (including LULUCF categories) are entered as absolute values.

Because both emissions and removals are entered with a positive (+) sign, the Total Contribution may be larger than a country's total emissions, less its removals.

I.5.4 LUCF Trend Assessment

[INSTRUCTIONS: Countries that have performed a LUCF Category Trend Assessment year should include this section.]

The contribution of each LUCF source or sink category to the trend in the total inventory can be assessed if more than one year of inventory data is available, according to Equation 4.

EQUATION 4

Source or Sink Category Trend Assessment =
 (Source or Sink Category Level Assessment) • |(Source or Sink Category Trend – Total Trend)|

$$T_{x,t^*} = E_{x,t^*}/E_t \bullet |[(E_{x,t} - E_{x,0})/E_{x,t}] - [(E_t - E_0)/E_t]|$$

Where:

T_{x,t*} = Trend Assessment, which is the contribution of the source or sink category trend to the overall inventory trend. The Trend Assessment is always recorded as an absolute value; i.e., a negative value is always recorded as the equivalent positive value. The asterisk (*) indicates that, in contrast to Equation 7.2, in Chapter 7 of the *IPCC Good Practice Guidance 2000*, LULUCF sources and sinks can be evaluated using this equation.

E_{x,t*} = |E_{x,t}| absolute value of emission or removal estimate of source or sink category x in year t.

E_{x,t} and E_{x,0} = real values of estimates of source or sink category x in years t and 0, respectively.

E_t and E₀ = $\sum_{x,t} x E$ and $\sum_{x,0} x E$ total inventory estimates in years t and 0, respectively. E_t and E₀ differ from E_{t*} and E_{0*} in Equation 3 in that removals are not entered as absolute values.

The Source or Sink Category Trend is the change in the source or sink category emissions or removals over time, computed by subtracting the base year (year 0) estimate for source or sink category x from the current year (year t) estimate, and dividing by the current year estimate.

The Total Trend is the change in the total inventory emissions (or removals) over time, computed by subtracting the base year (year 0) estimate for the total inventory from the current year (year t) estimate and dividing by the current year estimate.⁶

⁶ In circumstances where the current year emissions for a given category are zero, the expression may be reformulated to avoid zero in the denominator. Please see Equation 5.4.3 of *IPCC Good Practice Guidance* (2003).

I.6 References

[INSTRUCTIONS: Add any additional references used in the analysis.]

IPCC Good Practice Guidance for Land-Use Change and Forestry (IPCC 2003). < <http://www.ipcc-nggip.iges.or.jp/public/gp/gpgaum.htm>>

IPCC Good Practice Guidance (IPCC 2000). < <http://www.ipcc-nggip.iges.or.jp/public/gp/gpgaum.htm>>

I.7 Annex

[INSTRUCTIONS: Countries may add more detailed quantitative results in the Annex, including the output tables from the U.S. EPA software.]