
Possible options for the CRT of national GHG inventory: Overview

Informal technical workshop on transparency
under the SBSTA

Part I: Possible options for the CRT of national
GHG inventory

5 May 2021

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- **Principles**
- **Background on the format and content of reporting tables**
- **Synthesis of views on the reporting tables**
 - Considerations for summary and cross-cutting tables
 - Considerations for sectoral and background tables
 - Considerations for additional tables to be developed
 - Possible deletion of existing tables currently used for reporting
- **Compilation of possible summary, cross-cutting, sectoral and background tables proposed by Parties for reporting under the CRTs**

- The **MPGs** have established **all reporting and review requirements related to the BTRs** and **provide guidance for developing CRTs**. Developing reporting tables should not impose additional reporting requirements;
- It is **important to recognize different starting points, national circumstances and capabilities of Parties when developing CRTs** and reporting software, as many developing Parties do not have sufficient experience in using reporting tables;
- The **CRTs will allow Parties to report and explain quantitative information on the GHG inventory** at international and domestic levels and will **serve to fulfil reporting obligations under the ETF**, and functioning as a repository of information on GHG inventory;
- The **application of flexibility should not contradict TACCC principles** and should **help to indicate capacity-building needs** and identify a path for continuous improvement.

- The following types of CRTs have been identified:
 - **Summary tables** (e.g. emissions/removals by sector/category, trends of emissions/removals for the time series and methods and emission factors used)
 - **Cross-cutting tables** (e.g. key category analysis, recalculations and indirect emissions)
 - **Sectoral tables** (e.g. sectoral background data and sectoral report tables containing information on emissions/removals).
 - Also, have been identified **sector-relevant tables** (e.g. reference approach, international bunkers, feedstock and non-energy use of fuels, land transition matrix and HWP data).
- To fulfil current obligations for reporting GHG inventories, **developed Parties submit all** referred above **types of tables**, while **developing Parties** predominantly **submit summary-level tables**.

- The **software to facilitate reporting** is important and the inclusion of its consideration in designing CRTs, as well.
- **Developed Parties are required to use the CRF Reporter** to report annual GHG inventories.
 - The **CRF Reporter includes automated functions to facilitate reporting** (e.g. aggregation of data into sectoral and summary tables; data quality checks; automated data import and transfer).
 - This **software needs improvement for reporting of CRTs and making it more user-friendly**.
 - **Training on the use of the software is essential** for developing Parties that have no or limited experience in using such tools.
- Currently, **developing Parties are not required to use software to report** GHG inventories.
 - Some use the IPCC inventory software for the calculation of GHG emissions and generating reporting tables for their national communications and BURs.
 - Importance of **continued and strengthened cooperation between the secretariat and the IPCC Task Force on inventories** on facilitating use of this software and data transfer for CRTs is recognized.

- Most Parties acknowledged the need of an agreement on **a common set of reporting tables**.
 - Some Parties stated that **18/CMA.1 provides a clear mandate for CRTs**, which are essential for quality, comparability and transparency of reporting and should include enough detail to be of value for the reviews.
 - Some Parties recognized that once a common set of reporting tables is agreed, developing **Parties that need flexibility could operationalize it within the tables** in one or more ways.
- A group of Parties clarified that **CRTs development** should consider **information input and output**:
 - For the input, **CRTs should have the cells and/or tables necessary** for inclusion of all information agreed for the NIR and/or required by the 2006 IPCC Guidelines. Assuming CRTs will be presented through a software and/or web-based application, **Parties will not have the possibility to change the structure of the CRTs by deleting cells or tables**.
 - For the output, CRTs should allow for developing country Parties to **select output format and choose which tables will be submitted** (where flexibility provisions apply).
 - Some Parties stressed that, for comparability, **tables, columns and rows are not to be deleted and all cells to be filled out with notation keys** (e.g. “NE” or “IE”), making possible tracking issues for improvement.

- Considering the **need for a common set of tables**, most Parties indicated that **tables similar to CRF tables embody one or more principles in para. 3 of the MPGs** (e.g. enhancing current transparency arrangements, promoting TACCC, facilitating the review process and ensuring maintenance of frequency and quality of reporting).
 - Some Parties indicated that the **basis and starting point** for developing the CRTs should be the **CRF tables used by developed Parties**, which are designed to **enable electronic reporting of GHG data** in accordance with the 2006 IPCC Guidelines, as required by the MPGs.
 - A group of Parties suggested a **summary table containing source and sink categories and gases as a starting point for developing Parties** for GHG inventory reporting.
 - Other group of Parties suggested a **set of summary, trend, cross-cutting** (methods and emission factors, key categories and recalculations) **and sectoral tables containing source and sink categories and gases**, and indicated that **some tables should not be mandatory** (e.g. indirect gases) and that flexibility should be provided in reporting sectoral summary and background tables.
 - A Party welcomed the **tables in the informal note by co-facilitators** of CRT negotiations dated 9 December 2019 as a **good starting point**.
 - Some Parties clarified that **reporting of some tables should not be mandatory** (e.g. sectoral background tables).
 - A Party suggested that **CRTs use should not be mandatory owing their complexity** and flexibility in the use of modified CRF tables and associated software should be considered.

- Some Parties acknowledged that **further evaluation and update of tables similar to CRF tables** is needed, to ensure that **reporting tables align with MPGs**, including the flexibility provisions, which shall be integrated in the development of the tables.
- A group of Parties indicated that **CRTs must create the necessary space for developing Parties** to concisely **clarify capacity constraints** and **provide self-determined estimated time frames** for related improvements.
- Some Parties **proposed specific technical changes** for certain sectors **to update CRF tables to reflect the MPGs** (e.g. a table on natural disturbances) and to **better align categories in the CRF tables with the 2006 IPCC Guidelines** (e.g. disaggregation of the AFOLU sector into agriculture and LULUCF sectors as required in the MPGs).
- Some Parties proposed **specific changes to the existing CRF tables to correct errors and to improve and facilitate reporting** by all Parties based on developed Parties' long-term experience in reporting using these tables and related tools.
- A Party indicated that **CRF tables have been useful for providing reporting guidance through footnotes** when dealing with complicated issues in GHG inventory reporting and suggested that **footnotes should be used to provide supplemental guidance** on reporting in CRTs.

- Some Parties identified the need to **update existing tables** to give space to **report estimates** to Parties that **voluntarily apply the 2019 Refinement** or consider **options such as adding new categories from the 2019 Refinement** from drop-down menus in CRTs.
 - In the current CRF tables, **drop-down menus allow for different levels of detail** in sectoral disaggregation.
 - A group of Parties reflected that this could be **accomplished without prejudging** whether the use of the 2019 Refinement would be **optional, encouraged or mandatory**.
- It can be **difficult to separate discussions on content and format of tables** from discussions on the **software for reporting** and generation of those tables.
 - Some Parties identified ways in which the **software can facilitate reporting**.
 - Other Parties noted that **owing to the complex nature of the software**, its use **should not be mandatory**.
 - Some Parties called for **proactive engagement between the IPCC and the UNFCCC** to facilitate data transfer between various pieces of reporting software and **establishing a helpdesk or an online forum** for inventory compilers to **help in the use of the reporting software**.

- Some Parties acknowledged the **importance of the summary and/or cross-cutting tables** to convey **transparent information**.
- A group of Parties noted that taking into account national circumstances, **developing Parties should only be required to fill out the summary table**, giving due consideration to confidential business and military information.
- This group of Parties suggested that **more discussions are needed** in an upcoming ordinary session of the SBSTA **regarding other information on the GHG inventory** (e.g. methods used, the key category analysis, recalculations and the uncertainty assessment).
- One Party stated that the **current CRF tables on key categories and completeness are useful and relevant** for reporting and should **be part of the CRTs**.
- Two Parties proposed or acknowledged the need for **specific changes to the existing summary and cross-cutting tables** to **accommodate the flexibility** provisions and the **way to present national totals** and to **correct editorial errors**.

- Parties have **diverging views on whether the sectoral and background data tables** should be **mandatory** for all Parties.
 - A group of Parties noted that **para. 89 of decision 1/CP.21 provides developing Parties for a broader flexibility** by stating that they shall be provided flexibility, including in the scope, frequency and level of detail of reporting, and as such, these tables should not be mandatory.
 - Countering this point of view, a group of Parties noted that the **flexibility provisions agreed by decision 18/CMA.1 do not extend beyond the specific provisions in the MPGs**, and in particular, **do not extend to the reporting background data**, which is necessary for ensuring transparency of the reporting and in terms of facilitating the review process.
- All Parties noted the **importance of sectoral and background tables for developed Parties**, as their use will **mitigate the potential for backsliding** in the quality of their reporting.
- One Party indicated that **sectoral background data tables are a useful tool for recording detailed information** on the estimation of **GHG emissions and removals** and reporting data in these tables is **essential in terms of meeting the requirements in para. 47 of the MPGs** (e.g. reporting estimates at the most disaggregated level).

- Other Parties stated that **sectoral background data tables form the core of reporting** and are **essential for the transparent reporting** of inventories, as they allow to generate automatically several other tables by the CRF Reporter.
- Some Parties stressed that these **tables can present a significant burden to some developing Parties** given the extent of their existing experience with GHG inventory reporting.
- A Party highlighted that the **reporting of disaggregated background data is also useful for identifying capacity-building needs** (e.g. use of notation key “NE” records an issue for future improvement).
- Some Parties suggested **making specific changes to the existing sectoral or background data tables** included in the CRF, with **changes identified for all sectors**.
 - Key suggestions and specific technical suggestions by Parties were incorporated, as appropriate, in the compilation of possible CRTs (annex I to the Information Note).

- Some Parties identified **additional tables** that might be needed beyond those currently in the CRF in order **to accommodate reporting using the MPGs**.
 - Some Parties noted that it might be necessary a **table for reporting natural disturbances**, although no specific example of a table was submitted.
 - Some Parties reflected on **whether the existing tables for reporting HWP appropriately reflect or fully meet the requirements of the MPGs**, questioning whether a **new table would be required** or whether Parties could agree to **simplify the existing table**.
 - One group of Parties noted that information on **forest management reference level** may be required to be included **in a table**.
- Some groups of Parties suggested that a **CRT containing a summary of flexibility provisions use could be developed**, using a reporting software to automatically generate such table from information in documentation boxes of tables where flexibility provisions have been applied.
- Many other Parties saw the **value of such a summary table on flexibility**, but either called for its **inclusion in the BTR or the NID** or were not clear on the location of such a table.
- A group of Parties asserted that **should not be a single CTF for reporting the use of flexibility provisions**; rather, countries should have **flexibility to report this information as they see fit**.

- Some Parties **suggested to delete specific existing tables** used for reporting by developed Parties, not prejudging the discussion on the deletion of reporting tables (or their elements, such as rows and columns) associated with a Party's choice to apply a flexibility provision.
- While one group of Parties maintained that **developing Parties that need flexibility should not be required to report all tables**, in a few cases, **Parties suggested deleting a table that is currently used by developed Parties** for reporting.
 - One Party suggested **deleting the land transition matrix table** (current CRF table 4.1), although it acknowledged the importance of this table, it noted that given the complexities associated with completing it, it would be preferable to require its **reporting in the NID instead of in the CRTs**.
 - Although a group of Parties proposed the **deletion of a separate table on indirect N₂O emissions** from managed soils, it suggested the **inclusion of this information in the relevant existing tables** for direct N₂O emissions.

- Based on the submissions received, the experience gained in the reporting and review processes and the guidance of the SBSTA Chair, annex I to the Information Note presented **a compilation of possible summary, cross-cutting, sectoral and background reporting tables** that may be considered as an input to the discussions.
- The **presented reporting tables** are intended to **assist Parties in advancing discussions** and do not prejudge further work or whether a particular table or group of tables would be mandatory or voluntary for any group of Parties.
- The complete set of these reporting tables is presented below:

Compilation of possible summary, cross-cutting, sectoral and background tables proposed by Parties for reporting under the CRTs



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Reporting tables will be shown along data flow (*waste sector as an example*)

- **Sectoral Background Data Tables**

- *5A, 5B, 5C and 5D*

- **Sectoral Reporting Table**

- **Summary Tables**

- *Summary 1, 2 and 3, and*
- *table 10 Trend tables*

- **Cross-Cutting Tables**

- *table 6 Indirect emissions of CH₄ and N₂O,*
- *table 7 Key Category Analysis,*
- *table 8 Recalculations; and*
- *table 9 Completeness*

TABLE 5.A SECTORAL BACKGROUND DATA FOR WASTE
Solid waste disposal
(Sheet 1 of 1)

Year
Submission
Country

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION		IMPLIED EMISSION FACTOR	EMISSIONS	RECOVERY ⁽⁵⁾	
	Annual waste at the SWDS	MCF	CH ₄ ⁽¹⁾	CH ₄	CH ₄	
				Emissions ⁽²⁾	Flaring	Energy recovery ⁽³⁾
	(kt)		(t/t waste)	(kt)	(kt)	
5.A.1. Managed waste disposal sites						
5.A.1.a. Anaerobic						
Drop down list: ⁽⁴⁾						
Less decomposable wastes						
Moderately decomposable wastes						
Highly decomposable waste						
Bulk waste						
5.A.1.b. Semi-aerobic						
Drop down list: ⁽⁴⁾						
Less decomposable wastes						
Moderately decomposable wastes						
Highly decomposable waste						
Bulk waste						
5.A.1.c. Active-aeration						
Drop down list: ⁽⁴⁾						
Less decomposable wastes						
Moderately decomposable wastes						
Highly decomposable waste						
Bulk waste						
5.A.2. Unmanaged waste disposal sites						
Drop down list: ⁽⁴⁾						
Less decomposable wastes						
Moderately decomposable wastes						
Highly decomposable waste						
Bulk waste						
5.A.3. Uncategorized waste disposal sites						
Drop down list: ⁽⁴⁾						
Less decomposable wastes						
Moderately decomposable wastes						
Highly decomposable waste						
Bulk waste						

Note: SWDS = solid waste disposal site, MCF = methane correction factor, DOC = degradable organic carbon (IPCC Guidelines (Volume 5, section 3.2.3)).
Note: Annual waste includes household waste, yard/garden waste, commercial/institutional waste, sludge, industrial and other waste.
Note: There is no methodology in the 2006 IPCC Guidelines to estimate emissions from flaring based on recovered biogas from solid waste disposal sites and wastewater handling. If data are available, Parties are encouraged to report emissions of methane (CH₄) and nitrous oxide (N₂O) under category 5.E.

- ⁽¹⁾ The CH₄ implied emission factor (IEF) is calculated on the basis of gross CH₄ emissions as follows: IEF = (CH₄ emissions + CH₄ recovered)/annual waste at the SWDS.
⁽²⁾ Actual emissions (after flaring and recovery).
⁽³⁾ When recovered CH₄ emissions are used for energy, the emissions from the combustion should be reported under category 1.A and are provided here for information only.
⁽⁴⁾ Less decomposable waste is e.g. wood, engineered wood products, tree branches (wood). Moderately decomposable waste is e.g. paper, textile, nappies. Highly decomposable waste is, e.g. food waste, grass (garden and park waste excluding tree branches). Bulk waste can be used when the fractions of less, moderately and highly decomposable waste in MSW are not known.
⁽⁵⁾ Enter the amount of recovery as a negative number since this amount is subtracted from emissions produced.

Documentation box:

- Parties should provide detailed explanations on the waste sector in chapter 7: waste (CRT sector 5) of the national inventory document (NID). Use this documentation box to provide references to relevant sections of the NID, if any additional information and/or further details are needed to understand the content of this table.
- Parties that use country-specific models should provide a reference in the documentation box to the relevant section in the NID where these models are described, and fill in only the relevant cells of table 5.A.
- Provide a reference to the relevant section in the NID, in particular with regard to:
 - The population size (total or urban population) used in the calculations and the rationale for doing so;
 - The composition of landfilled waste.
- Parties should specify the category in the energy sector under which the emissions from energy recovery are reported.



TABLE 5.B SECTORAL BACKGROUND DATA FOR WASTE

Biological Treatment of Solid Waste

(Sheet 1 of 1)

Year

Submission

Country

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION	IMPLIED EMISSION FACTOR		EMISSIONS		RECOVERY ⁽⁵⁾	
		CH ₄ ⁽¹⁾	N ₂ O	CH ₄ ⁽²⁾	N ₂ O	CH ₄	
						Amount of CH ₄ flared	Amount of CH ₄ for energy recovery ⁽³⁾
	Annual waste amount treated						
	(kt dm)	(g/kg waste)		(kt)			
5.B.1. Composting							
5.B.1.a. Municipal solid waste							
5.B.1.b. Other (please specify) ⁽⁴⁾							
5.B.2. Anaerobic digestion at biogas facilities ⁽³⁾							
5.B.2.a. Municipal solid waste							
5.B.2.b. Other (please specify) ⁽⁴⁾							

⁽¹⁾ The CH₄ implied emission factor (IEF) is calculated on the basis of gross methane (CH₄) emissions as follows $IEF = (CH_4 \text{ emissions} + CH_4 \text{ recovered/flared}) / \text{annual waste at the solid waste disposal sites}$.

⁽²⁾ Actual emissions (after recovery and flaring).

⁽³⁾ When CH₄ emissions recovered are used for energy, the emissions from the combustion should be reported under category 1.A.

⁽⁴⁾ This category should include all organic waste from sources not covered by municipal solid waste.

⁽⁵⁾ Enter the amount of recovery as a negative number since this amount is subtracted from emissions produced.

Documentation box:

- Parties should provide detailed explanations on the waste sector in chapter 7: waste (CRT sector 5) of the national inventory document (NID). Use this documentation box to provide references to relevant sections of the NID, if any additional information and/or further details are needed to understand the content of this table.
- Parties should specify the category in the energy sector under which the emissions from energy recovery are reported.

TABLE 5.C SECTORAL BACKGROUND DATA FOR WASTE
Incineration and open burning of waste
(Sheet 1 of 1)

Year
Submission
Country

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA Amount of wastes (incinerated/open burned) (kt wet weight)	IMPLIED EMISSION FACTOR			EMISSIONS		
		CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O
		(kg/t waste)			(kt)		
5.C.1. Waste Incineration							
5.C.1.a. Biogenic ⁽¹⁾							
5.C.1.a.i. Municipal solid waste							
5.C.1.a.ii. Other (please specify) ⁽²⁾							
5.C.1.a.ii.1. Drop-down list							
5.C.1.a.ii.2. Industrial solid wastes							
5.C.1.a.ii.3. Hazardous waste							
5.C.1.a.ii.4. Clinical waste							
5.C.1.a.ii.5. Sewage sludge							
5.C.1.a.ii.6. Other (please specify)							
5.C.1.b. Non-biogenic							
5.C.1.b.i. Municipal solid waste							
5.C.1.b.ii. Other (please specify) ⁽³⁾							
Drop down list							
5.C.1.b.ii.1. Industrial solid wastes							
5.C.1.b.ii.2. Hazardous waste							
5.C.1.b.ii.3. Clinical waste							
5.C.1.b.ii.4. Sewage sludge							
5.C.1.b.ii.5. Fossil liquid waste ⁽⁴⁾							
5.C.1.b.ii.6. Other (please specify)							
5.C.2. Open burning of waste							
5.C.2.a. Biogenic ⁽¹⁾							
5.C.2.a.i. Municipal solid waste							
5.C.2.a.ii. Other (please specify)							
5.C.2.b. Non-biogenic							
5.C.2.b.i. Municipal solid waste							
5.C.2.b.ii. Other (please specify)							

Note: Only emissions from waste incineration without energy recovery are to be reported under the waste sector. Emissions from incineration with energy recovery are to be reported under the energy sector, as other fossil fuels (see the 2006 IPCC Guidelines, Volume 2, page 1.15).

⁽¹⁾ The CO₂ emissions from combustion of biomass materials (e.g. paper, food and wood waste) contained in the waste are biogenic emissions and should not be included in the national totals.

⁽²⁾ If data are available, Parties are encouraged to report at the disaggregated level available from the pre-defined drop-down menu. Furthermore, Parties are encouraged to the extent possible to use the pre-defined category definitions rather than to create similar categories. This ensures the highest possible degree of comparability of the reporting. If detailed data are not available, Parties should include all emissions from incineration of biogenic waste not included in municipal solid waste here.

⁽³⁾ If data are available, Parties are encouraged to report at the disaggregated level available from the pre-defined drop-down menu. Furthermore, Parties are encouraged to the extent possible to use the pre-defined category definitions rather than to create similar categories. This ensures the highest possible degree of comparability of the reporting. If detailed data are not available, Parties should include all emissions from incineration of non-biogenic waste not included in municipal solid without disaggregation waste here.

⁽⁴⁾ This category includes lubricants, solvents and waste oil. Unless fossil liquid waste is included in other types of waste (e.g. industrial or hazardous waste), the emissions need to be calculated separately.



Documentation box:

- Parties should provide detailed explanations on the waste sector in Chapter 7: Waste (CRT sector 5) of the national inventory document (NID). Use this documentation box to provide references to relevant sections of the NID, if any additional information and/or further details are needed to understand the content of this table.
- Parties that use country-specific models should provide a reference in the documentation box to the relevant section in the NID where these models are described, and fill in only the relevant cells of table 5.C.
- Provide a reference to the relevant section of the NID, in particular with regard to the amount of incinerated waste (specify whether the reported data relate to wet or dry matter).



TABLE 5.D SECTORAL BACKGROUND DATA FOR WASTE

Wastewater treatment and discharge
(Sheet 1 of 1)

Year
Submission
Country

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND RELATED INFORMATION			IMPLIED EMISSION FACTOR		EMISSIONS			RECOVERY ⁽⁷⁾	
	Total organic product	Sludge removed ⁽¹⁾	N in effluent	CH ₄ ⁽²⁾	N ₂ O ⁽³⁾	CH ₄ ⁽³⁾	N ₂ O		CH ₄	
							Plants	Effluent	Amount of CH ₄ flared	Amount of CH ₄ for Energy Recovery ⁽⁴⁾
							(kt)			
5.D.1. Domestic wastewater										
5.D.2. Industrial wastewater										
5.D.3. Other (<i>please specify</i>)										

If sludge removal is reported in the wastewater inventory, it should be consistent with the estimates for sludge applied to agricultural soils, sludge incinerated and sludge deposited in solid waste disposal sites.

The methane (CH₄) implied emission factor (IEF) is calculated on the basis of gross CH₄ emissions as follows: IEF = (CH₄ emissions + CH₄ recovered or flared) / total organic product.

Actual emissions (after flaring and recovery).

When CH₄ recovered is used for energy production, the emissions should be reported under category 1.A.

DC = degradable organic component. DC indicators are COD (chemical oxygen demand) for industrial waste water and BOD (biochemical oxygen demand) for domestic/commercial wastewater/sludge (2006 IPCC Guidelines (Volume 5. Section 6.1, pp. 6.7))

Enter the amount of recovery as a negative number since this amount is subtracted from emissions produced.

Documentation box:

- Regarding the estimates for N₂O from human sewage, specify whether total or urban population is used in the calculations and the rationale for doing so. Provide an explanation in the documentation box.
- Parties using methods other than those from the IPCC for estimating N₂O emissions from wastewater treatment should provide, in the national inventory document (NID), corresponding information on methods, activity data and emission factors used, and should provide a reference to the relevant section of the NID in this

Additional information

Population (1000s)	
Protein consumption (kg/person/yr)	
Fraction of nitrogen in protein	
F _{NON-COM}	
F _{IND-COM}	
T _{PLANT}	

Note: Parties are encouraged to supply the additional information regardless of the methodology applied

F_{NON-COM} = Fraction of non-consumed protein added to the wastewater

F_{IND-COM} = Fraction of industrial and commercial co-discharged protein into the sewer system

T_{PLANT} = Degree of utilization of modern, centralized WWT plants



TABLE 5 SECTORAL REPORT FOR WASTE
(Sheet 1 of 1)

Year
Submission
Country

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	NO _x	CO	NMVOC	SO _x	Total greenhouse gas emission (kt CO ₂ eq)
	(kt)							
5. Total waste								
5.A. Solid waste disposal								
5.A.1. Managed waste disposal sites								
5.A.2. Unmanaged waste disposal sites								
5.A.3. Uncategorized waste disposal sites								
5.B. Biological treatment of solid waste								
5.B.1. Composting								
5.B.2. Anaerobic digestion at biogas facilities								
5.C. Incineration and open burning of waste								
5.C.1. Waste incineration								
5.C.2. Open burning of waste								
5.D. Wastewater treatment and discharge								
5.D.1. Domestic wastewater								
5.D.2. Industrial wastewater								
5.D.3. Other (as specified in table 5.D)								
5.E. Other (please specify)								
Memo item: ⁽²⁾								
Long-term storage of C in waste disposal sites								
Annual change in total long-term C storage								
Annual change in total long-term C storage in HWP waste ⁽³⁾								

(1) CO₂ emissions from the categories solid waste disposal on land and waste incineration should only be included if they derive from non-biological or inorganic waste sources.

(2) Long-term storage of carbon in waste disposal sites, annual change in total long-term storage of carbon stored and annual change in long-term storage of carbon in HWP waste should be entered as carbon dioxide (CO₂).

(3) Carbon stored in wood, paper, cardboard, ~~garden and park~~ waste (equals to the annual change in stocks of harvested wood products in solid waste disposal sites from consumption, second activity data in the table for harvested wood products).

Documentation box:

- Parties should provide detailed explanations on the waste sector in chapter 7: waste (CRT sector 5) of the national inventory document (NID). Use this documentation box to provide references to relevant sections of the NID, if any additional information and/or further details are needed to understand the content of this table.
- If estimates are reported under 5.E Other, use this documentation box to provide information regarding activities covered under this category and to provide reference to the section in the NID where background information can be found.
- Parties should specify the warming potentials used for the calculation.



GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO ₂ emissions/ removals	CH ₄	N ₂ O	HFCs ⁽¹⁾	PFCs ⁽¹⁾	Unspecified mix of HFCs and PFCs ⁽¹⁾	SF ₆	NF ₃	NO _x	CO	NM VOC	SO _x	Total (kt CO ₂ equivalent)
	(kt)												
Total national emissions and removals													
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 substitutes for ODS													
2.G. Other product manufacture and use													
2.H. Other ⁽²⁾													
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 ⁽⁴⁾													
4.A. Forest land ⁽⁴⁾													
4.B. Cropland ⁽⁴⁾													
4.C. Grassland ⁽⁴⁾													
4.D. Wetlands ⁽⁴⁾													
4.E. Settlements ⁽⁴⁾													
4.F. Other land ⁽⁴⁾													
4.G. Harvested wood products ⁽⁴⁾													
4.(I) Direct N ₂ O emissions from N inputs to managed soils													
4.(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils													
4.(III) Direct N ₂ O emissions from N mineralization/immobilization associated with loss/gain of soil organic matter resulting from change of land use or management of mineral soils													
4.(V) Biomass Burning													
4.H. Other ⁽⁴⁾													
5. Waste													
5.A. Solid waste disposal ⁽⁵⁾													
5.B. Biological treatment of solid waste													
5.C. Incineration and open burning of waste ⁽⁵⁾													
5.D. Wastewater treatment and discharge													
5.E. Other ⁽⁵⁾													
6. Other (please specify) ⁽⁶⁾													
Memo items: ⁽⁷⁾													
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 ₂ O													
Indirect CO ₂													

⁽¹⁾ The emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), unspecified mix of HFCs and PFCs and other fluorinated gases are to be expressed as carbon dioxide (CO₂) equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in table 2(II) of this common reporting format.

⁽²⁾ For verification purposes, Parties are requested to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in the documentation box to table 1.A.(c). For estimating national total emissions, the results from the Sectoral approach should be used.

⁽³⁾ 2.H. Other includes pulp and paper and food and beverages industry.

⁽⁴⁾ For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽⁵⁾ CO₂ from categories solid waste disposal on land and waste incineration should only be included if it stems from non-biogenic or inorganic waste streams. Only emissions from waste incineration without energy recovery are to be reported in the waste sector, whereas emissions from incineration with energy recovery are to be reported in the energy sector.

⁽⁶⁾ If reporting any country-specific category under sector "6. Other", detailed explanations should be provided in Chapter 8: Other (CRT sector 6) of the national inventory document (NID).

⁽⁷⁾ Parties are asked to report emissions from international aviation and multilateral operations, as well as CO₂ emissions from biomass and CO₂ captured, under Memo Items. These emissions should not be included in the national total emissions from the energy sector. Amounts of biomass used as fuel are included in the national energy consumption but the corresponding CO₂ emissions are not included in the national total as it is assumed that the biomass is produced in a sustainable manner. If the biomass is harvested at an unsustainable rate, net CO₂ emissions are accounted for as a loss of biomass stocks in the Land Use, Land-use Change and Forestry sector.



GREENHOUSE GAS SOURCE AND	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Unspecified mix of HFCs and PFCs	NF ₃	Total
SINK CATEGORIES	CO ₂ equivalent (kt)								
Total (net emissions) ⁽¹⁾									
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 ⁽²⁾									
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.(I) Direct N ₂ O emissions from N inputs to managed soils									
4.(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils									
4.(III) Direct N ₂ O emissions from N mineralization/immobilization associated with loss/gain of soil organic matter resulting from change of land use or management of mineral soils									
4.(V) Biomass Burning									
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: ⁽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									
5.F.1. Long-term storage of C in waste disposal sites									
Indirect N ₂ O									
Indirect CO ₂ ⁽³⁾									
Total CO ₂ equivalent emissions without land use, land-use change and forestry									
Total CO ₂ equivalent emissions with land use, land-use change and forestry									
Total CO ₂ equivalent emissions, including indirect CO ₂ , without land use, land-use change and forestry									
Total CO ₂ equivalent emissions, including indirect CO ₂ , with land use, land-use change and forestry									



⁽¹⁾ For carbon dioxide (CO₂) from land use, land-use change and forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ See footnote 7 to table Summary 1.A.

⁽³⁾ In accordance with the UNFCCC Annex 1 inventory reporting guidelines, for Parties that decide to report indirect CO₂ the national totals shall be provided with and without indirect CO₂.



GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂		CH ₄		N ₂ O		HFCs		PFCs		SF ₆		Unspecified mix of HFCs and PFCs		NF ₃	
	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor
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																
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																
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.(I) Direct N ₂ O emissions from N inputs to managed soils																
4.(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils																
4.(III) Direct N ₂ O emissions from N mineralization/immobilization associated with loss/gain of soil organic matter resulting from change of land use or management of mineral soils																
4.(IV) Indirect N ₂ O emissions from managed soils																
4.(V) Biomass Burning																
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.A)																

Use the following notation keys to specify the method applied:

D (IPCC default)

RA (Reference Approach)

T1 (IPCC Tier 1)

T1a, T1b, T1c (IPCC Tier 1a, Tier 1b and Tier 1c, respectively)

T2 (IPCC Tier 2)

T3 (IPCC Tier 3)

CR (CORINAIR)

CS (Country Specific)

OTH (Other)

M (model)

If using more than one method within one category, list all the relevant methods. Explanations regarding country-specific methods, other methods or any modifications to the default IPCC methods, as well as information regarding the use of different methods per source category where more than one method is indicated, should be provided in the documentation box. Also use the documentation box to explain the use of notation OTH.

Use the following notation keys to specify the emission factor used:

D (IPCC default)

CR (CORINAIR)

CS (Country Specific)

PS (Plant Specific)

OTH (Other)

M (model)

Where a mix of emission factors has been used, list all the methods in the relevant cells and give further explanations in the documentation box. Also use the documentation box to explain the use of notation OTH.



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TABLE 10 EMISSION TRENDS
GHG CO₂ eq emissions
(Sheet 1 of 6)

Year
Submission
Country

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Reference year/period for NDC ⁽¹⁾	Base year ⁽²⁾	1990	(Years 1991 to 2019)	(Years 1991 to 2019)	(Years 1991 to 2019)	2020	(Years 2021 to latest reported year)	(Years 2021 to latest reported year)	(Years 2021 to latest reported year)	Change from 1990[base year][reference year][p eriod]] to latest reported year
	(kt CO ₂ eq)										%
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 substitutes for ODS											
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 ⁽⁴⁾											
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.(I) Direct N ₂ O emissions from N inputs to managed soils											
4.(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils											
4.(III) Direct N ₂ O emissions from N mineralization/immobilization associated with loss/gain of soil organic matter resulting from change of land use or management of mineral soils											
4.(V) Biomass Burning											
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. Wastewater treatment and discharge											
5.E. Other											
6. Other (as specified in summary 1)											
Memo items:											
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 ₂ O											
Indirect CO ₂ ⁽⁴⁾											
Total CO ₂ equivalent emissions without land use, land-use change and forestry											
Total CO ₂ equivalent emissions with land use, land-use change and forestry											
Total CO ₂ equivalent emissions, including indirect CO ₂ , without land use, land-use change and forestry											
Total CO ₂ equivalent emissions, including indirect CO ₂ , with land use, land-use change and forestry											

Note: All footnotes for this table are given at the end of the table on sheet 6.



Transparency

TABLE 10 EMISSION TRENDS
CO₂
(Sheet 2 of 6)

Year
Submission
Country

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Reference year/period for NDC ⁽¹⁾	Base year ⁽²⁾	1990	(Years 1991 to 2019)	(Years 1991 to 2019)	(Years 1991 to 2019)	2020	(Years 2021 to latest reported year)	(Years 2021 to latest reported year)	(Years 2021 to latest reported year)	Change from 1990[base year][reference year][p eriod]] to latest reported year
											%
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 substitutes for ODS											
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 ⁽³⁾											
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.(I) Direct N ₂ O emissions from N inputs to managed soils											
4.(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils											
4.(III) Direct N ₂ O emissions from N mineralization/immobilization associated with loss/gain of soil organic matter resulting from change of land use or management of mineral soils											
4.(IV) Indirect N ₂ O emissions from managed soils											
4.(V) Biomass Burning											
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. Wastewater treatment and discharge											
5.E. Other											
6. Other (as specified in summary 1)											
Memo items:											
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 ₂ O											
Indirect CO ₂ ⁽⁴⁾											
Total CO ₂ emissions without land use, land-use change and forestry											
Total CO ₂ emissions with land use, land-use change and forestry											
Total CO ₂ emissions, including indirect CO ₂ , without land use, land-use change and forestry											
Total CO ₂ emissions, including indirect CO ₂ , with land use, land-use change and forestry											

Note: All footnotes for this table are given at the end of the table on sheet 6.



Transparency

TABLE 10 EMISSION TRENDS
HFCs, PFCs, SF₆, and NF₃
(Sheet 5 of 6)

Year
Submission
Country

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Reference year/period for NDC ⁽¹⁾	Base year ⁽²⁾	1990	(Years 1991 to 2019)	(Years 1991 to 2019)	(Years 1991 to 2019)	2020	(Years 2021 to latest reported year)	(Years 2021 to latest reported year)	(Years 2021 to latest reported year)	Change from 1990[base year][reference year][period]] to latest reported year
	(kt)										%
Emissions of HFCs and PFCs - (kt CO ₂ equivalent)											
Emissions of HFCs - (kt CO ₂ equivalent)											
HFC-23											
HFC-32											
HFC-41											
HFC-43-10mee											
HFC-125											
HFC-134											
HFC-134a											
HFC-143											
HFC-143a											
HFC-152											
HFC-152a											
HFC-161											
HFC-227ea											
HFC-236cb											
HFC-236ea											
HFC-236fa											
HFC-245ca											
HFC-245fa											
HFC-365mfc											
Unspecified mix of HFCs ⁽⁵⁾ - (kt CO ₂ equivalent)											
Emissions of PFCs - (kt CO ₂ equivalent)											
CF ₄											
C ₂ F ₆											
C ₃ F ₈											
C ₄ F ₁₀											
c-C ₄ F ₈											
C ₅ F ₁₂											
C ₆ F ₁₄											
C ₁₀ F ₁₈											
c-C ₃ F ₆											
Unspecified mix of PFCs ⁽⁵⁾ - (kt CO ₂ equivalent)											
Unspecified mix of HFCs and PFCs - (kt CO ₂											
Emissions of SF ₆ - (kt CO ₂ equivalent)											
SF ₆											
Emissions of NF ₃ - (kt CO ₂ equivalent)											
NF ₃											

Note: All footnotes for this table are given at the end of the table on sheet 6.

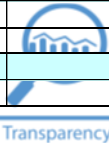


TABLE 10 EMISSION TRENDS
SUMMARY
(Sheet 6 of 6)

GREENHOUSE GAS EMISSIONS AND REMOVALS	Reference year/period for NDC ⁽¹⁾	Base year ⁽²⁾	1990	(Years 1991 to 2019)	(Years 1991 to 2019)	(Years 1991 to 2019)	2020	(Years 2021 to latest reported year)	(Years 2021 to latest reported year)	(Years 2021 to latest reported year)	Change from 1990[base year][reference year][period]] to latest reported year
	(kt CO ₂ eq)										(%)
CO ₂ emissions without net CO ₂ from LULUCF											
CO ₂ emissions with net CO ₂ from LULUCF											
CH ₄ emissions without CH ₄ from LULUCF											
CH ₄ emissions with CH ₄ from LULUCF											
N ₂ O emissions without N ₂ O from LULUCF											
N ₂ O emissions with N ₂ O from LULUCF											
HFCs											
PFCs											
Unspecified mix of HFCs and PFCs											
SF ₆											
NF ₃											
Total (without LULUCF)											
Total (with LULUCF)											
Total (without LULUCF, with indirect)											
Total (with LULUCF, with indirect)											

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Reference year/period for NDC ⁽¹⁾	Base year ⁽²⁾	1990	(Years 1991 to 2019)	(Years 1991 to 2019)	(Years 1991 to 2019)	2020	(Years 2021 to latest reported year)	(Years 2021 to latest reported year)	(Years 2021 to latest reported year)	Change from 1990[base year][reference year][period]] to latest reported year
	(kt CO ₂ eq)										(%)
1. Energy											
2. Industrial processes and product use											
3. Agriculture											
4. Land use, land-use change and forestry ⁽³⁾											
5. Waste											
6. Other											
Total (including LULUCF) ⁽⁶⁾											

⁽¹⁾ Each Party shall report a consistent annual time series starting from 1990; 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 under Article 4 of the Paris Agreement and, in addition, a consistent annual time series from at least 2020 onwards. (§57 of annex to the decision 18/CMA.1)

⁽²⁾ The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the COP. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

⁽³⁾ Fill in net emissions/removals as reported in table Summary 1. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽⁴⁾ In accordance with the UNFCCC Annex I inventory reporting guidelines, for Parties that decide to report indirect CO₂ the national totals shall be provided with and without indirect CO₂.

⁽⁵⁾ In accordance with the UNFCCC Annex I inventory reporting guidelines, HFC and PFC emissions should be reported for each relevant chemical. However, if it is not possible to report values for each chemical (i.e. mixtures, confidential data, lack of disaggregation), this row could be used for reporting aggregate figures for HFCs and PFCs, respectively. Note that the unit used for this row is kt of CO₂ equivalent and that appropriate notation keys should be entered in the cells for the individual chemicals.

⁽⁶⁾ Includes net CO₂, CH₄ and N₂O from LULUCF.

Documentation box:

• Parties should provide detailed explanations on emissions trends in chapter 2: Trends in Greenhouse Gas Emissions and, as appropriate, in the corresponding Chapters 3 - 8 of the national inventory document (NID). Use this documentation box to provide references to relevant sections of the NID, if any additional information and further details are needed to understand the content of this table.

• Use the documentation box to provide explanations if potential emissions are reported.



TABLE 6 CROSS-SECTORAL REPORT: Indirect emissions of N₂O and CO₂
(Sheet 1 of 1)

Year
Submission
Country

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	SOURCE EMISSIONS					INDIRECT EMISSIONS	
	CH ₄	CO	NM VOC	NO _x	NH ₃	CO ₂ ⁽¹⁾	N ₂ O ⁽²⁾
	(kt)					(kt)	
Total							
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⁾							
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. LULUCF⁽³⁾							
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.(I) Direct N ₂ O emissions from N inputs to managed soils							
4.(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils							
4.(III) Direct N ₂ O emissions from N mineralization/immobilization associated with loss/gain of soil organic matter resulting from change of land use or management of mineral soils							
4.(V) Biomass Burning							
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 (please specify)							

⁽¹⁾ Parties may report indirect CO₂ from the atmospheric oxidation of CH₄, CO and NMVOCs, according to §52 of annex to the decision 18/CMA.1.

⁽²⁾ Parties may report indirect emissions of N₂O from sources other than agriculture and LULUCF, according to §52 of annex to the decision 18/CMA.1.

⁽³⁾ Indirect emissions of N₂O resulting from ammonia emissions are covered in the sectoral tables for agriculture and LULUCF. In this table, only indirect N₂O emissions resulting from NO_x emissions are to be included.



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

Year
Submission
Country

KEY CATEGORIES OF EMISSIONS AND REMOVALS	Gas	Criteria used for key source identification		Key category excluding LULUCF	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 ₂ O				
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 ₂ O				
1.A.1 Fuel combustion - Energy Industries - Gaseous Fuels	CO ₂				
1.A.1 Fuel combustion - Energy Industries - Gaseous Fuels	CH ₄				
1.A.1 Fuel combustion - Energy Industries - Gaseous Fuels	N ₂ O				
1.A.1 Fuel combustion - Energy Industries - Other Fossil Fuels	CO ₂				
1.A.1 Fuel combustion - Energy Industries - Other Fossil Fuels	CH ₄				
1.A.1 Fuel combustion - Energy Industries - Other Fossil Fuels	N ₂ O				
1.A.1 Fuel combustion - Energy Industries - Peat	CO ₂				
1.A.1 Fuel combustion - Energy Industries - Peat	CH ₄				
1.A.1 Fuel combustion - Energy Industries - Peat	N ₂ O				
1.A.1 Fuel combustion - Energy Industries - Biomass	CH ₄				
1.A.1 Fuel combustion - Energy Industries - Biomass	N ₂ O				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Liquid Fuels	CO ₂				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Liquid Fuels	CH ₄				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Liquid Fuels	N ₂ O				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Solid Fuels	CO ₂				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Solid Fuels	CH ₄				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Solid Fuels	N ₂ O				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Gaseous Fuels	CO ₂				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Gaseous Fuels	CH ₄				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Gaseous Fuels	N ₂ O				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Other Fossil Fuels	CO ₂				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Other Fossil Fuels	CH ₄				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Other Fossil Fuels	N ₂ O				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Peat	CO ₂				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Peat	CH ₄				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Peat	N ₂ O				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Biomass	CH ₄				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Biomass	N ₂ O				
1.A.3.a Domestic Aviation	CO ₂				
1.A.3.a Domestic Aviation	CH ₄				
1.A.3.a Domestic Aviation	N ₂ O				
1.A.3.b Road Transportation	CO ₂				
1.A.3.b Road Transportation	CH ₄				
1.A.3.b Road Transportation	N ₂ O				
1.A.3.c Railways	CO ₂				
1.A.3.c Railways	CH ₄				
1.A.3.c Railways	N ₂ O				
1.A.3.d Domestic Navigation - Liquid Fuels	CO ₂				
1.A.3.d Domestic Navigation - Liquid Fuels	CH ₄				
1.A.3.d Domestic Navigation - Liquid Fuels	N ₂ O				
1.A.3.d Domestic Navigation - Gaseous Fuels	CO ₂				
1.A.3.d Domestic Navigation - Gaseous Fuels	CH ₄				
1.A.3.d Domestic Navigation - Gaseous Fuels	N ₂ O				
1.A.3.d Domestic Navigation - Other Fossil Fuels	CO ₂				
1.A.3.d Domestic Navigation - Other Fossil Fuels	CH ₄				
1.A.3.d Domestic Navigation - Other Fossil Fuels	N ₂ O				
1.A.3.d Domestic Navigation - Biomass Fuels	CH ₄				
1.A.3.d Domestic Navigation - Biomass Fuels	N ₂ O				
1.A.3.e Other Transportation	CO ₂				
1.A.3.e Other Transportation	CH ₄				
1.A.3.e Other Transportation	N ₂ O				
1.A.4 Other Sectors - Liquid Fuels	CO ₂				
1.A.4 Other Sectors - Liquid Fuels	CH ₄				
1.A.4 Other Sectors - Liquid Fuels	N ₂ O				

4.D.1.1 Peat Extraction Remaining Peat Extraction	CO ₂				
4.D.1.2 Flooded Land Remaining Flooded Land	CO ₂				
4.D.1.3 Other Wetlands Remaining Other Wetlands	CO ₂				
4.D.2 Land Converted to Wetlands	CO ₂				
4.E.1 Settlements Remaining Settlements	CO ₂				
4.E.2 Land Converted to Settlements	CO ₂				
4.F.1 Other Land Remaining Other Land	CO ₂				
4.F.2 Land Converted to Other Land	CO ₂				
4.G Harvested Wood Products	CO ₂				
4(I). Direct N ₂ O emissions from N inputs to managed soils	N ₂ O				
4(II). Emissions and removals from drainage and rewetting and other management of organic and mineral soils	CO ₂				
4(II). Emissions and removals from drainage and rewetting and other management of organic and mineral soils	CH ₄				
4(II). Emissions and removals from drainage and rewetting and other management of organic and mineral soils	N ₂ O				
4(III).Direct N ₂ O emissions from N mineralization/immobilization	N ₂ O				
4(IV) Indirect N ₂ O Emissions from Managed Soils	N ₂ O				
4(V) Biomass Burning	CO ₂				
4(V) Biomass Burning	CH ₄				
4(V) Biomass Burning	N ₂ O				
4.H Other	CO ₂				
4.H Other	CH ₄				
4.H Other	N ₂ O				
4. LULUCF (indirect CO ₂ emissions)	CO ₂				
5.A Solid Waste Disposal	CH ₄				
5.A Solid Waste Disposal	CO ₂				
5.B Biological Treatment of Solid Waste	CH ₄				
5.B Biological Treatment of Solid Waste	N ₂ O				
5.C Incineration and Open Burning of Waste	CO ₂				
5.C Incineration and Open Burning of Waste	CH ₄				
5.C Incineration and Open Burning of Waste	N ₂ O				
5.D Wastewater Treatment and Discharge	CH ₄				
5.D Wastewater Treatment and Discharge	N ₂ O				
5.E Other	CO ₂				
5.E Other	CH ₄				
5. Waste (indirect CO ₂ emissions)	CO ₂				
6. Other	CO ₂				
6. Other	CH ₄				
6. Other	N ₂ O				
6. Other	Aggregate F-gases				
6. Other (indirect CO ₂ emissions)	CO ₂				

Note: L = Level assessment; T = Trend assessment.

⁽¹⁾ This table is filled automatically based on the IPCC Approach 1 methodology.



TABLE 8 RECALCULATION - RECALCULATED DATA
(Sheet 1 of 2) Recalculated year:

Year
Submission
Country

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂						CH ₄						N ₂ O					
	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions excluding LULUCF ⁽²⁾	Impact of recalculation on total emissions including LULUCF ⁽³⁾	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions excluding LULUCF ⁽²⁾	Impact of recalculation on total emissions including LULUCF ⁽³⁾	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions excluding LULUCF ⁽²⁾	Impact of recalculation on total emissions including LULUCF ⁽³⁾
	CO ₂ equivalent (kt)			(%)			CO ₂ equivalent (kt)			(%)			CO ₂ equivalent (kt)			(%)		
Total national emissions and removals																		
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.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 (net)⁽⁴⁾																		
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.(I) Direct N ₂ O emissions from N inputs to managed soils																		
4.(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils																		
4.(III) Direct N ₂ O emissions from N mineralization/immobilization associated with loss/gain of soil organic matter resulting from change of land use or management of mineral soils																		
4.(V) Biomass Burning																		
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.A)																		
Memo items:																		
1.D.1. International bunkers																		
1.D.1.a. Aviation																		
1.D.1.b. Navigation																		
1.D.2. Multilateral operations																		
1.D.3. CO₂ emissions from biomass																		
1.D.4. CO₂ captured																		
5.E.1. Long-term storage of C in waste disposal sites																		
Indirect N₂O																		
Indirect CO₂																		

Note: All footnotes for this table are given at the end of the table on sheet 2.



Transparency

TABLE 8 RECALCULATION - RECALCULATED DATA

2 of 2)

Recalculated year:

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFCs						PFCs						SF ₆						Unspecified mix of HFCs and PFCs						NF ₃					
	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions excluding LULUCF ⁽²⁾	Impact of recalculation on total emissions including LULUCF ⁽²⁾	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions excluding LULUCF ⁽²⁾	Impact of recalculation on total emissions including LULUCF ⁽²⁾	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions excluding LULUCF ⁽²⁾	Impact of recalculation on total emissions including LULUCF ⁽²⁾	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions excluding LULUCF ⁽²⁾	Impact of recalculation on total emissions including LULUCF ⁽²⁾	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions excluding LULUCF ⁽²⁾	Impact of recalculation on total emissions including LULUCF ⁽²⁾
	CO ₂ equivalent (kt)		(%)				CO ₂ equivalent (kt)		(%)				CO ₂ equivalent (kt)		(%)				CO ₂ equivalent (kt)		(%)				CO ₂ equivalent (kt)		(%)			
Total Actual Emissions																														
2.B.9. Fluorochemical production																														
2.B.10. Other																														
2.C.3. Aluminium production																														
2.C.4. Magnesium production																														
2.C.7. Other																														
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.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.1. Electrical equipment																														
2.G.2. SF ₆ and PFCs from other product use																														
2.G.4. Other																														
2.H. Other																														

	Previous submission	Latest submission	Difference	Difference ⁽¹⁾
	CO ₂ equivalent (kt)			(%)
Total CO ₂ equivalent emissions with land use, land-use change and forestry				
Total CO ₂ equivalent emissions without land use, land-use change and forestry				

Calculate the percentage change due to recalculation with respect to the previous submission (percentage change = 100 x [(LS-PS)/PS], where LS = latest submission and PS = previous submission. All cases of recalculation of the estimate of the source/sink category should be addressed and explained in the

Footnote 1: Emissions refer to total aggregate GHG emissions expressed in terms of CO₂ equivalent, excluding GHGs from the LULUCF sector. The impact of the recalculation on the total emissions is calculated as follows: impact of recalculation (%) = 100 x [(source (LS) - source (PS))/total emissions (LS)].

LS = latest submission, PS = previous submission.

Footnote 2: Emissions refer to total aggregate GHG emissions expressed in terms of CO₂ equivalent, including GHGs from the LULUCF sector. The impact of the recalculation on the total emissions is calculated as follows: impact of recalculation (%) = 100 x [(source (LS) - source (PS))/total emissions (LS)] ,

LS = latest submission, PS = previous submission.

CO₂ emissions/removals to be reported.

Documentation box:

Parties should provide detailed information on recalculations in Chapter 10: Recalculations and Improvements, and in the relevant sections of Chapters 3 to 8 (see section 2.5 of each of Chapters 3 - 8) of the national inventory document (NID). Use this documentation box to provide references to relevant sections of the NID, if any additional information and further details are needed to understand the content of this table. References should point particularly to the sections of the NID in which justifications of the changes as to improvements in accuracy, completeness and consistency of the inventory are reported.



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 ⁽²⁾	Explanation	
CO ₂				
CH ₄				
N ₂ O				
HFCs				
PFCs				
SF ₆				
Unspecified mix of HFCs and PFCs				
NF ₃				
Sources and sinks reported elsewhere ("IE") ⁽³⁾				
GHG	Source/sink category	Allocation as per IPCC Guidelines	Allocation used by the Party	Explanation
CO ₂				
CH ₄				
N ₂ O				
HFCs				
PFCs				
SF ₆				
Unspecified mix of HFCs and PFCs				
NF ₃				

⁽¹⁾ Clearly indicate 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 the notation key "NE" (not estimated) is entered in the sectoral tables.

⁽²⁾ Indicate omitted source/sink category.

⁽³⁾ Clearly indicate 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.

