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Submission from the OECD/IEA Climate Change Expert Group Secretariat

**UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) call for submissions related to Methodological issues under the Paris Agreement
-Common Reporting Tables (CRTs)-**

The OECD/IEA Climate Change Expert Group (CCXG) is a group of government delegates and experts from developed and developing countries. The aim of the group is to promote dialogue on and enhance the understanding of technical issues in the international climate change negotiations. The CCXG provides this submission in response to the [SBSTA call for contributions](#) seeking views on “the common reporting tables for the electronic reporting of the information in the national inventory reports, including examples and options for the formats and contents of tables, in particular sectoral report and background tables, and options for implementation of the flexibility provisions”. The present submission extracts relevant information from recent CCXG publications¹, in particular:

- Falduto, C., Wartmann, S. and Rocha, M. (2020). [Reporting national GHG inventories through Common Reporting Tables \(CRTs\): An assessment of CRT reporting options through worked examples](#);
- Falduto, C. and Wartmann, S. (forthcoming, 2021). *Towards common GHG inventory reporting tables for Biennial Transparency Reports: Experiences with tools for generating and using reporting tables under the UNFCCC*.

These issues were further discussed at the [CCXG workshop on reporting tables for GHG inventories](#) (2-4 February 2021)

Overview

The first section of the submission identifies and analyses possible Common Reporting Tables (CRT) options and approaches to filling them in, including possible options for the structure/format and content of the tables and for implementing flexibility provisions outlined in the Modalities, Procedures and Guidelines (MPGs) and available to developing countries that need them in the light of their capacities. Worked examples of proposed CRT options are included [in Annex A](#). The second section of the submissions presents key considerations and insights on how the transition to a CRT system could be facilitated; particularly for developing countries with no or limited experience in reporting national GHG inventories using a common format and a reporting software.

¹ The opinions expressed in these publications are those of the CCXG Secretariat and do not necessarily reflect the views of the OECD, the IEA or their member countries, or the endorsement of any approach described herein.

1. Options for the development of CRTs

1.1 Criteria that can guide the development of CRTs

The CCXG has identified eight criteria that can guide the development of CRTs. These criteria stem from reporting principles laid down in the MPGs and in the Paris Agreement, and lessons learned from current reporting practices. These criteria are used in this submission (and the underlying CCXG analyses) to assess advantages and disadvantages of different CRT options and reporting approaches.

- Providing a common format for reporting (Decision 18/CMA.1, §12.a);
- Facilitating improved reporting and transparency over time (Annex to decision 18/CMA.1, Section I, §3.a);
- Promoting transparency, accuracy, completeness, consistency, and comparability (TACCC) (Annex to decision 18/CMA.1, Section I, §3.d);
- Ensuring that Parties maintain at least the current frequency and quality of reporting (Annex to decision 18/CMA.1, Section I, §3.f);
- Facilitating machine readability and/or automatised assessment;
- Facilitating the technical expert review (TER);
- Limiting the scope and complexity of changes compared to the current reporting tables so to allow for relevant reporting tools (hereinafter referred to as “CRT Reporter”) to be prepared in time to facilitate reporting the first Biennial Transparency Report (BTR)
- Allowing Parties to include new categories and gases from subsequent versions or refinements of the IPCC 2006 Guidelines where Parties wish to include them voluntarily.

Table 1 provides an overview of main findings of CRT reporting approaches discussed in this submission and tested against the above criteria.

Table 1. Overview of possible CRT reporting approaches discussed in this submission

Approach	Applicable reporting scenario	Advantages against selected criteria	Disadvantages against selected criteria
Reporting on the use of flexibility using a (common) tabular format	Reporting on the use of flexibility (paragraph 6 of the MPGs)	The use of a tabular format would promote transparency, and partially facilitate the Technical Expert Review (TER). The use of a common tabular format would also promote comparability and consistency; significantly facilitate the TER and machine readability and/or automated assessment.	Time and resources required to apply relevant adjustments to the reporting software that generates the set of tables.
Using notation keys	Operationalising flexibility (e.g. gas coverage; insignificance threshold)	The use of a standardised element promotes readability, comparability and consistency, in turn facilitating the TER and machine readability and/or automated assessment.	In some cases, (e.g. where flexibility is used to apply a lower insignificance threshold) the use of a flexibility notation key alone may not provide sufficient information to readers and/or reviewers.
Providing information in documentation boxes and/or footnotes	Operationalising flexibility; indicating a reference year	This approach would promote transparency and completeness of reporting. It would allow relevant reporting software to be developed in time for the first Biennial Transparency Report (BTR), as it demands minimal changes to current reporting tools.	This approach would render the TER more cumbersome, as reviewers would have to cross-reference information provided in the tables to that specified in documentation boxes, which may make comparability more difficult. Further, this approach would not allow for machine readability and/or automated assessment.
Amending tables to allow for the (voluntary) reporting of new elements	Facilitating the transition to future GHG inventory guidance; Reporting the reference year/period of the NDC; Indicating threshold for KCA; Operationalising flexibility (Completeness table)	Amending the table for all Parties according to a new, commonly-agreed structure to allow the reporting of new elements (e.g. reference year/period of the NDC, when applicable), would ensure a common format for reporting is used. This, in turn, would facilitate the TER and machine readability and/or automated assessment. This approach would also facilitate comparability and consistency across Parties.	Amending tables to add elements, e.g. new columns or reporting cells, may render the development of a new reporting software more cumbersome. Further, if only some Parties use amended tables (e.g. tables that allow for the reporting of new gases according to the IPCC 2019 Refinement), this approach would not allow for the adoption of a common format for reporting, thus hindering comparability, the TER and automated assessment and machine readability.
Deleting rows and/or columns	Operationalising flexibility (gas coverage; time series; insignificance threshold); Showing a trend in the summary tables	N/A	The manual deletion of rows and/or columns from tables would mean that output tables reported would not be common, which would also hinder machine readability and automated assessment. This approach would also hinder transparency of reporting, rendering the TER more cumbersome.

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

1.2 Options for the overall structure and content of the CRTs

The CCXG has analysed and developed CRT options for issues related to CRTs' overall structure and content. These options are elaborated below (and discussed in more detail in [Falduto, Wartmann and Rocha \(2020\)](#)). [Annex A](#) presents different reporting scenarios and worked examples to illustrate some of the CRT reporting options discussed here. A hyperlink to the corresponding worked examples are included next to relevant issues.

- **Sectoral background data tables and tables for indirect GHGs (see [Scenario 1](#))**

Paragraph 40 of the MPGs stipulates that “Each Party shall provide information on the category and gas, and the methodologies, emission factors and activity data used at the most disaggregated level, to the extent possible [...]” (Annex to decision 18/CMA.1, Section II, §40). The CCXG Secretariat understands this to mean that all Parties are to complete as appropriate and include the common set of CRTs sectoral background data tables. This would be consistent with the mandate of developing a common format for reporting, would enhance consistency and comparability of reporting across Parties, and would enhance transparency, accuracy, and completeness of reporting.
- **Indicating and reporting a reference year in the CRTs (see [Scenario 2](#))**

Possible options on how to report a reference year in the CRTs include:

 - **Option 1: Including a “reference year” column in the summary tables:** Where the reference year/period is the timeframe used as a basis for NDC projections, this information could be included in the GHG inventory reporting in case of recalculations. In principle, column(s) headed “reference year” could be included in the summary tables generated by an automatised function of the CRT Reporter as needed. Tool-based solutions allowing Parties to generate additional columns for reference years as appropriate might, however take time to set-up.
 - **Option 2: Indicating the reference year in a documentation box:** The documentation box could include clear guidance to indicate which year(s) are considered as reference years and what the Party understands to be a reference year/period. This is less transparent than using dedicated columns with headers indicating reference years/periods and is not a machine-readable solution.
- **Presenting GHG emission trends (see [Scenario 3](#)):**

Possible options for presenting GHG emission trends in the CRTs include:

 - **Option 1: Not including information on trends in the CRTs, i.e. deleting the columns titled “base year” and “% change to latest reporting year”.** This option would test negatively, against the criteria “ensuring that Parties maintain at least the current frequency and quality of reporting”, as Parties currently report on base year and percentage change. This option would, however, work in favour of allowing relevant reporting tools to be prepared in time for the first BTR, as changes to be applied to the current CRF Reporter software would be limited to deleting the relevant columns.
 - **Option 2: Including general information on the trend, by using information reported on the earliest year reported and the latest year reported.** This option would still allow showing a general trend while avoiding having to define what a base year is and differentiating between Parties for which the concept of a base year applies to their NDC and others where the concept does not apply. While this information would not be comparable between Parties where different starting and ending years are used, it would provide reviewers with a general indication of trend per category based on the information available. This option would test positively against the criteria of “Facilitating the TER”, but would test negatively against “promoting TACCC”, as the resulting trends, relating to different time periods, are not comparable among countries. The option would also require adding further automatised functions to the CRT reporting and thus score negatively against “allowing relevant reporting tools to be prepared in time for the first BTR”.

- **Adapting to the IPCC 2019 Refinement (see [Scenario 4](#)):**

Possible options for accommodating voluntary reporting on new categories introduced by the IPCC 2019 Refinement with limited effort include:

- **Option 1: Reporting on new categories (with regards to gases already included in the 2006 IPCC Guidelines) using the category “Other”.** This option would test positively against the criteria “Providing a common format for reporting”, as the CRTs would not have to be edited according to reporting guidelines. This option would also facilitate improved reporting and transparency over time, as well as promote TACCC. A standardised and common reporting format would in turn facilitate the TER. On the other hand, and in the absence of a drop down menu to select the chosen category, this option would test negatively against the “Facilitating machine readability” criteria. This is because the category titles would change based on the new category that a Parties decides to report on
- **Option 2: Tables could be amended to allow for the voluntary reporting on new gases identified in the 4th and 5th IPCC Assessment Reports and included in the IPCC 2019 Refinement.** This option would test negatively against the “Providing a common format for reporting” and “Allowing relevant reporting tools to be developed in time for the first BTR” criteria. This is because tables would substantially change across countries depending on whether or not new gases are being reported. Further, amending tables so to allow for the reporting of new gases, while ensuring that this option is voluntary, may render the development of a reporting software more complex. This option would however test positively against the criteria of “Facilitating improved reporting and transparency over time” and against “facilitating machine readability and/or automated assessment”, as the new reporting fields would be standardised.

1.3 Applying flexibility to the CRTs

The CCXG has analysed and developed options for the application of flexibility provisions within the CRTs. These options are elaborated below (and discussed in more detail in [Falduto, Wartmann and Rocha \(2020\)](#)). [Annex A](#) presents different reporting scenarios and worked examples to illustrate some of the CRT reporting options discussed here. A hyperlink to the corresponding worked examples are included next to relevant issues.

- **Transparently indicating in CRTs if and where flexibility options have been used through the use of notation keys, documentation boxes or footnotes (see [Scenario 5](#))**

The use of flexibility in CRTs can be indicated with a combination of a standardised element (e.g. a notation key) and explanatory qualitative information. Where cells are not filled in due to the use of flexibility (e.g. not reporting specific gases or certain reporting years) one option is the use of a new notation key to denote the use of flexibility (suggestions include F, FX or FLEX). The expert review team needs to understand where flexibility has and has not been used because paragraph 149(e) of the Annex to Decision 18/CMA.1 mandates that expert review teams are not to review a Party's determination to use a flexibility option or their capacity to report without this option.

To provide additional information, footnotes, documentation boxes and/or explanations in the National Inventory Document (NID) can be used as a complement to the notation key. Using documentation boxes to provide further information on flexibility used would enable the established and distinct functions of the footnotes being focused on providing guidance and information on specific cells to be maintained, and the documentation box providing additional information helping to understand better the information in a specific CRF table in general. Nevertheless, using a custom footnote for a specific cell (as opposed to the sheet as a whole) could still allow for transparent reporting. Both options would not require any changes to the CRF reporter, but neither would be machine-readable.

- **Emissions that are not estimated (see [Scenario 6](#))**

There are several options available to Parties to indicate where flexibility is applied to the provision specified in paragraph 32 (significance threshold) of the MPGs. The options include:

- **Option 1: Using a “flexibility” notation key (e.g. “F/FX/FLEX”) to indicate when emissions were not estimated because flexibility was used.** This option would allow readers and reviewers to clearly determine where a Party that needs flexibility in the light of its capacity has not estimated emissions due to the use of flexibility and thus of a higher insignificance threshold. Therefore, this option would test positively against the “Providing a common format for reporting” and “Facilitating improved reporting over time” criteria. This option would, however, not allow readers to discern whether emissions were not estimated because of the application of a higher significance threshold as a result of flexibility allowed by paragraph 32 of the MPGs or because of the application of flexibility to other reporting provisions (e.g. partial gas coverage as per paragraph 48 of the MPGs). For this reason, this option would only partially test positively against “Promoting TACCC”.
- **Option 2: Using both the “not estimated” and the “flexibility” notation keys (e.g. “NE, F/FX/FLEX”) in those cases in which emissions were not estimated because flexibility was used.** This option would facilitate the readability of the reporting tables and would allow readers and reviewers to easily identify where a higher significance threshold was applied due to the use of the flexibility. This option would test positively against all the criteria identified (with the exception of allowing for the voluntary reporting using 2019 IPCC Guidelines).
- **Option 3: Using only the notation key “NE” or “F/FX/FLEX” and to provide further information on the use of flexibility in the documentation box of the CRT and/or in the body of the NID.** This option would allow Parties to provide more information on the use of flexibility (e.g. motivation), thus testing positively, albeit

partially, against “Promoting TACCC”. On the other hand, this option would also render readability of tables more cumbersome, with potentially negative repercussions also on machine readability and on the TER.

- **Option 4: Using only the notation key “NE” or “F/FX/FLEX” and to provide further information on the use of flexibility in a completeness table with information on notation keys (e.g. Table 9 of current CRF tables).** This option also allows for the provision of further information on the use of flexibility, but with potentially negative repercussions on machine readability. However, if a standardised text label to highlight the use of flexibility (e.g. “Party has applied flexibility to insignificance threshold” to be selected from a drop-down menu) is agreed upon and included in the table, machine readability would be facilitated.

Importantly, current reporting experience from Annex I Parties, show that emissions from certain categories are at times not estimated – and thus marked as “NE”—not because these fall below the insignificance threshold, but instead because data is not available. Under current reporting guidelines, information on the use of NE “shall” be provided in the completeness table (Table 9 of the current CRFs). This practice is not specified in the MPGs, but Parties may wish to continue using a completeness table to clarify such information. Not estimating emissions due to unavailability of data is not necessarily eligible for the application of flexibility, if it does not fall within a specific flexibility provision as specified in the MPGs. It is important for the CRTs to consider this case and to ensure that it is possible to determine when emissions were not estimated due to the application of flexibility. Any of the options outlined above would allow third parties to make this distinction.

- **Key category analysis (see [Scenario 7](#))**

To indicate flexibility as per paragraph 25 of the MPGs, it could be possible to add a cell to Table 7 of the CRF tables. Such an approach would ensure transparent reporting and promote consistency and comparability across countries. With a view to improving over time, Parties could, when presenting key categories in their NID, also indicate which additional categories would have been identified as key categories had a 95% threshold been used. Because of the ease of readability and accessibility of the information presented in such a way, this option would also facilitate the technical expert review. Were a dropdown menu to be used offering Parties to choose a threshold between 85% and 95%, the information provided by Parties could be machine-readable.

- **Operationalising flexibility through the deletion of rows and columns (see [Scenario 8](#) and [9](#))**

This approach is not necessarily consistent with TACCC and with the SBSTA mandate of developing a common reporting format. In general, deleting rows and/or columns could either mean that such rows/columns are not generated at all (by the CRT Reporter) or that they are generated, left empty and then deleted manually by Parties. Five options are considered with regards to dealing with cells which are not filled with values due to flexibility options being used in light of a Parties capacities.

- **Option 1: Empty rows/columns are not generated by the CRT reporter.** When the CRT software is being developed, it could potentially be done so in such a way to ensure that empty rows and columns are not “exported”. However, while this is technically feasible, it might be complex to implement and thus take time. Furthermore, the CRT tables generated would then differ between Parties, so aiming to evaluate these files in an automatised manner would need an enhanced effort. This would also reduce the effectiveness of assessing CRT tables manually as part of a review and might lead to increased effort on the side of the Party being reviewed, as members of the expert review team might ask more questions for clarification. In summary, the option scores negatively on “providing a common format for reporting”, “facilitating TACCC and the TER”, as well as limiting changes to allow the CRT reporter to be prepared in time for the first BTR. The options scores neutral against “machine-readability”.
- **Option 2: The rows/columns are generated by the CRT Reporter and deleted manually by Parties before submission to the UNFCCC.** The same issues would apply as with Option 1. Furthermore, manual deletion could lead to errors, further reducing accuracy. In summary, the option scores negatively on “providing a

common format for reporting”, “facilitating TACCC and the TER”. The options scores neutral against “machine-readability” and as well as” limiting changes to allow the CRT reporter to be prepared in time for the first BTR”.

- **Option 3: Empty rows / columns are retained.** This option would be more transparent and could improved reporting over time, as cells yet to be filled remain visible. However, room for improvement with regards to transparency remains, as there can be various reasons for an empty cell, e.g. emissions not estimated for reasons other than flexibility options used in light of a Parties capacity, emissions not occurring, etc. The option scores positively against “providing a common reporting format”, “facilitating the TER” as well as “limiting changes to allow the CRT reporter to be prepared in time for the first BTR”.
- **Option 4: Empty rows/columns are filled with a notation key indicating the use of flexibility.** This approach would best facilitate transparency, effective reviews as well as improved reporting over time as a clear reason is provided why no value is reported while all cells for which no value is reported due to the use of flexibility are still visible. The option scores positively against “providing a common reporting format”, “facilitating the TER”, “facilitating improved reporting over time” as well as “limiting changes to allow the CRT reporter to be prepared in time for the first BTR”.
- **Option 5: Empty rows/columns are by default filled with the notation key “NE” unless the Party changes this.** This option avoids empty cells. At the same time, the risk arises that, where cells should have been filled with another notation key, e.g. NO, NA or F/FX/FLEX, but have been left empty erroneously, are automatically filled with NE, and the error is not noticed. This could lead to a number of cells being incorrectly filled with NE, which renders the reporting less transparent. It thus scores negatively against “promoting TACCC”, “facilitating the TER” and “limiting changes to allow the CRT reporter to be prepared in time for the first BTR”.
- **Reporting on the use of flexibility (see [Scenario 10](#))**

Reporting on the use of flexibility as per paragraph 6 of the MPGs is a separate issue from operationalising flexibility within the CRT tables, which is discussed above. There are at least three options that could be available to Parties to report on different informational elements related to the use of flexibility as mandated by paragraph 6 of the MPGs:

- **Option 1: Reporting on the use of flexibility in a narrative format within the NID.** This option could lead to some information to be potentially overlooked as reviewers and readers would need to cross-reference information contained in the NID with what is being reported in the CRTs. This is particularly true considering that, without agreed guidelines on the detailed structure of the NID, different countries may be including this information in different chapters or sections. This being considered, this option is deemed to test negatively against the criterion of providing a common format for reporting and criterion of facilitating the TER. This option would test negatively against the “comparability” aspect of promoting TACCC, but could potentially help to promote “transparency”, “accuracy” and “completeness” aspects of the same criterion.
- **Option 2: Reporting on the use of flexibility using a (common) reporting table.** Tabular formats for the reporting of informational elements related to the use of flexibility could be designed either at Parties’ discretion and included in the body of the NID only or could be designed in a common format and included in the set of CRTs. The use of tabular formats for the reporting on the use of flexibility would significantly facilitate the review of information, as it would provide reviewers with a clear overview of whether and where flexibility has been used by those developing country Parties that need it in the light of their capacities. The use of a table would therefore test positively against criterion “facilitating the TER”. Furthermore, a *common* flexibility table that is also included within the set of CRTs would test positively against criteria “providing a common format for reporting”, “facilitating the TER” and the “comparability” aspect of “promoting TACCC”.

- **Option 3: Reporting on the use of flexibility in a completeness table with information on notation keys** (e.g. Table 9 of current CRF tables). This option would only be viable if Parties were to indicate the use of flexibility within CRT tables with a “flexibility” notation key.

2. Facilitating the transition to a CRT system

Under the current reporting framework, non-Annex I Parties’ experience in using common reporting tabular formats and common reporting tools is more limited than that of Annex I Parties. To facilitate the transition to a CRT system, the different starting points of Parties would need to be taken into account. It is also key that developing countries have the opportunity to familiarise themselves with the CRF system as well as with the challenges and opportunities of different software, IT arrangements, and data collection processes to support the transition to a CRT system.

CCXG work identifies some key opportunities for facilitating the transition and contributing to the setup of an effective CRT reporting systems. Such opportunities are discussed in Falduto and Wartmann (forthcoming, 2021). In particular, the CCXG concludes that capacity-building support for the transition to a CRT system may benefit from focusing on enhancing available Information Technology (IT) arrangements and solutions. When considering the reporting of GHG inventories, a central challenge for developing countries with limited reporting experience and technical capacity may be that of organising activity and emission data in a format that can be easily inputted into the CRT Reporter, minimising the additional reporting burden. Experience from other countries shows that having such a system in place can be helpful, and significantly reduce the resources needed for reporting GHG inventories through CRF tables. The free and publicly-available IPCC Inventory Software can potentially play an important role in further facilitating developing country reporting of national GHG inventories through a CRT system. Overall, the level of reporting burden depends more on the availability and characteristics of the IT and institutional arrangements in place and of the reporting software used than on the numbers of reporting tables and their formats. While the clear mandate of the SBSTA is that of developing a set of CRTs, it is important to note that once the relevant data points have been entered into the CRT Reporter, these could, in theory, be presented in any tabular format desired and included in multiple tables offering different levels of aggregation, e.g., at category level, but also aggregated at sectoral and/or national level. The numbers of tables to be reported and their specific formats do not therefore determine the level of reporting burden on Parties. Factors that will influence the reporting burden include the approach to data entry, such as the software’s ability to communicate with software solutions for GHG inventory compilation like the IPCC Inventory Software.

Annex A. Worked examples

This section presents and briefly discusses a number of worked examples used to illustrate the different CRT reporting options discussed in this submission. Table 2 below shows an overview of the scenarios used to develop the worked examples. Scenarios 3 and 4 illustrate how CRFs are currently filled in to shed light on current reporting practices and related issues raised during the international climate negotiations. For more detailed background information and full understanding of these worked examples please see [Falduto, Wartmann and Rocha \(2020\)](#).

Table 2 Overview of scenarios used to develop the worked examples

	No	Scenario
Scenarios related to overall structure and content	1	Reporting sectoral background data tables
	2	Reporting a reference year
	3	Reporting on GHG trends in the summary tables
	4	Reporting on new categories from the IPCC 2019 Refinement
Scenarios related to flexibility options	5	Reporting on the use of flexibility: footnotes vs documentation boxes
	6	Applying a lower insignificance level (flexibility option in §32 of the MPGs)
	7	Applying a lower KCA threshold of no lower than 85% (flexibility option in §25 of the MPGs)
	8	Not reporting certain gases (flexibility options in §48 of the MPGs)
	9	Reporting a shorter time series (flexibility options in §57 and §58 of the MPGs)
	10	Reporting on the use of flexibility as per paragraph 6 of the MPGs (Annex to decision 18/CMA.1)

Scenario 1: Reporting sectoral background data tables

This scenario presents two worked examples that reflect current reporting practices and show two background data tables for CH₄ emissions from manure management filled-in by two different Parties that use different Tiers (Tier 1 in Figure 1 and Tier 2 in Figure 2, respectively).

Figure 1. Sectoral background data table for CH₄ emissions from manure management (cattle only) using Tier 1

TABLE 3.B(a) SECTORAL BACKGROUND DATA FOR AGRICULTURE
CH₄ Emissions from Manure Management
(Sheet 1 of 1)

Year 2022
Submission 2024
Country Party A

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION						IMPLIED EMISSION FACTORS CH ₄ (kg CH ₄ /head/yr)	EMISSIONS CH ₄ (kt)	
	Population size (1000s)	Allocation by climate region ⁽¹⁾			Typical animal mass (average) (kg)	VS ⁽²⁾ daily excretion (average) (kg dm/head/day)			CH ₄ producing potential (Bo) ⁽²⁾ (m ³ CH ₄ /kg VS)
		Cool	Temperate	Warm					
1. Cattle									
<i>Option A:</i>									
Dairy cattle ⁽³⁾	5674	65	35	NO	480	NA	NA	19.12	108.49
Non-dairy cattle	2345	65	35	NO	280	NA	NA	1.00	2.36
<i>Option B:</i>									
Mature dairy cattle									
Other mature cattle									
Growing cattle									

Note: Based on real Annex I Party reporting.

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Figure 2. Sectoral background data table for CH₄ emissions from manure management (cattle only) using Tier 2

TABLE 3.B(a) SECTORAL BACKGROUND DATA FOR AGRICULTURE
CH₄ Emissions from Manure Management
(Sheet 1 of 1)

Year 2022
Submission 2024
Country Party B

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION							IMPLIED EMISSION FACTORS CH ₄ (kg CH ₄ /head/yr)	EMISSIONS CH ₄ (kt)
	Population size (1000s)	Allocation by climate region ⁽¹⁾			Typical animal mass (average) (kg)	VS ⁽²⁾ daily excretion (average) (kg dm/head/day)	CH ₄ producing potential (Bo) ⁽²⁾ (average) (m ³ CH ₄ /kg VS)		
		Cool	Temperate	Warm					
		(%)							
1. Cattle									
<i>Option A:</i>									
Dairy cattle ⁽³⁾	4325	95	5	NO	670.44	4.20	0.24	21.68	93.77
Non-dairy cattle	1051	95	5	NO	382.31	1.58	0.24	7.71	64.18
<i>Option B:</i>									
Mature dairy cattle									
Other mature cattle									
Growing cattle									

Note: Based on real Annex I Party reporting.
Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Scenario 2: Reporting a reference year

This scenario presents worked example² that show how the reference year(s) for the NDC could be indicated in the CRTs³.

Figure 3. Option 1: CRT reporter automatically generates header indicating reference year

TABLE 10 EMISSION TRENDS		Inventory 2021	
Summary		Submission 2024v1	
(Sheet 6 of 6)		Example	
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Reference year: 2010	2020	2021
	(kt CO ₂ eq)	(kt CO ₂ eq)	(kt CO ₂ eq)
Total (net emissions) ⁽¹⁾			
1. Energy			
A. Fuel combustion (sectoral approach)			
1. Energy industries	33.44	33.33	33.22
2. Manufacturing indust	33.44	33.33	33.22
3. Transport	33.44	33.33	33.22
4. Other sectors	33.44	33.33	33.22
5. Other			

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Figure 4. Option 2: Party indicates reference year in a documentation box

TABLE 10 EMISSION TRENDS		Inventory 2021	
Summary		Submission 2024v1	
(Sheet 6 of 6)		Example	
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2010	2020	2021
	(kt CO ₂ eq)	(kt CO ₂ eq)	(kt CO ₂ eq)
Total (net emissions) ⁽¹⁾			
1. Energy			
A. Fuel combustion (sectoral approach)			
1. Energy industries	33.44	33.33	33.22
2. Manufacturing indust	33.44	33.33	33.22
3. Transport	33.44	33.33	33.22
4. Other sectors	33.44	33.33	33.22
5. Other			

Documentation box:
• 2010 is the reference year for our NDC.

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

² The worked example is based on data being reported only for the years 2010 (reference year), 2020 and 2021, which is in line with the flexibility options of para 57 and 58 of the MPGs. This is done with the sole purpose of keeping the example simple. All worked examples in this scenario use hypothetical data for the sole purpose of illustrating how tables can be filled. For this reason, within a specific reporting year, the same values are used for all categories shown. The worked examples in this scenario only show relevant elements of reporting tables as opposed to the full tables

³ Decision 18/CMA.1 in § 57 requires, among other, that Parties report at least (a) the reference year or period for the NDC. The decision does not specify what “reference year” means. This issue is discussed in Section 3, para 0.

Scenario 3: Reporting on GHG trends in the summary tables

This scenario presents worked examples⁴ that show options for the reporting of GHG trends in the summary tables.

Figure 5 Option 1: Base year and trend columns deleted from the summary tables

TABLE 10 EMISSION TRENDS Inventory 2021		
Summary	Submission 2024v1	
(Sheet 6 of 6)	Example	
GREENHOUSE GAS SOURCE AND SECTOR	2020	2021
	(kt CO₂ eq)	(kt CO₂ eq)
Total (net emissions)⁽¹⁾		
I. Energy		
A. Fuel combustion (sectoral approach)		
1. Energy industries	33.33	33.22
2. Manufacturing industries and construction	33.33	33.22
3. Transport	33.33	33.22
4. Other sectors	33.33	33.22
5. Other		
B. Fugitive emissions from fuels		

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

⁴ This worked example is based on data being reported only for the years 2020 and 2021, which is in line with the flexibility options of para 57 and 58 of the MPGs. This is done with the sole purpose of keeping the example simple. All worked examples in this scenario use hypothetical data for the sole purpose of illustrating how tables can be filled. For this reason, within a specific reporting year, the same values are used for all categories shown. The worked examples in this scenario only show relevant elements of reporting tables as opposed to the full tables.

Figure 6 Option 2: “Base year” column deleted, table on trend retained and renamed into “Change in % between first reported year to latest reported year”

TABLE 10 EMISSION TRENDS		Inventory 2021	
Summary		Submission 2024v1	
(Sheet 6 of 6)		Example	
GREENHOUSE GAS SOURCE AND SECTOR	2020	2021	Change from first reported year to latest reported year
	(kt CO ₂ eq)	(kt CO ₂ eq)	%
Total (net emissions)⁽¹⁾			
1. Energy			
A. Fuel combustion (sectoral approach)			
1. Energy industries	33.33	33.22	-0.3%
2. Manufacturing industries and construction	33.33	33.22	-0.3%
3. Transport	33.33	33.22	-0.3%
4. Other sectors	33.33	33.22	-0.3%
5. Other			
B. Fugitive emissions from fuels			

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Scenario 4: Voluntary reporting on new categories from the IPCC 2019 Refinement

This scenario explores two options for how CRTs could facilitate voluntary reporting of new categories and new gases from the IPCC 2019 Refinement.

Figure 7. Option 1: Reporting Hydrogen Production using the category 2.B.10 “Other” in the sectoral report table

TABLE 2(I) SECTORAL REPORT FOR INDUSTRIAL PROCESSES AND PRODUCT USE												Inventory 2021
(Sheet 1 of 2)												Submission 2024v1
												Example Party
GREENHOUSE GAS SOURCE	CO ₂	CH ₄	N ₂ O	HFC ₅ ⁽¹⁾	PFC ₅ ⁽¹⁾	Unspecified mix of HFC ₅ and PFC ₅ ⁽¹⁾	SF ₆	NF ₃	NO _x	CO	NM VOC	SO ₂
	(kt)			CO ₂ equivalent (kt)			(kt)					
Total industrial processes												
A. Mineral industry												
1. Cement production												
2. Lime production												
3. Glass production												
4. Other process uses of carbonates												
B. Chemical industry												
1. Ammonia production												
2. Nitric acid production												
3. Adipic acid production												
4. Caprolactam, glyoxal and glyoxylic acid production												
5. Carbide production												
6. Titanium dioxide production												
7. Soda ash production												
8. Petrochemical and carbon black production												
9. Fluorochemical production												
10. Hydrogen Production	99.99											

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Figure 8. Option 2: CRF 2(II) Sectoral report for industrial processes and product use, emissions of HFCs, PFCs, SF₆ and NF₃ with three further gases from the IPCC 2019 Refinement included (CF₃I, CH₂Br₂, CHCl₃)

TABLE 2(II) SECTORAL REPORT FOR INDUSTRIAL PROCESSES AND PRODUCT USE - EMISSIONS OF HFCs, PFCs, SF ₆ AND NF ₃ (Sheet 1 of 1)																							Inventory 2021 Submission 2024v1 Example Party														
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFC-23	HFC-32	HFC-41	HFC-69/125m	HFC-125	HFC-134a	HFC-143a	HFC-149a	HFC-152a	HFC-160	HFC-227ea	HFC-236fa	HFC-245ca	HFC-254ze	HFC-318a	HFC-365mfc	Unspecified mix of HFCs ⁽¹⁾	Total HFCs	CF ₄	C ₂ F ₆	C ₃ F ₈	C ₄ F ₁₀	C ₆ F ₁₄	e-C ₂ F ₄	C ₆ F ₆	C ₆ F ₈	C ₈ F ₁₈	C ₁₀ F ₂₀	e-C ₈ F ₁₈	Unspecified mix of PFCs ⁽²⁾	Total PFCs	Unspecified mix of HFCs and PFCs ⁽³⁾	SF ₆	NF ₃	CF ₃ I	CH ₂ Br ₂	CHCl ₃
	CO ₂ equivalent (kt)	0																CO ₂ equivalent (kt)	0										CO ₂ equivalent (kt)	0	0	0	0	0	0		
Total actual emissions of hydrocarbons (by chemical) and SF ₆																																					
B. Chemical industry																																					
F. Pharmaceutical production																																					
By-product emissions																																					

Unspecified mix of PFCs ⁽¹⁾	Total PFCs	Unspecified mix of HFCs and PFCs ⁽³⁾	SF ₆	NF ₃	CF ₃ I	CH ₂ Br ₂	CHCl ₃
CO ₂ equivalent (kt)	CO ₂ equivalent (kt)	(t)	(t)	(t)	(t)	(t)	(t)

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Scenario 5: Reporting on the use of flexibility: footnotes vs. documentation boxes

This scenario presents worked examples⁵ that show how Parties could indicate the use of flexibility on a specific CRT worksheet.

Figure 9. Option 1: A documentation box is used to indicate the use of flexibility

TABLE 10 EMISSION TRENDS Inventory 2021		
Summary	Submission 2024v1	
(Sheet 6 of 6)	Example	
GREENHOUSE GAS SOURCE A	2020	2021
Total (net emissions)⁽¹⁾		
I. Energy		
A. Fuel combustion (sectoral approach)		
1. Energy industries	33.33	33.33
2. Manufacturing industries	33.33	33.33
3. Transport	33.33	33.33

Documentation box:		
<p>Example Party makes use of the flexibility option provided by para 57 of Decision 18/CMA.1 allowing Parties who need it in light of their capacities to report 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, and of flexibility option provided by para 58 of Decision 18/CMA.1, allowing Parties who need it in light of their capacities to have their latest reporting year as three years prior to the submission of their national inventory report.</p>		

Note: This example shows the documentation box filled in by the Party. The guidance text has been deleted.
Source: [Falduto, Wartmann and Rocha \(2020\)](#)

⁵ The worked examples are filled with hypothetical data, using the same values for all cells filled. The worked examples only show relevant elements of a CRF table rather than the full table.

Figure 10. Option 2: Custom footnote used to indicate use of flexibility

TABLE 10 EMISSION TRENDS Inventory 2021		
Summary	Submission 2024v1	
(Sheet 6 of 6)	Example	
GREENHOUSE GAS SOURCE AND SECTOR	2020	2021
Total (net emissions)⁽¹⁾		
1. Energy		
A. Fuel combustion (sectoral approach)		
1. Energy industries	33.33 ⁽⁵⁾	33.33
2. Manufacturing industries and construction	33.33	33.33
3. Transport	33.33	33.33
4. Other sectors	33.33	33.33

⁽³⁾ 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.

⁽⁴⁾ Includes net CO₂, CH₄ and N₂O from LULUCF.

Custom Footnotes

⁽⁵⁾ ExampleParty makes use of the flexibility option provided by para 57 of Decision 18/CMA.1 allowing Parties who need it in light of their capacities to report 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, and of flexibility option provided by para 58 of Decision 18/CMA.1, allowing Parties who need it in light of their capacities to have their latest reporting year as three years prior to the submission of their national inventory report.

Note: The text in the custom footnote (5) is not standard text, but would need to be developed by the Party. The text in the standard footnotes (1)-(4) is intended to provide guidance to Parties in filling in the tables. This footnote text is taken from the current CRTs and included here for purely illustrative purposes. The text in the documentation box is guidance text aiming to help Parties fill the documentation box as appropriate. In this worked example, the Party has not included any information in the documentation box.

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Scenario 6: Applying a lower insignificance level (flexibility option in §32 of the MPGs)

This scenario illustrates four worked examples⁶ showing different reporting options available to a Party that needs flexibility in the light of its capacity that applies flexibility to the provision of paragraph 32 of the MPGs (i.e. insignificance threshold). Accordingly, the Party applies a higher insignificance threshold for CH₄ and N₂O emissions from category 2D.1 (Lubricant use) and CO₂, CH₄ and N₂O emissions from category D.2 (Paraffin wax use). In addition, the Party does not report HFCs, PFCs, SF₆ and NF₃, based on the flexibility provision of paragraph 48 of the MPGs (i.e. gas coverage).

⁶ This worked example is based on data being reported only for the years 2020 and 2021, which is in line with the flexibility options of para 57 and 58 of the MPGs. This is done with the sole purpose of keeping the example simple. All worked examples in this scenario use mock-up data for the sole purpose illustrating showing how tables can be filled and a trend is calculated. For this reason, within a reporting year, the same values are used for all categories shown. The worked examples in this scenario only show relevant elements of reporting tables as opposed to the full tables.

Figure 11. Option 1: Using a “flexibility” notation key (e.g. “FLEX”) to indicate when emissions were not estimated because flexibility was used

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

Inventory 2022
Submission 2024 v1
Example Party

GREENHOUSE GAS SOURCE AND SINK CATEGORY	CO ₂	CH ₄	N ₂ O	HFCs ⁽¹⁾	PFCs ⁽¹⁾	Unspecified mix of HFCs and PFCs ⁽¹⁾	SF ₆	NF ₃	NO _x	CO	NMVOC	SO ₂
	(kt)			CO ₂ equivalent (kt)			(kt)					
D. Non-energy products from fuels and solvents	155.52	FLEX	FLEX						NA	NA	NA	NA
1. Lubricant use	147.40	FLEX	FLEX						NA	NA	NA	NA
2. Paraffin wax use	FLEX	FLEX	FLEX						NA	NA	NA	NA
3. Other	NA	NA	NA						NA	NA	NA	NA
E. Electronics industry				FLEX	FLEX	FLEX	FLEX	FLEX				
1. Integrated circuit or semiconductor				FLEX	FLEX	FLEX	FLEX	FLEX				
2. TFT flat panel display				FLEX	FLEX	FLEX	FLEX	FLEX				
3. Photovoltaics				FLEX	FLEX	FLEX	FLEX	FLEX				
4. Heat transfer fluid				FLEX	FLEX	FLEX	FLEX	FLEX				
5. Other (as specified in table 2(II))				FLEX	FLEX	FLEX	FLEX	FLEX				
F. Product uses as substitutes for ODS⁽²⁾				FLEX	FLEX	FLEX	FLEX	FLEX				
1. Refrigeration and air conditioning				FLEX	FLEX	FLEX	FLEX	FLEX				
2. Foam blowing agents				FLEX	FLEX	FLEX	FLEX	FLEX				
3. Fire protection				FLEX	FLEX	FLEX	FLEX	FLEX				
4. Aerosols				FLEX	FLEX	FLEX	FLEX	FLEX				
5. Solvents				FLEX	FLEX	FLEX	FLEX	FLEX				
6. Other applications				FLEX	FLEX	FLEX	FLEX	FLEX				
G. Other product manufacture and use				FLEX	FLEX	FLEX	FLEX	FLEX				
1. Electrical equipment				FLEX	FLEX	FLEX	FLEX	FLEX				
2. SF ₆ and PFCs from other product use					FLEX	FLEX	FLEX					
3. N ₂ O from product uses												
4. Other												
H. Other (as specified in tables 2(I).A-H and 2(II))⁽³⁾												

⁽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 equivalent emissions.

⁽²⁾ ODS ozone-depleting substances.

Note: The documentation box of table 2(I) has been cut in this example for formatting purposes and to facilitate readability.

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Figure 12. Option 2: Using both the “not estimated” and the “flexibility” notation keys (e.g. “NE, FL”) in those cases in which emissions were not estimated because flexibility was used.

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

Inventory 2022
Submission 2024 v1
Example Party

GREENHOUSE GAS SOURCE AND SINK C	CO ₂	CH ₄	N ₂ O	HFCs ⁽¹⁾	PFCs ⁽¹⁾	Unspecifie d mix of HFCs and PFCs ⁽¹⁾	SF ₆	NF ₃	NO _x	CO	NMVOC	SO ₂
	(kt)			CO ₂ equivalent (kt)			(kt)					
D. Non-energy products from fuels and solv	155.52	NE, FLEX	NE, FLEX						NA	NA	NA	NA
1. Lubricant use	147.40	NE, FLEX	NE, FLEX						NA	NA	NA	NA
2. Paraffin wax use	NE, FLEX	NE, FLEX	NE, FLEX						NA	NA	NA	NA
3. Other	NA	NA	NA						NA	NA	NA	NA
E. Electronics industry				FLEX	FLEX	FLEX	FLEX	FLEX				
1. Integrated circuit or semiconductor				FLEX	FLEX	FLEX	FLEX	FLEX				
2. TFT flat panel display				FLEX	FLEX	FLEX	FLEX	FLEX				
3. Photovoltaics				FLEX	FLEX	FLEX	FLEX	FLEX				
4. Heat transfer fluid				FLEX	FLEX	FLEX	FLEX	FLEX				
5. Other (as specified in table 2(II))				FLEX	FLEX	FLEX	FLEX	FLEX				
F. Product uses as substitutes for ODS⁽²⁾				FLEX	FLEX	FLEX	FLEX	FLEX				
1. Refrigeration and air conditioning				FLEX	FLEX	FLEX	FLEX	FLEX				
2. Foam blowing agents				FLEX	FLEX	FLEX	FLEX	FLEX				
3. Fire protection				FLEX	FLEX	FLEX	FLEX	FLEX				
4. Aerosols				FLEX	FLEX	FLEX	FLEX	FLEX				
5. Solvents				FLEX	FLEX	FLEX	FLEX	FLEX				
6. Other applications				FLEX	FLEX	FLEX	FLEX	FLEX				
G. Other product manufacture and use				FLEX	FLEX	FLEX	FLEX	FLEX				
1. Electrical equipment				FLEX	FLEX	FLEX	FLEX	FLEX				
2. SF ₆ and PFCs from other product use					FLEX	FLEX	FLEX					
3. N ₂ O from product uses												
4. Other												
H. Other (as specified in tables 2(I).A-H and 2(II))⁽³⁾												

⁽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 equivalent emissions.

⁽²⁾ ODS ozone-depleting substances.

Note: The documentation box of table 2(I) has been cut in this example for formatting purposes and to facilitate readability.

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Figure 13. Option 3: Using only the notation key “NE” and to provide further information on the potential use of flexibility in the documentation box of the CRT

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

Inventory 2022
Submission 2024 v1
Example Party

GREENHOUSE GAS SOURCE AND SINK C.	CO ₂	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 ₂
	(kt)			CO ₂ equivalent (kt)			(kt)					
D. Non-energy products from fuels and solvents	155.52	NE	NE						NA	NA	NA	NA
1. Lubricant use	147.40	NE	NE						NA	NA	NA	NA
2. Paraffin wax use	NE	NE	NE						NA	NA	NA	NA
3. Other	NA	NA	NA						NA	NA	NA	NA
E. Electronics industry				FLEX	FLEX	FLEX	FLEX	FLEX				
1. Integrated circuit or semiconductor				FLEX	FLEX	FLEX	FLEX	FLEX				
2. TFT flat panel display				FLEX	FLEX	FLEX	FLEX	FLEX				
3. Photovoltaics				FLEX	FLEX	FLEX	FLEX	FLEX				
4. Heat transfer fluid				FLEX	FLEX	FLEX	FLEX	FLEX				
5. Other (as specified in table 2(II))				FLEX	FLEX	FLEX	FLEX	FLEX				
G. Other product manufacture and use				FLEX	FLEX	FLEX	FLEX	FLEX				
1. Electrical equipment				FLEX	FLEX	FLEX	FLEX	FLEX				
2. SF ₆ and PFCs from other product use					FLEX	FLEX	FLEX					
3. N ₂ O from product uses												
4. Other												
H. Other (as specified in tables 2(I).A-H and 2(II))⁽³⁾												

⁽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 equivalent emissions. Data on

⁽²⁾ ODS ozone-depleting substances.

Documentation box:

- Parties should provide detailed explanations on the industrial processes sector in chapter 4: industrial processes (CRF sector 2) of the national inventory report (NIR). Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- Parties who need it in light of their capacities using flexibility options granted by the Annex to Decision 18/CMA.1 should provide information on the specific flexibility options used in this documentation box.

Documentation box	<p>D.1 CH₄ and N₂O: ExampleParty makes use of the flexibility option provided by para 32 of Decision 18/CMA.1 allowing Parties who need it in light of their capacities to consider emissions insignificant if the likely level of emissions is below 0.1 per cent of the national total GHG emissions, excluding LULUCF, and 1,000 kt CO₂eq, whichever is lower.</p> <p>D.2 CO₂, CH₄, N₂O: ExampleParty makes use of the flexibility option provided by para 32 of Decision 18/CMA.1 allowing Parties who need it in light of their capacities to consider emissions insignificant if the likely level of emissions is below 0.1 per cent of the national total GHG emissions, excluding LULUCF, and 1,000 kt CO₂eq, whichever is lower.</p>
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Note: The “Product uses as substitutes for ODS” category (F) has been cut in this example for formatting purposes and to facilitate readability.

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Figure 14. Option 4: Using only the notation key “NE” and to provide further information on the use of flexibility in a completeness table with information on notation keys (e.g. Table 9 of current CRF tables)

TABLE 9 COMPLETENESS - INFORMATION ON NOTATION KEYS				Inventory 2022
(Sheet 1 of 1)				Submission 2024 v1
				Example Party
Sources and sinks not estimated ("NE") ⁽¹⁾				
GHG	Sector ⁽²⁾	Source/sink category ⁽²⁾	Explanation	
CO ₂	Industrial Processes and Product Use	D.2 Paraffin wax use	Emissions are less than the significance threshold. ExampleParty makes use of the flexibility option provided by para 32 of Decision 18/CMA.1, and thus consider emissions insignificant because below 0.1 per cent of the national total GHG emissions.	
CH ₄	Industrial Processes and Product Use	D.1 Lubricant use	Emissions are less than the significance threshold. ExampleParty makes use of the flexibility option provided by para 32 of Decision 18/CMA.1, and thus consider emissions insignificant because below 0.1 per cent of the national total GHG emissions.	
	Industrial Processes and Product Use	D.2 Paraffin wax use	Emissions are less than the significance threshold. ExampleParty makes use of the flexibility option provided by para 32 of Decision 18/CMA.1, and thus consider emissions insignificant because below 0.1 per cent of the national total GHG emissions.	
N ₂ O	Industrial Processes and Product Use	D.1 Lubricant use	Emissions are less than the significance threshold. ExampleParty makes use of the flexibility option provided by para 32 of Decision 18/CMA.1, and thus consider emissions insignificant because below 0.1 per cent of the national total GHG emissions.	
	Industrial Processes and Product Use	D.2 Paraffin wax use	Emissions are less than the significance threshold. ExampleParty makes use of the flexibility option provided by para 32 of Decision 18/CMA.1, and thus consider emissions insignificant because below 0.1 per cent of the national total GHG emissions.	
HFCs				
PFCs				
SF ₆				
Unspecified mix of				
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				
NF ₃				

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⁽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.

Note: This table would have to be used in conjunction with the use of notation key “NE”, as shown in Figure

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Scenario 7: Applying a lower KCA threshold of no lower than 85% (flexibility option in §25 of the MPGs)

This worked example presents an option for indicating that an 85% threshold has been used for the key category analysis, in line with the flexibility option provided by §25 of the MPGs to those developing countries who need it in light of the capacities (Annex to decision 18/CMA.1, Section II, §25). Figure 15 shows the CRF Table 7 providing a summary overview for key categories in its current format. Figure 16 presents the same table with the option to indicate the threshold value used for the key category analysis.

Figure 15 Summary overview for key categories in the current CRF

KEY CATEGORIES OF EMISSIONS AND REMOVALS	Gas	Criteria used for key source identification		Key category excluding LULUCF	Key category including LULUCF
		L	T		
<i>For example: 3.B Manure management</i>	CH ₄	X		X	

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

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

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Figure 16 Indicating that a KCA threshold of 85% has been used

KEY CATEGORIES OF EMISSIONS AND REMOVALS	Gas	Criteria used for key source identification		Key category excluding LULUCF	Key category including LULUCF
		L	T		
<i>Threshold used for the key category analysis</i>	85%				
3B. Land	CO ₂	X		X	X
1.A.1 Fuel combustion - Energy Industries - Liquid Fuels	CO ₂		X	X	X
1.A.3.b Road Transportation	CO ₂		X	X	X
3.D Agricultural Soils	CH ₄	X		X	X
5.A Solid Waste Disposal	CH ₄	X		X	

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Scenario 8: Not reporting certain gases (flexibility options in §48 of the MPGs)

This scenario presents worked examples of options available to a Party that, in light of its capacities, applies flexibility to the provision of paragraph 48 of the MPGs (i.e. gas coverage) (Annex to decision 18/CMA.1, Section II, §48).⁷

Figure 17. Option 2.1 Deleting empty columns, table 2(II)

TABLE 2(II) SECTORAL REPORT FOR INDUSTRIAL PROCESSES AND PRODUCT USE - EMISSIONS OF HFCs, (Sheet 1 of 1)		Inventory 2021	
		Submission 2024v1	
		Example	
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	SF ₆		
	(t)		
Total actual emissions of halocarbons (by chemical) and SF ₆			
B. Chemical industry			
C. Metal industry			
E. Electronics industry			
F. Product uses as substitutes for ODS ⁽²⁾			
1. Refrigeration and air conditioning			
2. Foam blowing agents			
3. Fire protection			
4. Aerosols			
5. Solvents			
6. Other applications			
G. Other product manufacture and use			
1. Electrical equipment			
2. SF ₆ and PFCs from other products		99.99	
4. Other			
H. Other (please specify)			
Total emissions ⁽³⁾			
B. Chemical industry			
C. Metal production			
E. Electronics industry			
F. Product uses as substitutes for ODS			
G. Other product manufacture and use			
H. Other			

⁷ Accordingly, the Party decides not to report on HFCs because data necessary to estimate emissions for these gases is not available and cannot be collected within the limited capacity available to the Party. The Party thus reports on the following gases: CO₂, CH₄ and N₂O as well as SF₆ from electrical equipment (the only source of SF₆ emissions within this Party's territory). The Party is aware that no emissions from electronic industry (category 2.E) are occurring, but HFC emissions occur for refrigeration, fire protection and air conditioning, foam blowing, aerosols and solvents occur (categories 2.F.1 and 2.F.3-2.F.5) and PFC emissions from fire protection (category 2.F.2). For this example, TABLE 2(I) Sectoral report for industrial processes and product use and TABLE 2(II) Sectoral report for industrial processes and product use - emissions of HFCs, PFCs, SF₆ and NF₃ are considered.

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Figure 18. Option 2.2 Deleting empty rows and columns, table 2(II)

TABLE 2(II) SECTORAL REPORT FOR INDUSTRIAL PROCESSES AND PRODUCT USE - EMISSIONS OF HFCs, PFCs, SF₆ AND NF₃	
(Sheet 1 of 1)	
Inventory 2021	
Submission 2024v1	
Example	
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	SF₆ (t)
G. Other product manufacture and use	
1. Electrical equipment	
2. SF ₆ and PFCs from other produ	99.99
4. Other	
Total emissions⁽³⁾	
B. Chemical industry	
C. Metal production	
E. Electronics industry	
F. Product uses as substitutes for ODS	
G. Other product manufacture and use	99.99
H. Other	

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Figure 19. Option 3 Leaving cells empty, table 2(I)

TABLE 2(I) SECTORAL REPORT FOR INDUSTRIAL PROCESSES AND PRODUCT USE											Inventory 2021	
(Sheet 2 of 2)											Submission 2024v1	
											Example	
GREENHOUSE	CO ₂	CH ₄	N ₂ O	HFC ₅ ⁽¹⁾	PFC ₅ ⁽¹⁾	Unspecified mix of HFC ₅ and PFC ₅ ⁽¹⁾	SF ₆	NF ₃	NO _x	CO	NM VOC	SO ₂
	(kt)			CO ₂ equivalent (kt)			(kt)					
D. Non-energy products from fuels and solvent use												
1. Lubricant use												
2. Paraffin wax use												
3. Other												
E. Electronics industry												
1. Integrated circuit or semiconductor												
2. TFT flat panel display												
3. Photovoltaics												
4. Heat transfer fluid												
5. Other (as specified in table 2(II))												
F. Product uses as substitutes for ODS⁽²⁾												
1. Refrigeration and air conditioning												
2. Foam blowing agents												
3. Fire protection												
4. Aerosols												
5. Solvents												
6. Other applications												
G. Other product manufacture and use												
1. Electrical equipment												
2. SF ₆ and PFCs from other product use												

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Figure 20. Option 4 Using a notation key, table 2(I)

TABLE 2(I) SECTORAL REPORT FOR INDUSTRIAL PROCESSES AND PRODUCT USE												Inventory 2021
(Sheet 2 of 2)												Submission 2024v1
												Example
GREENHOUSE	CO ₂	CH ₄	N ₂ O	HFCs ⁽¹⁾	PFCs ⁽¹⁾	Unspecified mix of HFCs and PFCs ⁽¹⁾	SF ₆	NF ₃	NO _x	CO	NMVOC	SO ₂
	(kt)			CO ₂ equivalent (kt)			(kt)					
D. Non-energy products from fuels and solvent use												
1. Lubricant use									NE	NE	NE	NE
2. Paraffin wax use									NE	NE	NE	NE
3. Other												
E. Electronics industry												
1. Integrated circuit or semiconductor				NO	NO	NO	NO	NO				
2. TFT flat panel display				NO	NO	NO	NO	NO				
3. Photovoltaics				NO	NO	NO	NO	NO				
4. Heat transfer fluid				NO	NO	NO	NO	NO				
5. Other (as specified in table 2(II))				NO	NO	NO	NO	NO				
F. Product uses as substitutes for ODS⁽²⁾												
1. Refrigeration and air conditioning				FLEX	FLEX	FLEX	FLEX	FLEX				
2. Foam blowing agents				FLEX	FLEX	FLEX	FLEX	FLEX				
3. Fire protection				FLEX	FLEX	FLEX	FLEX	FLEX				
4. Aerosols				FLEX	FLEX	FLEX	FLEX	FLEX				
5. Solvents				FLEX	FLEX	FLEX	FLEX	FLEX				
6. Other applications				FLEX	FLEX	FLEX	FLEX	FLEX				
G. Other product manufacture and use												
1. Electrical equipment				99.99	99.99	99.99	99.99	99.99				
2. SF ₆ and PFCs from other product use					NO	NO	NO					
3. N ₂ O from product uses												
4. Other												
H. Other (as specified in tables 2(I).A-H and 2(II))⁽³⁾												
				NO	NO	NO	NO	NO				

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Scenario 9: Reporting a shorter time series (flexibility options in §57 and §58 of the MPGs)

This scenario⁸ explores flexibility options provided in paragraphs 57 and 58 of the MPGs (Annex to decision 18/CMA.1, section II, §57 and §58), which allow Parties to report a shorter time series, including at least (a) the reference year or period for the NDC (§ 57); (b) a consistent time series from 2020 onwards (§57); (c) the latest reporting year as three years prior to the submission of their national inventory report (§58).

⁸ In this scenario, the Party has previously reported on its GHG emissions for the years 2000, 2010 and 2015. In order to report on these years, it would have to conduct further data collection to allow recalculating GHG emission for these years in order to ensure consistency with data sources and methodologies used for the GHG inventory compilation for its first BTR. It however considers that it does not have the capacity to carry out such data collection and recalculation. Furthermore, it considers that it does not have the capacity to collect data for any additional years before 2020. The Party notices that the term “reference year or period for the NDC” is not defined and interprets the term “reference year” to mean target year, which in its case is 2030. Submitting its first BTR in 2024, it thus reports on the years 2020 and 2021.

Figure 21. Option 1 Columns are included only for those years reported (2020-2021)

TABLE 10 EMISSION TRENDS				Inventory 2021
Summary				Submission 2024v1
(Sheet 6 of 6)				Example
GREENHOUSE GAS SOURCE AND SECTOR	Base year	2020	2021	Change from base to latest reported year
	(kt CO ₂ eq)			%
Total (net emissions)⁽¹⁾				
1. Energy				
A. Fuel combustion (sectoral approach)				
1. Energy industries		To be filled	To be filled	
2. Manufacturing industries and construction		To be filled	To be filled	
3. Transport		To be filled	To be filled	
4. Other sectors		To be filled	To be filled	
5. Other		To be filled	To be filled	
B. Fugitive emissions from fuels				
1. Solid fuels		To be filled	To be filled	
2. Oil and natural gas and their emissions		To be filled	To be filled	
C. CO ₂ transport and storage				
2. Industrial Processes				
A. Mineral industry		To be filled	To be filled	
B. Chemical industry		To be filled	To be filled	
C. Metal industry		To be filled	To be filled	
D. Non-energy products from fuels and solvents		To be filled	To be filled	
E. Electronic industry		To be filled	To be filled	
F. Product uses as ODS substitutes		To be filled	To be filled	
G. Other product manufacture and use		To be filled	To be filled	
H. Other				
3. Agriculture				
A. Enteric fermentation		To be filled	To be filled	
B. Manure management		To be filled	To be filled	
C. Rice cultivation		To be filled	To be filled	
D. Agricultural soils		To be filled	To be filled	
E. Prescribed burning of savannahs		To be filled	To be filled	

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Figure 22. Option 2.1 Columns are generated for all years from 1990 to n-2, cells are left empty where years are not reported

TABLE 10 EMISSION TRENDS													Inventory 2021
Summary													Submission 2024v1
(Sheet 6 of 6)													Example Party
GREENHOUSE GAS SOURCE AND SECTOR	Base year ⁽¹⁾	1990	1991	1992	2016	2017	2018	2019	2020	2021	2022	Change from base to latest reported year	
	(kt CO ₂ eq)											%	
Total (net emissions)⁽²⁾													
1. Energy													
A. Fuel combustion (sectoral approach)													
1. Energy industries									To be filled	To be filled			
2. Manufacturing industries and construction									To be filled	To be filled			
3. Transport									To be filled	To be filled			
4. Other sectors									To be filled	To be filled			
5. Other									To be filled	To be filled			
B. Fugitive emissions from fuels													
1. Solid fuels									To be filled	To be filled			
2. Oil and natural gas and their emissions from energy production									To be filled	To be filled			
C. CO ₂ transport and storage													
2. Industrial Processes													

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Figure 23. Option 2.2: Columns are generated for all years from 1990 to n-2, years not reported are filled with a notation key

TABLE 10 EMISSION TRENDS								Inventory 2021				
Summary								Submission 2024v1				
(Sheet 6 of 6)								Example Party				
GREENHOUSE GAS SOURCE AND SECTOR	Base year ⁽¹⁾	1990	1991	1992	2016	2017	2018	2019	2020	2021	2022	Change from base to latest reported year %
	(kt CO ₂ eq)											
Total (net emissions)⁽²⁾												
1. Energy												
A. Fuel combustion (sectoral approach)												
1. Energy industries		FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	To be filled	To be filled	FLEX	
2. Manufacturing industries and construction		FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	To be filled	To be filled	FLEX	
3. Transport		FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	To be filled	To be filled	FLEX	
4. Other sectors		FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	To be filled	To be filled	FLEX	
5. Other		FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	To be filled	To be filled	FLEX	
B. Fugitive emissions from fuels												
1. Solid fuels		FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	To be filled	To be filled	FLEX	
2. Oil and natural gas and their emissions		FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	To be filled	To be filled	FLEX	
C. CO ₂ transport and storage		FLEX	FLEX	FLEX	FLEX	FLEX	FLEX	FLEX			FLEX	
2. Industrial Processes												

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Scenario 10: Reporting on the use of flexibility as per paragraph 6 of the MPGs (Annex to decision 18/CMA.1)

This scenario illustrates two of the three different options available to Parties that need flexibility in the light of their capacities to “clearly indicate the provision to which flexibility is applied” (Annex to decision 18/CMA.1), and to “concisely clarify capacity constraints [...] and provide self-determined estimated time frames for improvements in relation to those capacity constraints”, as mandated by paragraph 6 of the MPGs. Option 1 (Reporting on the use of flexibility in a narrative format within the NID) is not illustrated as a worked example.

Table 3. Option 2: Worked example of a tabular format for the reporting of information on the use of flexibility

	<i>Provision</i>	<i>Is flexibility in reporting applied?</i>	<i>If so, how?</i>	<i>Concise clarification of capacity constraints^g</i>	<i>Time frame for improvement^g</i>
Flexibility used in the preparation or provision of National inventory data	Key Category Analysis (Annex MPGs II para 25) ^a	NO			
	Uncertainty assessment (Annex MPGs II para 29) ^b	NO			
	Insignificance threshold (Annex MPGs II para 32) ^c	YES	Party has applied a lower significance threshold for the estimation of CH ₄ and N ₂ O from non-energy products from fuels and solvent use	Unavailability of data due to limited technical capacities.	Parties aims at lower insignificance threshold within next 3 years.
	Quality assurance/quality control (Annex MPGs II para 34) ^d	NO			
	Reported greenhouse gases (Annex MPGs II para 48) ^e	YES	Party has not reported HFCs, PFCs, SF ₆ and NF ₃ throughout	Unavailability of data due to limited technical capacities.	Party intends to include HFCs in next national inventory by collecting data in the refrigeration and air-conditioning sectors
	Time series (Annex MPGs II paras 57 & 58) ^f	YES	Party has not reported the following years: 1991 to 1999; 2001 to 2009 and 2011 to 2019.	Party has not been able to perform recalculation of historical data to accommodate change from 1996 Revised IPCC GLs to 2006 IPCC GLs due to limited staff capacity.	Next national inventory to include estimates for 2011 to 2019 data, following enhancement of inventory team capacity.

Note: ^a Flexibility available to identify key categories using a threshold no lower than 85%, in place of the 95% threshold defined in the 2006 IPCC guidelines.

^b Flexibility available to provide, at a minimum, a qualitative discussion of uncertainty for key categories

^c Flexibility available to use notation key “NE” for a category if its level of emissions is likely below 0.1% of national total and 1000 kt CO₂ eq, whichever is lower

^d Developing country Parties using flexibility are encouraged to elaborate an inventory QA/QC plan in accordance with the 2006 IPCC guidelines, and to implement and provide information on general inventory QC procedures

^e Flexibility to report at least three gases (CO₂, CH₄ and N₂O) as well as any of the additional four gases (HFCs, PFCs, SF₆ and NF₃) that are included in the Party’s NDC under Article 4 of the PA, are covered by an activity under Article 6 of the PA, or have been previously reported

^f Flexibility to instead report data covering, at a minimum, the reference year/period for its NDC and, in addition, a consistent annual time series from at least 2020 onwards; latest reporting year three years prior to the submission of their NID

^g Parties shall concisely clarify capacity constraints and provide self-determined estimated time frames for improvements in relation to those capacity constraints in their Biennial Transparency Reports

Source: [Falduto, Wartmann and Rocha \(2020\)](#)

Figure 24. Option 3: Reporting on the use of flexibility in a completeness table with information on notation keys (e.g. Table 9 of current CRF tables)

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

Inventory 2022
Submission 2024 v1
Example Party

Sources and sinks not estimated ("NE") ⁽¹⁾				
GHG	Sector ⁽²⁾	Source/sink category ⁽²⁾		Explanation
CO ₂				
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				
NF ₃				
Sources and sinks for which flexibility was applied ("FLEX") ⁽⁴⁾				
GHG	Source/sink category	Relevant provision / paragraph of Annex to decision 18/CMA.1	Coincise clarification of capacity constraints	Time frame for improvement
CO ₂	2D.2 Paraffin wax use	Insignificance threshold (paragraph 32)	Unavailability of data due to limited technical capacities.	Party aims at lower insignificance threshold within next 3 years.
CH ₄	2D.1 Lubricant use	Insignificance threshold (paragraph 32)	Unavailability of data due to limited technical capacities.	Party aims at lower insignificance threshold within next 3 years.
	2D.2 Paraffin wax use	Insignificance threshold (paragraph 32)	Unavailability of data due to limited technical capacities.	Party aims at lower insignificance threshold within next 3 years.
N ₂ O	2D.1 Lubricant use	Insignificance threshold (paragraph 32)	Unavailability of data due to limited technical capacities.	Party aims at lower insignificance threshold within next 3 years.
	2D.2 Paraffin wax use	Insignificance threshold (paragraph 32)	Unavailability of data due to limited technical capacities.	Party aims at lower insignificance threshold within next 3 years.
HFCs	All categories	Reported greenhouse gases (paragraph 48)	Unavailability of data due to limited technical capacities.	Party intends to include HFCs in next national inventory by collecting data in the refrigeration and air-conditioning sectors
PFCs	All categories	Reported greenhouse gases (paragraph 48)	Unavailability of data due to limited technical capacities.	Party aims at including PFCs within next 5 years.
SF ₆	All categories	Reported greenhouse gases (paragraph 48)	Unavailability of data due to limited technical capacities.	Party aims at including SF ₆ within next 5 years.
NF ₃	All categories	Reported greenhouse gases (paragraph 48)	Unavailability of data due to limited technical capacities.	Party aims at including NF ₃ within next 5 years.

⁽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

⁽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.

⁽⁴⁾ Clearly indicate Sources and sinks in the submitted inventory for which flexibility was applied. An entry should be made for each source/sink for which the notation key "FLEX" (flexibility) is used in the sectoral tables with. Provide a concise clarification of the capacity constraint underlying the need to apply flexibility, and an estimated time frame for improvement, as per mandated by paragraph 6 of the Annex to decision 18/CMA.1.

Note: For formatting reasons and to facilitate readability, some rows of the "Completeness" table, which are not relevant for the purpose of this worked example, have been cut out.

Source: [Falduto, Wartmann and Rocha \(2020\)](#)