Reporting Gaps and Inconsistencies, Capacity Gap Analysis and Best Pratice

BTR Chapter 1: Greenhouse Gas Inventory

CBIT-GSP Knowledge Product Series

2025

CBIT-GSP BTR Quality Assurance

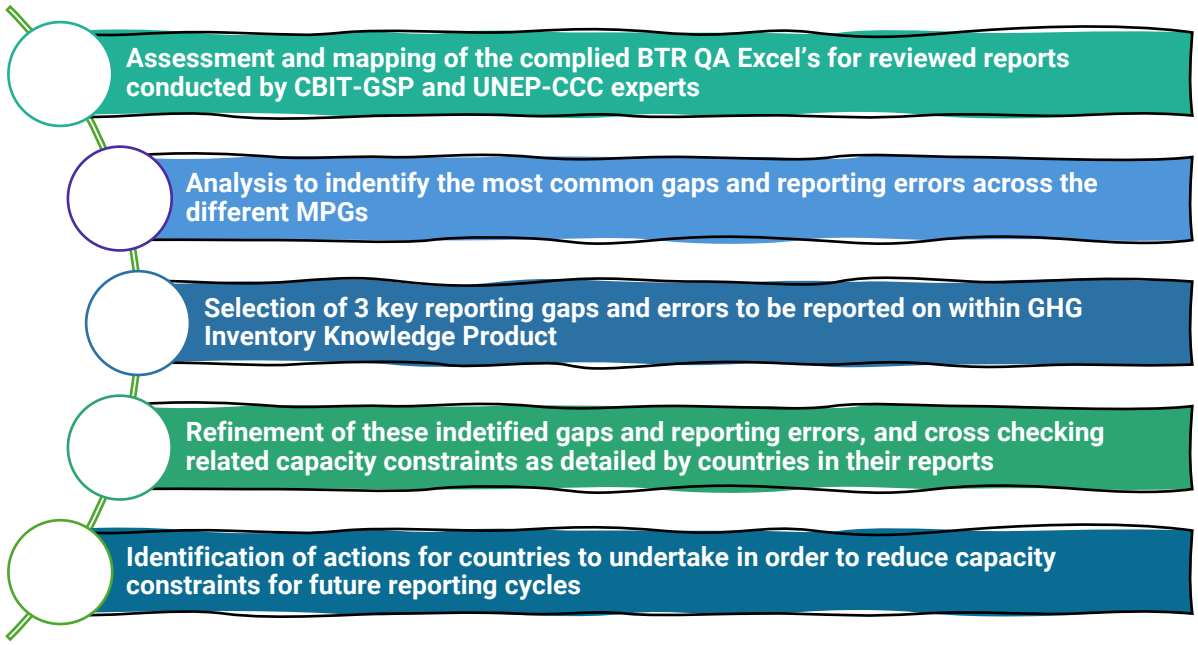
Through the CBIT-GSP project, countries within the 10 Transparency Networks can request support for preliminary peer-to-peer quality assurance checks of their BTRs prior to submission to the UNFCCC.

In 2024, CBIT-GSP conducted over 40 of these QA checks, using an internal MPG-aligned Excel review tool. In this peer-to-peer process, the CBIT-GSP team and other UNEP-CCC experts offered prescriptive feedback on structure, content, and alignment of their BTRs, or specific chapters, against the Modalities, Procedures and Guidelines (MPGs), providing recommendations and opportunities for countries to enhance their reporting prior to submission. In conducting these reviews, a number of common gaps, inconsistencies, and reporting challenges were identified across the different chapters. Using the information gathered by the CBIT-GSP undertaking these reviews, a set of knowledge products which consolidates the lessons learned from the QA reviews, with a focus on identifying systemic gaps and assessing the capacity support required to enhance future BTR submissions has been developed. By highlighting recurring issues and showcasing best practices, it aims to contribute to improved reporting quality and greater transparency under the Paris Agreement.

This knowledge products contains the information on Chapter I of the BTR: *National inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases*

Approach

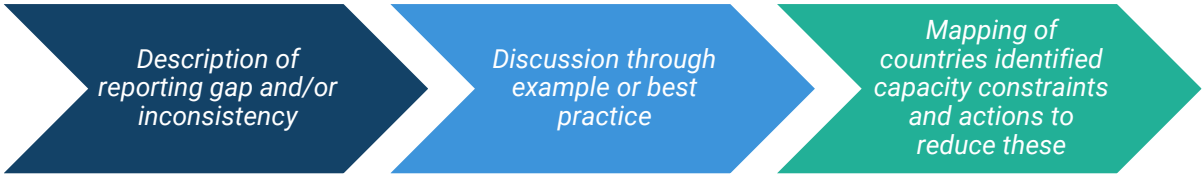
The approach of the gaps and reporting inconsistencies assessment, and the subsequent capacity review was conducted using the method detailed below:



Using this approach three of the most frequent reporting gaps and inconsistencies across all the synthesised reviews which were identified for the GHG Inventory Chapter:

1. **Level of Tier approach used for identified Key Categories**
2. **Time Series and Time Series consistency**
3. **Activity Data, Data Calculation**

Following the approach detailed above, the aim of this knowledge product is to provide practical examples and areas of capacity support that can aid in improving the reporting of the GHG Inventory Chapter of the BTR. For each of the reporting areas detailed above, the following information is set out:



It is important to note that this knowledge product is to focus on the areas which countries have reported on which has been done incorrectly or with inconsistencies, and not on where gaps have occurred as a result of utilising flexibility provisions in a manner that has **excluded it entirely from the BTR**. Information the use of flexibility and capacity gaps, will be presented in a dedicated knowledge product under this knowledge product series.

Level of Tier Approach used for identified Key Categories

The first area where significant gaps and inconsistencies were identified related to the MPGs applicable to the tier approach level and key categories resulting from the inventory.

In developing GHG Inventories for the BTR, countries are required to utilise the IPCC guidelines for inventory development, which provides a clear methodology and approach for quantifying emissions across the IPCC sectors. In response to the different capacities and capabilities in inventory development and reporting, the IPCC guidelines provide three approaches, Tier 1, Tier 2 and Tier 3, which each reflect a different level of data availability and capacity, becoming more granular in data approaches and detail from Tier 1 to Tier 2, and then from Tier 2 to Tier 3. In instances where countries are unable to use a higher Tier approach, that country needs to provide information on the capacity constraint or gap, and detail why the methodological choice was not in line with the corresponding decision tree of the IPCC guidelines.

Countries are similarly required to present the key categories of their national greenhouse gas inventory; these correspond to the IPCC categories, or sub-categories, which cumulatively represent 95% (or 85% where developing countries have elected to use flexibility) of the inventory's emission totals. Since these categories and sub-categories are the high emitting, and therefore, most significant categories in terms of understanding and reporting on emissions, countries are expected and required to utilise Tier 2 or Tier 3 methodological approaches to increase the level of accuracy reflected in their emission totals.

In the CBIT-GSP QA checks of the BTRs, it was identified that while almost all countries conducted the key category analysis, for the categories which contributed 85% or 95% of national emission totals, the Tier 1 approach was exclusively used in the inventory development. Countries often only provided brief detail on the capacity gaps relating to the use of the Tier 1 approach, and generally, there was a clear gap in countries detailing information on the IPCC decision trees.

Examples from review BTRs:

'Since country-specific emission factors were not available, the associated default factors were applied using the Tier 1 approach (whether key category or not). The resources and timeframe needed to develop the country-specific emission factors for the key categories have not been evaluated at this time due to a lack of capacity.'

- The country has clearly provided a reasoning on why Tier 1 has been used: *'Since country-specific emission factors were not available…'*
- However, relating to the associated improvements to increase to a higher Tier, the country has stated that the resources and timeframe for this could not be determined due to lack of capacity
- To improve this narrative, the country could have specifically referenced or included the IPCC Decision Tree to fully detail the decision-making process.
- While the country has stated they lack the internal capacity to full estimate the resources and timeline to develop country specific EFs, the country should still include this as an area for improvement within their inventory improvement plan.

'The IPCC inventory methodology is divided into various levels of tiers, with generally higher tiers being more detailed methodology and more accurate while the tier 1 level represents the

minimum, or default methodology. The national GHG inventory for the year 2021 & 2022 is estimated using the tier 1 methodology and using default emission factors provided by the 2006 IPCC Guidelines for the direct GHGs emissions. A consistent approach has been applied throughout the entire time series and there are no recalculations due to methodological changes and refinements'

- This country has stated clearly that a tier 1 level has been used for the entire time series of their inventory, however they have not provided any detail as to why this approach was taken
- The country should clearly state why this approach was used for Key Categories in place or Tier 2 or 3 approaches, providing details on the associated capacity constraint i.e. lack of available data, lack of country-specific emission factors, lack of technical capacity etc.
- The country should also provide detail on any planned improvements relating to increasing the tier level of their GHG Inventory, as to provide cohesiveness across the chapter and inventory improvement plans.

It is important to note that improvements on tier approach used is not a gap that is expected to be addressed from BTR1 to BTR2. The level of data, information, resources and capacity required for developing countries to report using tier 2 or tier 3 methodologies is extensive. However, countries should already be assessing how and when these improvements can be made. This is why the clear presentation of this information, the Why, When, Who and How, is essential – and ties in clearly with countries improvement plans, inventory planning processes and institutional arrangements.

The below example from Cambodia showcases how they have specifically addressed the requirement for improvements relating to the Tier approach as it relates to identified key categories.

Table 1: Cambodia Improvements relating to Tier Approach

Sector	Sub-sector	Identified gaps	Improvement actions	Responsible institution
AFOLU	3A1 – Enteric Fermentation	An inventory of emissions from other cattle calculated using the IPCC Tier 2 method is required since it has been identified as a key category in the previous NIR submission	An inventory of emissions from other cattle calculated using the IPCC Tier 2 method is under preparation	GDAHP
	3A2 – Manure Management	An inventory of emissions from pigs calculated using the IPCC Tier 2 method is required since it has been identified as a key category by the previous NIR submission	An inventory of emissions from pigs calculated using the IPCC Tier 2 method is under preparation	GDAHP

Capacity Contraints Mapping

***While this gap is significant in terms of inventory accuracy and granularity, it was not unexpected**. Developing countries (including SIDs and LDCs) detailed within both theirs BTRs and Second Capacity Needs Assessments that they face capacity constraints as it relates to data, and most countries required resources to develop their inventories using higher tier level.*

Table 2 details the identified mapped capacity constraints, along with the corresponding actions which countries could implement to reduce this capacity.

Table 2: Capacity Constraints, Tier Level

Capacity Constraints	Actions to reduce capacity constraint
Lack of access of sectoral specific data	• *Undertake a mapping exercise of all relevant data actors, with prioritisation of data actors for key categories and other high emitting sectors* • *Training for the development of a standardised data compilation system for private sector actors to input data* • *Development of robust data archiving systems*
Limited resource knowledge in applying higher tier methodologies and overall IPCC guidelines	• *Training on IPCC guidelines, software and the application and processes of utilising higher tier methodologies for the inventory* • *Workshop for the development of a roadmap for using higher tier methodologies*
No country specific emission factors	• *Prioritisation for sectors and or categories for which country specific emission factors would be most beneficial (i.e. for top emitting or most economically impactful sectors)* • *Training on the development of country specific EF*
Limited time, availability and resources to undertaken higher tier methodologies	• *Development of inventory and BTR process plan* • *Development of robust QA/QC plan* • *Development of Inventory Improvement plan with clear timeframes* • *Prioritise the sectors and categories for which higher tier methodologies should be used, i.e. for key categories.* • *Utilise flexibility provisions and use 85% cumulative threshold for key category analysis*
Lack of systems and resources in place to gather activity data from private sector actors	• *Development of data sharing and data compiling processes* • *Development of MoUs with private sector actors*

Utilisation of Flexibility Provisions for Time Series, and Time Series Consistency

The next area where there was consistent gaps and errors was in relation to the presented time series of countries' inventories.

As according to the MPGs, countries are required to report their national greenhouse gas emissions inventory for the time series of 1990 to 2021. Many developing countries do not have access to historical data that covers the full time series, and because of this, these developing countries with capacity constraints can elect to utilise flexibility. Under this provision, developing countries instead need to report at a minimum their emissions for the following timeseries:

- *Reference year/ period for its NDC*
- *Consistent annual time series from at least 2020 onwards*
- *Latest inventory year can be three years prior to the submission of their NIR*

The use of this flexibility was done so by a number of countries, however a major area that the was identified was that countries were not using the flexibility provision in the correct manner. The following example details a case-study example of how this reporting provision was done so incorrectly.

Discussion through case study example

'Country X has an NDC reference year of 2015. They have stated within their BTR Chapter I that they have resource and data capacity constraints and are therefore electing to use flexibility in relation to the time series of their inventory. Country X will report on the time series of 2018 - 2020. Table 3 presents their national inventory, by sector, per year, in CO2e. They note that they have not reported on emissions in for the Waste sector in 2019 as they did not have access to data from the IPPU sector for this year. Country X submitted their Inventory within their BTR in December 2024'

Table 3: Country X GHG Emissions, Time Series

Sector	2018	2019	2020
Energy, Mt CO_2eq	266.5	241.4	271.9
IPPU, Mt CO_2eq	25.4	-	27.0
LULUCF, Mt CO_2eq	10.6	16.1	4.1
Agriculture, Mt CO_2eq	29.8	33.5	33.0
Waste, Mt CO_2eq	5.3	5.7	6.9

While the information presented in Table 1 is correct and reflects the level of data availability in country at the time of their inventory compilation, the time series does not meet the requirements of the minimum reporting years under the MPGs. Since the country's NDC base year is 2015, the country should also be reporting on the inventory results for this year. Further to this, the inventory's latest reporting year is 2020. However, since the country has submitted their inventory in 2024, the latest reporting year should be no more than three years prior to the submission year. To satisfy the final flexibility requirement, the country should additionally report a consistent time-series from at least 2020 onwards.

Finally, it is also noted that for the IPPU sector, that Country X reports on emissions in 2018 and 2020, but not in 2019. To ensure time-series consistency, once emissions or removals for a sector have been estimated for a category or sector, and if they continue to occur, each Party shall report them in subsequent submissions.

Therefore, to properly utilise the flexibility provisions provided, Country X should report across all sectors consistently for the following years:

- 2015, as it is Country X's NDC reference year
- 2018 - 2020, for all sectors, using appropriate data interpolation or extrapolation to estimate emissions from the IPPU sector, which ensures a consistent time series.
- 2021, to meet the requirement of latest reporting year being 3 years prior to the submission year of 2024

Mapping of capacity constraints

Table 4 details the identified Capacity constraints that countries identified as contributing *to the gaps and inconsistencies as it related to time series, along with the corresponding actions which countries could implement in order to reduce this capacity.*

Table 4: Capacity constraints, time series

Capacity Constraints	Actions to reduce capacity constraint
Lack of understanding of IPCC guidelines and equations	• *Training on IPCC guidelines and equations for sectoral teams.* • *Development of in-house training programme which can be used for on-boarding for new staff to ensure no loss of knowledge as a result of employee turnover*
Lack of understanding and knowledge on the specific requirements of the MPGS	• *Training series covering the fundamentals and the chapter specific requirements under the MPGs*
Utilisation of flexibility provisions	• *Training on flexibility provisions* • *Training and support on filling in the CRTs and CTFs* • *Training on the use of IPCC software*
Data and knowledge gaps for a full time-series for 1990 – 2021	• *Development of inventory work plan to address gaps, identification and mapping of key actors responsible for category data, training and workshops with data actors on their role in the data compilation process (type of data, units, years, format, frequency of data provision)*
	• *Mapping of years which data series is available for, in cases where no data, full process for data interpolation or extrapolation to be developed as a standard method which will be used across each sector and its categories*
Lack of access to private sector activity data, and activity data accessed through stakeholder engagement	• *Undertake a mapping exercise of all relevant data actors, with prioritisation of data actors for key categories and other high emitting sectors* • *Training for the development of a standardised data compilation system for private sector actors to input data* • *Development of robust data archiving systems*
Access and knowledge of IPCC and UNFCCC reporting software	• *Dedicated training by UNFCCC on these reporting tools* • *Multiple persons within departments dedicated to the trainings, who will be responsible for ensuring onboarding of new staff*
Lack of understanding and/or capability to undertake and implement recalculations in inventory time-series	• *Training on recalculations, uncertainty analysis*

Activity Data, Emission Factors and Data Calculations

Linked to the previous reporting gap and error is the topic of the data, conversion factors and calculations within countries' inventories.

It is important that in the development of the inventory that countries are clear and transparent with the type of data being used, where it is coming from, how it is being used, and the process and methodologies utilised in order to utilise these aspects together.

The review team frequently observed a clear lack of overall consistency in the level of detail provided as it related to activity data, conversion factors and emission factors, and the use of interpolation and extrapolation and calculations for inventory development within the content of the BTR. Countries were not providing an adequate level of detail across all sectors on the relevant activity data used for the quantification of emissions. Data on activity data, emission factors and conversion factors were not clearly explained and detailed.

While information and activity data is generally provided within the CRTs, it is important for countries to also reflect the information presented within the tables within the body of the text in the report. This is especially important for countries which used data interpolation or extrapolation methods in order to address data gaps. Interpolation and extrapolation methods were rarely detailed, meaning that it is not clear how the information presented and therefore the entire time series is consistent and correct.

Example through Case Study

Within a country's GHG Inventory Chapter, they have stated the following as it relates to emissions calculated across the categories for the Energy sector:

'Data gaps for the year 2021 were filled though interpolation, as no activity data was available.'

This information has been stated clearly; however, the country has not provided any details on the method of interpolation, or any of the associated uncertainties related to this interpolated value. In order to ensure that the country, and others who have utilised interpolation or extrapolation in their inventories must ensure that they provide details on the following:

- Provide detail on the gap in information or activity data
- Clear narrative in the method of data interpolation or extrapolation
- Detail on the values utilised for data interpolation/extrapolation
- Calculation method
- Results from interpolation
- Details of improvements related to closing data gap to reduce need for data interpolation and extrapolation

Capacity Constraints Mapping:

Based on the assessment undertaken for this report Table 6 details the identified Capacity constraints *that countries identified as contributing to the gaps and inconsistencies as it related to data, emission factors and data calculations, along with the corresponding actions which countries could implement in order to reduce this capacity.*

Table 5: Capacity Constraints, Data and Calculations

Capacity Constraints	Actions to reduce capacity constraint
Lack of understanding and knowledge on the IPCC guidance, IPCC equations and requirements of MPGs	• *Training on IPCC guidelines and equations for sectoral teams.* • *Development of in-house training programme which can be used for on-boarding for new staff to ensure no loss of knowledge as a result of employee turnover*
	• *Training series covering the fundamentals and the chapter specific requirements under the MPGs*
Data gaps across activity data	• *Mapping exercise to identify key data actors and sources of data across data actors and private sector* • *Development of inventory data compilation plan* • *Mapping of data gaps and training on the use of data interpolation and extrapolation methods* • *Workshops with stakeholders related to data for each sector*
Lack of knowledge on the utilisation of data interpolation and extrapolation methods	• *Training on the use of IPCC guidelines, methodologies and data interpolation and extrapolation methods* • *Development of standardised interpolation and extrapolation methods for each sector*
Resource and time constraint in providing full details within the text of the BTR	• *Training on the development of an inventory development plan* • *Development of robust QA/QC plan* • *Development of detailed improvement plan for inventory with timeline for improvement*