ipcc
INTERGOVERNMENTAL PANEL ON climate change

Task Force on National Greenhouse Gas Inventories (TFI)

MEETING REPORT

Expert Meeting on the IPCC Inventory Software Users' Feedback

Nairobi, Kenya – 29 September-1 October 2026

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WMO
UN environment programme

1. Introduction

The Expert Meeting on IPCC Inventory Software Users' Feedback was held in Nairobi, Kenya, from 29 September to 1 October 2026. The meeting was hosted by the Kenya Meteorological Society, with support from the Technical Support Unit of the IPCC Task Force on National Greenhouse Gas Inventories (TFI).

The meeting brought together 34 participants representing 19 countries, primarily GHG inventory compilers from across Africa, including both experienced and newer users of the IPCC Inventory Software. Participants shared lessons from their national inventory systems, reflected on their experiences using the Software, and discussed challenges encountered during the preparation of their first Biennial Transparency Reports (BTR1).

The overall objective of the meeting was to collect structured user feedback to support the continuous improvement of the IPCC Inventory Software, strengthen its interoperability with reporting tools, and identify priority areas for future development. The discussions also contributed to a broader understanding of user needs related to documentation, support materials, and community engagement.

2. Meeting Objectives

The Expert Meeting was designed to deepen the understanding of how countries in the region use the IPCC Inventory Software in the preparation of their national greenhouse gas inventories, and to identify common challenges and sector-specific needs that arise in practical implementation. A key objective was to document real user experiences—often not shared collectively—and to create space for technical exchanges among experienced and newer users.

The meeting sought to gather practical and actionable feedback on both cross-cutting and sector-level functionalities of the Software. This included identifying priority issues requiring attention, clarifying areas where users need additional support, and collecting country-specific suggestions for improvements and potential new features.

The inputs generated during the meeting will guide the future development of the IPCC Inventory Software, as well as updates to its User Manual, sectoral Guidebooks, and online support materials. The meeting also aimed to reinforce the user community by strengthening communication channels between national experts and the IPCC TFI Technical Support Unit.

3. Summary of Sessions

Session 1 – Tour de Table: Experiences & Expectations

Purpose: The session reviewed survey feedback from 10 respondents across 10 countries on adoption and use of the IPCC Inventory Software, key implementation challenges, methodological difficulties and priorities for future improvements.

Summary: Most respondents reported using the Software for most sectors. Its primary applications include estimating emissions and removals, exporting data to perform recalculations, conducting QA/QC, preparing reporting outputs and supporting interoperability with the ETF Reporting Tool. Usage spans Waste, Energy, AFOLU and IPPU.

Participants identified challenges involving version migration, reporting and graph preparation, preparing IPCC data for upload to the ETF Reporting Tool, bulk data entry and export, QA/QC analysis, land-use representation, F-gases and preparing the reference approach. Barriers to adoption included limited familiarity or training, continued use of other tools and insufficient data-analysis functionality.

Most respondents had not compared the Software with their national tools. Where comparisons had been undertaken, results were generally consistent, although one respondent reported differences between FOLU calculations and Zero FRL outputs. This difference was not identified as owing to the Software, but rather differences in assumptions between the two tools used.

Methodological difficulties were concentrated around AFOLU/LULUCF, seagrass, waste subcategories, Tier 2 methods, time-series management, data disaggregation, including data collection for various F-gas applications, uncertainty analysis and QA/QC. Difficulties were also reported with preparation of the visualised CRT prior to upload to the UN tool.

Requested improvements included easier transfer of land-representation data between years and incorporation of the Approach 2 Land Representation tool into the Software, better multi-user workflows, clearer version-change information, improved procedures for exchanging CRT information among inventory team members, bulk data imports, enhanced analytical checks, integrating tools in the Software to perform data splicing techniques, wider uncertainty functionality and potential AI integration.

Main Takeaways:

- The Software is widely used across inventory sectors, particularly for emissions estimation and inventory management.
- Version migration, data handling, reporting and analytical functionality remain key challenges.

- AFOLU/LULUCF continues to present significant methodological and operational difficulties, to address which TSU is to be implementing further functionalities.
- Users want more efficient bulk-entry, import, export and CRT workflows.
- Better QA/QC, time-series analysis and uncertainty functionality are priorities.
- Training and support remain important for current users and those just starting to explore use of the Software.
- Interoperability with existing national systems and AI-assisted features are areas of future interest.

Detailed Discussion Notes:

Experience with the Software and transition

- Most participants indicated that they currently use the IPCC Inventory Software.
- A participant reported that the country is not yet using the Software for all sectors/categories. The country has an existing system that pre-dates the release of the Software with all interoperability functionalities, which is the reason for its limited use. Nevertheless, the NGHGI team is considering how Land Use data can best be incorporated to evaluate to move to using the Software instead of their current system.
- Another participant, noted that the NGHGI is evenly dependant on an international consultant, who does not agree to use the Software for the NGHGI. In this case, the use of the Software is the means to mitigate such a dependency of the country on a consultancy, by using it, for now, to assess the estimates provided by the international consultant with their tools, while building the system for a future reporting independent from non-free and non-owned tools.
- The use of interoperability functions appeared to be less widespread than expected. This could be a function of the role of the participants at the meeting in their actual inventory development; given that published information suggests about half of all countries that use the Software in some capacity use its interoperability functions.

Software versions, migration and user management

- Difficulties when migrating from version 2.69 to 2.98 that causes a perceived loss of data have been noted. TSU clarified that, to respond to UNFCCC requirements, for three categories (1.A.3.b, 3.B, 4.A) a new data structure has been implemented in the Software that requires more data for more variables than previously required. Usually when this happens, the current Software version includes methods to ensure all data are migrated and not lost. But in these instances, data cannot be transferred given they miss information required by the new structure.
- A participant raised concerns regarding the current process for moving towards new Software versions, including prompts to save work and the need to uninstall and reinstall the Software. The TSU noted that the installation of the new version does not require uninstalling the previous one, given the Software automatically updates to the latest version and accordingly deletes old installation files. Furthermore, TSU recommended users to always update their Software to the latest version published and indicated that

data loss associated with updating does not occur (and if this were to happen in the future the bug would be promptly fixed).The TSU also noted that all national team members ideally update the Software at the same time to ensure compatibility when preparing for BTR submission.

- A participant reported difficulties in data import, given the import results in a duplication of sources/sinks rather than in their integration. The TSU explained that this is an issue known for categories 2.F, 3.B and 4.A and that guidance to deal with this issue is provided in the Users' Manual ppt decks. Nevertheless, the TSU further communicated that this issue is going to be addressed within the current work-programme for the next version to be released.
- Another participant raised the issue about the 2 installation packages, 32-bit *vs* 64-bit, noting that most newer computers use 64-bit systems, and that the 32-bit version is no longer needed. The TSU explained that removing the 32-bit version now would be a risk given the range of programs used by countries worldwide, and that the software migration to the new open-source platform will address the issue.
- It was noted that the loss of passwords/log in credentials is a major concern for users. The TSU shared that they can reset the password in limited cases where the issue arises for a national inventory compiler, but this is to be considered an exceptional option, given TSU is not able to provide such a service to all users. A participant rightly noted that assigning more than a single superuser to a database mitigates problems with loss of credentials given more than a single actor may access the database with their credentials. .
- The issue of loss of the password launched a discussion on the future Software platform and whether (1) the password should be removed completely and (2) whether the database should be encrypted for enhanced security. The TSU noted that if encryption is applied, it may be even more difficult to retrieve lost passwords. Participants agreed that password access to the database should not be removed as default, but the option to be allowed to is desired. They did not provide a recommendation on encryption.
- Finally, it was noted that display/resolution issues are still affecting the correct visualisation of some of the Software's windows. TSU is aware of the problem, and in the past 2 years, the Software has been developed to minimise such an inconvenience, and guidance is provided in the Software's Manual; although it may still occur in case of old versions of WindowsOS. Software migration was identified as a possible solution.

<u>LULUCF and land representation</u>

- A participant asked whether the LULUCF database could support importing complete time series at once rather than requiring data to be entered year by year. This was identified for further discussion in Session 5.
- A participant raised questions regarding changing the default setting for land representation, with the topic also scheduled for further discussion in Session 5.
- Difficulties in assigning soil type to units of land have been noted. However, given that that is a Tier 1 requirement TSU emphasised that users should make every effort in

assigning units of land to the relevant soil type, by applying as a minimum the IPCC default classification of soil types; freely accessible maps of soil types according to the IPCC classification are available online (e.g. the Harmonized World Soil Database v2.0).

- Participants asked on the applicability of the forest land subdivision, and thus calculation worksheets, for mangrove forests. The TSU clarified that the Software provides flexibility for this type of forest within the forest land; nevertheless, TSU will ensure that dedicated guidance is provided in the relevant Guidebooks on reporting of Mangroves under Forest land.
- Participants noted that some specific LULUCF applications were more difficult in older Software versions, while version 2.98 has improved some of these issues, including the treatment of flooded land.

Data entry and historical years

- Participants raised concerns about the effort required to enter uncertainties across inventory data. The TSU indicated that this will be demonstrated in Session 3, and that new versions of the software are (and will be) providing IPCC default uncertainty values in the dropdown menu so making data input easier.
- A participant noted an issue when working backwards from 1990 in categories that produce estimates according to time series of data (e.g. 3.B, 2.F): changes made to an earlier year propagates through subsequent years.
- It was noted that changes in the data managers may (fuel manager) or may not (waste manager) be transferred by the Software to the relevant calculation worksheets. Guidance is to be provided in the Guidebooks that stress the data manager behaviour and thus how users shall proceed to get the results wished.

Reporting, outputs and visualisation

- Participants discussed the possibility of preparing graphs using data exported from the Software. The TSU explained that the aim of the software is to make the underlying data sufficiently accessible for users to produce graphs using other tools.
- Participants requested the ability to download multiple sectoral reports through multi-year selection. The TSU noted that work had already been initiated to export to Excel data in the calculation worksheets for a single year and multiple years and that the same functionality might potentially be carried over to sectoral reporting. It was clarified that these reports refer to IPCC reporting tables rather than CRTs. CRTs cannot be downloaded as Excel files because the Software shall support the use of the UNFCCC reporting tool rather than replacing it.

Methodological applications

- Participants discussed the use of the Software for REDD+ calculations and alignment with Zero FRL. It was noted that the Software can already support REDD+ calculations and can be used to calculate expected emissions under a business-as-usual scenario.

The recalculation tool will provide for the capacity to compare two sets of data and assess the differences in absolute and percentage terms.

- A request was raised regarding automatic population of information on carbon excluded (both the amount and category) in the Reference Approach tool, based on data entered in the relevant calculation worksheet. The TSU indicated it would assess the feasibility of an automatic upload or some type of check, noting that the reference approach is a top-down tool, while the calculation worksheets are bottom up, and thus may not reflect the total amount of non-energy use.
- Open burning of waste in cities was discussed, in particular for the activity data availability and derivation given that openly burned waste is unlikely part of statistical data on waste generation collected by countries and it is not included in the IPCC default method to estimate the annual amount of solid waste generated; this was identified for further discussion in Session 6.

Guidance and future developments

- A participant requested a comprehensive overview of carbon emissions capture by category. The TSU noted that relevant information is available through the IPCC background tables and further changes may be made pending the conclusion of the 2027 Methodology Report on CDR/CCUS.
- A participant also requested the 2019 Refinement inventory management aspects be included in the IPCC Software. The TSU noted that this would require a decision from IPCC on use of the 2019 Refinement, which has not yet been taken, and that it is in the hands of countries to take it. The only elements of the 2019 Refinement in the Software currently are those needed for interoperability with the UNFCCC ETF Reporting Tool.
- The potential role of AI in inventory preparation has been raised, and TSU was questioned on how practical it would be to integrate AI into the Software. The TSU explained that the role of AI is to generally support its users, and any incorporation into the future version of the Software would reflect this position

Session 2 – IPCC Inventory Software Overview & New Features

Purpose: To present Version 2.99 of the IPCC Inventory Software, outline planned near and medium-term improvements and provide practical guidance on its use and available support.

Summary: The TSU covered the Software's capabilities, structure and practical workflow. It also outlined future technical development, considerations for multi-user import/export workflows, and available guidance and support resources. The session was primarily informational, with limited questions from participants. One area of interest of participants was how future database updates would relate to existing databases. The TSU explained that current MS Access databases will be automatically upgraded by the Software to the new database structure.

Main Takeaways:

- Improved import/export functionality is important for handling larger and more complex datasets and for the use of the data for reporting (timeseries, recalculation, graphical representation).
- The Software can accommodate a combination of default and country-specific data, allowing users to apply different tiers as appropriate, as well as to work at a sub-national level, as per tracking NDC or REDD+ activities.

Session 3 – Crosscutting Features & Challenges

Purpose: To review cross-cutting functionalities of the Version 2.99 of the IPCC Inventory Software, with a focus on database management, time-series data entry, CRT preparation and updating, and uncertainty analysis, and to discuss issues encountered by users when applying these functions.

Summary: The session covered four main areas of cross-cutting functionality: database management, time-series data entry, CRT preparation and updating, and uncertainty analysis. Participants raised practical questions concerning export/import workflows, time series data entry, input of notation keys for the CRT, and the handling of data when moving between inventory years.

For time-series data entry, participants discussed challenges related to changing parameters over time, managing different levels of detail in LULUCF and livestock data, and maintaining consistency when developing a new BTR inventory from an earlier submission. The TSU provided clarification on the flexibility available within the Software and identified some issues for further investigation or future development (e.g. including CRT data in the worksheet XML) .

The CRT discussion focused on updating data and notation keys across years, correcting information carried over from previous BTRs, and understanding which CRT fields require user input versus those calculated automatically by the UNFCCC ETF Reporting Tool. It was clarified by the TSU that information in orange and green cells of the IPCC Software is provided only for QC purposes and do not transfer to the UNFCCC. Participants also asked about the availability of the uncertainty functionality for LULUCF; this is expected to be addressed in a future development.

Main Takeaways:

- Efficient and user-friendly functionalities to enable national teams to work together to prepare an inventory should be a high-priority area when moving the Software to a new platform, taking into account lessons learned in the current Software interface.
- Greater flexibility in time-series data entry would help users manage changing parameters and develop subsequent BTR inventories more efficiently (e.g. in data entry for livestock and the land representation).

- Several AFOLU-related workflows (e.g. related to Land, HWP and non-CO_2 emissions) require additional clarification, necessitating completion of the corresponding Guidebook, particularly for category 3.B Land.
- All preparations for the CRT should be done in the IPCC Software for archiving purposes; all information transfers to the UNFCCC ETF Reporting Tool and need not be input there. Data input in calculation worksheets and in the CRT can be made for one year, selected years, or multiple years, simplifying data entry.
- Uncertainty functionality for LULUCF remains a requested area for future development.

Detailed Discussion Notes:

Database

- Participants requested to have the option of a free database without login/password, to avoid incurring in difficulties if those are lost. The TSU considered that login/password is one of the features used by the Software to distinguish an NGHGI database from a simple MS Access database and removing the credentials would make the database not readable anymore by the Software.

Time series data entry – Building BTR2 from BTR1

- A participant raised an issue with forest land data, where the available parameter ("Ratio of below-ground biomass to above-ground biomass") does not provide sufficient flexibility. The TSU noted that work is underway to allow factors to change over time.
- Another participant noted that they currently use Excel rather than the Software and noted that it is easier to copy data from one year to another in Excel and asked to extend such a functionality in the Software. They further elaborated on the level of disaggregation at which operating the land estimates. TSU clarified that the Land Use Manager and the Land Representation Manager allow for any level of stratification of land required, from a single national to a project level, and that the level of disaggregation in land subdivisions of the IPCC land categories depends on data availability, including of IPCC default values. TSU further noted that disaggregation of estimates is a fundamental approach to promote their accuracy.
- The complexity of livestock stratification in the livestock manager, including in its subdivision by regions, was noted and a simplification was requested. The TSU noted that users do not need to apply a more detailed division if it is not required, although the structure remains based on the IPCC Guidelines.
- A participant asked about the LULUCF requirement for a 20-year period, which resulted in 2003 being used as the starting year, while other sectors started in 2000, and how to ensure consistent starting years. The TSU noted that the starting year of the land representation needs not to be necessarily the same of the NGHGI time series, and that it is good practice to enter in the NGHGI timeseries AD for the land representation for an additional period Y-(D-1), where Y is the first year of the NGHGI time series and D is the transition period (by IPCC default is 20 years). This issue has been further discussed in Session 5.

CRTs

- A participant noted that many countries have identified issues after submission of BTR1 and asked whether BTR1 should be corrected first. The TSU explained that ideal way is making a copy of the BTR1 CRTs as the basis of the BTR2 CRTs, then correcting everything all at once in BTR2 only, using Update Mode, unless the country intends to resubmit BTR1.
- Another participant asked whether values in BTR2 CRTs could be removed and replaced with the appropriate notation key (e.g. changing a value to NO). The TSU suggested that data should first be updated in the Software, after which the data/CRT can be refreshed or recompiled. The updated information will then be reflected in the CRT, after which the notation key can be changed to NO where appropriate. Generally, values should not change to a notation key in future years, unless there was an error in BTR1.
- It has been noted that non-white cells in the CRTs cannot generally be selected for update. The TSU explained that these do not need to be manually updated given those are automatically calculated and are visualised only for QC given the UNFCCC tool, which requires AD and emissions, calculates all other cells.
- Participant asked about updating notation keys year by year and whether applying the changes across all years is possible. The TSU noted that this functionality is already available through Update Mode.

Uncertainty

- Participants welcomed the enhanced uncertainty analysis for the Energy sector. They asked when the uncertainty analysis would become available for LULUCF, noting that LULUCF is usually the last to be addressed. The TSU noted that it will likely be available next year. The TSU also reminded participants that the information in the uncertainty analysis follows the IPCC categories, and would not always have a 1-1 mapping with CRT categories, especially for LULUCF-related categories.

Session 4 – Deep dive in Sectors – Livestock

Purpose: To present the Livestock functionality of the IPCC Inventory Software and discuss user questions and practical considerations related to livestock activity data, population categorisation, feed intake and emission factors.

Summary: The session provided a deep dive into the Livestock sector, with discussion focusing primarily on practical aspects of livestock population characterisation and data. Participants raised questions about the presentation and entry of numerical data, the treatment of different cattle populations, and how differences in animal diets and seasonal conditions can be represented in the Software.

Participants also discussed how feed intake and diet characteristics influence emissions, including whether different diets during dry and wet seasons could be represented through

separate average animal populations and corresponding emission factors. Questions were also raised regarding the distinction between dairy and other cattle categories and how milk production relates to the underlying emission calculations.

Main Takeaways:

- The Livestock Manager is populated once to reflect all circumstances in the country. All regions, livestock subcategories and MMS are input there. In the calculation worksheets, the user then selects the relevant combination of regions, livestock characterisations and tiers, based on national circumstances. Different livestock characterisations may be applied in different regions in the calculation worksheets.
- Users may need to represent different livestock populations where feed intake or diets vary between seasons.
- The Software allows different populations to be associated with relevant emission factors, including factors derived from the literature.
- Further clarification may be useful on how livestock production characteristics, such as milk production, are reflected in the relevant emission calculations.

Detailed Discussion Notes:

- A participant asked about entering numbers with commas and whether the display parameters could be changed. The TSU explained that the Software reads the computer settings of the user for the comma versus a full stop. The TSU further explained that decimal-place settings can be adjusted under Preferences > Worksheets > Decimal places and encouraged users to select zero padding to enhance readability and avoid errors in assessing Software calculations
- Participants asked about feed intake and how differences in diet affect emissions. The TSU explained how diets with different characteristics (e.g. higher fibre content) can affect emissions.
- Participants asked whether the Software can represent different diets between dry and wet seasons. The TSU suggested that different livestock subdivisions for wet season and dry season can be input in the Livestock Manager, and the separate livestock subdivisions for wet and dry season can be input in the calculation worksheets with the corresponding populations and dedicated emission factors input based on the relevant literature.
- Participants asked about the categorisation of different cattle types, including the distinction between dairy production/dairy cattle and other cattle. The TSU explained that different cattle subcategories can be represented, but they should not be mixed where the IPCC methodology distinguishes them. The IPCC provides guidance on the relevant animal categories.

Session 5 – Deep dive in Sectors: AFOLU

Purpose: To present the new Land Representation Tool, through a demonstration of its use.

Summary: The demonstration showed how the tool can be used to derive a consistent land representation dataset organised as a time series of units of land, consistent with the data input requirements of the IPCC Inventory Software for IPCC Approach 2.

The tool requires users to define land subdivisions and associated characteristics (e.g. climate, soil type, soil status) and to populate a consistent set of land transition matrices over time. Built-in QC checks ensure coherence across the time series. Once completed, the tool generates summary land-use data suitable for direct use in the Software.

The discussion focused mainly on clarifying how the tool and its outputs should be used, including the relationship between the Excel-based tool and the Software, subdivision and climate definitions, and the planned integration of the tool into the Software. Participants also raised several practical questions concerning data entry, default data, data display and guidance materials.

Main Takeaways:

- The Land Representation Tool is a valuable tool to organise data for input into the Software and participants encouraged the TSU to finalise the tool and integrate it into the Software to support users applying the Approach 2 land representation.
- Participants identified several usability and guidance considerations, including clearer data entry instructions, video-based guidance and improved data display.

Detailed Discussion Notes:

- Participants asked how to handle situations where land-use data are not available before 1990, given the 20-year requirement. The TSU suggested using proxy data where historical data are unavailable. The proxy does not need to be perfect, and that it is good practice to test a series of proxies to identify the best one; and that population trends are the likely basis to build proxies.
- Participants asked about the automatic computation of IDs in the Excel-based tool. The TSU explained that automatic ID computation depends on macros. Macros therefore need to be unblocked/enabled before opening the file.
- Participants questioned why Excel is needed if the matrixes are also in the Software. The TSU explained that the Excel tool is intended to derive the land representation data by entering the data for the time series of matrices; while the land representation matrix in the Software is just for visualisation of land representation data entered. Of course, the matrices in the Excel tool and those in the Software are expected to show the same data once the entire process for land representation is concluded, and thus act as a QC tool.

Participants also noted the importance of using consistent subdivision names between the Excel tool and the Software.

- Participants asked how "Climate" works in the Excel tool. The TSU explained that "Climate" is associated with the subdivision. Lands with same characteristics for all other parameters but climate need to be represented as separate subdivisions.
- The TSU noted that the Land Representation Tool is planned to be incorporated into the IPCC Inventory Software.
- Participants noted that there is currently no default data in the Land Use Manager for Cropland – Perennial Crops (Above-ground perennial biomass at maturity/harvest). The TSU identified this as a needed improvement for the next version.
- Participants suggested that the same Software version should be used by all participants during future demonstrations to avoid confusion. TSU noted that this requires users to bring a different computer from the one in which they are preparing their inventory, and this is unlikely to occur.
- Participants noted that green cells for total in the Land Representation Manager does not have the thousand separator. The TSU identified this as a potential improvement for future versions.
- Participants suggested turning the exercise/demonstration into a video. The TSU explained that the exercise is currently covered in the Guidebooks, but a video is not available at present.
- A question about using the Software together with satellite data, has been addressed by TSU referencing an existing FAO tool -for which significant resources had been invested- Collect Earth (not to be confused with Collect Earth Online). The following discussion considered the possibility of building on existing tools/data and the challenges associated with funding such a tool.
- A participant asked about precursors' emissions, including whether countries need to report these emissions. The TSU clarified that countries do not need to report the emissions of precursors, although they may if they wish to do so. Such emissions are to be entered directly in the IPCC reporting tables -given they cannot be estimated in the calculation worksheets (with a couple of exceptions)-. To calculate subsequent indirect emissions of CO_2 and N_2O from precursors, calculation worksheets for categories 5.A and 5.B can be used.
- Participants noted that only one root-to-shoot ratio can be used in the stock-difference calculation worksheets, while it has been argued that the one for the initial stock and that for the final stock may differ. TSU noted that this perceived limit is addressed by entering the total biomass rather than the aboveground biomass only and consequently entering the value of 1 for the root-to-shoot ratio.

Session 6 – Deep dive in Sectors: Waste

Purpose: To present new features for calculating emissions from open burning at solid waste disposal sites (SWDS) and to discuss user-identified needs for the Waste sector.

Summary:
The demonstration presented the new interaction between open burning and the SWDS model, a feature frequently requested by users. Discussion focused primarily on data entry challenges, including the treatment of negative amounts, updating activity data when moving from projected to actual values, accounting for recycled waste and categorising different types of disposal sites.

Main Takeaways:

- Users identified data input and activity data management as key challenges, particularly for SWDS.
- Guidance may be needed on how to account for waste removed for recycling and how to categorise different types of disposal sites.

Detailed Discussion Notes:

- A participant asked about the treatment of negative amounts, and if a negative sign indicates a "debt amount". The TSU clarified that the Software subtracts the amount, but the negative amount cannot exceed the amount deposited.
- A participant raised an issue concerning population-based activity data, and how to update that data when BTR1 applies a projection, while actual data are available for BTR2 . The TSU advised that the actual values should be entered and compared with the previous projections (this comparison is done based on information in two separate databases). The difference/recalculation should be explained, with the actual data replacing the previous extrapolation.
- A participant also asked how to account for waste that is removed for recycling, including situations where the amount or share of plastic removed is known. Asked whether the amount should be subtracted or entered directly in the Software, thee TSU suggested to specify the amount of waste deposited after accounting for the material removed for recycling rather than calculating it in the Software by applying the percentual composition in plastic of the total waste discarded.
- A participant asked how to categorise dumpsites as disposal sites, noting that this can be challenging for data collection, particularly for waste generated in rural areas. The TSU noted that the appropriate type of open dump should be selected based on expert judgement where detailed information is unavailable.

<u>Session 7 – Deep dive in Sectors: IPPU F-gases</u>

Purpose: To discuss data collection and calculation challenges for F-gas categories and present the latest Software updates to the IPPU data manager for F-gas chemicals and blends and the calculation worksheets, as well as the upcoming F-gases allocation tool.

Summary: Participants recognised F-gases as an area requiring increased methodological and practical support. The discussion covered practical challenges in collecting F-gas data,

including customs and import/export data, private-sector and confidential data, the use of proxy data, and the transition from Tier 1 to more detailed Tier 2 approaches. They also raised practical questions regarding data entry in the data manager and calculation worksheets and discussed areas where further improvements may be needed, including refinements to specific Tier 2 worksheets to account for stockpiles.

They expressed appreciation for the structured approach for data entry in the Software for F-gases and the quality checks, such as the F-gas allocation tool and the mass conservation checks.

The TSU presented proposed technical solutions and participants agreed on the need to prioritise their implementation, alongside clearer guidance to support users.

Main Takeaways:

- Calculation methods for many F-gas categories are complex owing to the development of the bank, but the IPCC Software eases the job of the inventory compiler by automatically carrying out the calculations.
- Minimal national data are needed to apply the Tier 1 approach for category 2.F, and there are some publicly available data sources.
- F-gas data collection remains a key practical challenge, particularly where data are held by customs agencies or private companies and may be subject to confidentiality restrictions. Developing relationships with the data providers will help acquire the necessary data for input into the Software.
- The F-gases allocation tool and mass balance checks were seen as a valuable QC feature, particularly for ensuring mass conservation.
- Updates to the relevant Guidebooks and clearer explanations of parameter calculations were considered essential to support effective use.

Detailed Discussion Notes:

- A participant asked about importing HFC data, noting that assumed consumption/use may not reflect actual use and could introduce uncertainty. The TSU noted that some uncertainty will always remain and should be described quantitatively or qualitatively where possible. Users could engage with customs agencies to improve the underlying data and progressively move towards a Tier 2 approach.
- The participant also noted that collecting detailed F-gas data is difficult and asked about using a top-down approach and the appropriate level of detail. The TSU explained that at a minimum, you need only know which F gases are used in the country, the first year they were introduced, and where they were used (e.g. refrigeration versus car air conditioning). Further, for Tier 1, only one year is needed as a minimum and the Software can use basic splicing techniques to complete the time series.
- Another participant asked whether the codes used by customs agencies are consistent across countries. The TSU explained that HS (Harmonized System) codes are

harmonised internationally for the first six digits, while individual countries may add further specifications beyond these digits.

- A participant asked about the interaction between IPPU and Waste, particularly for F-gases from refrigerators and other equipment after disposal. The TSU explained that F-gas emissions associated with manufacture, leakage during use, and disposal are all accounted for under the IPPU sector.
- The participant also asked who is responsible for collecting data when F-gases can only be tracked or identified at the end of the equipment life cycle, potentially creating an overlap with the Waste sector. The TSU explained that much of the relevant equipment would be considered inert, so double counting should not occur.
- A participant asked about data sources for N_2O from medical applications. The TSU explained that possible sources include import/export statistics or scaling estimates based on the number of hospitals or other relevant facilities.
- A participant asked about good practices for developing a database for F-gases, noting that the data depend on several sectors and data providers. The TSU explained that developing a "bank" of data adds complexity. The team would need to identify the relevant gases imported/exported, equipment lifetimes and other parameters. A spreadsheet can be developed to track these data over time. The US has developed a vintaging-type model that tracks gases entering and leaving the equipment stock over time. Tier 1 provides a more basic approach, and users should avoid getting unnecessarily caught up in details where the data are not available.
- It was also asked about using proxy data such as EDGAR, noting that these are modelled rather than measured data and may differ in accuracy from data used by the ozone unit. Asked which source should be preferred. The TSU explained that generally national data are preferred over international statistics Inventory compilers should assess all data sources, considering definitions and uncertainty, and apply expert judgement to use the one that best represents national circumstances.
- In addition, a participant asked whether reporting estimates or "NE" would be preferable if complete data are not available. The TSU suggested that an estimate is generally preferable to not estimating a category, where there is a reasonable basis for the estimate. Reviewers can also provide feedback on the approach used, thus helping countries improve data collection and reporting.
- A participant explained that differences when comparing UNEP and UNFCCC CRT data were around 20% for some gases and up to 90–100% differences for others. The TSU suggested that differences do not necessarily indicate that one dataset is incorrect, but the reasons for the differences need to be understood and can guide improvements.
- It was noted that private-sector companies may be unwilling to provide data, potentially because of tax or other confidentiality concerns, and it was asked whether countries could use data from countries with similar circumstances and explain the absence of national data. The TSU suggested that a multi-track approach may be needed. Where direct data are unavailable, published information and other sources can be considered, including data from other countries with similar circumstances. It was noted by the TSU

that this approach is more challenging with F-gases, as sufficiently detailed information is generally not available in the NID of other countries, and likely requires further consultation with countries on the F-gas species, applications and assumptions. Planned improvements could also include activities such as working with customs agencies to improve data availability.

- About confidentiality issues, TSU shared an example on building relationships with aluminium companies where developing relationships with industry is useful where possible. A third-party arrangement could be explored where companies are willing to share confidential information through an intermediary. The Software itself also has functionality related to confidential data.
- TSU further explained that while the confidentiality function is also available for other sectors/categories, it is generally AD in the IPPU sector where claims of confidentiality may be relevant when there are a limited number of producers.
- Participants asked what the potential impact are of using zeros in time series for the F-gases worksheets. The TSU explained that because the Software does interpolate and extrapolate input values to gap-fill the inventory timeseries and thus that the use of 0 is to be avoided, unless it reflects the actual circumstances for a given year(s). .
- A participant asked whether, when using Tier 2a, the amount of refrigerant, refills and stockpile are properly accounted for. The TSU explained that Tier 2a requires all relevant years to be populated and requires information such as the amount refilled. Mass-conservation checks have been introduced in the Software to verify it, and a colour code with red and orange colours to show when mass conservation is broken by data input. Such an occurrence signals an error in data input, to be corrected by the NGHGI compiler.
- About stockpile TSU clarified that it is not accounted as a source of emissions per se, it is an element that accounts for the delay in time between the production and import (or the consumption) of the F-gas and its actual use in the relevant appliances. Furthermore, TSU explained that there is a recycling component from retired equipment, and that recycled chemicals are automatically input in the calculation of the following year amount of F-gas available for the manufacturing of relevant appliances.
- Finally, the incorporation of calculation of NMVOCs into the Software was requested. The TSU explained that the calculation of NMVOCs is not currently included because it is not covered in the relevant IPCC Guidelines. Calculations must be done outside the Software and input in the proper worksheets (i.e. the IPCC sectoral reporting table and Sector 5).

Session 8 – Consolidation of Priorities for Future Software Development

Purpose: To consolidate the feedback collected throughout the meeting and agree on a structured set of priorities for future development of the IPCC Inventory Software and its supporting materials.

Summary: In this final session, participants and the TSU reviewed the main cross-cutting and sector-specific issues raised during the meeting. Using a draft table prepared by the TSU, the group consolidated proposed Software developments and discussed their priority, implementation considerations, and resource allocation.

The discussion covered improvements to data management and time-series workflows, database functionality, sector-specific tools, guidance and training materials, and other technical enhancements. The resulting priorities and indicative resource allocation are documented in Annex 2.

Main Takeaways:

- The Software is a valuable and effective tool already for preparing a GHG Inventory that adheres to the 2006 IPCC Guidelines and can be used for UNFCCC reporting. The improvements suggested by users during the meeting can further enhance the Software.
- Priorities covered both cross-cutting Software functionality and sector-specific improvements, including LULUCF, IPPU and Waste.
- Some developments are already allocated or ongoing, while others require further technical assessment, external support, or resource allocation.
- Guidance and supporting materials remain an important component of future Software development.

Note on Documentation

A detailed table summarising the proposed developments, including descriptions, priority levels and indicative resource allocation, is provided in Annex 2. The table consolidates the inputs collected throughout Sessions 1–7 and provides a reference for future planning by the TSU.

4. Meeting Conclusions

The meeting provided a clear and comprehensive picture of how countries in the region are using the IPCC Inventory Software and the challenges they face in practical implementation. Participants reaffirmed the Software's value, particularly for structured data management and interoperability with the UNFCCC ETF Reporting Tool, while also highlighting areas where additional flexibility, automation, or sector-specific support would be beneficial.

Across sessions, consistent themes emerged relating to data handling, time-series management, AFOLU land representation, and the effort required to manage version updates. Users also expressed growing interest in integrating the Software more effectively into national systems, including through enhanced data extraction options, multi-user arrangements, and clearer workflows. The strong demand for French-language support materials reflects the importance of improving accessibility for new and less experienced users.

The consolidated table developed in Session 8 captures the full set of proposed developments and associated considerations. These priorities range from short-term enhancements to longer-term structural options that may require further feasibility assessments, partnerships or alignment with future methodological work.

Beyond the technical discussion, the meeting strengthened regional collaboration and provided valuable insights into the diversity of national contexts and workflows. As the first TFI-promoted meeting in Africa in eight years, it demonstrated the importance of in-person exchanges for capturing practical feedback and fostering a shared understanding of user needs.

5. Next Steps

Following the meeting, the TSU consolidated the feedback received from participants, including the priority items identified during the plenary discussions. The draft Meeting Report was subsequently circulated to participants for their review and comments. Feedback received from one participant has been incorporated into this final version and is presented in Annex 3.

The consolidated feedback will be reviewed in consultation with the Software developers to assess feasibility, resource implications and potential timelines for implementation. The findings will inform future updates to the IPCC Inventory Software and its supporting materials, including guidance documents and sectoral tools. The TSU will also prepare a summary of key messages for the TFI Task Force Co-Chairs and the Task Force Bureau.

Looking ahead, the TSU may consider focusing the 2027 Software meeting on the Software clinic and database migration interface, as well as any major updates of the Software and its tools (e.g. the uncertainty analysis). Participants have varying levels of experience with the Software, making it challenging to address both introductory and advanced needs within the same sessions. A more focused clinic could allow participants to bring specific implementation issues for hands-on discussion, while a dedicated session on the database migration interface could provide an opportunity to address migration-related questions and gather targeted feedback on the new functionality.

6. Annexes

Annex 1. List of Participants

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Annex 2. Notes on IPCC Inventory Software Development from Kenya 2026

Findings	Comments[1]	Priority	Resources
General & Others			
Timeseries data entry	A. Produce a dedicated excel tool for the upload of data for: ✓ 4.A ✓ 2.F.1	Medium	Not allocated
	Always allow entry of all parameters for all inventory years for which the database exists even if it is empty (after migration)	High	Allocated
Recalculation & Time series	Adding a new functionality, to allow for time series analysis and recalculation analysis	High	Not Allocated, but is a priority [*subject to feasibility studio by IT coder*]
Splicing technique	External support tool	High	Not allocated – to be designed yet
Online use of the Database	Explore its feasibility and efficiency	High	Depends on partners
Interoperability (XML, JSON, DB) with national systems	Implementable by countries after a migration of the Software to an open-source platform	High	Dependent on Software migration to an open-source platform
Adding alert/functionality to CRT XML export/import to prompt the export/import of the XML data from the underlying calculation worksheets	To be defined with the IT developer	High	Allocated
Export emissions in XML	To be defined with the IT developer	High	Not allocated

Findings	Comments[1]	Priority	Resources
General & Others			
Export uncertainty	Export uncertainty reporting table following CRT categorisation	Medium	Not allocated
Add an option to remove password from database	To be discussed with the IT developers	High	To be included as part of the database migration
Encryption of the database	To be discussed with the IT developers	High	To be included as part of the database migration
Download IPCC reporting tables (background and sectoral) for multiple years		Low	Not yet allocated
Undo/redo button	To be considered after migration	Medium	Not yet allocated

Support			
Translation into French of support material [Guidebooks, Manual]	Setting a collaborative effort among French-speaking experts	High	A. No financial resources available B. IPCC Users Community as the tool to coordinate a voluntary work from experts. C. No French-speaking capacity at TSU
Interoperability Guidebook	✓ Add guidance on how to set the UNFCCC ETF version settings to allow a selected application of FX to specific F-gas and/or categories ✓ Add guidance on characters' limits for NK information as well as for the Documentation Box	High	TSU core budget [allocated]
Waste Guidebook	Adding guidance on how to deal with treatment technologies in SWDS and ensuring consistency in waste types for the open burning/SWDS link	High	TSU core budget [allocated]

Support			
LULUCF Guidebook	Finish the guidebook for 3.B	High	TSU core budget [allocated]
Land representative Guidebook	Update and add guidance for the tool	High	TSU core budget [allocated]
IPPU Guidebook	Include guidance on how to implement country specific circumstances for F-gases	High	TSU core budget [allocated]
Communication with TSU	TSU welcomes and solicits continuous communication, preferably through the IPCC Users Community, of users' problems, needs, wishes on Software's use & development	High	TSU core budget [allocated]
Recording of LULUCF exercise	Record a video of the LULUCF exercise to make available to users	Medium	TSU core budget [allocated]
Complete example database	Produce a complete example database for training and capacity building	Medium	TSU core budget [allocated]

Sectoral & Tools			
Waste – allocation tool	Due to be included in the next version	High	Ongoing
Waste – SWDS closure	Specifications to be drafted by TSU and shared (after database migration)	Medium	Not Allocated
Waste – SWDS conversion to a different type	Specifications to be drafted by TSU and shared (after database migration)	Medium	Not Allocated
Waste – SWDS	Functionality for linear interpolation of population	Medium	Not Allocated
Land use matrix tool	Add ecological zone for forest land	High	
	Add merging land use feature		

Sectoral & Tools			
LULUCF – default for area update mode	Allow to change the default for area update mode in the land representation manager to current inventory year only	High	Allocated
LULUCF – mangrove	Add mangrove to forest land	High	Ongoing
LULUCF – default data	Complete the gap in above ground biomass at maturity data for Cropland – Perennial Crops	High	Allocated
LULUCF – total check	Add a comma separator to the total check cell (green) in the Land Representation Manager	High	Allocated
LULUCF – transition period	Modify transition period all at once	High	Not allocated
F-gases – Allocation tool	Ability to select relevant categories [columns]	Medium	Not Allocated
F-gases – Annual EF	Integration of Year EF in a Tier 3 Approach	Low	Not Allocated In the meanwhile add workaround into the Guidebook
F-gases – 2.F.1 – Tier 2a	Addition of Stockpile	High	Allocated (ongoing)
Energy – reference approach	Automatic or validation check for excluded carbon and allocation of non-energy consumption to IPPU in the reference approach tables	Medium	Not allocated

(1) Rows highlighted in black were first identified at the expert meeting in Valdivia, Chile in 2025 and reaffirmed at this expert meeting. Rows in blue font are newly added suggestions from this expert meeting.

Annex 3. Additional feedback received after the Expert Meeting

1. Land Representation and Annual Land Conversion Matrices (Approach 2)

The meeting highlighted the importance of establishing consistent land representation datasets to support the application of IPCC Approach 2 in national greenhouse gas inventories. The Land Representation Tool provides a structured approach to organising land-use transition matrices over time, incorporating land subdivisions and their characteristics, including climate and soil type. However, its effective application depends on the availability, consistency and quality of historical land-use data.

Recommendations:

- Strengthen historical land-use data collection: Countries should compile annual land conversion matrices that capture transitions between relevant land-use categories and subdivisions, including forest land, cropland, grassland, wetlands and other land. Where historical data are unavailable, suitable proxy data should be explored and documented.
- Improve consistency in land classification: Land subdivisions should be clearly defined and applied consistently across reporting years. Relevant characteristics, including climate and soil types, should be incorporated to support appropriate land representation and emissions estimation.
- Strengthen quality assurance and quality control (QA/QC): Transition matrices should be checked for consistency across years, including the correspondence between initial and final land areas and the identification of land-use transitions. The Excel-based Land Representation Tool and the corresponding matrices in the IPCC Inventory Software should be used together to verify the consistency of the resulting datasets.
- Improve accessibility and usability: Finalising and integrating the Land Representation Tool into the IPCC Inventory Software, alongside clearer guidance and practical demonstrations, would help reduce data-entry challenges and improve its application by national inventory teams.

2. Data Collection for Fluorinated Gases (F-gases)

The meeting identified F-gas data collection as a significant challenge, particularly where information is held by customs agencies and private-sector companies or is subject to confidentiality restrictions. Reliable estimates require a clear understanding of the gases used nationally, their applications, and the availability of import, export and domestic sales data. The IPCC Inventory Software provides calculation and quality-control functionalities, but the accuracy of the resulting estimates depends on the quality of the underlying activity data.

Recommendations:

- Strengthen institutional coordination: National inventory teams should initiate consultations with customs agencies and National Ozone Units to identify the F-gases in use, their applications, the years they were introduced, and the availability of historical records.
- Establish systematic data collection: Relevant Harmonized System (HS) and national tariff codes should be identified to facilitate the tracking of imports and exports of individual gases, mixtures and equipment containing F-gases, where the available

classifications permit. Domestic sales statistics and other relevant national registers should complement customs records.

- Adopt a pragmatic, tiered approach: Where detailed data are unavailable, countries should consider applying the Tier 1 methodology using the minimum available national information, with progressive improvements towards Tier 2 as better data become available. Proxy datasets, including EDGAR, may supplement national information where necessary, provided their applicability and limitations are assessed.
- Address data gaps and confidentiality: Engagement with private-sector stakeholders should be strengthened to facilitate access to relevant information. Where direct disclosure is restricted, appropriate confidential data-sharing arrangements or alternative estimation methods should be explored.
- Improve transparency and quality control: Assumptions, proxy data, uncertainties and methodological choices should be documented. Estimates should be supported by available evidence, and zero values should only be used when they accurately represent the country's circumstances rather than as substitutes for missing data.

3. Overall Recommendation

The effective implementation of the IPCC Inventory Software requires both appropriate technical tools and reliable national datasets. Countries should strengthen institutional collaboration, establish systematic data-sharing arrangements, and prioritise consistent data collection and verification for land-use transitions and F-gases. Continued development of the Software, supported by practical guidance and capacity-building, would further improve inventory completeness, transparency and consistency with the IPCC Guidelines.