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Report and terms of reference of the Consultative Group of Experts

Regional hands-on training workshops on institutionalization of data management for the national greenhouse gas inventory

Report by the secretariat*

Summary

The Consultative Group of Experts conducted three regional hands-on training workshops in 2019 on institutionalization of data management for the national greenhouse gas inventory. The aim of the workshops was to enhance the technical capacity of national experts involved in the preparation of national communications, biennial update reports and national greenhouse gas inventories so as to institutionalize data management in national institutional arrangements. They also served as a platform for exchanging views, lessons learned and experience relating to institutional arrangements for data collection and data management processes, including commonly used techniques, approaches and tools. This report outlines the proceedings of the workshops and summarizes the discussions that took place.

* This document was scheduled for publication after the standard publication date owing to circumstances beyond the submitter's control.

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Contents

Abbreviations and acronyms

BUR	biennial update report
BTR	biennial transparency report
CGE	Consultative Group of Experts
COP	Conference of the Parties
ETF	enhanced transparency framework under Article 13 of the Paris Agreement
GEF	Global Environment Facility
GDP	gross domestic product
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
LEDS	low-emission development strategy
MRV	measurement, reporting and verification
NC	national communication
NDC	nationally determined contribution
QA/QC	quality assurance/quality control
SBI	Subsidiary Body for Implementation
SDG	Sustainable Development Goal

I. Introduction

1. COP 24 extended the term of the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention for eight years, from 1 January 2019 to 31 December 2026, and renamed it the Consultative Group of Experts.[1] The Conference of the Parties serving as the meeting of the Parties to the Paris Agreement decided[2] that the CGE shall also serve the Paris Agreement, starting from 1 January 2019, to support the implementation of the ETF.

2. The CGE developed its workplan for 2019[3] at its first meeting of the year, held in Bonn, Germany, on 21 and 22 February 2019. It agreed to conduct regional hands-on training workshops on institutionalization of data management for the national GHG inventory.

3. COP 19 requested the CGE to submit a progress report annually on its work to the SBI for consideration at the sessions of the SBI held in conjunction with the sessions of the COP.[4]

A. Scope of the report

4. Prepared as part of the annual progress report on the work of the CGE,[5] this report contains a summary of the proceedings of, and discussions at, the three regional hands-on training workshops held in 2019.

B. Possible action by the Subsidiary Body for Implementation

5. The SBI will be invited to consider the report prepared for the session and to provide guidance, as appropriate, to the CGE.

II. Proceedings

6. In 2019, the CGE conducted three regional hands-on training workshops on institutionalization of data management for the national GHG inventory:

(a) The workshop for Latin America and the Caribbean, held in San Ignacio, Belize, from 15 to 17 July, was hosted by the Government of Belize with the assistance of the United Nations Development Programme country office in Belize. It was attended by 25 national experts (12 female and 13 male), representing 22 developing country Parties from the region, four CGE members and three resource persons;[6]

(b) The workshop for Africa, held in Algiers, Algeria, from 16 to 18 September, was hosted by the Government of Algeria with the assistance of the United Nations Development Programme country office in Algeria. It was attended by 47 national experts (13 female and 34 male) representing 37 developing country Parties from the region, 5 CGE members, 2 resource persons[7] and 1 observer;

(c) The workshop for Asia-Pacific and Eastern Europe, held in Siem Reap, Cambodia, from 7 to 9 October, was hosted by the Government of Cambodia. It was attended by 34 national experts (13 female and 21 male) representing 32 developing country Parties from the region, 8 CGE members, 1 CGE observer and 2 resource persons.[8]

7. In the context of reporting under the Convention and the Paris Agreement, data availability and quality are fundamental to ensuring the timeliness and credibility of the

[1] Decision 11/CP.24, para. 1.
[2] Decision 18/CMA.1, para 15.
[3] Available at https://unfccc.int/CGE.
[4] Decision 19/CP.19, para. 7.
[5] See document FCCC/SBI/2019/19 for the 2019 report.
[6] Two from the Greenhouse Gas Management Institute and one from the Inner City Fund's Resources to Advance LEDS Implementation project.
[7] From the Greenhouse Gas Management Institute.
[8] As footnote 7 above.

information provided. Under the ETF, Parties are required to submit their first BTR by 31 December 2024 and subsequent BTRs every two years thereafter. They will need to have credible information available that can serve as the foundation for their timely submission of BTRs every two years. The CGE noted that enhanced reporting in BURs and NCs can facilitate the enhancing of this foundation to better serve future reporting, and that a number of developing country Parties continue to face issues related to data availability and quality. In addition, weak national institutional arrangements in a number of countries further amplify this issue.

8. With a view to addressing the issues identified in paragraph 7 above, the main objectives of the workshops were to:

(a) Enhance the technical capacity of national experts from developing country Parties involved in the preparation of NCs, BURs and national GHG inventories to institutionalize data management in their national institutional arrangements;

(b) Promote peer learning through the exchange of experience and lessons learned, group role play exercises that simulate an actual challenge faced by a country and designing ways to address that challenge, and hands-on exercises to experience using specific data management techniques and tools.

9. The workshops were structured to make efficient use of time and delivered in three phases:

(a) A pre-workshop webinar of one to two hours covering introductory and contextual elements, including an overview of the existing MRV arrangements under the Convention and the ETF under the Paris Agreement and an introduction to key data types and sources for national GHG inventories;

(b) Pre-workshop homework to introduce data management concepts and to identify existing national data management systems and practices, the level of interest in the topic, resources likely to be available for future work on the topic, and priority applications and functionalities of the data management systems;

(c) A three-day hands-on training workshop.

10. The three workshops were similar in structure and therefore followed similar agendas.[9] The workshops included presentations, interactive exercises and the following:

(a) A recap of the materials presented at the pre-workshop webinar and an opportunity for participants to ask any questions thereon;

(b) An overview of the key components of national institutional arrangements for preparing and submitting national reports, including examples of institutional arrangements established by some developing countries that facilitated an increase in the frequency of the preparation and submission of national reports;

(c) A group baseline mapping exercise, based on input provided by participants as part of the pre-workshop homework, that provided an overview of data management under current institutional arrangements, including software tools, processing procedures, stakeholder engagement, challenges, experience and lessons learned;

(d) A group functional design exercise that engaged participants in a brainstorming session on the desirable scope, functions and capabilities of a national MRV data management system;

(e) A technical session that addressed the QA/QC requirements associated with IPCC good practice and inventory quality standards (namely transparency, accuracy, completeness, comparability and consistency) and explained commonly used and recommended techniques, approaches and tools for meeting those requirements;

(f) A technical session that explained IPCC good practice in archiving and documentation associated with GHG data collection and processing and included a practical

[9] The agenda is available at https://unfccc.int/documents/200777.

exercise that used a case study to identify issues associated with archiving and documentation;

(g) A technical session that explained practical ways to resolve issues associated with missing data for some or most years of a time series in line with the inventory guidelines and IPCC good practice, followed by a hands-on exercise that used a case study to show how to apply different data splicing techniques to address data gaps;

(h) A brainstorming session that provided an opportunity for participants to work through their own country cases on the theme of institutional arrangements, data collection or QA/QC;

(i) A session that explored and highlighted areas of possible national synergy between MRV and the ETF, including national GHG inventories and tracking progress of NDCs, and indicators for monitoring progress towards achieving the SDGs.

III. Outcomes of discussions

A. Recap of the pre-workshop webinar

11. Participants were given a recap of the pre-workshop webinar, which had briefly covered existing MRV arrangements under the Convention and the ETF, the status of submission of NCs and BURs by Parties from the region, including the latest available GHG inventory information, and capacity-building tools and training opportunities available. They were also introduced to the core components that make up a functional GHG inventory data management system.

12. Participants sought clarification on using expert judgment to determine the applicability and reliability of methods, the quality of data, and the usability and appropriateness of emission factors. They were advised to provide detailed documentation where expert judgment is used in the process of developing the national GHG inventory. It was highlighted that table 2A.1 in annex 2A.1 to volume 1 of the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* provides guidance on using expert judgment and contains a template for documenting it.

13. Participants also sought clarification on the difference between QC and QA processes. Key QC activities were identified as including checks on the source, accuracy and appropriate referencing of activity data, emission factors, processes and procedures by personnel that are usually involved in the GHG inventory data management process. QA activities were identified as focusing on the applicability and relevance of methods and emission factors, or approaches to collecting activity data, and as usually performed by personnel not directly involved in the inventory preparation, such as peer review, use of expert judgment, and analysis of parts, categories or entire sectors of the inventory.

14. Participants expressed interest in learning more about enhancing existing institutional arrangements to improve the collection, management and reporting of GHG inventory data, including incorporating a GHG inventory component into the existing data collection and management systems and processes for sectors so that data for the inventory can be generated properly and in a timely manner. Participants expressed keen interest in: practical tools, techniques and approaches for setting up and maintaining a data management system; establishing a QA/QC process, including set-up of a QA team, conducting QA/QC and improving data quality; conducting uncertainty management; and data archiving and documentation.

15. They also expressed interest in enhancing regional collaboration on the institutionalization of data for GHG inventories on the basis of similarities in national circumstances in the region, noting the potential for sharing best practices, resources and expertise with a view to overcoming common challenges.

B. Institutional arrangements and data management: techniques, approaches and tools

16. Presentations focused on the fundamental building blocks for establishing robust institutional arrangements for a national framework for MRV and enhanced transparency.

17. Key learning points and reflections from the participants were as follows:

(a) A legal or formal mandate can provide a basis for the inventory coordinating body to mobilize necessary resources;

(b) Establishing the national GHG inventory coordinating body within government can be a key factor in influencing the effectiveness of institutional arrangements and, in particular, the strength of its mandate and ability to conduct interministerial coordination;

(c) Engaging a broad range of stakeholders and assigning roles and responsibilities to key stakeholders can benefit the process. The coordination and stakeholder engagement can work better when the stakeholders and entities are well informed about the MRV process in general and the strategic results, including usefulness of the data provided and contributions to the MRV process expected from their engagement, are well communicated;

(d) In-country institutional and technical capacity-building ensures the continuous improvement of data collection, management and reporting. It is important for a country to establish or strengthen a mechanism so as to retain institutional memory and built capacity, including knowledge and expertise gained from training;

(e) Robust archiving and documentation of the process and associated procedures, supported by regular communication among different stakeholders, helps to institutionalize the process;

(f) Political buy-in and high-level political commitment to MRV work plays a critical role, especially when the structure and affiliation of government institutions dealing with climate change are subject to frequent changes and/or are assigned to a vast range of issues beyond climate change and MRV or transparency issues, which often leads to lower priority being assigned to MRV work and a shortage in staff who undertakes MRV work.

18. There is no one-size-fits-all approach to national GHG inventory institutional arrangements. Understanding a country's existing legal and institutional arrangements is an entry point for strengthening those related to the GHG inventory. A few techniques, such as mapping and templates, were introduced for a country to identify what can be leveraged from the existing arrangements and what can be improved. The importance of documenting institutional arrangements was also highlighted to ensure everything relating to national GHG inventory development is documented and described in a way that is easy to understand and that helps to maintain business continuity through data collection and management.

19. Participants learned about different tools and approaches for setting up an information management system for collecting and managing data. They then applied this knowledge to a case study based on an NC so that they could trace through the institutional arrangements in place, track the origin of the data associated with different emissions sources, identify the unit responsible for the data processing and its impact on QA/QC measures, and identify the tools and software used to process the data.

20. Some participants shared experience and lessons learned in establishing institutional arrangements to support a framework for MRV and the ETF. They described their continued efforts to overcome challenges in strengthening their institutional arrangements, and highlighted the importance of accessing support, such as through the GEF-administered Capacity-building Initiative for Transparency. They also shared experiences addressing challenges in accessing data from the private sector and, to that end, the need to maintain confidentiality was highlighted as a key part of the solution.

21. Participants provided feedback on templates for documenting institutional arrangements, including attributes and associated values. They highlighted that in order to

enhance transparency and exchange data there is a need to ensure each attribute has a unique value.

C. Group baseline mapping exercise

22. On the basis of the pre-workshop homework that entailed mapping out the flow of data for a particular sector to be used for the national GHG inventory, participants described the challenges and data gaps that they face in attempting to improve the process at various phases, such as primary data collection, data analysis and QA/QC.

23. They highlighted the need for: (1) centralizing coordination and ownership of the process; (2) ensuring that consultants provide a rationale or an explanation for decisions made when analysing or assimilating data; (3) building sound information management systems and tools; (4) strengthening technical capacity in the appropriate ministries to oversee the QC of data collection; and (5) technical capacity for QA in the central coordinating body.

D. Group functional design exercise

24. Participants engaged in a brainstorming exercise to elucidate what a robust and effective national MRV data management system could look like, focusing on aspects such as scope, functional requirements and capabilities.

25. The result of this brainstorming exercise is captured in the annex. Participants used this exercise to determine key requirements for their MRV data management system.

26. Key learning points were as follows:

(a) Data management systems are indispensable for a structured arrangement of GHG data and information to ensure that data can be used effectively and efficiently;

(b) Careful analysis of data needs and availability of technological platforms that can be integrated or leveraged is key to selecting the most appropriate information system, which could be one of the many off-the-shelf products available;

(c) Identifying mandatory outputs is the first step in producing a list of the minimal necessary functions of a data management system, which should be considered in the light of the various scenarios that the system would be expected to handle;

(d) A data management system is intended to store, process, analyse and display data, as well as to use the data to generate reports, so careful consideration should be given to the types of data, including their sources and attributes, necessary for the system to be able to generate meaningful information;

(e) Data collection should be formalized through the use of tables and templates that are consistent and scalable, so that the system can use the data efficiently, data gaps can be identified, and future improvements can be planned.

E. Quality assurance and quality control

27. This session covered the key components of QA/QC processes, the use of standards and good practice guidance documents in developing a QA/QC plan, and the commonly used and recommended techniques, approaches and tools for implementing IPCC good practices.

28. From in-depth discussions on the differences between, and essential features of, QA and QC processes the following key learning points emerged:

(a) Good QA practices include independent third-party reviews and audits to assess the quality of the inventory, determine the level of conformity with the procedures applied and identify areas for improvement, including by developing an improvement plan;

(b) It is good practice for inventory compilers to conduct a basic expert peer review of all categories before finalizing the inventory in order to identify potential problems and make corrections where necessary;

(c) Key categories should be prioritized and, where significant changes in method or data have been made, an extensive peer review or audit could be performed;

(d) It is good practice in inventory preparation for audits to be used to evaluate the level of compliance of the inventory compiler with the minimum QC specifications outlined in the QC plan. Audits may also be used to assess the effectiveness and use of QA in the context of QC plans;

(e) It is good practice for the inventory compiler to establish a schedule for conducting audits at strategic points in the development of the inventory.

F. Documentation and archiving associated with greenhouse gas data collection and processing

29. Participants learned about IPCC good archiving and documentation practices associated with GHG data collection and processing and then applied them in a practical exercise to identify issues associated with archiving and documentation in a case study.

30. The key learning point was that it is important to follow a decision-making process to identify which activity data should be collected to estimate emissions for a specific sector. The method to be used for estimating emissions and the categories for which the data are required should be used to determine the nature of the data to be collected for the given method, whether or not the data are available, whether the available data represent a full time series or not, whether measured data represent a sample or cover the entire population, and how, if necessary, the data should be converted into units applicable to the method.

31. Documentation and archiving should be considered part of the process of national GHG inventory development, not a one-off exercise. Therefore, it was recommended that developing countries, in the light of their capacities, start from a minimum level of detail (e.g. using a simple template and/or survey, then introducing a calculation template) and gradually integrate documentation and archiving into the data management system if available. Regardless of the number of data attributes, it is important to document the data in a systemic way that enables the stakeholders, including data custodians, data compilers and any other stakeholders who would need access to data, to easily understand the process.

32. Identification of key data types and data attributes that could be used to describe the data values and the data collection methods and process is the basis of documentation and archiving. Developing countries can start from simple stories or narratives, for example outlining key elements of the inventory, such as inventory years, what was carried out, what methods were used, and what were the results. Such narratives can be formalized and standardized over time and integrated into the data management system.

G. Data gaps

33. Time-series consistency is an important aspect of GHG inventory data management. As far as possible, the time series of GHG emissions and removals should be calculated using the same methods and data sources for all years. Participants were taught about various splicing techniques for establishing a consistent time series following the IPCC good practice, such as the overlap, surrogate, interpolation and extrapolation, and cluster methods.

34. Participants engaged in an exercise, using a case study, to address gaps in a data time series. They identified the most appropriate ways to address the lack of data, justified the choice of method, applied the selected splicing technique and resolved the time-series inconsistency. The exercise generated fruitful discussion and exchange of lessons learned and experience. Key learning points were as follows:

(a) Examining time-series consistency should be a key goal of QA/QC checks. A visual inspection of graphs or use of statistical tools can help to identify inconsistencies;

(b) Not all inconsistencies are evidence of a problem; in which case it is important to explain, either qualitatively, quantitatively or both, how the time series is consistent;

(c) If previously reported estimates have been recalculated, due to updated activity data, emission factors or emissions, or because a splicing technique was used, this should be described in the inventory report.

35. Participants sought clarification on applying splicing techniques to address data gaps in a time series in the case of "missing" data versus "absence" of data owing to external factors (for example, agriculture sector data were not collected owing to drought). It was advised that the splicing technique be applied only when data should have been there but is missing; if the data does not exist owing to external factors, this should be described in the inventory report.

H. Brainstorming session

36. In this session, participants were engaged in an interactive "clinic" session where one participant per each group volunteered to be a "case owner" to share the respective country experience, including the current state of the national GHG inventory process, what worked well, what would benefit from further improvement, and challenges and constraints. The rest of the group provided feedback and potential solutions based on their own country experiences.

37. The session demonstrated that most of the countries have some form of institutional arrangements for a national GHG inventory either as a part of a broader climate change governance structure or a stand-alone arrangement covering the full MRV spectrum. The structure and the level of maturity of the institutional arrangement varied across countries.

38. Further, three commonalities emerged, including: (1) formalization of the national GHG inventory process and retention of resources; (2) stakeholder engagement and coordination; and (3) building technical capacity to coordinate and/or manage the GHG inventory process, collect activity data by the data provider, and improve or develop emission factors. Participants identified the following approaches based on country experiences and good practices:

(a) Formalization of the national GHG inventory process and retention of resources:

(i) Establish a legal framework that mandates data collection and management for the preparation of a national GHG inventory;

(ii) Create or enhance political buy-in for the MRV/transparency work so as to increase accountability and ownership by key stakeholders;

(iii) Create a designated entity to lead the national GHG inventory process;

(iv) Ensure senior management in charge of addressing the national response to climate change is aware of the need for dedicated technical resources for managing the GHG inventory preparation process;

(v) Ensure processes are documented so that new staff members are able to trace how previous inventory reports were prepared;

(vi) Ensure the staff training plan allows for knowledge retention so as to foster continuity of work;

(vii) Ensure continuity of work if a staff member leaves;

(b) Stakeholder engagement and coordination:

(i) Raise awareness to secure buy-in from senior policymakers and other key actors, including relevant line ministries and the private sector;

(ii) Conclude a memorandum of understandings between data custodian ministries or institutions and the entity responsible for compiling the national GHG inventory;

(iii) Develop protocols that outline the roles and responsibilities of the relevant ministries in data collection and management;

(iv) Develop terms of reference that clearly outline the role of consultants, including the need for them to explain the process and any expert judgment or assumptions used to prepare GHG emission estimates;

(c) Building technical capacity:

(i) Work with stakeholders to identify data and sources that could be used for estimating emissions and removals;

(ii) Develop country-specific emission factors;

(iii) Use methodologies for collecting sector-specific GHG data;

(iv) Access tools and support from providers such as the Initiative for Climate Action Transparency, which can assist in the development of emission factors;

(v) Train on how to draft a BUR as per the guidelines contained in annex III to decision 2/CP.17;

(vi) Increase awareness among various stakeholders on the value of a good data management system;

(d) Developing a coordination plan to work with support providers.

39. Participants shared information on projects submitted to the GEF to access financial support through the Capacity-building Initiative for Transparency, the aim of which is to strengthen the institutional and technical capacities of developing countries to engage effectively in existing MRV arrangements and the ETF.

I. Opportunities for synergy with nationally determined contributions and the Sustainable Development Goals

40. This session addressed opportunities for synergy between implementing MRV and the ETF and monitoring progress towards the SDGs. It highlighted interlinkages between national climate change agendas and the SDGs based on national priorities, needs, institutional structures and the range of financing available for implementation.

41. The exercise enabled participants to explore which SDG indicators can be linked to MRV and transparency elements, in particular the national GHG inventory and tracking the progress of NDCs; which information, collected at the national level, can inform and be fed into monitoring and reporting under both agendas; and the opportunities that exist for synergy in the monitoring and reporting of the two interlinked agendas at the national level.

42. Participants appreciated this information being shared and noted that linking climate change with existing institutional arrangements for socioeconomic development and the SDGs could negate the need for additional institutional arrangements related to climate change and help to engage stakeholders.

IV. Conclusions

43. Participants appreciated the opportunity to work through country case studies in hands-on exercises that simulated the situations they face on the ground. They welcomed the extensive interaction with peers, the CGE and other experts. The webinar, homework and distribution of training materials before the workshop allowed them to prepare in advance, thereby ensuring that the workshops were as interactive as possible.

44. In general, the workshops were successful in:

(a) Familiarizing national experts with the process and methods for institutionalization of data management for the national GHG inventory;

(b) Providing a platform for national experts from the same region to share experience and lessons learned;

(c) Promoting networking among national experts;

(d) Providing a platform for the CGE to interact with national experts and gain insight into relevant lessons learned, experience, constraints and challenges.

45. Some participants expressed their intention to use the training materials as a basis for training other national experts, enhancing existing institutional arrangements, furthering their knowledge of GHG inventory preparation and improving the terms of reference for hired experts and consultants.

46. After each workshop, a survey was conducted to obtain feedback from the participants. The response rate was 92 per cent (23 of 25 participants) for the Latin American and Caribbean region workshop, 85 per cent (40 of 47 participants) for the African region workshop and 76 per cent (26 of the 34 participants) for the Asia-Pacific and Eastern European regions workshop. The feedback is summarized in paragraphs 47–49 below.

47. Most surveyed participants found the quality of the workshops to be excellent (52 per cent) or good (48 per cent) across the three workshops, as indicated by the survey results. All survey respondents stated that the content was well prepared and 90 per cent indicated that the hands-on training exercises provided sufficient practice and stimulated sufficient feedback. Almost all survey respondents indicated that the knowledge and information gained from participating in the workshop would be useful in, and applicable to, their work.

48. Survey respondents suggested the following actions for enhancing the effectiveness of such workshops in the future:

(a) Allocate more time for hands-on exercises given how technical they are. Concrete suggestions include starting earlier in the morning, extending the training workshops to 4–5 days or focusing on fewer topics;

(b) Provide additional facilitation during the group hands-on exercise to ensure each exercise is reviewed and assessed, as appropriate, by resource persons and sufficient feedback is provided on areas for improvement;

(c) Keep presentations short and ensure they are delivered within the time allocated;

(d) Include more country cases and sectors in the design of hands-on exercises to enhance practicality;

(e) Share more country experience and lessons learned;

(f) Organize two-part workshops that cater to different levels of knowledge and experience of national experts, namely one part for experienced experts to learn about advanced tools and models, and the other for new experts to gain basic knowledge and start building their capacity.

49. Survey respondents suggested that the following be covered in future training workshops on MRV and the ETF:

(a) Guidance for the implementation of the ETF;

(b) Concrete examples on institutional arrangements;

(c) Key category and uncertainty analyses;

(d) Understanding QA/QC methodologies, archiving and documentation in the context of a GHG inventory;

(e) MRV of information management systems;

(f) Addressing time series data gaps in data management systems;

(g) Using the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* and associated software;

(h) Using mitigation tools, models and energy projections;

(i) Concluding a memorandum of understanding with stakeholders;

(j) Communicating UNFCCC and Paris Agreement obligations to wider communities, strengthening stakeholder participation in the process and learning about ways to mobilize support and cooperation in data collection and reporting;

(k) Examples of comprehensive MRV systems for climate change activities.

50. The CGE, the secretariat and workshop participants expressed their appreciation to the Governments of Algeria, Belize and Cambodia for hosting the workshops. The CGE also extended its appreciation to the United Nations Development Programme country offices in Algeria and Belize for handling the logistical arrangements for the workshops. The CGE thanked Parties that contributed financial resources to support the work of the CGE, including for the organization of these workshops.

Annex

Exercise to identify the key requirements for a robust and effective national measurement, reporting and verification data management system

[English only]

#	*Theme*	*Requirement*	*MoSCoW*[a]
1.1	Input/output	Read and process different data types from different sectors	
1.2	Input/output	Read data from Excel files	
1.3	Input/output	Accept manual data input	
1.4	Input/output	Visualize input data (tables and graphs)	
1.5	Input/output	Visualize output data (tables and graphs)	
1.6	Input/output	Easy navigation	
1.7	Input/output	Intuitive interface	
1.8	Input/output	Produce outputs in a form of common reporting format tables (or/and other formats that are mandatory for reporting)	
2.1	Security/confidentiality	Provide data views without pointing at individual suppliers (enable option to hide fields)	
2.2	Security/confidentiality	Store and display on demand the code of the country (or countries) that own the software	
2.3	Security/confidentiality	On login, recognize the user group the user belongs to	
2.4	Security/confidentiality	On login, display the relevant system view specific to a user group recognized from the login	
3.24	Analysis and processing	Enable recording and querying activity data	
3.25	Analysis and processing	Enable recording and querying information about methods of emission estimates	
3.26	Analysis and processing	Enable recording and querying country-specific emission factor information and values	
3.27	Analysis and processing	Enable recording and querying information on default emission factor (e.g. reference and value)	
3.28	Analysis and processing	Enable recording and querying information on QA/QC using user-specified templates	
3.29	Analysis and processing	Calculate emissions (net and gross)	
3.3	Analysis and processing	Calculate emission trends	
3.31	Analysis and processing	Calculate activity data trends	
3.32	Analysis and processing	Show projections for a given scenario	

#	Theme	Requirement	MoSCoW[a]
3.33	Analysis and processing	Produce mitigation indicators (e.g. emissions reductions)	
	Analysis and processing	Generate report for a given template:	
3.34	Analysis and processing	a. Text	
3.35	Analysis and processing	b. Tables	
3.36	Analysis and processing	c. Graphs	
3.37	Analysis and processing	Perform key category analysis	
	Analysis and processing	Perform uncertainty analysis:	
3.37	Analysis and processing	a. Uncertainty calculation for a single category (approach 1)	
3.38	Analysis and processing	b. Uncertainty propagation for several categories, by sector and for entire inventory (gross and net)	
	Analysis and processing	Perform data comparisons for:	
3.38	Analysis and processing	a. Between user-selected countries	
3.39	Analysis and processing	b. Between sectors	
3.40	Analysis and processing	c. Between user-selected categories	
		Perform data quality checks:	
3.41	Analysis and processing	a. Blank cells	
3.42	Analysis and processing	c. Exact cell value repeat for numerical values in time series	
3.43	Analysis and processing	d. Trend analysis – time-series consistency – implied emission factor variations	
3.44	Analysis and processing	e. Display notation keys (each type – NO, NA, NE, IE, C)[b]	
3.45	Analysis and processing	f. Identify application of tier 3 methods (requires verification)	
3.46	Analysis and processing	g. Calculate carbon dioxide from fuel combustion using the reference and sectoral approaches by fuel type and by fuel	
3.47	Analysis and processing	h. Calculate the differences in carbon dioxide emissions (absolute and per cent) from reference and sectoral approaches	
3.48	Analysis and processing	Enable recording and querying of the QA, QC and verification set-up	
3.49	Analysis and processing	Enable recording and querying of the QA, QC and verification procedures and the status of checks (complete, in progress, started, not started)	
3.50	Analysis and processing	Enable recording and querying of the institutional arrangements set-up and identify year-to-year changes	

#	Theme	Requirement	MoSCoW[a]
3.51	Analysis and processing	Enable recording and querying of the inventory improvements set-up and progress status and identify year-to-year changes	
3.52	Analysis and processing	Perform recalculations for all sectors, categories and gases and display the changes between the compared inventories in absolute numbers and per cent for each sector, category and gas	
3.53	Analysis and processing	Enable recording, storage and querying for proxy data (e.g. GDP, population, number of vehicles etc.) – make it scalable	
		Enable content management system write-up:	
3.54	Analysis and processing	a. Web pages	
3.55	Analysis and processing	b. Menus	
3.56	Analysis and processing	c. Texts	
3.57	Analysis and processing	d. Images	
3.58	Analysis and processing	e. Other elements	
3.59	Analysis and processing	Enable help module	
		Enable identification of data gaps:	
3.60	Analysis and processing	a. Enable analysis of applicability of linear interpolation and extrapolation	
3.61	Analysis and processing	b. Perform extrapolation and interpolation, if applicable (by authorized users)	
3.62	Analysis and processing	c. Calculate user-defined indicators based on GHG data and other user-defined or pre-recorded parameters (e.g. emissions in relation to GDP, emissions per capita, per vehicle type)	
4.1	Communication/Interface	Enable interfacing between this system and other nationally used systems (e.g., national statistics office data)	
		Enable system messaging services for:	
4.2	Communication/interface	a. Sending messages to other users of the system who are registered in the database	
4.3	Communication/interface	b. Sending messages if an incorrect entry is made (or a required entry is missing)	
4.4	Communication/interface	c. Sending reminders about data collection	
4.5	Communication/interface	d. On a mouse click, show a relevant definition and explanation	
4.6	Communication/interface	e. Integrate with the social media	

#	Theme	Requirement	MoSCoW[a]
4.7	Communication/interface	Enable data-sharing facilities with external users and/or systems on user's demand	
4.8	Communication/interface	Provide an option to group or add up data by region (so several countries could be included in the output)	
4.9	Communication/interface	Use web-based platform to support policy, research and quality management	
4.10	Communication/interface	Enable working on analyses and reports collaboratively	
4.11	Communication/interface	Show hints and screen tips	
4.12	Communication/interface	Include system manuals	
4.13	Communication/interface	Include standardized guidelines for data analyses	
		Enable public view of selected outputs:	
4.14	Communication/interface	a. Text	
4.15	Communication/interface	b. Tables	
4.16	Communication/interface	c. Graphs	
4.17	Communication/interface	A dashboard for the general public including summary figures and emission trends	
5.1	Internal system QC	Enable internal evaluation and send error messages if a required entry is missing or an entry is outside the correct (agreed) range	

[a] Mo = must have; S = should have; C = can have; W = can do without.

[b] NO = not occurring; NA = not applicable; NE = not estimated; IE = included elsewhere; C = confidential.