QA/QC Programme for the National GHG Inventory of Romania

Authors

General responsibility: Sorin Deaconu

Main author: Sorin Deaconu

Co-authors: Gheorghița Nicodim, Brîndușa Paciurea, Ramona Niculescu

Abbreviations

NGHGI	National Greenhouse Gases Inventory
QA	Quality assurance
QC	Quality control
GHG	Greenhouse gases
NEPA	National Environmental Protection Agency
ME	Ministry of Environment
UNFCCC	United Nations Framework Convention on Climate Change
IPCC	Intergovernmental Panel on Climate Change
UNFCCC-NS	United Nations Framework Convention on Climate Change guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (provided by Decision 19/CP.7)
IPCC-GPG	Intergovernmental Panel on Climate Change Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories
CRF	Common reporting format
ERT	Expert review team
NIR	National inventory report
COP/MOP	Conference of the Parties serving as Meeting of the Parties
ECGHGI	European Community Greenhouse Gases Inventory
LULUCF	Land Use, Land-Use Change and Forestry

Introduction

This document represents the second version of the QA/QC Programme for the Romanian National GHG Inventory (NGHGI). Relying on the practical results of the NGHGI management, NEPA may decide the substantial revision of the QA/QC Programme within the continuous improvement process of the inventory.

This QA/QC Programme was established according to the UNFCCC and Kyoto Protocol's provisions related to GHG inventory preparation and national system establishment and also to 1996 Revised IPCC Methodology and Good Practice Guidance. Therefore, the document comprises information on:

- the national authority responsible for the coordination of QA/QC activities;
- the objectives of the QA/QC Programme;
- the QA/QC Plan;
- the QA procedures;
- the QC procedures;
- the reporting, documenting and archiving procedures

Definitions

Audits - For the purpose of good practice in inventory preparation, audits may be used to evaluate how effectively the inventory agency complies with the minimum QC specifications outlined in the QC Plan. Audits might include rigorous certification of data or references and may be conducted during the preparation of an inventory, following inventory preparation, or on a previous inventory.

Expert peer review - consists of a review of calculations or assumptions by experts in relevant technical fields. Preferably these reviewers would be independent experts

not closely connected with national inventory compilation. The objective of the expert peer review is to ensure that the inventory's results, assumptions, and methods are reasonable as judged by those experts with knowledge in the specific field. Expert review processes can be supplemented by stakeholder and public review mechanisms.

Good practice - a set of procedures intended to ensure that GHG inventories are accurate in the sense that they are systematically neither over nor underestimates so far as can be judged, and that uncertainties are reduced so far as possible. Good practice covers choice of estimation methods appropriate to national circumstances, quality assurance and quality control at the national level, quantification of uncertainties and data archiving and reporting to promote transparency.

Inventory agency - institution responsible for coordinating QA/QC activities for the national inventory is National Environmental Protection Agency of Romania.

Inventory and QA/QC improvement - quality improvement of the inventory by improving the quality of activity data, emission factors, methods and other relevant technical elements of the inventory. Information regarding the implementation of the QA/QC Programme, the review process under Article 8 of the Kyoto Protocol and other reviews should be considered in the development and/or revision of the QA/QC Plan and its quality objectives.

Inventory Principles

- Transparency - the assumptions and methodologies used for the inventory should be clearly explained to facilitate replication and assessment of the inventory by users of the reported information. The transparency of inventories is fundamental to the success of the process for the communication and consideration of information;

- Consistency - the inventory should be internally consistent in all its elements with inventories of other years. The inventory is consistent if the same methodologies are used for the base year and all subsequent years and if consistent data sets are used to estimate emissions or removals from sources or sinks. The inventory using different methodologies for different years can be considered to be consistent if it has been recalculated in a transparent manner, in accordance with the IPCC GPG;
- Comparability - estimates of emissions and removals reported by Romania in inventories should be comparable among Annex I Parties. For this purpose, Romania should use the methodologies and formats agreed by the COP for estimating and reporting inventories. The allocation of different source/sink categories should follow the split of the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, and the IPCC GPG for Land Use, Land-Use Change and Forestry, at the level of its summary and sectoral tables;
- Completeness - the inventory should cover all sources and sinks, as well as all gases, included in the IPCC Guidelines as well as other existing relevant source/sink categories which are specific to Romania and, therefore, may not be included in the IPCC Guidelines. Completeness also means full geographic coverage of sources and sinks of Romania;
- Accuracy - a relative measure of the exactness of an emission or removal estimate. Estimates should be accurate in the sense that they are systematically neither over nor under true emissions or removals, as far as can be judged, and that uncertainties are reduced as far as practicable. Appropriate methodologies should be used, in accordance with the IPCC GPG, to promote accuracy in inventories.

Key category - a source or sink prioritized within the national inventory due to the fact that its estimate has a significant influence on Romania's total direct GHG emissions in terms of the absolute level of emissions, the trend in emissions, or both.

National entity - single national entity formally designated with overall responsibility for the national inventory in Romania (NEPA).

National system - a national system includes all institutional, legal, procedural arrangements made in Romania for estimating anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol, and for reporting and archiving inventory information.

QA/QC coordinator - is the person responsible for ensuring that the objectives of the QA/QC Programme are implemented (Mr. Sorin Deaconu, Head of Inventory Team).

QA/QC plan - an internal document for organizing, planning and implementing all QA/QC activities. The plan outlines QA/QC activities that will be implemented, and includes a scheduled time frame following the inventory process from its initial development through the final reporting.

QA/QC system - has a number of major elements as follows:

- an inventory agency responsible for coordinating QA/QC activities;
- a QA/QC Plan;
- general QC procedures (Tier1);
- source category-specific QC procedures (Tier 2);
- QA review procedures;
- reporting, documentation and archiving procedures

Quality assurance (QA) - activities include a planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process to verify that data quality objectives were met, ensure that the inventory represents the best possible estimate of emissions and sinks given the current state of scientific knowledge and data available, and support

the effectiveness of the quality control (QC) programme. QA activities include audits and expert peer reviews.

It is good practice for inventory agencies to conduct a basic expert peer review (Tier 1 QA) prior to inventory submission in order to identify potential problems and make corrections where possible. Inventory agencies may also choose to perform more extensive peer reviews or audits or both as additional (Tier 2 QA) procedures within the available resources.

Quality control (QC) - a system of routine technical activities, to measure and control the quality of the inventory as it is being developed. The QC system is designed to:

- Provide routine and consistent checks to ensure data integrity, correctness, and completeness;
- Identify and address errors and omissions;
- Document and archive inventory material and record all QC activities.

QC activities - include general methods such as accuracy checks on data collection and aggregations and the use of approved standardized procedures for emission calculations, measurements, estimating uncertainties, archiving information and reporting. Higher tier QC activities include technical reviews of source categories, activity data and emissions factors, and methods of estimation.

- Tier 1 QC procedures

Tier 1 General Inventory Level QC procedures are checks that the inventory agency is using routinely throughout the preparation of the annual inventory. The focus of general QC techniques is on the processing, handling, documenting, archiving and reporting procedures that are common to all the inventory source categories.

- Tier 2 QC procedures

Source category-specific QC procedures (Tier 2), are directed at specific types of data used in the methods for individual source categories and require knowledge of the emissions source category, the types of data available and the parameters associated with emissions. The source category specific QC measures are applied on a case-by-case basis focusing on key source categories and on source

categories where significant methodological and data revisions have taken place. Tier 2 QC activities are in addition to the general QC conducted as part of Tier 1.

Quality Objectives - concrete expressions regarding the standard aimed for in the inventory preparation and reporting by addressing also the inventory principles (transparency, accuracy, comparability, consistency, completeness and timeliness). Some of the inventory principles lead to exact, measurable quality objectives, but for others it is possible to set only general, qualitative objectives. Quality objectives should be realistically achievable with the available resources. Quality objectives are set and reviewed annually by the responsible inventory agency.

Verification - refers to the collection of activities and procedures that can be followed during the planning and development, or after the completion of an inventory that can help to establish its reliability for the intended applications of that inventory. Typically, methods external to the inventory are used to check the accuracy of the inventory, including comparisons with estimates made by other bodies or with emissions estimations determined from atmospheric concentrations or concentration gradients of these gases.

Verification techniques include internal quality checks, inventory inter-comparisons, comparisons of intensity indicators, comparisons with atmospheric concentrations and source measurements, and modeling studies. In all cases, comparisons of the systems for which data are available and the processes of data acquisition are considered along with the results of the studies.

Concepts Specific to Quality Related Actions

Quality is defined as the degree to which a set of inherent characteristics fulfill requirements. Requirements are the need or expectation that is stated, generally implied of obligatory. The quality planning is based on the following definitions as lined out by both ISO 9000 standards and it covers the activities lined out by the UNFCCC and the Good Practice Guidance:

- Quality Management (QM) co-ordinate activity to direct and control quality
- Quality Planning (QP) defines quality objectives including specification of necessary operational processes and resources to fulfill the quality objectives
- Quality Control (QC) fulfils quality requirements
- Quality Assurance (QA) provides confidence that quality requirements will be fulfilled
- Quality Improvement (QI) increases the ability to fulfill quality requirements

The activities are considered inter-related in this process as presented in Figure 1.

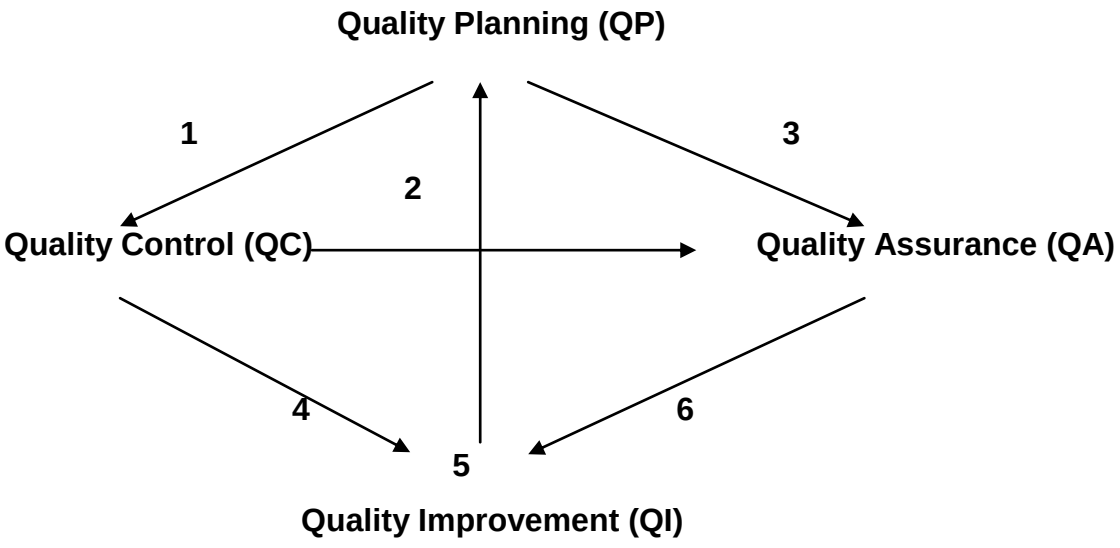

Figure 1. The Inter-relation between the activities with regard to quality (the meaning of the arrows is explained in below)

1 - The QP sets up the objectives and measurable indicators valid for the QC.
2 - The QC investigates the measurable indicators that are communicated to the AC for assessment in order to ensure sufficient quality.
3 - The QP identifies and defines measurable indicators for the fulfillment of the quality objectives. They form the basis for the QA and are supported by the input coming from the QC.
4 - The result from the QC will highlight the degree of fulfillment for every quality objective. It represents a good basis for suggestions of improvements of the inventory in order to meet the quality objective.
5 - Suggested improvements in the quality may induce changes in the quality objectives and their measurability.
6 - The evaluation performed by external entities is an important input when improvements in quality are considered.

Specific Responsibilities

According to the provisions in the Governmental Decision regarding the establishment of the national system for estimating the anthropogenic GHG emissions provided by the Kyoto Protocol and the IPCC-GPG, Romanian NEPA is the competent authority responsible with the coordination of the QA/QC activities under the NGHGI.

For this purpose, NEPA is performing the following activities:

- ensures that the objectives of the QA/QC programme are established;
- develops and regularly updates a QA/QC plan;
- implements the QA/QC procedures;
- establishes and ensures the implementation of reporting, documenting and archiving procedures.

The QA/QC coordinator is represented by the same person designated to fulfill the tasks of the NGHGI general coordinator, in the person of Mr. Sorin Deaconu.

QA/QC Programme's Objectives

Overall objective

The overall objective of the QA/QC programme is to develop the National Greenhouse Gas Inventory in line with the requirements of the IPCC methodology, IPCC-GPG and EU requirements presented in Decision 280/2004.

Specific quality objectives

The specific quality objectives of the QA/QC programme and its application are an essential requirement in the GHG inventory development and submission processes in order to ensure and improve the inventory principles: transparency, consistency, comparability, completeness and accuracy of the national emissions and removals estimates for the purposes of meeting Romania's reporting commitments under the UNFCCC and Kyoto Protocol. They are required for providing concrete and measurable indicators regarding the standard that is aimed for the NGHGI preparation and reporting process. If necessary, they may be reviewed when revising the programme. The specific objectives are presented below.

The programme's objectives for ensuring the **transparency** are referring to:

- ✓ providing transparent information in the NIR;
- ✓ providing sectoral background data tables of the CRF based on the aggregation allowed by methodologies and activity data;
- ✓ providing documentation for the use of estimation algorithm on missing activity data;
- ✓ using the notation keys as indicated in the UNFCCC guidelines;
- ✓ addressing the recommendations related to transparency provided in the review reports, during the preparation of the following inventory submission;
- ✓ providing full documentation on quality checks used in the QA/QC procedures;

- ✓ presenting in the NIR a summary of the improvement of transparency comparing with the previous submission.

The programme's objectives for ensuring the **completeness** are referring to:

- ✓ reporting estimates for all sources and sinks and for all gases included in the IPCC guidelines as well as for other relevant source/sink categories;
- ✓ reporting all emissions estimates by sources and removals by sinks from land use, land-use change and forestry (LULUCF) activities under Article 3.3 of the Kyoto Protocol and the elected activities under Article 3.4 of the Kyoto Protocol (forest management and revegetation);
- ✓ reducing the use of the estimation algorithm for missing activity data annually, aiming to avoid its use completely;
- ✓ addressing the recommendations related to completeness provided in the review reports, during the preparation of the following inventory submission;
- ✓ providing all CRF tables/CRF Reporter including complete sectoral background data tables of the CRF, where similarities in methodologies or activity data used allow an aggregation;
- ✓ providing information in the NIR on completeness of NGHGI;
- ✓ providing a summary in the NIR regarding the changes related to completeness of NGHGI and the improvements of completeness from the previous submission.

The programme's objectives for ensuring the **consistency** are referring to:

- ✓ maintaining a consistent time-series of emissions and removals;
- ✓ undertaking the recalculations in a systematic and timely manner to account for any new knowledge and for the solutions of the problems identified;
- ✓ addressing the recommendations related to consistency provided in the review reports, during the preparation of the following inventory submission;
- ✓ providing information in the NIR on consistency and recalculations of NGHGI;

- ✓ explaining the major trends and sharp increases/decreases of time series emissions in the NGHGI;
- ✓ compiling and highlighting the issues related to time series consistency of NGHGI during the QC procedures and resolving the inconsistencies encountered;
- ✓ eliminating all the inconsistencies between NIR and the CRF tables.

The programme's objectives for ensuring the **comparability** are referring to:

- ✓ using the methodologies, procedures and formats agreed upon under the UNFCCC and the Kyoto Protocol for estimating and reporting the national GHG emissions and removals by sinks;
- ✓ allocating the emissions and removals to source and sink categories in accordance with the aggregation level presented in the Revised 1996 IPCC Guidelines and IPCC-GPG.

The programme's objectives for ensuring the **accuracy** are referring to:

- ✓ providing the quantitative uncertainty estimates for the NGHGI;
- ✓ using tier 2 or higher tier methods for estimating emissions from key categories as far as possible considering the availability of activity data;
- ✓ providing information in the NIR on uncertainties of parameters under the NGHGI;
- ✓ providing a summary of improvements concerning uncertainties performed from the previous submission;
- ✓ providing a summary in the NIR regarding the changes in the uncertainty values of the NGHGI and the improvement of uncertainty values from the previous submission.

QA/QC Plan

Romania's QA/QC Plan closely follows the definitions, guidelines and processes presented in Chapter 8 "Quality Assurance and Quality Control" of the Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC, 2000). The QA/QC plan constitutes the heart of the QA/QC programme. It outlines the current and planned QA/QC activities. The specific QA/QC activities are performed during all stages of the inventory preparation.

The QA/QC plan will be reviewed periodically if needed, as it is a "living" document that can be modified as appropriate, especially when changes in processes occur or based on advice from independent reviewers.

Objectives of the QA/QC Plan

The QA/QC plan is intended to ensure the fulfillment of the greenhouse gas inventory principles in Romania. The objectives of the plan include:

- applying greater QC effort for key source categories and for those source categories where data and methodological changes have occurred recently;
- periodically checking the validity of all information as changes in reporting, methods of collection or frequency of data collection occur;
- conducting the general procedures outlined in QC Procedures (Tier 1) on all parts of the inventory over a complete exercise;
- balancing efforts between development and implementation of QA/QC procedures and continuous improvement of inventory estimates;
- customising the QC procedures to the resources available and the particular characteristics of Romania's greenhouse gas inventory;
- confirming that national statistical institute and other agencies supplying activity data to NEPA have implemented QC procedures.

Responsibilities

The Romanian National Environmental Protection Agency is the competent authority responsible with the coordination of the QA/QC Plan under the NGHGI. NEPA is also the single national entity in charge of compiling Romania's greenhouse gas inventory.

All specific QA/QC documentation is archived according to the provisions in the Section ”Documenting and archiving procedures”.

QC Procedures

General and specific QC procedures

The following QC activities are conducted annually before and during the preparation of estimates (15 September-30 October):

- checking the specific requirements regarding the reporting deadlines;
- verification of the collection of data against the information needed;
- checking the correct transcription of input data from the format they were provided into the calculation sheets;
- checking the correctness of conversion factors to be used in calculation;
- checking the data structures integrity and the desaggregation of activity data at calculation sheets level;
- checking the concordance between the measurement units of data in the calculation sheets and the equivalent data in the CRF Reporter format;
- checking the consistency and the data values magnitude order used in the AD and EF series, at the calculation sheets level;
- identifying parameters common to multiple source categories or sinks and checking the values consistency between source categories or sinks;
- checking the emissions calculation into the calculation sheets by reproducing a representative sample calculation;
- checking the correctness of the aggregation of estimated emissions at the calculation sheets level

The following QC activities are conducted annually during and after the preparation of estimates (15 October -10 January-10 March):

- checking the emissions estimates existence for all sources and for all sinks and for the entire time series;
- checking the explanations existence when the emissions estimates are lacking;
- checking the correctness and consistency of choosing the AD, EF and methods used along the entire time series;
- checking the trends for identifying the outliers and re-analyze the values;
- checking the correctness of recalculations and the existence of explanations;
- checking the recording and archiving of AD, EF and methods used;
- checking the correctness and the completeness of the data transcription from the calculation sheets level to the CRF Reporter level;
- checking the correctness and the completeness of the data transcription from the CRF Reporter level to the CRF tables level;
- checking the data used in the NIR against the CRF tables and calculation sheets;
- checking the correctness of applied methods description, at the NIR's level;
- checking the references completeness at the NIR's level;
- checking the archiving of the CRF tables, NIR, „xml" database and of the CRF Reporter's specific databases, including the calculation sheets;
- checking the key sources persistency along the time series;
- checking the adequate qualification of individuals providing expert judgments on the uncertainty estimates and the archiving of documentation regarding the qualification and the expert judgments;
- checking the uncertainty calculation correctness by partially replying the Monte Carlo analysis;
- verification of the ERT recommendations implementation
- checking the completeness of the QA/QC documentation archiving: QA/QC programme, checklists, ERT report, improvements lists;
- checking the QA/QC programme performance and propose improvements

Within the specified deadlines, the previously mentioned activities are performed at sectorial level. Based on specific sectorial responsibilities allocated within the sector, the QC checks are performed for certain category by a sectorial expert not being involved in the administration, including estimating emissions/removals, of that category (cross-checking approach).

The results of all checks outlined above are documented in the annual QC checklist for inventory preparation. For this purpose QC checklists will be used consistently throughout the years by all experts involved in the inventory preparation.

Category-specific QC procedures

According to the provisions of IPCC-GPG, in addition to general QC, NEPA's inventory team experts are conducting category-specific QC procedures at key source categories and at all categories where significant recalculations were performed.

QA procedures

Quality assurance procedures will involve external reviewers conducting an unbiased review of the national inventory or parts of the inventory. The results of the QA activities and procedures will be documented and described in the QA/QC sub-chapter from the NIR.

Based on the Memorandum of Understanding signed in 2003 between Romania and Denmark regarding climate change activities, the Danish Environmental Protection Agency (DEPA) accepted the requests of the Romanian Ministry of Environment regarding the strengthening of the capacity in this field. In 2006, one of the most important activities developed with financial support from DEPA was related to the establishment of the National System for assessing the GHG emissions and the review of the latest GHG inventory, for addressing the commitments taken under the UNFCCC and the Kyoto Protocol. The Danish experts have also reviewed the Romanian inventory and presented recommendations. During the 2006-2008 period, as part of a twinning programme, the Federal

Environmental Protection Agency of Austria (UBA Austria) supported NEPA in improving the quality of the inventory, performing also a review of different sector of the GHG inventory. Until now, these were the most important QA activities performed outside the regular UNFCCC review process. This activities might continue in the future with other countries that have concluded bilateral agreements on climate change with Romania or based on independent projects.

By joining the European Union at 1st of January 2007, Romania has to prepare and submit the GHG inventory according to EU Decision 280/2004/EC, which provides for a QA activity after the first submission of data on 15th of January and a final QA of all 27 member states after 15th of March for the preparation of the EC inventory. In this respect, starting with 2007, Romania has the possibility to verify the inventory twice before the official submission to the UNFCCC Secretariat.

In order to get an objective assessment of the inventory quality and for identifying areas where improvements can be made, NEPA plans to involve third party reviewers at the QA activities level according to the provisions in IPCC-GPG, depending on the availability of resources. In this scope, NEPA is developing the specific procedural arrangements. The Ministry of Environment through its international contacts and bilateral agreements supports NEPA in identifying the available processes for ensuring the implementation of QA activities.

National inventory submissions to the UNFCCC Secretariat are subject to the review procedures defined in the relevant COP/MOP decisions. In response to the UNFCCC ERT recommendations, all recalculations implemented are mentioned in the improvements list.

The results of QA checks (excepting the ERT report) are documented in the annual QA checklist for inventory preparation. For this purpose, QA checklists are used consistently throughout the years by all inventory experts involved in the inventory compilation.

Sector-specific QA/QC and verification activities

The following sector-specific QC, QA and verification activities are conducted annually before, during and after the preparation of estimates:

- automated data validation within the Excel model-validation is implemented on the consideration of any activity data value provided through the Energy Balance and concerning an inventory specific activity, and on the range of the determined country-specific emission factors as defined within the relevant IPCC methodologies; the model is directly linked to the International Energy Agency and Eurostat versions of the Energy Balance provided by the National Institute for Statistics and to the determination of the country-specific or default emission factors spreadsheets (Energy Sector-Stationary Combustion Subsector and Reference Approach);
- manual checks on all spreadsheets part of the model presented at the previous point (Energy Sector-Stationary Combustion Subsector and Reference Approach);
- manual checks on all spreadsheets on renewable fuel combustion; the spreadsheets are directly linked to the International Energy Agency and Eurostat versions of the Energy Balance and to the default emission factors spreadsheets (Energy Sector-Stationary Combustion Subsector and Reference Approach);
- manual checks on all spreadsheets on Fugitive Emissions Subsector; the spreadsheets are directly linked to the International Energy Agency and Eurostat versions of the Energy Balance and to the used emission factors spreadsheets (Energy Sector-Fugitive Emissions Subsector);
- implementing an analysis on the share of European Union-Emission Trading Scheme to Energy Balance fuel consumption data, in respect to equivalent activity categories (Energy Sector except the Fugitive Emissions Subsector, Reference Approach);
- checks specific to country-specific emission factors determination, based on background data reported under the European Union Emission Trading Scheme and validated through the reports of Ministry of Economy, Commerce and Business Environment accredited verifiers (Energy Sector except the Fugitive Emissions Subsector, Reference Approach);

- checks on the correlation between energy demand and energy resources data in the Energy Balance (Energy Sector except the Fugitive Emissions Subsector, Reference Approach);
- checks of the outliers on the fuel mix and on the energy consumption data changes, and of double accounting potential cases, together with the Industrial Processes Sector experts (Energy Sector except the Fugitive Emissions Subsector, Reference Approach);
- check on the potential double accounting cases through the use of carbon balance (Industrial Processes Sector);
- implement cross-sectoral checks for emissions from categories calculated using tier 1 default emission factors that do not specifically account for the sources of carbon (Industrial Processes Sector);
- implementing an analysis on the share of European Union-Emission Trading Scheme to National Greenhouse Gas Inventory data, in respect to equivalent activity categories (Industrial Processes Sector);
- comparison of activity data on the CH_4 recovery for valorizing from solid waste disposal on land facilities and on the waste incineration with corresponding data in the Energy Sector (Waste Sector-Solid Waste Disposal on Land and Waste Incineration Subsectors);
- check the potential occurrence of double accounting cases between the Agriculture and Land Use, Land-Use Change and Forestry Sectors (Agriculture and Land Use, Land-Use Change and Forestry Sectors);
- implementation of a comparative analysis of country-specific emission factors and associated uncertainties with equivalent international data, mostly from the countries having similar national circumstances (technologies, the same fuels sources) (Energy Sector except the Fugitive Emissions Subsector);
- comparison of the Enteric Fermentation and Manure Management Subsectors country-specific emission factors data and information with equivalent international data and information, especially in respect with elements available within countries with similar technical conditions (livestock characteristics, Animal Manure Management Systems characteristics) (Agriculture Sector-Enteric Fermentation and Manure Management Subsectors);

- comparison between Agriculture and Waste Sectors data in the National Greenhouse Gas Inventory and at the level of Food and Agriculture Organization and Eurostat.

Documentation and archiving procedures

NEPA team manages and maintains the Romanian NGHGI database and the documentation of specific inventory information. According to the provisions in IPCC GPG, the Romanian NGHGI documentation includes:

- assumptions and criteria for selection of AD and EF;
- EF used, including references to the IPCC documents for default factors or to published references or other documentation for emission factors used in higher tier methods;
- AD or sufficient information to enable activity data to be traced to the referenced source;
- information on the uncertainty associated with AD and EF;
- rationale for choice of methods;
- methods used, including those used to estimate uncertainty;
- changes in data inputs or methods from previous years;
- identification of individuals providing expert judgment for uncertainty estimates and their qualifications to do so;
- details of electronic databases or software used in production of the inventory, including versions, operating manuals, hardware requirements and any other information required to enable their later use;
- worksheets and interim calculations for source category estimates and aggregated estimates and any recalculations of previous estimates;
- final inventory report and any analysis of trends from previous years;
- QA/QC plans and outcomes of QA/QC procedures

All inventory information, as far as needed to reconstruct and interpret inventory data and to describe inventory system and its functions, is accessible at a single location at the NEPA's headquarters in Bucharest. While all information officially

submitted according to the requirements of the Kyoto Protocol is translated into English, this may not be possible for background information made available during the review process as the official inventory documentation language is Romanian.

Specific NGHGI data are archived as follows:

- electronically – most of the documents;
- on paper – the documents specific to the early period took into account by the inventory

In order to ensure the security of databases and the confidentiality of the background data, both paper and electronical data are kept under strict access conditions. Furthermore, electronic data backup activities are undertaken on NEPA's server with daily frequency during the generation of the official submission and within a three-day interval frequency in rest of cases.

The manager of the archiving system is represented by the same person designated to fulfill the tasks of the NGHGI general coordinator, in the person of Mr. Sorin Deaconu.

Reporting procedures

The NIR comprises a summary of the implemented QA/QC activities and the key findings which will present:

- which activities were performed internally and
- what external reviews were conducted for each source category and on the entire inventory in accordance with the QA/QC Plan;
- key findings of the QA/QC reviews – should describe major issues regarding quality of input data, methods, processing and archiving and the description the way they were addressed or plan to be addressed in the future

Schedules for QA/QC and verification specific activities

The specific QA/QC and verification activities are performed during all stages of the inventory preparation. Generally:

- QC and verification activities are performed before the submission of the CRF tables, “xml” file and elements of NIR to the central public authority for the environment protection (see the “QA/QC programme objectives” Section);
- most of the QA activities are performed for the subsequent inventory after the submission of the NGHGI to the UNFCCC secretariat.

NGHGI improvement plan

The QA/QC coordinator checks and documents whether the specific quality objectives outlined before in the “QA/QC programme objectives” Section were met. The QA/QC coordinator elaborates the NGHGI improvement plan based on:

- the results of the evaluation of the fulfillment of the specific quality objectives;
- the results of the evaluation of the implementation of the previous improvement plan;
- the results of the QA/QC procedures conducted;
- the NGHGI key category assessment;
- the NGHGI uncertainty assessment;
- the findings from the UNFCCC inventory review

The QA/QC coordinator (Sorin Deaconu) annually evaluates the inventory improvement plan and its implementation and updates the plan accordingly.

Improvements are planned to be realized especially in the following areas:

- developing national emission factors, and methods;
- improving the quality of the uncertainty assessment

NGHGI publication

The annual inventory submission, consisting of the NIR and the CRF tables is published as follows:

- electronically, on the NEPA's homepage: www.anpm.ro and on the ME's central public authority for environment website: www.mmediu.ro;
- on paper support, on the NEPA's headquarters – Climate Change Department

Assessment and Updating of QA/QC Programme

The quality objectives and the QA/QC Plan will be reviewed annually and modified or updated as appropriate (when changes in process occur or based on advice of independent reviewers).

QA/QC coordinator,
Sorin Deaconu

References

Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, Intergovernmental Panel on Climate Change, 2000;

Guidelines for National Systems under Article 5, paragraph 1, of the Kyoto Protocol, Decision 19/CMP. 1, 2006;

Romania's Greenhouse Gas Inventory 1989-2010, NEPA, 2012