

National System: Guidelines for Non-Annex I Parties

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Executive summary

The Kyoto Protocol, adopted by the Third Conference of Parties, held in Kyoto, 1997, has set binding targets for Parties by committing industrialized countries and economies in transition included in Annex I to the Convention, to reduce total emissions of direct greenhouse gases (GHG) by at least 5 percent, against 1990 levels over the five-year period 2008-2012.

Article 7 of the Kyoto Protocol requires Annex I Parties to submit annually greenhouse gases inventories, as well as national communications at regular intervals, both including supplementary information of the Kyoto Protocol contained in the annex to decision 15/CMP.1, to demonstrate compliance with the Protocol. In addition, Article 5, paragraph 1, of the Kyoto Protocol commits Annex I Parties to having in place, no later than 2007, national systems for the estimation of GHG emissions by sources and removals by sinks.

At present, international negotiations focus on future commitments of the Convention Parties for post-Kyoto period. A post-2012 climate agreement may be more complex than the Kyoto Protocol, incorporating a wider range of GHG mitigation actions from a larger number of countries. The thirteenth Conference of Parties (Bali, 2007) decided to launch a comprehensive process by addressing a shared vision for long-term cooperative action, including a long-term global goal for emission reductions, to achieve the ultimate objective of the Convention.

The Copenhagen Accord (FCCC/AWGLA/2010/14) called for reporting mitigation actions along with national inventory reports in national communications every second year.

Decision 1/CP.16, reflecting the outcome of the work of the Ad Hoc Working Group on long-term Cooperative Action under the Convention up to its thirteenth session in Cancun, defined the conditions for an enhanced action on mitigation by developing country-Parties, or National Appropriate Mitigation Action (NAMAs). In accordance with Decision 1/CP.16 developing countries, consistent with their capabilities and the level of support provided for reporting, should also submit biennial update reports, containing updates of national greenhouse gas inventories including a national inventory report and information on mitigation actions, needs and support received.

Considering the experience of Annex I Parties, it is clear that frequent preparation of GHG inventory requires National System in place. In this context, non-Annex I Parties might have to design national systems to ensure high quality national inventory. In addition, some non-Annex I Parties are bordering the European Union (EU) and ones adhered already to the EU, new member states will have commitments to report regularly their national inventory of GHG, and that will require a national system in place.

Non-Annex I Parties might find constrains to apply at once rules similar to those included in the decision 19/CMP.1 (guidelines for National System under the Kyoto Protocol), given the long experience Annex I Parties already have in preparing their inventories and the differences in national circumstances between developing and developed Parties.

The goal of this analytical paper is to identify guidelines for the development/improvement of National System for non-Annex I Parties. The objectives to be achieved are as follows: (i) identify elements to be considered in designing National System by non-Annex I Parties; (ii) identify which functions of National System should be performed; (iii) identify appropriate structures for National System. This study is aiming at providing general guidelines that will facilitate and soften the implementation of national system by non Annex I Parties.

The paper is structured in the following manner: (i) overview of decision 19/CMP.1 and of National Systems of Annex I Parties; (ii) outstanding problems of Annex I Parties; (iii) elements to be considered by non-Annex I Parties in designing their National System; and (iv) a National System model for non-Annex I Parties. The goal of the study is achieved through three phases:

Phase 1: Compilation of information on institutional arrangements: Annex I Parties (nine Parties) - compilation of information on National System from expert review teams review reports and non-Annex I Parties (Moldova) - conducting in country stakeholders' interview.

Phase 2: Analysis and identification of problems such as analysis of National Systems of Annex I Parties, identification of problems in non-Annex I Parties, analysis of elements of National System, analysis of functions of National System, and analysis of National System structure.

Phase 3: Recommendation for non-Annex I Parties in designing their National System based on the challenges faced by Annex I Parties, and considering a national system model that includes (i) elements to be considered in designing National System, (ii) priorities in planning National System based on decision 19/CMP.1 and (iii) steps to be taken in designing National System.

From the lessons learnt on reviewing National System of Annex I Parties, the outstaying recommendations that could apply to non-Annex I Parties are: the system should clearly specify the roles and specific responsibilities and fully meet the guidelines for National System; elaborate a detailed inventory manual and secure institutional arrangements on a longer-term basis, collaborate with institutions, universities and ensure adequate long-term financial support for inventory-related contracts, elaborate quality assurance/quality control plan and nominate quality assurance/quality control coordinator, centralise archiving and transfer all historical key activity data into electronic system.

Non-Annex I Parties shall ensure the performance of the functions of National System, including the maintenance of the institutional and procedural arrangements; the arrangements for the technical competence of the staff involved in the inventory development process; and the capacity for timely performance. The elements to be considered in designing National System are: inventory planning to decide upon centralised vs. decentralised and formal vs. informal system; inventory preparation that includes data collection, choice of method, quality assurance/quality control plan, and national inventory improvement plan, and finally inventory management that includes archiving. Two additional elements are essential for non-Annex I Parties to establish and maintain National System functions: capacity building and fund raising. National System should be based on contracts and/or agreements between the responsible for greenhouse gases inventory and expert organisations involved in the inventory process. Inventory compiler should collaborate closely with relevant ministries and agencies.

Decision 19/CMP.1 contains functions that refer to review process which may not be applicable to non-Annex I Parties and therefore were given a lower priority. The specific functions of National System are prioritised as immediate, medium and latest implementation. Certain functions such as quality assurance plan activities and uncertainty analysis shall be carried out along with the development of inventory. Financial resources might be crucial element in establishing and maintaining the national system and therefore non-Annex I Parties should start with fund raising.

This paper includes flowcharts with a proposal for a sequence of activities in inventory planning and inventory preparation and management. The results of this paper can be used by non-Annex I Parties in designing their own National System which is the foundation for more complete and accurate inventories. It provides insights that will facilitate and soften implementation of National System such as: the steps to be taken and elements to be considered in designing National System, describes the challenges faced by Annex I Parties and makes a priority in planning a National System.

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ACRONYMS

AD - Activity Data

ANI - Annex I Parties

ARR - Annual review report

AWGLCA - Ad Hoc Working Group on Long-Term Cooperative Action under the Convention

COP - Conference of Parties

CMP - COP serving as the meeting of the Parties to the Protocol

EF - Emission Factors

ERT - Expert Review Team

GHG - Greenhouse gas

IPCC - Intergovernmental Panel on Climate Change

IR - Initial Report under the Kyoto Protocol

NAMA - Nationally appropriate mitigations measures

NAI - Non-Annex I Parties

NIR - National Inventory Report

QA- Quality Assurance

QC - Quality Control

UNFCCC - United Nations Framework on Climate Change

1 Introduction

The ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC) is to achieve stabilization of greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such levels which the Convention does not quantify, should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

One of the first Convention's tasks was to establish national GHG inventories. Article 4, paragraph 1(a), and Article 12, paragraph 1(a), require that each Party has to make available to the Conference of the Parties (COP) a national inventory of anthropogenic emissions by sources and removals by sinks of all GHG not controlled by the Montreal Protocol, to the extent its capacities permit, using comparable methodologies to be agreed upon by the COP; and any other information that the Party considers relevant to the achievement of the objective of the Convention and suitable for inclusion in its communication, including, if feasible, material relevant for calculations of global emission trends.

The Convention itself sets no mandatory limits on GHG emissions for individual countries and contains no enforcement mechanisms. In that sense, the treaty is considered legally non-binding. Instead, the treaty provides for updates that would set mandatory emission limits. The Kyoto Protocol (KP), adopted by COP 3 (Kyoto, 1997), represent an instrument setting binding targets for the Convention Parties, by committing industrialized countries and economies in transition included in Annex I to Convention, to reduce total emissions of direct GHG by at least 5 percent, against 1990 levels over the five-year period 2008-2012.

The Kyoto Protocol's effectiveness depends upon two critical factors: whether Parties follow the Protocol's rulebook and comply with their commitments; and whether the emissions data used to assess compliance is reliable. Recognizing this, the Kyoto Protocol and Marrakesh Accords, adopted by COP serving as the meeting of the Parties to the Protocol (CMP) 1 in Montreal (Canada, 2005), include a set of monitoring and compliance procedures to enforce the Protocol's rules, address any compliance problems, and avoid any error in calculating emissions data.

Article 7 of KP requires Annex I Parties (AIP) to submit annual GHG inventories, as well as national communications, at regular intervals, both including supplementary information of the Kyoto Protocol contained in the annex to decision 15/CMP.1, to demonstrate compliance with the Protocol. In addition, Article 5, paragraph 1, of KP commits Annex I Parties to having in place, no later than 2007, National Systems for the estimation of GHG emissions by sources and removals by sinks.

CMP adopted decision 19/CMP.1 guidelines for national system under Article 5, paragraph 1 of the Kyoto Protocol. This decision defines a national system as a system that: "includes all institutional, legal and procedural arrangements made within a Party included in Annex I for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and for reporting and archiving inventory information"¹. The decision also states that that "national systems should be designed and operated to ensure the transparency, consistency, completeness and accuracy of inventories"².

At present, international negotiations focus on future commitments of the Convention Parties for post-Kyoto period. A post-2012 climate agreement may be more complex than the Kyoto Protocol, incorporating a wider range of GHG mitigation actions from a larger number of countries. The thirteenth Conference of Parties (Bali, 2007) decided to launch a

¹ Paragraph 2, annex to decision 19/CMP.1

² Paragraph 6, annex to decision 19/CMP.1

comprehensive process by addressing a shared vision for long-term cooperative action, including a long-term global goal for emission reductions, to achieve the ultimate objective of the Convention.

The Bali Action Plan calls for enhanced national/international action on mitigation of climate change, including: (i) measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives, by all developed country Parties, while ensuring the comparability of efforts among them, taking into account differences in their national circumstances; and (ii) nationally appropriate mitigation actions (NAMA) by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner³.

COP 15 (Copenhagen, 2009) noted in its decision 2/CP.15 that mitigation actions subsequently taken and envisaged by non-Annex I Parties, including national inventory reports (NIR), shall be communicated through national communications consistent with Article 12, paragraph 1(b), every two years on the basis of guidelines to be adopted by the COP. Mitigation actions taken by non-Annex I Parties will be subject to their domestic measurement, reporting and verification the result of which will be reported through their national communications every two years. Nationally appropriate mitigation actions seeking international support will be recorded in a registry along with relevant technology, finance and capacity building support. These supported nationally appropriate mitigation actions will be subject to international measurement, reporting and verification in accordance with guidelines adopted by the COP.

Decision 1/CP.16, reflecting the outcome of the work of the Ad Hoc Working Group on long-term Cooperative Action under the Convention up to its thirteenth session in Cancun, defined the conditions for an enhanced action on mitigation by developing country-Parties, or NAMAs. This document presents the information communicated by non-Annex I Parties on their NAMAs, as well as the related context, conditions and considerations associated with these actions, including with regard to the support required for their preparation and implementation, which information was compiled in FCCC/AWGLCA/2011/INF.1. Mitigation actions taken by developing country Parties will be subject to their domestic measurement, reporting and verification the result of which will be reported in their national communications every two years⁴.

Decision 1/CP.16 calls developing countries, consistent with their capabilities and the level of support provided for reporting, to submit biennial update reports, containing updates of national greenhouse gas inventories including a national inventory report and information on mitigation actions, needs and support received. It is clear that frequent preparation of GHG inventory may require a national system in place. In this context, non-Annex I Parties may have to design national systems and ensure high quality national inventory. In addition, some non-Annex I Parties are bordering the European Union or even in the process to adhere to the EU, new member states will have the commitment to report regularly their national inventory of GHG that will require a national system in place.

Undeniably, it will be an advantage for non-Annex I Parties (NAI) to use the same guidelines of decision 19/CMP.1. However, there is a difference between Parties from Annex and non-Annex I since the first have designed national system having already a solid background in preparing GHG inventory whilst the latter will have to start with limited or no experience. Hence, non-Annex I Parties may find decision 19/CMP.1 too complex for implementing it at once.

³ Paragraph 1, decision 1/CP.13

⁴ Paragraph 36, 39, negotiation text FCCC/AWGLA/2010/14

The goal of this analytical paper is to guide the development/improvement of national system for non-Annex I Parties. The objectives to be achieved are as follows: (i) identify elements to be considered in designing NS by non-Annex I Parties; (ii) identify which functions of NS should perform; (iii) identify appropriate structure of National System.

This study is aiming at providing general guidelines that will facilitate and soften the implementation of national system. It provides: (i) overview of decision 19/CMP.1 and of NS of Annex I Parties; (ii) outstanding problems of Annex I Parties; (iii) elements to be considered by non-Annex I Parties in designing their NS; (iv) a NS model for non-Annex I Parties.

2 Methodology

In order to achieve the goal of the study, three phases have been identified (Fig 1):

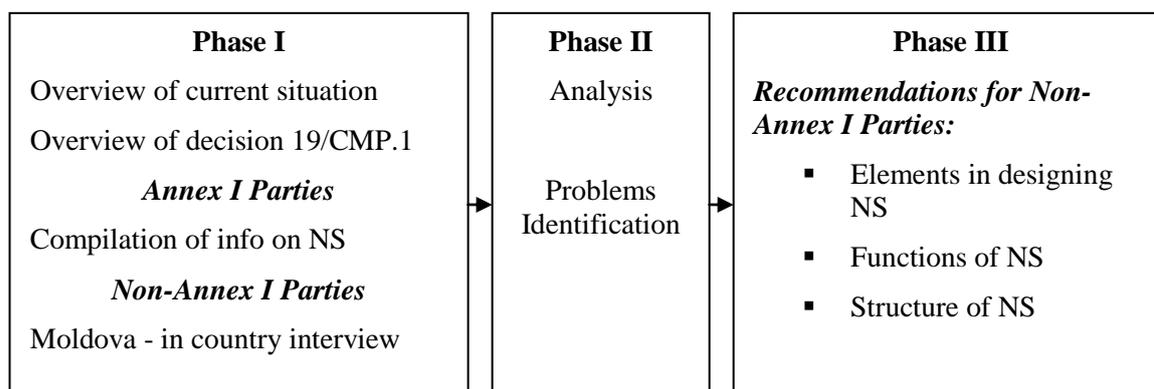


Figure 1: Phases of the research

2.1 Compilation of information on institutional arrangements (phase I)

Annex I Parties - compilation of information on National Systems from the expert review teams review reports: Article 5, paragraph 1, of the Kyoto Protocol, requires each Annex I Party to establish and maintain a national system for the estimation of GHG emissions and removals no later than 1 January 2007. National system refers to the institutional, legal and procedural arrangements necessary for the planning, preparation, reporting and archiving of inventory information.

Paragraph 8 (e) of the annex to decision 13/CMP.1 requires each Party to include in Initial Reports under the Kyoto Protocol “a description of its national system in accordance with Article 5, paragraph 1, reported in accordance with the guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol”. Any changes in Party’s national system shall be included in NIR and are assessed during the annual review.

Information on legal, institutional and procedural arrangements as well as main findings expert review team’s (ERT) recommendations were compiled in two tables. The first one include information from Reports of the Review of Initial Reports under the Kyoto Protocol where the functions of national system were assessed by ERT in order to determine Party’s capacity to account for emissions and the assigned amount. The second one contains information on changes on NS from 2009 annual review reports (ARR). 2009 NIR was also used when too little information was available in initial reports and annual review reports.

Nine Parties were selected for this study: (i) with economy in transition, (ii) OECD countries; (iii) potential problems of National Systems. Information on NS was structured under several compartments such as Legal and Institutional Arrangements; Procedural Arrangements (Data

management, Archiving, QA/QC); Main findings and Expert Review Team's Recommendations.

Non-Annex I Party - In country stakeholders' interview: Article 4, paragraph 1(a) and Article 12, paragraph 1(a) of the UNFCCC require that each Party has to make available to the Conference of the Parties a national inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol. The main mechanism for NAI to make this information available is national communications. There are no requirements for NAI to have national system in place; however GHG inventory is presented to COP through national communications.

Institutional arrangements of NAI were assessed based on questionnaire (Annex 7.1) which includes: introduction part, scope of the work, background - Bali Action Plan and advance draft text under negotiation by the AWG-LCA and questions related to institutional framework, data management, archiving, QA/QC and perspective of the inventory.

The head of Climate Change Office (CCO) and the National Inventory Team Leader were interviewed in Moldova during summer 2010. Both persons work for CCO which is under the Ministry of Environment and have political and technical experience regarding climate change and GHG inventory. The Office submitted two national communications and in 2010 started preparation of the third one. As a result of interview a summary was prepared which includes current institutional arrangements, challenges the Party are facing and future perspectives of inventory in Moldova.

2.2 Analysis and identification of problems (phase II)

During the second phase of the study the followings were considered:

Analysis of national system of Annex I Parties: The synthesis of information from initial reports under the Kyoto Protocol and annual review reports provides an overview of current institutional and procedural arrangements as well as solved and outstanding problems with respect to national systems. All outstanding recommendation of each Party were summarised in Annex 7.2. Afterwards were generalised per specific functions related to inventory planning, preparation and management and included in the recommendation for NAI.

Identification of problems in non-Annex I Parties: During the meeting with local stakeholders in Moldova questions on main difficulties the Party is facing in preparing the inventory were raised. Based on identified challenges, recommendations were prepared that would help NAI to overcome similar problems.

Analysis of elements of national system: NS does not have a general structure that could be applied by all Parties since every one has its own specifics. There are different systems such as centralised and decentralised, formal and informal. These elements were analysed and would help NAI decision makers to plan their NS.

Analysis of functions of national system: Decision 19/CMP.1 Guidelines for National System under Article 5, paragraph 1, of the Kyoto Protocol are applied to each Party included in Annex I to the Convention also Party to the Kyoto Protocol to implement national system including the elements described in these guidelines. Even though the functions of NS are specifically designed for Annex I Parties, those could also be applied by NAI.

NAI do not have the inventory experience as AIP and therefore may face difficulties to implement at once all functions of NS. In order to facilitate the implementation of the above mentioned guidelines, the specific functions relating to inventory planning, preparation and management were analysed and prioritized as immediate, medium and latest implementation. Priorities were performed in consultancy with review officers from UNFCCC secretariat and represent a general point of view. It is also to be mentioned that some functions were split for different stages of implementation.

Analysis of NS structure: After the functions of NS were prioritised, a flowchart was created that includes inventory planning, preparation and management for designing NS. The model is a general one, quite flexible and therefore could be applied by any Party.

2.3 Recommendation for non-Annex I Parties in designing their National System (phase III)

Preparation of the inventory is a learning process. Even Annex I Parties who have experience in preparing GHG inventory are facing challenges and there is always room for improvement. The ERT are reviewing Annex I Parties' GHG inventories every year based on Article 8 of KP. During the review the ERT identifies potential problems and provide recommendation on NS to the Party in order to improve the quality of the inventory.

Based on challenges faced by Annex I Parties, the author selected those recommendations which a non-Annex I Party may consider when designing own national systems. These recommendations would help the Party to bypass common issues related to NS and were included in sub-chapter "elements to be considered in designing NS" under: centralised vs. decentralised, formal vs. informal, data collection, choice of method, QA/QC, archiving, capacity building and fund rising.

Priorities in planning NS based on requirements of 19/CMP.1: Functions of NS from decision 19/CMP.1 were prioritised under three implementation stages such as immediate, medium and latest. Those priorities also provide some flexibility and the Parties should start with the immediate one, followed by the medium and finish with the latest implementation stage.

National system model: A flowchart containing steps in designing NS was created.

3 Results and Discussions

3.1 Annex I Parties

3.1.1 Current requirement for GHG inventory for Annex I Parties

Annual monitoring of GHG emissions and removals is one of the obligations following from the UNFCCC and its Kyoto Protocol. The Protocol imposes Annex I Parties to submit national GHG inventory which contain information on GHG emissions, such as activity data, emission factors and methodologies used to estimate these emissions. National GHG inventories are reported annually by Annex I Parties following the UNFCCC reporting guidelines (decisions 18/CP.8 and 14/CP.11) agreed by the COP and methodology developed by the Intergovernmental Panel on Climate Change (IPCC).

Article 5, paragraph 1, of the Kyoto Protocol requires that each Annex I Party establish and maintain a national system for the estimation of GHG emissions and removals. A national system refers to the institutional, legal and procedural arrangements necessary for the planning, preparation, reporting and archiving of inventory information. The national system had to be in place no later than 1 January 2007.

Paragraph 8 (e) of the annex to decision 13/CMP.1 requires each Party to include under this decision in their Initial Report under KP "a description of its national system in accordance with Article 5, paragraph 1, reported in accordance with the guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Paragraph 30 of the annex to decision 15/CMP.1 provides a list of mandatory reporting requirements that corresponds to the substantive requirements for national system outlined in decision 19/CMP.1.

Each Party's national system was subject to a thorough in-country review during the preparation of the initial review report and during the periodic review of national communications. The purpose of this review was to assess the conformity of the national

system to the requirements under Article 5, paragraph 1, of the Kyoto Protocol, and its capacity to produce national GHG inventories in line with the requirements under the Kyoto Protocol⁵.

Since then, any reported changes to a Party's national system are assessed during the annual review. If the ERT identifies potential problems in the Party's inventory and concludes that these problems may be related to significant changes in the national system, the ERT may request an in-country review of the national system and inventory. The in-country review could occur with the next scheduled in-country review of the annual inventory or national communication, whichever is earlier⁶.

3.1.2 Decision 19/CMP.1 and the National System for Annex I Parties

Decision 19/CMP.1 (included in Annex 7.3 to this report) defines a national system as a system that: "includes all institutional, legal and procedural arrangements made within a Party included in Annex I for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and for reporting and archiving inventory information"⁷. The decision also states that that "national systems should be designed and operated to ensure the transparency, consistency, completeness and accuracy of inventories"⁸.

In paragraph 1 of the annex to decision 19/CMP.1 there is a recognition that "Parties' implementation of national system requirements may differ according to national circumstances."⁹ It nevertheless requires that a national system shall include all the elements listed in the decision.

The main objective of national systems is to "enable Parties included in Annex 1 to estimate anthropogenic GHG emissions by sources and removals by sinks, as required by Article 5, and to report these emissions by sources and removals by sinks in accordance with Article 7, paragraph 1, and relevant decisions of the COP/MOP". To achieve the objectives of the national system, Parties must ensure that their national systems fulfil the general and specific functions elaborated in decision 19/CMP.1 sections V and VI.

Section V of decision 19/CMP.1 defines general functions of NS which each Party included in Annex I shall:

- (a) Establish and maintain the institutional, legal and procedural arrangements necessary to perform the functions defined in these guidelines for national systems;
- (b) Ensure sufficient capacity for timely performance of the functions defined in these guidelines for national systems, including data collection for estimating anthropogenic GHG emissions by sources and removals by sinks and arrangements for technical competence of the staff involved in the inventory development process;
- (c) Prepare national annual inventories and supplementary information in a timely manner in accordance with Article 5 and Article 7, paragraphs 1 and 2, and relevant decisions of the COP and/or COP/MOP;
- (d) Provide information necessary to meet the reporting requirements defined in the guidelines under Article 7 in accordance with the relevant decisions of the COP and/or COP/MOP.

⁵ Paragraph 12 and 96, decision 22/CMP.1

⁶ Paragraph 15 (b) (iii) and 99, decision 22/CMP.1

⁷ Paragraph 2, annex to decision 19/CMP.1

⁸ Paragraph 6, annex to decision 19/CMP.1

⁹ Paragraph 1, annex to decision 19/CMP.1

Section VI of the decision 19/CMP.1 defines specific functions related to inventory planning, preparation and management. The main functions are as follows:

- (a) Designate a single national entity with overall responsibility for the national inventory;
- (b) Define and allocate specific inventory responsibilities, such as data collection and processing, and select data and methods;
- (c) Develop and implement an inventory quality assurance/quality control (QA/QC) plan and procedures;
- (d) Identify key source categories following the methods described in the IPCC good practice guidance (chapter 7, section 7.2);
- (e) Prepare estimates in accordance with the methods described in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, as elaborated by the IPCC good practice guidance, and ensure that appropriate methods are used to estimate emissions from key source categories;
- (f) Collect sufficient activity data, process information and emission factors as are necessary to support the methods selected for estimating anthropogenic GHG emissions by sources and removals by sinks;
- (g) Use the IPCC methodologies and IPCC good practice guidance to prepare the inventory; and
- (h) Archive all inventory information for each year.

3.1.3 Outstanding recommendations from the review of annual submissions by Annex I Parties

The national System of Austria, Estonia, France, Greece, Romania, Russia, Ukraine, Slovenia, and Sweden was analysed based on Reports of the Review of Initial Reports under the Kyoto Protocol and 2009 ARR. The main recommendations for improving the NS found in those reports that could apply to NAI are:

General

- National system shall fully meet the guidelines for NS under Article 5, paragraph 1 and the Article 7 guidelines with respect to the functions of national system, including the maintenance of the institutional and procedural arrangements; the arrangements for the technical competence of the staff involved in the inventory development process; and the capacity for timely performance;
- A detailed inventory manual for inventory planning and management should be elaborated, reflecting national circumstances and including detailed descriptions of formal procedures, time schedules, data flow, documentation formats and guidance for improvements.
- The national system should clearly specify the role and specific responsibilities of organisations and consultants who assist in the inventory preparation;
- Institutional arrangements should be secured on a longer-term basis, for example, by means of framework agreements or memoranda of understanding between the coordinator and the participating entities. That would improve the planning process so the long-term planning of more complex issues can be carried out under the national system in a transparent and efficient manner;
- Institutions, universities, private industries and local environmental agencies should be involved to obtain AD and develop country-specific methods and EFs, particularly for estimating emissions from key categories at higher tier level;

- National and international experts from universities, research organizations and industry should collaborate to enhance the flow of data and information needed in the inventory preparation, as well as to validate and verify results of the inventory calculations, especially for key categories and when country-specific methodologies are used;
- Financial support should be ensured for inventory-related contracts. Improved funding seems essential to the timely preparation of inventories in the future;
- Sufficient funding and resources should be provided for the compilation of the basis AD and prepare include a list of indicators that has to be prepared annually on a mandatory and a clearly defined methodological basis especially when basis AD is not part of the mandatory information to be produced under national statistics legislation;
- National inventory experts should be encouraged to attend the UNFCCC training and participate in the review;
- Data collection should be performed in timely manner;
- The national system should ensure the transparency, consistency, completeness and accuracy of GHG inventories.

QA/QC

- External data providers should be periodically audited by the sector experts for emissions inventory;
- QA/QC management systems must be implemented in practice;
- Detailed QA/QC plans should be elaborated in line with the requirements of the IPCC good practice guidance, and all QA/QC procedures should be documented;
- QA/QC should have a nominated coordinator;
- QC should be improved by better linking data collection, data processing and emissions estimation;
- An inventory improvement plan should be elaborated as part of the QA/QC procedures, which allocates specific responsibilities, resources and timelines for the improvement activities identified and is updated annually.
- QC procedures can be improved by exploring the development of category-specific QC procedures (tier 2) for all key categories and for those categories in which significant methodological and/or data changes have occurred (e.g. in the industrial processes and waste sectors) and to integrate these procedures into the QA/QC plan and the quality management handbook;
- System level checks should be carried out, such as cross-checking activity data (AD) available from different sources to minimize the risks of missing plants/data in future submissions. These QC checks could include an independent sectoral expert review of AD to explain the reasons for large inter-annual variations for emissions from key sources (both level and trend basis).

Archiving

- A centralised archiving process must be present to ensure continuity of inventory compilation;
- All relevant inventory information should be transferred into central archiving systems including underlying calculation sheets as well as all references for all categories. This would allow information to be retrieved quickly upon request, the institutional memory to be safeguarded and the estimates to be reproduced if needed;

- All historical key AD should be transferred into the electronic system;
- A catalogue with archived information should be developed.

3.2 Non Annex I Parties

3.2.1 GHG inventory of Non-Annex I Parties

Article 4, paragraph 1(a) and Article 12, paragraph 1(a) of the UNFCCC stipulate that each Party has to make available to the COP a national inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, to the extent its capacities permit, using comparable methodologies to be agreed upon by the COP; also a general description of steps taken or envisaged by the Party to implement the Convention; and any other information that the Party considers relevant to the achievement of the objective of the Convention and suitable for inclusion in its communication, including, if feasible, material relevant for calculations of global emission trends.

The main mechanism for making this information available is national communications. COP 2 (Geneva, 1996) adopted the Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention (Decision 10/CP 2). COP 8 (New Delhi, 2002) adopted a new Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention (Decision 17/CP 8).

COP 8 (New-Delhi, 2002) decided that non-Annex I Parties should use the guidelines contained in the annex to this decision for the preparation of second and, where appropriate, third national communications and, where appropriate, initial national communications, except where Parties have initiated the process of preparing second national communications and received funding under the expedited procedures or on an agreed full cost basis prior to the approval of the guidelines annexed to this decision¹⁰.

Paragraph 7 of the decision 17/CP.8 states that Non-Annex I Parties shall estimate national GHG inventories for the year 1994 for the initial national communication or alternatively may provide data for the year 1990. For the second national communication, non-Annex I Parties shall estimate national GHG inventories for the year 2000. The least developed country Parties could estimate their national GHG inventories for years at their discretion.

3.2.2 Case study: the Republic of Moldova

Moldova was chosen as case study as the author comes from this country.

3.2.2.1 The current situation of inventory preparation in the Republic of Moldova

During summer 2010, an in-country interview was conducted with the head of the Climate Change Office and the national inventory team leader. Based on the interview a summary of the current situation in the Republic of Moldova related to GHG inventory was prepared.

Background: The Republic of Moldova signed the UNFCCC on June 12, 1992 and it was ratified by its Parliament on March 16, 1995.

Preparation of GHG inventories: The periodicity of inventory corresponds to periodicity of national communications which, at least theoretically, is at least ones in 3-4 years. So far Moldova has prepared two NC and has started its third one in 2010. During the first NC, the national inventory covered the period 1997-2000, the second one the period 1990-1998, and the third one the period 1990-2010.

¹⁰ Paragraph 1, letter (a), decision 17/CP.8

Legal arrangements: The national legislation does not provide any requirements for periodical preparation of the GHG inventory. However, in the new version of “Law on environmental protection” the article 106 (d) states that the Central Environmental Authority will have the responsibility to “Prepare the GHG inventory, national political documents and National Communication regarding climate change”. The preparation of the GHG inventory totally relies on donors funds.

Institutional and Legal Arrangement for preparing the inventory: The Ministry of Environment of the Republic of Moldova is the state authority responsible for development and promotion of policies and strategies addressing environment protection, rational use of natural resources and biodiversity conservation. Within the Ministry of Environment, the Climate Change Office (CCO) is responsible for the activities related to preparation of National Communications and National Inventory Reports.

The Climate Change Office was created by Ministerial decree no. 21 from 11.02.2004 for implementing and accomplishing the UNFCCC provisions, as well as mechanisms and provisions of Kyoto Protocol. Within the CCO the National Inventory Team (NIT) is responsible for estimating emissions by categories of sources and removals by categories of sinks, Key Sources Analysis, QA & QC procedures, uncertainties assessment, documentation, reporting and archiving of data related to inventory preparation process.

Official consideration and approval of the NIR: Following the final review, after incorporation of comments received in the process of peer reviews, the Climate Change Office prepared the final version of the National Inventory Report. The final version of NIR as well as NC had to be approved by the GEF and UNFCCC National Focal Points. Afterwards, the National Inventory Report and the National Communications are submitted by the Ministry of Environment to the COP, in conformity with international commitments of the Republic of Moldova under the UNFCCC.

The National Inventory Team: The inventory team includes one team leader and 10 national experts (hired on contract basis). The team is responsible for estimating emissions by individual categories of sources and removals by individual categories of sinks at sectoral level (Energy Sector, Industrial Processes Sector, Solvents and Other Products Use Sector, Agriculture Sector, LULUCF Sector and Waste Sector).

The national experts are also responsible for development components of the NIR’s sectoral chapters. They are also responsible for the AD collection, application of decision trees in terms of selecting suitable assessment methods and EFs, estimating emission uncertainties by individual categories of sources, as well as for taking correction measures as a response to QA&QC activities.

Eight out of 11 experts that participated in the elaboration of the second national communication (period 1990-2005) also participated in the elaboration of the first national communication (1990-1998). The team leader is full time employed and rest experts are part time employed for the period of inventory preparation.

The responsibilities in preparing the GHG inventory are as follows:

- Choosing the methods: Team Leader and National Experts
- Data collection: National Experts
- AD and EFs: Team Leader and National Experts
- Processing and archiving: National Experts
- QA/QC: Team Leader and National Experts
- Key category and uncertainty analysis: Team Leader and National Experts

Data management: There is no official document describing the specific responsibilities of other institutions involved in the preparation of NIR. The information is obtained based on the provisions of the Law on Access to Information, adopted by the Decision of the Parliament No. 982-XIV as of 11.05.2000 and Law on national statistics No. 412 from 9.12.2004.

The activity data (AD) needed for inventory is available in the Statistical Yearbooks, Energy Balances and other sectoral statistic publications of the National Bureau of Statistics. Additional statistical data (unpublished) may be provided at request, in conformity with provisions of the Law No. 412 as of 09.12.2004 on 'Official Statistics', Article 9 (2), item a) and b), according to which "the official statistics authorities must disseminate statistical data to users in the amount, manner and terms specified in the statistical works programme", as well as to "to ensure access of all users to non-confidential statistic on equal conditions in terms of amount and terms of dissemination".

Other relevant AD are collected at request, from various partner organizations: the Transport Agency, the Ministry of Economy and Trade, Ministry of Information Development, Ministry of Agriculture and Food Industry, Ministry of Defence, Ministry of Health, Ministry of Internal Affairs, Academy of Sciences of Moldova, Forest Agency "Moldosilva", Agroindustrial Agency "Moldova-Vin", Land Relations and Cadastre Agency, Civil Aviation State Administration, Customs Service, State Ecological Inspectorate, Ozone Office under the MENR, IPROC State Projections Institute, "Moldavian Railways" State Enterprise, "Moldova-Gaz" J.S.C., "Lafarge- Cement" J.S.C., etc.

Archiving: All data along with official letters from partner institutions and all the correspondence related to EF, methodologies and emissions estimation is archived at single location. Archiving process is linked to finalization of the projects on preparing national communications. For instance the first archiving was in November 2000 and the second one April 2009. The data is archived and kept on CD/DVDs at the Climate Change Office (inclusively, in pre fire conditions in safe). In the future is planned to improve the archiving system based on Good Practice Guidelines 2000.

Quality assurance and quality control: The QA/QC plan was prepared in the framework of regional project UNDP-GEF RER/01/G31 (2003-2006). This plan contains forms for QA/QC procedures. In the framework of preparation of third national communication is planned to update the QA/QC Plan and the manager of CCO will formally approve it. This plan already includes activities to ensure the quality. The system could be improved when the control will be done by the third party.

3.2.2.2 Constrains and future of the Moldovan's inventory

Difficulties related to data collection: The main problems with data collection in the Republic of Moldova are related with the geographical cover of the entire country. It is very difficult to obtain data from the left bank of Dnepr (Transdnistria). Even though there is some statistical data it does not cover all sectors and collection of data through questionnaires is not possible since the authorities from left bank don't cooperate with the right bank of the river.

Another problem stands with confidentiality of statistical data. According to law, data is defined as confidential if less than three of the same kind of enterprises operates so there are two cement plant and one beer plant. Collection of data from these enterprises relies on good will of the producers.

Lack of data as information related to import and export of cooling agents, medical products based on aerosols, construction materials (foams). The custom service doesn't keep any record on products that contain HFC, PFC and SF₆. As a result for calculation of gas emissions - F, indirect methods are utilised.

The best way to improve the activity data is to formalise the relation between the inventory compiler and the National Bureau of Statistics as with other key data providers through long term accords. It is also important to increase the periodicity of data collection, improving the collection procedure, and introduction of new indexes for data collection (to collect data according to inventory needs). Unfortunately at the moment the statistical department claim that has no monetary resources available for improvement of data collection. Alternatively, data could be collected through central public authorities who conduct monitoring activities

such as the Ecological Inspectorate of the Ministry of Environment (which should have a separate statistic or database).

Future: Currently, there is no plan to periodically prepare updated of the national inventory since requires additional financing resources, and the Republic of Moldova, as a developing country, has far too many other concerns such as roads, infrastructure, education, and school. Also, there is no plan to elaborate new institutional arrangements since the existing one fulfil the current commitments the country has in the framework of UNFCCC.

However, in the near future the quality of the inventory may only increase by building capacity of existing national experts, as well as involving new experts, getting more experience from compilation of the inventory in the frame of national communication. An important aspect is to extend the number of national experts in the UNFCCC roster of experts with their participation in the review of national inventories of Annex I Parties. In particular, it is desired to have more qualified experts especially in the energy and LULUCF sector and good command in English.

4 A proposed model for a National System for non Annex I Parties

This chapter provides guidelines for non-Annex I Parties in designing their NS including:

- Elements to be considered in designing NS, in particular providing insights to Party to make decisions what to consider in designing their NS and minimum requirements in implementing certain functions of the system which are mandatory;
- Priorities in planning NS - it breaks down the decision 19/CMP.1 to immediate, medium and latest implementation which soften the implementation of NS functions;
- Steps in designing NS - a flowchart that provides sequence of activities in establishing and maintaining NS.

4.1 Elements to be considered in designing a National System

National system should include all institutional, legal and procedural arrangements made within a Party for estimating anthropogenic emissions by sources and removals by sinks of all GHG not controlled by the Montreal Protocol, and for reporting and archiving inventory information.

The Party shall ensure the performance of the functions of national system, including the maintenance of the institutional and procedural arrangements; the arrangements for the technical competence of the staff involved in the inventory development process; and the capacity for timely performance.

The following sub-sections list elements to be considered in designing NS, which are classified in:

- inventory planning: centralised vs. decentralised and formal vs. informal system;
- inventory preparation: data collection, choice of method, QA/QC, and national inventory improvement plan,
- and inventory management; archiving.

In addition, two important elements which are essential for non-Annex I Parties such as capacity building and fund raising in order to establish and maintain NS functions.

4.1.1 Centralised vs. decentralised system

Three out of nine analysed Annex I Parties have decentralised systems, and, in accordance with the review process, both were able to deliver high quality inventory.

The main difference between those systems is, however, the number of entities responsible for sectors compilation. A centralised system (Fig. 1) aims to have all sector expertise in one place under one coordinator while a decentralised one (Fig. 2) aims at hiring on contact basis other entities or experts to compile information on specific sector.

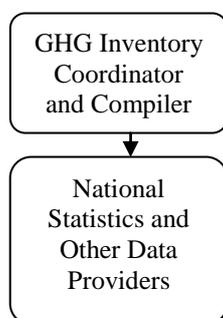


Fig. 2 Centralised system

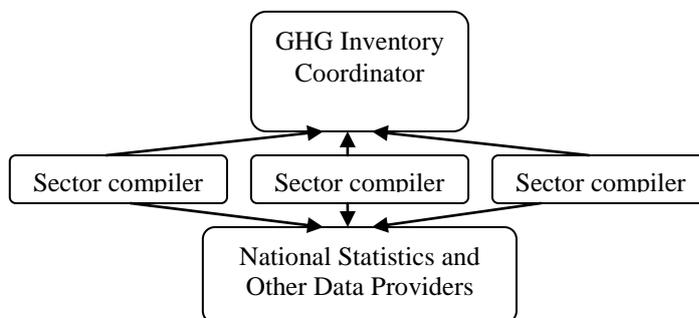


Fig. 3 Decentralised system

Centralised: A well-planned centralised system holds human resources and data in one place, which makes both faster and easier to undertake any activities. One main intention of centralised approaches is to have a single version of any particular file, and to store only a single instance of data. A centralised approach for inventory preparation is usually less expensive than a decentralised one, however the quality of the inventory may be weaker due to various sectors particularities.

Decentralised: In decentralised systems the inventory is prepared throughout other departments, agencies, universities or organisations. It is definitely a slower system but it could be of higher quality, since it takes expertise from real experts in different field areas.

Though, it is hard to say which system centralised or decentralised is more appropriate, non-Annex I Parties should take into account their development priorities, objectives and national circumstances when designing their national systems. In any case, an important aspect is that the system should clearly specify the role and specific responsibilities of organisations and consultants who participate or assist in the inventory preparation. For that purpose might be useful to elaborate a detailed inventory manual for inventory planning and management which reflects national circumstances and includes detailed descriptions of formal procedures, time schedules, data flow, documentation formats and guidance for improvements.

4.1.2 Formal vs. informal system

In a formal system communication takes place through the formal channels which are generally in writing and may take any of the forms; policy; manuals: procedures and rule books; memoranda, etc. Advantage of such system is the clear knowledge of responsibility. It could be very simple but in most cases due to bureaucracy is generally time consuming and cumbersome.

Informal systems are built around social relationship, and do not follow explicit lines of authority as is the case of formal communication. At times, in informal communication, it is difficult to fix responsibility about accuracy of information.

As regard to the NS, the author consider as essential to define responsibilities and formalise the cooperation with participating entities. Organisations and consultants should know their responsibilities and boundaries and what outputs are expected from them. A well defined responsibility would overcome misunderstandings and delays in inventory preparation. It is recommended to clearly define the responsibility of each player participating in the inventory

process since the beginning, but there also should be some flexibility in allocating the responsibility to someone else in case of bad performance.

Institutional arrangements should be secured on a longer-term basis, for example, by means of framework agreements or memoranda of understanding between inventory compiler and participating entities. That would improve the planning process so the long-term planning of more complex issues can be carried out under NS in a transparent and efficient manner.

4.1.3 Data collection

Data collection is an integral part of developing and updating a GHG inventory. Formalised data collection activities should be established, adapted to countries' national circumstances¹¹. Where appropriate, it may be useful to explore existing or new legal arrangements as means of guaranteeing the delivery of data to the inventory.

There are also other means to collect data. Even though, agreements with data providers (ministries, departments and agencies) do not exist in the Republic of Moldova, the Law on Access to Information permit to inventory compiler to obtain necessary data during 10 working days. This Law regulates the relationships between information providers and individual/legal entity in the process of ensuring and implementing the constitutional right of access to information.

Data collection should be performed in timely manner. In this regard sufficient funding and resources for the compilation of the basis AD should be provided. A list of indicators that has to be prepared annually on a mandatory and a clearly defined methodological basis especially when basis AD is not part of the mandatory information to be produced under national statistics legislation should be provided. Institutions, universities, private industries and local environmental agencies should be involved to obtain AD and develop country-specific methods and EFs, particularly for estimating emissions from key categories at higher tier level.

Data collection activities should establish and maintain good verification, documentation and checking procedures (QA/QC) to minimise errors and inconsistencies in the inventory estimates. QA/QC activities should continue throughout this process to minimise errors and document data sources, methods and assumptions. The results of the data collection may lead to refinement of the methods chosen.

There are different data sources which depend on country's specifics but generally official statistics and energy balance are the main one. The inventory compiler may face problem to access confidential data. Where possible, the inventory compiler should cooperate with data providers and explain the intended use of the data and agreeing, in writing, to the level at which it will be made public.

4.1.4 Choice of method

The IPCC Workbook contains default methods for the estimation of each of the main source categories for CO₂, CH₄, N₂O, halocarbons (HFCs, PFCs) sulphur hexafluoride (SF₆), and ozone and aerosol precursors. IPCC's default methodology aims to provide the simplest realistic procedures for countries to use when making GHG emissions inventories. Default values are provided for emission factors and some activity data. Because default information is frequently general, and applicable to all countries of the world, it may not capture the variations in emission levels.

The Workbook is nevertheless a starting point for many countries that are preparing GHG inventories for the first time. Countries may use more detailed methodologies, emission factors or activity data where these are compatible with IPCC source categories, and can be

¹¹ 2006 IPCC Good Practice Guidelines, page 2.4

shown to give consistent and accurate results. Default emission factors and activity data also provide useful points of comparison for national assumptions. If a country's data vary significantly from the default data, the IPCC asks that the difference be explained.

Decision trees of the IPCC good practice guidance (2000) and the IPCC good practice guidance for LULUCF (2003) should also be taken into account. These decision trees provide which tier is appropriate for some specific conditions.

4.1.5 Quality assurance and quality control

QA/QC activities should be integral part of inventory process. Before implementing QA/QC activities, it is necessary to determine which techniques should be used, and where and when they will be applied. The inventory compiler should assess national circumstances such as available resources and expertise and the particular characteristics of the inventory and decide upon: (i) resources allocated to QA/QC for different categories and the compilation process; (ii) time allocated to conduct the checks and reviews of emissions and removal estimates; (iii) frequency of QA/QC checks and reviews on different parts of the inventory.

The QA/QC system should contain: (i) a QA/QC plan; (ii) general QC procedures that apply to all inventory categories; (iii) category-specific QC procedures; (iv) QA and review procedures; (v) QA/QC system interaction with uncertainty analyses; (vi) verification activities; (vii) reporting, documentation, and archiving procedures. In order to ensure the implementation of QA/QC system, that Party shall nominate a QA/QC coordinator. The QA/QC Coordinator shall be responsible for ensuring that adequate QA/QC is performed on the inventory and its supporting documents and spreadsheets and that all team members know their QA/QC responsibilities.

QA/QC plan: QA/QC plan should, in general, outline QA/QC activities that will be implemented, and include a scheduled time frame that follows inventory preparation from its initial development through to final reporting in any year. It should contain an outline of the processes and schedule to review all source categories.¹² Each Party shall elaborate QA/QC plan in line with the requirements of the IPCC good practice guidance. It is essential to communicate the contents of the QA/QC plan to inventory team members and outside experts so that its procedures can be effectively implemented and evaluated.

QC procedures: General QC procedures include generic quality checks related to calculations, data processing, completeness, and documentation that are applicable to all inventory sources and sink categories. Good Practice Guidelines provides a table of examples of QC procedures. Although general QC procedures are designed to be implemented for all categories and on a routine basis, it may not be necessary or possible to check all aspects of inventory input data, parameters and calculations every year.

Checks may be performed on selected sets of data and processes. Particular attention should be given to parts of the inventory development that rely on external, and shared databases. QC procedures can be improved by:

- better linking data collection, data processing and emissions estimation;
- exploring the development of category-specific QC procedures (tier 2) for all key categories and for those categories in which significant methodological and/or data changes have occurred (e.g. in the industrial processes and waste sectors) and to integrate these procedures into the QA/QC plan and the quality management handbook;
- carry out system level checks, such as cross-checking activity data available from different sources to minimize the risks of missing plants/data. These QC checks could include an independent sectoral expert review of AD to explain the reasons for large

¹² IPCC Good Practice Guidelines, page 8-6

inter-annual variations for emissions from key sources (both level and trend basis);
(iv) auditing periodically external data providers by the sector experts for emissions inventory. All QC procedures should be documented.

QA procedures: Quality assurance comprises activities outside the actual inventory compilation. Good practice for QA procedures includes reviews and audits to assess the quality of the inventory, to determine the conformity of the procedures taken and to identify areas where improvements could be made. QA procedures may be taken at different levels (internal/external), and they are used in addition to the general and category-specific QC procedures. The inventory may be reviewed as a whole or in parts.

The objective of QA implementation is to involve reviewers that can conduct an unbiased review of the inventory and who may have a different technical perspective. It is important to use QA reviewers that have not been involved in preparing the inventory. Preferably these reviewers would be independent experts from other agencies or national or international experts or groups not closely connected with the national inventory compilation, e.g., inventory experts of other countries.

Where third party reviewers who are independent from the inventory compiler are not available, persons who are at least not involved in the portion being reviewed can also perform QA. The Party may also elaborate an inventory improvement plan as part of the QA/QC procedures, which allocates specific responsibilities, resources and timelines for the improvement activities identified and is updated annually. All QA procedures should be documented.

4.1.6 National Inventory improvement plan

The national inventory improvement plan (NIIP) presents actions that Party has identified to improve its national systems. The NIIP will guide future efforts to increase the transparency, consistency, comparability, completeness, and accuracy of future inventories. Completeness must come as the highest priority since the inventory should cover all sectors and all existing emissions should be reported. In parallel efforts should be focused on transparency, comparability, consistency and accuracy.

The plan addresses many of the shortcomings of the previous inventory, and informs future inventory teams of needed improvements. The improvements shall be identified through an assessment of key sources, methodologies and data used to estimate emissions, and existing institutional arrangements.

To improve the national GHG inventory, it may be necessary to consider more accurate methodologies, to develop country-specific emission factors, or to collect more detailed activity data. These activities all require additional resources, and it is not possible to make improvements for every source category. Therefore, Party shall identify the source categories as the most important source categories contributing to national emissions. Assessing the methods and data used to estimate emissions from these key categories is integral to identifying priorities.

4.1.7 Archiving

Archives refer to a collection of records, as well as to the location where these records are kept. Archives consist of records that have been created during the development of the inventory (emission factors, activity data, key sources, QA/QC, uncertainty, methods used, calculation sheets as well as all references for all categories, etc.). A critical component of the inventory development process is the appropriate and systematic archiving of all documents related to the compilation of the inventory.

A good archive system is important for sustaining NS because the national inventory must be transparent and reproducible. The archive system is the foundation for development of subsequent inventories by future inventory staff. All information used to create the inventory

should be archived in a single location through electronic and paper storage. If possible, a copy of all archive documents should be kept in another location to reduce the risk of losing all records due to theft or disaster (e.g., fire, earthquake, or flooding). All historical key AD should be transferred into the electronic system.

An archiving coordinator shall be designated at the beginning of the inventory process who is responsible for ensuring that all archiving procedures are performed for the inventory and its supporting documents and spreadsheets. The archiving coordinator is also responsible for clarifying who is responsible for carrying out archive procedures at various levels, as well as for ensuring that all team members know their archiving responsibilities.

The archive coordinator should ensure that the archive procedure is carried out effectively and that copies of all new data sources and referenced documents are properly archived. To ensure a successful archiving system, the archiving coordinator should use a comprehensive checklist (a catalogue with archived information). Checklists help to ensure that all archiving procedures occur in a timely and complete manner.

4.1.8 Capacity building

Capacity building can be defined as the process of developing and strengthening the skills, abilities, processes and resources that organizations need to survive, adapt, and thrive in the fast-changing world.

Capacity building is much more than training and includes: (i) human resource development, the process of equipping individuals with the understanding, skills and access to information, knowledge and training that enables them to perform effectively; (ii) organizational development, the elaboration of management structures, processes and procedures, not only within organizations but also the management of relationships between the different organizations and sectors; (iii) institutional and legal framework development, making legal and regulatory changes to enable organizations, institutions and agencies at all levels and in all sectors to enhance their capacities.

As regard to national system the capacity building can be improved though:

Human resources development: Adequate local training should be provided to staff involved in the inventory. It is strongly recommended for inventory experts to attend the UNFCCC training and participate in the annual review of GHG inventory of Annex I Parties. Exchange of experience with inventory experts from other Parties would facilitate the improvement of the level of expertise of national experts.

Organisational development: The objective of organisational development is to improve the organization's capacity to handle its internal and external functioning and relationships. This would include such things as improved interpersonal and group processes, more effective communication, enhanced ability to cope with organizational problems of all kinds, more effective decision processes, more appropriate leadership style, improved skill in dealing with destructive conflict, and higher levels of trust and cooperation among organizational members.

Institutional and legal framework development: comprise the laws, executive orders and other legal instruments that define NS and participating entities in the inventory process. They define the authorities, responsibilities and roles of organisations, establish legal authority and create coordination mechanisms. All these measures are necessary to enhance the capacity to deliver high quality inventory.

4.1.9 Funds rising

In order to establish NS and perform inventories on regular basis sufficient financial resources must be allocated. Improved funding seems essential to the timely preparation of inventories. To start with it is important to plan well the necessary budget of the.... There are several ways

to ensure financial flow in order to ensure the continuity of the system. The first one could be to convince the Government on the importance of the inventory which will lead to allocation of appropriate resources in national budget for this purpose. The second one would be to apply for funding to international donors that are supporting this kind of activities such as the Global Environmental Facility. Nevertheless, an important aspect is to ensure adequate long-term financial support for inventory-related contracts.

4.2 Priorities in planning NS based on requirements of 19/CMP.1

Decision 19/CMP.1 defines guidelines for national system under Article 5, paragraph 1, of Kyoto Protocol which applies only for Annex I Parties. The guidelines establish objectives, characteristics, general and specific functions of the national system. The functions of NS are specifically designed for Annex I Parties, and could be applied also by NAI with adaptations. It is important to take in consideration that NAI do not have the inventory experience as AIP and may face difficulties to implement at once all functions of NS.

NAI shall respect the general function of NS such as:

- Establish and maintain the institutional, legal and procedural arrangements necessary to perform the functions of national systems, as appropriate, between the government agencies and other entities responsible for the performance of all functions.
- Ensure sufficient capacity for timely performance of the functions of national systems, including data collection for estimating anthropogenic GHG emissions by sources and removals by sinks and arrangements for technical competence of the staff involved in the inventory development process

On the other hand, Decision 19/CMP.1 contains functions that refer to review process which are not applicable to NAI and therefore should be excluded.

In order to facilitate the implementation of NS by NAI, the specific functions of NS were prioritised as immediate, medium and latest implementation (I, M, L). Certain functions such as QA activities and uncertainty analysis shall be carried out along with the development of inventory. It is to be mentioned that financial resources might be crucial element in establishing and maintaining the NS for NAI. Comparing to AIP, fund rising appears to be the most important function of NS for NAI which Party shall start with.

Immediate implementation:

1. Identify and secure adequate financial resources to establish and maintain NS;
2. Designate a single national entity with overall responsibility for the national inventory;
3. Define and allocate specific responsibilities in the inventory development process, including those relating to choice of methods, data collection, particularly activity data and emission factors from statistical services and other entities, processing and archiving, and QA and QC.
4. Specify the roles of, and cooperation between, government agencies and other entities involved in the preparation of the inventory;
5. Ensure sufficient capacity for timely performance of the functions of national systems;
6. Establish processes for the official consideration and approval of the inventory, including any recalculations, prior to its submission.
7. Collect sufficient activity data, process information and emission factors as are necessary to support the methods selected for estimating anthropogenic GHG emissions by sources and removals by sinks;

8. Elaborate an inventory QA/QC plan which describes specific QC procedures to be implemented during the inventory development process, facilitate the overall QA procedures to be conducted, to the extent possible, on the entire inventory and establish quality objectives;
9. Identify key categories following the methods described in the IPCC good practice guidance (chapter 7, section 7.2);
10. Prepare estimates in accordance with the methods described in the Revised 1996 IPCC Guidelines for National GHG Inventories, as elaborated by the IPCC good practice guidance, and ensure that appropriate methods are used to estimate emissions from key source categories. The Party may explore use of other methodological sources such as 2006 IPCC Guidelines;
11. Archive inventory information on all disaggregated emission factors, activity data, and documentation about how these factors and data have been generated and aggregated for the preparation of the inventory. This information shall also include documentation on key categories and key categories identification.

Medium Implementation:

1. Implement general inventory QC procedures (tier 1) in accordance with its QA/QC plan following the IPCC good practice guidance;
2. Apply category-specific QC procedures (tier 2) for key categories and for those individual source categories in which significant methodological and/or data revisions have occurred, in accordance with the IPCC good practice guidance;
3. Ensure that any recalculations of previously submitted estimates of anthropogenic GHG emissions by sources and removals by sinks are prepared in accordance with the IPCC good practice guidance and relevant decisions of the COP;
4. Consider ways to improve the quality of activity data, emission factors, methods and other relevant technical elements of inventories. Information obtained from the implementation of the QC programme should be considered in the development and/or revision of the QA/QC plan and the quality objectives.
5. Archive information on QC procedures and planned inventory improvements.

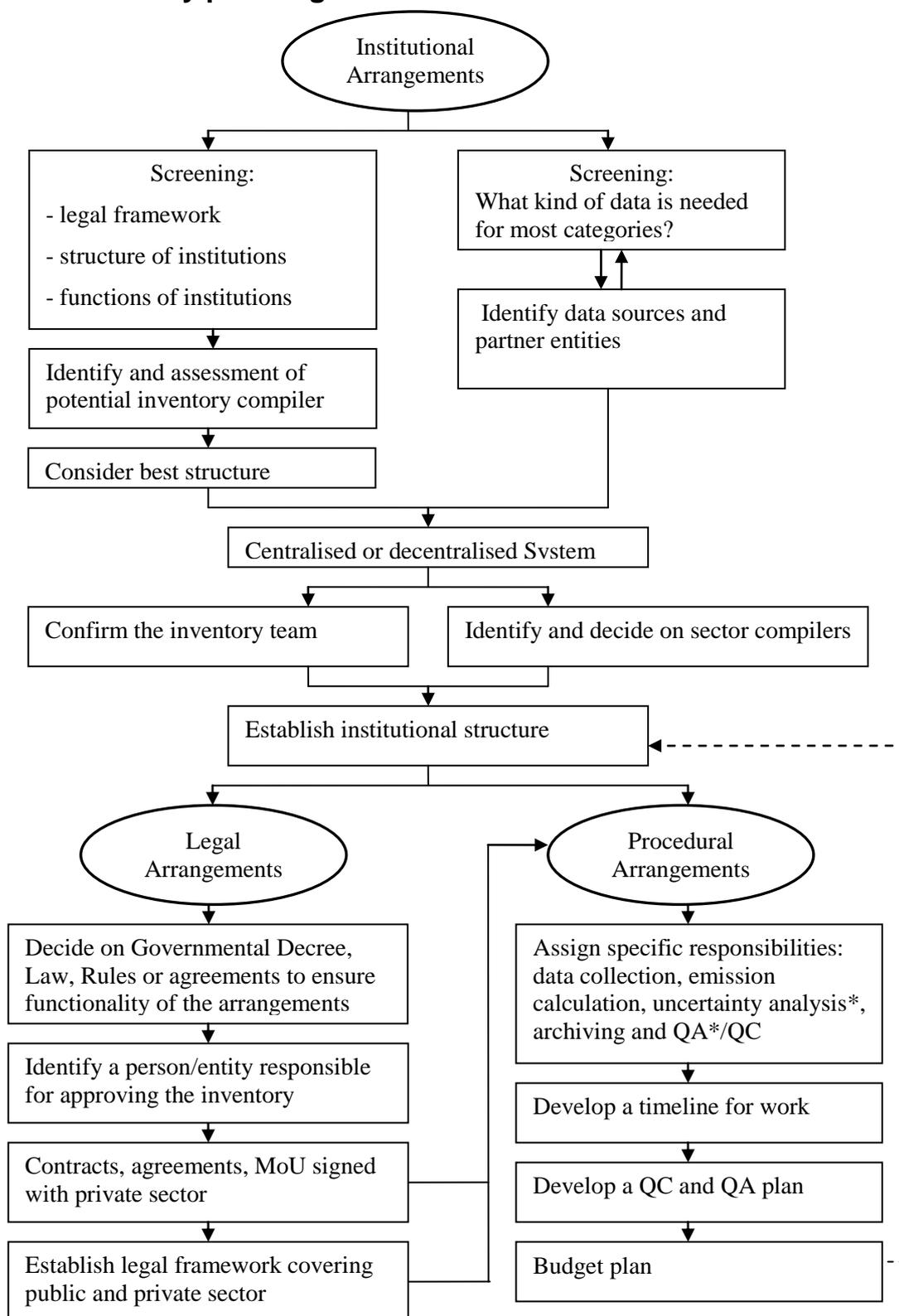
Latest implementation:

1. Make a quantitative estimate of inventory uncertainty for each source category and for the inventory in total, following the IPCC good practice guidance;
2. Carry out QA activities in accordance with the planned QA procedures such as:
 - Provide for a basic review of the inventory by personnel that have not been involved in the inventory development, preferably an independent third party;
 - Provide for a more extensive review of the inventory for key categories, as well as categories where significant changes in methods or data have been made;
 - Internal evaluations of the inventory preparation process, re-evaluate the inventory planning process in order to meet the established quality objectives.
3. Information obtained from the implementation of the QA programme should be considered in the development and/or revision of the QA/QC plan and the quality objectives.
4. Archive information on QA procedures and uncertainty analysis.

4.3 Steps in designing NS

Although, there is some flexibility in implementing NS, certain requirements apply.

4.3.1 Inventory planning



* Functions to be performed as medium or latest implementation

The National System involves all of the institutional, legal, and procedural arrangements made by a Party for estimating anthropogenic emissions, and archiving of inventory information. National System should be based on contracts and/or agreements between the responsible for GHG inventory (inventory compiler) and expert organisations involved in the inventory process. Inventory compiler should collaborate closely with relevant ministries and agencies.

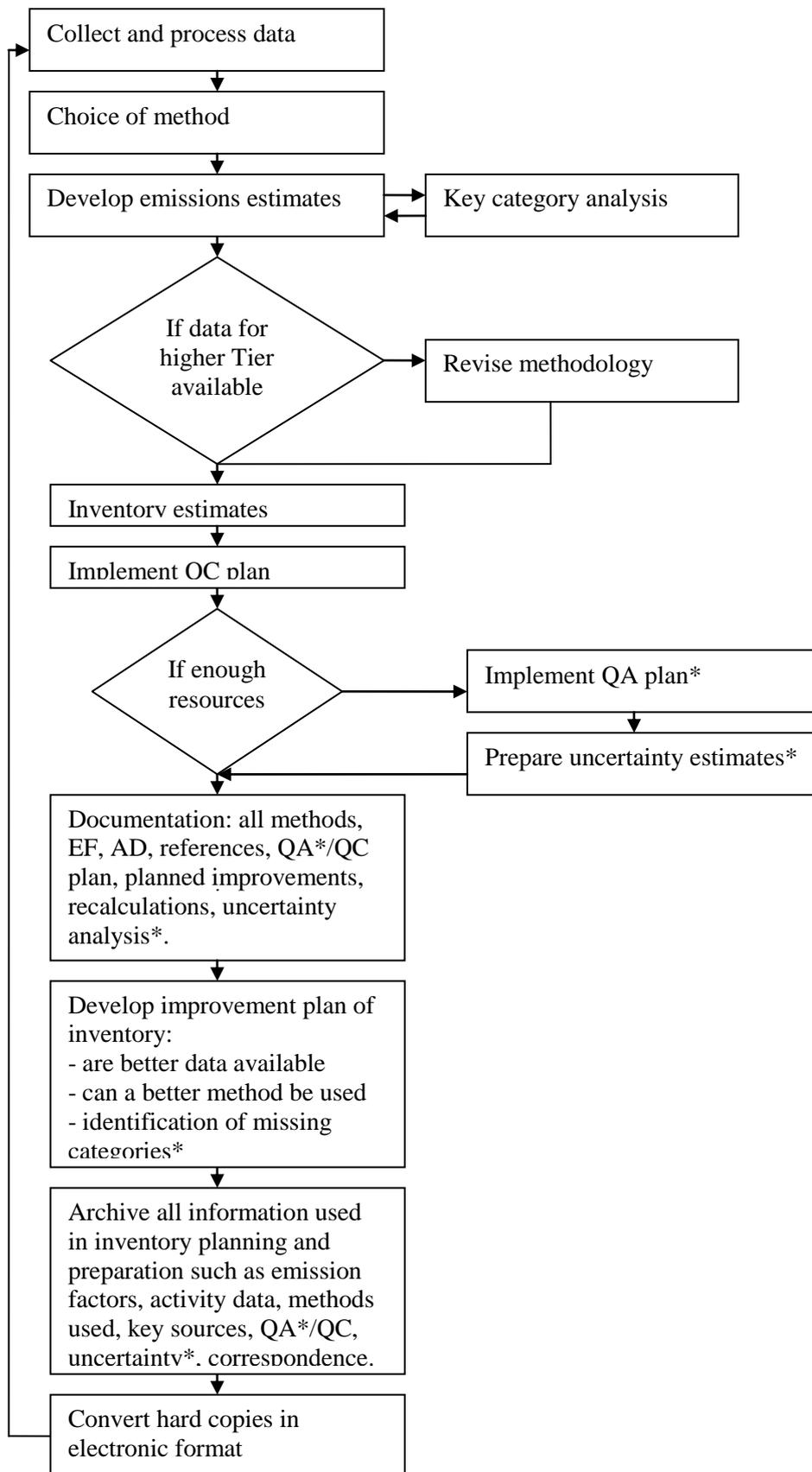
Preparing a comprehensive inventory requires establishing, identifying, and documenting all relevant contributors to the National System. Assessing and documenting the status of existing institutional arrangements for inventory development will ensure continuity and integrity of the inventory, promote institutionalization of the inventory process, and facilitate prioritization of future improvements. The following table summarises potential institutional arrangement.

Table 1. Potential institutional arrangements

Function	Institution	Responsibility
Single national entity	Entity responsible for environment (Ministry of Environment, Hydro-meteo Institute, etc)	<ul style="list-style-type: none"> ▪ Supervision of national system; ▪ UNFCCC National Focal Point; ▪ Official consideration and approval of inventory.
Inventory coordination and compilation	Subordinated agency, unit, or division (inventory compiler) dealing with climate change and/or air pollution (preferably with experience in reporting under other conventions)	<ul style="list-style-type: none"> ▪ Management of the inventory ▪ Provision of work plan ▪ Contracting consultants ▪ Completion of CRF and NIR ▪ Archiving
Designate a QA/QC coordinator	The inventory compiler or agency, division, company.	<ul style="list-style-type: none"> ▪ Ensure that QA/QC plan is carried out well; ▪ Create a checklist of QA/QC procedures for team members to follow and review completeness; ▪ Assign QA/QC tasks to sectors compilers; Deliver QA/QC documentation to archiving coordinator (or inventory coordinator). ▪ Invite technical review from other institutions.
Designate a archiving coordinator	The inventory compiler	<ul style="list-style-type: none"> ▪ Ensure that copies of all new data sources and referenced documents are properly archived; ▪ Create a checklist of archiving procedures for team members to follow; ▪ Determine and assign archiving tasks to staff; ▪ Serve as the keeper of archive, and respond to future requests to view archive materials.
Inventory preparation of Energy sector	Inventory compiler or Energy Agency	<ul style="list-style-type: none"> ▪ Data collection ▪ Choice of methods and EFs, ▪ Inventory preparation
Inventory on Industrial of Process,	Inventory compiler or industry associations, universities	<ul style="list-style-type: none"> ▪ Data collection ▪ Choice of methods and EFs, ▪ Inventory preparation
Inventory preparation of Agriculture	Inventory compiler or Ministry of Agriculture, research institutions	<ul style="list-style-type: none"> ▪ Data collection ▪ Choice of methods and EFs, ▪ Inventory preparation

Inventory preparation Land Use Change and Forestry sector	Inventory compiler or Forestry Agency/Forest Research Institute	<ul style="list-style-type: none">▪ Data collection▪ Choice of methods and EFs,▪ Inventory preparation
Inventory preparation of Waste sector	Inventory compiler or entity providing environmental permits	<ul style="list-style-type: none">▪ Data collection▪ Choice of methods and EFs,▪ Inventory preparation

4.3.2 Inventory preparation and management



* Functions to be performed as medium or latest implementation

The annual inventory cycle shall be carried out in accordance with the principles and procedures set out in the IPCC (1996) Guidelines and the IPCC Good Practice Guidance. Based on IPCC (1996) Guidelines to estimate GHG emissions and removals the Party should begin by developing a plan or strategy. The first step is to identify the range of possible source and sink activities that exist in your country for prioritizing among various GHG. Second, to establish priorities for inventory work based on several considerations as the relative importance of source and sink activities within the country and the availability of relevant information.

The inventory compiler or sector compiler shall be responsible for the choice of methods and emission factors. The Party may prefer to start using default EFs but gradually should replace default one by country-specific emission factors characteristic of domestic technologies as part of inventory improvement. Before, compiling the data, it is desirable to carry out preliminary data control.

5 Conclusion

As Copenhagen Accord as negotiation text FCCC/AWGLA/2010/14 call for reporting mitigation actions along with national inventory reports in national communications every second year. As already experienced by Annex I Parties, frequent preparation of GHG inventory may require a national system in place. In this context, non-Annex I Parties might have to design national systems and ensure high quality national inventory. Besides, some non-Annex I Parties are bordering European Union and ones adhered to the EU, new member states will commit to report regularly their national inventory of GHG that also may require a national system in place.

Currently non-Annex I Parties prepare national inventories in the frame of NC. Institutional arrangements exist only for certain periods to the extent external funds allow it. There is some technical expertise for GHG inventory but the arrangements are not sustainable due to lack of funding. There is no possibility to keep inventory team on permanent basis and rather contracting experts per assignment. Also due to limited resource, teams are small with multiple responsibilities and various levels of expertise especially regarding LULUCF sector.

National Systems are a foundation for more complete and higher quality inventory. Inventory development is an evolutionary process; continuously improve capabilities to develop emission estimates. The goal of this study is to guideline the development/improvement of national system for non-Annex I Parties. To achieve the goal of this paper a NS model was created which includes elements be considered in designing NS, the appropriate structure and functions of NS.

The elements to be considered in designing NS are divided in inventory planning: centralised vs. decentralised and formal vs. informal system; inventory preparation: data collection, choice of method, QA/QC, and national inventory improvement plan, and finally inventory management; archiving. There are two important elements which are essential for non-Annex I Parties such as capacity building and fund raising in order to establish and maintain NS functions.

- Centralised vs. Decentralised system: It is hard to say which system centralised or decentralised prevail. Non-Annex I Parties should take into account their development priorities, objectives and national circumstances when designing their national systems.
- Formal vs. Informal arrangements. It is important to define responsibilities and formalise the cooperation with participating entities. A well defined responsibility would overcome misunderstandings and delays in inventory preparation.

- Documentation is very important and everything must be documented. Inventory process should be transparently documented; an expert should be able to reproduce estimates.
- The implementation of QA/QC procedures is an important part of the development of national GHG inventories. As described in the IPCC Good Practice Guidance, an adequate QA/QC program helps to improve transparency, consistency, comparability, completeness, and confidence in national GHG emission inventories.
- An archiving system is an inexpensive yet critical step in the sustainability of the NS because it serves as a starting point for future inventory teams.
- The national inventory improvement plan is to help countries identify and prioritize improvements to their NS. There are two kinds of issues: 1) important but difficult, 2) easy to solve but less important. An improvement plan should consider both options equally. A completed plan will guide future efforts to increase the transparency, consistency, comparability, completeness, and accuracy of future inventories.
- Improved funding seems essential to the timely preparation of inventories. In order to ensure the continuity of the system it is important to convince the Government on the importance of the inventory and to apply for funding to international donors that are supporting inventory related activities.

The functions of NS specified in decision 19/CMP.1 are particularly designed for Annex I Parties, nevertheless could be applied also by NAI with some adaptations. NAI may face difficulties to implement at once all functions of NS since do not have the inventory experience as AIP. Therefore, the specific functions of NS were prioritised as immediate, medium and latest implementation. The latest one should be implemented when resources are available. NAI shall respect the general function to establish and maintain the institutional, legal and procedural arrangements necessary to perform the functions of national systems and to ensure sufficient capacity for timely performance of the functions of national systems,.

National System should be based on contracts and/or agreements between the responsible for GHG inventory (inventory compiler) and expert organisations involved in the inventory process. Preparing a comprehensive inventory requires establishing, identifying, and documenting all relevant contributors to the NS. Assessing and documenting the status of existing institutional arrangements for inventory development will ensure continuity and integrity of the inventory, promote institutionalization of the inventory process, and facilitate prioritization of future improvements.

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Last but not least, other UNFCCC colleagues and not only for extra work activities and great time.

7 Annexes

7.1 Questionnaire for stakeholders from Non-Annex I

Introduction and my work with UNFCCC

Background - Bali Action Plan and advance draft text under negotiation by the AWG-LCA

Paragraph 1. Decision I/CP.13 (Bali Action Plan)

1. Decides to launch a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012:

(b) Enhanced national/international action on mitigation of climate change, including, inter alia, consideration of:

(i) Measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives, by all developed country Parties, while ensuring the comparability of efforts among them, taking into account differences in their national circumstances;

(ii) Nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner;

Paragraph 2. Advance draft of a revised text to facilitate negotiations among Parties, to be issued as an official document (FCCC/AWGLCA/2010/8) for consideration at the eleventh session of the AWG-LCA

33. Developing country Parties shall also prepare and submit biennially [beginning in 20XX], following elements to the Conference of the Parties:

(a) National GHG inventories;

(b) Status of implementation of mitigation actions and estimated emission reductions or removals achieved from implementation of those actions;

(c) Methodologies used and assumptions made in quantifying emissions reductions or removals;

(d) Information on receipt of finance, technology and capacity building support;

(e) Result of domestic verification of domestically funded autonomous actions;

Questions: Institutional Framework

In the second national communication of Moldova is stated that the Climate Change Office is fully responsible for preparation of national communications and GHG Inventory.

- What is reason for preparing GHG Inventory these days? Is it because of national communications or there is something else?

- Could you please elaborate more on the institutional arrangements for the inventory?

Inventory planning and management?

- Is there any official document that outlines that the climate change office is responsible for the inventory preparation?

- *If yes: which one? Please provide the document, - If no: why? Is there any plan to have such? What is necessary for that purpose?*

-Is there any official document that would describe the specific responsibilities of the participating agencies other than Climate Change Office in the inventory development process?

-What is the overall budget for the preparation of GHG inventory and how the resources are allocated to each sector?

- Who is responsible for: choosing the methods, data collection, AD and EFs, processing and archiving, QA/QC, key category and uncertainty analysis?

- What are the ways of improving the quality of AD, EFs, methods?

- What is the periodicity of the inventory?

- How many people are in the inventory team?

- What is the team experience in preparation of the inventory (status of the team)?

- Is the team employed full time in the inventory or it is involved in other activities?

- Do you think more resources should be allocated for the inventory?

-Is there any established process for the official consideration and approval of the inventory?

If no: What is necessary to develop such?

Data management: - What is the main data source (per sector) for inventory preparation and how the data is being collected?

- Is there any arrangement for collecting data?

- What are the main problems with data collection?

- Which ways do you see for improving the data collection process?

Archiving: - How the arching system is organised?

- Who is responsible for archiving system?

- What is archived (AD, EFs, methods,)? Is correspondence archived as well?

- What is the periodicity of archiving?

- The future of archiving systems?

QA/QC: - Is there any QA/QC plan? Do you have any documents?

- Could you please elaborate more on QC process? How about QA?

- Have been set any quality objectives of the inventory?

- In what way the system can be improved (the future)?

Future of the inventory

- How do you see the near and long terms future of the inventory preparation?

- What is the real situation in comparison with the desired one?

- Is there any plan for cooperation with other Parties?
- If the text included in draft **FCCC/AWGLCA/2010/8** is formally adopted, Moldova as developing country will have a commitment to prepare and submit every second year the GHG inventory:
 - What do you think is necessary to ensure the compliance?
 - This obviously will require additional financing? Could Moldova support it or donor assistance is required?
- What should be done to maintain the institutional and procedural arrangement?

7.2 Expert review team's recommendation

Recommendation from Review Reports on Initial Reports under KP

SWE - Whether the transparency of the methodological description have been improved;

- The effective transfer of data between the data providers and the technical production system database and the use of this information to produce the emission estimates.

ROU - To involve other institutions for ex. Universities, private industries and local EA when developing country-specific methods and Efs, particularly for estimating emissions from key categories at higher tier level.

- Improve QC by better linking data collection, data processing and emissions estimation, and document QA/QC procedures in more detail in its next submissions.

- Perform inventory checks by external experts before its next submission.

- Consider system level checks, such as cross-checking activity data (AD) available from different sources to minimize the risks of missing plants/data in future submissions. These QC checks could include an independent sectoral expert review of AD to explain the reasons for large inter-annual variations for emissions from key sources (both level and trend basis).

- Transfer historical key AD into the electronic system.

- Increase the sustainability of the national system in its specific functions of inventory planning and management and elaborate a detailed inventory manual for inventory planning and management which reflects national circumstances and includes detailed descriptions of formal procedures, time schedules, data flow, documentation formats and guidance for improvements.

- Strengthen its institutional capacity by ensuring adequate long-term financial support for inventory-related contracts and arrangements and by encouraging inventory experts to attend the UNFCCC training.

- Further elaborate the existing QA/QC plan in line with the requirements of the IPCC good practice guidance, including extensive tier 2 checking procedures for key categories, a procedure for external review and QA/QC procedures for activities related to Article 3, paragraphs 3 and 4, of the Kyoto Protocol; and additionally elaborate a guidance for prioritizing inventory improvements;

- Continue to transfer all relevant inventory information into the central archiving system, giving priority to the base year and the most recent year, develop catalogued or archived information and report updated information on the archiving system in its next

GRC - Focus on the implementation of the QA/QC plan, particularly by sector, as well as the implementation of tier 2 procedures.

- Improve its QA by carrying out a review of the inventory by independent national experts for its next inventory submission.

- Develop a more sophisticated archiving system, for example, by using a relational database for the central archiving of all data, and provide information on this in its next report under the Kyoto Protocol.

- Improve the transparency of the estimates by providing more precise and detailed descriptions and documentation of methods, AD, EFs, for all the key categories in its NIR;

- Ensure that the national system of Greece fully meets the guidelines for national systems under Article 5, paragraph 1 and the Article 7 guidelines with respect to the functions of Greece's national system, including the maintenance of the institutional and procedural arrangements; the arrangements for the technical competence of the staff involved in the inventory development process; and the capacity for timely performance;

- Further develop QA/QC system and subsequently implement QA/QC procedures in the inventory preparation, particularly by carrying out a domestic review of the inventory by independent national experts;

- Include more information on QC activities in each sectoral chapter of its next NIR;

AUT - Extend the QA/QC procedures to all categories. Austria has indicated that it intends to do so in its future submissions.

SVK - Involve the participating organizations and consultants in this phase as well, in order to improve the quality and consistency of the descriptions of methodologies as well as the overall quality of the inventory. The ERT also encourages Slovakia to secure the institutional arrangements on a longer-term basis, for example, by means of framework agreements or memoranda of understanding between the SHMI and the participating entities.

- Develop the plan further and provide a comprehensive QA/QC plan in its next NIR.

- QA/QC plan should be improved and implemented in all sectors.

- Improve the resources for the coordination and compilation of the national inventory and involve sectoral experts in this process, as appropriate;

RUS - The national system should be expanded to include private entities as well as governmental bodies because access to this data will be key for the future improvement activities, in particular in the energy and industrial processes sector.

- Develop an inventory improvement plan as part of the QA/QC procedures, which allocates specific responsibilities, resources and timelines for the improvement activities identified and is updated annually.

- Additional resources should be devoted to the team that is compiling the inventory at the IGCE, and improved funding seems essential to the timely submission of inventories in the future.

- Ensure access for ERTs to key energy data during reviews.

- Improve funding and resources for the compilation of the federal energy balance and inclusion of the balance in the list of indicators that has to be prepared annually on a mandatory and a clearly defined methodological basis. Additional information should be collected on fuel consumption by companies, industries, households, the services sector and the transport sector, and used to improve the statistical data on disaggregated energy consumption in the Russian Federation. This may require additional legislative arrangements, but the entities included in the national system should have the power to implement such changes.

- Fill the software with the relevant data and to link the AD and EFs with the files of emissions calculations. Otherwise, the archive provides a potential source of additional errors and mistakes.

- Electronic documentation and archiving system should be further developed and implemented as planned and checked during the next in-country review of the GHG inventory.

- Fully implement the QA/QC procedures and the QA/QC plan for the inventory preparation;

- Complete the archiving system and link it with the emission estimations.

- Fully implement the QA/QC management system and develop an inventory improvement plan as part of the QA/QC procedures;

UKR - Maintain the operational functions of its national system as outlined in the information provided by Ukraine after the in-country review and in the plan for the inventory preparation and management (Order of MEP No. 268 of 31 May 2007); to maintain consistency in the

allocated responsibilities; and enhance existing inter-institutional and inter-agency cooperation with a view to consolidating centralized inventory compilation and archiving structures, using the current expertise gained by the Ukrainian inventory experts and ensuring enough capacity for timely performance of the functions.

-Clearly define and document in the QA/QC plan the relevant responsibilities of cooperating institutions and experts and their contribution to QA/QC activities, and to present a clear and detailed QA/QC plan to be applied to its inventory development process in the next submission and thereafter.

- Introducing better documentation on QC procedures at all stages of inventory preparation.

- Implement its QA/QC plan, extend its verification procedures to models, AD and estimates, further develop the plan in line with the recommendations outlined above and document all these actions in its next inventory submission.

- Finalize the establishment, as a matter of priority, of its centralized inventory archiving system, which shall contain all the information required by the guidelines for national systems (decision 19/CMP.1), and to provide the relevant documentation on the archiving system's structure and operation

FRA - Should consider whether independent review procedures similar to those set up in other EU member States could also be used in France.

Ensure time-series consistency in its future inventories submitted under the Convention and the KP.

Review the level of resources provided for the national inventory and to consider how adequate they are. A comparison with the resources allocated for similar purposes by other EU member States could provide an indication of this.

- Improve QA in the system by implementing a review prior to each inventory submission; the ERT suggests that France consult with other EU member States that have already implemented such a procedure.

- Include an independent review prior to submission of the inventory as part of the QA system;

EST - Include SoE more formally into the institutional arrangements.

- Include in its next NIR a list of the QC checks that are carried out by the ministry prior to submission.

- Assess the quality of its inventory before the next submission.

- Institutionalize system level checks, such as cross checking activity data (AD) available from different sources (SoE, the European Union (EU) emissions trading scheme (ETS), the EU Large Combustion Plant Directive, the EU IPPC Directive and the European Pollutant Emission Register), to minimize the risks of missing plants/data in future submissions.

- Elaborate the archive at the EEIC and to include all inventory data from the inventory experts, in order to allow access to all inventory information at a single location.

- Include a description of the QA/QC plan and information on the QA/QC measures implemented in all sectors in the NIR, and a list of the QC checks that are carried out by the ministry prior to submission;

- Provide detailed explanations and analysis on the emission trends by sector and by gas in its next NIR;

ERT's current outstanding recommendations from Annual Review Reports

SWE - Extend the information on its national system to include the specific responsibilities of the organizations participating in SMED and consultants who assist the Swedish EPA in the inventory preparation;

- Provide information on QA applied to data from EU ETS;
- There is room for improvement in the implementation of QA/QC with regard to the consistency of the NIR and the CRF and background tables contained in annexes to the NIR and therefore Sweden should provide information on QA applied to data from EU ETS.

ROU - Increase the sustainability of the national system in its specific functions of inventory planning and management and elaborate a detailed inventory manual for inventory planning and management which reflects national circumstances and includes detailed descriptions of formal procedures, time schedules, data flow, documentation formats and guidance for improvements;

- Strengthen its institutional capacity by ensuring adequate long-term financial support for inventory-related contracts and arrangements and by encouraging inventory experts to attend the UNFCCC training;
- Involve other institutions for ex. Universities, private industries and local EA when developing country-specific methods and EFs, particularly for estimating emissions from key categories at higher tier level;
- Further elaborate the existing QA/QC plan in line with the requirements of the IPCC good practice guidance;
- Improve QC by better linking data collection, data processing and emissions estimation, and document QA/QC procedures in more details;
- Perform inventory checks by external experts before its next submission;
- Continue to transfer all relevant inventory information into the central archiving system, giving priority to the base year and the most recent year, develop catalogued or archived information; and transfer historical key AD into the electronic system.

GRE - Provide further information on the QA/QC procedures applied to these data and how they relate to the corresponding methodology selection and QA/QC and/or verification procedures set out in the IPCC good practice guidance;

- Establish more specific procedures to underpin the periodic review of the QA/QC plan and the QMS, using information obtained from the implementation of its QA/QC programme, including from an independent audit;
- Consider including, in an annex to the NIR, elements of the QA/QC plan and the QMS, any planned improvements, additional information on QA/QC procedures for the data supplied by external sources and explanations of the role of external experts who are not directly involved in the inventory compilation or development process;
- Improve QC procedures by exploring the development of category-specific QC procedures (tier 2) for all key categories and for those categories in which significant methodological and/or data changes have occurred (e.g. in the industrial processes and waste sectors) and to integrate these procedures into the QA/QC plan and the quality management handbook;
- Establish an archiving process that will help to ensure continuity of inventory compilation.

AUT - Continue to improve the description of category specific QA/QC procedures, for all categories, in future annual inventory submissions;

- Improve some functions of the national system, such as the inclusion of the whole LULUCF sector in the uncertainty analysis, the inclusion of a tier 2 key category analysis and the provision of detailed descriptions of category-specific QA/QC activities for all sectors.

SVK- Strengthen national system and to secure the institutional arrangements on a longer-term basis, for example, by means of framework agreements or memoranda of understanding between the SHMI and the participating entities. That would improve the planning process so the long-term planning of more complex issues can be carried out under the national system in a transparent and efficient manner;

- Improve transparency and documentation of the inventory approval process that takes place before it is submitted to the secretariat;

- Verify emissions data for all sectors and/or categories, following the IPCC good practice guidance;

- Enhance its documentation of QC for all stages of inventory preparation (within SHMI and for external institutions and/or experts) and should nominate a QA/QC coordinator at SHMI for the national inventory submission;

- Improve the long-term robustness of archiving and record-keeping at inventory compiler by archiving underlying calculation sheets as well as all references for all categories. This would allow information to be retrieved quickly upon request, the institutional memory to be safeguarded and the estimates to be reproduced if needed.

RUS - To include private entities as well as governmental bodies because access to this data will be key for the future improvement activities, in particular in the energy and industrial processes sector;

- To develop an inventory improvement plan as part of the QA/QC procedures, which allocates specific responsibilities, resources and timelines for the improvement activities identified and is updated annually;

- To devote additional resources to the team that is compiling the inventory, and improved funding seems essential to the timely submission of inventories in the future;

- To provide public access to detailed energy balances;

- To improve funding and resources for the compilation of the federal energy balance and inclusion of the balance in the list of indicators that has to be prepared annually on a mandatory and a clearly defined methodological basis;

- To develop further the electronic documentation and archiving system;

- To improve the QA/QC procedures and plan;

- Fully implement the QA/QC management system and develop an inventory improvement plan as part of the QA/QC procedures;

- To explore ways to use more disaggregated data in the inventory;

- To enhance collaboration with experts that do not participate in preparing the inventory to validate and verify country-specific methods and data;

- Continue and increase its collaboration with national and international experts from universities, research organizations and industry (in particular with the oil and gas industry, as well as the cement industry) to enhance the flow of data and information needed in the inventory preparation, as well as to validate and verify results of the inventory calculations, especially for key categories and when country-specific methodologies are used.

UKR - Clarify the role private oil and gas companies that provide AD in the national system;

- Provide all of the required information on its QA/QC plan, and annual QA procedures and their results;

- Improve the transparency of descriptions of QA procedures.

FRA - Provide explanations of how time-series consistency is maintained when EU ETS data is included for more recent years;

- Implement a tier 2 key category analysis and improve transparency in the reporting of uncertainty analysis;

- Implement external reviews of the inventory as part of the QA procedures.

EST - Improve its centralized archiving system, with the aim of ensuring the quality of its inventory for the entire commitment period by storing the background data, documentation on methods, EFs, AD and calculation sheets at the central location;

- Strengthening of the national system and of the sustainability of institutional arrangements, with the aim of building capacity and ensuring the quality of the inventory for the entire commitment period;

- Strengthening of the implementation of the QA/QC plan and verification procedures;

- Allocation of efforts to identify land areas subject to afforestation, reforestation and deforestation, in order to facilitate the meeting of reporting requirements under Article 3, paragraph 3, of the Kyoto Protocol.

7.3 Decision 19/CMP.1

Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol

The Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol,

Recalling Article 5, paragraph 1, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change, in particular its provision that each Party included in Annex I shall have in place, no later than one year prior to the start of the first commitment period, a national system for the estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol,

Recognizing the importance of such national systems for the implementation of other provisions of the Kyoto Protocol,

Having considered decision 20/CP.7, adopted by the Conference of the Parties at its seventh session,

1. *Adopts* the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol as contained in the annex to the present decision;
2. *Urges* Parties included in Annex I to implement the guidelines as soon as possible.

ANNEX

Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol¹

I. Applicability

1. The provisions of these guidelines shall apply for each Party included in Annex I to the Convention which is also a Party to the Kyoto Protocol. Parties' implementation of national system requirements may differ according to national circumstances, but shall include the elements described in these guidelines. Any differences in implementation shall not impair the performance of the functions described in these guidelines.

II. Definitions

A. Definition of national system

2. A national system includes all institutional, legal and procedural arrangements made within a Party included in Annex I for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and for reporting and archiving inventory information.

¹ "Article" in these guidelines refers to an Article of the Kyoto Protocol, unless otherwise specified.

B. Other definitions

3. The meaning of the following terms in these guidelines for national systems² is the same as in the glossary of the Intergovernmental Panel on Climate Change (IPCC) good practice guidance,³ accepted by the IPCC at its sixteenth session:⁴

- (a) **Good practice** is a set of procedures intended to ensure that greenhouse gas inventories are accurate in the sense that they are systematically neither over- nor underestimated as far as can be judged, and that uncertainties are reduced as 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
- (b) **Quality control (QC)** is 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:
 - (i) Provide routine and consistent checks to ensure data integrity, correctness and completeness;
 - (ii) Identify and address errors and omissions;
 - (iii) Document and archive inventory material and record all QC activities.

Quality control activities include general methods such as accuracy checks on data acquisition and calculations and the use of approved standardized procedures for emission calculations, measurements, estimating uncertainties, archiving information and reporting. Higher tier QC activities also include technical reviews of source categories, activity and emission factor data and methods

- (c) **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 QC programme
- (d) **Key source category** is one that is prioritized within the national inventory because its estimate has a significant influence on a country's total inventory of direct greenhouse gases in terms of the absolute level of emissions, the trend in emissions, or both
- (e) **Decision tree** is a flow-chart describing the specific ordered steps which need to be followed to develop an inventory or an inventory component in accordance with the principles of good practice.

4. **Recalculation**, consistent with the UNFCCC reporting guidelines on annual inventories, is a procedure for re-estimating anthropogenic greenhouse gas (GHG)⁵ emissions

² The guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol are referred to herein as "guidelines for national systems".

³ The IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* is referred to as the "IPCC good practice guidance" in these guidelines for national systems.

⁴ Montreal, 1–8 May 2000.

by sources and removals by sinks of previously submitted inventories⁶ as a consequence of changes in methodologies, changes in the manner in which emission factors and activity data are obtained and used, or the inclusion of new source and sink categories.

III. Objectives

5. The objectives of national systems under Article 5, paragraph 1, for the estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, referred to below as national systems, are:

- (a) To enable Parties included in Annex I to estimate anthropogenic GHG emissions by sources and removals by sinks, as required by Article 5, and to report these emissions by sources and removals by sinks in accordance with Article 7, paragraph 1, and relevant decisions of the Conference of the Parties (COP) and/or the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP);
- (b) To assist Parties included in Annex I in meeting their commitments under Articles 3 and 7;
- (c) To facilitate the review of the information submitted under Article 7 by Parties included in Annex I, as required by Article 8;
- (d) To assist Parties included in Annex I to ensure and improve the quality of their inventories.

IV. Characteristics

6. National systems should be designed and operated to ensure the transparency, consistency, comparability, completeness and accuracy of inventories as defined in the guidelines for the preparation of inventories by Parties included in Annex I, in accordance with relevant decisions of the COP and/or COP/MOP.

7. National systems should be designed and operated to ensure the quality of the inventory through planning, preparation and management of inventory activities. Inventory activities include collecting activity data, selecting methods and emission factors appropriately, estimating anthropogenic GHG emissions by sources and removals by sinks, implementing uncertainty assessment and quality assurance/quality control (QA/QC) activities, and carrying out procedures for the verification of the inventory data at the national level, as described in these guidelines for national systems.

8. National systems should be designed and operated to support compliance with Kyoto Protocol commitments relating to the estimation of anthropogenic GHG emissions by sources and removals by sinks.

9. National systems should be designed and operated to enable Parties included in Annex I to consistently estimate anthropogenic emissions by all sources and removals by all sinks of all GHGs, as covered by the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* and IPCC good practice guidance, in accordance with relevant decisions of the COP and/or COP/MOP.

⁵ References to greenhouse gases (GHG) in these guidelines for national systems refer to GHGs not controlled by the Montreal Protocol.

⁶ “National GHG inventories” are referred to simply as “inventories” in these guidelines for the sake of brevity.

V. General functions

10. In the implementation of its national system, each Party included in Annex I shall:
- (a) Establish and maintain the institutional, legal and procedural arrangements necessary to perform the functions defined in these guidelines for national systems, as appropriate, between the government agencies and other entities responsible for the performance of all functions defined in these guidelines;
 - (b) Ensure sufficient capacity for timely performance of the functions defined in these guidelines for national systems, including data collection for estimating anthropogenic GHG emissions by sources and removals by sinks and arrangements for technical competence of the staff involved in the inventory development process;
 - (c) Designate a single national entity with overall responsibility for the national inventory;
 - (d) Prepare national annual inventories and supplementary information in a timely manner in accordance with Article 5 and Article 7, paragraphs 1 and 2, and relevant decisions of the COP and/or COP/MOP;
 - (e) Provide information necessary to meet the reporting requirements defined in the guidelines under Article 7 in accordance with the relevant decisions of the COP and/or COP/MOP.

VI. Specific functions

11. In order to meet the objectives and perform the general functions described above, each Party included in Annex I shall undertake specific functions relating to inventory planning, preparation and management.⁷

A. Inventory planning

12. As part of its inventory planning, each Party included in Annex I shall:
- (a) Designate a single national entity with overall responsibility for the national inventory;
 - (b) Make available the postal and electronic addresses of the national entity responsible for the inventory;
 - (c) Define and allocate specific responsibilities in the inventory development process, including those relating to choice of methods, data collection, particularly activity data and emission factors from statistical services and other entities, processing and archiving, and QC and QA. This definition shall specify the roles of, and cooperation between, government agencies and other entities involved in the preparation of the inventory, as well as the institutional, legal and procedural arrangements made to prepare the inventory;
 - (d) Elaborate an inventory QA/QC plan which describes specific QC procedures to be implemented during the inventory development process, facilitate the

⁷ For the purpose of these guidelines for national systems, the inventory development process encompasses inventory planning, preparation and management. These steps of the inventory development process are considered in these guidelines only in order to clearly identify the functions to be performed by the national systems, as described in paragraphs 12 to 17 of the present guidelines.

overall QA procedures to be conducted, to the extent possible, on the entire inventory and establish quality objectives;

- (e) Establish processes for the official consideration and approval of the inventory, including any recalculations, prior to its submission and to respond to any issues raised by the inventory review process under Article 8.

13. As part of its inventory planning, each Party included in Annex I should consider ways to improve the quality of activity data, emission factors, methods and other relevant technical elements of inventories. Information obtained from the implementation of the QA/QC programme, the review process under Article 8 and other reviews should be considered in the development and/or revision of the QA/QC plan and the quality objectives.

B. Inventory preparation

14. As part of its inventory preparation, each Party included in Annex I shall:

- (a) Identify key source categories following the methods described in the IPCC good practice guidance (chapter 7, section 7.2);
- (b) Prepare estimates in accordance with the methods described in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, as elaborated by the IPCC good practice guidance, and ensure that appropriate methods are used to estimate emissions from key source categories;
- (c) Collect sufficient activity data, process information and emission factors as are necessary to support the methods selected for estimating anthropogenic GHG emissions by sources and removals by sinks;
- (d) Make a quantitative estimate of inventory uncertainty for each source category and for the inventory in total, following the IPCC good practice guidance;
- (e) Ensure that any recalculations of previously submitted estimates of anthropogenic GHG emissions by sources and removals by sinks are prepared in accordance with the IPCC good practice guidance and relevant decisions of the COP and/or COP/MOP;
- (f) Compile the national inventory in accordance with Article 7, paragraph 1, and relevant decisions of the COP and/or COP/MOP;
- (g) Implement general inventory QC procedures (tier 1) in accordance with its QA/QC plan following the IPCC good practice guidance.

15. As part of its inventory preparation, each Party included in Annex I should:

- (a) Apply source-category-specific QC procedures (tier 2) for key source categories and for those individual source categories in which significant methodological and/or data revisions have occurred, in accordance with the IPCC good practice guidance;
- (b) Provide for a basic review of the inventory by personnel that have not been involved in the inventory development, preferably an independent third party, before the submission of the inventory, in accordance with the planned QA procedures referred to in paragraph 12 (d) above;
- (c) Provide for a more extensive review of the inventory for key source categories, as well as source categories where significant changes in methods or data have been made;

- (d) Based on the reviews described in paragraph 15 (b) and (c) above and periodic internal evaluations of the inventory preparation process, re-evaluate the inventory planning process in order to meet the established quality objectives referred to in paragraph 12 (d).

C. Inventory management

- 16. As part of its inventory management, each Party included in Annex I shall:
 - (a) Archive inventory information for each year in accordance with relevant decisions of the COP and/or COP/MOP. This information shall include all disaggregated emission factors, activity data, and documentation about how these factors and data have been generated and aggregated for the preparation of the inventory. This information shall also include internal documentation on QA/QC procedures, external and internal reviews, documentation on annual key sources and key source identification and planned inventory improvements;
 - (b) Provide review teams under Article 8 with access to all archived information used by the Party to prepare the inventory, in accordance with relevant decisions of the COP and/or COP/MOP;
 - (c) Respond to requests for clarifying inventory information resulting from the different stages of the review process of the inventory information, and information on the national system, in a timely manner in accordance with Article 8.
- 17. As part of its inventory management, each Party included in Annex I should make the archived information accessible by collecting and gathering it at a single location.

VII. Updating of the guidelines

- 18. These guidelines shall be reviewed and revised, as appropriate, by consensus, in accordance with decisions of the COP/MOP, taking into account any relevant decisions of the COP.

*2nd plenary meeting
30 November 2005*

7.4 Examples of quality control activity

QC Activity	Procedures
Check that assumptions and criteria for the selection of activity data and emission factors are documented.	Cross-check descriptions of activity data and emission factors with information on source categories and ensure that these are properly recorded and archived.
Check for transcription errors in data input and reference.	Confirm that bibliographical data references are properly cited in the internal documentation. Cross-check a sample of input data from each source category (either measurements or parameters used in calculations) for transcription errors.
Check that emissions are calculated correctly.	Reproduce a representative sample of emissions calculations. Selectively mimic complex model calculations with abbreviated calculations to judge relative accuracy.
Check that parameter and emission units are correctly recorded and that appropriate conversion factors are used.	Check that units are properly labeled in calculation sheets. Check that units are correctly carried through from beginning to end of calculations. Check that conversion factors are correct. Check that temporal and spatial adjustment factors are used correctly.
Check the integrity of database files.	Confirm that the appropriate data processing steps are correctly represented in the database. Confirm that data relationships are correctly represented in the database. Ensure that data fields are properly labeled and have the correct design specifications. Ensure that adequate documentation of database and model structure and operation are archived.
Check for consistency in data between source categories.	Identify parameters (e.g., activity data, constants) that are common to multiple source categories and confirm that there is consistency in the values used for these parameters in the emissions calculations.
Check that the movement of inventory data among processing steps is correct.	Check that emissions data are correctly aggregated from lower reporting levels to higher reporting levels when preparing summaries. Check that emissions data are correctly transcribed between different intermediate products.
(Lower priority) Check that uncertainties in emissions and removals are estimated or calculated correctly.	Check that qualifications of individuals providing expert judgment for uncertainty estimates are appropriate. Check that qualifications, assumptions, and expert judgments are recorded. Check that calculated uncertainties are complete and calculated correctly. If necessary, duplicate error calculations or a small sample of the probability distributions used by Monte Carlo analyses.

<p>Undertake review of internal documentation.</p>	<p>Check that there is detailed internal documentation to support the estimates and enable duplication of the emission data.</p> <p>Check that inventory data, supporting data, and inventory records are archived and stored to facilitate detailed review.</p> <p>Check integrity of any data archiving arrangements of outside organizations involved in inventory preparation.</p>
<p>Check methodological and data changes resulting in re-calculations.</p>	<p>Check for temporal consistency in time series input data for each source category.</p> <p>Check for consistency in the algorithm/method used for calculations throughout the time series.</p>
<p>Undertake completeness checks.</p>	<p>Confirm that estimates are reported for all source categories.</p> <p>Check that known data gaps that result in incomplete source category emissions estimates are documented.</p>
<p>Compare estimates to previous estimates.</p>	<p>For each source category, compare current inventory estimates to previous estimates. If there are significant changes or departures from expected trends, re-check estimates and explain any difference.</p>