Ministry of the Environment of Estonia

National Greenhouse Gas Inventory System in Estonia

Tallinn, July 2007

Preface

The obligation to implement a national inventory system for the estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases is a result of the Article 5.1 of the Kyoto protocol.

The report on national system for greenhouse gas inventories describes how the functions required for the national system will be implemented in Estonia. The report has been prepared by the Estonian Environment Information Centre, the Estonian Ministry of the Environment and Tallinn University of Technology

Contents

Introduction

In accordance with the Article 5.1 of the Kyoto protocol 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. In accordance with the Decision 19/CMP.1 a national inventory system (NIS) has to include 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. At the same time NIS has to be designed and operated to ensure the transparency, consistency, comparability and accuracy of inventories. NIS 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 greenhouse gas (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.

The Guidelines for national system are defined in the Annexes of the decisions 20/CP.7 and 19/CMP.1. These guidelines describe various functions that need to be implemented concerning the national system.

The functions are divided into general and specific functions.

The general functions include:

- Establish and maintain the institutional, legal and procedural arrangements necessary to perform the functions defined in the guidelines for national systems, as appropriate, between the government agencies and other entities responsible for the performance of all functions defined in the guidelines for national systems;
- 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;

- Designate a single national entity with overall responsibility for the national inventory;
- Prepare national annual inventories and supplementary information in a timely manner in accordance with the Kyoto protocol and relevant decisions;
- Provide information necessary to meet the reporting requirements.

The specific functions include:

- **Inventory planning**
  - Designate a single national entity with overall responsibility for the national inventory;
  - Make available the postal and electronic addresses of the national entity responsible for the inventory;
  - 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;
  - 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;
  - 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.

- **Inventory preparation**
  - Identify key source categories;
  - Prepare estimates in accordance with the methods described in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories and the IPCC Good Practice Guidance;

- 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;
- Make a quantitative estimate of inventory uncertainty for each source category and for the inventory in total, following the IPCC Good Practice Guidance;
- 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;
- Compile the national inventory;
- Implement general inventory QC procedures (tier 1) in accordance with its QA/QC plan following the IPCC Good Practice Guidance;
- Consider source-specific QC procedures and provide for a basic review of the inventory of personnel that have not been included in the inventory development.

- **Inventory Management**
  - Archive information for each year in accordance with relevant decisions;
  - Provide a review team with access to archived information used by the Party to prepare the inventory;
  - Respond to requests for clarifying inventory information resulting from different stages of the review process of the inventory information, and information on the national system, in a timely manner.

Good practice is in the guidelines for national systems defined as a set of procedures intended to ensure that greenhouse gas inventories are accurate in the sense that they are systematically neither over- nor underestimates as far as can be judged, and that uncertainties are reduced as far as possible. Guidance on preparing greenhouse gas inventories is given in the 1996 IPCC Revised Guidelines for Inventory Preparation (IPCC, 1996) and the IPCC Good Practice Guidance for Uncertainty Management in National Greenhouse Gas Inventories from 2000 (IPCC, 2000). The guidelines on QA/QC and resource prioritization are given in the latter report, which in this document is referred to as the "good practice guidance". For the land use, land-use change and forestry (LULUCF) sector, the IPCC has prepared a supplementary good practice report in 2004 (IPCC, 2004).

Data is reported to the UN Framework Convention on Climate Change (UNFCCC) annually before April 15. Reporting includes tables (using the Common Reporting Format (CRF)), the National Inventory Report (NIR) describing data, methodologies and the main results of the inventory and additional documentation.

1. National responsibilities

1.1. General overview

Single national entity with overall responsibility for the Estonian greenhouse gas inventory is the Estonian Ministry of the Environment (MoE). The inventory is produced in collaboration between the MoE, Estonian Environment Information Centre (EEIC) and Tallinn University of Technology (TUT). The Estonian Environmental Research Centre (EERC) is also involved since 2007.

The MoE is responsible for:

- Coordinating the overall inventory preparation process;
- Approving the inventory before official submission to the UNFCCC;
- Concluding the formal agreements with inventory compilers annually by 1st of July (TUT, EERC, etc);
- Coordinating the cooperative work between the inventory compilers and UNFCCC;
- Informing the inventory compilers about the requirements of the national system and ensuring that existing information in national institutions is considered and used in the inventory where appropriate;
- Coordinating the UNFCCC inventory reviews.

Climate and Ozone Bureau in EEIC is responsible for:

- Completing the National Inventory Report according to the parts submitted by the inventory compilers;
- Reporting the greenhouse gas inventory to the UNFCCC, including the National Inventory Report and CRF tables;
- Coordinating the QA/QC plan;
- Preparation of the UNFCCC inventory reviews and coordinating the communication with the expert review team, including responses to the review findings;
- Overall archiving system.

Department of Thermal Engineering and Department of Chemistry at Tallinn University of Technology prepare the estimates for the Energy, Industrial Processes, Agriculture, Waste and LULUCF sectors. They collect activity data, prepare relevant QC, fill in the sectoral data to the CRF Reporter and prepare sectoral parts of the NIR. They also have archiving system for the sectors that they are working with.

The EERC is responsible for the industrial process sector together with the fluorinated gases estimates in the 2005 inventory preparation.

1.2. Legal basis

In accordance with § 117 of the Ambient Air Protection Act (RT I 2004, 43,298; 2007, 19, 95), activities for the reduction of climate change are organised by the Ministry of the Environment on the basis of the requirements for the restriction of the limit values of emissions of greenhouse gases provided by the United Nations framework Convention on Climate Change and the Kyoto Protocol to the United Nations Framework Convention on Climate Change.

In accordance with §12 section 5 of the Statute of the Ministry of the Environment, the Ministry coordinates international cooperation and the implementation of international agreements in its jurisdiction and according to §36 section 4, the Department of Environmental Management and Technology deals with ambient air, including climate change problems.

§2 section 1 subsection 3 of the Statute of the Department of Environmental Management and Technology provides that the department shall develop international cooperation in its field, organize the fulfilment of obligations under the conventions and agreements, controls the fulfilment of obligations and intermediates the related information to Estonia. §2 section 2 subsection 5 of the mentioned Statute provides that the Ambient Air and Radiation Protection Bureau shall organize the fulfilment of obligations under the UNFCCC and IAEA conventions and obligations set to the European Union Parties in its field, controls the fulfilment of obligations, analyses the fulfilment process and intermediates the related

information. §2 section 2 subsection 15 of the above Statute provides that the Ambient Air and Radiation Protection Bureau shall organise the required reports related to its field.

The Estonian Environmental Information Centre works under the jurisdiction of the Ministry of the Environment and in accordance with its Statute (RTL 2004, 1, 3), the Climate and Ozone Bureau deals with climate change issues. Responsibilities of the Ministry of the Environment and of the Estonian Environmental Information Centre concerning the greenhouse gas inventory are regulated by the Directive of the Minister of the Environment that is already in the signing process.

A co-operation agreement between the Ministry of the Environment and University of Technology is under preparation and will be concluded in September 2007 the latest. The agreement sets out the mutual cooperation directions in the field of climate change, including greenhouse gas inventory compilation for 5 years. The contract agreement with the Estonian Environmental Research Centre was concluded on 28 May 2007, wherewith the Estonian Environmental Research Centre obligates to compile the industrial processes sector in Estonia's GHG inventory.

The Statistical Office of Estonia collects statistical data on the basis of the Official Statistics Act § 3(2), taking into consideration the official statistical surveys approved by the Government of the Republic. The official statistical surveys of the year 2007 are approved by Government of the Republic in Regulation No. 549 of 16 October 2006. According to the Regulation, data of carbon dioxide, methane, nitrous oxide, freons and sulphur hexafluoride emissions and carbon dioxide removals by ecosystems are collected during the survey "Greenhouse gases emissions and removals". The data on freons and sulphur hexafluoride are based on the survey "Using of Chemicals".

1.3. Institutional cooperation

The three core institutions: MoE, EEIC and TUT work together to fulfil the requirements for the national system. Since 2007 the Estonian Environmental Research Centre is also involved and is responsible for the industrial processes sector. The overview of the allocation of responsibilities is shown in Figure 1.

The EEIC is a state organisation administered by MoE. The functions of the EEIC are covered with a Statute of Estonian Environment Information Centre.

The MoE has signed an agreement with TUT and EERC. Through these agreements, the institutions are committed to implement the QA/QC and archiving procedures, documentation, making information available for review, and delivering data and information in a timely manner to meet the deadline for reporting to the UNFCCC.

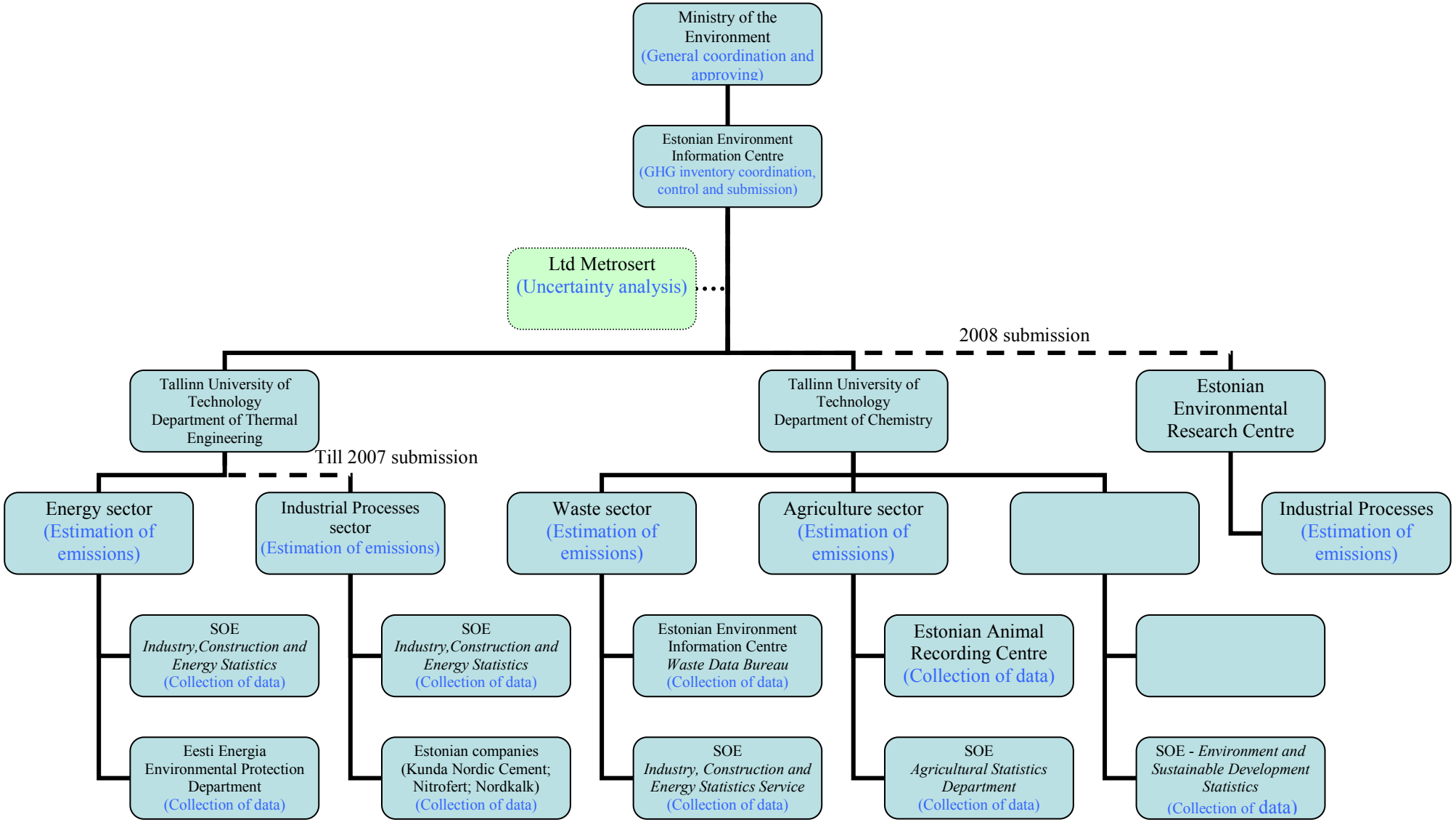
For the calculation of uncertainty analysis the MoE has an agreement with the Central Office of Metrology in Estonia, Ltd Metrosert.

These institutions are in close contact with each other. Several cooperation meetings are held to discuss and agree on the methodological issues, problems that have arised and improvements that need to be implemented. As Estonia is a small country there is close contact between inventory experts (TUT) and inventory compiler (EEIC) and as a result different problems and misunderstandings are also solved on a daily basis.

During the cooperation meetings the following subjects are addressed:

- Preparation of the annual review;
- Discussion on the comments received from the expert review and agreeing on possible changes that have to be made;
- Discussion on the different problems that came up during the last inventory preparation and find solutions to improve the overall system;
- Discussion on methodologies and possible changes in the future;
- Discussion on QA/QC plan, available resources and possible improvements;
- Discussion on data collection and agreeing on possible institutions that could be also involved;
- Agreement on recalculations;
- Archiving system, updating and possible improvements;
- Exchange of relevant information;
- Reporting the conclusions from the meetings and dividing the responsibilities.

Figure 1. Structure of the National Inventory System



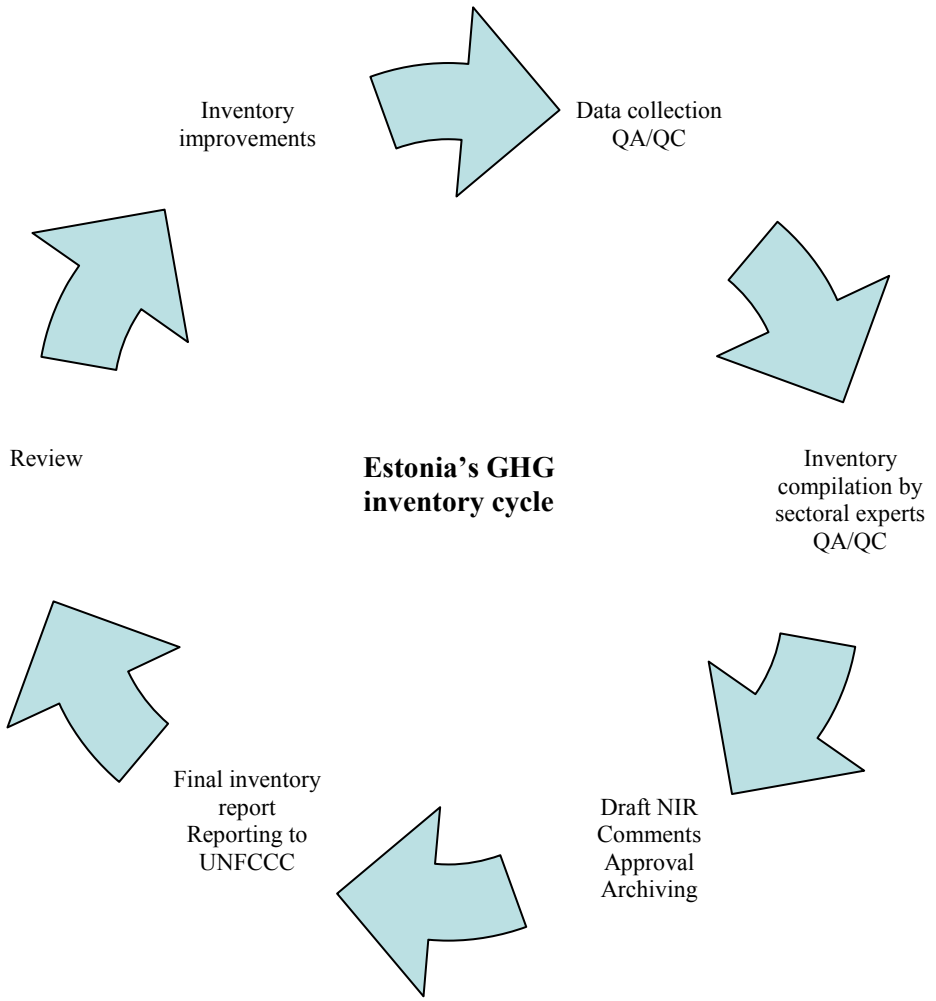
1.4. Inventory production plan

Table 1. Inventory production plan

	Responsible	Deadline
Looking over the changes needed for the next year's reporting, including the comments and suggestions made by the review team.	All	May 15
Agreement on the changes and adjustments to be made for the next year's reporting	All	July 1
Collection of information (activity data) from the Statistical Office of Estonia:		
Energy sector	TUT (Department of Thermal Engineering)	October 01-31
Industrial Processes sector	TUT (Department of Thermal Engineering)	October 01-31
Agriculture sector	TUT (Department of Chemistry)	August 1
LULUCF sector	TUT (Department of Chemistry)	Sept. 1
Collection of information (activity data) from AS Estonian Energy:		
Energy sector	TUT (Department of Thermal Engineering	October 01-31
Collection of information (activity data) from different factories (cement, ammonia, lime, etc factories):		
Industrial Processes sector	TUT (Department of Thermal Engineering	October 01-31
Collection of information (activity data) from Animal Recording Centre:		
Agriculture sector	TUT (Department of Chemistry)	March 1
Collection of information (activity data) from Forest yearbook:		
LULUCF sector	TUT (Department of Chemistry)	Sept. 1
Collection of information (activity data) from Waste yearbook:		
Waste sector	TUT (Department of Chemistry)	Sept. 1
Collection of information (activity data) from Wastewater yearbook:		
Waste sector	TUT (Department of Chemistry)	July 1

Compilation of the CRF tables by the experts and completion of QC and sent to EEIC	TUT	Dec. 1
Compilation of the complete CRF tables and completion of QC	EEIC	Dec. 10
Draft inventory to MoE for comments and QA/QC	EEIC	Dec. 10
Comments by the MoE	MoE	Dec. 25
Final inventory (CRF tables)	EEIC	Jan. 15
NIR 1st draft by sectoral experts	TUT	Feb. 1
NIR 1st draft	EEIC	Feb. 15
QA/QC	All, public review	March 15
NIR finalized	EEIC	April 1
Formal approval of inventory for the purpose of reporting	MoE	April 10
Reporting	EEIC	April 15

Figure 2. The inventory preparation cycle



2. QA/QC plan

It is important that the national greenhouse gas inventories would be readily assessed in terms of quality. It is good practice to implement quality assurance/quality control (QA/QC) procedure in the development of national greenhouse gas inventories.

Quality Control (QC) is a system of routine technical activities to assess and maintain the quality of the inventory as it is being compiled. It is performed by personnel compiling the inventory. The QC system is designed to:

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

QC activities include general methods such as accuracy checks on data acquisition and calculations, and the use of approved standardised procedures for emission and removal calculations, measurements, estimating uncertainties, archiving information and reporting. QC activities also include technical reviews of categories, activity data, emission factors, other estimation parameters, and methods.

Quality Assurance (QA) is a planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process. Reviews, preferably by independent third parties, are performed upon a completed inventory following the implementation of QC procedures. Reviews verify that measurable objectives were met, ensure that the inventory represents the best possible estimates of emissions and removals given the current state of scientific knowledge and data availability, and support the effectiveness of the QC programme.

2.1. QA/QC responsibilities

All institutions involved in the inventory process (MoE, EEIC; TUT and EERC) are responsible for implementing QC procedures to meet the data quality objectives.

MoE as the national entity is responsible for overall QC and is in charge of checking on an annual basis that the appropriate QC procedures are implemented internally in TUT; EERC and EEIC. The EEIC has an overall responsibility for QC of the data of the emission inventory. EEIC checks the QC reports of TUT and EERC. When EEIC disagrees with the report then the errors are discussed and changes are made if necessary.

Each institution is responsible for reporting on their completion of the QC procedures on an annual basis. This reporting is based on a checklist of general and source-specific QC checks and a textual description of possible recalculations, issues to be followed up before the next submissions, and other relevant information.

MoE as the national entity is responsible for the overall QA of the national system, including the UNFCCC reviews and any national reviews undertaken.

2.2. QC procedures

The Estonian Greenhouse Gas Inventory is compiled by the EEIC. The data compilation and reporting for source sectors are performed by TUT and EERC.

The quality of the inventory is ensured in the course of the compilation and reporting, that consists of four main stages: planning, preparation, evaluation and improvement. The quality management of inventory is a continuous process.

It starts from the consideration of the inventory principles. The setting of concrete annual quality objectives is based on this consideration. The next step is elaboration of the QA/QC plan and implementing the appropriate quality control measures (e.g. routine checks, documentation) focused on meeting the quality objectives set and fulfilling the requirements. In addition, the QA procedures are planned and implemented. In the improvement phase of the inventory, conclusions are made on the basis of the realized QA/QC process and its results.

The sectoral experts from TUT and EERC are collecting data for the national inventory. More detailed information about the data collection, methodologies and QC for each sector are described in chapter 6. The current system complies with the Tier 1 procedures outlined in the Good Practice Guidance (IPCC, 2000). The Tier 1 QC checks for key sources are carried out and individual source category checklists are produced. Also assessment of completeness is evaluated. The system is being developed so that the system complies with Tier 2.

The sectoral experts send their CRF tables to the compiler (EEIC) who puts all the sectors together and completes the CRF tables. During that time the numbers are cross-checked in the CRF reporter to make sure that no mistakes were made during the importing process. Also the CRF completeness check is carried out to make sure that all the necessary data is filled.

When the CRF tables are finalized, the experts will start preparing the sectoral chapters of the NIR. These parts are also sent to the compiler who adds the introduction part and puts the draft NIR together. The compiler arranges the different chapters into one uniform document and makes sure that the structure of the report follows the IPCC guidelines. All figures on emissions and removals in tables and text are checked to make sure that they are consistent with those reported in the CRF. It is also checked that all methodological changes, recalculations, trends in emission and removals are well explained.

When the draft NIR is completed it is sent to the MoE. The Ambient Air and Radiation Protection Bureau in Environmental Management and Technology Department looks over the inventory report and makes sure that the submitted data is officially valid. Also the structure of the report is assessed based on the established requirements. When there are no contradictions the report is introduced for coordination to the Forestry, Waste and Water Department, Deputy Secretary General on Environmental Management and Deputy Secretary General on International Co-operation and afterwards to the Secretary General. When the report is approved by the Secretary General the report can be sent to the EC and UNFCCC.

MoE and EEIC, in collaboration with the expert organizations responsible for the inventory calculation sectors, set yearly quality objectives for the whole inventory at the inventory planning stage and designs the QC procedures needed for achieving these objectives. In addition, the expert organizations set their own, sector and/or category specified quality objectives and prepare their QC plans.

The setting of quality objectives is based on the inventory principles presented in the UNFCCC Guidelines and in the EUs decision on a mechanism for monitoring community greenhouse gas emissions, that is, transparency, consistency, comparability, completeness, accuracy and timeliness. In addition, the principle of continuous improvement is included.

2.3. QA procedures

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 experts or groups not closely connected with the national inventory compilation.

At this moment Estonia is not implementing QA procedures. It is planned to involve several institutions for QA in the next reporting cycle. There are negotiations with Faculty of Power Engineering in Tallinn University of Technology.

Also public review is planned for the next cycle. The draft NIR will be uploaded to the EEIC Climate and Ozone Bureau website www.envir.ee/kliima where all interested parties have an opportunity to comment on it. The public reviews of the draft document offer a broader range of researchers and practitioners in non-governmental organizations, industry and academia, as well as the general public, the opportunity to contribute to the final document. The comments received during these processes will be reviewed and, as appropriate, incorporated into the NIR.

One part of QA is UNFCCC reviews. The reviews are performed by a team of experts (sectoral experts and generalist) from other countries. They are examining the data and methods that Estonia is using, checking the documentation, archiving system and national system. In conclusion they report whether Estonia's overall performance is in accordance with current guidelines. The review report indicates the specific areas where the inventory is in need of improvements.

2.4. Plans for improvements

Estonia's inventory needs to be further developed before it can fulfil the data quality objectives. All institutions involved in the making of the inventory are all part of developing plans for improving the data. The plan will be based on the UNFCCC review, QA/QC activities, information that came up during the previous reporting cycle and other information.

3. Uncertainty calculations

Uncertainty analysis for the energy and industrial processes sectors is conducted by the Central Office of Metrology in Estonia Ltd Metrosert. The uncertainty analysis for the agriculture, LULUCF and waste sectors are conducted by a TUT sectoral expert. MoE has a contract with Ltd Metrosert for the two sectors and also putting together the final document. In the future Ltd Metrosert will be responsible for the complete uncertainty calculations.

4. Recalculations

In accordance with the IPCC guidelines Estonia routinely evaluates whether recalculations of data are needed. Recalculations are made if there have been methodological changes influencing emissions in previous years or changes in data due to correction of errors or changes in preferred data sources.

Estonia made large recalculations for the years 1990-2005 and they are presented in the Estonia's NIR 1990-2005.

5. Archiving

As part of general QC procedures, it is good practice to document and archive all information required to produce the national emissions inventory estimates.

It is good practice for inventory compilers to maintain this documentation for every inventory produced and to provide it for review. It is good practice to maintain and archive this

documentation in such a way that every inventory estimate can be fully documented and reproduced if necessary.

All institutions are responsible for archiving the data they collect and the estimates they calculate. But it is necessary to have a central archiving system located at a single location.

Estonian Environment Information Centre (EEIC) bears the responsibility of archiving and Estonia's central inventory archive is located there. When the reporting cycle ends and all inventory calculations are finalized all experts send their documentation to the compiler and it is stored in one place.

The data and information is archived for each submission year. The archiving includes all input data, all estimated emissions, corresponding letters, all partly filled-in or final CRF, recalculations of previous estimates, submissions to UNFCCC and EC and NIR-s. The archiving system is located in EEIC server which undergoes a daily backup and the backups are securely saved. Also after inventory compilation the calculation results are archived on CD-ROM.

In addition to the main archive, the expert organizations contributing to the sectoral calculation archive the primary data used, internal documentation of calculations and sectoral CRF tables. These organizations keep records of their work on hard disks of individual expert's desktop workstations, with copies on backed up network servers. Also electronic copies on CD-ROMs are produced.

Estonia's archiving system is under development and it will be improved in line with the requirements for the national system.

6. Sectoral information

6.1. Energy

6.1.1. Basic input activities and emissions

Energy sector covers three basic greenhouse gases: CO_2, CH_4 and N_2O. A ratio of CO_2-equivalent emission from energy sector to the total greenhouse gas (GHG) emission of Estonia was 89% in 2004.

Emissions from energy sector are reported in two main CRF categories:

- 1.A. Fuel Combustion (reported gases: CO_2, CH_4 and N_2O);
- 2.A. Fugitive Emissions (reported gas: CH_4).

For calculation GHG emissions from Fuel Combustion, two approaches were used:
1.AA. Fuel Combustion - Reference Approach and
1.AB. Fuel Combustion - Sectoral Approach.

6.1.2. Inventory process

The inventory process for the current year starts with examination of previous years and by analyzing of available datasets in order to improve the inventory due to new knowledge and activity data developed.

Activity data used in the estimates is obtained mainly from the Statistical Office of Estonia.

The Statistical Office publishes:
1. Energy related data in the annual statistical bulletin *Energy Balance* in September. The data received from the Statistical Office cover all fuels used in 6 main end-use sectors (Energy Industries, Manufacturing Industries, Transport, Agriculture, Residential and Commercial/Institutional).

2. Additionally TUT asks every year by special inquiry data on aviation bunkering because this data is not published (in the Energy Balance bulletin there is given data Jet Kerosene

total, not spitted into national and international use) and quantities of some industrial products which are not published (like production of pulp and paper, food and drink, etc) but needed for implementation of GHG Inventory.

Other information sources used in estimates of GHG emissions from energy sector are:

- AS Estonian Energy (data on oil shale consumption for pulverized combustion and for Circulating Fluidized Bed Combustion and oil shale mining data).

6.1.3. Methodology

GHG emissions from energy sector are calculated by researchers of Tallinn University of Technology according to the rules developed in the IPCC Guidelines.

Mainly Tier 1 approach is used for calculation GHG emissions from fuel combustion, only for some local fuels like Oil Shale, Oil Shale Gas and Shale Oil (liquid oil made from oil shale) Tier 2 method is used.

Emission factors are mainly IPCC default factors except Carbon Emission Factors (CEF) for Oil Shale, Oil Shale Gas and Shale Oil. For those fuels Country specific CEF were used.

6.1.4. Main pollution sources

The main sources of GHG emissions from energy sector are:

1.A.1.a	Public Electricity and Heat Production	CO2
1.A.1.b	Petroleum refining	CO2
1.A.1.a	Public Electricity and Heat Production	CO2
1.A.3.b	Road Transportation	CO2
1.A.3.b	Road Transportation	CO2
1.B.2.b	Natural Gas	CH4
1.A.1.a	Public Electricity and Heat Production	CO2
1.A.2.f	Other	CO2
1.B.1.a	Solid Fuels /Coal Mining	CH4
1.A.2.f	Other	CO2
1.A.4.c	Agriculture/Forestry/Fisheries	CO2
1.A.3.c	Railways	CO2
1.A.1.c	Manufacture of Solid Fuels and Other Energy Industries	CO2
1.A.4.b	Residential	CO2

1.A.4.b	Residential	CO2
1.A.2.f	Other	CO2
1.A.4.b	Residential	CH4
1.A.4.c	Agriculture/Forestry/Fisheries	CO2
1.A.4.a	Commercial/Institutional	CO2
1.A.4.a	Commercial/Institutional	CO2
1.A.4.b	Residential	CO2
1.A.3.d	Navigation	CO2
1.A.4.b	Residential	N2O
1.B.2.a	Oil	CH4
1.A.1.a	Public Electricity and Heat Production	N2O
1.A.2.e	Food Processing, Beverages and Tobacco	CO2
1.A.4.a	Commercial/Institutional	CO2
1.A.1.a	Public Electricity and Heat Production	CH4

6.1.5. Process of quality assurance and control (QA/QC)

The elaboration of a formal QC procedure in energy sector started in 2007 (the 2007 submission). QA activities are not implemented in energy sector currently but Estonia will implement QA procedure in energy sector in future submissions as it is required by UNFCCC.

For QC procedure Tier 1 method was used. National experts responsible for the GHG inventory in energy sector perform QC.

QC includes standardized procedures, such as checks on accuracy of activity data acquisition and selection of emission factors and methods, appropriateness of emission calculations, archiving information and reporting is considered.

6.2. Industrial Processes

6.2.1. Basic input activities and emissions

Industrial processes sector (2.A.) covers four basic greenhouse gases: CO_2, HFCs, PFCs and SF_6. A ratio of CO_2-equivalent emission from industrial processes (IP) sector to the total greenhouse gas (GHG) emission of Estonia was approximately 3% in 2004.

Emissions from IP sector are reported in three main CRF categories:

2.A. Mineral products (reported gas: CO_2);

2.B. Chemical industry (reported gas: CO_2);

2.F. Consumption of halocarbons and SF6 (reported gases: HFCs, PFCs and SF6).

6.2.2. Inventory process

The inventory process for the current year starts with examination of previous years and by analyzing of available datasets in order to improve the inventory due to new knowledge and activity data developed.

Activity data used in the estimates is obtained mainly from plants.

There are two sub-sectors in Mineral industries:

- Cement Industry and
- Lime Industry

Data on clinker production (raw material for cement production) is received directly from the cement factory AS Kunda Nordic Cement.

Activity data on lime production is received from Statistical Office.

In chemical industry sector only CO2 emissions from ammonia production are calculated. Activity data is received directly from the ammonia factory AS Nitrofert.

6.2.3. Methodology

GHG emissions from IP sector are calculated by researchers of Tallinn University of Technology according to the rules developed in the IPCC Guidelines.

Tier 2 approach was used for calculation CO_2 emissions from cement and ammonia production and Tier 1 for estimation CO_2 emissions from lime production.

Both, Country Specific and IPCC default factors were used (for clinker and ammonia production-CS and for lime production-D).

6.2.4. Main pollution source

Based on the estimates carried out, the main sources of GHG emissions from IP sector are:

- 2.A.1. Cement Production (CO_2);
- 2.A.2. Lime Production (CO_2);
- 2.B.1. Ammonia Production (CO_2).

6.2.5. Process of quality assurance and control (QA/QC)

The elaboration of a formal QC procedure in IP sector started in 2007 (the 2007 submission). QA activities are not implemented in IP sector currently but Estonia will implement QA procedure in IP sector in future submissions as it is required by UN FCCC rules .

For QC procedure Tier 1 method was used. National experts responsible for the GHG inventory in IP sector perform QC.

6.3. Agriculture (CRF 4)

6.3.1. Basic input activities and emissions

Agriculture sector covers two basic gases: CH_4 and N_2O. A ratio of CO_2-equivalent emission from agriculture sector to the total greenhouse gas (GHG) emission of Estonia was 6% in 2004.

Emissions from agriculture sector are reported in the following CRF categories:

- 4.A. Enteric Fermentation (reported gas: CH_4);
- 4.B. Manure Management (reported gases: CH_4 and N_2O);
- 4.D. Agricultural Soils (reported gas: N_2O).

6.3.2. Inventory process

The inventory process for the given year starts by examination of previous years and by analyzing of available datasets in order to improve the inventory due to new knowledge and activity data developed.

Activity data used in the estimates is obtained mainly from the Statistical Office of Estonia.

The Statistical Office opens the data annually by August. The data received from the Statistical Office are the following:

- number of livestock;
- crop yields;
- volume of N fertilizers applied on agricultural soils.

Other information sources used in estimates of GHG emissions from agriculture sector are:

- Estonian Animal Recording Centre (fat content of milk and number of cows, which give birth);
- Scientific publications (a model of gross intake by pigs).

6.3.3. Methodology

GHG emissions from agriculture sector are calculated by researchers of TUT according to the rules developed in the IPCC Guidelines.

Tier 2 approach is in use in calculating emissions from cattle and swine enteric fermentation and Tier 1 method is use to estimate emissions from other categories of agriculture sector.

Emission factors are mainly IPCC default factors.

6.3.4. Main pollution sources

Based on the estimates carried out, the main sources of GHG emissions from agriculture sector are:

- 4.A. Cattle Enteric Fermentation (CH_4);
- 4.D.1.1. Synthetic Fertilizers (N_2O);
- 4.D.1.4. Crop Residues (N_2O);
- 4.B. Manure Management (N_2O);
- 4.D.2. Pasture, Range and Paddock Manure (N_2O);
- 4.D.3.1. Atmospheric Deposition (N_2O);
- 4.B. Cattle Manure Management (CH_4);
- 4.B. Swine Manure Management (CH_4);
- 4.A. Sheep Enteric Fermentation (CH_4);
- 4.A. Swine Enteric Fermentation (CH_4).

6.3.5. Process of quality assurance and control (QA/QC)

The elaboration of a formal QC procedure in agriculture sector started in 2007 (the 2007 submission).

QA activities are not implemented in agriculture sector in Estonia currently. However, Estonia is required to report results of QA to the UNFCCC, thus Estonia will implement QA procedure in agriculture sector in future submissions.

QC activities comprise Tier 1 method [Penman *et al*., 2000]. National experts responsible for the GHG inventory in agriculture sector perform QC.

QC includes standardized procedures, such as checks on accuracy of activity data acquisition and selection of emission factors and methods, appropriateness of emission calculations, archiving information and reporting is considered.

QC is carried out for the following IPCC categories:

– CH_4 emission from Enteric Fermentation (Dairy Cattle, Non-Dairy Cattle, Sheep, Goats, Horses, Swine, Poultry) (4.A);

– CH_4 emissions from Manure Management (Dairy Cattle, Non-Dairy Cattle, Sheep, Goats, Horses, Swine, Poultry);

– N_2O emissions from Manure Management (Anaerobic Lagoon, Liquid system, Daily spread, Solid storage and dry lot, Pasture range and paddock, Other AWMS) (4.B);

– N_2O emissions from Synthetic Fertilizers applied to agricultural soils (4.D.1.1);

– N_2O emissions from growing of N-fixing Crops (4.D.1.3) and Crop Residue (4.D.1.4);

– Indirect N_2O emissions: Atmospheric Deposition (4.D.3.1) and Nitrogen Leaching and Run-off (4.D.3.2).

6.4. Land Use, Land Use Change and Forestry (CRF 5)

6.4.1. Basic input activities and emissions

Land use, land use change and forestry sector plays an important role in Estonian carbon cycle. A quantity of carbon sequestrated by forest biomass (a quantity of carbon emission from forest felling is not taken into account) was almost equaled to an amount of carbon emitted from fossil fuel combustion in 2004.

The sector covers all three basic GHGs – CO_2, N_2O and CH_4. In the reporting to the United Nations on Climate Change, Tallinn University of Technology is responsible for reporting GHG emissions and removals from LULUCF sector from the following IPCC land category:

- Forest Land (reported gases: CO_2, CH_4 and N_2O).

GHG emissions and removals are reported for the “Forest Land remaining Forest Land” categories:

- carbon sequestration by forest biomass;
- carbon emission from forest felling;
- GHG emissions due to biomass burning (wildfire).

Other land categories of LULUCF sector and associated flows of GHGs are not considered in the framework of the inventory currently. However, Estonia takes steps to develop required datasets for estimation of GHG emissions from other land categories reported in the IPCC Guidelines [GHG LULUCF, 2003].

6.4.2. Inventory process

Activity data on forest biomass and biomass harvest are collected annually between 1 May and 30 April (the national forest inventory).

Activity data are taken from a yearbook published by Estonian Centre of Forest Protection and Silviculture annually by July-August [www.metsad.ee].

6.4.3. Methodology

Carbon flows related to the "Forest Land remaining Forest Land" category are calculated in accordance with the 1996 IPCC Guidelines, some factors used in the calculations are taken from the IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry [GHG LULUCF, 2003].

Tier 1 approach is employed for estimations. CO_2 emission from forest biomass felling is considered to be immediate.

6.4.4. Reporting under the Kyoto Protocol (Article 3.3 and Article 3.4)

Estonia has chosen to account for the activities under Article 3.3 (afforestation, reforestation and deforestation) for the whole commitment period. However, until now Estonia does not have quantitative estimates of the projected anthropogenic GHG flows (emissions and removals) from forestry under Article 3.3 of the Kyoto Protocol during the commitment period. The reporting of emissions and removals under the Article 3.3 will be provided.

Estonia does not have reliable estimates of GHG emissions/removals from activities under Article 3.4 for the first commitment period.

6.4.5. Main pollution sources

Based on the estimates carried out, the main source of GHG emissions from LULUCF sectors is:

- 5.A. Forest management – volume of biomass harvested (CO_2).

6.4.6. Process of quality assurance and control (QA/QC)

The elaboration of a formal QC procedure in LULUCF sector started in 2007 (the 2007 submission).

QA activities are not implemented in LULUCF sector in Estonia currently. However, Estonia is required to report results of QA to the UNFCCC and Estonia will implement QA procedure in future submissions.

Quality control activities comprise Tier 1 method [Penman *et al*., 2000]. National experts responsible for the GHG inventory in LULUCF sector perform QC.

QC is carried out for the following IPCC categories:

- Forest land (5.A.1);
- Biomass Burning (5.A.1).

6.5. Waste (CRF 6)

6.5.1. Basic input activities and emissions

Waste sector covers two basic GHGs – N_2O and CH_4. GHGs are emitted from the following activities of waste sector:

- 6.A. Solid waste disposal (reported gas: CH_4);
- 6.B. Wastewater handing (reported gas: CH_4);
- 6.C. Human sewage (reported gas: N_2O).

Emissions from waste incineration are not reported in Estonia, the issue requires investigations and will be provided in future submissions.

6.5.2. Inventory process

Activity data on solid waste generation and disposal used in calculating emissions are taken from an Estonian Environment Information Centre's yearbook (EEIC) published annually by September.

A staff of Waste Bureau of the EEIC and an expert of waste sector (from Tallinn University of Technology) negotiate on further collaboration, which allows to the expert to receive activity data directly from EEIC waste datasets.

Quantity of methane recovered from landfills is taken from an "Energy Balance" yearbook published by the Estonian Statistical Office annually by September.

Activity data on wastewater treatment used in estimates are taken from an EEIC's annual report published by August.

A staff of Water Bureau of the EEIC and the expert of waste sector negotiated, that since this year (for future submissions) data will be delivered directly to the expert in accordance with a requisition prepared by the expert.

6.5.3. Methodology

Emissions from landfills are estimated based on Tier 1 method of the 1996 IPCC Guidelines in Estonia. Emission sources include solid (domestic) waste disposed on landfills and domestic and industrial sludge landfilled.

Emissions from wastewater handling (domestic and industrial) are calculated using Tier 1 approach of the 1996 IPCC Guidelines. Emissions from sludge are reported in the framework of "solid waste disposal" category.

Emissions from "human sewage" category are estimated by employing Tier 1 method of the 1996 IPCC Guidelines.

6.5.4. Main pollution sources

Based on estimates carried out, the main sources of emissions from waste sectors are:

- 6.A.1. Managed Waste Disposal on Land (CH_4);
- 6.B.2.2. Wastewater handing/Human Sewage (N_2O).

6.5.5. Process of quality assurance and control (QA/QC)

The elaboration of a formal QC procedure in waste sector started in 2007 (the 2007 submission).

QA activities are not implemented in waste sector in Estonia currently. However, Estonia is required to report results of QA to the UNFCCC, thus Estonia will implement QA procedure in future submissions.

Quality control activities comprise Tier 1 method [Penman *et al*., 2000]. National experts responsible for the GHG inventory in waste sector perform QC.

QC includes standardized procedures, such as checks on accuracy of activity data acquisition and selection of emission factors and methods, appropriateness of emission calculations, archiving information and reporting is considered.

QC is carried out for the following IPCC categories:

- Solid Waste Disposal on Land (Managed Waste Disposal on Land) (6.A.1);
- Industrial Wastewater: Wastewater (6.B.1);
- Domestic and Commercial Wastewater: Wastewater (6.B.2.1);
- Human Sewage (6.B.2.2).

References

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