

# **QUALITY MANUAL FOR THE CZECH GREENHOUSE GAS INVENTORY**

**TK02010056-V8**

*RISTO SAARIKIVI (AIR QUALITY DIVISION)*

# Content

<b>Introduction</b> .....	<b>5</b>
<b>Definition of sufficient quality</b> .....	<b>6</b>
<b>Concepts of quality work</b> .....	<b>6</b>
<b>Quality work cycle in the inventory process</b> .....	<b>7</b>
<b>TCCCA principles</b> .....	<b>8</b>
<b>QC checks</b> .....	<b>9</b>
<b>Quality assurance procedures</b> .....	<b>12</b>
Expert peer review.....	13
Expert peer review with another country .....	13
Audits .....	13
Verification of data .....	13
Comparison with the EU countries .....	14
Comparison with atmospheric measurements .....	14
<b>QAQC, uncertainty estimates and KCA</b> .....	<b>14</b>
<b>Frequently asked questions</b> .....	<b>15</b>
Threshold of significance .....	15
Importing and exporting data to the CRF .....	15
The UNFCCC review .....	16
Connection to improvement plan and to a submission Annex .....	17
The EU initial checks review .....	17
The EU capacity building workshops .....	18

Use of notation keys and completeness.....	18
Use of expert judgement form.....	19
Recalculations and justification.....	20
<b>Adapting to new regulatory obligation.....</b>	<b>20</b>
<b>References.....</b>	<b>21</b>
<b>Abbreviations.....</b>	<b>22</b>
<b>Figures and Tables.....</b>	<b>23</b>

**Czech Hydrometeorological Institute**

Na Šabatce 2050/17

143 06 Prague 4 – Komořany

[www.chmi.cz](http://www.chmi.cz)



# Data sheet

CHMI document ID:	TD 000156
MoE certification ID:	MZP/2023/810/238
TA ČR project ID:	TK02010056–V8
Category:	Technical document
Title:	Quality manual for the Czech greenhouse gas inventory
Subtitle:	Version 1
Authors:	Risto Saarikivi
Email:	ristojuhana.saarikivi@chmi.cz
Publisher:	Czech hydrometeorological institute – CHMI ©
Address:	Na Šabatce 2050/17, 143 06 Praha 4 - Komořany, Czechia
URL:	<a href="https://www.chmi.cz/">https://www.chmi.cz/</a>
Year of publication:	2023
Reviewers:	Joel Bengtsson (Naturvårdsverket) and Martin Beck (CHMI)
Financial support:	Technology Agency of the Czech Republic – TA ČR.
Please cite as:	Saarikivi, R. 2023. Quality manual for the Czech greenhouse gas inventory. Version 1. Czech hydrometeorological institute, TD 000156.
Abstract:	Report describes the QAQC management of Czech national greenhouse gas inventory; principles the quality work and planning are based on, processes of the QAQC cycle and related useful documents and guidelines.
Keywords:	Greenhouse gases, emission inventory, quality management, QAQC handbook, UNFCCC, IPCC, CHMI, NIS
ISBN:	
ISSN (electronic):	
Number of pages:	24
Internet version:	Report in pdf format is at <a href="https://www.chmi.cz/files/portal/docs/uoco/oez/nis/nis_do_cz.html">https://www.chmi.cz/files/portal/docs/uoco/oez/nis/nis_do_cz.html</a>

# Introduction

Quality manual for the Czech greenhouse gas inventory, from now on called quality manual, QAQC manual or manual, was developed as a part of the TA ČR research project Théta No. TK02010056-V8. The manual is based on existing UNFCCC (UNFCCC, 2014) and the 2006 IPCC guidelines (IPCC, 2006), their quality assurance (QA) and quality control (QC) requirements, QAQC tools and good practices.

In depth interviews were conducted with each sector expert; Energy, IPPU, LULUCF, Agriculture and Waste to reflect the wider-range of national expertise in the quality manual. The quality manual is useful for anyone, Ministry, institute or private company, who works with the Czech national greenhouse gas (GHG) inventory. It is especially designed for newcomers for the Czech GHG inventory system, but also as a refresher for the current experts and stakeholders. New sector experts were consulted, that the manual would meet the real needs of the experts who are in the beginning of their GHG inventory journey. The cooperation is reflected in the frequently asked questions section of the manual with more hands-on approach than in usual quality manuals. One of the main functions of the quality manual is its usefulness for transferring existing good practises and knowhow to the new workers and harmonising the QAQC practices within the Czech GHG inventory community.

Quality manual is based on two main sources, that set out the quality requirements for the GHG inventory quality; Revision of the UNFCCC reporting guidelines on annual inventories for Parties included in Annex I to the Convention. Decision 24/CP.19. (UNFCCC, 2014) and the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 1-5, Intergovernmental Panel on Climate Change (IPCC, 2006). Quality manual has structure with small modifications from the 2006 IPCC Guidelines QAQC section and explains the international QAQC requirements in the national context. Specific 2006 IPCC Guidelines principles, QC forms and tools are highlighted for the sector experts to perform QAQC processes in the required international level. The quality manual fulfils the UNFCCC requirement for the QAQC plan.

This is the first version of quality manual for the Czech greenhouse gas inventory, but the National Greenhouse Gas Inventory Report of the Czech Republic (CHMI, 2022), from now on NIR, has also a comprehensive up to date description of the Czech institutional arrangements, quality arrangements and roles. Interested stakeholders and sector experts are recommended to visit chapter for the general QAQC part in the latest NIR. This quality manual builds on the lessons learned in the GHG inventory work, which is also reflected in the NIR chapter for the general QAQC part. The most resent category specific quality assurance (QA) and quality control (QC) activities are listed in their relevant chapters in the NIR. Especially the newcomers are welcomed to familiarise themselves with the latest NIR while reading this quality manual. The main idea is, that the quality manual enhances the quality skills and activities of all the interested parties of the Czech GHG inventory system, which in time shows as improvements in the GHG inventory submission.

Lessons learned from the Capacity Building Initiative for Transparency (CBIT) cooperation with the Balkan GHG inventory teams has contributed towards this quality manual.

Author wishes to express appreciation and thank the experts, who participated in the in depth interviews;

Andrea Paulu (Koneko), Emil Cienciala and Jana Beranová (IFER), Beáta Ondrušová (CHMI) and Jana Esterlová (CENIA).

Author wishes to express appreciation and thank various new sector experts, whose input has been valuable for the compiling of the quality manual;

Zuzana Kačmárová (CDV), Jitka Slámová and Barbora Koči (CHMI).

# Definition of sufficient quality

In the ISO 9001 standard, quality requirements arise from need or expectations as stated by either organizations, customers or interested parties. For the GHG inventory under the Convention, the quality requirements come from the UNFCCC (UNFCCC, 2014) and the 2006 IPCC guidelines (IPCC, 2006). Quality and fulfilment of requirements is audited, or in the case of the GHG inventory, reviewed by the external operator, which is the UNFCCC review team (ERT) and for the European Union (EU) Member states (MS), also by the EU review team (TERT).

The 2006 IPCC Guidelines (IPCC, 2006) defines quality control as a system of routine technical activities to assess and maintain the quality of the inventory as it is being compiled. 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.

The 2006 IPCC Guidelines (IPCC, 2006) defines quality assurance as a planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process. Reviews, preferably by independent 3<sup>rd</sup> parties, are performed upon a completed inventory following the implementation of QC procedures.

The 2006 IPCC Guidelines (IPCC, 2006) defines verification as collection of activities and procedures conducted during the planning and development, or after completion of an inventory that can help to establish its reliability for the intended applications of the inventory.

## Concepts of quality work

The 2006 IPCC Guidelines (IPCC, 2006) offers a set of quality elements that are part of a complete QAQC and verification system:

- Participation of an inventory compiler who is responsible for coordinating QAQC and verification activities and definition of roles/responsibilities within the inventory. *In case of Czechia, the compiler does it with the support from the QAQC manager and the compiler team;*
- A QAQC plan;
- General QC procedures that apply to all inventory categories;
- Category-specific QC procedures. *In the case of Czechia, the main responsibility is for the relevant sector expert, but the compiler team provides QC support and coordinates QAQC activities.*
- QA and review procedures. *In the case of Czechia, the main responsibility is for the relevant sector expert, but the compiler team provides QA support and coordinates QA activities and implementation of planned improvements.*
- QAQC system interaction with uncertainty analyses; *this means, that uncertainty level guides the improvement decisions. Higher the uncertainty of sub category, data or parameter, higher priority to improve it.*
- Verification activities;
- Reporting, documentation and archiving procedures.

It is good to mention the key category analysis (KCA) here as it affects the quality requirements for categories. In Czechia, the compiler team provides KCA to sector experts, that they may apply categories with the correct Tier methodology and data requirements. Tier 2 (T2) or Tier 3 (T3) methodologies and T2 QC controls are required for the key categories. Please, see Fig 4.1 in the 2006 IPCC Guidelines (IPCC, 2006)

# Quality work cycle in the inventory process

In the 2006 IPCC Guideline, Fig. 1.1 illustrates an inventory development cycle (IPCC, 2006). It has been a model for the Fig. 4-1 below, which represents the Czech GHG inventory and QAQC cycle under the Convention. (CHMI, 2022) The principle of continuous improvement is built within the cycle.

Czechia has double reporting obligation; to the EU and to the UNFCCC. This can be seen in the Fig. 4.1 (CHMI, 2022) submission dates. It affects the QAQC and inventory cycle. 1. Inventory planning starts after the submission to the UNFCCC in 15<sup>th</sup> of April and after the EU review, which is performed annually from February to April. The EU review recommendations are scheduled to the sector specific improvement plans for each sector expert.

Under the Convention, the UNFCCC review usually happens every 2<sup>nd</sup> year and it's from July to October. The review report with recommendations is not published in time for the January, but it is usually available for the March submission. Of course, the whole review process before the final review report helps the GHG inventory team to prepare for the coming January submission to the EU. The UNFCCC review also takes much needed time resources away from planning and implementing improvements. It is beneficial that the review is not annually. May to August is usually more quiet time in the inventory cycle, so it is a good time for QA activities, data verification and planning of improvements.

During the summer the compiler team meets with the sector experts to coordinate planned improvements and QAQC activities. Possible changes in reporting obligations are communicated and sector experts' needs to fulfil the planned improvements are addressed. Long term planning is also communicated by informing possible national projects from the Ministry of Environment for supporting research to develop the inventory and enable planned improvements. A 3-year TA ČR project is just ending, which has already resulted in improvements in the GHG inventory.

Part 2 of the inventory planning in Fig. 4-1 (CHMI, 2022) represents the preparation phase of the inventory. Sector experts perform internal QC activities related to methodology, data collection and data preparation and documentation to ensure reliable data delivery to the CRF and to the "short" January NIR. Please, see chapter 'QC checks' for the complete list of QC activities to be done and documented. Sector experts are required to deliver QC forms and updated improvement plans in December.

Part 3 and 4 in Fig. 4-1 have intensive QA activities as the EU is performing its initial checks on Member States both to the January and March submissions. The EU initial checks serve as an extra QAQC layer for the EU MS GHG inventory team. Communication between the compiler team and sector experts is expected to be more intense in part 2 and 3. Compiler team encourages sector experts to contact for support in any case.

Under the Paris Agreement, the deadline for the UNFCCC submission will be 31.12. The 2<sup>nd</sup> version of the quality manual will address the quality cycle under the Paris Agreement.

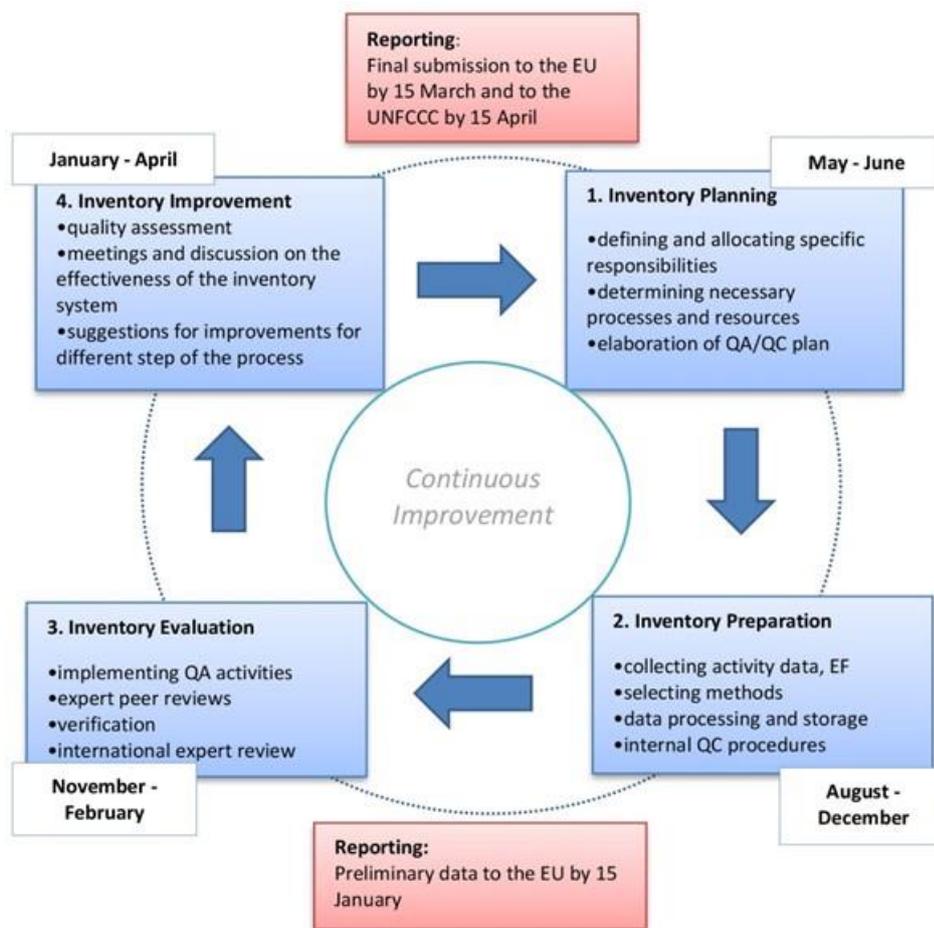


Fig. 4-1 The GHG inventory reporting and QA/QC cycle under the Convention.

## TCCCA principles

UNFCCC Annex I inventory reporting guidelines (UNFCCC, 2014) states, that the annual GHG inventory should be transparent, consistent, comparable, complete and accurate. UNFCCC reporting guidelines (UNFCCC, 2014) describes these principles:

- Transparency** means that the data sources, assumptions and methodologies used for an inventory should be clearly explained, in order to facilitate the replication and assessment of the inventory by users of the reported information. The transparency of inventories is fundamental to the success of the process for the communication and consideration of the information. The use of the common reporting format (CRF) tables and the preparation of a structured national inventory report (NIR) contribute to the transparency of the information and facilitate national and international reviews;
- Consistency** means that an annual GHG inventory should be internally consistent for all reported years in all its elements across sectors, categories and gases. An inventory is consistent if the same methodologies are used for the base and all subsequent years and if consistent data sets are used to

estimate emissions or removals from sources or sinks. Under certain circumstances referred to in paragraphs 16 to 18 below, an inventory using different methodologies for different years can be considered to be consistent if it has been recalculated in a transparent manner, in accordance with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the 2006 IPCC Guidelines);

- (c) **Comparability** means that estimates of emissions and removals reported by Annex I Parties in their inventories should be comparable among Annex I Parties. For that purpose, Annex I Parties should use the methodologies and formats agreed by the COP for making estimations and reporting their inventories. The allocation of different source/sink categories should follow the CRF tables provided in annex II to decision 24/CP.19 at the level of the summary and sectoral tables;
- (d) **Completeness** means that an annual GHG inventory covers at least all sources and sinks, as well as all gases, for which methodologies are provided in the 2006 IPCC Guidelines or for which supplementary methodologies have been agreed by the COP. Completeness also means the full geographical coverage of the sources and sinks of an Annex I Party;
- (e) **Accuracy** means that emission and removal estimates should be accurate in the sense that they are systematically neither over nor under true emissions or removals, as far as can be judged, and that uncertainties are reduced as far as practicable. Appropriate methodologies should be used, in accordance with the 2006 IPCC Guidelines, to promote accuracy in inventories.

Same TCCCA principles are in the 2006 IPCC Guidelines. The GHG inventory preparation, QAQC processes and long-term development of the inventory are done through these principles. Also, the UNFCCC review recommendations are based on these principles. Therefore, the TCCCA principles are affecting everything that is presented in the QAQC manual and serves as a cornerstone for the inventory work of the sector experts.

## QC checks

The 2006 IPCC Guidelines (IPCC, 2006) provides QC check template for Tier 1 (T1) and also a template for the higher Tiers 2 and 3. Below is T1 QC form. These are practical to use, because they represent the different stages in the inventory preparation process and provide concrete QC checks according the TACCC principles.

It is preferable to adopt a good practise to fill in the QC form while preparing the GHG inventory data and conducting QC activities along the way, or afterwards when one GHG inventory preparation step is finished. All the QC activities cannot be done sufficiently in one time due the nature of the inventory process and schedule of the double reporting obligations to the EU and to the UNFCCC.

First the focus is on the methodology and data quality for the January submission to the EU, but also the January short NIR chapter should be updated with focus on justification of recalculations, trend changes, outliers and explaining the use of notation keys (NK). For the March submission to the EU, it is important to check that NIR values are identical to the CRF values and CRF reporting tables. These QC checks are responsibility of sector expert. After sector experts, the compiler team performs additional QC checks on CRF data and does completeness check, which is added as Annex to the submission. Please, notice that not all the QC checks in the form are relevant to each sector, and sector expert may have developed more suitable category specific QC checks that are not in the form.

For the April UNFCCC submission, the compiler team performs QC checks between NIR and the CRF tool and the focus is on the NIR updates done by the sector expert. The compiler team resources are limited and especially time is scarce. Hence, by adopting QC routines as internal part of work processes and following the 2006 IPCC Guidelines (IPCC, 2006) sector expert minimises discrepancies and errors. Random errors are acceptable, systematic year to year errors are not. If systematic repeating errors happen, the QC process has broken down in

all the levels of the national GHG inventory, which needs to be assessed before the next submission. We all do errors and that is why we have standardised and sometimes automated QC routines to minimise human error from the system. Below Tab 6-1 is the QC form for T1.

**Summary of control results**

Overview of findings and corrections:

*description of findings*

*(Relates to immediate QC actions)*

Suggested corrections, which should be realized in the next submission:

*description of suggested corrections*

*(Add the action to the improvement plan (IP) excel and schedule it for the next submission)*

Issues remaining after the corrections:

*description of remaining issues*

*(Add the issue to the improvement plan (IP) excel, schedule it and write next steps how to proceed, if known at that time. If next steps unknown, the improvement needs to be planned properly in the summer or when less time pressing obligations)*

Item		Checked completed			Corrective action		
		Date	Who, initials	Errors (Y/N)	Date	Who, initials	Supporting documents
<b>Input data QC</b>							
1	Cross-check activity data from each category (either measurements or parameters used in calculations) for transcription error (errors between the source of data and spreadsheets).						
2	Check that units are properly labelled in calculation sheets.						
3	Check that units are correctly carried through from beginning to end of calculations.						
4	Check that conversion factors are correct.						
5	Check that temporal and spatial adjustment factors are used correctly.						
6	Cross-check activity data between calculation spreadsheets and <b>CRF</b> tables (and if needed in <b>NIR</b> ).						
7	Other (please specify)						
<b>Calculation</b>							
8	Reproduce a set of emissions and removals calculations.						
9	Use a simple approximation method that gives similar results to the original and more complex calculation to ensure that there is no data input error or calculation error.						
10	Identify parameters (e.g., activity data, constants) that are common to multiple categories and confirm that there is consistency in the values used for these parameters in the emission/removal calculations.						
11	Check that emissions and removals data are correctly aggregated from lower reporting levels to higher reporting levels when preparing summaries (also in <b>CRF</b> tables)						

12	Check that emissions and removals data are correctly transcribed between different intermediate products, including calculation spreadsheets, <b>CRF</b> tables and <b>NIR</b>						
13	Other (please specify)						
<b>Database files</b>							
14	Confirm that the appropriate data processing steps are correctly represented in the database.						
15	Confirm that data relationships are correctly represented in the database.						
16	Ensure that data fields are properly labelled and have the correct design specifications.						
17	Ensure that adequate documentation of database and model structure and operation are archived.						
18	Other (please specify)						
<b>Consistency</b>							
19	Check for temporal consistency in time series input data for each category.						
20	Check for consistency in the algorithm/method used for calculations throughout the time series.						
21	Check methodological and data changes resulting in recalculations.						
22	Check that the effects of mitigation activities have been appropriately reflected in time series calculations.						
23	Other (please specify)						
<b>Completeness</b>							
24	Confirm that estimates are reported for all categories and for all years from the appropriate base year to the period of the current inventory.						
25	For subcategories, confirm that entire category is being covered.						
26	Provide clear definition of 'Other' type categories ( <b>NIR</b> and spreadsheets)						
27	Check that known data gaps that result in incomplete estimates are documented, including a qualitative evaluation of the importance of the estimate in relation to total emissions (e.g., subcategories classified as 'not estimated').						
28	Other (please specify)						
<b>Trend QC</b>							
29	For each category, current inventory estimates should be compared to previous estimates, if available.						
30	If there are significant changes from expected trends, re-check estimates and explain any differences.						

31	Check value of implied emission factors (aggregate emissions divided by activity data) across time series.						
32	Do any years show outliers that are not explained?						
33	If they remain static across time series, are changes in emissions or removals being captured?						
34	Check if there are any unusual and unexplained trends noticed for activity data or other parameters across the time series.						
35	Other (please specify)						
<b>Data documentation (NIR + DATA)</b>							
36	Check of data file (e.g. importing tables) from the view of completeness						
37	Confirm that bibliographical data references are properly cited in the internal documentation						
38	Check of the references on source of input data in the spreadsheets						
39	Check that all references in spreadsheets are documented						
40	Check of completeness of references on the sources of input data in the computational spreadsheets						
41	Random check of referred materials, if they really contains referred data						
42	Check that assumptions and criteria for the selection of activity data, emission factors and other estimation parameters are properly recorded and archived.						
43	Check that the changes in data or methodology (e.g. recalculations) are described and documented						
44	Check that quotes are realized uniformly						
45	Other (please specify)						

Tab. 6-1 Tier 1 QC form from the 2006 IPCC Guidelines (IPCC, 2006)

## Quality assurance procedures

The 2006 IPCC Guidelines (IPCC, 2006) describes quality assurance to be taken internally or externally in different levels, and they are used additionally to general and category-specific QC procedures. 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 for improvement. In Czechia, both external and internal QA procedures happen in different levels. The international reviews for the whole GHG inventory, the UNFCCC review and the EU review, are considered in the chapter 'Frequently asked questions'.

## Expert peer review

Expert peer review consists of a review of calculations and assumptions by expert in relevant technical fields. This procedure is generally accomplished by reviewing the documentation associated with the methods and results, but usually does not include rigorous certification of data or references such as might be undertaken in an audit (IPCC, 2006). This is the most common way of QA in the Czech GHG inventory processes. The external peer experts have technical competence, but they are not directly involved in the Czech GHG inventory preparations. This ensures the independence of the reviewer and avoids the bias from the QA process. Examples of organisations that have lately participated in peer reviews are universities, other scientific institutes, trade associations in their relevant fields and technical experts from Ministry of Environment.

## Expert peer review with another country

Czechia has a long history of cooperation with the Slovakian GHG inventory team. COVID special circumstances hampered the cooperation, because in person meetings were not allowed, but even then virtual meetings were arranged between the Czech and Slovak experts.

Bilateral collaboration has structure that each year different sector and different general topic are chosen for review. This ensures that all the sectors get reviewed within few years while the general part is always on the table. The review happens in person in two day seminar annually. Sector experts are encouraged to share information and benefit from collaboration also during the reporting cycle. During the COVID, multiple sector experts expressed a need for this cooperation with the Slovakian colleagues for QA purposes. Next meeting is scheduled for May 2023 this spring. For up to date list of individual meetings and their topics, please consult the latest NIR (CHMI, 2022).

Peer reviews have not only been with Czechia and Slovakia, but Hungary, Poland and Austria have participated too in the meetings. The compiler team will inform sector experts about the schedule and agenda, and also encourage experts whose sector is not in the agenda to get contacted by the counterpart expert from Slovakia to enable QA activities, improvement planning and to find co-benefits via cooperation and information exchange.

## Audits

For the purpose of good practice in inventory preparation, audits may be used to evaluate how effectively the inventory compiler complies with the minimum QC specifications outlined in the QC plan (IPCC, 2006). Czech hydrometeorological institute has ISO 9001:2015 quality standard, and the CHMI GHG inventory team was audited last year. The audit was conducted by CHMI expert responsible of the ISO audits in the institution, but external to the CHMI GHG inventory processes.

Any stakeholder of the Czech GHG inventory system may order an external audit for a selected need. The 2006 IPCC Guidelines also encourages compiler to schedule an external audit for example for “initial data collection, measurement work, transcription, calculation and documentation” (IPCC, 2006). Negative side of the external audit is the cost. Peer reviews are more cost-efficient.

## Verification of data

Verification activities include comparison with emissions and removal estimates prepared by other bodies and comparisons with estimates derived from fully independent assessments (IPCC, 2006). If alternative data source

exists in the country, it is a good opportunity to compare activity data applied in the inventory to this external independent data set. Differences may exist, but there should be a feasible explanation for the discrepancies. For increased transparency, results of the verification processes should be reported in the relevant chapters of the NIR. The 2006 IPCC Guidelines warns, that the limitations and uncertainties associated with the verification technique should be thoroughly investigated prior to its implementation so that the results can be properly interpreted (IPCC, 2006)

Czechia has open recommendations from the UNFCCC review team to conduct a verification process to already otherwise approved use of data and methodology. When data comparison produces discrepancies between data sets, cooperation between the two data providers is needed to find out the root cause of the difference in the data. The compiler team offers support for the sector experts in this case too.

International reviewers compare for example, Eurostat, International Energy Agency (IEA) and the EU Emission trading System (ETS) data to reported data in the GHG inventory of the EU MS. Differences are expected to be explained in the relevant chapters of the NIR.

## **Comparison with the EU countries**

Time efficient internal QA activity is to compare data and parameters with the nearby EU countries who have similar national circumstances or to the average EU level. If country has no national parameter available, it is acceptable by the ERT, that country compares parameters from the nearby countries and determines its parameter from them. If this course of action is taken, the ERT will ask reasoning and calculations for justification of the new parameter in the review.

## **Comparison with atmospheric measurements**

At the moment, the Czech GHG inventory team is not engaging in any comparisons with atmospheric measurements. The European Environmental Agency (EEA) has an ongoing project for atmospheric measurements. The Czech GHG inventory team will keep an eye on the developments in this field, but has no any future plans or actions for it planned or does not expect these actions to be taken in the near future.

## **QAQC and uncertainty estimates**

Uncertainty estimates give insight to reliability of data. From the QAQC perspective, its main function is to guide prioritisation of improvements. Higher the uncertainty level, higher the priority to plan the improvement sooner than later.

# Frequently asked questions

The frequently asked questions section reflects the input gained from the in-depth interviews with the national sector experts, lessons learned from the international cooperation in Capacity Building Initiative for Transparency (CBIT), cooperation with the European Topic Center - Climate Change Mitigation (ETC/CM) and from the international review processes over time.

## Threshold of significance

According to the UNFCCC Annex I inventory reporting guidelines (UNFCCC, 2014), when a Party reports not estimated – NE for an insignificant category, use of NE needs to be justified. If the likely level of emissions is below 0.05 % of the national total GHG emissions, and does not exceed 500 kt CO<sub>2</sub> eq., then emissions from that category can be considered insignificant.

Threshold of significance (ToS) = total CO<sub>2</sub> equivalent emissions, including indirect CO<sub>2</sub>, without land use, land-use change and forestry x 0.0005, or in other words it is 0.05% of the national total.

In the Czech 2022-2020 January submission, threshold of significance was 113371.9 kt x 0.005 = 56.7kt.

During the reviews, a sector expert may argue that a discussed issue is below the ToS. If this is the case, a reviewer will not pursue the issue no more. For the argument, a sector expert needs to produce a calculation for the ToS.

For the improvement purposes, it is wise for the sector expert to check the likely level of significance of the planned improvement. If it's above the ToS, bring this improvement to attention of the compiler team, please. Sometimes the ERT does not approve methodological changes of the reporting Party. When the changes are above the ToS, the ERT will ask for the Party to resubmit. If this happens, no worries, because it only wastes sector expert and compiler team's time resources, but to minimise the risk of resubmitting, please communicate methodological changes and recalculations with the compiler team.

## Importing and exporting data to the CRF

Currently in Czechia, the GHG inventory is based on excel files. Hence, we import and export data by excels to the CRF.

1. Login to UNFCCC CRF reporter in this page: <https://unfccc.int/crfapp/view/listSubmission.jsf>
- 1.1 Select the latest submission
2. Press Import/Export
- 2.1 Press Sectors/Totals +
- 2.2 Select your sector or subsector
- 2.3 Press Export selected sector/subsector. CRF downloads the excel file of the sector or subsector you had selected.

3. Press 'My data export', and the file shows pending and estimated time for its downloading. When downloading is finished, 'My data export' shows File and you can download it to your comp by pressing File.
- 3.1 In the downloaded excel, update your new data on white cells for the whole time series. For the QC habits;
4. Press 'Excel / XML – Import' and 'Choose file' option appears. Press it and upload the right excel with updated data from your computer to the CRF.
5. Wait that CRF has finished uploading, and download again the same sector or subsector. For the QC habits;
  - Check for outliers, consistency of IEF and also compare latest year values to the previous year values. Check if there is a reason for differences or if it's an error; Fix the error or explain changes in the trend in the NIR for transparency.
  - Check that CRF has no empty cells to ensure completeness. Check that no empty cell exists for values, parameters and explanation for NK is provided in a cell or in the documentation box.
  - Check that CRF has the same data as your original calculation sheet. Also use excels and reporting tables from the CRF to update NIR to ensure consistency of data between calculation sheets, CRF tables and NIR text. Sum tests are useful and quick for these checks.

In 2023, CRF AR5 reporting tool became available for the EU MSs. As this is only for a transition period from GWP AR4 to AR5 (IPCC, 2014), this version of the manual will not describe more of the process. New link to the CRF AR5 inventory with existing login credentials were provided to the sector experts in 2023.

From 2024, CRF will be replaced by the CRT electronic reporting tool, which has reporting tables according the Paris Agreement and will be using GWP AR5 values too. CRT is based on CRF, but as the CRT is estimated to be available from summer 2024, the CRT guidance will replace the CRF guidance in the next version of the quality manual.

## The UNFCCC review

UNFCCC review can also be seen as quality assurance process for the Party that is being reviewed. The UNFCCC review happens usually every two year. It starts in July with initial checks on completeness, empty cells, use of NKs and if NE and IE explanation is provided in the reporting table 9, explaining outliers and same values for consecutive years. The 2<sup>nd</sup> set of questions involve checking the status of previous year recommendations, change in trends and that recalculations are justified.

The review week in early October is preserved for more challenging recommendations. Sector experts are expected to be available for the review questions from Monday 8am to Friday 5pm and to provide answer to CZ compiler team by email within 2 days of the question, earlier the better, that the ERT is able to understand the raised issue. If the ERT team feels that more time is needed to understand open issues, the ERT will issue Saturday paper, which will be answered during the weekend.

In some cases, the TERT team asks for virtual meeting or a phone call. Czech GHG inventory team has good experiences from virtual meetings with the ERT as efficient way to reach understanding often resulting only a transparency recommendation. In the meeting are present a representative from the compiler team, the sector expert, reviewer and lead reviewer and a representative from the UNCF. This composition sounds heavy, but is in practise very flexible and quick. Virtual meeting may happen, when the ERT is closing the review week and notices, that they have overlooked something and wish for brief clarification from the Party.

Communication between the TERT and the sector experts goes via compiler team. Schedule is send by email in July to the sector experts and review questions are send in word document and excel as questions appear to iVTR

electronic review tool. There has been cases when the ERT has not stuck with the schedule, which can cause chaos among sector experts, because holidays, personal life and other tasks need to be scheduled too. The compiler team does utmost effort to have excellent communication with each ERT and to provide smooth review environment for the sector experts.

## Connection to improvement plan and to a submission Annex

UNFCCC review recommendations are integrally connected to the improvement plans (IP). New recommendations are added to the sector IP excel and resolved previous recommendations are closed in the IP. After the final review report, ARR, is published, the compiler team updates each IP excel according the new draft review report. The compiler team may prefer to provide sector experts with updated info as soon as possible, meaning that IPs are updated already with the draft review report info. In this case, use of draft ARR is indicated in the updated IP.

UNFCCC open recommendations are connected to an Annex about recommendations, which is provided with the submission. The compiler team fills in the Annex on behalf of the sector expert. Information needed for the Annex from the sector expert are;

- Location in the CRF/CRT or in NIR, chapter, page.
- Status of recommendation; when it was already implemented or when it is scheduled to be implemented.

If above information is not provided in the IP by the sector expert, there will be an increased chance for discrepancies between the Annex information and the real status of the recommendation.

The ERT always asks the status of the previous open review recommendations. Sector expert will have answers ready for this set of review questions, by filling in the IP excel properly.

## The EU initial checks review

The EU ESD review has ended in its past form, but the EU still conducts initial checks to the January and March GHG inventory submissions from the MSs. The annual EU review is a QAQC process, but it can be seen as high quality free capacity building from the EU to the MS, inspiration for improvements and certainly helps MS to prepare for the UNFCCC review.

The EU does its GHG inventory submission based on the MS reporting. Hence, the EU initial checks serves the EU purposes too. The EU has interest in guaranteeing that the data it reports in the EU GHG inventory is according the 2006 IPCC guidelines (IPCC, 2006) and the UNFCCC guidelines for the GHG review (UNFCCC, 2014) and it receives the data in time from the MSs to be able to compile the EU GHG inventory submission to the UNFCCC.

The EU review starts in February and ends in April. Communication between the TERT and sector experts goes via compiler team. Schedule is send by email in February to the sector experts and then review questions as they appear to the EMRT electronic review tool. There is no review week in the EU review.

The previous potential significant issue (PSI) is from 2023 called potential follow-up question. Focus on clarifying potential follow-up questions with the TERT in time. Otherwise the EU will come back to the issue after 15.4 with more detailed questions and offering capacity building and steps how to proceed with the issue. At this date we do not yet have experience of this new procedure, if it's identical to the 2<sup>nd</sup> step of the previous ESD review or if the potential follow-up procedure will be different. More detailed information will be provided in the next version of the QAQC manual.

## The EU capacity building workshops

The EU provides free sector specific capacity building workshops in autumn. Sector experts are highly recommended to participate in their relevant sector workshop (WS) and to take advantage of this unique opportunity for QAQC and improvement planning. The WS also gives guidance if the EU or UNFCCC regulations are changing.

WS is provided virtually. First part is overview of the sector and issues that have been common to many MSs, but sometimes the EU expert may go into detail with a specific issue. MS expert may influence the agenda and contact WS providers in advance and propose a country specific problem to be discussed. All the material and previous year WS material is available in the sharepoint. Please, contact compiler team if you do not have access.

## Use of notation keys and completeness

According the 2006 IPCC Guidelines table 8.1 (IPCC, 2006) it is good practice to fill in information for all entries. Notation keys are appropriate if emission estimates or removal are incomplete, or represent only a part of the total activity or require clarification. Table 8.1 (IPCC, 2006) is below with added guidance.

<b>NE, not estimated</b>	Emissions and/or removals occur but have not been estimated or reported.
Reviewers demand:	Justify the use of NE in the reporting table 9 and include the explanation to the NIR chapter for transparency. Produce a rough estimate to argue, that most likely emission estimates are below the threshold of significance.
<b>IE, included elsewhere</b>	Emissions and/or removals for this activity or category are estimated and included in the inventory but not presented separately for this category The category where these emissions and removals are included should be indicated (for example in the documentation box)
Additional info	Add explanation of IE to each CRF/CRT cell the IE is inserted. Justify the use of IE in the reporting table 9 and add explanation to the NIR chapter for transparency. If emissions are reported in another sector, ensure cross sector data consistency by communicating with that sector expert that values match.
<b>C, confidential info</b>	Emissions and/or removals are aggregated and included elsewhere in the inventory because reporting at a disaggregated level lead to the disclosure of confidential info.
Additional info	In CRF/CRT, insert C for AD and IEF cells, but add emissions. If reviewer asks for the data and calculation sheet, they have signed a confidentiality agreement, and it is ok to send the data to the reviewer.
<b>NA, not applicable</b>	The activity or category exists but relevant emissions or removals are considered never to occur. Such cells are normally shaded in the reporting tables.
Additional info	Explain the use of NA in the NIR chapter.
<b>NO, not occurring</b>	An activity or process does not exist within the country.
Additional info:	Explain the use of NO in the NIR chapter.

## Use of expert judgement form

According to the 2006 IPCC Guidelines vol.1 page 2.21 (IPCC, 2006) it is recommended that expert judgement (EJ) forms are documented as part of the national archiving process, and inventory compilers are encouraged to use EJ forms especially for key categories. When suitable data or parameters are not available, sector experts have to use expert judgement in reporting. It is good practice to fill in the EJ form and transparently describe the reasons and logic of the EJ. Reviewers will be asking for documentation and especially the EJ form, if a sector expert has used expert judgement in reporting. Below is Tab. 9-1 Expert judgement form, which is an example of an EJ form from the 2006 IPCC Guidelines vol.1 Table 2A.1 (IPCC, 2006).

Documentation element	Documentation example
<b>Reference number for judgement</b>	<i>EJIPPU2005-001</i>
<b>Date</b>	<i>14th January 2005</i>
<b>Name of expert(s) involved</b>	<i>Dr Anne N Other</i>
<b>Experts' background</b> ( <i>references, roles, etc.</i> )	<i>Nitric Acid Process emissions and abatement industrial expert</i>
<b>The quantity being judged</b>	<i>National emission factor for emissions of N<sub>2</sub>O from Nitric Acid Plant</i>
<b>The logical basis for judgement</b> ( <i>including any data taken into consideration. This should include the rationale for the high end, low end, and central tendency of any uncertainty distribution</i> )	<i>An absence of measurement data for 9 out of the 10 Nitric Acid plants. The single plant estimate has been recommended as the basis for a national factor to be applied to national nitric acid production</i>
<b>The result</b> ( <i>e.g., activity value, emission factor or for uncertainty the probability distribution, or the range and most likely value and the probability distribution subsequently inferred</i> )	<i>8.5 kgN<sub>2</sub>O/tonne nitric acid produced for 1990 –2003</i>
<b>Identification of any external reviewers</b>	<i>Nitric Acid Trade Association</i>
<b>Results of any external review</b>	<i>See document: e:/2003/ExpertJudgement/</i>
	<i>EJIPPU2005-001.doc</i>
<b>Approval by inventory compiler</b> ( <i>specifying date and person</i> )	<i>25th January 2005, Dr S.B Else</i>

## Recalculations and justification

Recalculations need to be made when new more accurate and representative data becomes available or methodology changes. Reasons for recalculations are provided in the chapter 10 of the NIR by sector expert who has performed recalculation. Impact of the recalculations is calculated in the relevant chapter. Naturally the latest year is not recalculated. The recalculation is for all the affected years in the time series to maintain the time series consistency. Recalculation shows what impact to emission estimates is due to change in new data or methodology. Reviewers always ask about recalculations that are over the threshold of significance. It is a good practice to report and justify all the recalculations in the January NIR to avoid additional questions from the TERT. If recalculation is done between the January submission and the March submission, this recalculation needs to be reported and reason for the recalculation needs to be provided.

## Adapting to new regulatory obligation

This is the first version of quality manual for the Czech greenhouse gas inventory. As reporting under the Convention is coming to its end and reporting under the Paris Agreement will begin in 2024, changes in the international reporting obligations will be updated to the 2nd version of the quality manual in coming years. This manual still refers to current reporting cycle under the Convention. The 2006 IPCC Guidelines (IPCC, 2006) and the 2019 refinement (IPCC, 2019) will still provide the requirements for the reporting under the Enhanced Transparency Framework and the Paris Agreement. It is expected, that the main changes will affect the reporting cycle and quality processes within the new cycle and also new guidance for the UNFCCC reporting tool for Common Reporting Tables (CRT) for the GHG inventories and for the National inventory document (NID), which replaces current NIR.

# References

- 1. IPCC (2006):** 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 1-5, Intergovernmental Panel on Climate Change (IPCC).
- 2. IPCC (2014):** IPCC Fifth Assessment Report: Climate Change 2014, Geneva ([www.ipcc.ch](http://www.ipcc.ch))
- 3. IPCC (2019):** 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 1-5, Intergovernmental Panel on Climate Change (IPCC).
- 4. UNFCCC, (2014):** Revision of the UNFCCC reporting guidelines on annual inventories for Parties included in Annex I to the Convention. Decision 24/CP.19.
- 5. CHMI (2022):** National Greenhouse Gas Inventory Report of the Czech Republic. Prague, Czech hydrometeorological institute, 2022.

# Abbreviations

AD	Activity data
CHMI	Czech hydrometeorological institute
CS	Country specific value
CRF	Common Reporting Format
CRT	Common Reporting Tables
D	Default value
EF	Emission factor
EIONET	European Environment Information and Observation Network
EJF	Expert judgement form
ERT	Expert review team (UNFCCC)
ESD	Effort sharing decision
ETF	Enhanced transparency framework
IEF	Implied emission factor
IP	Improvement plan
IPCC	Intergovernmental Panel on Climate Change
KC	Key category
NIR	National Inventory Report
MOE	Ministry of Environment
MPGs	Modalities, procedures and guidelines
QA	Quality Assurance
QC	Quality Control
QP	Quality Plan
PA	Paris Agreement
SE	Sector expert
TA ČR	Technology Agency of the Czech Republic
T1	Tier 1
TOS	Threshold of Significance
TERT	Technical expert review team (EU)
UNFCCC	United Nations Framework Convention on Climate Change

# Figures and Tables

Fig. 4-1 The GHG inventory reporting and QAQC cycle under the Convention..... 9

Tab. 6-1 Tier 1 QC form from the 2006 IPCC Guidelines (IPCC, 2006) ..... 11

Tab. 9-1 Expert judgement form..... 20

**Czech Hydrometeorological Institute**

Na Šabatce 2050/17

143 06 Prague 4 – Komořany

[www.chmi.cz](http://www.chmi.cz)

