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COMMISSION STAFF WORKING DOCUMENT

Elements of the Union greenhouse gas inventory system and the Quality Assurance and Control (QA/QC) programme

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This staff working paper consists of four chapters and two annexes. It covers the European Union's reporting of greenhouse gas emissions by sources and removals by sinks. It describes the Union inventory system, the QA/QC programme, and progress made. It also provides background information on Commission Decision 2005/166/EC (Implementing Provisions) and adapts some articles where necessary to take into account the specific circumstances of reporting by the Union. These adaptations do not introduce additional reporting obligations for Member States. In 2013, Regulation (EU) No 525/2013 of the European Parliament and of the Council amended and replaced Decision No 280/2004/EC of the European Parliament and of the Council. Commission Decision 2005/166/EC, implementing Decision No 280/2004/EC, will be replaced by delegated and implementing acts adopted under Regulation (EU) No 525/2013.

List of abbreviations

CRF	Common reporting format
DG	Directorate-General (of the European Commission)
EU	European Union
EEA	European Environment Agency
ESTAT	Statistical office of the European Union (a Directorate-General of the European Commission)
GHG	Greenhouse gases
IPCC	Intergovernmental Panel on Climate Change
JRC	Directorate-General Joint Research Centre of the European Commission
LULUCF	Land use, land-use change and forestry
NIR	National Inventory Report
QA/QC	Quality assurance and quality control
QMS	Quality Management System
UNFCCC	United Nations Framework Convention on Climate Change
ETC/ACM	European Topic Centre on Air Pollution and Climate Change Mitigation

CHAPTER I – THE UNION INVENTORY SYSTEM

The Union inventory system in accordance with Article 6(1) of Regulation (EU) No 525/2013¹

1. OBJECTIVES

1. The Union inventory system entails the planning, preparation and management of the Union greenhouse gas (GHG) inventory, and seeks to ensure the accuracy, comparability, consistency, completeness, transparency and timeliness of inventories of Member States with regard to the preparation of the Union GHG inventory in accordance with *UNFCCC Guidelines for annual inventories*.

2. To that end, the European Union has put in place the necessary institutional, legal and procedural arrangements linked to the preparation of the Union inventory. According to Article 23(a) of Regulation (EU) No 525/2013 (hereinafter the Monitoring Mechanism Regulation), the Member States and the Union must cooperate fully with each other on the compilation of the Union GHG inventory and the preparation of the Union GHG inventory report.

2. GENERAL RESPONSIBILITIES

3. Overall responsibility for the Union inventory system rests with the European Commission, more specifically its Directorate-General for Climate Action (DG CLIMA).

4. In accordance with Article 26(1) of Regulation (EU) No 525/2013, the Climate Change Committee established under Article 3 of Regulation (EU) No 182/2011² assists the Commission. The Committee is composed of representatives of the Member States and chaired by a representative of the Commission.

5. Working Group 1 ‘Annual inventories’ (hereinafter WG 1) has been established under the Climate Change Committee as a regular body for exchange of information between the Commission (DG CLIMA, DG ESTAT, DG JRC), the EEA and its ETC (ETC/ACM) and the Member States. The objectives and tasks of WG 1 include:

- (a) promotion of the timely delivery of national annual GHG inventories as required under the Monitoring Mechanism Regulation;
- (b) improvement of the quality of GHG inventories on all relevant aspects

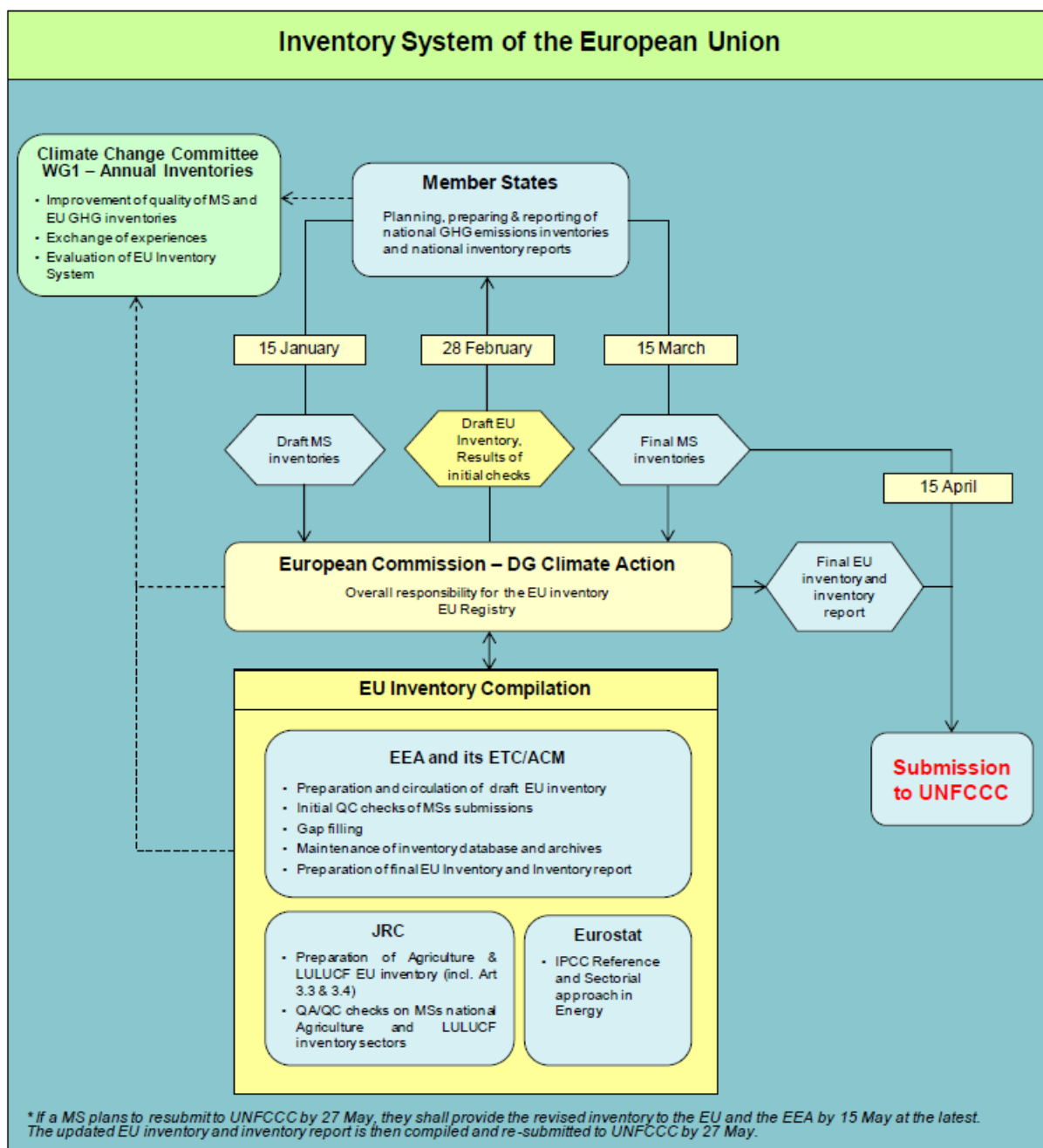
¹ Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC, OJ L165, 18.6.2013, p. 13.

² Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission’s exercise of implementing powers (OJ L 55, 28.2.2011, p. 13).

(transparency, consistency, comparability, completeness, accuracy and timeliness);

- (c) exchange of practical experiences on inventory preparation, on all quality aspects and on the use of national methodologies for GHG estimation;
- (d) evaluation of the current organisational aspects of the Union inventory preparation process and drafting of proposals to improve the process;
- (e) promotion of the implementation of the *Guidelines on national systems under Article 5, paragraph 1 of the Kyoto Protocol* by each Member State and the Union, and to exchange practical experiences of such implementation.

Figure 1 Inventory system of the European Union



6. DG CLIMA is assisted by the European Environment Agency (EEA), which is an agency of the European Union, with member countries going beyond the EU Member States to include Iceland, Liechtenstein, Norway, Switzerland and Turkey³. The EEA is governed by a Management Board consisting of one representative of each of the member countries, two

³ The EEA was established in 1990 by Council (EEC) No 1210/90 of 7 May 1990 on the establishment of the European Environment Agency and the European Environment Information and Observation Network, repealed and replaced by Regulation (EC) No 401/2009 of the European Parliament and of the Council of 23 April 2009 on the European Environment Agency and the European Environment Information and Observation Network (OJ L 126, 21.5.2009, p. 13–22).

representatives of the Commission and two scientific experts designated by the European Parliament. As regards the Union inventory, Article 24 of the Monitoring Mechanism Regulation provides the legal basis for cooperation between the European Commission and the EEA. The specific activities of the EEA are outlined in its respective annual management plans, approved annually by its Management Board.

7. The EEA is assisted in its work by a European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM). The ETC/ACM is an international consortium working with the EEA under a framework partnership agreement. The ETC/ACM assists the EEA in the following activities:

- (a) preparation and circulation of a draft Union inventory annually by 28 February based on Member States' submissions;
- (b) preparation of the final Union inventory consisting of Common Reporting Format (CRF) tables and a Union inventory report annually by 15 April (to be submitted by the Commission to the UNFCCC Secretariat);
- (c) in case of resubmissions by Member States, preparation of the revised Union inventory consisting of the elements described in paragraph (b) above by 27 May (to be submitted by the Commission to the UNFCCC Secretariat);
- (d) maintenance of the inventory database and of inventory archives;
- (e) implementation of QA/QC procedures for the Union inventory as outlined in the Union QA/QC programme;
- (f) consultation with Member States in order to clarify data and other information provided, including consultation during inventory reviews.

8. The Commission's DG ESTAT and DG JRC are also involved in the process of inventory preparation, with their respective roles related to energy statistics for ESTAT and LULUCF and agriculture for JRC. DG ESTAT assists DG CLIMA and cooperates with the EEA in quality assurance and quality control activities of the Union inventory as described in the QA/QC programme, focusing on activity data, in particular energy data. DG ESTAT compiles annual estimates of the Union CO₂ emissions from fossil fuels using the IPCC Reference Approach, based on the ESTAT energy balance data. ESTAT collects energy data from EU Member States under Regulation (EC) No 1099/2008 of the European Parliament and of the Council of 22 October 2008 on energy statistics⁴. The specific activities of DG ESTAT are outlined in its annual statistical work programme.

9. DG JRC assists DG CLIMA and cooperates with the EEA in quality assurance and quality control activities of the Union inventory, focusing on the sectors of land use, land-use change and forestry (LULUCF) and agriculture. JRC performs these activities in close cooperation with the Member States and the research community. The specific activities of DG JRC are outlined in its annual management plan.

⁴ OJ L 304, 14.11.2008, p. 1.

3. PREPARATION OF THE UNION INVENTORY

10. The Union inventory for the complete time series, including the base year and all other inventory years, is established on the basis of the inventories supplied by Member States. The total estimates in the Union GHG inventory should accurately reflect the sum of Member States' national GHG inventories corresponding to the EU's geographical area. The quality of the Union inventory depends on the quality of Member States' inventories. Member States are responsible for the quality of activity data, emission factors and other parameters used for their national inventories as well as the application of methodologies consistent with the IPCC Guidelines, IPCC Good Practice Guidance, 2013 revised supplementary methods and Good Practice Guidance arising from the Kyoto Protocol. Member States are also responsible for establishing QA/QC programmes for their inventories. The QA/QC activities of each Member State are described in the respective national inventory reports and summarised in the Union inventory report. The detailed QA/QC activities of the Union inventory system are described in Chapter II of this staff working document.

11. The Union inventory consists of CRF tables and a Union inventory report. The CRF tables include summary tables, sectoral tables, sectoral background data tables for all years from 1990 to the latest inventory year (year X-2), recalculation tables and trend tables for all Member States and the European Union. The description of the Union GHG inventory system in the inventory report explains the limitations in aggregating Member State data at EU level. Difficulties may arise from differences in activity data, confidentiality of data and data gaps at Member State level, among other things. Short explanations are provided for each table of the CRF that is not included in the Union inventory, explaining why these tables are only provided by Member States.

12. The Union inventory reports the sum of Member States' GHG emissions by sources and removals by sinks from land use, land-use change and forestry activities under Article 3.3 and elected activities under Article 3.4 of the Kyoto Protocol. The Union inventory includes information on those carbon pools in accordance with paragraph 6(e) of the Guidelines under Article 7, paragraph 1, of the Kyoto Protocol as reported in Member States' inventories and refers to Member States' inventory reports with regard to the demonstration that unaccounted pools were not a net source of anthropogenic GHG emissions.

13. The Union inventory report provides descriptions of institutional arrangements, explanations of emission trends, the EU key category analysis, an uncertainty analysis at EU level, information on QA/QC, recalculations, overviews on methodologies and data sources used, an assessment of completeness, responses to the UNFCCC review, and it explains specific issues related to the Union inventory. Detailed descriptions of methodologies and underlying data used for individual national estimates are included in Member States' inventory reports. The Union inventory report also follows the structure provided by the *UNFCCC Guidelines for annual inventories*.

14. The Union inventory contains overviews and references indicating where and how Member States obtained/calculated the underlying national activity data and implied emission

factors. It also includes a list of the contact details of each of the single national entities responsible for the national inventory that have been officially designated by each Member State.

15. The Union inventory refers to Member States' inventory reports with regard to the information required in paragraphs 6, 7, 8 and 9(a), (c) and (d) of the Guidelines under Article 7, paragraph 1, of the Kyoto Protocol on the accounting of sinks under Articles 3.3 and 3.4 of the Kyoto Protocol.

4. IDENTIFICATION OF KEY CATEGORIES

16. For the Union inventory, key categories are identified by the EEA using the IPCC tier 1 methodology. Depending on the availability of country-specific uncertainty estimates from Member States, tier 2 methods from the IPCC Good Practice Guidance are used. The key category analysis at EU level is combined with information on the contribution of Member States to individual EU key categories in order to provide information that indicates which individual Member States are most important with regard to specific key categories.

17. The identification of key categories at EU level is intended to identify those categories that should receive special attention with regard to QA/QC at EU level and to prioritise resources and activities for the improvement of quality at EU level. For decisions on methodological choices in Member States' inventory systems and for prioritisation of national resources, national key category analyses are used.

5. ESTIMATION OF INVENTORY UNCERTAINTIES

18. For the Union inventory, inventory uncertainties are based on the quantitative uncertainty assessments of Member States and methods for combining uncertainties as provided by the IPCC Good Practice Guidance. In addition to the uncertainty assessment at EU level, an overview of uncertainties of Member States' inventories and uncertainty estimation methods are provided in the Union inventory report.

6. RECALCULATIONS OF PREVIOUSLY SUBMITTED ESTIMATES OF ANTHROPOGENIC GREENHOUSE GAS EMISSIONS BY SOURCES AND REMOVALS BY SINKS

19. Recalculations are performed at Member State level. The Union inventory report provides an overview of major recalculations performed by Member States and an analysis of their quantitative effects on the Union inventory.

7. RESPONSE TO THE UNFCCC INVENTORY REVIEW

20. The Union inventory is subject to UNFCCC inventory reviews. The results of these and other reviews are addressed in the Union inventory system. The Union inventory report includes a section that addresses issues raised by the review process in respect of past Union inventories.

21. The Union inventory presents an overview of responses by Member States to issues raised by the UNFCCC and other reviews of their inventories.

8. QUALITY ASSURANCE AND QUALITY CONTROL OF THE UNION INVENTORY REPORT

22. The European Commission (DG CLIMA) is responsible for coordinating QA/QC activities for the Union inventory and ensures that the objectives of the QA/QC programme are established and that a QA/QC plan is developed. The EEA is responsible for the annual implementation of QA/QC procedures for the Union inventory.

23. The Union QA/QC programme is described in detail in Chapter II, and definitions for terms related to QA/QC are provided in Annex I of this document.

9. INFRINGEMENT PROCEDURES

24. Article 258 of the Treaty on the Functioning of the European Union (TFEU) authorises the Commission to start infringement proceedings against any EU Member State that is deemed to be in breach of its obligations. In the context of the Union inventory system and Union inventory report, such obligation would ultimately entail the Member State's submission of a complete GHG inventory as required by the Monitoring Mechanism Regulation. The Commission has made use of infringement procedures with regard both to the inventory that must be submitted by 15 January and the ones due on 15 March and 15 April. In the end, if the Member State does not undertake corrective action to fulfil the legal requirements, the Commission may bring the matter before the European Court of Justice (ECJ). The ruling of the ECJ is binding on the defaulting Member State. To date, no cases have been brought before the ECJ.

10. UPDATING OF THE UNION INVENTORY SYSTEM

25. The Union inventory system is reviewed, and may be updated where appropriate, to ensure that the objectives established in the Monitoring Mechanism Regulation are met.

CHAPTER II – QA/QC PROGRAMME

The Union quality assurance and quality control programme in accordance with Article 6(1)(a) of Regulation (EU) No 525/2013

1. INTRODUCTION

26. This chapter describes the quality assurance and quality control (QA/QC) programme for the annual Union greenhouse gas inventory including the quality objectives and the inventory QA/QC plan. It also describes the responsibilities and the time schedule for the performance of QA/QC procedures. Definitions of quality assurance, quality control and related terms used are those provided in IPCC Good Practice Guidance and Guidelines for National Systems under the Kyoto Protocol. A compilation of these definitions is included in Annex I.

2. GENERAL RESPONSIBILITIES FOR QA/QC AT EU LEVEL

27. The quality of the Union inventory depends on the quality of Member States' inventories. Member States are responsible for the quality of activity data, emission factors and other parameters used for their inventories as well as for adherence to methodologies laid down in the Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories, the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories and the 2013 revised supplementary methods Good Practice Guidance arising from the Kyoto Protocol. Member States are also responsible for establishing national QA/QC programmes for their inventories as part of their national inventory systems. The QA/QC plan included in this document only addresses QA/QC activities at EU level. However, given the unique manner in which the Union inventory is compiled and recognising that inventories of the required standard can only be achieved by undertaking improvements in a systematic way in all Member States, the successful implementation of many of these activities will necessarily involve the coordinated participation of inventory agencies in each Member State.

28. The European Commission (DG CLIMA) ensures that the objectives of the QA/QC programme are fulfilled. The EEA is responsible for the annual implementation of QA/QC procedures for the Union inventory. The EEA performs the tasks relating to the objectives of the QA/QC programme while the EEA's ETC/ACM coordinates QA/QC activities for the Union inventory and develops the QA/QC plan. The National Inventory Report (NIR) and the QA/QC Manual provide an updated overview of the specific responsibilities of individual experts for the implementation of defined QA/QC activities for the most recent inventory submission and the scheduled implementation of these activities during the preparation of the inventory submission.

3. OBJECTIVES OF THE EU QA/QC PROGRAMME

3.1. Overall objectives

29. The overall objectives of the QA/QC programme are:

- (a) to establish quality objectives for the Union GHG inventory taking into account the specific nature of the Union GHG inventory as a compilation of Member States' GHG inventories;
- (b) to implement the quality objectives in the design of the QA/QC plan, defining general and specific QC procedures for the Union GHG inventory submission taking into account the specific nature of the Union GHG inventory;
- (c) to provide a Union inventory of GHG emissions and removals consistent with the sum of Member States' submitted inventories of GHG emissions and removals and covering the EU's geographical area;
- (d) to ensure the timeliness of Member States' GHG inventory submissions for compilation of the Union GHG inventory;
- (e) to ensure the completeness of the Union GHG inventory, inter alia, by implementing procedures to estimate any data missing from the national inventories, in consultation with the Member State(s) concerned;
- (f) to contribute to the improvement of quality of Member States' inventories and
- (g) to provide assistance for the implementation of national QA/QC programmes.

3.2. Specific quality objectives

30. The specific quality objectives of the QA/QC programme referring to and complying with the UNFCCC inventory principles of transparency, completeness, consistency, comparability, accuracy and timeliness are set out in paragraphs 31 to 36 below. They are required for providing concrete and measurable indicators of the standard that is aimed at in the Union inventory preparation and reporting process. They may be reviewed periodically when revising the programme, if necessary.

31. With regard to *transparency*, the objectives are to ensure that:

- (a) transparent information is provided in the NIR on the aggregation of Member States' inventories;
- (b) sectoral background data tables of the CRF are provided where methodologies and activity data used by Member States allow such aggregation;
- (c) transparent documentation is provided on the use of estimation procedure for data missing from a Member State's inventory;

- (d) notation keys are used as indicated in UNFCCC guidelines;
- (e) transparent explanations are provided for NEs reported by Member States, should IPCC 1996 methods be available;
- (f) major trends and sharp increases/decreases of time series emissions in the Union inventory are explained;
- (g) reporting of recalculations is done transparently, based on the largest recalculations by Member States;
- (h) recommendations related to transparency arising from the UNFCCC inventory reviews are addressed in the subsequent inventory submission;
- (i) full documentation is provided on quality checks, checklists and electronic checking routines used for QC procedures.

32. With regard to *completeness*, the objectives are to ensure that:

- (a) estimates are reported for all sources and sinks and for all gases included in the IPCC guidelines for the entire EU area as well as other relevant source/sink categories that may be specific to individual Member States;
- (b) estimates of emissions by sources and removals by sinks from LULUCF activities under Article 3.3 of the Kyoto Protocol and any elected activities under Article 3.4 of the Kyoto Protocol are reported for the entire EU area;
- (c) Member States' estimates of emissions by sources and removals by sinks for all reported gases cover the EU's geographical area for the purpose of the Union GHG inventory compilation and submission to UNFCCC;
- (d) the use of the estimation procedure for data missing from a Member State's inventory is reduced annually, thereby aiming to avoid its use completely;
- (e) recommendations related to completeness arising from the UNFCCC inventory reviews are addressed in the subsequent inventory submission;
- (f) all CRF tables including complete sectoral background data tables of the common reporting format are provided where differences in methodologies or activity data used by Member States allow such aggregation;
- (g) information is provided in the NIR on completeness of Member States' inventories compiled from the national inventory reports of Member States as well as from findings of UNFCCC inventory reviews;
- (h) a summary is provided in the NIR of changes related to completeness of the Union inventory and Member States' inventories and of improvement in completeness since the last inventory submission;
- (i) notation keys NE, NO, NA and IE used by Member States are checked for correct use.

33. With regard to *consistency*, the objectives are to ensure that:

- (a) a consistent time-series of emissions and removals is maintained;

- (b) recalculations at EU level are undertaken in a systematic and timely manner to account for any recalculations reported by Member States;
- (c) recommendations related to consistency arising from the UNFCCC inventory reviews are addressed in the subsequent inventory submission;
- (d) information is provided in the NIR on consistency and recalculations of Member States' inventories compiled from the national inventory reports of Member States as well as from findings of UNFCCC inventory reviews;
- (e) issues related to time series consistency of Member States' inventories during the initial checks are compiled and highlighted, and any inconsistencies encountered are resolved in cooperation with Member States.

34. With regard to *comparability*, the objectives are to ensure that:

- (a) data sets that are comparable among Member States are used to facilitate the compilation of CRF tables at EU level where this does not compromise accuracy;
- (b) all Member States use the methodologies and formats agreed upon under the UNFCCC and the Kyoto Protocol for estimating and reporting their emissions;
- (c) all Member States allocate emissions and removals to source and sink categories in accordance with the split given by the Revised 1996 IPCC Guidelines;
- (d) information (such as methods, emission factors and notation keys used) on sectors and categories is compared across Member States and major areas where differences occur are addressed, with the aim of clarifying the underlying reasons for differences and ensuring that potential problems that occur during such clarification are addressed;
- (e) workshops and expert meetings are organised with a view to addressing comparability issues;
- (f) recommendations related to comparability arising from the UNFCCC inventory reviews are addressed to the extent possible in the subsequent inventory submission.

35. With regard to *accuracy*, the objectives are to ensure that:

- (a) quantitative uncertainty estimates are provided in the Union inventory;
- (b) a description is provided of the aggregation of uncertainties in Member States' inventories at EU level;
- (c) tier 2 or higher tier methods are used for estimating emissions from EU key categories in those Member States covering 75% (ranked by level) of the EU emissions in the category as far as feasible;
- (d) an accurate aggregation of Member States' inventories is provided;
- (e) information is provided in the NIR on accuracy and uncertainties of Member States' inventories compiled from the national inventory reports of Member States as well as from findings of UNFCCC inventory reviews of individual Member States' submissions;

- (f) recommendations related to accuracy arising from the UNFCCC inventory reviews are addressed to the extent possible in the subsequent inventory submission;
- (g) workshops and expert meetings are organised with a view to enhancing accuracy.

36. With regard to timeliness, the objective is that the Union inventory system should provide the fully completed Union inventory by the due date of 15 April to the UNFCCC, and by 27 May, should there be resubmissions by Member States.

37. The European Commission as the body responsible for coordinating QA/QC activities must contribute to improving the quality of Member States' inventories and provide assistance for the implementation of national QA/QC programmes by organising workshops and expert meetings.

4. QA/QC PLAN

4.1. Quality control (QC) procedures

38. Quality control procedures are performed at several different stages during the preparation of the Union inventory. Firstly, a range of checks are needed to determine the consistency and completeness of Member States' data so that they may be compiled in a transparent manner at EU level. Secondly, checks are carried out to ensure that the data are compiled correctly at EU level to meet the overall reporting requirements of the Union inventory. Thirdly, a number of checks are conducted with regard to data archiving and documentation to meet various other data quality objectives set out in Section 3 above.

4.2. Initial QC checks of Member States' inventory submissions

39. Initial checks of Member States' submissions are conducted annually as soon as their inventory submissions are received, and include:

- (a) checking routines in relation to completeness and consistency to check Member States' submissions (using forms and algorithms developed by the UNFCCC secretariat). In relation to consistency these procedures primarily identify and document deviations of implied emission factors in the time series and across Member States;
- (b) checks on correctness of aggregating sub-categories;
- (c) checks on completeness of information in those CRF tables that are necessary for the compilation of the Union inventory;
- (d) checks on completeness ('NE' check) and harmonisation (correct and consistent use of notation keys);

- (e) other completeness checks to determine if gap filling is required in respect of estimates of emissions or removals in any Member State;
- (f) ad-hoc checks on consistency between NIR and CRF in those parts that are necessary for the compilation of the Union inventory report;
- (g) checks as to whether methodological and data changes resulting in recalculations of Member State data are documented appropriately in the CRF;
- (h) checks as to whether uncertainty estimates have been included;
- (i) documentation of any further findings and procedures applied.

40. All deviations, incorrect sums, gaps or other issues identified under subparagraphs 39 (a) to (i) are compiled and documented in the QA/QC web communication tool and/or in the draft Union GHG inventory and inventory report⁵ that is forwarded to Member States by 28 February each year if the necessary data were received by 15 January.

41. Member States are asked to check:

- (a) whether the status and consistency reports are correct, in particular with regard to the completeness checks (reporting of 'NE') in sheet 3 of the status and consistency report. Sheet 4 of the status and consistency report flags potential findings from the QA/QC checks performed using the web-based communication tool during February;
- (b)
- (c) if the correct data/information has been included in the draft CRF tables/draft inventory report;
- (d) the QA/QC findings flagged by the web-based communication tool that refer to the specific Member State; and
- (e) the correctness of the draft Union GHG inventory and inventory report.

The results of these checks, including responses to the QA/QC findings should be provided to the EU inventory team by 15 March at the latest.

42. Any corrective action resulting from the initial checks is taken by Member States in consultation with the EU inventory team. If there are problems that cannot be resolved immediately, the QA/QC coordinator identifies and documents these issues and makes provisions for any follow-up action that might be needed.

43. After the initial checks, all national data from the officially submitted xml files are imported and stored in the CRF Aggregator database. All submissions may be traced back to

⁵ The draft EU GHG inventory and inventory report consists of the following parts:
 (1) The draft EU GHG inventory report;
 (2) Status and consistency reports for EU-27 MS, including results of completeness checks;
 (3) CRF Tables Summary 1.A and 8(a) for EU MS;
 (4) CRF Sectoral Report Tables for EU MS;
 (5) Comparison of Eurostat reference and sectoral approach data with CRF data for the years between 2005 and t-2 for EU-27 MS.

their source according to the version number of their xml files.

44. The same procedures outlined under subparagraphs 39(a) to (i) are conducted for any updates of data received until 15 March. Any corrections or updates are documented in the ETC archive database where latest versions are easily identifiable and corrections of data are clearly traceable to their sources.

45. The QA/QC coordinator must determine the exact electronic checking routines applied and precise QC checklists used under subparagraph 39. The QC checklists must be updated for each inventory submission with regard to the timelines and responsible staff members for the QC checks.

4.3. QC procedures during compilation of the Union inventory

46. Electronic procedures for data processing are used where possible to minimise errors when compiling the Union inventory from the EEA's ReportNet Central Data Repository. Automatic data processing using the CRF Aggregator database ensures that input data from Member States' xml files have been checked for errors associated with data input and with aggregation during intermediate stages of inventory compilation. In addition, an inter-comparison with the EDGAR estimates can be used. The following activities are conducted additionally during the compilation of the Union inventory:

- (a) confirming that all initial submissions and all updates of inventory data received until 15 March from Member States are correctly accounted for in the Union inventory and correctly documented and catalogued;
- (b) ensuring that gap-filling, where applicable, has been undertaken in accordance with the methods set out in Commission Decision 2005/166/EC ('the Implementing Provisions')⁶;
- (c) checking calculations in aggregating Member States' inventory data for all source and sink categories and gases at EU level;
- (d) checking whether emissions and removals estimates are correctly aggregated from lower reporting levels to higher reporting levels when preparing summaries at EU level;
- (e) checking whether Member States' submissions use the same type of input data (e.g. energy consumption, animal population data) and report the same units for activity data which are aggregated at EU level in sectoral background data tables;
- (f) confirming that estimates of emissions and removals are reported at EU level for all relevant source and sink categories of the 1996 Revised IPCC Guidelines and for all years from the appropriate base year to the current inventory;

⁶ Commission Decision of 10 February 2005 laying down rules implementing Decision No 280/2004/EC of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol, OJ L 55, 1.3.2005, p. 57.

- (g) confirming that estimates of emissions by sources and removals by sinks for LULUCF activities under Article 3.3 of the Kyoto Protocol and any elected activities under Article 3.4 of the Kyoto Protocol are reported at EU level;
- (h) checking that all relevant resubmissions provided by Member States are included in the EU resubmission;
- (i) ensuring that any findings from the review of the Union inventory prepared by the UNFCCC secretariat, which are relevant for Member States, are forwarded to these Member States.

47. The circulation of the draft Union inventory and inventory report on 28 February each year to all Member States for review and comment (as described in paragraph 41) is an important QC activity aimed at improving the quality of the Union inventory and inventory report. The Member States review the Union inventory report and check their national data and information used in the report and send updates as necessary by the agreed deadline of 15 March. This procedure facilitates the timely submission of the final Union GHG inventory and inventory report to the UNFCCC secretariat by 15 April and it offers Member States an opportunity to ensure that the GHG estimates they submit to the UNFCCC secretariat are consistent with those in the EU submission. Any resubmission made by a Member State to the UNFCCC needs to be provided to the European Commission by 15 May in order to reflect it in the resubmission of the EU to the UNFCCC by 27 May. The CRF Aggregator tool uses a mysql-database. Automatic data processing steps and clear data relationships ensure the integrity of the data. The data sources are traceable by the version of Member States' xml import files. All data import, aggregation and export procedures are generated automatically. Cell protection is applied to final data export files (annex to NIR).

4.4. Other Inventory Level QC Procedures

48. The following activities related to documentation and archiving are conducted:

- (a) checking whether all inventory data, supporting data, and inventory records are archived and stored appropriately in the ETC/ACM archive database;
- (b) checking whether known data gaps that result in incomplete source category emission estimates and/ or gap-filling at EU level are documented;
- (c) checking whether all recalculations at EU level resulting from Member State recalculations are documented appropriately in the Union CRF and NIR;
- (d) checking whether internal documentation is consistent and complete;
- (e) checking whether bibliographical data references are properly cited and catalogued in the internal documentation.

49. The following activities are performed in relation to trends and consistency of time series:

- (a) emission and removals estimates are compared to previous estimates;
- (b) recalculations conducted by Member States are documented including changes in

- methodology, data or other reasons provided as justification for recalculation;
- (c) comparison of trends in activity data to relevant international statistics, where available, or to other sources of national statistics, where available;
 - (d) checking of implied emission factors across the time series and across Member States.

50. The results of all checks outlined in paragraphs 46 to 49 are documented in the annual QC checklists for inventory preparation. These QC checklist forms, developed by the QA/QC coordinator, are included in part II of the QA/QC Manual. The QA/QC coordinator ensures that these QC checklist forms are used by all staff involved in compiling the inventory and is responsible for the documentation of the completed forms.

5. QUALITY ASSURANCE (QA) PROCEDURES

5.1. Other related activities

51. Good practice for QA procedures requires an objective review to assess the quality of the inventory, and to identify areas where improvements could be made. Therefore a rigorous assessment of the extent to which the specified data quality objectives are being achieved for the Union inventory should be undertaken. Part of the work on improving the quality of the Union inventory is carried out in WG 1 under the Climate Change Committee.

52. A collaborative internal review mechanism enables all participants (Member States, DG CLIMA, EEA and its ETC/ACM, Eurostat, and JRC) to contribute to the identification of shortcomings and propose amendments to existing procedures. The review activities including the approach, the specific focus and the timing are coordinated by the EEA and presented and discussed in WG 1, and they take place during the period from June to December each year. The activities and results are documented. Given the continuous nature of the inventory process, such a review mechanism substantially fulfils the QA requirement to review the completed inventory.

53. A flexible and targeted approach has been adopted for the collaborative internal review activities. The aim is to focus on finding practical solutions to outstanding problems at the inventory level in Member States and at EU level. The reviews may therefore be confined to particular issues or to a limited number of IPCC sectors, as the case may be, depending on the circumstances and status of Member States' inventories.

54. Sector-specific workshops are conducted under the Monitoring Mechanism Regulation (and previously the Monitoring Mechanism Decision) with a view to addressing specific inventory issues and developing follow-up activities to resolve problems, clarify approaches and improve the quality of Member States' inventory submissions. The follow-up activities are subsequently addressed in meetings of WG 1 under the Climate Change Committee.

55. The synthesised findings of collaborative reviews will provide a basis for the planned progressive development of inventories. Priorities will be established for the changes that are required, which will be agreed among participants, so that a strategic and streamlined approach can be followed to achieve improvements. Issues that will need to be addressed by way of further EU workshops may be identified through this review process.

56. Besides the QA procedures mentioned above, QA procedures that are based on the independent UNFCCC review process of the Member States' inventories should be considered. Union QA procedures aim to build on the issues identified during the independent UNFCCC inventory review of Member States' inventories. Quality assurance procedures that are based on outcomes from the UNFCCC inventory review comprise:

- (a) annual compilation of issues identified during the UNFCCC inventory review related to sectors, key categories and the major inventory principles of transparency, consistency, completeness, comparability and accuracy for all Member States;
- (b) identification of major issues related to the compilation and discussion of ways to resolve them in WG 1 under the Climate Change Committee, including identification and documentation of follow-up actions that are considered as necessary within WG 1;
- (c) reviews of the extent to which issues identified through this procedure in previous years have been addressed by Member States.
- (d) Ongoing investigation of ways to produce a more transparent inventory for the unique circumstances of the European Union.

6. EU INTERNAL REVIEW UNDER ARTICLE 19 OF THE MONITORING MECHANISM REGULATION

57. Under Article 20 of the Monitoring Mechanism Regulation the Commission is required to perform annual reviews of the national inventory data submitted by Member States. An implementing act will further determine the timing and steps for conducting these reviews. The first of the comprehensive reviews provided for by Article 19(1) of the Monitoring Mechanism Regulation was already performed in 2012. A second comprehensive review will be conducted after the recalculations to implement 2006 IPCC Guidelines for national GHG inventories and before December 2016. A third comprehensive review will be conducted in 2022. In all years without a comprehensive review, an annual review with checks to verify the transparency, accuracy, consistency, comparability and completeness of information submitted will be performed. Where those checks identify significant issues, such as:

- (a) recommendations arising from earlier Union or UNFCCC reviews which have not been implemented, or questions that have not been explained by a Member State, or
- (b) overestimations or underestimations related to a key category in a Member State's inventory,

(c) or if requested by a Member State in consultation with the Commission, a comprehensive review will be performed for that Member State. The comprehensive review may, where appropriate, result in technical corrections, in consultation with the Member State concerned.

7. OTHER RELATED ACTIVITIES

58. A number of other activities are conducted by EU institutions to support the general inventory quality management system at EU level, but which are not encompassed by the IPCC definition of Quality Assurance. Some of these activities involve comparison exercises related to methods, data and emissions/removals estimates for particular sectors and are intended to assist Member States in preparing their annual inventories and in the application of harmonised methods and data. The results of such exercises may also be used for gap-filling purposes at EU level in cases where Member States have not submitted estimates of emissions or removals. The main activities are summarised in the following paragraphs.

59. DG ESTAT collects energy statistics through five standard questionnaires and from those data ESTAT calculates standardised/harmonised energy balances for each Member State individually and the EU as a whole. These data are used for the estimation of the reference approach and the sectoral approach by the EEA. The EEA compares the results of the two approaches with Member States' CRF submissions. These comparisons are sent to Member States during the consultation on the draft Union GHG inventory by 28 February (see also paragraph 41). In addition, Member States with large differences are asked to provide explanations during the initial checks.

60. DG JRC assists in the improvement of methodologies for the LULUCF and agriculture sectors. It does so by comparing methodologies used among the Member States for estimating emissions and removals from LULUCF and agriculture and by providing EU-wide emissions and removals estimates obtained using various models/methods with a focus on LULUCF. In performing these activities DG JRC interacts closely with the Member States and the research community. The results of these activities are made available to Member States in the period between May and December to assist Member States in the compilation of their national inventories for the subsequent year. In addition, JRC provides the EDGAR estimates as an independent reference for checking the completeness, transparency, correctness and comparability between the EU Member States' inventories. JRC annually issues a CO₂ report with the full estimate of CO₂ emissions for the year before (X-1), using International Energy Agency (IEA) and British Petroleum (BP) statistics and industrial and World Bank data for the most important sectors (e.g. cement).

61. Additional comparisons of Union and Member States' inventories with GHG emissions data from other alternative or independently compiled sources are performed as far as such independent data sources are available (e.g. EU ETS data, data from scientific literature or other institutes or agencies) and as far as the differences in definitions enable such comparisons. Such verification processes may help evaluate the uncertainty in emissions estimates, taking into account the quality and context of both the original inventory data and data used for verification purposes. Alternative estimates should be used carefully in the QA

analysis, in particular if alternative estimates can only provide less accurate data than those provided by Member States. Another activity may address independent verification by inverse modelling building on ongoing research activities in the EU. Results of the verification process and any resulting inventory improvements are documented and reported in the Union inventory report, and identified areas for improvements are incorporated in the Union inventory improvement plan. The availability of additional data sources for verification purposes and the possibility of their use for inventory QA purposes are assessed systematically and periodically, and resulting verification activities are outlined in the annual work programme of the institutions involved in the inventory system. Where verification activities involve periodic activities, clear responsibilities and schedules for such activities are established and included in the QA/QC Manual. Priorities for the development of such activities are the key categories identified for the Union inventory and the possibility to reduce existing uncertainties of the Union inventory.

62. Following the annual submission of the Union inventory to the UNFCCC secretariat, a detailed analysis of trends in GHG emissions in the European Union and in each Member State is carried out as part of the evaluation of progress by Member States and the Union towards meeting their obligations under the UNFCCC, the Kyoto Protocol and Decision No 406/2009/EC as established under Article 21 of the Monitoring Mechanism Regulation. The evaluation compares and analyses Member States' emission trends in key categories identified at EU level and provides the reasons for these trends. The trend analysis provides useful information to support the Union inventory report. It contributes to the understanding of the development of GHG emissions in Member States and may assist in identifying ways to improve the quality of the Union GHG inventory.

8. PROCEDURES FOR DOCUMENTATION AND ARCHIVING

63. On behalf of the Commission (DG CLIMA), the EEA, through the ETC/ACM archive database, manages and maintains the Union GHG inventory database and the documentation of Union inventory information.

The archives must be sufficiently complete to allow an informed analyst to obtain relevant data sources and spreadsheets, reproduce the inventory and review all decisions about assumptions and methodologies that have been made. Section 12 of the QA/QC Manual contains two tables, one presenting the structure of the archive and the other giving an overview of archiving of QA/QC documentation. The documentation includes results of QC checks, QA procedures, and evaluation procedures.

When the annual inventory is finalised, the annual projected folder becomes part of the archives. At that time, it should be complete, and should contain:

- (a) electronic copies of the draft and final Union inventory reports, electronic copies of the draft and final CRF tables and xml files;
- (b) electronic copies of all the final, linked source category spreadsheets for the inventory estimates (including all spreadsheets that feed the emission spreadsheets), as well as any other important spreadsheets;

- (c) all information and data received in the project file from each Member State;
- (d) all additional materials received and included in the project file;
- (e) electronic copies of all checklists, reports and forms that have been completed as part of QA/QC procedures.

64. Adequate backup routines should be in place for all electronic data in the annual project folder.

9. SCHEDULES FOR QA/QC PROCEDURES

Table 1 Schedules for QA/QC procedures⁷

Element	Activity	Who	What	When
Quality control checks	QC	EEA	Initial checks of Member States' data, → status and consistency reports for each Member State	Before 28 February
Quality control checks	QC	EEA	Checks for inventory preparation, → QC checklist for inventory preparation	Before 28 February
Quality control checks	QC	EEA	Checks for Integrity of database	From 15 January to Before 15 April
Quality control checks	QC	EEA	Checks for documentation and archiving	From 15 January to Before 15 April
Quality control checks	QC	Member States	Verification of national data in Union inventory and updates as necessary; Member States' review of draft Union inventory report	1 to 15 March
Quality control checks	QC	EEA	Procedures for archiving	Before 15 April
Archiving	QC	EEA	Annual (digital) documentation file including correspondence,	Before 15 April

⁷ The Union's QA/QC procedures are carried out again in case a Member State resubmits its national GHG inventory by 15 May. The procedure will run until the EU's resubmission of its GHG inventory on 27 May.

Element	Activity	Who	What	When
			references, checks, comments, replies to the comments	
Annual verification activities	QA	ESTAT	Reference approach with DG ESTAT data and comparison of activity data	Before 15 April
Collaborative reviews	QA	EEA, Member States, JRC, ESTAT	EU internal review mechanism	June through September

Annual verification activities	QA	JRC	Improvement of methodologies in agriculture and LUCF sector by JRC	After 15 April for subsequent inventory report
Additional verification activities	QA	EEA	Additional activities depending on data availability and future assessment of possibilities	After 15 April for subsequent inventory report
Compilation	QA	EEA	Compilation of Member States' QA/QC activities	Before 15 April
Assessment of UNFCCC review of MS inventories	QA	EEA	Compile issues identified in annual UNFCCC inventory review for all Member States, discuss solutions and check whether problems were addressed; address issues raised in UNFCCC review of Union inventory	Compilation: November-December, discussion and follow-up: February-April
Trends and projections report	QA	EEA, JRC	Analyse trends in EU and Member States' emissions and compile a trends and projection report	After 15 April
Workshops under WG 1	QA	DG CLIMA, EEA, JRC	Specific workshops on inventory issues and follow-up processes	Throughout the year

10. INVENTORY IMPROVEMENT PLAN

65. The QA/QC Coordinator checks and documents whether the specific quality objectives outlined in paragraphs 31 to 36 have been met. This evaluation is used as an input for the inventory improvement plan.

66. The QA/QC Coordinator draws up an inventory improvement plan based on:

- (a) the results of the evaluation of the fulfilment of specific quality objectives;
- (b) the results of the evaluation of the implementation of the previous improvement plan;
- (c) the results of QA/QC procedures conducted;

- (d) the EU key category assessment;
- (e) the EU uncertainty assessment;
- (f) the findings from the UNFCCC inventory review of the Union inventory taking into account the findings of the UNFCCC inventory review of Member States' inventories.

67. The QA/QC Coordinator annually evaluates the inventory improvement plan and its implementation and updates the plan accordingly, and discusses the results in WG 1 of the Climate Change Committee. The results of this evaluation form the basis for updating the QA/QC programme as referred to in paragraph 45.

11. PUBLICATION OF THE ANNUAL INVENTORY DOCUMENT

68. The publication of the annual inventory document comprising the CRF tables and the Union inventory report passes through the following stages:

1. *Member States review the draft report from 1 March until 15 March.* During the Member States' review process, the draft Union inventory and the inventory report are circulated and reviewed by relevant experts in two stages: (1) Member State experts review the inventory estimates and check whether the correct Member State data have been taken for the Union inventory; and (2) Member State experts review the relevant parts of the draft Union inventory report.
2. *Internal final draft (in electronic format).* This document is the 'final' version, incorporating any comments and updates received during the review processes. This is the document that is delivered to the UNFCCC on 15 April.
3. *Electronic copy of the GHG inventory by the end of May.* The EEA publishes the final Union GHG inventory and the Union inventory report. An electronic copy is available on its website. The publication of the inventory is accompanied by a press release issued by the EEA.

12. ASSESSMENT AND UPDATING OF QA/QC PROGRAMME

69. The QA/QC programme consisting of quality objectives and a QA/QC plan is an EU-internal document serving to organise, plan and implement QA/QC activities. The document is not published but information on the QA/QC programme is readily available. The quality objectives and the QA/QC plan are reviewed annually and modified or updated as appropriate (i.e. when changes in processes occur or on advice of independent reviewers).

CHAPTER III – EVALUATION OF PROGRESS

Evaluation of progress in accordance with Article 21(1) and (3) of Regulation (EU) No 525/2013

70. The Union inventory, the Union inventory report, information provided by Member States under Articles 13(1) and 14(1) of the Monitoring Mechanism Regulation, any updates of national programmes under Article 4(3) of the Monitoring Mechanism Regulation and questionnaires prepared by the Commission, available by 15 April, and under Annex V to Commission Decision 2005/166/EC, available by 15 April (questionnaire on Kyoto mechanisms), are used for the evaluation of progress by the Commission and Member States towards fulfilling their commitments under the UNFCCC and the Kyoto Protocol in accordance with Article 21(1) and (3) of the Monitoring Mechanism Regulation, in terms of whether the progress being made is sufficient to fulfil these commitments.

71. The annual evaluation of actual progress is based to a large extent on emission inventories of Member States and the European Union and on projections. It includes comparison of the base-year emissions with the inventories for subsequent years for the Union and the Member States in order to establish actual trends in emissions. It also includes comparison of inventories for years during the first commitment period under the Kyoto Protocol with the relevant quantified emission limitation and reduction commitments, including consideration of the use of flexible mechanisms under the Kyoto Protocol and activities under Article 3.3 and Article 3.4 of the Kyoto Protocol as indicated in the questionnaires under Annex V to Commission Decision 2005/166/EC. The comparisons are undertaken at different levels:

- (i) EU level, to assess whether the European Union is on track to meet its commitments under the UNFCCC and the Kyoto Protocol;
- (ii) Member State level, to assess whether each Member State (EU-28) is on track to meet its commitment under the UNFCCC, the Kyoto Protocol and/or the EU burden-sharing agreement as indicated in Council Decision 2002/358/EC⁸;
- (iii) EU sectoral or key category level, to assess trends in GHG emissions by key source sector and removals by sinks, due to structural developments and policies and measures.

72. In assisting the Commission in the evaluation of progress, the EEA further addresses the following elements, although not all this information is reflected in the progress report or in such detail:

- (1) For each of the policies and measures reported by Member States, the following aspects are assessed:
 - (a) present status of policies and measures (planning stage, adopted or under implementation);
 - (b) quantitative mitigation impact of individual policies and measures or

⁸ Council Decision 2002/358/EC of 25 April 2002 concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfilment of commitments thereunder (OJ L 130, 15.5.2002, p. 1).

collections of policies and measures, as far as possible;

- (c) interaction with other policies and measures, specifically investigating the interaction of domestic policies and measures and common and coordinated policies and measures within the European Union.

(2) With regard to projections reported by Member States, the quantitative and qualitative information provided in the ‘with measures’ projections and ‘with additional measures’ projections (overall projections as well as projections for individual sectors) is assessed.

(3) As part of the QA/QC process of information used for the evaluation of progress, the EEA also examines the underlying assumptions of the emission projections (e.g. fuel prices, GDP growth) and assesses their consistency across Member States (inter-country comparisons of estimates for similar measures). This is, however, not necessarily reflected in the progress report.

73. EU projections of GHG emissions pursuant to Article 21(3) of the Monitoring Mechanism Regulation are based on Member States’ reported projections. The Commission may also provide alternative projections based on different external assumptions and methodologies (e.g. EU models, projections and scenarios), developed in cooperation with Member States. The Commission ensures the provision of transparent information related to any alternative data sources used in this context.

74. The EEA performs a comparison of projections with commitments which is intended to monitor and assess whether the European Union and its Member States are on track to fulfil their commitments under the UNFCCC, the Kyoto Protocol and Council Decision 2002/358/EC, including consideration of the use of flexible mechanisms under the Kyoto Protocol and activities under Article 3.3 and Article 3.4 of the Kyoto Protocol by Member States. This comparison is based on the assessments referred to in paragraph 73. The Commission identifies, in its annual report to the European Parliament and the Council, made under Article 21(3) of the Monitoring Mechanism Regulation, any issues relevant to compliance with commitments that arise from this comparison.

75. In Annex III the process of submission of Member States’ information and compilation of the EU progress report under the Monitoring Mechanism Regulation by the Commission is specified.

CHAPTER IV

Additional information on Commission Decision 2005/166/EC

76. This chapter provides background information on Commission Decision 2005/166/EC and adaptations of some articles of the Decision where necessary to account for the specific circumstances of reporting by the European Union. These adaptations do not introduce additional reporting obligations for Member States. The article numbers and titles in this chapter all refer to that Decision. In the period 2013-2014, Commission Decision 2005/166/EC will be replaced by delegated and implementing acts adopted pursuant to Articles 6, 7, 13 and 14 of Regulation (EU) No 525/2013.

Article 3 of Commission Decision 2005/166/EC

Reporting under Article 3(1)(d) of Decision 280/2004/EC (now Article 7(1)(d) of Regulation (EU) No 525/2013)

77. Member States are invited to annually provide information on the use of activities under Articles 3.3 and 3.4 of the Kyoto Protocol in the questionnaire included in Annex II to this document at the same time as the annual inventory information. In 2006, this information was used in the pre-commitment period report. For the remainder, this information that Member States are providing on a voluntary basis is used in the annual progress report under Article 21(1) of the Monitoring Mechanism Regulation to indicate Member States' projected net removals during the first commitment period.

Article 4 of Commission Decision 2005/166/EC

Reporting under Article 3(1)(f) of Decision 280/2004/EC (now Article 7(1)(p) of Regulation (EU) No 525/2013)

78. Member States must provide by 15 January each year sections 1.2 and 1.3 of their national inventory reports (NIR) as outlined in Annex 1 of document FCCC/SBSTA/2004/8 for reporting under Article 4(1)(a), section 1.4 for reporting under Article 4(1)(b), section 1.6 for reporting under Article 4(1)(c), section 1.7 for reporting under Article 4(1)(d), section 1.8 for reporting under Article 4(1)(e), the comparison between the sectoral and the reference approach in the energy sector in chapter 3 of their NIR for reporting under Article 4(1)(f), sections 10.1 and 10.4 for reporting under Article 4(1)(g), and sections 2.1 to 2.3 for reporting under Article 4(1)(h).

Article 5 of Commission Decision 2005/166/EC

Reporting under Article 3(1)(g) of Decision 280/2004/EC (now Article 7(1)(g) of Regulation (EU) No 525/2013)

79. In accounting and reporting information from the national registry on the issuance, acquisition, holding, transfer, cancellation, retirement and carry-over of assigned amount units, removal units, emission reduction units and certified emission reductions pursuant to Article 7(1)(g) of the Monitoring Mechanism Regulation, Member States apply requirements specified in the Annex of decision 15/CMP.1 (Modalities for the accounting of assigned amounts under Article 7, paragraph 4, of the Kyoto Protocol) and report in accordance with the guidelines under Article 7, paragraph 1, of the Kyoto Protocol. The information submitted to the Commission is identical to the information submitted in the standard electronic format to the UNFCCC secretariat according to UNFCCC decision 13/CP.10 (Incorporation of the modalities and procedures for afforestation and reforestation project activities under the clean development mechanism into the guidelines under Articles 7 and 8 of the Kyoto Protocol), as specified in the Annex of decision 14/CMP.1 (Standard electronic format for reporting Kyoto Protocol units), and the section on ‘Information on emission reduction units, certified emission reductions, assigned amount units and removal units’ in the guidelines under Article 7, paragraph 1.

Moreover, as CH₄ is also an air pollutant that is monitored by the European Monitoring and Evaluation Programme (EMEP) station pursuant to the Convention on Long-range Transboundary Air Pollution (CLTRAP), a single dataset for CH₄ could be agreed upon and the CH₄ inventory could be submitted to both the UNFCCC and the Centre on Emission Inventories and Projections (CEIP).

Reporting under Article 3(1)(i) of Decision 280/2004/EC (now 7(1)(j) of Regulation (EU) No 525/2013)

80. Pursuant to Article 7(1)(j) of the Monitoring Mechanism Regulation and to paragraph 4 of the guidelines under Article 7, paragraph 1, of the Kyoto Protocol, each Member State must describe in its national inventory report to the Commission any steps taken to improve estimates in areas that were previously adjusted in accordance with procedures under Article 5.2 of the Kyoto Protocol. This information is to be provided by the due date of 15 January each year. Improvements related to adjustments are not part of any updates of information submitted by 15 March.

81. The Union inventory includes a description of steps taken to improve previously adjusted estimates of the Union inventory and compiles information on improvements reported by Member States whose inventory estimates have been subject to adjustments. This description does not include recalculations because description of recalculated data is already provided under paragraphs 33 and 34 of the UNFCCC guidelines for annual inventories.

Article 10 of Commission Decision 2005/166/EC

Reporting under Article 3(2)(b) of Decision 280/2004/EC (now Article 14(1) of Regulation (EU) No 525/2013)

82. If a ‘without measures’ projection is provided, all currently quantified policies and measures implemented, adopted or planned after the year chosen as the starting year for this projection should be excluded, regardless of their original purpose.

83. Member States must clearly identify the policies and measures included in each projection.

Article 8 of Commission Decision 2005/166/EC

Reporting under Article 3(2)(c) of Decision 280/2004/EC (now Article 13(1)(c) of Regulation (EU) No 525/2013)

84. The Member States’ reporting on legal and institutional steps to implement the commitments under the Kyoto Protocol should clearly distinguish between the implementation of relevant Union legislation and additional national legal arrangements.

Article 18 of Commission Decision 2005/166/EC

Member State reporting upon expiration of the additional period for fulfilling commitments under Article 5(5) of Decision 280/2004/EC

85. The report upon expiration of the additional period for fulfilling commitments is based on paragraph 49 of the Annex of draft decision 13/CMP.1 (Modalities for the accounting of assigned amounts under Article 7, paragraph 4 of the Kyoto Protocol) and included in document FCCC/CP/2001/13/Add.2.

Article 21 of Commission Decision 2005/166/EC

The review, adjustment and compliance procedures under the UNFCCC and the Kyoto Protocol pursuant to Article 8(1)(b) and (c) of Decision 280/2004/EC (now Article 23(c) and (d) of Regulation (EU) No 525/2013)

86. The Commission must inform the other Member States within one week of receipt of the information referred to in Article 21(1) and 21(2) of Commission Decision 2005/166/EC.

87. The procedures for the inventory review process are set out in decision 22/CMP.1 (Guidelines for review under Article 8 of the Kyoto Protocol) and included in FCCC/CP/2001/13/Add.3. Procedures concerning compliance are set out in decision 27/CMP.1 (Procedures and mechanisms relating to compliance under the Kyoto Protocol).

ANNEX I

Definitions for national system and quality control (QC) and quality assurance (QA) of greenhouse gas inventories

Audits (Chapter 8.8, IPCC 2000⁹)

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

Union inventory system (Regulation (EU) No 525/2013)

The Union inventory system for ensuring the accuracy, comparability consistency, transparency, completeness and timeliness of national inventories with regard to the Union greenhouse gas inventory.

Expert peer review (Chapter 8.8, IPCC 2000)

Expert peer review consists of a review of calculations or assumptions by experts in relevant technical fields. Preferably, these reviewers would be independent experts not closely connected with national inventory compilation.

The objective of the expert peer review is to ensure that the inventory's results, assumptions and methods are reasonable as judged by those knowledgeable in the specific field. Expert review processes can be supplemented by stakeholder and public review mechanisms¹⁰.

Good practice (Annex 3, IPCC 2000)

Good practice is a set of procedures intended to ensure that greenhouse gas inventories are accurate in the sense that they are systematically neither over nor underestimates so far as can be judged, and that uncertainties are reduced as far as possible.

Good practice covers choice of estimation methods appropriate to national circumstances, quality assurance and quality control at the national level, quantification of uncertainties and data archiving, and reporting to promote transparency.

⁹ IPCC Good practice guidance and uncertainty management in national greenhouse gas inventories (IPCC, 2000)

¹⁰ More specific information is provided in the sector specific chapters of the IPCC GPG.

Inventory agency (Chapter 8.4, IPCC 2000)

The inventory agency is responsible for coordinating QA/QC activities for the national inventory.

Inventory and QA/QC improvement (Decision 20/CP.7)

Improvement of the quality of the inventory system by, for example, improving the quality of activity data, emissions factors, methods and other relevant technical elements of inventories. Information from the implementation of the QA/QC programme, the review process under Article 8 of the Kyoto Protocol and other reviews should be considered in the development and/or revision of the QA/QC plan and the quality objectives.

Key (source) category (Annex 3, IPCC 2000)

A key source category is one that is prioritised within the national inventory system because its estimate has a significant influence on a country's total inventory of direct greenhouse gases in terms of the absolute level of emissions, the trend in emissions, or both.

National entity (Decision 20/CP.7)

Single national entity formally designated with overall responsibility for the national inventory.

National system/ national inventory system (Decision 20/CP.7)

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

QA/QC coordinator (Chapter 8.4, IPCC 2000)

A QA/QC coordinator is the person responsible for ensuring that the objectives of the QA/QC programme are met.

QA/QC plan (Chapter 8.5, IPCC 2000)

The QA/QC plan is an internal document serving to organise, plan and implement all QA/QC activities. The plan should in general outline QA/QC activities that will be implemented, and include a scheduled time frame that follows inventory preparation from its initial development through to final reporting.

QA/QC programme (Regulation (EU) No 525/2013)

QA/QC programme includes the quality objectives and an inventory QA/QC plan.

QA/QC system (Chapter 8.3, IPCC 2000)

The major elements of a QA/QC system are:

- an inventory agency responsible for coordinating QA/QC activities;
- a QA/QC plan;
- general QC procedures (Tier 1);
- source category-specific QC procedures (Tier 2);
- QA review procedures;
- reporting, documentation and archiving procedures.

QC activities (Chapter 8.1, IPCC 2000)

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

- **Tier 1 QC procedures (General QC procedures) (Chapter 8.6, IPCC 2000)**
Tier 1 General Inventory Level QC procedures are checks that the inventory agency should use routinely throughout the preparation of the annual inventory. The focus of general QC techniques is on the processing, handling, documenting, archiving and reporting procedures that are common to all the inventory source categories¹¹.
- **Tier 2 QC procedures (Source category-specific QC procedures) (Chapter 8.7, IPCC 2000)**
Source category-specific QC procedures (Tier 2) are directed at specific types of data used in the methods for individual source categories and require knowledge of the emission source category, the types of data available and the parameters associated with emissions.
The source category-specific QC measures are applied on a case-by-case basis focusing on key source categories and on source categories where significant methodological and data revisions have taken place. Tier 2 QC activities are in addition to the general QC conducted as part of Tier 1¹².

QC checks

→ QC activities

QC System

→ Quality control

QC procedures

→ QC activities

¹¹ Table 8.1 of the IPCC 2000 GPG lists the general QC procedures.

¹² More specific information is provided in the sector specific chapters of the IPCC GPG.

Quality assurance (Chapters 8.1 and 8.8, IPCC 2000)

Quality assurance (QA) activities include a planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process to verify that data quality objectives have been met, ensure that the inventory represents the best possible estimate of emissions and sinks given the current state of scientific knowledge and data available, and support the effectiveness of the quality control (QC) programme. QA activities include audits and expert peer reviews.

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

Quality control (Annex 3, IPCC 2000)

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

- 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.

Quality Management System (QMS) (ISO 9000)

Management system to direct and control an organisation with regard to quality.

Generic requirements for certified quality management systems are specified e.g. in ISO 9001. If no general third party certification is needed, ISO 9004 can be used as guidance for a QMS.

Quality Objectives (Chapter 8.1 and Annex 3, IPCC 2000)

The objectives of QA/QC activities on national greenhouse gas inventories are to improve transparency, consistency, comparability, completeness, accuracy, confidence and timeliness in national inventories of emissions estimates¹³.

- **Transparency** means that the assumptions and methodologies used for an inventory should be clearly explained to facilitate replication and assessment of the inventory by users of the reported information.
- **Consistency** means that an inventory should be internally consistent in all its elements over a period of years. 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.

¹³ The objective of timeliness is introduced in Decision 280/2004EC, all other definitions are taken from Annex 3, IPCC 2000.

- **Comparability** means that estimates of emissions and removals reported by Parties in inventories should be comparable among Parties.
- **Completeness** means that an inventory covers all sources and sinks as well as all gases included in the Revised 1996 IPCC Guidelines for national greenhouse gas inventories in addition to other existing relevant source/sink categories which are specific to individual Parties and therefore may not be included in the IPCC Guidelines. Completeness also means full geographic coverage of sources and sinks of a Party according to its ratification.
- **Accuracy** is a relative measure of the exactness of an emission or removal estimate. Estimates should be accurate in the sense that they are systematically neither over nor under true emissions or removals, as far as can be judged, and that uncertainties are reduced as far as practicable. Appropriate methodologies conforming to guidance on good practice should be used to promote accuracy in inventories.
- **Confidence** is used to represent trust in a measurement or estimate. Having confidence in inventory estimates does not make those estimates more accurate or precise; however, it will eventually help to establish a consensus regarding whether the data can be applied to solve a problem. This usage of confidence differs substantially from the statistical usage in the term confidence interval.
- **Timeliness** means submission of a fully complete inventory by 15 April.

Verification (Inventory definition, Annex 2 and 3, IPCC 2000)

Verification refers to the collection of activities and procedures that can be followed during the planning and development, or after the completion of an inventory, that can help to establish its reliability for the intended applications of that inventory. Typically, methods external to the inventory are used to check the truth of the inventory, including comparisons with estimates made by other bodies or with emission and uptake measurements via inverse modelling confronted to atmospheric concentrations (in situ or via satellite imagery) or concentration gradients of these gases. JRC can demonstrate these methods and contribute to the discussion on verification via measurement (cfr. Bergamaschi et al (2013)).

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

ANNEX II

Process of submission of Member States' information and compilation of the EU progress report under the Monitoring Mechanism Regulation

Element	Who	When	What
1. Submission of Member States' GHG inventories and questionnaires on the use of flexible mechanisms and activities under Articles 3.3 and 3.4	Member States	15 January annually	CRF tables and elements of NIR necessary for Union inventory compilation and updated information in questionnaire.
2. Submission of complete NIR	Member States	15 March and 15 May (re-submission) annually	Final version of the NIR
3. Submission of reports by Member States <ul style="list-style-type: none"> ▪ national programmes and ▪ projections according to Articles 13(1) and 14(1) of Regulation (EU) No 525/2013	Member States	15 March every second year	Details of policies and measures implemented or planned by gas and sector, their effect on greenhouse gas emissions / removals and projected emissions by sources and removals by sinks
4. Drafting of Commission progress report under Council Decision 280/2004/EC.	Commission (DG CLIMA), assisted by EEA	15 June until 5 September	Outline of the Commission's progress report, based on first draft EEA technical reports. The report evaluates actual and projected progress, based on MS information. It includes extended analyses, comparison with Union-wide projections and Union policies and measures each year.
5. Circulation of final draft of progress report under the Monitoring	Commission (DG CLIMA),	August	Final draft of progress report circulated to Member States

Element	Who	When	What
Mechanism Regulation.	assisted by EEA and the Member States		
6. Consultation of Member States on draft progress report under the Monitoring Mechanism Regulation	Member States	August	Comments by Member States
7. Adoption of progress report under the Monitoring Mechanism Regulation by the European Commission and submission to the European Parliament and the Council	Commission	October	Final amendments on draft Commission progress report according to comments from the other concerned services of the Commission
8. Publication of Commission	Commission	October	Publication of Commission and EEA reports on the internet