EUROPEAN COMMISSION
DIRECTORATE-GENERAL
CLIMATE ACTION
Directorate A - International and Climate Strategy
CLIMA.A.3 - Monitoring, Reporting, Verification

Guidance Document

The Accreditation and Verification Regulation - Competence

AVR Key guidance note No II.7, Version of 19 September 2012

This document is part of a series of documents and templates provided by the Commission services for supporting the implementation of Commission Regulation (EU) No 600/2012 of 21 June 2012 on the verification of greenhouse gas emission reports and tonne-kilometre reports, and the accreditation of verifiers pursuant to Directive 2003/87/EC of the European Parliament and of the Council.

The guidance represents the views of the Commission services at the time of publication. It is not legally binding.

This guidance document takes into account the discussions within meetings of the informal Technical Working Group on the Accreditation and Verification Regulation under the WGIII of the Climate Change Committee (CCC), as well as written comments received from stakeholders and experts from Member States.

This guidance document was unanimously endorsed by the representatives of the Member States at the meeting of the Climate Change Committee on 19 September 2012.

All guidance documents and templates can be downloaded from the documentation section of the Commission's website at the following address: **http://ec.europa.eu/clima/policies/ets/monitoring/index_en.htm.**

Background

This key guidance note is part of a suite of guidance documents developed by the Commission services to explain the requirements of the EU ETS Regulation on Accreditation and Verification (AVR).[1] The suite of guidance documents consists of:

- an explanatory guidance on the articles of the AVR (EGD I), including a user manual providing an overview of the guidance documents and their interrelation with the relevant legislation;
- key guidance notes (KGN II) on specific verification and accreditation issues;
- a specific guidance (GD III) on the verification of aircraft operator's reports;
- templates for the verification report and information exchange requirements;
- exemplars consisting of filled-in templates, checklists or specific examples in the explanatory guidance or key guidance notes;
- frequently asked questions.

This key guidance note (KGN II.7) explains the competence requirements of the verification team, the EU ETS auditors and lead auditors, technical experts and independent reviewers. The note represents the views of the Commission services at the time of publication. It is not legally binding.

▪ Wherever the note uses the term operator's report it means the operator's emission report and the aircraft operator's emission report or tonne-kilometre report. ▪ Wherever the note uses the term operator this also means aircraft operators unless this is specifically mentioned otherwise in the note.	

1. Competence

The verifier and its personnel have to be competent to perform the verification. Competence is not only knowledge but also the skills to carry out prescribed activities. The AVR contains EU ETS specific competence requirements for the verification team as a whole as well as for the EU ETS auditors, lead auditors and technical experts individually. Furthermore, specific competence requirements have been laid down for independent reviewers that are not part of the verification team. To ensure that all personnel carrying out verification activities are, and continue to be competent for the tasks that are allocated to them, the AVR requires the verifier to establish, document, implement and maintain a competence assessment and management process. An explanation of what this competence process should entail is provided in Chapter 5 of the Explanatory Guidance on the articles of the AVR (EGD 1).

Art. 3(8) AVR

Art. 35 AVR

2. Competence of the verification team

The verification team consist of an EU ETS lead auditor and, where the verifier's conclusions during the pre-contract stage and the strategic analysis require it, a suitable number of EU ETS auditors and technical experts. Team members not only have to meet the competence requirements that are specific to them (see section 3 and 4) but also the following requirements.

Art. 36(2) AVR

[1] Commission Regulation (EU) No 600/2012 of 21 June 2012 on the verification of greenhouse gas emission reports and tonne-kilometre reports and the accreditation of verifiers pursuant to Directive 2003/87/EC of the European Parliament and of the Council, OJ EU, L 181/1.

Article 36(4) of the AVR	Explanation
Each team member shall have a clear understanding of his or her individual role in the verification process	The roles of each team member are explained in section 3. Each team member must understand that he or she: ▪ remains impartial to the activitity verified,free from bias, and avoids any actual or perceived conflict of interest; ▪ maintains his or her objectivity throughout the verification; ▪ demonstrates fair behaviour through trust, honesty, working with diligence and responsibility, observing the law, maintaining confidentiality etc.; ▪ reflects truthfully and accurately the verification activities and findings; ▪ exercises due professional care and judgment; ▪ is able to draw meaningful and accurate conclusions, give opinions and makes interpretations based on observation, knowledge, experience, literature and other sources of information.
Each team member shall be able to communicate in the language necessary to perform his or her specific tasks	The team should be able to share and distribute relevant information through written communications (e.g. reports, notes, letters etc). Verbal communications should be conducted in an appropriate language and in a professional manner. The information should also be presented, in a format that is well understood by all parties. The team should, for example, be able to: ▪ explain what documentation an operator has to provide to the team to allow for the necessary input to the verification process; ▪ explain the verification process to the operator; ▪ interview relevant persons at the operator in a manner so that they understand the required output and the team can gather the necessary evidence for verification purposes; ▪ explain identified misstatements and non-conformities to the operator and the requirement to correct them; ▪ explain what findings from the verification process mean and what their consequences are; ▪ write a verification report based on an analysis of findings from the verification activities and use terms and language appropriate for verification statements. Each team member does not necessarily have to speak the language required for the verification in the Member State (MS) in which the team carries out the verification. However the team must have at least one person who is able to communicate and write in that language.

Art. 36(4) AVR

Besides the individual competence requirements of the team members involved, the verification team as a whole must meet two specific competence requirements:

Art. 36(5) AVR

- at least one person in the team must be able to communicate in the language required for the verification in the Member State in which the verifier is carrying out that verification. An interpreter can be hired to provide that competence. In those cases the team must be able to communicate effectively while using the interpreter. The risk for hiring an interpreter is a verification risk that the verifier accepts based on the risk analysis. The verifier remains responsible for the quality of the translation and that the translation is according to standards and properly certified.

- at least one person in the team must have the technical competence and understanding required to assess the specific technical monitoring and reporting aspects related to the activities of the operator whose report the verifier is verifying. This means in relation to the operator's activities listed in Annex I of the AVR.

As the verifier has to check the application of the monitoring methodology and to carry out plausibility checks of the data involved, the team as a whole needs to understand the specifics of the operator. Otherwise the verifier will not be able to assess the material correctness of the data and the correct implementation of the monitoring plan. The table below provides an indication which technical competence and understanding should apply for the team to assess the specific technical monitoring and reporting aspects.

Art. 36(5) AVR

Elements of technical expertise and competence	**Examples of knowledge and skills related to technical competence**
Assessing aspects of the monitoring plan	Being able to assess and understand: ▪ how the monitoring plan is implemented in the installation or aircraft operator; ▪ how to check the emission report against the approved monitoring plan; ▪ how to analyse information and data to confirm whether the monitoring plan is still appropriate and is being implemented.
Specific GHG activity and technology	Being able to: ▪ identify and understand which key operations impact the operator's GHG emissions; ▪ understand the actual operational processes being used within the installation or by the aircraft operator; ▪ assess the installation's boundaries or coverage of EU ETS flights in aviation. This will enable the team to assess what activities are covered by EU ETS and what activities are not covered, and so to identify the monitoring boundaries. And having: ▪ general knowledge of the technologies applicable to the industry sector in which the team operates; ▪ generic knowledge of GHG and global warming potentials.
Relevant GHG sources	Being able to understand and have the knowledge of: ▪ the operator's activities, equipment and relevant processes, emission sources and source streams, including the categorisation of source streams (de-minimis, minor and major source streams); ▪ the categorisation of installations or aircraft operators, and the applicable requirements for each category; ▪ assessing the completeness of source streams and emission sources; ▪ production inputs and outputs relevant to GHG emissions.
Quantification, monitoring and reporting including relevant technical and sector issues	Being able to understand and have knowledge of techniques relevant for monitoring and reporting which requires skills such as the ability to: ▪ assess the selection, use and maintenance of measurement and calibration devices; ▪ determine the extent of testing needed to check the completeness, accuracy and reliability of information used in the analysis; ▪ identify corroborating information that supports the material correctness of the reported data;

Elements of technical expertise and competence	Examples of knowledge and skills related to technical competence
	▪ conclude whether to accept or reject the information or whether to modify the testing; ▪ identify the purpose of computations and what methodology is required. Having knowledge and understanding of EU ETS specific monitoring issues such as: ▪ where a standard calculation based methodology is used to determine the GHG emissions: e.g. the method for determining activity data; the origin and application of calculation factors; the appropriate units used to express the activity data and calculation factors; ▪ where a mass balance methodology is used: the inputs and outputs of the mass balance and the methodology used to determine the inputs and outputs; ▪ where a measurement based methodology is used: the system and elements used for continuous measurement, the standards applied, the measurement points and measuring frequencies, the calibration procedures, the parameters used for determining the GHG emissions, the sampling rates, the requirements for determining missing data, data management and storage, and the method used to check the results of continuous measurement; ▪ the required tiers and corresponding uncertainty thresholds; ▪ where a fall back methodology is used: the approach used for assessing and quantifying the uncertainty. The verifier has to have sufficient knowledge of the ISO Guide to Expression of Uncertainty in Measurement or another equivalent internationally accepted standard in order to assess whether the overall uncertainty assessment is in accordance with requirements; ▪ knowledge of the relevant standards: e.g. calibration standards, measurement standards, management system standards and their use; ▪ assessing compliance with uncertainty thresholds and the validity of information used to calculate uncertainty levels of activity data and calculation factors (for measurement systems under and outside the operator's control); ▪ application of the monitoring and reporting principles laid down in Article 5-9 of the MRR[2]; ▪ assessing data gaps, the conservativeness of the approach to complete the data gap and measures to avoid double counting of GHG emissions; ▪ the techniques for chemical analysis, sampling and sample preparation, including the application of a sampling plan and chain of custody.
Knowledge related to the operator's organisation and quality assurance	▪ operator's specific data flow and risk assessment; ▪ operator's specific control activities in relation to data flow; ▪ overall organization with respect to monitoring and reporting, as well as the control environment in which the operator's accounting system operates; ▪ procedures mentioned in the MRR; e.g. procedures for data flow

[2] Commission Regulation (EU) No 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council, OJ EU, L 181/30.

Elements of technical expertise and competence	Examples of knowledge and skills related to technical competence
	activities and control activities; and for managing the responsibilities for monitoring and reporting within an installation or for the activities of an aircraft operator.
Knowledge related to verification agreements	▪ understanding contracts or other agreements with the operator to manage conflicts that could impact the verification (e.g. time allocation in contracts with the operator).

The table in Annex I gives indicative examples of what competence the team should possess when carrying out the verification in a specific scope of accreditation.

Verification team consisting of one person: A verification team can consist of one person provided that this person meets all the verification team requirements including the requirements of an EU ETS lead auditor.	

Art. 36(6) AVR

3. Roles of the team members

Verification team members have different roles during the verification. First of all the verification is carried out under the responsibility and direction of the EU ETS lead auditor. In that capacity **the EU ETS lead auditor**:

- leads and manages the verification process;
- identifies any additional competencies the verification team needs to possess, and based on that identification confirms the appropriate competence of the verification team;
- allocates and briefs the verification team members on their specific tasks;
- conducts the strategic and risk analysis;
- develops and implements the verification plan (e.g. drafting the verification programme, the data sampling plan and the control test plan, and establishing how the elements mentioned in the verification plan will be carried out during the verification);
- directs the compilation of the internal verification documentation, the drafting of the verification report and maintains communication with the independent reviewer;
- conducts the site visit since he/she is responsible for assigning the tasks to other team members and implementing the verification plan. The lead auditor decides which team member joins him/her in the site visit and whether he/she needs a technical expert during the site visit. In the site visit the lead auditor must manage the process and communication of planning and concerns to the client;
- ensures that all internal verification documentation, including supporting evidence, and the draft verification report is complete and ready for the independent review;
- provides assistance to independent reviewers in order to complete the verification.

Under the overall responsibility of the EU ETS lead auditor, the EU ETS auditor, if assigned to the team may carry out the following activities:

- confirm the scope of verification with the operator;
- make the lead auditor aware on whether the verification objectives are addressed in the detailed verification planning. The lead auditor has the final call on whether this is the case;

- undertake the process analysis;
- resolve issues relating to verification, in particular those associated with the materiality of reported data and conformance with the monitoring plan;
- compile the internal verification documentation;
- write the verification report.

If the EU ETS auditor or lead auditor or independent reviewer needs support on a specific subject matter, a **technical expert** may be called in to provide detailed knowledge and expertise on that subject matter. This could concern all types of issues such as technical sector specific knowledge, IT expertise, language needs, technical expertise on specific standards or calibration equipment etc.. The technical expert undertakes the activities for which his or her support is needed, under the direction and full responsibility of the EU ETS lead auditor of the verification team in which the technical expert is operating or the independent reviewer if the technical expert is providing support to the independent reviewer. The EU ETS lead auditor or independent reviewer determines the activities the technical expert will undertake during the verification, and for how long the technical expert is needed. When the technical expert identifies specific issues, he or she shall report this to the EU ETS lead auditor or independent reviewer who will then determine follow up action. The primary function of the technical expert is to provide information to the verification team.

Art. 39 AVR

The independent reviewer is not part of the verification team. The AVR prevents the independent reviewer from being involved in any detailed verification activities he/she reviews.	

4. Competence of EU ETS auditors

EU ETS auditors have to meet specific competence requirements. The table includes an explanation of those requirements as well as examples related to those requirements.

Art. 37(1) AVR

Article 37(1) of the AVR	Explanation and examples of competence
Knowledge of the EU ETS specific legisation and relevant guidance mentioned in Article 37(1) (a) of the AVR GHG specific programme knowledge (EN ISO 14065)	This involves knowledge of: ▪ EU ETS Directive (in particular Annex I on activities covered by EU ETS Directive and Annex IV and V containing general monitoring and verification requirements); ▪ the AVR and guidance material developed by the Commission Services to support the interpretation of the AVR; ▪ the MRR and the guidance material developed by the Commission Services to support the interpretation of the MRR; ▪ ISO 14064-3 and EN ISO 14065; ▪ other relevant legislation: e.g. Commission Decision on the detailed interpretation of the aviation activities in Annex I of the EU ETS Directive[3]; ▪ other relevant guidance: e.g. guidance on the interpretation of Annex I of the EU ETS activities, EA 6/03; ▪ templates; ▪ relevant national legislation and guidance issued by the MS in which the

[3] Commission Decision of 8 June 2009 on the detailed interpretation of the aviation activities listed in Annex I to Directive 2003/87/EC of the European Parliament and of the Council, OJ EU 12 June 2009, L 149/69.

Article 37(1) of the AVR	Explanation and examples of competence
	verifier is carrying out a verification.
Knowledge and experience of data and information auditing mentioned in Article 37(1) (b) of the AVR	Knowledge and experience of data and information auditing methodologies which includes, for example, the ability to: ▪ check the initial effectiveness of control activities as an input to strategic and risk analysis; ▪ determine the extent of substantive testing in the process analysis; ▪ notice whether the plan needs updating because of findings and to communicate that to the lead auditor. The lead auditor decides on the revision of the verification plan and revises this; ▪ determine corrective action and its impact on the data and information assessment; ▪ make decisions on the data and information reported based on findings from the data and information assessment; ▪ collate appropriate evidence and information to support decisions; ▪ identify situations and factors that may affect the materiality of misstatements (including typical and atypical operating conditions); ▪ analyse the material impact of misstatements and non-conformities on the reported data; ▪ identify risks that could result in material misstatements and decide on the need to gather additional evidence or to extend the depth and detail of verification activities; ▪ use information obtained from a variety of sources and form conclusions based on that analysis; ▪ use the materiality level in the verification process; ▪ evaluate the sufficiency and significance of the evidence and analysis; ▪ identify inconsistencies, unexpected circumstances and findings by carrying out for example analytical procedures; ▪ evaluate the overall adequacy of documentation. Knowledge and experience of analysing inherent and control risks. The risk analysis itself will however be carried out by the lead auditor. He will make all the decisions. Knowledge and experience of sampling techniques which includes, for example, the ability to: ▪ manage complex data collection and recording interfaces; ▪ deal with data manipulation processes and their challenges; ▪ identify actual data system problems and failures, and take appropriate action (i.e. increasing the sampling size in the data sampling plan and reporting potential non-conformities and misstatements); ▪ use audit processes to identify information, statements and facts that contradict the data in the emission report; ▪ challenge assumptions and statements in the emission report. Knowledge and experience in assessing data and information systems, data flows, control activities and procedures which includes, for example, the ability to: ▪ understand statistics, financial and economic accounting tools and practices; ▪ assess computer information system environments; ▪ assess the GHG information system to determine whether the operator

Article 37(1) of the AVR	Explanation and examples of competence
	has identified, collected, analysed and reported on the data in a way that is necessary to compile an accurate emissions report; and has taken corrective action to address misstatements and non-conformities; ▪ use appropriate methods for obtaining or developing the information needed: e.g. document review, observation, cross checking with external sources, interviews, inspection of whether the control activities are functioning; ▪ integrate information from various sources comparing information from internal and external sources; ▪ evaluate data, errors in data, data sources, applicable processes and data management systems; ▪ evaluate the functioning of control activities and correct implementation of procedures for control activities (e.g. how the operator manages IT systems and new technologies); ▪ remain alert to the possibility of false information; ▪ understand the implications of misstatements and non-conformities and recommended improvements in robustness and controls.
The ability to perform the verification activities listed in Chapter 2 of the AVR	This includes, for example, the ability to: ▪ carry out data verification and analytical procedures, e.g. comparing projected emissions with actual results, making logical inferences; ▪ retrieve relevant information and apply knowledge in a manner appropriate for the verification activities; ▪ understand the meaning, translation and interpretation of information; ▪ think critically and analyse multiple inputs; ▪ distinguish between facts and inferences, and to exercise professional sceptiscism; ▪ carry out independent research and challenge assumptions and evidence asserted by the operator; ▪ strike a balance between attention to detail and a high level assessment of the anticipated outcome during the verification process; ▪ manage detail, particularly at the level of ensuring that required checks are performed, e.g. checking between the emission report and the approved monitoring plan; ▪ evaluate the information, data and assumptions and make professional judgments; ▪ apply verification methods in expected and unanticipated situation; ▪ communicate the verification process and the results with the operator; ▪ be aware that the verification plan needs to support the nature, timing and extent of the verification. The actual responsibility for ensuring this is the case lies with the lead auditor and he/she should have full knowledge and experience on that; ▪ ensure that the internal verification documentation contains sufficient information to support the verification report and meets the requirements of the AVR.
Knowledge of and experience in sector specific technical monitoring and reporting aspects	The EU ETS auditor must have the necessary knowledge on and experience of sector specific technical monitoring and reporting issues related to the scope of activities that are listed in Annex I of the AVR, and in which the EU ETS auditor is operating. Examples of technical knowledge and experience are provided in section 2 and Annex I of this key guidance document.

Article 37(1) of the AVR	Explanation and examples of competence
that are relevant of the scope of activities referred to in Annex I of the AVR in which the EU ETS auditor is carrying out verification	

5. Competence of EU ETS lead auditors

In addition to the requirements of the EU ETS auditor mentioned in section 4, the EU ETS lead auditor must have demonstrated competence to lead a verification team and to be responsible for carrying out the verification activities, and to undertake the roles assigned to an EU ETS lead auditor as mentioned in section 3 of this key guidance document. **Art. 37(2) AVR**

This means that the EU ETS lead auditor must for example have sufficient skills to:

- assign team members based on an analysis of the competence needed to carry out specific tasks during the verification for a particular operator;
- understand the rigour of verification activities needed for obtaining reasonable assurance;
- be able to communicate on the progress, concerns and findings to the client;
- challenge findings from team members and manage the team;
- manage the verification process and manage the drafting of the verification report;
- be able to function as a team leader to ensure that the verification is performed in accordance with the AVR.

6. Competence of technical experts

The technical expert must have:

- the competence and expertise required to effectively support the EU ETS auditor or lead auditor or independent reviewer on the subject matter for which his knowledge and expertise is requested; **Art. 39(3) AVR**
- sufficient understanding of EU ETS specific legislation and guidance, data and information auditing and the activities needed to carry out assigned tasks. The technical expert does not have to possess full competence on all these issues but he should understand it sufficiently to be able to support the EU ETS (lead) auditor during the verification.

7. Competence of independent reviewers

The independent reviewer must meet the competence requirements of an EU ETS lead auditor (see section 4 and 5). Furthermore the independent reviewer must have the necessary competence to: **Art. 38(2) (3) AVR**

- analyse the information provided to confirm the completeness and integrity of the information;
- challenge missing or contradictory information;
- check data trails to be able to assess whether the internal verification documentation is complete and provides sufficient information to support the draft verification report.

An independent reviewer must have appropriate authority to objectively review the draft verification report and internal verification documentation and reject them as unsound if **Art. 38(1) AVR**

necessary. What constitutes sufficient and appropriate competence, experience and authority depends on the circumstances of the verification engagement.

In the communcations between the independent reviewer and the EU ETS lead auditor care should be taken that the reviewer's objectivity is maintained. If this objectivity is compromised or the authority of the independent reviewer is threatened, another independent reviewer must be appointed.

8. Demonstration of competence

For personnel involved in the verification process the verifier shall demonstrate their competence through a competence process. For more information on the competence process please see section 5.2 of the Explanatory Guidance on the articles of the AVR (EGD I). As one of the steps in the competence process the verifier must evaluate whether the competence of the personnel meets the specific competence criteria the verifier has set for each function. The verifier will use a variety of methods to evaluate that competence: e.g. training, evaluation of work experience relevant to the competence required, evaluation of performance, observation, examination and testing, mentoring of personnel. The verifier should ensure that a variety of methods is applied and not only one method is used to evaluate the competence of personnel.

Please note that experience, qualification through examinations and training alone do not demonstrate that an individual is competent: they are just some of the factors in the competence process that may demonstrate compliance with part of the competence requirements.	

Externally, the National Accreditation Body (NAB) assesses the competence of the verifier and its personnel in the intitial accreditation, annual surveillance and reassessment. This includes a witness audit to assess the actual performance of verifier's personnel. Please see Chapter 6 of the Explanatory Guidance on the articles of the AVR (EGD 1).

Annex I Competences related to the activities in Annex I of the AVR

The table below provides only some examples of activity specific technical knowledge and expertise. This should not be interpreted as an exhaustive list. There are many more technical and monitoring aspects a verifier needs to know when carrying out verification related to a particular Annex I activity. The verifier must develop detailed competence criteria specific for each scope of its accreditation and ensure that its personnel involved in verification activities meets the competence criteria for the tasks that are assigned to them and is sufficiently competent.

Annex I activities (AVR)	Examples of technical competence and understanding
Combustion of fuels (scope 1a and 1b)	Knowledge and understanding of, for example: ▪ Potential sources related to combustion activities ▪ The applicable default values for calculation factors ▪ Application of the requirements for commercial standard fuels ▪ Flaring sources ▪ Co-generation ▪ Emissions resulting from the production of energy and heat, and from scrubbing ▪ Methods used to determine the process emissions from the use of carbonate for acid gas scrubbing from the flue gas stream.
Refining mineral oil	Knowledge and understanding of, for example: ▪ Catalyst regeneration from catalytic cracking and regeneration from other catalytic processes ▪ Flexi-coking, delayed coking and other coking or cracking processes and their emissions ▪ Mass balance methodology to determine the GHG emissions for the whole refinery or individual processes or the GHG emissions from catalytic cracking regeneration or other processes.
Production of coke Production of metal ore, roasting or sintering Production of pig iron or steel	Knowledge and understanding of, for example: ▪ Potential sources for the production of coke, metal ore and pig iron or steel ▪ Process gases and waste gas scrubbing ▪ Input material used in the production of these substances ▪ Mass balance methodology or standard methodology used to determine GHG emissions ▪ Reducing agents ▪ How to derive the carbon content of the input and output stream in the case of production of pig iron and steel
Production or processing of ferrous metals (including ferro-alloys)	Knowledge and understanding of for example: ▪ Potential sources for the production of ferrous and non-ferrous metals such as conventional fuels, alternative fuels, reducing agents, raw materials including limestone and dolomite, secondary feed materials

Annex I activities (AVR)	Examples of technical competence and understanding
Production of secondary aluminium Production or processing of non-ferrous metals, including production of alloys	▪ The specific monitoring methodology used: e.g. mass balance where carbon stemming from fuels or input materials at the installation remain in the products or other outputs of the production.
Production of primary aluminium (CO_2 and PFC emissions)	Knowledge and understanding of, for example: ▪ Potential sources for the production of primary aluminum such as fuels for the production of heat or steam, electrode production, reduction of AL_2O_3 during electrolysis which is related to electrode consumption and used of soda ash or other carbonates for waste gas scrubbing, ▪ Mass balance methodology used to determine the CO_2 emissions as well as the factors to be taken into account in the mass balance (e.g. the inputs and outputs) ▪ Common mass balance for søderberg cells ▪ Method A and B used to determine the PFC emissions ▪ Technology specific emission factors applicable for PFC emission determination (related to activity data for the slope method and related to the overvoltage activity data) ▪ Tier 3 of section 4.4.2.4 of the 2006 IPCC guidelines on emission factors ▪ How to include global warming potentials in the determination of $CO_{2(e)}$ emissions from CF_4 and C_2F_6 emissions
Production of cement clinker Production of lime or calcination of dolomite or magnesite Manufacture of glass including glass fibre Manufacture of ceramic products by firing Manufacture of mineral wool insulation material Drying or calcination of gypsum or production of plaster boards and other gypsum products	Knowledge and understanding of, for example: ▪ Potential sources for the production of substances such as calcinations of limestone in raw materials, conventional kiln fuels, dolomite or magnesite in raw materials, alternative fossil-based kiln fuels, decomposition of alkali- and alkali earth carbonates, biomass fuels in the glass industry ▪ Calculation method A to determine the GHG emissions resulting from the production of cement clinker and the underlying calculation factors based on the carbonate content of the process input ▪ Calculation method B to determine the GHG emissions resulting from the production of cement clinker and the underlying calculation factors based on the amount of clinker produced ▪ How to adjust the carbonate content values for the respective moisture and gangue content of the material in the case of the input based methodology (production of lime) ▪ Methodology used to determine emissions from combustion and process materials for the manufacture of glass including applicable stoichiometric ratios ▪ Method A for defining tier definitions of the emission factor for the ceramics industry, including the values and determination of emission factors (input-based) ▪ Method B for defining tier definitions for emission factors for the ceramics industry (output based), including the values and determination of emission factors ▪ How to monitor emissions from combustion activities

Annex I activities (AVR)	Examples of technical competence and understanding
Production of pulp from timber or other fibrous materials Production of paper or cardboard	Knowledge and understanding of, for example: ▪ Potential emission sources such as gas turbines, recovery boilers, fuel fired dryers ▪ How to monitor emissions from combustion activities including flue gas scrubbing ▪ Methodology used to determine the process emissions from raw materials used as make-up chemicals, including limestone and soda ash ▪ How to include CO_2 emissions from the recovery of limestone sludge in pulp production ▪ Tier definitions for the emission factor for emissions from make-up chemicals
Production of carbon black Production of ammonia Production of bulk organic chemicals by cracking, reforming, partial or full oxidation or by similar processes Production of hydrogen (H_2) and synthesis gas by reforming or partial oxidation Production of soda ash (Na_2CO_3) and sodium bicarbonate ($NaHCO_3$)	Knowledge and understanding of, for example: ▪ Potential sources for the production of substances such as combustion of fuels supplying the heat for reforming or partial oxidation, fuels as process input to the ammonia production process, fuels used in the hydrogen or synthesis gas process, fuels used for combustion processes including fuels used for the production of hot water or steam, raw materials including vent gas from calcinations of limestone to the extent it is not used for carbonation, waste gases from washing or filtration steps after carbonation to the extent it is not used for carbonation ▪ How to monitor emissions from combustion activities including flue gas scrubbing ▪ Methodology used to determine the emissions resulting from the production of ammonia and the inclusion of CO_2 from ammonia production used as feedstock for the production of urea or other chemicals, or transferred out of the installation and not covered by Article 49(1) of the MRR ▪ The methodology used to determine emissions from bulk organic chemicals, including the emission factors applicable and the calculation of the carbon content from the stoichiometric carbon content in the pure substance and the concentration of the substance in the input or output stream ▪ The methodology used to determine emissions from hydrogen (standard methodology) and synthesis gas (mass balance) ▪ The methodology used to determine the emissions from the production of soda ash and sodium bicarbonate (mass balance) and for determining the combustion emissions (the standard or mass balance methodology)
Production of nitric acid (CO_2 and N_2O emissions) Production of adipic acid (CO_2 and N_2O emissions) Production of glyoxal and glyoxylic acid	Knowledge and understanding of, for example: ▪ Potential emission sources of the production of substances such as N_2O emissions from the catalytic oxidation of ammonia and NO_x/ N_2O abatement units, N_2O emissions from adipic acid production, glyoxal and glyoxylic acid production and caprolactam production, including from the oxidation reaction, any direct process venting and any emissions control equipment; ▪ Continuous measurement based methodology used to determine the abated N_2O emissions, including how to calculate the annual hourly average of N_2O emissions and the determination of the hourly N_2O concentration in

Annex I activities (AVR)	Examples of technical competence and understanding
(CO_2 and N_2O emissions) Production of caprolactam	the flue gas from each emission source ▪ Techniques capable of measuring N_2O concentrations during abated and unabated conditions ▪ Methodology used to determine the flue gas flow and the parameters in that methodology such as primary input air flow ▪ Calculation based methodology for temporary occurrences of unabated emissions ▪ Calculation of production rates ▪ Determination of annual CO_2 equivalent
Capture of greenhouse gases from installations for the purpose of transport and geological storage in a storage site. Transport of greenhouse gases by pipelines for geological storage in a storage site	Knowledge and understanding of, for example: ▪ The boundaries of a capture installation and transport network ▪ Monitoring plans required by Directive 2009/31 and reports required by Article 14 of that Directive ▪ Potential sources of emissions, such as transferred CO_2 from the capture installation, combustion activities that are related to the capture of CO_2, fugitive and vented emissions from the transport networks, emissions from leakage events ▪ Methodology used to determine the transferred CO_2 and the emitted CO_2 emissions ▪ Method A for determining the emissions of the transport network (overall mass balance of all input and output source streams) ▪ Method B used to determine of the transport network (monitoring of emissions individually) ▪ Determining the fugitive emissions from the transport network, including the determination of average emission factors per piece of equipment in the transport network, per occurrence where fugitive emissions can be anticipated ▪ Types of equipment in the transport network such as seals, measurement devices, valves, intermediate compressor stations, intermediate storage facilities ▪ Methodology used to determine emissions from leakage events, including industry best practice guidelines to avoid these emissions, and evaluation of temperature and pressure data to detect those emissions; ▪ Uncertainty of measurement systems and assessing the conservativeness of adjustments that were made by the operator to align differences between the measured values
Geological storage of greenhouse gases in a storage site	Knowledge and understanding of, for example: ▪ Relevant provisions from Directive 2009/31 ▪ Monitoring plans required by Directive 2009/31 and reports required by Article 14 of that Directive ▪ The boundaries of a geological storage, storage site and storage complex pursuant to Directive 2009/31 EC ▪ Potential sources of emissions such as fuel use by associated booster stations, venting from injection or enhanced hydrocarbon recovery operations, fugitive emissions from injection, breakthrough CO_2 from enhanced

Annex I activities (AVR)	Examples of technical competence and understanding
	hydrocarbon recovery operations and leakages ▪ Methodology used to determine vented and fugitive emissions from injection including the issues related to measurement based methodology for determining vented emissions ▪ Emission points ▪ Methodology used to determine vented and fugitive emissions from enhanced hydrocarbon recovery operations ▪ Methodology used to determine leakage from storage complex, including applicable uncertainty
Aviation	Knowledge and understanding of, for example: ▪ How to interpret the data from Eurocontrol and other data sources ▪ Which flights are excluded from EU ETS ▪ Which flights are the responsibility of the aircraft operator: identification of flights by ICAO designator, registration markings and other means ▪ How to deal with leased in flights ▪ Method A and B to determine the fuel consumption, including the determination of fuel consumption by the auxiliary unit ▪ Uncertainty requirements and ability to assess supporting evidence in aircraft operator's or manufacturer's specifications and documentation showing routine checks have been carried out on the operation of fuel measurement systems ▪ How to determine the actual density: on board measurements, measured by the fuel supplier at fuel uplift and recorded on the fuel invoice or delivery note, standard density factor and situations in which this standard factor can be used ▪ Emission factors for standard fuels ▪ Requirements on the use of biofuels (e.g. how to assess the evidence of the sustainability of the biofuels used) ▪ Fuelling systems, maintenance of metering instruments ▪ The Eurocontrol tool used to complete data gaps or to monitor the fuel consumption of small emitters ▪ How to determine the payload, including the determination of mass of freight and mass of passengers ▪ What constitutes pallets and containers in EU ETS aviation that have to be excluded from the payload ▪ The ability to identify whether systems to calculate the great circle distance are based on WGS 84 systems ▪ Aerodrome location data published in the Aeronautical Information Publications (AIP data)