European Union Network for
the Implementation and Enforcement
of Environmental Law

Proposals for future development of the EU Emissions Trading Scheme - Phase II & beyond

Annex 5: technical guidance notes

Introduction to IMPEL

The European Union Network for the Implementation and Enforcement of Environmental Law is an informal network of the environmental authorities of EU Member States, acceding and candidate countries, and Norway. The European Commission is also a member of IMPEL and shares the chairmanship of its Plenary Meetings.

The network is commonly known as the IMPEL Network

The expertise and experience of the participants within IMPEL make the network uniquely qualified to work on certain of the technical and regulatory aspects of EU environmental legislation. The Network's objective is to create the necessary impetus in the European Community to make progress on ensuring a more effective application of environmental legislation. It promotes the exchange of information and experience and the development of greater consistency of approach in the implementation, application and enforcement of environmental legislation, with special emphasis on Community environmental legislation. It provides a framework for policy makers, environmental inspectors and enforcement officers to exchange ideas, and encourages the development of enforcement structures and best practices.

Information on the IMPEL Network is also available through its web site at:
http://ec.europa.eu/environment/impel/

Proposals for future development of the EU ETS - Phase II & beyond. **Annex 5 : technical guidance notes**	Number of the report 2007/9
Project Manager:– Lesley Worswick, Environment Agency, England and Wales	Report adopted at Lisbon plenary November 2007
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EXECUTIVE SUMMARY

This annex contains practical guidance on how to interpret some of the key issues in the Monitoring and Reporting Guidelines for the EU Emissions Trading Scheme (MRG2007). The guidance notes are not intended to impose a mandatory explanation or interpretation of the MRG 2007 requirements. They should primarily be considered as practical tools and guidance aimed at assisting competent authorities and industry in the implementation of the MRG requirements.

Introduction

In 2006 the Emissions Trading Technical Support Group (ETSG) was formed to address a range of questions that emerged from the discussions on the revised MRG 2007. The ETSG was set-up on the invitation of the Dutch Ministry of environment (VROM) with the support of the UK Environment Agency for England and Wales, and consists of representatives of Member States, technical experts as well as representatives from industry.[1]

From September till November 2006 a range of notes were prepared and these formed the basis for various comments and suggestions on the Frequently Asked Questions (FAQs) that in October 2006 had been prepared by Ecofys on the commission of DG Environment.

On 16 & 17 April 2007 IMPEL EU-ETS organized a workshop on the implementation of the revised Monitoring & Reporting Guidelines and concluded in its findings that the ETSG should be invited to provide further guidance on a range of key issues in the MRG. The ETSG held a couple of meetings to discuss the request IMPEL made together with the various notes that ETSG had prepared already, and decided on the items and questions the ETSG would undertake on the request of IMPEL. Subsequent to a number of ETSG meetings all the draft notes prepared by ETSG were forwarded to IMPEL EU-ETS in August to allow a discussion and comparison of the ETSG notes with the assessments and judgments that national experts had made during the IMPEL workshop on the 10th of September in Edinburgh. During the workshop questions were put forward and issues raised that the ETSG should address before these notes should be included in the final IMPEL report, that is to be submitted to the IMPEL Plenary meeting in Lisbon on 28-30 November 2007.

The issues, clarifications and questions raised during the IMPEL workshop have all been addressed in the revised ETSG notes. These notes provide to the competent authorities and industries practical guidance on how to interpret some of the key issues in the MRG. The guidance notes are not intended to impose a mandatory explanation or interpretation of the MRG 2007 requirements. They should primarily be considered as practical tools and guidance aimed at assisting competent authorities and industry in the implementation of the MRG requirements. It is up to the Competent Authority of the Member State or industry whether they want to use the tools and guidance submitted in this compendium of ETSG notes. Companies that would like to use the tools and the guidance are well advised to check with their competent authorities whether they are allowed to apply the methods, tools and guidance in these notes.

[1] ETSG participants are Chris Dekkers (Ministry of Environment-VROM), Rob Gemmill (UK Environment Agency for England and Wales), Doris Tharan (DEHSt Germany), Wim Burgers (Infomil), Dop Schoen (ExxonMobil, representing Cefic-Europia), Wolfgang Bednar (Umweltbundesambt , Austria), Mike Cunningham (Scottish Environment Protection Agency-SEPA), Bram Maljaars (Dutch Emissions Authority-NEa), Duncan Clarke (ESB Power Generation, Ire, representing Eurolectric), Fredrik Zetterlund (Swedish Environment Protection Agency), Chiara di Mambro (Ministry of Environment, Italy),Machtelt Oudenes (advisor to NEa/VROM)

The ETSG notes address the following issues:

• **Uncertainty assessment of quantity measurements in relation to EU ETS requirements:** the note outlines a practical way to assess the uncertainty of measurement instruments and measurement systems that are used to determine the amount of a source stream. It provides a practical tool to interpret the error propagation law mentioned in section 7.1 MRG (chapter II.1);

• **Uncertainty assessment of activity specific factors:** the note clarifies how to assess the uncertainty for the activity specific factors like the emission factor, net calorific value etc (chapter II.2). It provides a practical tool to interpret section 13.6 MRG. Besides an explanatory note this chapter also includes an excel sheet that can be used to assess the uncertainty (chapter II.3);

• **Guidance on data flow activities and the control system:** provides practical guidance on how to interpret the requirements on data flow activities and the control system that are prescribed in section 10 MRG (chapter III);

• **Equivalence of non-accredited labs to EN ISO 17025:2005:** the note provides a check list of questions that can be used to check whether a non-accredited lab has implemented the most critical issues of the EN ISO 17025:2005. This is meant to be a practical tool to interpret section 13.5 MRG pursuant to which an operator has to show whether the non-accredited lab he uses, meets requirements equivalent to the EN ISO 17025:2005 (chapter IV);

• **Monitoring Plan requirements:** the note clarifies the monitoring plan requirements laid down in section 4.3 MRG. It also includes the UK template for a monitoring plan and its guidance. Both documents provide operators and companies insight on how to submit the section 4.3 MRG requirements in a monitoring plan (chapter V). In chapter X the monitoring plan requirements for small installations have been submitted;

• **Assessment of unreasonable costs:** the note provides a method to assess unreasonable costs and is a practical interpretation of section 2 (4) (a) MRG (chapter VI);

• **Commercially traded fuels and materials:** the note indicates when an operator is allowed to use invoice data for determining the annual amount of commercially traded fuel or material as well as the net calorific value for commercially traded fuels. It provides guidance on how to interpret the MRG provision on commercially traded fuels and materials laid down in section 7.1 MRG and Annex II MRG (chapter VII);

• **Determining the quantity and assessing the uncertainty of source streams partially covered by EU ETS:** the note describes how to monitor the quantity of a source stream partially covered by EU ETS. It also explains how to assess the uncertainty of the quantity measurement in that case (chapter VIII). Section 4 in this note concerning the uncertainty assessment should be read in conjunction with the note in chapter II.1 and should be seen as a specification of that note for installations partially covered by EU ETS.

• **Deviation from the required tier and how to avoid applying the fall back approach:** the note clarifies when the competent authority could allow an operator to deviate from the required tier and how <if unavoidable> the fall back approach could be used as an exceptional, temporary solution in case tier 1 can not be met for one or more source streams (chapter IX).

• **Small installations emitting less than 25 ktonnes CO2:** the note provides guidance on how to interpret section 16 MRG and when to waive certain MRG provisions for small installations (chapter X).

• **How to interpret non-conformities in the MRG?** the note clarifies that nonconformities
should be submitted in the verification report and how operators should
be required to address non-conformities according to section 10.4 MRG (chapter XI).
• **Transferred CO2:** this note clarifies when to subtract transferred CO2 and interpret the requirements laid down in section 5.6 and 5.7 MRG (chapter XII).
• **Using normal cubic meters:** this notes recommends allowing operators to convert to Nm3 as defined for final reporting purposes instead of immediate conversion in all their calculations involving gas volumes data in terms of Nm3 as defined by section 2 (3) (i) MRG (chapter XIII).
• **Presentation on Uncertainty**: Annex 1 contains a presentation prepared by D. Schoen which clarifies the background of the term uncertainty and explains the difference between individual readings on uncertainty and an annual uncertainty value (required for section 7.1 MRG). This presentation should be read in conjunction with chapter II.1 of this compendium.
• **Meaning of accuracy:** this note which was already prepared in 2005, clarifies the meaning of accuracy, precision, error and uncertainty with respect to emissions trading.

For further information please visit the website below:

European Commission : http://ec.europa.eu/environment/climat/emission/htm

Disclaimer

The contents of this document are **not legally binding**. The document reflects the proposed practice and/or what is currently applied in some Member States for accreditation, verification, monitoring and reporting of greenhouse gas emissions. It should be noted that not all of the authorities involved in the discussions on the issues covered by this document agree with all aspects. National legislation will always take precedence over guidance.

Uncertainty Assessment of Quantity Measurements in relation to EU ETS requirements – Guidance Note I

Introduction
This guidance note outlines a practical way to assess the uncertainty of measurement instruments and measurement systems that are used as part of an EU ETS monitoring methodology. The ETSG is of the opinion that the practical approach offered in this note is applicable in <roughly speaking> 90% of the installations, and provides in most cases a practical tool for operators and competent authorities to deal with this difficult subject.

Section 7.1 of the MRG requires operators to take account of the cumulative effect of the components of a measurement system on the uncertainty of annual amount of source stream using the error propagation law. Specific reference is made to ISO-5168:2005[1] and the Guide to Expression of Uncertainty in Measurement[2] but these standards are detailed and complicated to apply. Of course, the operator is free to use the standards, but we think that this guidance note provides a more practical and proportionate method to determine the uncertainty of the majority of EU ETS related measurement instruments and measurements systems used to measure the amount of fuel or material in an installation. If the operator has better information on the company specific measurement situation than the information in this guidance, the operator should use this better information. The onus of proving and substantiating the uncertainties in those cases shall always be on the operator (see steps 1 and 2 of section II of this note for further information).

This guidance note has been developed by the Dutch Emission Authority (NEa) in close liaison with the Emissions Trading Technical Support Group (ETSG) which is operated in support of the IMPEL EU ETS Project. The members of the ETSG endorse the methodology described in this guidance note as a very useful and suitably practical approach for the assessment of measurement instrument and measurement system uncertainty as required by the MRG. It is suggested that this note is read in conjunction with the MRG and any associated guidance provided by Member States (e.g. Guidance on CO_2 emission monitoring, issued by the Dutch Emission Authority, available on the website of the NEa).

This guidance note consists of two sections in which the following questions are answered:

Question I: When to assess the measurement uncertainties in relation to MRG monitoring requirements?
Question II: How to assess the uncertainty of a quantity measurement of a source stream?

Note: Uncertainties will always be expressed as a 95% confidence interval around the annual values.

I. When to assess the measurement uncertainties in relation to MRG monitoring requirements?

The operator has to describe in his monitoring plan how from each source stream the CO_2 emissions will be determined. In principle the uncertainty associated with the amount of a source stream (fuel, raw material, auxiliary and product) has to be submitted and substantiated in the monitoring plan. Section II of this guidance document outlines how to assess the uncertainty of a quantity measurement of a source stream.

[1] ISO-5168:2005 "Measurement of fluid flow – Procedures for the evaluation of uncertainties.
[2] Guide to the Expression of uncertainty in measurement, ISO/TAG 4. Published by ISO (1993; improved reprint, 1995) on behalf of BIPM, IEC, IFCC, ISO, IUPAC, IUPAP and OIML.

Before continuing, it is important to note that there are some situations where the MRG does not require the operator to provide written proof of the uncertainty associated with the determination of the amount of fuel or material. **The uncertainty does not have to be assessed** for the following source streams:

- Commercially traded (or standard) fuels or materials: the uncertainty requirements applicable to the measurements will be guaranteed by national legislation or the proven application of relevant national and international standards. The total amount of fuel or material and the net calorific value of the fuel can be derived from supplier invoices without considering and substantiating the uncertainty of the measurement instrument. [3]
- De minimis source streams: when determining the amount of these source streams, operators do not have to comply with a set uncertainty level. For these source streams a no tier approach may be used.
- All quantities of major and minor source streams within small installations (those that emit in total less than 25 ktonnes of fossil CO_2 annually, according to MRG Section 16): the uncertainty associated with the amount of these source streams does not have to be substantiated or assessed. Operators may base the determination of the amount of fuel or material on registered purchasing data (invoices) and/or estimated stock changes. The quantity measurement instrument does not have to be guaranteed by national legislation or the proven application of relevant national and international standards. When substantiating the uncertainty of internal meters operators may use the uncertainty advised by the meter supplier irrespective of the circumstances in which it is being used (see step 2 for further information).

> ***Example:***
> An installation uses only natural gas that is being measured by the main gas meter of the mains manager. This main meter has to comply with the national measurement standard. As the entire installation falls under CO_2 emission trading, no other meters apart from the main gas meter are relevant for determining the CO_2 emissions. The uncertainty for the quantity measurement does not have to be assessed.

The operator has to assess the uncertainty for the quantity measurements of the following source streams.[4]

1. All major and minor source streams (within installations emitting ≥ 25 ktonnes of fossil CO_2 annually) that are not commercially traded (or standard) fuels or materials;
2. All major and minor source streams (within installations emitting ≥ 25 ktonnes of fossil CO_2 annually) that belong to commercially traded (or standard) fuels or materials but that are not or not only being measured by guaranteed main meters;
3. Major and minor source streams (within small installations, those that emit in total less than 25 ktonnes of fossil CO_2 annually, according to MRG Section 16) where the amount of fuel or material cannot be determined on the basis of supplier data and/or stock changes. When supplier data, invoices and stock changes cannot be used by the operator, small installations are allowed to use the information specified by the manufacturer of the measurement instrument in order to estimate the uncertainty of activity data. The same is true for situations in which the operator cannot use supplier data of internal meters (please see step 2 for further information).

[3] Approval of the competent authority is required either through validation of the monitoring plan or in certain countries through separate authorization

[4] An uncertainty assesment of de minimis source streams is not necessary, because operators do not have to comply with a predetermined uncertainty level.

Example:
A large installation (emitting ≥ 25 ktonnes fossil CO_2/year) uses only natural gas that is being measured by the main gas meter of the mains manager. This main gas meter is covered by the national measurement standard. However, not all of the installation emission points/sources fall under EU ETS, and the sub-source stream natural gas that is being measured by the sub-meter is deducted from the main stream. In this situation the uncertainty of the main gas meter guaranteed under the national measurement standard does not have to be assessed. Moreover, the uncertainty of the internal sub-meter that is not guaranteed as well as the total uncertainty of the source stream do have to be assessed and substantiated according to the steps described in part two of this guidance.

II How to determine the uncertainty of a quantity measurement of a source stream?
The required tiers for the quantity measurement are related to each source stream. As a result the achieved uncertainty for each source stream has to be assessed. It should be noted that for emissions trading the operator needs to assess the uncertainty of the measurement data over a year, rather than the uncertainty of an individual observation at one particular moment in time. Random errors are a major factor in the uncertainty of an individual observation, but not the uncertainty of measurement data over a year. In this case systematic errors are more significant. Random errors tend to average during the year.

The practical way to determine and assess the uncertainty associated to the amount of a source stream consists of the following five steps:

- Step 1: Assess the uncertainty of the measurement instrument;
- Step 2: Assess the additional uncertainty of "context specific" factors (i.e. how the measurement instrument is used in practice);
- Step 3: Assess the uncertainty of pressure and temperature corrections for gas meters;
- Step 4: Sum up the uncertainties of steps 1, 2 and 3;
- Step 5: Assess the uncertainty of the amount of the source stream.

Step 1: Assess the uncertainty of the measurement instrument
This step concerns the instrument specific uncertainty that is linked to the measurement principle of a meter. Annex I to this guidance contains standard uncertainty levels for the most common measurement instruments.[5] The operator is allowed to submit this uncertainty level in his monitoring plan without further assessing and substantiating that number provided that the measurement instrument concerned meets the conditions laid down in Annex I[6] and the relevant measurement principle is applicable. If the specific meter does not meet one or more conditions laid down in Annex I, the operator has to substantiate and justify that the conditions concerned do not influence the uncertainty. The operator is also allowed to make a conservative and substantiated judgement of the additional effect that the non-compliance of the conditions concerned would have on the uncertainty of the measurement instrument.

[5] Annex I provides general conservative uncertainty data that can be met by both existing and new measurement instruments. If specific uncertainty data of the used instrument is available, this data may be used provided that the conditions laid down in this Annex for the relevant measurement principle are met. It should be stressed that in general specific uncertainty data will be lower than the conservative data in this Annex. Moreover, national legal requirements may impose more stringent or different uncertainty levels than those laid down in the Annex. Where this is the case or if the operator has better information on the uncertainty of the meters he uses in the installation and their specific measurement situation than the uncertainty levels listed below in this Annex, the operator has to use these stricter levels or this better information.

[6] Some of the conditions of Annex I are aspects of ISO 9001 certification, e.g. maintenance and calibartion. However, ISO 9001 doesn't prescribe the minimum requirements as given in Annex 1. Therefore ISO 9001 certification in itself is not sufficient to prove that the requirements of step 1 are fulfilled.

If the operator decides to use this guidance note, the operator is advised to describe in the part of the monitoring plan that relates to the quality assurance of the measurement equipment how he will meet the conditions for the measurement instrument that are prescribed for the measurement principle concerned in Annex I. He is allowed to refer to the requirements of the manufacturer if these are applicable, provided that these requirements are available within the installation site. In any case the monitoring plan must show the frequency with which the operator carries out the maintenance and calibration of the measurement instruments.

It can be the case that the uncertainty depends on the total quantity that a measurement instrument actually measures: for example, for 0-20% of the maximum measurement range another uncertainty applies than for 20-100% of the maximum measurement range. If both situations occur within the representative company-specific circumstances of the installation, the operator does not have to calculate the weighted average uncertainty. The uncertainty of the weighted average measurement value is sufficient for those cases. Below an example of how to calculate this average is included.

Example:

A rotor meter that measures gas has an uncertainty of 3% for 0-20% of the maximum measurement range and an uncertainty of 1,5% for 20-100% of the maximum measurement range (see Annex I).
In a year 480,000 m^3 natural gas flows through the meter during 8000 hours. The maximum flow (100%) is 220 m^3/hour. The weighted average flow corresponds to 27,3% of the maximum measurement range:

480,000 = 27,3%
8,000 * 220

Conclusion: as 27,3% is within the range of 20-100%, the operator may apply an uncertainty of 1,5%.

If the measurement instrument concerned is not mentioned in Annex I, the operator has to assess the uncertainty of that measurement instrument in a year on the basis of specifications provided by the supplier of the measurement instrument. The conditions that have to be met for that uncertainty have to be derived from supplier data. This should include specifications regarding maintenance and calibration requirements.

Step 2: Assess the additional uncertainty of context specific factors
This step is not applicable to measurement instruments within small installations (emitting less than 25 ktonnes fossil CO_2 annually, according to MRG Section 16). They can apply an uncertainty of 0% for the outcome of step 2.

To assess the additional uncertainty the following three questions need to be answered:
1. Is the measurement instrument installed according to the requirements of the manufacturer or, if those data are not available, according to requirements that apply to similar instruments? The latter situation can for example occur when the manufacturer data for an old instrument no longer exist. In those cases the requirements for a similar newer instrument shall be used.
2. Is the medium (gas, liquid, solid substance) that is measured by the meter a medium for which the measurement instrument has been designed according to the requirements of the manufacturer or, if these data are not available, according to the requirements applicable to similar instruments?
3. Are there no other factors that can have adverse consequences on the uncertainty of the measurement instrument?

Example of step 2 question 3:
Generally the composition of process gases is not constant. Also the physical parameters will vary in time. Some of the Annex I measurement principles are sensitive to changes in these physical parameters. For example the reading of an ultrasonic flow measurement depends on the density of the process gas. When a constant value for the density (kg/Nm3) is used in the calculation of the flow with an ultrasonic meter, the variations in the density in time shall be expressed as an additonal uncertainty. In order to reduce this additional uncertainty, the density of the process gas can be measured. In those cases the step 2 uncertainty is the uncertainty of the density measurement.

If the answer to all three above questions is yes, the operator can use an uncertainty of 0% for the outcome of step 2. If the answer to one or more of these questions is no, the operator has to make a conservative and substantiated judgement of the additional uncertainty that is connected to the factor or factors for which the operator has answered negatively. This judgement has to be done in consultation with the manufacturer of the measurement instrument or another expert.[7]

Step 3: Assess the uncertainty of the pressure and temperature corrections for gas meters
Pressure and temperature corrections are only applicable to the determination of the amount of gas and not to the measurement of liquids or solid substances. For liquids and solid substances the operator can use an uncertainty of 0% for the outcome of step 3. The operator has to correct the actual amount of gas for pressure and temperature to normal conditions. This correction is compulsory since not correcting these elements may cause major systematic errors. The following situations can occur in practice.

Situation I Gas meter with Electronic Volume Conversion Instrument (EVCI)
If the operator has a gas meter with an EVCI that determines the pressure and temperature, the following standard uncertainties and numbers can be applied for the outcome of step 3 for the EVCI.

<u>However when a temperature and pressure measurement covers more than one meter</u> those measurements cannot be regarded as independent from each other. Therefore step 3a is introduced which reflects the situation in which the measurement of pressure and temperature are interdependent (this would for example be the case in situation III).

$U\_step\_3 = 0{,}5$

$U\_step\_3a = 0$

The uncertainty of 0,5% can only be used if the operator meets the conditions laid down in Annex I for EVCI. These conditions have to be submitted in the part of the monitoring plan that relates to the quality assurance of measurement equipment.[8]

Situation II Gas meter using separate pressure and temperature measurement
If the operator has a gas meter using a separate pressure and temperature measurement at that meter, he has to make a conservative and substantiated judgement of the uncertainty of the pressure and temperature measurement in consultation with the manufacturer of the meter or another expert.

[7] In some cases an in-house expert could be used to make an conservative judgement. An operator is allowed to use an inhouse-expert provided that he is capable of making that expert judgment and that the competent authority agrees with that in-house expert judgement in the context of validating the monitoring plan.
[8] In response to Section 4.3(m) and Section 10.3.1 of the MRG.

The uncertainty has to be calculated according to the following formula in the outcome of step 3.

$$U\_step\_3 = \sqrt{(U\_pressuremeasurement)^2 + (U\_temperaturemeasurement)^2}$$

$$U\_step\_3a = 0$$

Where:
U is the uncertainty.

Situation III Gas meter without separate pressure and temperature measurement
If there is a gas meter without separate pressure and temperature measurement at that meter (correction takes place on the basis of pressure and temperature measurement/ EVCI at the main gas meter), the operator has to make a conservative and substantiated judgement of the uncertainty of the pressure and temperature measurement at the location of the gas meter concerned in consultation with the manufacturer of the meters or another expert. The operator has to take the differences in pressure and temperature into account between the location of the pressure and temperature measurement and the location of the gas meter concerned.

The uncertainty of the pressure and temperature measurement has to be determined according to the following formula in the outcome of step 3:

$$U\_step\_3 = 0$$

$$U\_step\_3a = \sqrt{(U\_pressuremeasurement)^2 + (U\_temperaturemeasurement)^2}$$

Where:
U is the uncertainty.

Step 4: Sum up the uncertainty of step 1, 2 and 3
Steps 1, 2 and 3 lead to uncertainty levels that need to be summed up to determine the total uncertainty of the individual quantity measurement. The following formula has to be applied by the operator:

$$U\_quantitymeasurement = \sqrt{(U\_step\_1)^2 + (U\_step\_2)^2 + (U\_step\_3)^2}$$

Where:
U is the uncertainty.

Note:
The uncertainty of step 3a (U_step_3a) has to be ‘saved’ for step 5.

Step 5: Assess the uncertainty of the amount of the source stream
In steps 1 to 4 the operator has determined the uncertainty of one individual (corrected) quantity measurement. If the amount of a source stream is determined by more measurement instruments, the operator has to sum up the uncertainties of these different individual measurements (the components of the measurement system) to determine the total cumulative uncertainty of the amount of the source stream.

The following formula has to be applied by the operator:

$$U\_source\_stream = \sqrt{\left(\frac{\sqrt{(U_1 * x_1)^2 + (U_2 * x_2)^2 + (U_n * x_n)^2}}{x_1 + x_2 + x_n}\right)^2 + (U\_step\_3a)^2}$$

Where:
U_ source_stream is the total uncertainty of the source stream;
U_1 – U_n are the uncertainties of the individual quantity measurements as determined in step 4;
x_1 – x_n are the quantities that are measured annually by the measurement instruments concerned.

If the total uncertainty of the source stream is measured with one measurement instrument and situation I or II as described in step 3 is applicable, the outcome of step 5 is the same as the outcome of step 4.

To assess the uncertainties associated to the amount of the source streams in a practical way operators may consider the uncertainties in the formula as uncorrelated uncertainties. In practice the measurements may be partly interdependent and partly uncorrelated.

Annex I: standard measurement uncertainties for the most common measurement instruments

Annex I provides general conservative uncertainty data that can be met by both existing and new measurement instruments. If specific uncertainty data of the used instrument is available, this data may be used provided that the conditions laid down in this Annex for the relevant measurement principle are met. It should be stressed that in general specific uncertainty data will be lower than the conservative data in this Annex. Moreover, national legal requirements may impose more stringent or different uncertainty levels than those laid down in the Annex. Where this is the case or if the operator has better information on the uncertainty of the meters he uses in the installation and their specific measurement situation than the uncertainty levels listed below in this Annex, the operator has to use these stricter levels or this better information.

If the measurement instrument concerned meets the conditions laid down in this Annex and the relevant measurement principle is applicable the operator may use the uncertainty level for step 1. Further specifications are mentioned under *Step 1: Assess the uncertainty of the measurement instrument*.

Where relevant the uncertainty for step 2 and 3 has to be assessed (see step 2 and 3). Steps 1, 2 and 3 lead to uncertainty levels that need to be summed up to determine the total uncertainty of the individual quantity measurement (please see step 4).

Rotor meter
Medium: gas Uncertainty for 0-20% of the maximum measurement range: 3 % Uncertainty for 20-100% of the maximum measurement range: 1,5% Conditions: - Once per 10 year cleaning, recalibration and if necessary adjusting - Annual inspection of the oil level of the carter - Application filter for polluted gas - Life span 25 years - No overload of longer than 30 minutes › 120% of maximum measurement range
Medium: liquid Uncertainty for 5-100% of the maximum measurement range: 0,3% Conditions: - Once per 5 year cleaning, recalibration and if necessary adjusting (or at an earlier time when flow liquid of 3500 hours × maximum range of the meter has run through the meter - Annual maintenance according to instructions of manufacturer / general instructions measurement principle - Life span 25 years

Turbine meter
Medium: gas Uncertainty for 0-20% of the maximum measurement range: 3 % Uncertainty for 20-100% of the maximum measurement range: 1,5% Conditions: - Once per 5 year cleaning, recalibration and if necessary adjusting - Annual visual inspection

- Once per three months lubrication of bearings (not for permanent lubricated bearings)
- Application filter for polluted gas
- No intermittent (pulsating) gas stream if no special measures are taken
- Life span 25 years
- No overload of longer than 30 minutes › 120% of maximum measurement range

Medium: liquid
Uncertainty for 10-100% of the maximum measurement range: 0,3%

Conditions:
- Once per 5 year cleaning, recalibration and if necessary adjusting
- Once per three months lubrication of bearings (not for permanent lubricated bearings)
- Application filter for polluted liquid
- Life span 25 years
- No overload of longer than 30 minutes › 120% of maximum measurement range

Bellows meter

Medium: gas

Uncertainty for 0-20% of the maximum measurement range: 6 %
Uncertainty for 20-100% of the maximum measurement range: 4%

Conditions:
- Once per 10 year cleaning, recalibration and if necessary adjusting
- Annual maintenance according to instructions of manufacturer / general instructions measurement principle
- Life span 25 years

Orifice meter

Medium: gas and liquid

Uncertainty for 30-100% of the maximum measurement range: 1,5%

Conditions:
- Annual calibration of the pressure transmitter
- Once per 5 years calibration of the orifice meter
- Annual inspection of abrasion orifice and fouling
- Annual maintenance according to instructions of manufacturer / general instructions measurement principle
- Life span 30 years
- No corrosive gases and liquids

Guidelines for building in orifices: minimum of 4D free input flow length before the orifice and 2D after the orifice: smooth surface of inner wall.

Venturi meter

Medium: gas and liquid

Uncertainty for 20-100% of the maximum measurement range: 1,5%

Conditions:
- Annual calibration of the pressure transmitter
- Once per 5 years calibration of entire measurement instrument
- Annual visual inspection

- Annual maintenance according to instructions of manufacturer / general instructions measurement principle
- Life span 30 years
- No corrosive gases and liquids

Ultrasonic meter

Medium: gas and liquid

Uncertainty for 1-100% of the maximum measurement range: 0,5%

Conditions:
- Once per 5 years cleaning, recalibration and if necessary adjusting
- Annual inspection of contact between transducer and tube wall. When there is not sufficient contact, the transducer assembly has to be replaced according to the specifications of the manufacturer.
- Annual inspection on corrosion of wall
- Annual inspection of transducers
- Annual maintenance according to instructions of manufacturer / general instructions measurement principle
- Life span 15 years
- No disturbances in frequencies
- Composition of medium is known

Guidelines for building in ultrasonic meters: minimum of 10D free input flow length before the meter and 5D after the meter

Vortex meter

Medium: gas

Uncertainty for 10-100% of the maximum measurement range: 2%

Conditions:
- Once per 5 years cleaning, recalibration and if necessary adjusting
- Annual inspection of sensors
- Annual inspection of bluff body
- Annual inspection on corrosion of wall
- Annual maintenance according to instructions of manufacturer / general instructions measurement principle
- Life span 10 years
- Set-up is free of vibration
- Avoid compressive shocks

Guidelines for building in vortex meters: minimum of 15D free input flow length before the meter and 5D after the meter

Medium: liquid

Uncertainty for 10-100% of the maximum measurement range: 1,5%

Conditions:
- Once per 5 years cleaning, recalibration and if necessary adjusting
- Annual inspection of sensors
- Annual inspection of bluff body
- Annual inspection on corrosion of wall
- Annual maintenance according to instructions of manufacturer / general instructions measurement principle

- Life span 10 years
- Set-up is free of vibration
- Avoid compressive shocks and gas bubbles

Guidelines for building in vortex meters: minimum of 15D free input flow length before the meter and 5D after the meter

Coriolis meter

Medium: gas and liquid

Uncertainty for 1-100% of the maximum measurement range: 1%

Conditions:
- Once per 5 years cleaning, recalibration and if necessary adjusting
- Monthly control of adjusting zero point
- Annual inspection of corrosion and abrasion
- Annual check on sensors and transmitters
- Annual maintenance according to instructions of manufacturer / general instructions measurement principle
- Life span 10 years

Ovalrad meter

Medium: liquid

Uncertainty for 5-100% of the maximum measurement range: 0,5%

Conditions:
- Viscid liquids (oil): once per 5 years cleaning, recalibration and if necessary adjusting
- Thin liquids: once per 2 years cleaning, recalibration and if necessary adjusting
- Annual inspection of abrasion
- Annual maintenance according to instructions of manufacturer / general instructions measurement principle
- Life span 30 years

Electronic Volume Conversion Instrument (EVCI)

Medium: gas

Uncertainty for 0,95-11 bar and -10 – 40°C: 0,5%

Conditions:
- Once per 4 years recalibration and if necessary adjusting
- Replace batteries (frequency is dependent on instructions manufacturer)
- Annual maintenance according to instructions of manufacturer / general instructions measurement principle
- Life span 10 years

Annex II Sources of information

All information reported in Annex I stem from the following sources;

Literature:
- Praktische meettechniek; cursus materiaal Edion Trainingen Hogere gastechniek
- Joseph P. Decarlo; Fundamentals of Flow Measurement
- David W. Spitzer; Industrial Flow Measurement

Guidelines and standards:
- MID (Annex MI-002)
- OIML (Organisation Internationale de Métrologie Légale) richtlijn R117 uit 1995EN 1359
- EN12480
- EN12261
- IJkregeling gasmeters 1989 (Dutch Calibration Regulation 1989)

Results from questionnaires submitted by:
- VAF instruments
- Dresser
- Actaris
- CY
- Imeter
- Dresser

Interviews with:
- Dhr. M. Oosting, ODS
- Dhr. W. Norde, CY
- Dhr. R. Schoen; Exxonmobil
- Dhr. W. Burgers; Infomil

Manuals and product brochures:
- ABB
- Elster Instromet
- Emerson
- Bopp & Reuter
- Rheonik
- Siemens
- Yokogawa
- Ultraflux
- Vemmtec
- Hoffer Instruments

Publications:
- Daniel 1997, Fundamentals of Orifice Measurement
- Huain et al., 1997, Theoretical uncertainty of orifice flow measurement
- Ultrasoon flowtechniek: theorie en praktijk; ODS Barendrecht
- Trolin en Patten: Mass meters for gas measurements (Emerson Process Management)

Uncertainty Assessment of Activity Specific Factors in relation to EU ETS requirements – Guidance Note II

Introduction

According to section 13.6 MRG the sampling procedure and frequency of analyses shall be designed such that the annual average of the activity-specific factors is determined with a maximum uncertainty of less than 1/3 of the maximum uncertainty which is required for the amount of the source stream. This guidance clarifies how to determine the uncertainty for the net calorific value, emission factor, oxidation factor, conversion factor, the carbon content, the biomass fraction and the composition data. It provides for a practical method to assess that uncertainty.

1. How to assess the uncertainty of the activity-specific factors that are relevant for determining the CO_2 emissions in an installation?

Before describing this method it is important to indicate the situations in which the MRG does not require the operator to provide written proof of the uncertainty associated with the determination of the activity-specific factors. The uncertainty does not have to be assessed in the following cases:

1. The variable concerned is not relevant for determining CO_2 emissions.
2. The operator is allowed to use standard factors for the variable concerned.
3. The operator is allowed to determine the variable according to the minimum frequency of analyses indicated in MRG Table 5.[1]
4. The net calorific value of a commercially traded (or standard) fuel or material is based on accepted national or international measurement standards. In that case the operator can take the net calorific value from the invoice of the supplier. He does not have to assess and substantiate the uncertainty of the net calorific value.

Further situations where determinations are not required:

- The conversion factor is not relevant for determining the CO_2 emissions from a fuel stream.
- The oxidation factor is not relevant for determining the CO_2 emissions from a raw material stream.
- The operator uses a standard factor 1 for the oxidation factor.
- For the net calorific value and emission factor the operator uses standard factors.[2]

The operator shall assess the uncertainty for all factors that are relevant to the determination of CO_2 emissions within the installation if those factors have to be determined according to the required tier.

2. How to determine the uncertainty of the activity-specific factors

If the activity-specific factors that are relevant for determining CO_2 emissions have to be determined, the uncertainty connected to that variable is 1/3 of the maximum uncertainty that applies to the quantity measurement of the source stream.

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[1] The requirement in the Guidance on CO_2 monitoring is in accordance with the frequency of analyses laid down in table 5 in section 13.6 of the MRG.

[2] Section 11 of the MRG or standard factors as reported by the respective Member State in its latest national inventory submitted to the Secretariat of the United Nations Framework Convention on Climate Change.

Example:
If the amount of coal within the installation has to be determined with a required uncertainty of 1.5% (tier 4), the net calorific value and the emission factor of coal have to be determined with an uncertainty of 1/3 * 1,5% = 0,5%.

The advantage of this approach is that the operator does not have to sample and analyse the raw materials or fuels of a constant composition to a needless extent. If the operator cannot meet the required uncertainty for one or more variables or is not able to demonstrate compliance with the uncertainty requirement, the operator can opt for applying the conservative frequency of analyses laid down in table 5 of section 13.6 of the MRG.

Method
The uncertainty in determining the variables can be reduced by increasing the number of samples and analyses. Statistically the uncertainty in the average emission factor or net calorific value will diminish with a factor 1/ √n where n is the number of independent observations on which the average is based. An independent observation is the (average) resultant analyses of one sample or one mixed sample.

To meet the uncertainty requirement for the variables the operator, when drafting the monitoring plan, has to determine through historical data how often analyses and sampling have to be carried out. Subsequently analyses and sampling have to be carried out in 2008 according to the calculated frequency. On the basis of the results of the analyses the operator can calculate whether he meets the required uncertainty in practice. In view of this the operator can adjust the frequency of samples and analyses.

Helpful tool for operators
With the aid of the spreadsheet 'Uncertainty variables CO2 emissions.xls' and the historical results of analyses of the variables that are available within the installation site and applicable to the installation site concerned, the operator can discern quickly the number of analyses he has to carry out to meet the required uncertainties. This spreadsheet has attached to this note and can also be downloaded from the website of the Dutch Emission Authority (NEa)
www.emissieautoriteit.nl>mediatheek>hulpmiddelen.
In the work table 'history' the results of analyses carried out in the past and the required uncertainty of the quantity measurement can be filled in. On the basis of this the spreadsheet calculates a minimum number of samples and analyses and will advise the operator the frequency of those samples and analyses. As from 2008 the results of analyses can be filled in the worktable 'uncertainty'. This worktable will calculate the actual realised uncertainty of the variable concerned.

The spreadsheet is a simple approach that assumes that the installation will apply the annual average of the variable when monitoring CO_2 emissions without using a weighted factor for the flow. Alternatively, the operator is allowed to use a method of his own to determine the uncertainty of the variables.

Monitoring plan

If the operator uses this guidance he is advised to submit in his monitoring plan for every source stream which tier is required and which tier is achieved. For the activity-specific factors the operator has to indicate in his monitoring plan the substantiation for the uncertainty of the factor concerned. This can be done by referring to an Annex to the monitoring plan that contains a print-out of the work table ‘history’ in the spreadsheet for all the factors. The operator is also allowed to refer to substantiations and justifications that are available within the installation site. The part of the monitoring plan that relates to the quality assurance of the measurement equipment has to show clearly for each variable how many samples and analyses will be taken.

Guidance on data flow activities and the control system

1. Introduction

Compared to the MRG 2004 of the first trading period, section 10.1 up to 10.3 of the revised MRG (2007) have introduced new requirements on quality assurance and quality control. Section 10 states that the operator shall establish, document, implement and maintain data acquisition activities and a control system which consists of various control activities. Section 10.3.2 to 10.3.6 of the MRG elaborate on the specific control activities. This note aims to clarify the meaning of the data acquisition and handling activities as well as the content of the control system and provides practical guidance on how to interpret section 10 MRG.

2. Requirements

2.1 Data acquisition and handling

According to section 10.1 of the MRG the operator shall establish, document, implement and maintain effective data flow activities for the monitoring and reporting of greenhouse gas emissions in accordance with the approved monitoring plan, the permit and the MRG. The data flow activities have to be established, documented and implemented for all installations, even for small installations.

For each operational activity a procedure shall be developed that meets the procedural elements described in MRG section 10.3.1 (third paragraph).[1]

Section 5.1 of this document describes the requirements for data acquisition and handling in more detail.

2.2 Control system

Operators shall establish, document, implement and maintain an effective control system to ensure that the annual emissions report, resulting from the data flow activities does not contain misstatements[2] and is in conformity with the approved monitoring plan, the permit and the MRG (section 10.2 MRG). The control system consists of the operator's own risk assessment process and control activities. The purpose of the control activities and the evaluation of the control system are to mitigate the identified risks. A more detailed description of the requirements for the control system and its elements can be found in section 5.2 of this document.

In order to identify the risks in the data flow activities that could lead to misstatements in the emission report, the operator has to carry out a risk assessment. The outcome of such a risk assessment determines to what extent control activities shall be set-up and an evaluation of the control system must take place. If there are no risks identified in a particular data flow activity a control activity does not necessarily have to be implemented for that specific data flow activity. In that case there are no risks to be mitigated by a control activity.

[1] MRG Section 10.3.1 (third paragraph): Each of these procedures shall address (where appropriate) the following elements: responsibilities, records, information systems used, input and output and clear linkage with previous and next activity, and frequency (if applicable).

[2] Misstatements are omissions, misrepresentations and errors in the emission report.

According to section 10.3.1 of the MRG the control activities to be covered in procedures include:

a. Quality assurance of the measurement equipment and information technology;
b. Internal reviews of reported data;
c. Outsourced processes;
d. Corrections and corrective action;
e. Records and documentation;
f. Management of the necessary competences for the responsibilities assigned.

The procedures shall be suitable to mitigate the identified risks. Detailed requirements for all these control activities can be found in section 5.2.2 of this document.

According to section 10.2 MRG the control system shall be evaluated by the operator by performing internal audits of the control system and the data reported.

3. Roles and responsibilities of the parties involved

The roles and responsibilities of the parties involved can be defined as follows:

The operator:

The operator shall submit a monitoring plan that is in full accordance with the MRG or, as is the case in most MS, the national legislation by which the MRG have been implemented. The operator shall ensure that the control system is in accordance with the approved MP and the permit and the MRG.

The competent authority

The Competent Authority shall check and approve that a description of or a referral to the procedures for data flow activities and control activities are included in the MP. He shall also check whether the data flow activities and control activities are in line with the MRG.

The verifier

The verifier shall check whether the procedures for data flow activities and the control activities as referred to and/or shortly described in the approved MP have been (correctly) implemented and are up to date. The extent to which a verifier can check this depends on the way the procedures for control activities and other MP elements have been described or referred to in the Monitoring Plan. If the Monitoring Plan contains a limited description of these elements and there are no references to internal procedures or documents for the data flow activities and control activities, the verifier has less means to verify the control activities extensively.

Given the objective of verification in section 10.4.1 MRG verifiers are however still able to check whether these control activities are in line with the MRG and if not, they must assess whether the lack of control activities has an impact on the emission data in the emission report. If that is the case they must be regarded as misstatements. In other cases the verifier can recommend that the operator brings the situation in line with the MRG and refer him to the CA according to the improvement of performance principle in section 3 MRG.[3]

4. Elements of data flow and control activities to be covered in the MP

The MP requirements for the different activities are outlined below:

[3] Please see for further information the note on non-conformities in the MRG.

- **Data flow activities:** description of the procedures for the operational activities or referral to these procedures;
- **Quality assurance:** description of the procedure for quality assurance and annual plan for quality assurance or reference thereto;
- **Records and documentation:** description of the procedure for document management and the procedure for registering records or a referral to those procedures;
- **Outsourced processes:** description of the procedure for outsourced activities or a referral to those procedures;
- **Organization and management of responsibilities:** description of the organization (e.g. organization chart) and an overview of responsibilities, tasks and areas of authority or a referral to such an overview and procedure;
- **Evaluation of control system:** description of procedure for internal audits or a referral to those procedures.

Corrections/ corrective action (section 2 under d of this note) and internal review of data (section 2 under b of this note) are part of the abovementioned procedures.

When the MP refers to procedures and work descriptions these references must be traceable and verifiable. The referral must be such that it will enable a verifier and the CA to easily reproduce the results and to check the procedures against the approved MP.

According to section 16 of the MRG exceptions apply to small installations. Small installations only have to submit in their MP:

- a short description or referral to a procedure for data flow activities. The description of such a procedure in the MP is for small installations less detailed than for large installations. When describing the procedure in the MP it is sufficient to state which procedures and operational activities there are.
- Only the calibration frequency of the measurement equipment and referral to a calibration report should be submitted in the MP.
- The control activities records, documentation and outsourced processes have to be carried out if applicable given the risk assessment but they do not need to be described in the MP.
- Although small installations have to evaluate the control system, they do not need to describe the procedure for internal audits or refer to such a procedure.
- Organization and management of responsibilities have to be described or referred to if applicable given the risk assessment.

The way data flow activities and control activities have been described in the monitoring plan and/or references are made to internal records and procedures on data flow activities and control activities determines to what extent a verifier can have a proper insight into the internal safeguards and can look at the procedures for data flow activities and control activities in the installation.

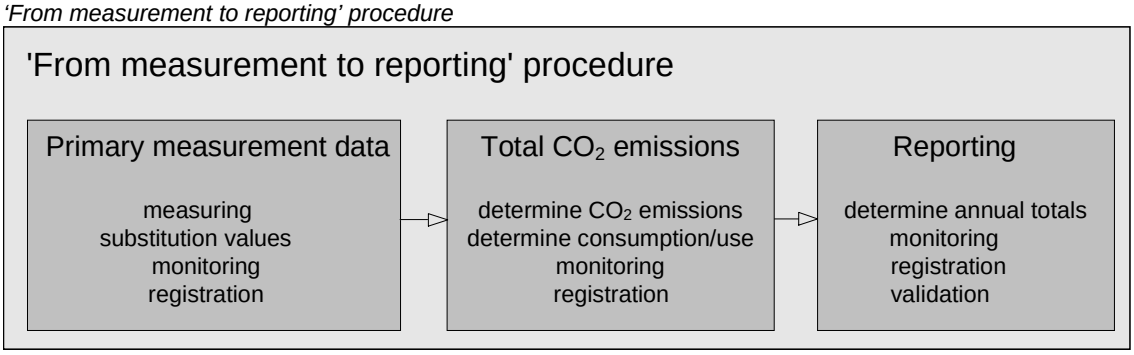
5. Detailed description of requirements from Section 10 of the MRG

5.1 Detailed requirements for data acquisition and handling activities

According to section 10.1 of the MRG the operator shall establish, document, implement and maintain effective data flow activities for the monitoring and reporting of greenhouse gas emissions in accordance with the approved monitoring plan, the permit and the MRG.

The MRG specifically mention measuring, monitoring, analysing, recording, processing and calculating parameters. However, this is not a fully explicit list of elements. In fact the data flow activities concern all operational activities that are necessary to produce an emission report from primary measurement data.

'From measurement to reporting' procedure



Procedure for data flow activities
The operator shall document the data flow activities in written procedures (section 10.3.1 MRG). The procedures have to be set-up in such a way that there is a clear linkage with the previous and the next activity. The sequence and interaction between those activities should be clear (section 10.3.1 second paragraph, first bullet). This could be achieved by listing the procedures in a diagram form or in a flow chart and to list the various parts of procedures concerned within a procedure itself.

Procedures (including work descriptions)
The procedure should describe what is done where, when, by whom and how for each step in the procedure and operational activity in order to meet the other procedural elements described in MRG section 10.3.1 (third paragraph).[4] It should therefore describe:

- what tasks and/or actions are performed in the activity concerned;
- at what time and/or with what frequency are the tasks and/or actions performed;
- what resources, if any, are used for the tasks and/or actions concerned. A resource could for example be a data storage system, calculation system, information system, data processing system, spreadsheet or reporting program. For each resource the following elements must be described:
  - a description, location, brand and type of system;
  - function and operation of the system;
  - facilities for regular backups and backups in the event of faults

Annex I to this note provides an example on how to set-up such a procedure for primary measurements.

[4] MRG Section 10.3.1 (third paragraph): Each of these procedures shall address (where appropriate) the following elements: responsibilities, records, information systems used, input and output and clear linkage with previous and next activity, and frequency (if applicable).

5.2 Detailed description of the Control system

The control system consists of the operator's own risk assessment process and control activities.

5.2.1 Risk assessment

In order to identify the risks in the data flow activities that could lead to misstatements in the emission report, the operator has to carry out a risk assessment.
The outcome of such a risk assessment determines to what extent the control activities should be set-up and to what extent an evaluation of the control system is to take place.
The purpose of the control activities and the evaluation of the control system are to mitigate the identified risks.
The outcome of the risk assessment is determined by:

- Susceptibility to misstatements in the emission report;
- Susceptibility to non-conformities with the approved MP, the permit and the monitoring and reporting guidelines.

This means for example that the complexity of the installation, the size and quantity of CO_2 emitted from the installation can all have an impact on the susceptibility to misstatements and non-conformities and ultimately on how control activities to mitigate these risks should be designed.

If there are no risks identified in a particular data flow activity a control activity does not necessarily have to be implemented for that specific data flow activity. In that case there are no risks to be mitigated by a control activity. For example in case of a small installation emitting less than 25,000 tonnes of fossil CO_2 per year an operator may determine the use of the fuel or the material used on the purchasing records and the estimated stock changes without further consideration of uncertainties. For that particular data flow activity (i.e. determining the amount of fuel or material) a calibration does not have to be carried out since operators may base their data on the invoices or stock changes. The fact that a control activity does not have to be set-up if there are no risks involved in the data flow activity derives from section 10.3 first paragraph MRG.[5] Control activities have only to be implemented for the purposes of controlling and mitigating risks.

If the risks to misstatements and non-conformities in a particular data flow activity are high, the control activities for that activity should be stronger and more robust. The lower the risks, the less control activities and the less detailed control activities should be designed.

When assessing the risks, the operator should not only look at the present situation but also look at the susceptibility to future risks for a data flow activity. If future risks to misstatements and non-conformities are very likely to occur, the operator should implement a control activity to avoid misstatements and non-conformities from happening.

[5] MRG Section 10.3.1 (first paragraph): For the purposes of controlling and mitigating the inherent and control risks pursuant to Chapter 10.2 the operator shall identify and implement control activities in accordance with the following sections 10.3.1 to 10.3.6.

To ensure that the risk assessment is done accurately the operator is required to set up a procedure for the risk assessment of the definition and evaluation of the control system according to section 10.3.1. MRG. The risk assessment itself should be stored in internal records within the company. The operator should submit a short description of the procedure for risk assessment and/or a traceable referencing to the risk assessment in the Monitoring Plan. This would enable the CA and the verifier to see whether the risk assessment has been carried out correctly. [6]

5.2.2 Control activities

According to section 10.3.1 of the MRG and depending on the outcome of the risk assessment the control activities to be covered in procedures include[7]:

a. Quality assurance of the measurement equipment and information technology;
b. Internal reviews of reported data;
c. Outsourced processes;
d. Corrections and corrective action;
e. Records and documentation;
f. Management of the necessary competences for the responsibilities assigned.

Detailed requirements for the different activities can be found in the next sub-sections.

5.2.2.a. Quality assurance of the measurement equipment and the information technology used (if applicable)

Quality assurance of the measurement equipment and information technology includes all activities that are performed relating to calibration and maintenance of that equipment. According to section 10.3.2 of the MRG, the measurement, sampling and analysis equipment and automatic data processing equipment must be calibrated, adjusted and checked both before and during use.

- It must be checked against measurement standards traceable to international measurement standards where available.
- The measurement instrument and systems used to determine the amount of fuel or material is connected to an uncertainty that has to be assessed according to section 7.1 MRG. The guidance on uncertainty assessment prepared [8] by the ETSG specifies calibration and maintenance requirements for specific measurement instruments.
- Online gas analyzers and gas chromatographs that are used to determine composition data for gaseous fuels or materials have to meet the requirements in section 13.5 of the MRG.

Quality assurance must be implemented in accordance with the risks identified by the risk assessment (see under section 5.2.1 of this note).

The following provisions have to be carried out even if the risks are not very high:

- If the measurement instrument or parts thereof cannot be calibrated the operator must suggest alternative control activities to the Competent Authority who has to

[6] At a later time the ETSG may develop a separate note containing general guidelines for risk assessment to assist operators and ensure some uniformity in the way risk assessments are being carried out by operators

[7] MRG Section 10.3.1 (third paragraph): Each of these procedures shall address (where appropriate) the following elements: responsibilities, records, information systems used, input and output and clear linkage with previous and next activity, and frequency (if applicable).

[8] Uncertainty Assessment of Quantity Measurements in relation to EU ETS requirements, Guidance note I, prepared by ETSG.

approve these activities. Such control activities must be listed or referred to in the MP. According to section 8 MRG the control activities can also be submitted in the emission report as a change in the installation if the non-calibration of a measurement instrument occurs after the MP has been approved. In that way the verifier can check the alternative control activity.

- When the equipment is not functioning in line with the requirements, the operator shall promptly take necessary remedial action. The extent of remedial action depends on the risks involved. When the non-functioning of measurement equipment will influence the uncertainty and will lead to a situation in which the tier will not be achieved prompt remedial action must be taken.
- Records of the results of calibration and authentification shall be retained for a period of 10 years. These records should be registered in the company's records (please see the note under section 5.2.2 e). If a registration is changed the original results must be kept and it must be clearly indicated that the registration has been corrected.

Evaluation of quality assurance
The operator must evaluate the results of the quality assurance. He is to ascertain whether the calibration measurements have been carried out correctly and fully. The result of this check must also be recorded in the company's internal records (section 5.2.2 e of this note).

Procedure for quality assurance
According to 10.3.1 MRG the operator shall set-up and document a procedure of quality assurance of the measuring equipment and information technology used. The following options could be applied:

- Produce a multi-annual quality assurance plan for in-house validation of the measuring equipment. This plan shall contain the following parts:
  - the measuring equipment to be calibrated and maintained;
  - the method used to perform the calibrations and the validation checks (this also applies if they are performed by an external body);
  - the resources used to perform the calibrations and validation checks (this would include a definition, location, type of resources);
  - the frequency with which the calibration and maintenance are being carried out.

  In the plan calibration and maintenance are separate activities which must be mentioned along with their frequency.
- Procedure of quality assurance in which calibration and maintenance activities are described. These should contain the elements as described in the first bullet point and the elements below.

Procedures (Work descriptions)
The procedure must describe the following elements in order to meet the other procedural requirements described in MRG section 10.3.1 (third paragraph)[9]:

- how validation, calibration and maintenance activities are performed;
- when and how validation, calibration and maintenance activities are performed;
- when and how the results of the validation, calibration and maintenance activities are registered;

[9] MRG Section 10.3.1 (third paragraph): Each of these procedures shall address (where appropriate) the following elements: responsibilities, records, information systems used, input and output and clear linkage with previous and next activity, and frequency (if applicable).

- when and how corrective action is taken (please see under section 5.2.2 d of this note);
- when and how the results of the checks and corrective action are registered (please see under section 5.2.2 d of this note);
- how the original uncorrected value can be retrieved.

5.2.2.b. Internal reviews of reported data
For managing the data flow the operator shall design and implement reviews and validation of data according to section 10.3.3 of the MRG. Internal review and validation are part of data flow activities. It concerns checks and corrections on primary measurements and checks and corrections on consumption and CO_2 emissions. Under this circumstance, a separate procedure for internal review of reported data is not necessary. It should be part of the procedures for data flow activities.

Internal reviews for reported data have to be developed in accordance with the risks identified by the risk assessment (see under section 5.2.1 of this note).

5.2.2.c. Outsourced activities
When an operator chooses to out-source any process in the data flow, the operator shall control the quality of these processes. This will be done in accordance with the risks identified by the risk assessment (see under section 5.2.1 of this note). He wil set suitable requirements with respect to the performance and methods used by an external body and he will check the results of that outsourced activity. Outsourced activities can for example concern:
- accredited labs determining the activity-specific factors;
- non-accredited labs outside the company determining activity-specific factors;
- consultants validating the MP;
- data received from supplier of measurement instruments or suppliers of fuels/ materials.

A procedure for outsourced activities should be set-up by the operator. This procedure should mention among other things requirements an external body must meet. These are for example accreditation and certification requirements.

5.2.2.d. Corrections and corrective action
When any part of the data flow activities or control activities is found not to function effectively or outside set boundaries the operator shall take appropriate action and the rejected data shall be corrected. An important element of this section is that corrections and corrective action shall be performed in accordance with a risk-based approach. The susceptibility to misstatements and non-conformities in data flow activities determine the extent to which corrections and corrective action needs to be carried out. For instance: it is not always necessary to take prompt action when a staff member is sick since in most situations this will not likely lead to misstatements and non-conformities.
Corrections and corrective action can take place in all parts of the data flow activities or control activities.

Corrections and corrective action to be carried out for primary measurements (data flow activity:

- This should include for example data accuracy checks (e.g. checks based on backup meters, plausibility checks, invoiced data, energy or material balance method) as well as data completeness checks.
- It should be clear:
  - when and how checks are performed;
  - when and how corrective action is taken;
  - when, how and where the results of the checks and corrective action are registered;
  - how the original uncorrected value can be retrieved.

  The rejection criteria for the primary measurements (if corrective action is taken) are a particularly important point for attention. They must be specific, measurable, acceptable, realistic and timely (SMART).

Corrections and corrective action to be carried out on fuel consumption and CO_2 emissions (data flow activity):
Internal checks can be performed in two ways: using the horizontal and the vertical method. The horizontal method compares values from various operational systems. The vertical method compares the same data over different years (trend analysis). Both methods should describe:

- when and how checks are performed;
- when and how corrective action is taken;
- when, how and where the results of the checks and corrective action are registered;
- how the original uncorrected values can be retrieved.

The rejection criteria for the primary measurements (if corrective action is taken) are a particularly important point for attention.

Corrections and corrective action to be carried out for data in the emission report (data flow activity):
This could include when and how checks and corrective action are performed on the data in the emission report and would describe:

- when and how checks are performed;
- when and how corrective action is taken;
- when, how and where the results of the checks and corrective action are registered.

Procedure for corrections and corrective action
According to section 10.3.1 MRG a procedure for corrections and corrective action should be set-up. However corrections and corrective action are closely linked to the data flow activity or other control activities that need to be corrected. Corrections feed back into changing data and will therefore result again in data flow activities. Because of this overlap the procedure for corrections and corrective action can be made part of the procedures for data flow activities and the other control activities. Corrections and corrective action shall therefore be mentioned in the description of the relevant data flow activity or control activity it relates to:

- For the data flow activities, procedures for corrections and corrective action shall be part of the procedures of the data flow activities clarified in section 5.1 of this note.

- For the control activities, procedures for corrections and corrective action are part of the procedures of quality assurance (section 5.2.2a), outsourced processes (section 5.2.2c) and potentially records and documentation (section 5.2.2e of this note).

5.2.2.e. Records and documentation
The operator shall keep records of all control activities (including QA/QC) and information listed in section 9 of the MRG. These records shall be registered and stored in internal registers at the installation.

Records
The register must provide an overview of the records created in the context of section 5.1, 5.2.1, 5.2.2 a to d and 5.2.2 f of this note which includes:
- the permit application and the monitoring plan;
- data provided to competent authorities in connection with the allocation of CO_2 emission allowances;
- operational data (measurements, analysis data);
- calculations (emissions, consumption);
- logbooks with exceptional operational circumstances that have affected the monitoring of CO_2 emissions;
- substantiations of the monitoring methodology;
- results of calibration and maintenance activities for CO_2 monitoring;
- temporary and permanent changes to the monitoring methodology and correspondence on them with the Competent Authority
- visit reports from testing and auditing bodies and/or the Competent Authority;
- audit reports and results from the evaluation of the control system.

The register should contain the following for each record:
- the name of the record;
- the manager of the record;
- the location of the record and its backup;
- a reference to the procedure and work description to which the record relates;
- back-up of records.

The retention period for records is 10 years. According to section 10.3.1 MRG a procedure should be developed for registering records.

Documents
Registering records (output of a control activity) is different from documentation of documents. Documentation concerns the documents that are used by the operator as input in the process like the monitoring plan and the emission report.
The procedure for document management has to meet requirements of EMAS, ISO 9001/14001 or a similar system. This procedure must be set up in such a way that:
- All relevant documents can be localized;
- All relevant documents can be periodically assessed, revised if necessary and approved by authorized personnel;
- Current versions of relevant documents are available at all relevant locations
- All documents are kept for at least 10 years;
- All superseded documents are immediately removed from circulation to prevent their erroneous use
- All documents are accessible for external auditing purposes.

- The monitoring plan must be included in the document management system and all versions must be kept, as must all notifications submitted to the Competent Authority in relation to all changes and proposed changes to the monitoring plan.

These requirements elaborate on the requirements of section 10.3.6 MRG.[10]

The monitoring plan itself must be included in the document management procedure. All versions of the monitoring plan must be kept.

The procedure for records and documentation is risk based and its design is dependent on the risks identified by risk assessment (see under section 5.2.1 of this note).

5.2.2.f. Organization and management of responsibilities

According to section 10.3.1 the operator shall assign responsibilities to all data flow activities and all control activities. An overview of the organizational structure and responsibilities and tasks in the MP reflects the assignment of these responsibilities.

The functions between performance of activities, monitoring of activities and quality assurance of these activities should be segregated from each other. This is however dependent on the risk assessment as described in section 2 and 5.1 of this note. When there are no real risks involved, the segregation of these duties cannot be expected. In their MP the installations should in that case demonstrate to the CA that the organization of tasks, areas of authority and responsibilities will lead to an accurate and proper implementation of the monitoring plan and that quality assurance is sufficiently safeguarded.

5.2.3 Evaluation of the control system

All procedures and work descriptions from the control activities as well as the risk assessment must be audited. Every calendar year an operator must produce an audit plan containing the internal audit(s) for that year. Internal audits should be performed in accordance with the requirements set out in EMAS, ISO 9001-2000, ISO 14001-2004 or similar systems.

The following applies to the frequency of the audits:

- In the first year in which the monitoring plan is used, a specific audit of the implementation of the monitoring plan is required;
- Thereafter an industrial site must ensure that all parts of the monitoring plan are audited at least once every three years.

If an audit reveals shortcomings, they must be converted into preventive and corrective actions within 6 months. A report of every audit describing the actions performed the conclusions of the audit and the planned corrective actions must be produced. Both the audit plan and the audit report must be registered and kept.

[10] The operator shall ensure that relevant documents are available when and where they are needed to perform the data flow activities as well as the control activities. The operator shall have a procedure to identify, produce, distribute and control the version of these documents.

Annex I An example of the procedure for data flow activities (primary measurement) in an installation

Example 0-1: Procedure for primary measurements
This example contains work descriptions in the procedure ranging from determining the primary measurements to determining the CO_2 emission for the source stream.

Taking primary measurements
CO_2 emissions from the natural gas source stream are calculated using the following formula:

$$CO_2(natural\ gas) = corrected\ consumption \times net\ calorific\ value \times emission\ \ factor \times oxidation\ \ factor$$

$$corrected\ \ consumption = consumption(meter\ 1) - consumption(meter\ 3)$$

The natural gas emissions are calculated on an hourly basis by multiplying the adjusted hourly natural gas consumption by the fixed net calorific value, emission factor and oxidation factor. The emissions per hour are added to form daily, monthly and annual totals.
The adjusted hourly consumption is determined by deducting the consumption from meter [3] from the consumption from meter [1]. Meter [1] is a turbine meter which is Meetcode Gas[11] and ISO 9951-1993/94 compliant, and meter [3] is an ISO 9300-1990 compliant venturi meter. All signals from the two gas meters are added up over the course of 1 hour and divided by the number of times the signal is emitted. The hourly consumption is added up to form daily, monthly and annual totals.

$$emissions_{hour} = consumption_{hour} \times net\ calorific\ value \times emission\ \ factor \times oxidation\ \ factor$$

$$(corrected)\ consumption_{hour} = \frac{\sum_{1}^{n} flow_{natural\ gas\ meter\ 1}}{n} - \frac{\sum_{1}^{n} flow_{natural\ gas\ meter\ 3}}{n}$$

$$consumption_{day} = \sum_{1}^{24} consumption_{hour} \qquad emissions_{day} = \sum_{1}^{24} emissions_{hour}$$

$$consumption_{month} = \sum_{1}^{28..31} consumption_{day} \qquad emissions_{month} = \sum_{1}^{28..31} emissions_{day}$$

$$consumption_{year} = \sum_{1}^{12} consumption_{month} \qquad emissions_{year} = \sum_{1}^{12} emissions_{month}$$

Substitution values
If the hourly consumption signal fails while the units are in operation, the maximum hourly consumption is used as the substitution value. Because the maximum hourly consumption is used, the CO_2 emissions can never be underestimated.

Checking
The operational status of the units is checked hourly. In both situations the hourly consumption is checked and automatically corrected (see Corrections). A monthly mass

[11] "Meetcode Gas" is a Dutch measuring standard for natural gas

audit of all gas meters is produced. If a discrepancy of more than 2% is discovered, corrective action is taken.

Corrections

- If units are not operational, the hourly consumption is automatically set to zero.
- If units are operational and the hourly consumption is less than 5% of the maximum hourly consumption, the hourly consumption is automatically set to the maximum consumption.
- If the monthly mass audit shows an upward discrepancy of more than 2%, the monthly consumption is adjusted on a pro-rata basis and the cause of the problem is investigated.

Registration

All calculated values are automatically registered in the process database along with substitution values and automatic corrections. Substitution values and automatic corrections are registered alongside the original data and labelled separately so that it is always possible to trace when a particular correction was made. Once a month the results are read and the checks and corrections described are performed. The results are stored in the emission register.

Equivalence of non-accredited labs to EN ISO 17025:2005

The MRG 2007 state in section 13.5.2 the preference for the use of laboratories accredited according to EN ISO 17025:2005, and also that the use of non-accredited laboratories shall be limited to situations in which the operator can demonstrate to the competent authority that the laboratory meets equivalent requirements to those laid out in EN ISO 17025:2005. The respective laboratories and relevant analytical procedures shall be listed in the monitoring plan for the installation. Equivalence in respect to quality management could be demonstrated by an accredited certification of the laboratory against EN ISO 9001:2000. Additional evidence shall be provided that the laboratory is technically competent and able to generate technically valid results using the relevant analytical procedures.

The main question remains therefore how equivalence in respect to quality management could be demonstrated. This memo provides in the annexes a list of concrete check points and questions to check if a non-accredited laboratory has implemented the most critical issues that are addressed in EN ISO 17025.

This checklist of questions has been tested in practice within an installation site and this lead to the following conclusions:

- ***The checklist is a good and practical tool to test the equivalence of non-accredited labs to EN ISO 17025:2005. It will enable operators to spot bottlenecks and it provides good starting points to discuss potential problems in showing equivalence to EN ISO 17025:2005;***
- ***However, testing the equivalence of non-accredited labs to EN ISO 17025:2005 cannot be done from behind a desk. A site visit should be carried out by the competent authority or a third party to the particular installation site/ laboratory in order to discuss the checklist in detail with the persons responsible for the quality systems within an installation site/ laboratory and those responsible and qualified to deal with the system daily. When the competences and resources to carry out site visits are not available in the CA, this area of work may be outsourced. The site visit should be carried out in such a way that equivalence of the non-accredited lab to EN ISO 17025:2005 can be demonstrated.***

Commentary

The requirements in the EN ISO 17025 for the competence and quality management of laboratories promote the reliability of analysis data. Therefore the EN ISO 17025 shall be implemented by laboratories performing analysis within the framework of emissions trading. Accreditation is the first option of choice in the revised MRG for laboratories to prove that the EN ISO 17025 is properly implemented. Although this is the best way to prove implementation of EN ISO 17025, the revised MRG (see Annex 1) give operators the possibility to demonstrate to the competent authority that the non-accredited laboratory performing analyses meets equivalent requirements to those laid out in EN ISO 17025.

With respect to the quality management aspects the MRG 2007 state that the equivalence can be demonstrated with accredited certification of the laboratory against EN ISO 9001. The most important aspects of chapter 4 (Management requirements) of the EN ISO 17025 are indeed covered by EN ISO 9001. However, some aspects like registration of the technical records are not clearly covered by the EN ISO 9001. As most of the companies are certified against the EN ISO 9001 and the MRG 2007 is leading on this point, the equivalence of the quality management and the missing aspects are not worked out in this memo.

In chapter 5 of the EN ISO 17025 the technical requirements for a laboratory are specified. The scope of this chapter 5 can easily be seen from its contents (see Annex II of this note). The requirements in the MRG for validation and inter-comparison are the interpretations of clause 5.4.5 (validation of methods) and the requirement for the participation in inter-laboratory comparison of

clause 5.9.1.a. The next table contains the most critical issues for which equivalence shall be proven by the operator.

Paragraph/Clause	Subject/requirement
5.2.5	education, training and skills of personnel
5.4.2	selection of methods; method meet the requirements of the customer; usage of the latest valid version of a standard
5.4.4	specification of non-standard methods
5.4.6.2 / 5.4.6.3	procedures for the estimation of the uncertainty of the measurement including all uncertainty components
5.4.7.1	checking calculations and data transfer in a systematic manner
5.5.2/5.5.6/5.6.3.2	appropiate calibration and maintenance of the equipment
5.5.5	recording of the used equipment
5.5.10 / 5.6.3.3	procedure for the intermediate checks of the equipment
5.5.11	procedure for the correct update of the calibration factor
5.6.3.1	calibration of the reference materials used by the laboratory
5.7.1	sampling plan and procedure for sampling
5.9	quality assurance of test results: intermadiate checks of the calibration using reference materials and statistic evaluation using predefined criteria; participation in interlaboratory comparison

Annex III provides the specified clauses and a simplified list of questions to check if a laboratory has implemented the most critical issues of the EN ISO 17025. When all questions can be answered with yes or not applicable and the MRG 2007 procedures for validation and intercomparison are implemented, the laboratory meets equivalent requirements to those laid out in EN ISO 17025. As laboratories have their own specific procedures to meet the requirements of EN ISO 17025, the simplified check list may not applicable for all laboratories.

The onus for demonstrating equivalence of the non-accredited labs to EN ISO 17025 is still on the operator. According to section 13.5.2 MRG the operator has to give additional evidence that the lab is able to generate technically valid results using the relevant analytical procedures. This could be done by referring in the monitoring plan to the report that contains the results of the validation of the applied method as well as the inter-comparison tests. Furthermore the operator shall control the quality of the processes and activities that are carried out by the non-accredited lab according to the requirements in section 10.3.4 MRG (please see for explanation section 5.2.2.c. of Guidance note III on data flow activities and control system) The operator will set suitable requirements with respect to the performance and methods used by an external body and he will check the results of that outsourced activity.

Annex 1: MRG requirements for laboratories

13.5. Requirements for Determination of Fuel and Material Properties

13.5.1. Use of Accredited Laboratories

The laboratory used to determine the emission factor, net calorific value, oxidation factor, carbon content, the biomass fraction or composition data should be accredited according to EN ISO 17025:2005 (“General requirements for the competence of testing and calibration laboratories”).

13.5.2. Use of Non-Accredited Laboratories

Preference is for use of laboratories accredited according to EN ISO 17025:2005. The use of non-accredited laboratories shall be limited to situations in which the operator can demonstrate to the competent authority that the laboratory meets equivalent requirements to those laid out in EN ISO 17025:2005. The respective laboratories and relevant analytical procedures shall be listed in the monitoring plan for the installation. Equivalence in respect to quality management could be demonstrated by an accredited certification of the laboratory against EN ISO 9001:2000. Additional evidence shall be provided that the laboratory is technically competent and able to generate technically valid results using the relevant analytical procedures.
Under the responsibility of the operator, each non-accredited laboratory used by the operator to determine results used for the calculation of emissions shall take the following measures:

a) Validation

A validation of each relevant analytical method to be carried out by the non-accredited laboratory against the reference method shall be carried out by a laboratory accredited according to EN ISO 17025:2005. The validation procedure is carried out before or at the beginning of the contract relationship between operator and laboratory. It includes a sufficient number of repetitions of the analysis of a set of at least five samples representative for the expected value range including a blank sample for each relevant parameter and fuel or material in order to characterise the repeatability of the method and to derive the calibration curve of the instrument;

b) Inter-comparison

An inter-comparison of the results of analytical methods shall be executed once a year by a laboratory accredited according to EN ISO 17025: 2005 involving at least a fivefold repetition of the analysis of a representative sample using the reference method for each relevant parameter and fuel or material;
The operator shall apply conservative adjustments (i.e. avoiding under-estimation of emissions) to all relevant data of the respective year in cases in which a difference is observed between the results derived by the non-accredited and the accredited laboratory which might lead to an under-estimation of emissions. Any statistically significant (2σ) differences between the end results (e.g. the composition data) derived by the nonaccredited and the accredited laboratory shall be notified to the competent authority and be immediately resolved under supervision of a laboratory accredited according to EN ISO 17025: 2005.

13.5.3. Online Gas Analysers and Gas Chromatographs

The use of online gas chromatographs and extractive or non-extractive gas analysers for emission determination under these Guidelines is subject to approval by the competent authority. The use of these systems is limited to the determination of composition data of gaseous fuels and materials. The operator operating the systems shall meet the requirements of EN ISO 9001:2000. Evidence that the system is meeting those requirements can be demonstrated by an accredited certification of the system. Calibration services and the suppliers of calibration gases shall be accredited against EN ISO 17025:2005. Where applicable an initial and annually repeated validation of the instrument shall be carried out by a laboratory accredited against EN ISO 17025:2005 using EN ISO 10723:1995 “Natural gas - Performance evaluation for on-line analytical systems”. In all other cases, the operator shall commission an initial validation and annual intercomparison:

a) Initial validation

The validation shall be carried out before 31 January 2008 or as part of the commissioning of a new system. It includes an appropriate number of repetitions of the analysis of a set of at least five samples representative for the expected value range including a blank sample for each relevant parameter and fuel or material in order to characterise the repeatability of the method and to derive the calibration curve of the instrument;

b) Annual inter-comparison

The inter comparison of the results of analytical methods shall be executed once a year by a laboratory accredited according to EN ISO 17025: 2005 involving an appropriate number of repetitions of the analysis of a representative sample using the reference method for each relevant parameter and fuel or material;

The operator shall apply conservative adjustments (i.e. avoiding under-estimation of emissions) to all relevant data of the respective year in cases in which a difference is observed between the results derived by the results of the gas analyser or gas chromatograph and the accredited laboratory which might lead to an under-estimation of emissions. Any statistically significant (2σ) differences between the end results (e.g. the composition data) of the gas analyser or gas-chromatograph and the accredited laboratory shall be notified to the competent authority and be immediately resolved under supervision of a laboratory accredited according to EN ISO 17025: 2005.

Annex II: Contents of chapter 5 of EN ISO 17025

Annex III: the most critical issues of the EN ISO 17025 and a list of questions to check implementation

5.2.5 The management shall authorize specific personnel to perform particular types of sampling, test and/or calibration, to issue test reports and calibration certificates, to give opinions and interpretations and to operate particular types of equipment. The laboratory shall maintain records of the relevant authorization(s), competence, educational and professional qualifications, training, skills and experience of all technical personnel, including contracted personnel. This information shall be readily available and shall include the date on which authorization and/or competence is confirmed.

Question 1: Are the personnel executing the sampling and analysis authorized for their job by the management?

Question 2: Can the competence of the personnel be proven by records of their education, training and experience?

Question 3: Is an adequate procedure for training and supervision of new personnel implemented?

5.4.2 Selection of methods

The laboratory shall use test and/or calibration methods, including methods for sampling, which meet the needs of the customer and which are appropriate for the tests and/or calibrations it undertakes. Methods published in international, regional or national standards shall preferably be used. The laboratory shall ensure that it uses the latest valid edition of a standard unless it is not appropriate or possible to do so. When necessary, the standard shall be supplemented with additional details to ensure consistent application. When the customer does not specify the method to be used, the laboratory shall select appropriate methods that have been published either in international, regional or national standards, or by reputable technical organizations, or in relevant scientific texts or journals, or as specified by the manufacturer of the equipment. Laboratory-developed methods or methods adopted by the laboratory may also be used if they are appropriate for the intended use and if they are validated. The customer shall be informed as to the method chosen. The laboratory shall confirm that it can properly operate standard methods before introducing the tests or calibrations. If the standard method changes, the confirmation shall be repeated. The laboratory shall inform the customer when the method proposed by the customer is considered to be inappropriate or out of date.

Question 4: Is an adequate procedure in use to ensure that it uses the latest valid edition of a standard?

Question 5: Is the procedure for the selection of a method documented and is the procedure actually used for the selection of appropriate methods?

Question 6: Is the reporting of deviations from the standardized method ensured?

5.4.4 Non-standard methods

When it is necessary to use methods not covered by standard methods, these shall be subject to agreement with the customer and shall include a clear specification of the customer's requirements and the purpose of the test and/or calibration. The method developed shall have been validated appropriately before use.

NOTE For new test and/or calibration methods, procedures should be developed prior to the tests and/or calibrations being performed and should contain at least the following information:

a) appropriate identification;
b) scope;
c) description of the type of item to be tested or calibrated;
d) parameters or quantities and ranges to be determined;
e) apparatus and equipment, including technical performance requirements;
f) reference standards and reference materials required;
g) environmental conditions required and any stabilization period needed;
h) description of the procedure,
i) criteria and/or requirements for approval/rejection;
j) data to be recorded and method of analysis and presentation;
k) the uncertainty or the procedure for estimating uncertainty.

Question 7: When non-standard methods are used, are these methods well described and adequately validated?

5.4.6.2 Testing laboratories shall have and shall apply procedures for estimating uncertainty of measurement. In certain cases the nature of the test method may preclude rigorous, metrologically and statistically valid, calculation of uncertainty of measurement. In these cases the laboratory shall at least attempt to identify all the components of uncertainty and make a reasonable estimation, and shall ensure that the form of reporting of the result does not give a wrong impression of the uncertainty. Reasonable estimation shall be based on knowledge of the performance of the method and on the measurement scope and shall make use of, for example, previous experience and validation data.

5.4.6.3 When estimating the uncertainty of measurement, all uncertainty components which are of importance in the given situation shall be taken into account using appropriate methods of analysis.

Question 8: Does the procedure for the estimation of the uncertainty include all important components of uncertainty?
Question 9: Are previous experience and the results of the validation of the applied method included in the estimation of the uncertainty?

5.4.7.1 Calculations and data transfers shall be subject to appropriate checks in a systematic manner.
Question 10: Is an adequate procedure for checking calculations and data transfer on regularly base implemented and are the corrective actions in case of encountered mistakes specified?

5.5.2 Equipment and its software used for testing, calibration and sampling shall be capable of achieving the accuracy required and shall comply with specifications relevant to the tests and/or calibrations concerned. Calibration programmes shall be established for key quantities or values of the instruments where these properties have a significant effect on the results. Before being placed into service, equipment (including that used for sampling) shall be calibrated or checked to establish that it meets the laboratory's specification requirements and complies with the relevant standard specifications. It shall be checked and/or calibrated before use (see 5.6).
5.5.5 Records shall be maintained of each item of equipment and its software significant to the tests and/or calibrations performed. The records shall include at least the following:
a) the identity of the item of equipment and its software;
b) the manufacturer's name, type identification, and serial number or other unique identification;
c) checks that equipment complies with the specification (see 5.5.2);
d) the current location, where appropriate;
e) the manufacturer's instructions, if available, or reference to their location;
f) dates, results and copies of reports and certificates of all calibrations, adjustments, acceptance criteria, and the due date of next calibration;
g) the maintenance plan, where appropriate, and maintenance carried out to date;
h) any damage, malfunction, modification or repair to the equipment.
5.5.11 Where calibrations give rise to a set of correction factors, the laboratory shall have procedures to ensure that copies (e.g. in computer software) are correctly updated.
5.6.3.2 Reference materials
Reference materials shall, where possible, be traceable to SI units of measurement, or to certified reference materials. Internal reference materials shall be checked as far as is technically and economically practical.
Question 11: Is there a scheme for calibration of the equipment and its software implemented?
Question 12: Are the used reference materials, where possible, traceable to international standards?
Question 13: Can the state of calibration be proven with certificates?
Question 14: Is there an adequate procedure to ensure that calibration factors are correctly implemented in time?

5.5.6 The laboratory shall have procedures for safe handling, transport, storage, use and planned maintenance of measuring equipment to ensure proper functioning and in order to prevent contamination or deterioration.
Question 15: Does the laboratory apply procedures for safe handling, transport, storage, use and planned maintenance of the measuring equipment to ensure proper functioning?

5.5.10 When intermediate checks are needed to maintain confidence in the calibration status of the equipment, these checks shall be carried out according to a defined procedure.
5.6.3.3 Intermediate checks
Checks needed to maintain confidence in the calibration status of reference, primary, transfer or working standards and reference materials shall be carried out according to defined procedures and schedules.
Question 16: Are adequate procedures for intermediate checking of the calibration documented and implemented on a regular basis?

5.6.3.1 Reference standards
The laboratory shall have a programme and procedure for the calibration of its reference standards.
Reference standards shall be calibrated by a body that can provide traceability as described in 5.6.2.1. Such reference standards of measurement held by the laboratory shall be used for calibration only and for no other purpose, unless it can be shown that their performance as reference standards would not be invalidated. Reference standards shall be calibrated before and after any adjustment.
Question 17: Is there a programme and procedure for calibration of the reference standards?

5.7.1 The laboratory shall have a sampling plan and procedures for sampling when it carries out sampling of substances, materials or products for subsequent testing or calibration. The sampling plan as well as the sampling procedure shall be available at the location where sampling is undertaken. Sampling plans shall, whenever reasonable, be based on appropriate statistical methods. The sampling process shall address the factors to be controlled to ensure the validity of the test and calibration results.

Question 18: Is an adequate procedure for representative sampling of substances, materials or products implemented?

5.9.1 The laboratory shall have quality control procedures for monitoring the validity of tests and calibrations undertaken. The resulting data shall be recorded in such a way that trends are detectable and, where practicable, statistical techniques shall be applied to the reviewing of the results. This monitoring shall be planned and reviewed and may include, but not be limited to, the following:
a) regular use of certified reference materials and/or internal quality control using secondary reference materials;
b) participation in interlaboratory comparison or proficiency-testing programmes;
c) replicate tests or calibrations using the same or different methods;
d) retesting or recalibration of retained items;
e) correlation of results for different characteristics of an item.
5.9.2 Quality control data shall be analysed and, where they are found to be outside pre-defined criteria, planned action shall be taken to correct the problem and to prevent incorrect results from being reported.
Question 19: Does the laboratory apply procedures to monitor the validity of the test and calibration results?
Question 20: Are the results of these checks recorded, stored and, where practicable, statistically evaluated?

Requirements of the Monitoring Plan (MRG2, Section 4.3)

Points (a) to (n) of Section 4.3 of the revised Monitoring and Reporting Guidelines (MRG2) list the contents that must be considered in an EU ETS monitoring plan, unless the installation is one with low emissions (in accordance with Section 16: <25 kt fossil CO_2 per year). The following provides further interpretation of the individual requirements, but it is important to appreciate that an actual plan needs to cross reference the various pieces of information, combining details, rather than laying them out point by point as suggested by Section 4.3. This is apparent in the monitoring plan template that is circulated in association with this guidance to indicate how the requirements can be collated in practice

(a) *the description of the installation and activities carried out by the installation to be monitored*

Details should include the:

- Operator name - should correspond with the EU ETS permit
- Installation name (and specific site name) – should correspond with the EU ETS permit
- List of Directive 96/61/EC Annex I activities relevant to the installation and corresponding Member State legislation.
- Other activities that may be relevant to discerning EU ETS source streams

N.B. Article 3(e) of Directive 96/61/EC defines **installation** as *"a stationary technical unit where one or more activities listed in Annex I are carried out and any other directly associated activities which have a technical connection with the activities carried out on that site and which could have an effect on emissions and pollution"*. Further details covering installation boundaries are often published in Member State regulations, rules and guidance, and will also need to be taken into account.

These details should also be included in a monitoring plan for an installation with low emissions (<25 kt fossil CO_2 per year in accordance with Section 16) entitled under Section 16 to use of a simplified monitoring plan.

(b) *information on responsibilities for monitoring and reporting within the installation*

Details concerning main responsibilities should be expected including, for example, the executive nominated overall responsibility for EU ETS, the day to day contact for dealing with EU ETS regulatory/MRV communications, and the manager in charge of maintenance, calibration and adjustments of EU ETS relevant equipment. It may be appropriate to identify lead officers assigned specific responsibilities for monitoring, reporting, verification, and provision of training. Relevant QA/QC procedures and other EMS documentation confirming these and further details should be identified. It may be sensible to list according to job titles rather than the names of specific persons (in order to reduce the frequency of requisite modifications to the plan and variations of the permit).

These details should also be included in a monitoring plan for an installation with low emissions (<25 kt fossil CO_2 per year in accordance with Section 16) entitled under Section 16 to use of a simplified monitoring plan.

(c) *a list of emission sources and source streams to be monitored for each activity carried out within the installation*

The following MRG2 definitions need to be taken into account:

- Section 2(1)(d) defines **source stream** as *"a specific fuel type, raw material or product giving rise to emissions of relevant greenhouse gases at one or more emission sources as a result of its consumption or production"*

- Section 2(1)(c) defines **emission source** as *"a separately identifiable part (point or process) of an installation from which relevant greenhouse gases are emitted"*

A list is required of each specific fuel type, raw material or product associated with each of the activities identified under MRG2 Section 4.3(a). A stream involving one set of activity metering equipment, emission and oxidation/conversion factor data, CV/carbon content analysis can be regarded as one stream irrespective of its association with different parts of the installation. Where a stream of the same fuel or material is split and emission calculations need to be carried out separately because they are dependent on different data sets (i.e. different emission factor, oxidation factor, conversion factor values), it should be regarded as more than one stream and separate streams listed. Assignment of unique reference numbers to each listed stream is recommended, e.g. Fuel (F1) hard coal, Fuel (F2) natural gas, Gypsum (G1), etc., for ease of cross-referencing to other MRG2 Section 4.3 requirements.

Relevant emission points and processes within the installation should also be identified. Assignment of reference numbers is again recommended, e.g. Main Stack Flue 1 (A1), Boiler B1 (S1). Listing in conjunction with relevant source streams is recommended.

These details should also be included in a monitoring plan for an installation with low emissions (<25 kt fossil CO_2 per year in accordance with Section 16) entitled under Section 16 to use of a simplified monitoring plan.

(d) *a description of the calculation based methodology or measurement based methodology to be used*

Subject to minimising unnecessary duplication of information supplied in accordance with other MRG2 Section 4.3 requirements, indication needs to be provided of how the requirements of MRG2 Section 4.2 and Section 5 (especially Section 5.1) or Section 6 (especially Section 6.1) are to be met. The main requirement is to indicate the details of the specific emission determination methods to be applied, including necessary conversions to standard conditions. The objective should be to provide the regulator and verifier confidence that an overall robust and satisfactory approach is being applied (for example, activity data in net CV terms is being multiplied against an emission factor in net CV terms). The description should show how other information requirements under MRG2 Section 4.3 are correctly joined together.

Although not a formal requirement under MRG2 Section 16, it is recommended that this general description is also included in a monitoring

plan for an installation with low emissions (<25 kt fossil CO_2 per year in accordance with Section 16).

(e) *a list and description of the tiers for activity data, emission factors, oxidation and conversion factors for each of the source streams to be monitored*

Indication is required of the tiers to be applied in accordance with MRG2 Section 5.2/Annexes II-XI (regarding a calculation based methodology) or Section 6.2/Annex XII (regarding a measurement based methodology).

Operators of Category B and C installations are required to apply highest tiers to determine all variables for all source streams unless they can demonstrate to the satisfaction of the competent authority that the highest tier approach is technically not feasible or will result in unreasonably high costs. In this case a next lower tier may be applied for that variable within the monitoring methodology. Operators of all installations, including Category A installations (except those subject to Section 16 with low emissions: <25 kt fossil CO_2 per year) should be expected to meet the tiers set out in MRG2 Table 1 as a minimum.

Subject to approval from the competent authority, the Operator may apply lower tiers or a no-tier estimation method for variables relevant to source streams designated minor or de-minimis source streams respectively, subject to the corresponding definitions provided in MRG2 Section 2(4)(e) and Section 2(4)(c). No-tier approaches may also be agreed for installations or parts of installations, involving pure (as defined in MRG2 Section 2(4)(g)) biomass fuel or material.

Irrespective, of eligibility for lower or no-tier derogation, higher tiers should be applied where they are technically feasible and will not result in unreasonably high costs (relative to their minor or de-minimis status). Operators will need to include justifications where highest tier and Table 1 expectations cannot be met (including in association with the evidence requested under Section 4.3(g). Operators should make it clear which source streams may and are being designated minor, de-minimis, and pure biomass.

It should be noted that the need for details concerning activity data may require additional indication of tiers that will be met regarding determination of calorific values (CVs) and carbon content or material composition.

These details should also be included in a monitoring plan for an installation with low emissions (<25 kt fossil CO_2 per year in accordance with Section 16) entitled under Section 16 to use of a simplified monitoring plan.

(f) *a description of the measurement systems, and the specification and exact location of the measurement instruments to be used for each of the source streams to be monitored*

Details should include:

- A succinct description of all the metering or measurement devices involved (for example, orifice plate concerning refinery fuel gas supplied to boiler B1; or natural gas GC; or weighbridge at works)
- The specification of the metering or measurement device. This should provide a unique identifier to enable tracing of the device back to, for example, calibration records, and it should further

assist assessment of the adequacy/quality of the device to be used. The specification could include, for example, a serial number, a tag number, an as supplied accuracy specification, and/or a specific standard to which the device is to be used.

- The location where the device can be found. This may be reference to a supplier's (for example, a fuel merchant's) device, or to an on-site device. A schematic plan or map could be supplied to assist provision of this information, as well as reference to process and information diagrams that may be inspected on-site.

These details should also be included in a monitoring plan for an installation with low emissions (<25 kt fossil CO_2 per year in accordance with Section 16) entitled under Section 16 to use of a simplified monitoring plan.

(g) *evidence demonstrating compliance with the uncertainty thresholds for activity data and other parameters (where applicable) for the applied tiers for each source stream*

Further to the justifications suggested under MRG2 Section 4.3(e), the operator should indicate appropriate uncertainty assessments in association with proposed activity tier and other parameter threshold compliance. MRG2 Section 7 and further Member State endorsed guidance on such assessments should be taken into account.

(h) *if applicable, a description of the approach to be used for the sampling of fuel and materials for the determination of net calorific value, carbon content, emission factors, oxidation and conversion factor and biomass content for each of the source streams*

Sampling method and frequency details are required where installation-specific sampling is involved (i.e. circumstances that do not involve application of an IPCC factor specified in MRG2 Table 4, or country specific factors). Due note needs to be taken of:

- MRG2 Sections 13.1 – 13.4, involving application of appropriate methods (CEN > ISO/national standard method > draft standard/industry best practice), and
- Need for representative sampling, including in terms of frequency requirements specified in MRG2 Section 13.6

Details concerning particular parameters should be clearly cross-referenced to the identifiers listed previously for particular emission sources and source streams (for example, S1: F1, F2, M1).

(i) *a description of the intended sources or analytical approaches for the determination of net calorific value, carbon content, emission factor, oxidation factor, conversion factor or biomass fraction for each of the source streams*

Details need to be provided for each parameter and source stream concerning intended:

- Sources of standard factors to be applied, for example, MRG2 Table 4, or country-specific factors published in the Member State's appropriate submission to the UNFCCC (web-address included)

- Accredited EN ISO 17025 laboratory services for installation-specific determinations (appropriately accredited for the methods involved)
- Methods to be specifically applied (for installation specific analyses), for example, standard method reference, internal/in-house standard or procedure.

Due account should be taken of MRG2 Sections 13.1 – 13.4, 13.5.1 and 13.5.3.

Details concerning particular parameters should be clearly cross-referenced to the identifiers listed previously for particular emission sources and source streams (for example, S1: F1, F2, M1).

(j) *if applicable, a list and description of non-accredited laboratories and relevant analytical procedures including a list of all relevant quality assurance measures, e.g. inter-laboratory comparisons as described in section 13.5.2*

In accordance with MRG2 Section 13.5.2, listing of any non-EN ISO 17025 accredited laboratories and relevant analytical procedures proposed for use for specific determinations, assuming EN ISO 17025 equivalent requirements and suitable validation and on-going inter-comparison can be demonstrated. MRG2 Section 13.5.2 also requires equivalence in terms of quality management (such as accreditation in accordance with EN ISO 9001) and evidence that the laboratories concerned are technically competent and able to generate technically valid results using the relevant analytical procedures.

Details concerning particular parameters should be clearly cross-referenced to the identifiers listed previously for particular emission sources and source streams (for example, S1: F1, F2, M1).

(k) *if applicable, a description of continuous emission measurement systems to be used for the monitoring of an emission source, i.e. the points of measurement, frequency of measurements, equipment used, calibration procedures, data collection and storage procedures and the approach for corroborating calculation and the reporting of activity data, emission factors and alike*

Where applied, details are required justifying and describing the system to be used for direct measurement of CO_2 by continuous emission monitoring. The requirements of MRG2 Sections 4.2 and 7 need to be duly taken into account and complied with as well as ability to meet the further requirements advised in Annex XII.

Details should be provided for the emission source(s) concerned. Comparisons with calculation based methodologies should be based on identical emission sources and source streams involved.

Where relevant, these details should also be included in a monitoring plan for an installation with low emissions (<25 kt fossil CO_2 per year in accordance with Section 16) entitled under Section 16 to use of a simplified monitoring plan.

(l) *if applicable, where the so-called "fall-back approach" (section 5.3) is applied: a comprehensive description of the approach and the uncertainty analysis, if not already covered by items a) to k) of this list*

Justifications and details provided in connection with MRG2 Section 5.3.

Where relevant, details concerning a fall-back approach should also be included in a monitoring plan for an installation with low emissions (<25 kt fossil CO_2 per year in accordance with Section 16) entitled under Section 16 to use of a simplified monitoring plan.

(m) *a description of the procedures for data acquisition and handling activities and control activities as well as a description of the activities (see section 10.1-3)*

According to MRG2 Section 10.1, the operator must be able to confirm ability to establish, document, implement and maintain effective data acquisition and handling activities (*flow activities*) for the monitoring and reporting required according to the approved monitoring plan, the permit and MRG2. *Flow activities* shall include measuring, monitoring, analysing, recording, processing and calculating parameters in order to be able to report requisite greenhouse gas emissions.

According to MRG2 Section 10.2, the operator also needs to establish, document, implement and maintain an effective *control system* to ensure that the annual emissions report resulting from the *flow activities* does not contain misstatements, or non-conformances with the approved monitoring plan, the permit or MRG2. MRG2 Section 10.3 elaborates further on the requirements for the *control system*, namely that the operator shall identify and implement control activities in accordance specifically with:

- Procedures and Responsibilities (specified in detail in MRG2 Section 10.3.1)
- Quality Assurance (specified in detail in MRG2 Section 10.3.2)
- Reviews and Validation of Data (specified in detail in MRG2 Section 10.3.3)
- Out-sourced Processes (specified in detail in MRG2 Section 10.3.4)
- Corrections and Corrective Action (specified in detail in MRG2 Section 10.3.5)
- Records and Documentation (specified in detail in MRG2 Section 10.3.6)

The operator needs to ensure that relevant documents are available when and where they are needed to perform the data flow activities as well as the control activities. The operator is also required under MRG2 Section 10.3.6 to have a procedure to identify, produce, distribute and control the version of these documents.

The monitoring plan needs to demonstrate intended compliance with these aspects in accordance with a risk-based approach.

Although not a formal requirement under MRG2 Section 16, it is recommended that operators of installations with low emissions (<25 kt fossil CO_2 per year in accordance with Section 16) also give due consideration to the above data acquisition and handling as well as control activity procedure where relevant and that this is included in the monitoring plan.

(n) *where applicable, information on relevant links with activities undertaken under the Community eco-management and audit scheme (EMAS) and other environmental management systems (e.g. ISO14001:2004), in particular on procedures and controls with relevance to greenhouse gas emissions monitoring and reporting*

In accordance with MRG2 Section 10.1, the operator's *control system* may make reference to other procedures and documents, including those in management systems EU Eco-Management and Audit Scheme (EMAS), ISO 14001:2004 ("Environmental management systems - Specification with guidance for use"), ISO 9001:2000 and financial control systems. When such a reference has been made, the operator shall ensure that the requirements in the approved monitoring plan, the permit and MRG2 are arranged for in the respective applicable system.

Operator references to other procedures and documents should be clear and concise and parts relevant to monitoring, reporting and verification under the EU ETS easy inspect and verify.

<u>Supplementary Requirements</u>

Supplementary details likely to be required to assist determination of the monitoring plan and on-going enforcement are:

- National Allocation Plan and/or current emissions trading permit numbers
- Contact person for liasing on the permit/monitoring plan application to assist enquiries for further information (Job & Affiliation Title, Tel/Fax Numbers, Email address)

- Indication of the annual fossil CO_2 emission (average for the previous trading period or "conservative estimate or projection") to consider Table 1 and Section 16 eligibility.

RJ Gemmill
26th July 2007

Assessment of unreasonable costs

The MRG allow the Competent Authority to accept that an operator deviates from the monitoring requirements on the grounds of unreasonable costs. Annex I to this note clarifies the situations where such a request for a deviation could be justified. The operator has then to demonstrate in the monitoring plan that complying with a MRG requirement would result in unreasonable costs.

The question for the competent authority is how to assess when the costs for complying with the MRG requirements are unreasonable and therefore in which cases an operator can be allowed to apply various methods listed in Annex I to this note. The answer to this question will determine whether the Competent Authority accepts the request or requires that the operator changes the proposed monitoring methodology and/ or the measuring equipment in such a way that he meets those MRG monitoring requirements. The central question is thus at what cost level such a requirement for a change of the monitoring methodology and/ or monitoring equipment is deemed to be unreasonable and at what cost level the Competent Authority will consider it reasonable for the operator to deviate from the monitoring requirements? According to section 2 (5) (a) MRG unreasonable costs have been defined in general terms.[1] However, in most practical situations this definition will not be sufficiently clear to determine what level of costs involved with changing the monitoring methodology to reach the tier level is disproportionate to its overall benefits.

This note aims at providing a practical tool to make that assessment and calculation. It is in fact an integration of the approach the German Emission Authority (DEHSt) and the Dutch Emission Authority (NEa) have developed. **Section 1** of this note concerns the situation whereby the required tier for the activity data and the uncertainty associated with that, cannot be met because of unreasonable costs. **Section 2** of this note describes the method to assess unreasonable costs for the activity-specific factors like the emission factor, net calorific value etc. It basically sees to all determinations except for measurement uncertainties in quantity determinations and continuous CO_2 measurements.

1. Unreasonable costs of uncertainties of quantities

When assessing the unreasonable costs in the aforementioned context, the following concrete factors need to be taken into account and should be part of the formula that is used to determine unreasonable costs:

- the annual CO_2 emissions from the source stream concerned;
- the depreciation period;
- the financial value of a CO_2 emission allowance;
- the required uncertainty for the source stream concerned;
- the actual uncertainty of the source stream concerned.

The formula to determine unreasonable costs is as follows:

Total Installed Investment Costs/ depreciation (Nr of years) > annual CO_2 emissions x (realized uncertainty – required uncertainty)% x financial value of CO_2 emission allowance

Whereby:
the uncertainty achieved and the required uncertainty are expressed in %;

[1] "Unreasonable costs" means costs of a measure disproportionate to its overall benefits as established by the competent authority. In respect to the choice of tier levels the threshold may be defined as the value of the allowances corresponding to an improvement of the level of accuracy. For measures increasing the quality of reported emissions but without direct impact on accuracy, unreasonable cost may correspond to a fraction exceeding an indicative threshold of 1% of the average value of the available emissions data reported for the previous trading period. For installations without this history, data from representative installations carrying out the same or comparable activities are used as reference and scaled according to their capacity.

the annual CO_2 emissions is expressed in tonnes;

the depreciation period is set at 5 years as standard;

the financial value of CO_2 emission allowance is established and published by the competent authority and expressed in €.

The following methodology can be followed to determine the costs:

The operator takes into account the cost of the meter (investment costs) and the installation/ replacement costs. In addition to the installation/replacement cost, sometimes also the downtime of the installation can be a significant cost factor.

The competent authority may optionally take into account these additional costs compared with the potential advantages for the operator in commercial transactions because of the more accurate quantity measurement. The cost savings due to a more accurate measurement will in that case be subtracted

If the installation/ replacement costs are not available or the operator is not willing to use them because the data is not accurate, the operator may calculate the costs to achieve the required uncertainty as follows:

cost of the meter * instalment cost factor.

The cost of the meter must be substantiated, e.g. with a quote from a meter supplier. The instalment cost factor is to be decided by the competent authority: it is intended to include the costs involved in installing and fitting a meter. Which factor to use depends on the size and complexity of the company and should be decided by the competent authority. A factor 2 is in general applicable.

Example of the costs to the operator of replacing a meter:

Investment of the meter	€ 80,000
Installing & replacement costs	€ 30,000
Sum	€ 110,000

In this case the total investment costs are assumed to be € 110,000, and with a linear depreciation rate over a period of 5 years this amounts to an annual cost of € 22,000.

Value emission allowances: The value of the emission allowances is to be set at a reasonable price level. For the first two years of the 2nd trading period, i.e. 2008 and 2009, such a “fair” price could be € 20 per tone of CO_2.[2]

Conclusion

The cost of investing to improve the measuring device is related to the annual surplus or insufficiency of emission allowances that would be the result from a more accurate measurement of the activity data.

Example: Calculation of unreasonable costs of changing a meter

Suppose a source stream produces 100,000 tonnes of CO_2 per year, which is monitored with an uncertainty of 2.3%, although an uncertainty of 1.5% is required. A new metering device which would ensure that the uncertainty of the source stream meets the required uncertainty. The costs for the measurement equipment are € 20,000.

[2] ABN-AMRO quotes in its Carbon Markets Overview of 22 October 2007 for week 42 a closing price level of € 22.60 for delivery December 2008, and € 23,15 for delivery December 2009.

Costs to the operator:

Investment of the meter	€	20,000
Installing & replacement costs	€	20,000
Sum	€	40,000

The total investment costs are in this case € 40,000, and with a linear depreciation rate over a period of 5 years € 8,000 per annum. This € 8.000 is less than 100,000 * (2.3 – 1.5)% * € 20 = € 16.000, and thus the cost of reducing the measurement uncertainty is not unreasonable in this example. The source stream concerned must therefore comply with the required tier. The competent authority may take into account cost savings due to a more accurate measurement and subtract them.

If the instalment and replacement costs are not available or inaccurate:
The costs for the measurement equipment are € 20,000 x an instalment cost factor decided by the competent authority to include the costs involved in installing and fitting a meter. This will be a factor 2 in general.

2. Other unreasonable costs

The following formula is used to determine unreasonable costs involved in the other determinations (all determinations except for measurement uncertainties in quantity determinations and continuous CO_2 measurements):

Unreasonable costs > annual CO_2 emissions * financial value of CO_2 emission allowance * 1%

Whereby:

the annual CO_2 emissions is expressed in tonnes;

the financial value of CO_2 emission allowance is established and published by the competent authority and expressed in €;

a fixed factor of 1%.

Example-1: Examples of other unreasonable costs

Suppose a source stream causes 1.5 M tonnes of CO_2 emissions per annum. The analysis of the specific emission factor by an accredited laboratory costs €22,000 a year.

Unreasonable costs for the analysis of the activity-specific emission factor for that source stream are: 1,500,000 * €20 * 1% = € 225.000. Because the actual costs are lower than the unreasonable costs, the determination of the emission factor must comply with the required tier.

3. Improvement of monitoring methodology

The operator will have to periodically assess and demonstrate to the competent authority whether the costs are still unreasonable or improvement of the monitoring methodology should be made. The assessment of costs shall take place every year. This is in line with the improvement principle laid down in Section 3 MRG and Section 4.3 MRG which requires an operator to change the monitoring methodology if this improves the accuracy of the reported data unless this is technically not feasible or would lead to unreasonable costs. Furthermore section 4.3 MRG requires the competent authority to check and approve the monitoring plan prepared by the operator before the start of the reporting period. An annual assessment of the unreasonable costs would therefore be in line with this MRG requirement.

Annex I Application of MRG provisions on the grounds of unreasonable costs

The MRG allows an operator to apply the following methods on the grounds of unreasonable costs:

- An industrial site may continuously measure some or all of its CO2 emissions instead of calculating them if it can demonstrate that the 'calculation' method would result in unreasonable costs compared with the 'measurement' method (section 4.2 MRG).
- The monitoring methodology shall be changed by the operator if this improves the accuracy of the reported data unless this would lead to unreasonable costs (section 4.3 MRG).
- An industrial site may deviate from the highest tier for its category B or C installation if it can demonstrate that achieving it would result in unreasonably high costs (section 5.2 MRG). This does not apply if the highest tier is also the minimum table 1 MRG tier requirement.
- An industrial site may use the fall back approach to determine the uncertainty of its CO_2 monitoring if it can demonstrate that achieving even tier 1 for a major or minor source stream (except for de minimis source streams) would result in unreasonable costs (section 5.3 MRG).
- If an industrial site performs a assessment of stock changes, the opening and closing stocks do not have to be determined by direct measurement if it can demonstrate that this would result in unreasonable costs (section 5.4 MRG).
- If an industrial site performs a stock audit, this audit does not need to be performed over an entire calendar year if it can demonstrate that this would result in unreasonable costs (section 5.4 MRG).
- An industrial site may determine an emission factor in tonnes of CO_2/tonne of fuel or tonnes of CO_2/Nm³ of fuel instead of an emission factor in tonnes of CO_2/TJ if it can demonstrate that the use of an emission factor in tonnes of CO_2/TJ would result in unreasonable costs (section 5.5 MRG).
- An industrial site that continuously measures its CO_2 emissions may deviate from the highest tier for continuous measurement for a particular source if it can demonstrate that achieving this tier for this source would result in unreasonably high costs (section 6.2 MRG).
- An industrial site may use a biomass fraction of 0 or an estimation method accepted by the competent authority for determining the biomass fraction if it can demonstrate that determining the activity-specific biomass of a mixed fuel would result in unreasonable costs (section 13.4 MRG).

Commercially traded fuels and materials

When to use invoiced data for determining the annual fuel and material flow as well as the net calorific value?

Introduction

Commercially traded fuels[1] and materials[2] are defined in section 2 (2) (f) and 2 (2) (g) MRG. Special MRG provisions apply for commercially traded fuels and materials:

- According to section 7.1 MRG the operator may use invoiced data for the determination of the annual fuel and material flow without assessing and proving the uncertainty that is associated with that particular source stream. This is only possible under certain conditions and if the competent authority approves of this.
- The net calorific value of the commercially traded fuel may be derived from the purchasing records of the fuel supplier (Annex II MRG). This is also only possible under certain conditions and if the competent authority approves of this.

This note will clarify when the use of invoiced data can be allowed for determining the amount of commercially traded fuels and materials as well as the net calorific values for these fuels.

When to use invoiced data for determining the annual fuel and material flow?

According to section 7.1 MRG the operator may use invoiced data to determine the amount of commercially traded fuel and material provided that national legislation or the demonstrated application of relevant national or international standards ensures that respective uncertainty requirements for activity data are met for commercial transactions. This MRG provision can best be explained by the scheme laid down in Annex I. A predefined list of commercially traded fuels and materials does not automatically imply that the operator is allowed to use invoiced data for the measurement of that particular commercially traded fuel or material. It depends on the outcome of the questions and answers listed in Annex I. That's why it is difficult to compile up front a complete list of commercially traded fuels and materials that would meet all the conditions laid down in section 7.1 MRG.

The following overall conclusions apply:

- Non-complex installations that use and measure natural gas by a gas meter would be allowed to base the determination of the amount of natural gas on invoiced data. For those installations the requirements for natural gas and gas meters will normally have been submitted in national legislation inclusive of an inherent uncertainty that meets the MRG 2007 activity tier level required of the installation: for example a maximum uncertainty requirement of less than 1,5% for the amount of fuel when the highest tier is applicable.
- The quantity measurement of liquid fuels is in most cases covered by a calibration scheme that is prescribed in national legislation or in national or international standards. For those measurements calibrated measurement instruments will be used that have to meet national and international legal requirements. The calibration scheme has to be set-up such that it meets the MRG 2007 activity tier level required of the installation. In that case operators can base the determination of the amount of commercially traded fuels or materials (i.e. liquid fuels like diesel, light and heavy fuel oil) on invoiced data.
- For liquid fuels that are delivered in batches by ships legal requirements in national legislation do not necessarily exist. In those cases the operator has to determine the amount of fuel himself and in such manner that it meets the MRG uncertainty

[1] Commercially traded fuels means fuels of specified composition which are frequently and freely traded, if the specific batch has been traded between economically independent parties, including all commercial standard fuels, natural gas, light and heavy fuel oil, coal, petroleum coke.

[2] Commercially traded materials means materials of specified composition which are frequently and freely traded, if the specific batch has been traded between economically independent parties.

requirements laid down in Annex II MRG for the specific amount of fuel or material. Furthermore the operator has to assess and substantiate the uncertainty associated to the tier level for that particular source stream. For further information on the uncertainty assessment please see the ETSG Guidance note on Uncertainty of Quantity Measurement.

- The application of relevant national and international standards (see step II in Annex I) has to be demonstrated to the satisfaction of the competent authority.

When to use purchased records of the fuel supplier for determining the net calorific value for commercially traded fuel?
Two provisions in Annex II MRG are relevant for the NCV of commercially traded fuels and commercially standard fuels.

Annex II tier 2b
According to Annex II MRG under tier 2b the fuel specific net calorific value (NCV) may be taken from the fuel supplier's specification on the invoice for a commercially traded fuel provided that the NCV was obtained using accepted national or international standards. The operator has to demonstrate to the competent authority that the value was indeed obtained using accepted national and international standards.

Annex II tier 3
According to Annex II MRG under tier 3 the NCV representative for the fuel in an installation is measured by the operator, a contracted laboratory or the fuel supplier in accordance with the provisions of section 13 MRG. In principle the operator would have the supplier determine the NCV according to section 13 MRG requirements. If the operator cannot use the data determined by the supplier or if the supplier's data do not meet section 13 MRG requirements and the requirements set in national legislation, the operator has to determine the NCV himself according to section 13 MRG. The onus for proving this is on the operator.

As commercially standard fuels have a standard composition (a confidence interval of not more than ± 1% for their specified calorific value), operators will generally be able to demonstrate more easily that the supplier's data are sufficient and all requirements have been met.

The tier structure in section 5.2 MRG and table I MRG determine in which cases an operator may base the NCV on invoiced data under the conditions laid down in Annex II (tier 2b) or in which cases the NCV has to be measured according to section 13 MRG requirements (tier 3).

Three situations can be distinguished:

1. Commercially standard fuels

- Category B and C installations have to apply the highest tier according to section 5.2 MRG which is tier 3.
- If the operator can demonstrate to the competent authority that it is technically not feasible to meet tier 3 or that this will lead to unreasonable costs, he is allowed to apply a next lower tier which would be tier 2b. Given the definition of commercial standard fuels in section 2 (2) (h) MRG[3] the improvement in accuracy deriving from a measurement made by *"the operator, a contracted laboratory or the fuel supplier in accordance with the*

[3] 'Commercial standard fuel' means the internationally standardised commercial fuels which exhibit a 95 % confidence interval of not more than ± 1 % for their specified calorific value, including gas oil, light fuel oil, gasoline, lamp oil, kerosene, ethane, propane and butane.

provisions of Section 13 of Annex I" (tier 3) instead of a tier 2b approach[4] is generally not significant. This means that in general the operator will easily be able to demonstrate to the competent authority that the cost to "improve" monitoring from tier 2b to tier 3 is unreasonable. This implies that for commercial standard fuels the operator of a category B or C installation can be allowed to apply a next lower tier which would be tier 2b. In those cases the fuel specific NCV may be taken from the fuel supplier's specification on the invoice provided that the value was indeed obtained using accepted national and international standards.

- Category A installations may apply the tiers mentioned in table I MRG which would be tier 2b.

2. Commercially traded fuels (other gaseous and liquid fuels)

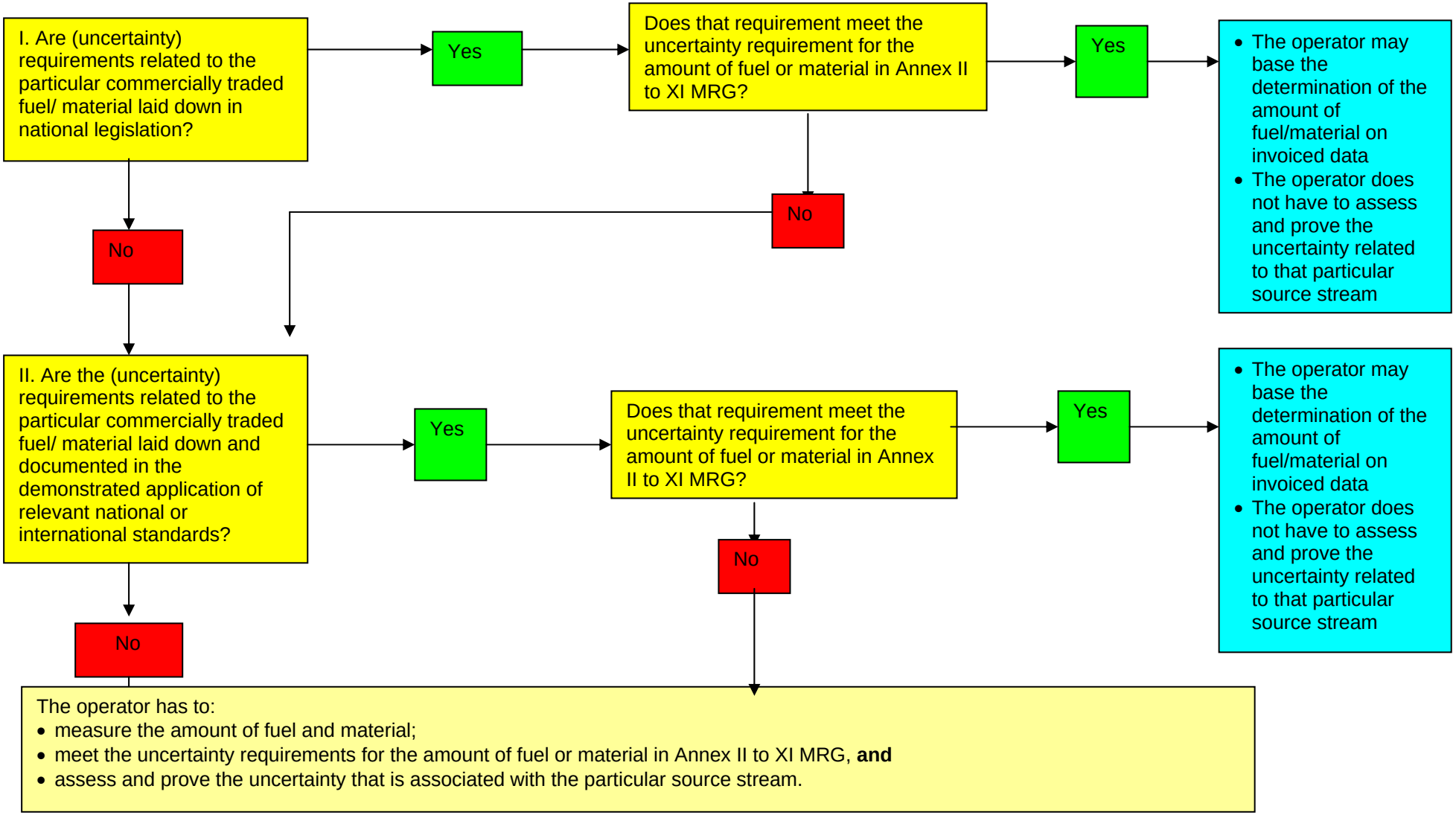
- According to table 1 MRG Category C installations have to apply tier 3 (highest tier for NCV). Deviation from this tier requirement is only possible if the operator can demonstrate that it is technically not feasible to meet tier 3. This means again that the operator would in principle have to apply the requirements in tier 3.
- Category B installations have to apply the highest tier according to section 5.2 MRG. If meeting tier 3 is technically not feasible or will lead to unreasonably high costs, tier 2b can be applied and category B installations may base their NCV on invoiced data under the conditions of Annex II.
- Category A installations may always apply tier 2b and base their NCV on invoiced data under the conditions of Annex II.

3. Commercially traded fuels (solid fuels)

- According to table 1 MRG Category B and C installations have to apply tier 3 (highest tier for NCV). Deviation from this tier requirement is only possible if it is technically not feasible to meet tier 3.
- Category A installations may always apply tier 2b and base their NCV on invoiced data under the conditions of Annex II.

[4] NCV derived from the purchasing records for the respective fuel provided by the fuel supplier, provided that it is based on accepted national or international standards

Annex I Scheme for identifying when to use invoiced data for commercially traded fuels/ materials



Author ETSG note: Machtelt Oudenes rev4 291007

Determining the quantity and assessing the uncertainty of a source stream partially covered by EU-ETS

1. Introduction

In 2004, at the start of implementing the directive for the first trading period the term "combustion installation" laid down in Annex I to the EU ETS Directive lead to different interpretations by Member States thereby negatively impacting the level playing field intended by the directive. During 2006 and even before in 2005, a number of efforts were made when discussing the preparations for the second NAPs to achieve a more uniform or "common" interpretation of the term "combustion installation".[1] [2] In its guidelines for the allocation plans agreed in the Climate Change Committee, the European Commission provided guidance on how the term combustion installation should be interpreted and used. As a result thereof the new interpretation excludes for example certain combustion units like dryers and other smaller "combustion units".

In order to ensure that the allocation would be in line with these guidelines some of the "EU-ETS installations" may have been redefined in national legislations. In some countries this caused certain units or smaller parts of the installation to no longer fall under EU-ETS since they are no longer included within the scope of the term "EU-ETS combustion installations". As a result of excluding these combustion units, some installations will now only be partly covered by ETS from 2008 onwards. In such situations a clear delineation and description of the system limits of the EU-ETS installation becomes a necessity for a proper monitoring of the ETS installation and its emissions. From the permit and the monitoring plan it must be absolutely clear what part of the installation falls within the EU-ETS scope and which part of the installation does not fall within these limits.

2. Situations relating to the redefinition of combustion installations

In order to become more specific one has to make assumptions of situations that will "emerge" during the up-coming revision process of the monitoring plans. Two arch-types of situations could occur (for a clear picture please see the drawings attached in Annex I to the note):

- The first case refers to a situation whereby a unit falling outside EU-ETS is connected to that part of the installation that belongs to EU ETS so that the same source stream goes through both parts of the installation. The source stream is partially covered by EU ETS in that case.
- The second case refers to a situation whereby a unit that falls outside EU-ETS does not share the source stream with the part of the installation that belongs to EU-ETS and therefore is not connected to that part of the installation. The particular source stream is not covered by EU ETS in it entirety.

First situation

[1] Some Member States based the first phase national allocation plans on an interpretation which included all combustion processes fulfilling the specified capacity, regardless of whether the combustion process produces energy independently or as an integrated part of another production process. Other Member States applied variants of a more narrow interpretation, excluding some or all combustion processes as integrated parts of another production process.

[2] This note provides guidance for Member States who have redefined the term combustion installation according to the guidelines for the national allocation plans in the second trading period. When a Member State has chosen to apply the broad definition of combustion installation, the guidance in this note may not be applicable for or relevant to that Member State. Operators who would like to use the guidance in this note should check with their competent authority whether they can utilize the methods described in this note.

In the first situation the emission is being monitored by measurement at the gate. The question is then how to monitor that part of the total emissions that is to be deducted from the total emissions so as to ensure that the emission reported is fully reflective of the CO_2 emission falling within the scope of the directive. That means that to determine the quantity of the source stream the main meter as well as the internal sub-meters have to be used. If there is a internal sub-meter or monitoring device on the piece of combustion unit not falling within the scope of the "EU-ETS installation", the problem is reduced to the question what should be required for achieving the required tier of the total source stream. If there is no internal sub-metering or monitoring device to determine the amount of source stream not falling under EU-ETS and to deduct that amount from the total amount of the source stream, the question becomes then what is reasonable to require from the operator to ensure proper monitoring or estimation of those emissions. Assessing the options available to monitor those CO_2 emissions is also in the (financial) interest of the operator.

Second situation
In the second situation both parts of the installation do not share the same source stream. In that case the uncertainty level of the part of the installation falling within the scope of EU ETS is not affected by the uncertainty belonging to the part of the installation not covered by EU ETS. This means that emissions do not have to be monitored according to the same standards as for the first situation.

3. How to monitor the amount of source stream not covered by EU ETS
For situation I drawn in Annex I to this note the monitoring of emissions must be carried out in such a way that also the tier requirements of the MRG are complied with.
Four alternative routes could be applied by the operator to determine the quantity of the source stream:

1. If the uncertainty of the source stream remains within the required uncertainty (tier), the requirements of the MRG have been met.
2. If the uncertainty of the source stream does not remain within the required uncertainty, the operator can deviate from the required tier for the source stream provided that the operator can demonstrate to the competent authority the technical infeasibility or the unreasonable high costs for meeting the required tier.
3. A third option would be that the CO_2 emissions from the EU ETS installation are being overestimated by not deducting from the total emission of that EU ETS installation any emissions that stem from the unit that is not included in EU ETS. In this situation the operator chooses to use the total quantity from the source stream. Internal sub-meters need not to be taken into account and the uncertainty of the source stream can be assessed for the total emissions.
4. A fourth option is that, in order to meet the required tier for the source stream, the CO_2 emissions from the EU ETS installation are overestimated as compensation for the emissions that stem from combustion unit not covered by the EU-ETS installation. This can best be explained by an example. Suppose the required uncertainty for the natural gas source stream is 1,5%. Suppose further that the required uncertainty for the internal sub-meter that is placed in a combustion unit falling outside EU ETS would have to be 2,5% in order to meet the required uncertainty for the source stream (i.e. 1,5%). However, the actual uncertainty of the internal sub-meter is 3,5%. In such a situation the operator could be allowed to underestimate the quantity of the source stream that passes through the internal sub-meter by 1% so that the total CO_2 emissions from the EU ETS installation increases slightly, and this will lead to a marginal overestimation of the CO_2 emissions from the EU ETS installation. By doing so, the operator will be able to comply with the

required tier without having to install a new sub-meter with the required uncertainty for that unit.

5. A fifth option could be the following situation: if a source stream splits into a major source stream that is covered by EU ETS and a minor/ de minimis source stream which is not covered by EU ETS, the emission calculation of the major source stream and the minor/ de minimis source stream can be carried out separately. The major source stream has to be monitored according to the MRG requirements that apply to that particular source stream. The minor source stream or de minimis source stream can be monitored using lower tiers respectively a no tier approach. This option cannot be applied when a source stream splits into two major source streams.

4. Assessing the uncertainty for installations partly covered by EU ETS

When the installation is partly covered by EU ETS and not all CO_2 units fall under the scheme, the quantity measurement determined by an internal sub-meter for the CO_2 unit not covered by EU ETS may have to be subtracted from the quantity of the source stream that is measured by the main meter. In such a situation step 1 to 5 of section II of the ETSG Guidance note I on uncertainty[3] have to be followed by the operator. However in step 5 of that note the operator is allowed to fill in a negative value for quantity x_i in the formula with respect to the source stream that will be subtracted from the main source stream. How to process this can best be explained by the following example.

Suppose the installation site uses 500,000 Nm^3 natural gas annually. Out of that amount of natural gas 100,000 Nm^3 will be burnt by a process not falling under EU ETS. To determine the consumption of natural gas of the EU ETS installation, the consumption of natural gas by that specific process has to be subtracted from the total natural gas consumption of the installation site. To assess the uncertainty for the natural gas consumption of the EU ETS installation, step 1 to 4 outlined in Guidance Note I on Uncertainty have to be applied for the natural gas consumption by the main meter and by that process. Suppose the outcome of these steps is 1% and 5% respectively for the main meter and the measurement concerning the process falling outside EU ETS. In that case U_step_3a as outlined in the formula below will be zero. This is because both quantity measurements have their own temperature and pressure measurement for the conversion to standard conditions. Below the input variables for step 5 laid down in the Guidance note on Uncertainty I are given.

mmeter	= main meter
U_mmeter	= 1%
x_mmeter	= 500.000 Nm3/jaar
U_process (outside EU ETS)	= 5%
x_process (outside EU ETS)	= -100.000 Nm3/jaar
U_step_3a	= 0%

The assessment of the uncertainty in the quantity measurement will be calculated as follows:

$$U\_source\_stream = \sqrt{\left(\frac{\sqrt{(U_{mmeter} * x_{mmeter})^2 + (U_{installation} * x_{installation})^2}}{x_{mmeter} + x_{installation}}\right)^2 + (U\_step\_3a)^2} \Rightarrow$$

[3] Uncertainty Assessment of Quantity Measurements in relation to EU ETS requirements – Guidance note I.

$$U\_source\_stream = \sqrt{\left(\frac{\sqrt{(1\%*500.000)^2 + (5\%*-100.000)^2}}{500.000 + -100.000}\right)^2 + (0\%)^2} \Rightarrow$$

$$U\_source\_stream = \sqrt{\left(\frac{\sqrt{(5.000)^2 + (-5.000)^2}}{400.000}\right)^2 + (0\%)^2} = 1{,}8\%$$

5. How to ensure that the CO_2 emissions are not underestimated?

When option 3 and 4 are applied, the CO_2 emissions of the EU ETS installation will be overestimated. The MRG allow in certain situations that an estimation is carried out by the operator. The text of the MRG itself state explicitly or indirectly by using the term "conservative" that CO_2 emissions shall not be underestimated.[4] The MRG do not mention or address explicitly the issue of overestimating emissions, and thus do not explicitly forbid overestimation, though of course in general overestimation won't be acceptable nor desirable. However, in those cases where estimation is the only feasible solution, the context and the "spirit" can be interpreted to imply that overestimation of CO_2 emissions in those situations can be allowed. For the next trading period it is for example no longer possible to take the average reported annual emissions over the previous trading period in order to see whether an installation is a category A, B and C installation. In that case a conservative estimate could be used to categorize the installation.

For installations partly covered by EU ETS the system boundaries will be different as from 2008. This will influence the monitoring of that installation as well as the reported emissions. These installations will have to be categorized anew, and in those situations a conservative estimate of the CO_2 emissions could be accepted. This would mean that overestimating CO_2 emissions of the installation covered by EU ETS is in line with the MRG.

6. Conclusion

For installations that fall partially under EU ETS because of the new definition of "combustion unit" the following requirements should apply to ensure a credible, accurate and balanced account of an installation's emissions that is free from bias and consistent to the EPRTR and IPPC reporting systems:

- Monitoring and reporting CO_2 emissions not falling under EU ETS should be well defined and well delineated from the emissions falling under EU-ETS. Thereto the following items should be submitted in the monitoring plan:
  - delineation of system limits to identify which part of the installation, units, source streams and sources is "in" and which part is "out" of EU-ETS. The operator has to submit in this MP the EU ETS installation and its boundaries, the CO_2 units, source streams and sources covered by EU ETS and those that are not covered by EU ETS.
  - the measurement instruments which are relevant for determining CO_2 emissions including internal sub-meters that are used to determine the quantity of the source stream.
  - The method used to determine the quantity of the source stream.

[4] Section 2 under 2 under d MRG conservative means that a set of assumptions is defined in order to ensure that no under-estimation of annual emissions occurs.

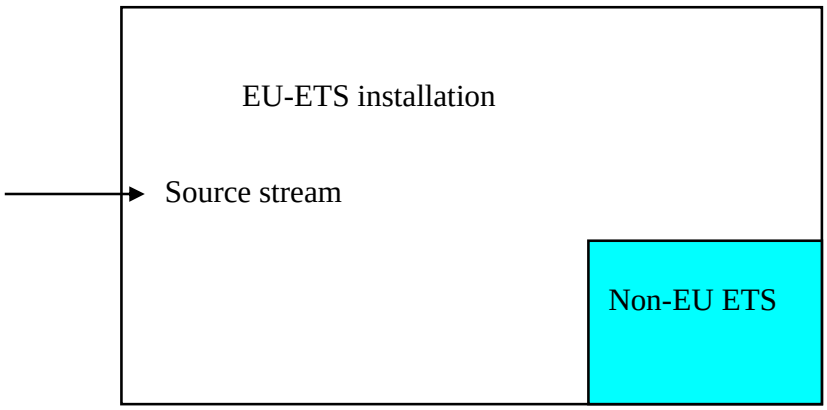
These requirements are justified from a technical, financial and administrative point of view, and in our opinion fully in line with the legal requirements of the MRG and other EU legislation.

- For situation I (see annex) the CO_2 emissions that are not covered by EU ETS should be monitored according to one of the five options mentioned under section 3 of this note. Overestimating CO_2 emissions in this case can be allowed in accordance with the MRG.

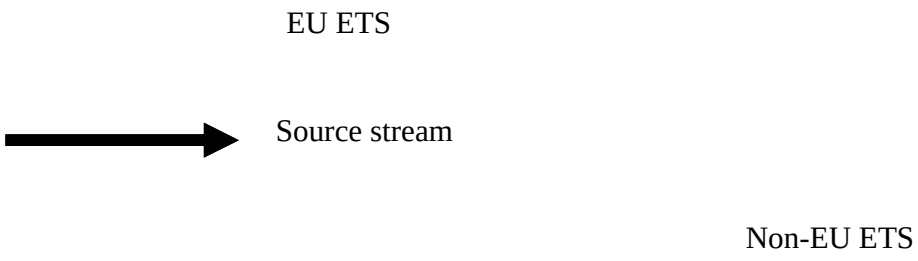
Annex I: Explanatory drawings determining and reporting CO_2 outside EU-ETS

Two situations (Sites) with an EU-ETS installation and a unit which is not part of the EU-ETS installation are shown below. In the situation (site I)_there is only one source stream for the whole site, and in second situation (site II) , the non EU-ETS unit has a separate fuel input. Arrows = source stream

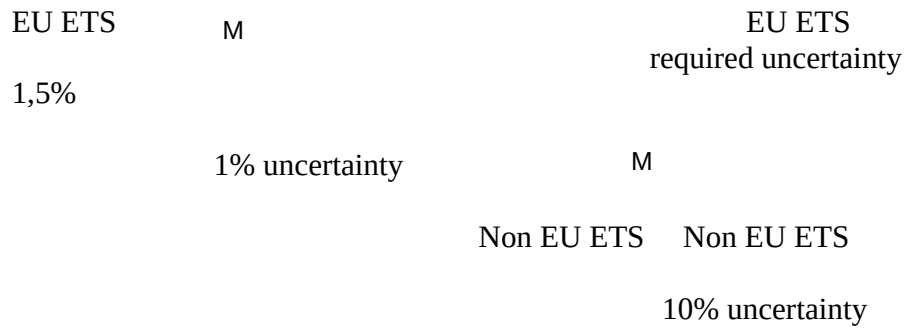
Situation I



Situation II



Annex II Impact on uncertainty when subtracting CO_2 emission of installations falling outside EU ETS



Deviation from the required tier - how to avoid applying the fall back approach?

The MRG 2007 contain provisions for deviating from the required tier (section 5.2 MRG) as well as a section on the fall back approach (section 5.3 MRG). This note addresses the situations when the required tier can not be met and the Competent Authority must consider allowing the operator to deviate from the required tier. For instance, the MRG 2007 do not explicitly address the issue of late compliance or regulate what to do in situations when late compliance is somehow unavoidable. In such situations late compliance needs to be considered and should be interpreted in accordance with section 5.2 and 5.3 MRG.

In most situations it is not cost-effective and feasible for refineries or complex chemical plants to make a complete shut-down of the whole or even part of the installation to change a meter to meet the tier requirements as laid down in the MRG. This would not be economically justifiable in 95% of the installations. Those installations can then be allowed to change the meter at the next stop of an installation thereby temporarily deviating from the required MRG tier and subsequently complying with those requirements at the next stop of an installation (late compliance). This note also describes the situation in which even tier 1 cannot be reached for one or more source streams of the installation. In those cases, when thus a situation of late compliance is unavoidable, the competent authority can consider under certain conditions to allow the operator to use temporarily, i.e. till the next stop, the fall back approach. These conditions will be outlined in this note. .

Three situations of late compliance can occur:

1. Highest tier (next lower tier): deviation from the tier is possible because of technical infeasibility and unreasonable costs (section 5.2 fourth paragraph MRG).
2. Deviation from table I requirements: this is only possible when meeting the required tier is technically not feasible (section 5.2 fifth paragraph MRG).
3. Deviation from tier 1 for a particular source stream. This is only possible when meeting tier 1 for one or more source streams is technically infeasible or would lead to unreasonable costs (section 5.3 MRG).

The question is then how to handle in each situation

- In situation I the normal tier structure can be applied. In certain specific situations the operator may request to be allowed to deviate from the required (highest) tier arguing that meeting the tier would require replacement of the meter and shut-down of the installation, which would lead to apparent unreasonable costs.
- Situation II, a deviation from the table I tier requirements of the MRG, can be allowed in a particular situation when meeting the tiers is technically not feasible. The definition in the MRG on technical feasibility is broadly formulated (section 2 under 4 under b MRG): *Technically feasible means that technical resources capable of meeting the needs of a proposed system can be acquired by the operator in the required time.* The term technical feasibility can be interpreted such that a complete shutdown of the whole or part of the installation in order to change a meter is technically not feasible. In fact FAQ 14 of the European Commission implies such reasoning, where it states that the term can refer to availability of the technical resources as well as to the economic ability of the operator to acquire them, taking into account a typical budget for improved process control, automation and process retrofit.
- If however the operator is not able to meet even tier 1 for one or more of the source streams and changing the meter would imply a complete shut-down of the installation which in most situations will lead to unreasonable costs, the operator can apply the fall back approach laid down in section 5.3 MRG. However, in such a situation the fall back approach should be considered as a purely temporary situation. According to section 5.3 MRG the overall uncertainty analysis should be updated by the operator on an annual basis. The annual update shall be prepared together with the annual emissions report and shall be subject to verification. This demonstrates in the opinion of the ETSG the

temporary nature of the fall back approach and means that the operator should not be allowed to keep on using the fall back approach and be excused from taking measures towards meeting at least tier 1. This would also be in line with the improvement principle laid down in section 3 MRG which requires an operator to improve his performance in monitoring. The temporary nature of the fall back approach also derives from section 4.3 MRG according to which the monitoring methodology shall be changed if this improves the accuracy of the reported data unless this is technically not feasible or will lead to unreasonably high costs. Therefore the competent authority should assess annually if the fall back approach is still applicable. In the particular case of late compliance the competent authority should only allow an operator to use the fall back approach until the next stop of an installation. At that moment the operator has to replace the meter and has to meet the required tier.

The overall conclusions for deviating from the required tier and allowing the fall back approach are:

- The competent authority should be reluctant to allow the operator to deviate from the required tier, and if so only for such a limited period that it will be reasonable for the operator to change meters allowing meeting the tier requirement. According to section 4.3 MRG the monitoring methodology shall be changed if this improves the accuracy of the reported data, unless this is technically not feasible or would lead to unreasonable costs. Furthermore the improvement principle laid down in section 3 MRG requires operators to improve their performance in monitoring emissions. This implies that a deviation from the required tier should be considered as a temporary solution;
- The competent authority should be very reluctant to allow the operator to apply the fall back approach because of technical infeasibility or unreasonable costs.
- The competent authority should assess annually whether the fall back approach is still applicable. This assessment can be done when the operator has prepared and submitted his annual update of the overall uncertainty analysis to the competent authority. The onus for proving that the fall back approach can still be applied, is on the operator.

Conclusion: Late compliance must be a temporary and exceptional solution. It should only be applied when a complete shut-down of the whole or part of the installation would be required to meet the tier requirements. In normal circumstances operators can always and must therefore comply with the normal tier requirements. To ensure that late compliance is justified in a particular situation, the operator must provide supporting evidence justifying the non-compliance to the competent authority. The monitoring plan must in such cases describe the following:

- the exact reason why it is not possible to meet the tier requirements. The supporting evidence must provide well-argued reasons that justify deviation from the requirements;
- the time when and the way in which the relevant tier requirements will be met;
- the way in which the annual CO_2 emissions will be determined in the meantime.

More flexible requirements for small installations

How to interpret section 16 MRG requirements for small installations emitting less than 25 ktonnes of CO_2 per annum?

Introduction

Section 16 MRG 2007 stipulates a set of less demanding and flexible requirements for installations with average verified reported emissions of less than 25,000 tonnes of fossil CO_2 per year. According to section 16 MRG small installations may also use a simplified monitoring plan. This note will clarify and elaborate on the more flexible requirements that can apply for small installations emitting less than 25,000 tonnes of fossil CO_2 per year. Operators that would like to monitor according to these more flexible requirements should check with their competent authority on whether they are allowed to do so.

Classification of small installations

To determine whether an installation emits less than 25,000 tonnes of fossil CO_2 per year, the operator must use the average reported annual CO_2 emissions during the previous trading period. For the second trading period this should be the reported data for 2005-2006 and if possible, 2005-2007. It concerns the CO_2 emissions of an EU ETS installation that falls under emissions trading in the 2nd trading period, 2008-2012, including any transferred or exported CO_2. Only CO_2 from fossil source streams is included in the classification of small installations.

If the average reported annual CO_2 emissions during the previous trading period is not representative from 2008 onwards or if the emission data is no longer available (e.g. changes to the installation boundaries, reduction of production, changes in the operating conditions or the lack of a reporting obligation in the previous trading period) the operator has to demonstrate to the satisfaction of the competent authority that the annual emissions of the installation will be less than 25,000 tonnes of fossil CO_2 by providing a conservative, substantiated estimate of these emissions. This can be done by using for example data on the allocation of emission allowances or underlying data from earlier emission reports. The burden of proof for meeting the threshold of 25,000 tonnes of fossil CO_2 is on the operator.

Flexible monitoring requirements

Section 16 MRG contains less demanding, relatively flexible monitoring requirements for small installations:

Monitoring of the quantity of a source stream and uncertainty

- Operators may base the determination of the amount of fuel or material on registered purchasing data (invoices) of the fuel/ material supplier and/ or estimated stock changes. In that case the uncertainty associated with the amount of these source streams does not have to be substantiated or assessed. The MRG provision dispensates an operator from the need to check or have knowledge of his supplier's uncertainty analysis. For further information please see section I of ETSG Guidance Note I on Uncertainty Assessment of Quantity Measurements (chapter II.1)
- When supplier data, invoices and stock changes cannot be used by an operator (the operator is relying on his own activity data metering) or if an operator measures the amount of fuel by using internal (sub) meters (e.g. since not all units are included in EU ETS), small installations are allowed to use information specified by the manufacturer of the measurement instrument in order to estimate the uncertainty of the activity data. They may use the uncertainty advised by the meter supplier irrespective of the circumstances in which the measuring device is being used. For further information please see section I and II under step 2 of ETSG Guidance Note I on Uncertainty Assessment of Quantity Measurements (chapter II.1).

- In situations in which the operator cannot use supplier data of internal meters, they have to assess the uncertainty. However they can use the practical tool for assessing that uncertainty described in section II of ETSG Guidance Note I on Uncertainty Assessment of Quantity Measurements (chapter II.1). In that case they can apply an uncertainty of 0% for the additional uncertainty of context specific factors. For further information please see section II under step 2 of ETSG Guidance Note I on Uncertainty Assessment of Quantity Measurements (chapter II.1).

Monitoring and applicable tier

- The operator is allowed to use tier 1 for all variables (amount of fuel/ material, emission factor, oxidation factor, conversion factor etc.).
- The operator is allowed to enter tier 1 in their monitoring plan without reporting an uncertainty value against the amount of a source stream.

Calibration

If the risks in a particular data flow activity require so, small installations have to calibrate, adjust and check the relevant measurement equipment at regular intervals including prior to use. The outcome of the risk assessment determines whether and to what extent installations have to implement control activities (i.e. calibration) in order to mitigate the risks involved (for further information please see section 5.2.1 of the ETSG note Guidance on data flow activities and the control system). If the operator determines the amount of fuel or material solely on invoice data and estimated stock changes, a calibration of the measurement equipment is for example not needed.

If small installations are relying on their own activity data metering, section 16 MRG does not exempt an operator from calibrating his measurement equipment. However he does not have to provide full proof of compliance with the calibration requirements laid down in section 10.3.2 MRG. In that case small installations are only required to include the calibration frequency of the measurement equipment and a reference to the calibration reports in the monitoring plan. The calibration reports within the installation site must remain available to the competent authority and should be registered and stored in internal registers at the installation for the period of 10 years.

Other section 10.3.2 requirements will also have to be applied:

- The operator shall identify in the monitoring plan if components of the measurement instrument cannot be calibrated and propose alternative control activities which need the approval of the competent authority. As the risks for small installations are generally not that high, the alternative control activities do not have to be as robust as for larger installations.
- When the equipment does not function properly according to requirements, the operator shall take necessary remedial action.

Requirements for small installations on the accreditation to 17025

Small installations do not need to apply the EN ISO 17025:2005 accreditation requirements provided that the laboratory concerned:

- can prove that it is technically competent and is capable of producing technically valid results using the relevant analytical procedures; **and**
- participates in an annual inter-laboratory comparison and subsequently undertakes corrective measures where necessary.

Verifying small installations

According to section 16 MRG, Member States may waive the mandatory need for annual site visits by the verifier in the verification process. Some small installations use only natural gas which in general will make it relatively easy to verify the emission report from behind a desk

without carrying out a site visit. However, there could also be more complex gas fired installations for which a site visit is absolutely necessary. A waiver of a site visit solely based on a verifier's decision is therefore not recommended.

Thus the following approach should be used: A verifier can decide that a site visit to the installation is not required based on the result of his own risk analysis against the requirement to deliver a verification opinion with reasonable assurance, and the consideration that any changes on the installation have been notified to the CA, when either of the following conditions apply:

1. the operator has obtained approval from the competent authority that for that year the site visit can be waived, provided that for each year thereafter again that approval is based on the verifiers' justification for waiving the site visit to that installation, or;
2. the competent authority has determined and approved a list of criteria and the verifier has assessed that these criteria for waiving the site visit apply.

Criteria for waiving site visits could for example include:

- Where there is an un-manned site with telemetered data sent to another location; and the same person is responsible for all the data management and recording for the site;
- The site is in a remote or inaccessible location and there is high centralisation of the data collated from the site at another location with good quality assurance; or
- Meters have already been inspected on site and a signed meter/matrix document and/or photographic evidence from the operator demonstrates that no metering or operational changes have occurred at the installation.

The waiver of site visits shall be justified, referenced and recorded in the verification report.

Simplified monitoring plan requirements for small installations

Small installations emitting less than 25,000 tonnes of fossil CO_2 may use a simplified monitoring plan which should contain at least the following elements.[1]

- **General installation and activity data:** a description of the installation and activities carried out by the installation to be monitored (general installation data, data on activities etc.) (section 4.3 a MRG);
- **System boundaries and identification of source streams/ sources and units:** a list and overview of source streams, emission sources and CO_2-units including EU ETS system boundaries (section 4.3 c MRG);
- **Classification of the installation:** description and substantiation of the classification of the installation (section 4.3 a MRG);
- **Monitoring methodology:** this should contain a description of the following elements:
  - **Monitoring method:** a description of the calculation based methodology or measurement based methodology used (section 4.3 d MRG);
  - **Tier data:** a list and description of the tiers for activity data, emission factors, oxidation and conversion factors for each of the source streams to be monitored (section 4.3 e MRG);
- **Measurement instrument data:** a description of the measurement systems and the specification and exact location of the measurement instruments to be used for each of the source streams to be monitored (section 4.3 f MRG);
- **CEMS:** where relevant a description of continuous emission measurement systems to be used for the monitoring of an emission source, i.e. the points of measurement, frequency of measurements, equipment used, calibration procedures, data collection and storage procedures and the approach for corroborating calculation and the reporting of activity data, emission factors and alike (section 4.3 g MRG);

[1] For further information on the specific monitoring plan requirements please see the ETSG note Requirements of the Monitoring Plan and the UK monitoring plan template.

- **Fall back approach:** where relevant details concerning a fall back approach should be included. This would concern a comprehensive description of the approach and the uncertainty analysis (section 4.3 l MRG);
- **Data flow activities and control activities:** small installations will only have to submit the following elements in the monitoring plan (section 4.3 m MRG)[2]:
  - A short description or referral to a procedure for data flow activities. It is sufficient to state which procedures and operational activities there are.
  - Where relevant the calibration frequency of the measurement equipment and referral to a calibration report should be submitted in the monitoring plan.
  - An overview of the organization and management of responsibilities or referral to such an overview (section 4.3 b MRG).
  - The other control activities and the evaluation of the control system have to be carried out by small installations if applicable given to the risk assessment. They also have to be registered and stored at the installation for a period of 10 years. However these control activities and the evaluation thereof do not need to be described in the monitoring plan itself.[3]

[2] For further information on the specific monitoring plan requirements for data flow activities and control activities please see the ETSG note Guidance on data flow activities and the control system.

[3] See footnote 2.

Note on non-conformities in the MRG

1. Introduction

The new MRG introduces the terms material non-conformity and non-conformity. This note outlines the differences and similarities between both definitions and their impact on the outcome of the verification process. Whereas in principle any material non-conformity will cause the verifier to refuse a verification opinion statement or to give a statement that the emission report is not satisfactory, non-material non-conformities will not have an influence on the outcome of the verification process. Therefore the question remains how to address (non-material) non-conformities. This note will especially focus on:

- what the responsibilities of the different parties are with respect to non-conformities;
- how non-conformities should be submitted in the verification report;
- how operators should be required to address non-conformities.

For these three questions different options and their consequences will be outlined. At the end of this note some conclusions will be drawn.

2. Differences and similarities

The definition of material non-conformity and (non-material) non-conformity differ in some aspects from each other.

Differences:

- In principle material non-conformities will lead to a refusal of a verification opinion statement or to verification opinion statement that the emission report is not satisfactory. According to Annex V a verifier is not allowed to verify the emission report as satisfactory in that case. This is different for non-material non-conformities since the MRG specifically state that an annual emission report is verified as satisfactory if the total emissions are not materially misstated, and if, in the opinion of the verifier, there are no material non-conformities. Therefore, there appears no provision to refuse verification of the emissions report in cases of just (non-material) non-conformities.
- A material non-conformity means that a non-conformity to the requirements in the approved monitoring plan could lead to a different treatment of the installation by the competent authority. This could be the case if the materiality level of 5% for category A and B installations or 2% for category C installations has been exceeded. An assumption could therefore be that a non-conformity would not be material if the emission deviation as a result of the non-conformity is below that materiality threshold. However material non-conformities are not solely linked to the materiality threshold.
- Given the wording in the definition of material non-conformity it could be any act or omission of an act that is contrary to the requirements of the approved monitoring plan and that could lead to a different treatment of the installation by the competent authority. Furthermore according to section 10.4.2 (d) MRG the verifier shall make a judgement whether the annual emissions report contains any material misstatement as compared to the materiality threshold, and whether there are material non-conformities. This provision implies that the material non-conformity is not automatically linked to the materiality threshold. In other words, material non-conformities below the materiality threshold could also lead to a rejection. In practice, it will be very difficult to draw the precise line on what constitutes a material non-conformity and just a non-conformity without a material effect. Gross negligence or major errors in calibration would constitute a non-conformity while it may be very difficult to assess the material implication.

Similarities:

- Material non-conformities and (non-material) non-conformities both concern *"any act or omission of an act by the installation that is contrary to the requirements in the approved monitoring plan".* This implies that in principle the verifier has to take the approved

monitoring plan as a starting point. He is not supposed to redo the job of the CA and validate the monitoring plan himself.

- As non-conformities can have an effect on the total emission figure in the emissions report, non-conformities could have some overlap with misstatements[1] irrespective of whether they have a material effect.

3. Responsibilities of parties with respect to non-conformities

Compared to the old MRG the role of the verifier has changed in some aspects in the new MRG. Whereas the old MRG allowed verifiers to assess whether the monitoring methodology applied by the operator complied with the installation's monitoring methodology as approved by the competent authority and the MRG, the introduction of the requirement to have an approved monitoring plan and the definition of (material) non-conformities have changed this. Section 10.4 (new) MRG requires that the approved monitoring plan has to be taken as a starting point by the verifier. This has led to a change-over of roles and responsibilities between operator, verifier and competent authority. That was also needed to establish a much clearer delineation between the roles of these parties and to avoid a situation whereby the verifier would redo the work of the competent authority or that the CA would be mixed-up in the verification process.

However introducing the term (non-material) non-conformities also raises questions, for instance how to deal with situations in which a verifier spots a non-conformity in the installation that is not covered in the approved monitoring plan. Before answering these questions it is important to outline the roles and responsibilities of the operator, the competent authority and the verifier.

The responsibility of the operator

The operator shall submit a monitoring plan that is in accordance with the MRG or, as is the case in most MS, the national legislation which has implemented the MRG. This stems from the spirit of the MRG[2] as well as article 14 (2) of the EU ETS Directive which requires Member States to ensure that the monitoring of greenhouse gas emissions is done in accordance with the MRG. MRG provisions that indicate conformity of the MP with the new MRG are to be found in section 4.3[3] and section 10.2.[4] Furthermore the operator has to include the information listed in section 8 MRG in the emission report.

The responsibility of the Competent authority

The CA is required to check and approve the Monitoring Plan and see to it that the MP is in line with the MRG and national legislation which has implemented the MRG. This derives from Article 14 (2) of the EU ETS Directive as well as from section 4.3 MRG.[5]

The responsibility of verifier

The verifier shall assess whether the data in the emission report is free from material misstatements and whether there are no material non-conformities according to section 10.4 MRG. He shall therefore check whether the data in the emission report is correct and whether there is an act or omission of an act contrary to the approved monitoring plan. The fact that the verifier has to take the approved monitoring plan as a starting point in case of assessing non-conformities does not mean that he is not allowed to check whether a particular situation within

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[1] Misstatements means omissions, misrepresentations and errors not considering the permissible uncertainty in the annual emission report.

[2] Consideration 1 MRG: The complete, consistent, transparent and accurate monitoring and reporting of greenhouse gas emissions in accordance with the guidelines laid down in this Decision are fundamental for the operation of the greenhouse gas emission allowance trading scheme established in Directive 2003/87/EC.

[3] Section 4.3 page 20: A competent authority shall require the operator to change its monitoring plan if its monitoring plan is no longer in conformity with the rules laid down in these Guidelines

[4] Section 10.2 first paragraph: The operator shall establish, document, implement and maintain an effective control system to ensure that the annual emission report, resulting from the data flow activities does not contain misstatements and is in conformance with the approved monitoring plan, the permit and these guidelines.

[5] See footnote 4.

an installation is not in accordance with the MRG. This derives from the following MRG provisions.

- According to section 10.4.1 the objective of the verification is to ensure that emissions have been monitored in accordance with the MRG and that reliable and correct emissions data will be reported pursuant to Article 14 (3) of Directive 2003/87/EC. This means that the verifier can check beyond the approved MP especially if this relates to the monitoring of emission data.
- According to the improvement of performance principle the process of verifying the emissions report shall be an effective and reliable tool in its support of quality assurance and quality control procedures, providing information upon which an operator can act to improve its performance in monitoring and reporting emissions (section 3 MRG). This principle implies that a verifier can make recommendations to the operator so that the operator can improve the monitoring and reporting of emissions and bring this in line with the MRG.
- The verifier has to understand the operator's monitoring plan, data flow activities and control system as well as the overall organisation with respect to monitoring and reporting (section 10.4.2 (a) MRG).
- The verifier has to determine misstatements and non-conformities by assessing whether the monitoring plan has been implemented to support the determination of non-conformities and see whether the monitoring plan is up to date (section 10.4.2 (c) MRG).

Consequences of delineation of responsibilities for the verifier

The aforementioned MRG provisions leave the verifier with the following possibilities to check an operator's compliance with the MRG and the approved MP:

- **Omissions, misrepresentations and errors in the emission report:** these are misstatements which usually concern the emission data. However it could also relate to other data in the emission report. The verifier can check whether the data in the emission report is in line with the MRG and list this as a misstatement if the emission report is not in accordance with the MRG.
- **Non-conformities regardless of whether they have material effect:** These could for example concern:
  - elements in the approved MP (e.g. data flow activities and procedures for control activities) which have not been implemented by the installation or have been implemented incorrectly.
  - monitoring methodology, tiers etc. are not in line with the approved MP.
  - calibration and other control activities are not performed according to the requirements in the approved MP.

  In some cases non-conformities may also be misstatements.
- **Elements that have not been described in the MP and are not in line with the MRG:**
  - If these elements have an effect on the emission data submitted in the emission report they can be listed as a misstatement since this would mean an omission, misrepresentation or error in the emission report.
  - If these elements have no effect on the emission data or other data in the emission report, these elements cannot be regarded as non-conformities since they have not been mentioned or referred to in the approved MP. However according to the improvement principle a verifier can recommend the operator to bring the situation in line with the MRG and refer him to the CA. This would be information upon which the operator can act to improve his monitoring and reporting of emissions in future.
  - If the operator has not updated the MP as a result of changes to and temporary deviations from the MP, the verifier must make the operator aware of that and refer him to the CA since it is the verifier's responsibility to assess whether the MP is indeed implemented and is up to date (section 10.4.2 (c) MRG). This also applies to other omissions in the approved MP.

The implication of these conclusions for section 10.1 to 10.3 MRG on control are that the verifier is still required to check whether all data flow activities and control activities mentioned or referred to in the approved MP have been implemented correctly and are up to date. The extent to which a verifier can check this depends on the way the procedures for control activities and other MP elements have been described or referred to in the Monitoring Plan. If the Monitoring Plan contains a limited description of these elements and there are no references to internal procedures or documents for the data flow activities and control activities, the verifier has less means to verify the control activities extensively. It is therefore important to develop guidance and uniform requirements on the content of the MP to avoid diversity between Member States.

Given the objective of verification in section 10.4.1 verifiers are however still able to check whether these control activities are in line with the MRG if they have an impact on the emission data in the emission report in which case they would be regarded as misstatements. In other cases the verifier can recommend that the operator brings the situation in line with the MRG and refer him to the CA.

4. Non-conformities in the verification report

According to section 10.4.2 (e) MRG the verifier may include in his verification report a statement on non-material non-conformities or non-material misstatements. This flexibility seems to contradict the further requirement in section 10.4.2 (e) of the MRG that Member States shall ensure that the operator addresses non-conformities and misstatements after consultation of the competent authority in a timeframe set by the competent authority. The question is how non-conformities can be addressed when they are not incorporated in the verification report. Not submitting them in the verification report would mean that there is the high likelihood that (non-material) non-conformities will not, perhaps, be addressed if the operator keeps on refusing to deal with them. A verifier can not require the operator to comply with the MRG as this is the CA's job. A coherent and consistent interpretation of the MRG must lead to the conclusion that the non-material non-conformities should at least be mentioned in the verification report instead of only being notified in the internal verification report (or a management letter to the operator).[6]

Non-material non-conformities that have not been solved on the 31 March and are still outstanding should be submitted in the verification report. Small and trivial non-material non-conformities do not necessarily have to be listed in the verification report and should in that case be logged in the internal verification report and reported to the operator in the management letter. It is recognised that the line between trivial non-conformities and other non-material non-conformities is difficult to determine. However, it is recommended that apart from the trivial ones non-material non-conformities should be reported in the verification report.

Non-conformities that have an impact or could have an impact on the emission data should not be considered as trivial non-material non-conformities and shall always be listed in the verification report.

Non-conformities that have or could have an impact on the emission data include for example:

- failure to install metering device/ or not installing a meter on time;
- incorrect calibration/ failure to carry out calibration or maintenance;
- failure to apply corrections and corrective action when equipment does not function properly;
- major flaws in quality assurance of outsourced processes, document management and internal audit compared to the procedure described in the approved MP (like internal audits

[6] Although some data in the verification report have to be published (emission data) in view of the Arhus convention, other data (like non-conformities) could be withheld based on the Arhus Convention and the EU Directive 2003/4 on public access to environmental information. For more information please see the note "*Transparency and non-material non-conformities in the Verification Opinion Statement (VOS) in relation to the Arhus Convention and public disclosure of environmental information".*

not performed, gross negligence in quality assurance, incomplete data management system procedures);
- not performing an update of the uncertainty analysis in relation to the fall back approach;
- errors in spreadsheet and resources/ information system used due to inadequate security etc.
- errors in the document management system.

The assessment whether aforementioned non-conformities have material implication is dependent on concrete circumstances.

For example, factors that can determine whether a non-conformity has material effect, are:
- a non-conformity exceeds the materiality threshold;
- the aggregate of non-conformities exceeds the materiality threshold;
- whether the non-conformity can be rectified. If non-conformities cannot be rectified in the short term or cannot be rectified at all, a verification body could consider this as a material non-conformity if this has an impact on the emission data;
- possibility of reoccurrence together with impact on emission data; or
- duration of existence of that non-conformity, i.e. a non-conformity in the quality assurance and control procedures has not been addressed for several years by the operator and has therefore grown into a non-conformity that is no longer acceptable for the verifier because of its impact on the emission data.

5. How to interpret section 10.4.2 (e) MRG?
Before detailing the issue of how to deal with non-conformities and non-material misstatements, it goes without saying that material non-conformities and material misstatements may lead to a refusal of the verification report or a statement that the emission report is not satisfactory. In those cases the competent authority will officially determine the emission figure in the Registry according to article 51 of the Regulation for a standardised and secured system of Registries.

Section 10.4.2 (e) of the MRG requires operators to address all non-material non-conformities and misstatements after consultation of the CA.

What does this requirement imply in practice?
Rectifiable non-material non-conformities and non-material misstatements that have or could have an affect on the emission data, have to be corrected by the operator before or on the 31st of March at the latest. If the non-conformities and misstatements are solved before that date, their submittal in the verification report is not necessary. In that case they shall be closed in the internal verification report by the verifier.

Non-material non-conformities and non-material misstatements that have not been corrected before or on the 31st of March at the latest shall be listed in the verification report.

The verifier shall submit in the verification report a description of the non-material non-conformities and misstatements as well as a recommendation for a timeframe in which these non-conformities and misstatements can be addressed.

Non-material non-conformities and misstatements that have not been corrected before or on the 31st of March and affect or could affect the emission data shall be addressed by the operator within a limited timeframe to be set by the Competent Authority. This timeframe should be six weeks after handing in the verified emission report unless this is not feasible.

If this is not feasible, the operator has to propose to the CA in what timeframe he is going to address these non-conformities or misstatements and what action he will take in the meantime.

The more trivial and small non-material non-conformities that have no affect on the emission data should be addressed within a timeframe of three months. This could be for example a small error in the management system that has no impact on the emission data and is not that relevant for the competent authority to know. A correction of such errors sometimes needs the approval of the company's internal management board and subsequent adaptation in its Document Management system. A correction and change in the procedure could thus take two or three months. As these trivial and small non-material non-conformities have no affect and cannot have an affect on the emission data the period for addressing these non-conformities can be set at three months.

There are several ways to set aforementioned timeframes: national legislation, permit or through an improvement report, for instance if this relates improvement of tiers or calibration of meters..

If the option of an improvement report is used, operators are required to state in the improvement report the full details for implementing improvements concerning recommendations in relation to non-conformities and misstatements identified by the verifier in the verification report. If no improvement is proposed in response to a recommendation identified by the verifier, the operator shall justify why no action is to be taken.

An improvement report should be submitted by the operator by 30 June of each year. The operator is required to implement the improvements specified by the Competent Authority in response to the improvement report within a reasonable timeframe. The aforementioned timeframes should apply.

6. Consequences for EA Guidance note

Section 5.5 of the current EA guidance note contains some provisions on how to address non-material non-conformities. Chapter 5 EA Guidance note is currently being revised taking into account the conclusions of this note. A zero order draft has been prepared and is under discussion by the European Organization for Accreditation at this moment.

Competent Authority approval for subtraction of CO_2 in fuel transferred out of an EU ETS installation

This note emphasizes competent authority responsibilities concerning approval for subtraction of inherent CO_2 in a fuel transferred out of an installation.

Section 5.5 MRG states *"Subject to approval by the competent authority, inherent CO_2 originating from a source stream but subsequently being transferred out of an installation as part of a fuel may be deducted from the emissions of that installation – independently of whether it is supplied to another EU-ETS installation or not"*.
In executing its duty in relation to this requirement, a competent authority needs to be vigilant that:

- The output stream concerned does represent a genuine fuel.
- The output stream is being properly used as a genuine fuel.
- No unscrupulous claim is being made, in an attempt to reduce the EU ETS installation's reported CO_2 emissions and the number of allowances that they then have to surrender.

Added concern should surround the provision for an EU ETS operator to supply a claimed fuel to a non-EU ETS installations as this could result in CO_2 unjustly being removed from EU ETS control.

Although Section 2 MRG provides definitions for "commercially traded fuels" and "commercial standard fuel", the MRG does not provide a more fundamental definition of "fuel". This exacerbates the difficulty associated with competent authorities reaching a consistent decision regarding deserving and non-deserving cases.

The following are put forward as initial suggestions for assessing that an output stream is being transferred out of an installation for use as a genuine fuel:

- Dictionary definition of fuel is usually along the lines of "a substance burned for heat or power". It should be possible for the recipient installation to demonstrate recovery and use of the resultant heat/power. Failure to do this may suggest a disposal service rather than energy recovery.
- The output stream falls within the Section 2 MRG definition of "commercially traded fuels" (which is inclusive of a "commercial standard fuel")
- The output stream is of sufficient quantity (including calorific value, CV content) to constitute a realistic fuel supply to the recipient installation. Continuity of supply may also be relevant. Sufficient CV content is likely to be a moot point, but it is noted that Article 3(2)(a) of Directive 2000/76/EC sets a minimum NCV of 30 MJ/kg in relation to excluding materials from consideration as hazardous waste (the inference being that it constitutes a reasonable fuel instead).
- The output stream is being purchased. A genuine fuel can be expected to have a financial value, and availability of associated purchase records demonstrating payment from the recipient to the supplier, not the other way round which would suggest a disposal service rather than genuine use.
- The output stream is being fully fired in the recipient's combustion unit(s); not directed elsewhere or vented direct to atmosphere.

It should be noted that where the competent authority does approve transfer of "inherent CO_2" out of an installation as part of a fuel, Section 5.5 MRG still requires this quantity to be reported as a memo item in the verified annual emissions report, and for the installations concerned to be reported by Member States to the Commission under the obligations of Article 21 of the EU ETS Directive.

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MRG requirement regarding Normal Cubic Meters (Nm^3)

Section 2(3)(i) MRG states that *"standards conditions" means temperature of 273.15 K (i.e. 0°C) and pressure conditions of 101.325 kPa defining normal cubic metres (Nm^3)*. Further references to Nm^3 then follow in connection with MRG text explaining the handling and reporting of activity data, net calorific values, volumetric based emission factors and carbon contents. This includes in Section 5.1 (Calculation Formulae), Section 5.4 (Activity Data), Section 5.5 (Emission Factors), Section 8 (Reporting), Section 12 (List of CO_2-Neutral Biomass) and Section 14 (Reporting Format) of Annex I; and Section 2.1.1.1 (General Combustion Activities) and Section 2.1.1.3 (Flares) of Annex II.

It is clear that the MRG requires final reporting of gaseous volumes in terms of Nm^3. This is to allow subsequent consideration and comparison of reported data on a fair and like for like basis. Where conversion to Nm^3 is still required, it can be satisfied by conversion of final data values according to the simple formula:

$$V_2 = \frac{P_1 \times V_1 \times T_2}{T_1 \times P_2}$$

where:

P_1	=	pressure (kPa) at which V_1 is expressed
T_1	=	temperature (K) at which V_1 is expressed
V_1	=	volume (m^3) at P_1 and T_1
P_2	=	101,325 kPa
T_2	=	273.15 K
V_2	=	volume (Nm^3, as defined by the MRG)

Although, a preference may be for gaseous volume data used during EU ETS emission calculations (i.e. before final reporting) to also be already on a Nm^3 basis, this is not actually imperative. What is imperative is for component data during calculations to be on the same temperature and pressure basis as each other. So if, for example, a country specific emission factor is being used which is on a basis of a temperature of 15°C (288 K) and a pressure of 101.325 kPa, the activity data volume must also be on this same basis (whether measured at this or converted). Obviously a conversion to Nm^3 still needs to be made to the final data for reporting purposes as explained above.

In some cases, early conversion of input data (rather than final values) to a Nm^3 basis will add cost and result in added administrative (bureaucratic) disruption and confusion. It may also be a source of greater inaccuracy in the final data, including through additional rounding-up and rounding-down of values. It should be remembered that these considerations could affect *inter alia* laboratories and their analytical/reporting practices (in turn affecting their current basis of EN ISO 17025 accreditation), fuel and material suppliers (who may be required by legislation to invoice on a different T&P basis), the published basis of country-specific factors, and the complication and expense of inspection and verification duties.

Therefore, this note recommends that operators should be allowed to convert to Nm^3 as defined by the MRG at the stage of final reporting if this is more convenient and cost effective, and assuming that the competent authority is satisfied that this does not compromise transparency and data accuracy. Requirement will still remain for prior calculations involving gaseous volumes to be carried out on a like for like basis

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(i.e. in terms of the same standardised conditions whatever they may be). Whatever approach is used, it should be made clear within the monitoring plan.

Meaning of accuracy, precision, error and uncertainty with respect to emissions trading

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In common speech, the words accuracy and precision are often used interchangeably. However, there is a distinction between the meanings of these two words (see appendix A). Accuracy refers to the relationship between a measured quantity and the real value of that quantity. The accuracy of a single measurement is defined as the difference between the measured value and the true value. The accuracy of a measurement is therefore influenced by such things as the calibration and sensitivity of the instruments used, the ability to read the meters, mistakes in recording the numbers, and so on. The word precision refers to the scatter in a series of measurements of the same quantity. It is possible for a measurement to be very precise, but at the same time not very accurate. For example, if you measure a voltage using a digital voltmeter that is incorrectly calibrated the answer will be precise (repeated measurements will give essentially the same result to several decimal places) but inaccurate (all of the measurements will be wrong). By making a series of measurements of some quantity, we can obtain an estimate of the precision of each individual measurement.

The words error and uncertainty are also often used interchangeably. Nevertheless, it is important to be aware of the distinction between the actual error (also called bias) in a given measurement (i.e. in the amount by which the measured value differs from the true value) and the uncertainty in a measurement. The point is that normally we do not know the true value, and therefore cannot determine the actual error in our result. However, it is still possible to make an estimate of the uncertainty (or the probable error) in the measurement based on what we know about the properties of the measurement system.

For emissions trading this means that the uncertainty of an annual load is determined by the uncertainty of all individual readings. In the uncertainty of annual load, the precision will tend to level out with a increasing number of measurements. The accuracy on the other hand will not level out, e.g. if a watch is half a minute off, the average of a large number of readings will also be half a minute off. A lack in maintenance or calibration procedures of the monitoring equipment for the annual emission will therefore cause an uncontrollable and unknown decrement in accuracy.

Suppliers of instrumentation always specify the aspects contributing to the precision of a measurement (e.g. the repeatability). The accuracy aspects are not specified, because these aspects are generally instrument independent. The accuracy aspects depend for example on sampling and calibration procedures. Persons dealing with instruments are normally aware of the concepts of accuracy, precision and uncertainty of individual readings, because directives like the Large Combustion Plant directive and the Waste Incineration directive, set requirements for the uncertainty of individual readings. Generally the precision is the main component in the uncertainty of a single measurement. However, when an emission figure is based on the average of a number of measurements, the precision decreases with the number of individual measurements. Therefore the contribution of the accuracy to the total uncertainty increases with the number of measurements This aspect of the uncertainty in annual loads is not well-known.

What is the difference between accuracy and precision?

The difference between accuracy and precision is illustrated below by the scores of four different archers, each with varying degree of ability. The bull's-eye in the target represents the true value of a measurement.

Inaccurate and imprecise

Precise but inaccurate

.

Accurate but imprecise

Accurate and precise