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CLIMA.A.3 - Monitoring, Reporting, Verification

Guidance Document

The Monitoring and Reporting Regulation – Data flow activities and control system

MRR Guidance document No. 6, final version of 17 October 2012

This document is part of a series of documents provided by the Commission services for supporting the implementation of Commission Regulation (EU) No. 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council[1].

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

This guidance document takes into account the discussions within meetings of the informal Technical Working Group on the Monitoring and Reporting Regulation under the WGIII of the Climate Change Committee (CCC), as well as written comments received from stakeholders and experts from Member States. This guidance document was unanimously endorsed by the representatives of the Member States at the meeting of the Climate Change Committee on 17 October 2012.

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

[1] **http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:181:0030:0104:EN:PDF**

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1 INTRODUCTION

1.1 About this document

This document has been written to support the M&R Regulation, by explaining its requirements in a non-legislative language. While Guidance Document No. 1 provides a general overview on monitoring and reporting of emissions from installations under the EU ETS and Guidance Document No. 2 serves the same purpose for aircraft operators, this document (Guidance Document No. 6) explains in more detail the requirements for data flow activities and the control system, as it is required as part of the monitoring plan. The set of guidance documents is further complemented by electronic templates[2] for information to be submitted by operators and aircraft operators to the competent authority. However, it should always be remembered that the Regulation is the primary requirement.

This document interprets the Regulation regarding requirements for installations and aircraft operators. It also builds on guidance and best practice developed during the first two phases[3] of the EU ETS (2005 to 2007 and 2008 to 2012), in particular the experience gathered by the Member States based on the Monitoring and Reporting Guidelines (MRG 2007) including a set of guidance notes known as the ETSG[4] guidance notes developed under the framework of IMPEL. It also takes into account the valuable input from the task force on monitoring established under the EU ETS Compliance Forum, and from the informal technical working group (TWG) of Member State experts established under Working Group 3 of the Climate Change Committee.

1.2 How to use this document

Where article numbers are given in this document without further specification, they always refer to the M&R Regulation. For acronyms, references to legislative texts and links to further important documents, please see the Annex.

This document only refers to emissions starting from 2013. Although most of the concepts have been used in the MRG 2007 before, this document does not give a detailed comparison to the MRG 2007. Instead, a symbol (such as in the margin here) indicates where changes to requirements compared to the MRG have taken place, or where concepts have not been used in the MRG before.

This symbol points to important hints for operators and competent authorities.

This indicator is used where significant simplifications to the general requirements of the MRR are promoted.

[2] Note that Member States may define their own templates, which must contain at least the same information as the Commission's templates.

[3] Within this documents, as in some Member States, the term 'phase' is used with the same meaning as 'trading period' (Article 3(2) of the MRR).

[4] ETS support group; IMPEL is the European Union Network for the Implementation and Enforcement of Environmental Law. The notes are found at **http://impel.eu/projects/emission-trading-proposals-for-future-development-of-the-eu-ets-phase-ii-beyond**.

The light bulb symbol is used where best practices are presented.

The small installation symbol is used to guide the reader to topics which are applicable for installations with low emissions.

The small emitter symbol is used in a similar way for aircraft operators classified as “small emitters”.

The tools symbol tells the reader that other documents, templates or electronic tools are available from other sources.

The book symbol points to examples given for the topics discussed in the surrounding text.

1.3 Where to find further information

All guidance documents and templates provided by the Commission on the basis of the M&R Regulation and the A&V Regulation can be downloaded from the Commission’s website at the following address:

http://ec.europa.eu/clima/policies/ets/monitoring/documentation_en.htm

The following documents are provided[5]:

- Guidance document No. 1: “The Monitoring and Reporting Regulation – General guidance for installations”. This document outlines the principles and monitoring approaches of the MRR relevant for stationary installations.
- Guidance document No. 2: “The Monitoring and Reporting Regulation – General guidance for aircraft operators”. This document outlines the principles and monitoring approaches of the MRR relevant for the aviation sector.
- Guidance document No. 3: “Biomass issues in the EU ETS”: This document discusses the application of sustainability criteria for biomass, as well as the requirements of Articles 38, 39 and 53 of the MRR. This document is relevant for operators of installations as well as for aircraft operators.
- Guidance document No. 4: “Guidance on Uncertainty Assessment”. This document for installations gives information on assessing the uncertainty associated with the measurement equipment used, and thus helps the operator to determine whether he can comply with specific tier requirements.
- Guidance document No. 5: “Guidance on sampling and analysis” (only for installations). This document deals with the criteria for the use of non-accredited laboratories, development of a sampling plan, and various other related issues concerning the monitoring of emissions in the EU ETS.
- Guidance document No. 6: “Data flow activities and control system”. The current document.

[5] This list is at the current stage non-exhaustive. Further documents may be added later.

The Commission furthermore provides the following electronic templates[6]:

- Template No. 1: Monitoring plan for the emissions of stationary installations
- Template No. 2: Monitoring plan for the emissions of aircraft operators
- Template No. 3: Monitoring plan for the tonne-kilometre data of aircraft operators
- Template No. 4: Annual emissions report of stationary installations
- Template No. 5: Annual emissions report of aircraft operators
- Template No. 6: Tonne-kilometre data report of aircraft operators

Besides these documents dedicated to the MRR, a separate set of guidance documents on the A&V Regulation is available under the same address. Furthermore, the Commission has provided guidance on the scope of the EU ETS which should be consulted to decide whether an installation or part thereof should be included in the EU ETS. That guidance is available under **http://ec.europa.eu/clima/policies/ets/docs/guidance_interpretation_en.pdf**

Although not directly related to monitoring issues, with the exception of reporting on relevant changes in the installation under Article 24 of the Community-wide Implementation Measures, the set of guidance documents and templates provided by the Commission on the allocation process for the third phase are also acknowledged at this point. That set of guidance can be found under **http://ec.europa.eu/clima/policies/ets/benchmarking/documentation_en.htm**

All EU legislation is found on EUR-Lex: **http://eur-lex.europa.eu/**

The most important legislation is furthermore listed in the Annex of this document.

Also competent authorities in the Member States may provide useful guidance on their own websites. Operators of installations should in particular check if the competent authority provides workshops, FAQs, helpdesks etc.

[6] This list is at the current stage non-exhaustive. Further templates may be added later.

2 CONTEXT OF THE MONITORING PLAN

Monitoring plan and written procedures

The Monitoring Plan (MP) of an installation or aircraft operator is the very core of the Monitoring, Reporting and Verification (MRV) system of the EU ETS. Like a recipe for a cook and like the management handbook for a certified quality management system, it serves as manual for the operator's tasks. The MP is supplemented by "written procedures", which the operator or aircraft operator establishes, documents, implements and maintains for activities under the MP, as appropriate. They must be described in the MP with sufficient level of detail that the competent authority (CA) and the verifier can understand the content of the procedure, and can reasonably assume that a full documentation of the procedure is maintained and implemented by the operator or aircraft operator. The full text of the procedure would be delivered to the CA/verifier only upon request (see section 5.4 of guidance document No. 1 for installations or section 6.2 of Guidance document No. 2 for aircraft operators).

Data flow activities

Monitoring of emissions data is more than just reading instruments or carrying out chemical analyses. It is of utmost importance to ensure that data are produced, collected, processed and stored in a controlled way. Therefore the operator or aircraft operator must define instructions for "who takes data from where and does what with the data". These "data flow activities" (Article 57) form part of the monitoring plan (or are laid down in written procedures, see above), where appropriate. A data flow diagram (see section 3.2) is often a useful tool for assessing and/or setting up data flow procedures. Examples for data flow activities include reading from instruments, sending samples to the laboratory and receiving the results, aggregating data, calculating the emissions from various parameters, and storing all relevant information for later use.

Control system

As human beings (and often different information technology systems) are involved, mistakes in these activities can be expected. The M&R Regulation therefore requires operators and aircraft operators to establish an effective control system (Article 58). This consists of two elements:

- A risk assessment (see chapter 4), and
- Control activities (see section 4.4) for mitigating the risks identified.

Implications for design of a monitoring plan

The design of a monitoring plan is an iterative process (see also section 5.1 of GD 1). First the operator or aircraft operator identifies the data sources and calculation and/or measurement activities. Then he creates the data flow providing a logical sequence of data collection and processing steps. Next, he will assess the risks associated with this data flow, and set up appropriate control activities for mitigating the identified risks. In this context "risk" is always related to errors, misrepresentations and omissions in the monitoring data (for details see chap-

ter 4). Finally, he has to assess the risks (now mitigated) once more to determine if the control measure will be effective and properly applied. If the result is not satisfactory, he will have to return to the step of developing the control activities. However, it might even be necessary to go back to the early steps of selecting more appropriate data sources, or to rearranging the data flow in a sequence which is less prone to errors.

The final result of this exercise should be:

- a monitoring plan (and the associated procedures) which contains
- a well-defined data flow (documented in data flow procedures and a data flow diagram, if relevant),
- a set of control activities (which may be described together with the data flow activities) and
- a final risk assessment which demonstrates that the remaining risk for errors, misrepresentations or omissions is reduced to an acceptable low level.

The control activities are laid down in written procedures and referenced in the monitoring plan. The results of the final risk assessment are submitted as supporting documentation to the competent authority when approval of the monitoring plan is requested by the operator or aircraft operator.

Installations with low emissions:

Article 47(3) exempts operators of installations with low emissions (→ section 4.4.2 of guidance document No. 1) from submitting a risk assessment when submitting the monitoring plan for approval by the competent authority. However, operators will still find it useful to carry out a risk assessment for their own purposes. It has the advantage of reducing the risk of under-reporting, under-surrender of allowances and consequential penalties, and also of over-reporting and over-surrender.

Small emitters (aircraft operators)

The same as said for installation with low emissions applies to aircraft operators who are classified as “small emitters” and who intend to use the small emitter tool (→ section 5.6.1 of guidance document No. 2). Article 54(3) exempts them from submitting a risk assessment when submitting the monitoring plan for approval by the competent authority. However, aircraft operators will still find it useful to carry out a risk assessment for their own purposes, for the same reasons given for installations.

3 DATA FLOW ACTIVITIES

The data needed for an emissions report (or tonne-kilometre data report) may be generated in different departments of a company (laboratory, HSEQ managers, shift managers in production, financial department for invoices,…) and may occur at different time scales (some fuels may be delivered every few months only, other data may be collected on daily basis, other data may be continuously measured). In order to prevent data gaps or double counting, the data flow must be well designed. The M&R Regulation takes this into account when it requires written procedures for the data flow activities. As stated in the previous chapter, they serve as instructions for "who takes data from where and does what with the data".

Data flows can be described in writing in different forms. The MRR does not require any specific template to be used. For simple data flows a few words may be sufficient, while in complex cases a data flow diagram will be indispensable. Furthermore detailed checklists for each department involved, and training materials for staff may need to be developed. This guidance paper only gives examples for how data flows can be described.

3.1 The example

This guidance will describe the data flow, risk assessment and control system of a very simple category A installation:

- Natural gas is the only source stream;
- The standard calculation approach is used (see section 4.3.1 of Guidance Document No. 1);
- Activity data (volume of gas purchased) is taken from (monthly) invoices;
- Emission factor (EF) and net calorific value (NCV) are taken from national inventories, the Oxidation factor (OF) is 1.
- The formula for calculation is: $Em = AD \times EF \times NCV \times OF$

Note: For such simple installations it will usually *not* be necessary to develop a data flow diagram or a detailed risk assessment such as presented in this document. However, a simple example has been chosen for easier discussion of the concepts.

3.2 Data flow diagram

There are several ways of describing a data flow. The common element is that the logical flow or temporal sequence of data collection or processing steps is shown along the main axis. The diagram may be organised with each department or role as separate column, or as in the example here, with the responsibilities given for each step.

The example format used for Figure 1 places the activity into the centre, with the input for each process on the left hand and the output of each step on the right side.

Each activity is described by:

- What is to be done? (Name of the process step)
- Who is responsible? (Department or post)
- When is it to be done? (By a certain deadline, or regularly every <interval>)

Inputs are described by:

- Which data?
- Where is it found? (Reading from an instrument or document, copied from an IT system,…)

Outputs are described by:

- Which data?
- Where is it stored? (Electronically and/or hardcopy? How can it be found again?)

Figure 1 shows the data flow diagram for the example installation described in section 3.1, using the described level of detail.

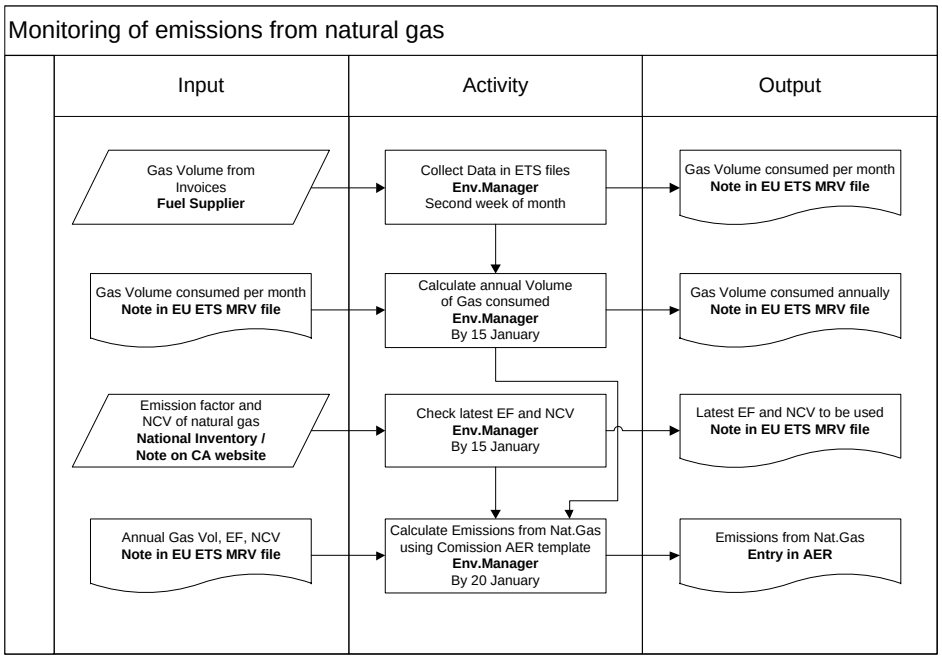


Figure 1: Data flow diagram for the example installation described in section 3.1.

Note: For some activities it might not be obvious what the output is and how to store it. In everyday life an activity may be for example “check if all invoices are in the dedicated file”. The output of a successful check might be “nothing”, and if

an invoice is found to be missing, the output might be “look for the invoice”. However, these two reactions would be undocumented results. The verifier would not be able to judge whether the activity has been carried out at all. In a written data flow it is better to have as output a note saying “Person A has checked on date X.Y., and the result was OK/not OK and followed up”.

If there is a doubt if a piece of information might be important, it is always better to put it in written form and “immediately”. This may range from a paper note book which may serve as “log book”, over separate papers and notes collected in a file, a central spreadsheet for collecting notes to a dedicated IT system. Where an operator or aircraft operator adheres to this principle of “write down everything”, outputs of activities are clearly defined. This helps to create the transparency which makes verification easier which in turn helps to reduce costs.

3.3 Task list

Another tool for establishing a data flow is to write down a task lists for the different departments/posts, indicating again “who has to do what when and how”, and where to store data thereafter.

In complex installations or aircraft operators usually a data flow diagram will be developed first, and the task list will then be used to translate the diagram into instructions for staff training, which may also serve as check list throughout the monitoring period. In simpler cases (such as in the example of section 3.1), it may be enough to have a task list without a data flow diagram. Table 1 presents an example.

Table 1: Task list for the example installation of section 3.1:

Who?	Task #	When?	Action required
Accounts department			
	1	Each time a payment for a fuel invoice is booked	send (electronically) a copy of the invoice to environment manager
Environment manager			
	2	when a fuel invoice is received	Store copy in the ETS folder (hardcopy and electronically)
	3	By every 15 January (or nearest working day)	check CA website for latest EF and NCV default values
	4	Same date as #3	Calculate gas volume consumed in previous calendar year (i.e. year to be reported)
	5	when tasks 3 and 4 are complete	calculate the annual emissions using the formula laid down in the data flow procedure attached to the MP

3.4 Written procedures

Activities which are too complex to be described in a simple task list should be described in the form of written procedures (see Article 12(2) and section 5.4 of GD 1). Table 2 shows an example for a typical data flow procedure. It should be noted once more that this is a simple example used for illustration purposes only. A simple data flow as described here may not need a fully elaborated procedure.

Table 2: Example related to data flow: Description of a written procedure as required in the monitoring plan.

Item according to Article 12(2)	Possible content (examples)
Title of the procedure	Calculate annual emissions
Traceable and verifiable reference for identification of the procedure	EmCalc
Post or department responsible for implementing the procedure and the post or department responsible for the management of the related data (if different)	Environment manager
Brief description of the procedure[7]	• Check if necessary data is available and complete: • Perform calculation (see "processing steps" below) • Store result for finalizing annual report and verification
Location of relevant records and information	Hardcopy: HSEQ Office, shelf 27/9, Folder identified "ETS 01-Rep". Electronically: "P:\ETS_MRV\manag\ETS_01-Rep.xls"
Name of the computerised system used, where applicable	N.A. (Normal network drives)
List of EN standards or other standards applied, where relevant	N.A.

List of primary data sources	• Output from previous procedure:
	  ◦ Annual volume of gas consumed (based on invoices)
	  ◦ Calculation factors (from CA website)

[7] This description is required to be sufficient clear to allow the operator, the competent authority and the verifier to understand the essential parameters and operations performed.

Item according to Article 12(2)	Possible content (examples)
Description of the relevant processing steps for each specific data flow activity	• Check if necessary data is available and complete (see “primary data sources”) • Check if new version of reporting template is available • Enter data in latest version of the reporting template • If template is new, compare result to own calculation • Note down the result calculated by the template in the ETS folder.

Table 3: More complex example for a description of a procedure. Here the amount of cement clinker produced is determined based on the cement sales figures, because there is no direct weighing possibility for clinker or raw meal in the installation.

Item according to Article 12(2)	Possible content (examples)
Title of the procedure	Calculation of clinker
Traceable and verifiable reference for identification of the procedure	ClinkerCalc. V.1
Post or department responsible for implementing the procedure and the post or department responsible for the management of the related data (if different)	Management of the procedure: Environment manager Data contributions (monthly collections): • Sales department: Weighing slips of trucks loaded with cement • Packaging unit manager: production protocols which indicate mass and type of cement packed • Grinding plant manager: clinker factors for each cement type
Brief description of the procedure	• Environment manager collects data from the persons listed under “data contribution” • Using the formulae laid down in the main text of this procedure, the clinker mass is calculated from clinker factor and cement mass. • A data flow diagram is also contained in the main body of the procedure
Location of relevant records and information	Hardcopy: ……. Electronically: ……
Name of the computerised system used, where applicable	……

Item according to Article 12(2)	Possible content (examples)
List of EN standards or other standards applied, where relevant	N.A.
List of primary data sources	Weighing slips of trucks: Truck scale TS003 Weight of big bags: Scale BB342 Consumer size packages: Pallets are counted[8] by packaging unit manager
Description of the relevant processing steps for each specific data flow activity	*[Here the detailed calculation should be described, indicating where the input and output data is stored, how data gaps are treated,…]*

3.5 Check lists and incidents triggering activities

In many cases it will be beneficial to establish data flow activities for carrying out regular or spot checks for diverse issues. These checks will usually trigger another activity. For example the procedure could be "have all samples of material XY for the current month been sent to the laboratory?". The result "No" would trigger the activity "collect the remaining samples, take further samples if necessary, mark them clearly and send them to the laboratory".

Examples:

- Monthly check for completeness of source streams
- Completeness of samples and analyses results for each batch of fuel
- For each measurement instrument:
  - When has it to be calibrated?
  - Has the scheduled calibration been performed?
  - Have all relevant maintenance activities been carried out?
  - Are necessary replacement parts in stock?

Note: These checks with their deadlines should be included in the relevant task lists.

Furthermore there will be many activities which are not depending on a check by the operator or aircraft operator, but which have to be initiated if a certain event occurs. For example a procedure could be useful which says "When a truckload of biomass material ABC is delivered, the person signing the delivery note must ask the truck driver for a copy of the proof that the material meets the required sustainability criteria (where sustainability criteria are relevant[9])."

Those "incident triggered procedures" cannot be included in task lists with a certain date. Therefore it is highly important that all staff involved receives regular

[8] In this example the weight of each bag is determined by a balance under national legal metrological control, but no individual weighing slips are available.

[9] For details on sustainability criteria for biomass see Guidance Document No. 3.

training and is made appropriately aware that they are responsible for kicking-off these procedures. The first activity in a procedure started as consequence of the triggering event should always be “make a note to the file: What happened, who was in charge, what was the next step (who was informed, which data has been noted down, e.g. weight of the truck,…)”.

Note: Data flow activities of this type may often need a close link to control procedures, or some may be considered control activities themselves (see section 4.4).

4 RISK ASSESSMENT

4.1 Introduction – Definitions

"*Risk*" (*R*) is a parameter which takes into account both, the *probability* (*P*) of an incident and its *impact* (*I*). In terms of emissions monitoring, the risk refers to the probability of a misstatement (omission, misrepresentation or error) being made, and its impact in terms of annual emissions figure or tonne-kilometre data. Simplifying it can be said that $R = P \times I$. Therefore if either of probability or impact is high, the risk will be high as well, unless the other parameter is very low. Where probability and impact are high, the risk will be very high.

The higher the risk identified by the operator or aircraft operator, the more important is the implementation of an effective control measure for mitigating the risk.

In the context of monitoring, reporting and verification (MRV) of GHG emissions the definitions as given in Article 3(1) and (15) to (17) of the A&V Regulation[10] are the most appropriate ones:

- 'Inherent risk' (IR) means the susceptibility of a parameter in the operator's or aircraft operator's report to misstatements that could be material, individually or when aggregated with other misstatements, before taking into consideration the effect of any related control activities.
- '*Control risk*' (*CR*) means the susceptibility of a parameter in the operator's or aircraft operator's report to misstatements that could be material, individually or when aggregated with other misstatements, and that will not be prevented or detected and corrected on a timely basis by the control system.
- '*Detection risk'* (*DR*) means the risk that the verifier does not detect a material misstatement.
- '*Verification risk*' (*VR*) means the risk, being a function of inherent risk, control risk and detection risk, that the verifier expresses an inappropriate verification opinion when the operator's or aircraft operator's report is not free of material misstatements.

In simpler language this means: The inherent risk mirrors the fact that MRV is carried out by human beings, and that therefore errors can simply happen. The control risk reflects the quality of the control system. The more effective the operator's or aircraft operator's control system is, the lower is the control risk, i.e. the likeliness for a failure to prevent errors. Similarly, the detection risk gives an indication for the possibility that a verifier may fail to detect the one or other misstatement which has slipped through the control system. Finally, the overall verification risk is the overall result of the first three. It can be described as $VR = IR \times CR \times DR$.

The verifier has to strive to reduce VR as much as possible. However, from operator's or aircraft operator's view, it is only the two factors *IR* and *CR* which give his overall risk:

[10] The MRR (Article 3(9) and (10) uses the same definitions. However, the definition of detection risk is only found in the AVR.

The inherent risk is to be reduced as much as possible by choosing robust data sources and short and simple communication paths. The control risk is minimised by setting up effective control activities.

4.2 What is to be assessed

In principle the operator or aircraft operator should carry out the risk assessment for the whole data flow from obtaining primary data from measurement instruments to the final annual emissions report or tonne-kilometre report, including document management and storage of data. However, common sense suggests that reasonably a threshold for the overall risk should be used. Data flow activities for which the associated risk can reasonably be expected to be below this threshold, may be left out from the assessment.

An example for setting the threshold may be to set the impact to half the materiality level[11] of the installation or aircraft operator, or more conservatively to e.g. 20% of the materiality level. The probability threshold should be “less than once per year”, or even lower for being on the safe side.

For each data source, data handling or processing step it should be assessed “what can go wrong”. For example if natural gas is metered, the gas meter itself as well as the temperature/pressure compensation can break down, they can fail only for a short period (if they need electricity for operation), they can be inaccurate (due to a lack of or inaccurate calibration), the data transmission (if electronic) can fail, the meter can be read inaccurately, readings can be noted down with typos, notes scribbled on paper can be lost (if the meter is read manually), the flow rate to be measured or any ambient conditions can be outside the specifications of the meter, the software for data collection can contain bugs, hard disks for storage can crash, etc. Even this simple example illustrates the high number of possible risks, and provides a rationale for the need for a threshold. Table 4 gives another example for a list of possible risks to be assessed.

[11] Article 23 of the AVR: The materiality level is 5% of the total annual emissions for category A and B installations, and aircraft operators emitting up to 500 000 tonnes CO_2 per year, and 2% for other installations and aircraft operators. For tonne-kilometre data, the level is 5%.
Note that materiality level is a value used for the planning and performing verification. It is by no means a threshold for an "acceptable" error (see Article 22(2) of the AVR: "The operator or aircraft operator shall correct **any** communicated misstatements or non-conformities").

Table 4: Example for risks associated to a flow meter with electronic data logger.

Data Flow Step	Inherent risk	Data inaccuracy	Data Loss
1 Meter measures flow rate	Flow is outside calibrated range	✓	
	Ambient temperature is outside operational range	✓	
	Meter failure	✓	✓
	Time since last calibration greater than specification	✓	
2 Data logger records flow rate and time data received	Break in data transmission		✓
	Interference in data transmission	✓	✓
	Data logger fault	✓	✓
3 At the start of the shift the operator reads the digital display	Display fault		✓
	Operator fails to read display		✓
	Operator misreads display	✓	
4 The operator records the digital display reading in the log book.	Operator mis-records reading	✓	
	Damage to log book		✓

4.3 Steps to perform in a risk assessment

When the operator or aircraft operator carries out a risk assessment, he analyses (e.g. by using an appropriate table format) for each point in the data flow for each possible incident (see 4.2) the following points:

1. Type of incident: (What can go wrong?)
2. Probability: How likely is it to happen? (Section 4.3.1)
3. Impact: How big would the error be (in terms of emissions / t-km)? (See section 4.3.2)
4. Risk resulting from probability and impact (section 4.3.3)
5. Appropriate control activity: How can the risk be mitigated? (see chapter 4.4)
6. Final (overall) risk remaining when taking into account the control activity.

4.3.1 Probability

It is usually not necessary to determine exact quantitative values for the probability of an incident. It is common practice to use semi-quantitative such as “happens very often” to “happens almost never”. Depending on the complexity of the installation or the aircraft operator’s activities it is useful to define e.g. three or five probability levels. An example is given in Table 5.

Table 5: Example for definitions of five probability levels to be used in an EU ETS risk assessment.

Very low	Unlikely to occur more than once per year
Low	May occur up to 4 times per year
Moderate	May occur up to 12 times per year
High	May occur up to 24 times per year
Very high	May occur more than 24 times per year

4.3.2 Impact

Similar to probability, a semi-quantitative value should be defined for the impact of an incident as appropriate for the circumstances of the individual installation or aircraft operator. Useful threshold definitions refer either to absolute emission figures, or to percentages of the whole installation's or aircraft operator's emissions. Percentages of the materiality threshold might also be considered. Table 6 shows an example referring to absolute emissions (referring to the example of section 3.1, which is a category A installation).

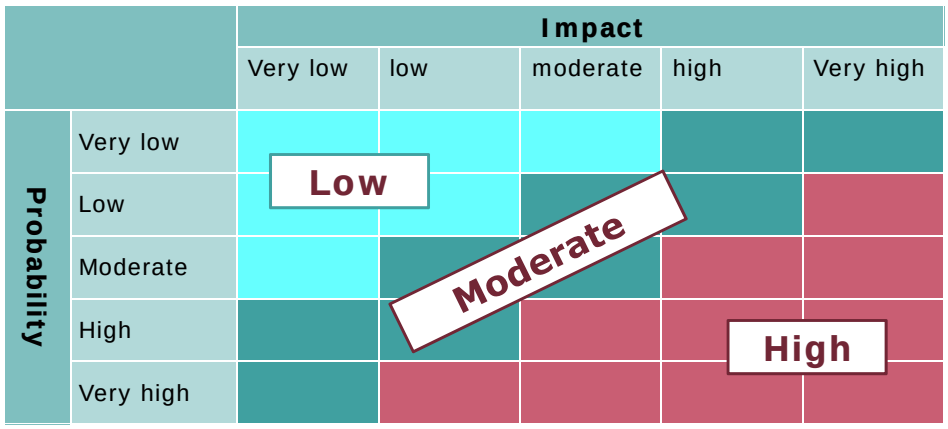
Table 6: Example for definitions of five impact levels to be used in an EU ETS risk assessment of the sample installation described under section 3.1.

Very low	No noticeable effect on measured parameter
Low	Effect leads to misstatement of max. ±50 tonnes CO_2(e)
Moderate	Effect leads to misstatement of max. ±250 tonnes CO_2(e)
High	Effect leads to misstatement of max. ±500 tonnes CO_2(e)
Very high	Effect leads to misstatement of more than ±500 tonnes CO_2(e)

4.3.3 Risk

Before the operator or aircraft operator can assess the risk for each potential incident, a combination of the two scales from the previous steps is to be defined. Table 7 shows an example.

Table 7: Example for definitions of five impact levels to be used in an EU ETS risk assessment.



4.3.4 Assessment of inherent risk

Using the scales developed under the three previous steps, the operator or aircraft operator can now assign the values for probability, impact and risk for each possible incident. As these risks are not yet mitigated, they represent the "inherent risk". Table 8 gives some few examples for such assessment referring to the example installation described in section 3.1. In this table also examples for proposed risk mitigation measures (control activities) and the expected overall risk (i.e. with application of the control activity) are shown.

A simple overview such as in this table is expected to satisfy the requirements of Article 12(1)(b) of the MRR (supporting document to be submitted to the CA with the monitoring plan).

Table 8: Example for the risk assessment for a few possible incidents in the installation described in section 3.1.

Incident	Probability	Impact	Inherent Risk	Control activity	Overall risk
Gas invoice is wrong	moderate	high	high	Compare with own reading	Low
Meter breakdown	Very low	high	moderate	Fuel supplier contract → high availability	Low
Miss inclusion of new source stream	Very low	Very high	moderate	None, because unlikely	moderate

4.4 Control activities

After the operator or aircraft operator has assessed the risks associated with his data flow, the second part of the control system has to be established, i.e. the control activities. As mentioned in chapter 2 this may be an iterative process, i.e. data flow procedures, the associated risks, the control activities and the resulting overall risk are mutually influencing each other. Various types of controls may be assessed for effectiveness before choosing the best one.

The control activities are laid down in written procedures. As mentioned earlier, they may sometimes be tightly linked with the data flow procedures.

Examples

Some examples for control activities are included in Table 8 above.

For the example installation described in section 3.1 the following controls might be helpful:

- The operator should carry out own readings of the gas meter regularly, and in particular on 1 January every year.
- Those own readings are used to corroborate the values found on the invoices of the gas supplier.
- The four-eyes principle should be applied at least on the overall annual emissions report (in analogy to the independent review of the verifier).

4.5 Result of the Risk assessment – Final Data Flow

As a next and final step the control activities are included in the data flow diagram and the associated procedures, check lists etc. The risk assessment is finalised using the overall risks remaining after implementing the control activities. For illustration the data flow diagram given in section 3.2 for the installation described in section 3.1 can then be updated as shown in Figure 2. In that figure the control activities outlined for the example in the previous section are included. The control activities are shown in red.

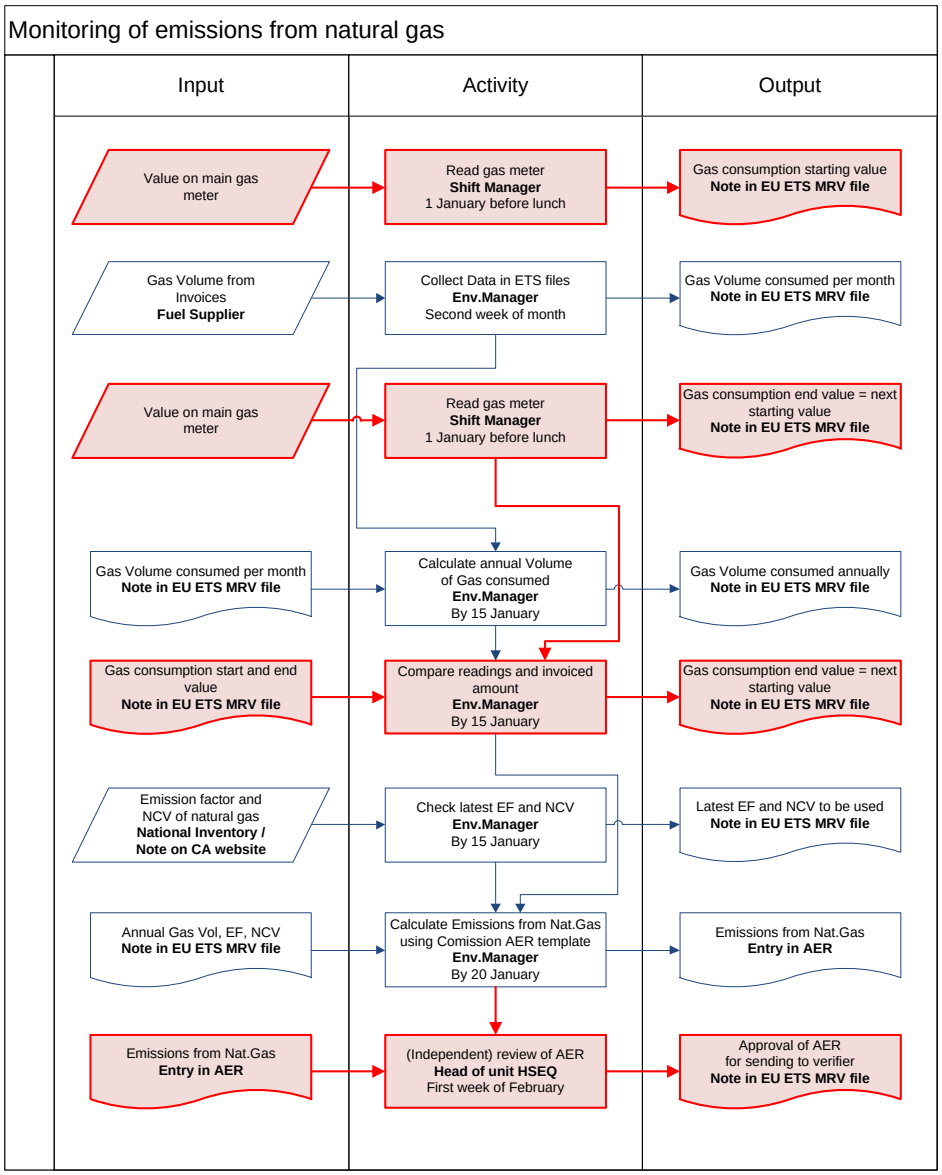


Figure 2: Final data flow diagram for the installation described in section 3.1. The red elements are control activities as outlined in the section 4.4.

5 THE CONTROL SYSTEM

The M&R Regulation requires the operator or aircraft operator to establish an effective control system (Article 58). This consists of two elements:

- A risk assessment (see chapter 4), and
- Control activities (see section 4.4) for mitigating the risks identified.

In addition to what has been discussed in chapter 4, operators and aircraft operators should ensure that they cover at least the points listed in Article 58(3) of the MRR with their control system:

(a) quality assurance of the measurement equipment (→ Article 59);

(b) quality assurance of the information technology system used for data flow activities, including process control computer technology (→ Article 60);

(c) segregation of duties in the data flow activities and control activities as well as management of necessary competencies (→ Article 61);

(d) internal reviews and validation of data (→ Article 62);

(e) corrections and corrective action (→ Article 63);

(f) control of out-sourced processes (→ Article 64);

(g) keeping records and documentation including the management of document versions (→ Article 66).

In the following we give a very short overview to these requirements.

5.1 Measurement equipment

Article 59 “reminds” the operators and aircraft operators of what should be clear based on what the MRR requires under the tier approach. All relevant measuring instruments must be regularly calibrated, adjusted and checked as appropriate for their specifications or as required by national legal metrological control, if applicable. For details please see guidance document No. 4: “Guidance on Uncertainty Assessment”[12]. Where Continuous Emission Measurement Systems (CEMS) are used, Article 59(2) sets out the necessary requirements, in particular the application of EN 14181 for quality assurance.

5.2 Information technology systems

Article 60 requires that information systems used for monitoring and reporting are appropriately designed, documented, tested, implemented and maintained. Control is to be exerted in particular regarding access to the systems, backups, recovery, continuity planning and security. IT systems include plant information, distributed control systems and measurement flow computers etc.

[12] See section 1.3 for where to find other guidance documents.

5.3 Segregation of duties

In short, Article 61 requires the four-eyes principle to be used as much as possible ensuring the competence of involved staff.

5.4 Internal reviews and validation of data

Operators and aircraft operators are required to review regularly the data collected throughout the year. This is intended to prevent situations where the verifier detects errors or data gaps very late in the process, when corrective action is coming too late. Appropriate written procedures must be in place which lay down the types of checks to be carried out (comparison of data over time, comparing data from different sources if possible, plausibility checks of emissions data with production data, etc.). Article 62 lists minimum checks that need to be included. It also highlights that those control procedures shall, to the extent feasible, contain criteria or thresholds for rejecting data. I.e. the operator or aircraft operator must decide in advance about criteria which would lead to corrective action.

5.5 Corrections and corrective action

Article 63 lays down requirements for operators and aircraft operators on how to react in case their internal reviews find data that must be rejected. In essence, the Article requires that any corrections of data must avoid an underestimation of emissions. Furthermore the root cause for the malfunctioning or error must be determined. If relevant, the correction is to be accompanied by appropriate corrective action regarding the root cause of the error (e.g. replacement of a bad measurement instrument, use of another laboratory, improvement of control activities,…).

Note: Such corrective action may have an impact on the monitoring plan and/or its procedures. For the requirements regarding update of the monitoring plan please see section 5.6 of guidance document 1 (for installations) or section 6.5 of guidance document 2 (for aircraft operators).

5.6 Out-sourced processes

Summarizing Article 64, the operator or aircraft operator has the full responsibility for the well-functioning of any data collection or processing steps which have been outsourced (such as external laboratory analyses, maintenance of measurement equipment,…). Thus they must be included in the control system, in particular regarding reviewing of results, setting criteria for the well-functioning and for initiating appropriate corrective action if needed. Criteria for the well-functioning may in particular be useful if already included in the contract between operator or aircraft operator and provider of the outsourced activity.

5.7 Records keeping and documentation

The operator or aircraft operator is required by Article 66 to keep records of “all relevant data and information” (including the information listed in Annex IX of the MRR). This is required for robust verification, as verifiers can’t work based on assumptions or allegations, but only using clear objective evidence for their judgment. This is the reason why the results of all data flow procedures and control procedures should somehow be stored, either in an IT system or in a paper file, or logbook. The data and information stored must enable the verifier to follow the complete audit trail.

Furthermore this data retention is required for at least 10 years from the date of submission of the verified report. This means that paper must be sufficiently stable, well indexed for clear identification (including version management of documents), and that IT systems must be designed such that the data can be retrieved after that time (i.e. exotic data formats are to be avoided, sufficient backups are to be kept, etc.)

6 ANNEX

6.1 Acronyms

EU ETS..... EU Emission Trading Scheme

MRV..... Monitoring, Reporting and Verification

MRG 2007 .. Monitoring and Reporting Guidelines

MRR..... Monitoring and Reporting Regulation (M&R Regulation)

AVR ..... Accreditation and Verification Regulation (A&V Regulation)

MP ..... Monitoring Plan

Permit ..... GHG emissions permit

CIMs ..... Community-wide fully harmonised Implementing Measures (i.e. allocation rules based on Article 10a of the EU ETS Directive)

CA ..... Competent Authority

ETSG..... ETS Support Group (a group of ETS experts under the umbrella of the IMPEL network, who have developed important guidance notes for the application of the MRG 2007)

IMPEL..... European Union Network for the Implementation and Enforcement of Environmental Law (**http://impel.eu**)

AER ..... Annual Emissions Report

CEMS ..... Continuous Emission Measurement System

MPE..... Maximum Permissible Error (term usually used in national legal metrological control)

MS ..... Member State(s)

CCS ..... Carbon Capture and [geological] Storage

GD ..... Guidance document

6.2 Legislative texts

EU ETS Directive: Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, most recently amended by Directive 2009/29/EC. Download consolidated version: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2003L0087:20090625:EN:PDF

M&R Regulation: Commission Regulation (EU) No. 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:181:0030:0104:EN:PDF

A&V Regulation: Commission Regulation (EU) No. 600/2012 of 21 June 2012 on the verification of greenhouse gas emission reports and tonne-kilometre reports and the accreditation of verifiers pursuant to Directive 2003/87/EC of the European Parliament and of the Council. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:181:0001:0029:EN:PDF

MRG 2007: Commission Decision 2007/589/EC of 18 July 2007 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council. The download of the consolidated version contains all amendments: MRG for N_2O emitting activities, aviation activities; capture, transport in pipelines and geological storage of CO_2, and for the activities and greenhouse gases only included from 2013 onwards. Download: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2007D0589:20110921:DE:PDF

RES Directive: Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. Download: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:EN:PDF

7 ANNEX: FURTHER EXAMPLES FOR CONTROL ACTIVITIES

The following Annex is taken from a working paper of the Task Force on Monitoring under the EU ETS Compliance Forum. It is intended to supplement chapter 5, and to demonstrate which kind of activities may be useful to meet the requirements set out by Articles 59 to 66.

Measurement equipment (Art. 59)

- Describe the measures undertaken to ensure that equipment is correctly installed and operated, in accordance with the manufacturer's recommendations so that it can achieve the uncertainty specified for the relevant tier over the full range of expected operation and ambient conditions.
- Describe how individual equipment items (measurement components such as pressure, temperature etc.) are identified and recorded so that they are traceable.
- Describe the arrangements for calibration and maintenance, including the calibration standards applied, how calibration and maintenance are scheduled and recorded and how it is ensured that scheduled calibrations and maintenance activities are carried out.
- Describe back-up measurement procedures that can be used if the equipment malfunctions.

Information technology systems (Art. 60)

- Describe the measures undertaken to ensure that equipment is correctly installed and operated, in accordance with the manufacturer's recommendations so that it can achieve the necessary recording frequency, data storage quantity and data processing requirements.
- Describe how individual equipment items (components) are identified and recorded so that they are traceable.
- Describe measures such as backup power supplies installed to ensure security of operation.
- Describe measures such as data back up and off-site storage to ensure data security.
- Describe the arrangements for maintenance, including how maintenance is scheduled and recorded and how it is ensured that scheduled maintenance activities are carried out.
- Describe backup data recording and processing arrangements that can be used if the information technology system malfunctions.

Segregation of duties (Art. 61)

- Describe the responsibilities and required competencies of all personnel involved in data flow activities.
- Describe how it is ensured that only personnel with the necessary competencies carry out the relevant responsibilities for data flow activities.

- Describe how process responsibilities are segregated from control responsibilities (duties devolved to different persons).
- Describe how personnel changes are managed.

Internal reviews and validation of data (Art. 62)

- Describe checks that are carried out to validate the data produced by measurement equipment.
- Describe checks that are carried out to confirm that the information technology system is working correctly.
- Describe how maintenance and calibration records are reviewed.
- Describe how training records are reviewed.
- Describe how the measurement and reporting procedures are reviewed.
- Describe how records of corrective actions are reviewed.

Corrections and corrective action (Art. 63)

- Describe how errors and gaps in data are identified and corrected.
- Describe how data corrections are recorded.
- Describe how equipment malfunctions are corrected and recorded.

Out-sourced processes (Art. 64)

- Identify all out-sourced processes related to measurement and reporting of GHG emissions. These might include laboratory analyses, consumption and composition data provided by suppliers, calibration and maintenance of measurement and information technology equipment, etc.
- Describe who within your organisation is responsible for monitoring the performance of each out-sourced service.
- Describe the levels of service specified in the contracts for out-sourced services.
- Describe the procedures for monitoring the performance of out-sourced service providers.

Records keeping and documentation (Art. 66)

- Identify all documents and records related to measurement and reporting of GHG emissions. This might include management procedures, operating procedures, equipment specifications, equipment manuals, calibration and maintenance certificates and records, responsibilities and training records of personnel, contracts for out-sourced services, data reports and logs, fault reports.
- Describe how different versions of the documents are identified.
- Describe how current versions of documents are identified and access to out-dated documents is restricted.
- Describe how documents are reviewed and updated and how new versions are authorised before use.