EU Emissions Trading Scheme

Guidance to Operators on the requirements for installations to achieve the highest applicable monitoring tiers (as defined within Commission Decision 2007/589/EC - Monitoring and Reporting Guidelines)

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1 Introduction

1.1 PURPOSE

The purpose of this guidance is to assist Operators with interpretation of the requirements of the EU Emissions Trading Scheme (EU ETS) with regard to achieving the highest standard of monitoring for carbon dioxide emissions, for each sector under the Scheme, as prescribed in the EU Monitoring and Reporting Guidelines[1] (herein referred to as the 'M&R Guidelines').

It should be noted that this guidance relates specifically to the M&R Guidelines as published in Commission Decision 2007/589/EC).

This guidance identifies the requirements, on an activity specific basis, for determining each variable required for monitoring and reporting during Phase II of the EU ETS.

1.2 BACKGROUND

Activity specific guidelines are set out in Annexes II to XI of the M&R Guidelines[1] including specific methodologies for determining variables: activity data, emission factors, oxidation or conversion factors.

For each methodology there are one or more approaches to determining these variables. These different approaches are referred to as 'tiers'. The numbering of tiers from Tier 1 upwards reflects increasing levels of accuracy, with the highest numbered tier as the preferred tier. For those activities where alternative calculation methods are provided within these guidelines (e.g. in Annex VII: 'Method A — Kiln Input Based' and 'Method B — Clinker Output Based') an operator may only change from one method to the other if he can demonstrate to the satisfaction of the Competent Authority that such change will lead to a more accurate monitoring and reporting of the emissions of the relevant activity.

The M&R Guidelines (section 5.2) require that the **highest tier approach shall be used by all operators to determine all variables for all source streams for all category B or C installations.** Only if it is shown to the satisfaction of the Competent Authority that the highest tier approach is technically not feasible or will lead to unreasonably high costs, may a next lower tier be used for that variable within a monitoring methodology.

Therefore, the selected tier shall reflect the highest level of accuracy that is technically feasible and does not lead to unreasonably high costs. The operator may apply different approved tiers to the variables: activity data, emission factors, oxidation or conversion factors used within a single calculation. The choice of tiers is subject to approval by the Competent Authority.

Permit condition no. 9 requires that all Operators of category B and C installations whose permits do not require them to use the highest tier approach for all variables (except oxidation factors) for all major source streams must submit a report to the Regulator by 30 June each year. This report must contain either proposals to meet the highest tier or justification, in terms of technical feasibility or unreasonable cost, for not doing so. This condition is therefore applicable to installations applying the Fall-back approach as well as to those applying tiers of approaches. This guidance is not applicable to category A installations as they are not required to submit proposals for improvements.

1.3 Note on the use of pure biomass or materials

For pure biomass fuels or materials (≥97% biomass content) the M&R Guidelines (section 5.2) allows Competent Authority discretion to approve a no tier approach except where the data are to be used in the subtraction of biomass contribution from the overall carbon dioxide emissions derived from continuous emission measurement. Accordingly, for pure biomass fuels or materials that are also major sources, the Competent Authority will not normally expect the operator to apply the highest tiers for monitoring of these fuels and/or material streams

[1] Commission Decision 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 (2007/589/EC)

1.4 Note on the use of the fall back approach

In cases where it is deemed to be technically not feasible or would lead to unreasonable costs to apply at least tier 1 to all source streams (except de minimis) the operator may apply the “fall-back approach”. This exempts the operator from the application of Annex I section 5.2 of the M&R guidelines. However the operator is required to demonstrate to the satisfaction of the competent authority that the alternative monitoring methodology meets the required overall uncertainty threshold as given in Annex I section 5.3 Table 2 of the M&R guidelines. It should be noted that the use of the fall-back approach is considered as a purely temporary situation and the competent authority will periodically reassess whether this approach continues to be applicable, including via the annual improvement report mechanism.

2 Monitoring tiers

Activity specific tables that present the highest tier requirements to be achieved for monitoring of all major fuels and materials (see Box 1) are presented in Appendix 1. These tables are:

Table 1 Combustion activities
Table 2 Mineral oil refineries
Table 3 Coke ovens
Table 4 Metal ore roasting and sintering
Table 5 Pig iron and steel production (including continuous casting)
Table 6 Production of cement clinker
Table 7 Production of lime
Table 8 Production of glass
Table 9 Manufacture of ceramic products
Table 10 Production of pulp and paper

The guidance provided within these tables are without prejudice to an operator's justification that to apply the highest tier would not be technically feasible or would lead to unreasonably high costs. Some guidance on how an Operator may assess whether the cost of a potential improvement is either reasonable or unreasonable, by evaluating the costs and benefits of an improvement, is provided in Section 3.

Box 1

*"**Major sources streams"** means a group of source streams which do not belong to the group of "minor source streams" . "**Minor source streams**" means those source streams selected by the operator to jointly emit 5ktonnes of fossil CO2 or less per year or to contribute less than 10% (up to a total maximum contribution of 100ktonnes of fossil CO2 per year), to the total annual emissions of fossil CO_2 of an installation before subtraction of transferred CO2, whichever is the highest in terms of absolute emissions". "**De-minimis source streams**" means a group minor source streams selected by the operator and jointly emitting 1ktonnes of fossil CO2 or less per year or that contribute less than 2% (up to a total maximum contribution of 20ktonnes of fossil CO2 per year) of total annual emissions of fossil CO2 of that installation before subtraction of transferred CO2, whichever is the highest in terms of absolute emissions"*

(Source: M&R Guidelines Annex I section 2(4)(c)(d)(e)

For minor or de minimis source streams (please note minor source streams and the threshold are inclusive of any de minimis source streams), an operator must apply the highest tier practicable i.e. if an operator uses a metering device (e.g. weighbridge) to meet the highest possible tiers for a major source within a given activity then the Competent Authority would normally expect this to also be applied for minor and de minimis source streams.

An operator may also determine carbon dioxide emissions using continuous emission measurement systems (CEMS) from each source using standardized or accepted methods following approval from the Competent Authority provided that using a CEMS achieves greater accuracy than the calculation of emissions using the most accurate tier approach. Details of the requirements for CEMS are given in the M&R Guidelines Annex I (sections 4.2, 6 and 7.2).

In addition to these requirements, for operators of installations in England and Wales, the Environment Agency would expect that, where used, installed CEMS should conform to the requirements of the Monitoring Certification Scheme (MCERTS).

Operators should also note that in accordance with the M&R Guidelines Annex I, section 4.2, that emissions determined using CEMS must be corroborated by a supporting calculation of emissions applying the most accurate tiers as described in M&R Guidelines Annex I section 6.3(c).

Monitoring of emissions using CEMS is not discussed further within this guidance.

3 Demonstration of cost-benefits

In order to demonstrate how reasonable or unreasonable the costs of implementing a measure(s) to meet the highest tiers would be, an Operator should evaluate the costs of implementing measures to improve metering, sampling and/or analytical accuracy against the benefits obtained. Such analysis is often referred to as a cost-benefit analysis.

It should be noted that 'benefit' in this context relates to improvements in accuracy of monitoring and therefore benefit to the Scheme as a whole; it does not relate to benefit to the installation concerned.

Annex I section 5.2 of the M&R Guidelines states that:

'The highest tier approach shall be used by all operators to determine all variables for all source streams for all category B or C installations. Only if it is shown to the satisfaction of the competent authority that the highest tier approach is technically not feasible or will lead to unreasonably high costs, may a next lower tier be used for that variable within a monitoring methodology.'

Unreasonable Costs are defined within Annex I section 2(4)(a) of the M&R Guidelines as:

"..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."

For minor and de minimis fuel or material streams lower tiers may be applied subject to approval from the Competent Authority. For pure Biomass a no tier approach may be applied. Accordingly, for all category B and C installations and all **major** fuel or material streams then the highest tier approach must be used in all circumstances unless this can be demonstrated to be *technically not feasible or will lead to unreasonably high costs.* Demonstration of how reasonable the costs of implementing improvement measures are should be set out in a cost-benefit analysis similar to the general approach outlined in Figure 1.

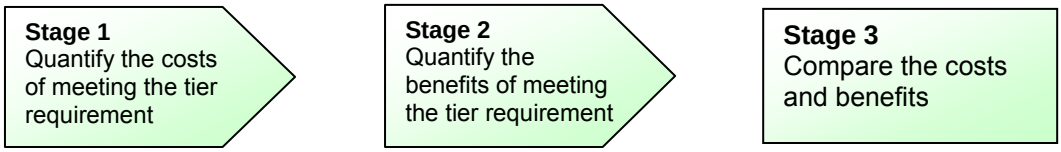

Figure 1 Key stages of a cost-benefit analysis

A description of each of these stages is provided below.

Stage 1 Quantify the costs of meeting the required monitoring tier

The costs should include the capital expenditure (purchase costs) and installation and maintenance costs. If the proposed equipment (e.g. a metering device) is a replacement for an existing, e.g. less accurate, device then the maintenance costs of the new equipment must be off-set against the cost of maintaining and calibrating the current equipment.

Where there is more than one technical option, the operator may select the most cost-effective measures for evaluation, i.e. those options that meet the operator's requirements at the lowest overall cost.

Stage 2 Quantify the benefits of achieving an increased accuracy

The benefits should, where possible, be monetized by assessing the value of carbon dioxide allowances involved in achieving greater accuracy. In some cases a movement to a higher tier may not necessarily improve accuracy but be related to providing increased data quality assurance e.g. where the use of ISO 17025 accredited services or equivalent are required. In these cases an operator could assess the cost of the improvement against the value of allowances issued during the trading period (i.e. the sum of the installation allowances for the current phase of the EU ETS) using an indicative threshold of >1% of the value of these allowances as representing "un-reasonable cost"

For example, following an evaluation of suppliers and equipment an operator has selected a new meter to replace his current oil flow meter. The new meter has a manufacturer guaranteed uncertainty of ±0.5% of fsd whereas the existing meter has an uncertainty of ±4% fsd. Installation of the new meter would enable the operator to move from activity data tier 2 to tier 4. The cost of the replacement meter is £4,000 including purchase and installation costs. The marginal costs of maintaining and calibrating the new meter are considered to be £0 as these should be similar to those for the current meter.

The current meter and its replacement would meter gas oil to a boiler house that is expected to give rise to around 5000 tonnes of carbon dioxide per annum.

Accordingly the amount of CO_2 associated with the improvement in accuracy is given by:

(4 – 0.5)/100 x 5000 = 175 tonnes

The value of this carbon dioxide will vary according to current market price. However, a low price could be expected to be around £20 per tonne of CO_2. A high price could be considered to be around €100/tonne or about £85/tonne which is the mandatory penalty that must be paid by an operator on failure to surrender sufficient allowances by 30th April each year (in Phase 2). Accordingly the value of the carbon dioxide allowances potentially affected in a single year can be considered and calculated as a range given by:

(175 x £20) to (175 x £85)

i.e. £3,500 to £14,875

Stage 3 Compare the costs and the benefits (taking account of uncertainties)

In this stage the costs of implementing the measure are compared with the monetized benefits. Accordingly, from our example above:

The cost of moving from Tier 2 to Tier 4 is £4,000

The monetized benefits range from a low estimate of £3,500 to a high estimate of £14,875. This range reflects the uncertainty in the assessment of the benefits.

Accordingly, in this example, as the implementation costs are only marginally greater than the lowest estimate of the value of the allowances and about a third of the highest estimate then the costs of achieving the higher tier would considered to be *reasonable* particularly if the benefits are multiplied over the expected lifetime of the new meter.

However, it is not the purpose of this guidance to identify the specific point within the range of monetized benefits at which an improvement cost may be considered to be reasonable. It is for the Operator to provide his/her recommendation together with their justification for this. The Regulator will then judge each case on its own merits, taking account of any wider circumstances surrounding the Operator's proposal, for example, standards that are already applied at similar installations and verifier recommendations.

It should also be noted that this is a very simplistic approach and is provided for guidance only. An Operator may wish to consider other factors in the analysis such as the remaining life of the existing meter and its residual asset value. For example, if a meter were shortly due for replacement because it was close to the end of its useful life then only the marginal costs of replacement should be considered i.e. the difference in the purchase and installation costs between an identical meter and a more accurate

meter. However, if the existing meter was fairly new then its remaining asset value could also be added to the replacement costs unless the meter could be sold or usefully used elsewhere within the installation.

Further information can be found in Appendix 2 of this guidance in the form of an ETSG note entitled "Assessment of Unreasonable Costs"

APPENDIX 1 – Activity specific tables of highest tier requirements

Table 1 Combustion activities (M&R Guidelines Annex II)

Combustion Activities		
Variable	**Highest tier**	**Requirement**
Activity data	4	**Solid & Liquid fuels** Generally Tier 4 applies to the use of most solid and liquid fuels. Compliance can be achieved by measuring fuel purchase through use of calibrated weighbridges or other appropriate metering devices with a maximum uncertainty over the reporting period of less than ±1.5% taking into account the effect of stockpile movements (stock changes) where applicable.
	4	**Gaseous fuels** **Tier 4 requires that:** *"The fuel consumption over the reporting period shall be determined by the operator or fuel supplier within a maximum uncertainty of less than ±1.5% taking into account the effect of stock changes where applicable"* Fiscal gas meters are supplied and installed to statutory standards. These require that for major users of natural gas, gas meters are supplied and calibrated to an uncertainty of around ±1% and (this complies with Tier 4). For lower volume users of gas, regulations require that meters should be supplied to a specification of within ±2% (this complies with Tier 3). It may be difficult to justify the costs and disruption that would be imposed by upgrading gas meters from Tier 3 to 4 compared to the marginal increase in metering accuracy. However, it should be noted any sub meters installed, for example to subtract gas usage for a non-Schedule 1 listed process, from the total installation consumption, must also be taken into consideration. Depending on the proportion of gas being metered and reasonable cost and technical feasibility, the Competent Authority may expect certain sub-meters to be likewise supplied to a specified uncertainty of better than ±1.5% (i.e. to meet Tier 4). For some process gas streams, for example blast furnace gas, it may not be possible to meter the gas flow to the uncertainty required for Tier 4 due to the corrosive nature of the gas or deposition of materials within the gas onto the orifice plate. In these circumstances the operator should consider measures to clean the fuel gases prior to metering and/or to periodically clean the metering equipment and recalibrate, where practicable. Alternatively, an Operator may wish to consider the merits of a mass balance approach.

Combustion Activities		
Variable	**Highest tier**	**Requirement**
Emission Factor and Net Calorific Value (NCV)	3	**Solid and liquid fuels** Tier 3 to be obtained through representative sampling of the fuel and subsequent analysis by a laboratory certified to ISO17025 for the determination of calorific values and carbon content. Both the fuel sampling and analytical methodologies must be accordance with recognized standard methods e.g. BS ISO13909:2001 or BS ISO 18283:2006 for fuel sampling, BS1016 for determination of NCV and carbon content. To achieve Tier 3, ISO17025 accredited analysis is required for directly determining NCV or for determining the fuel composition and applying reference NCV data to each of the fuel components. All installations emitting greater than 500 kt of CO_2 per annum and using solid or liquid fuels as major fuels should meet Tier 3 requirements. Smaller installations, particularly those emitting several hundred kilotonnes of CO_2 per annum should also be able meet the highest tiers through improving their fuel sampling methodologies and the use of ISO17025 certified laboratory services. Use of non accredited laboratories should be limited to situations in which the operator can demonstrate to the satisfaction of the competent authority that the laboratory meets equivalent requirements to those laid out in ISO 17025. Further details on requirements on use of non accredited laboratories are available in section 13.5.2 of the M&R Guidelines Regular sampling using in-house but non-accredited analysis backed up with sub samples that are aggregated and sent for less frequent analysis by a ISO17025 accredited laboratory may comply with Tier 3. However, without approval of ISO 17025 equivalence the Operator should be aware that where this method is applied then only the results of the certified analysis may be used in the calculation of the NCV and emission factor. Accordingly, the Operator must carefully consider how representative the samples are that are sent to the accredited laboratory for analysis. He will need to be able to demonstrate that sampling and analysis is representative to the Verifier. A further alternative approach, to reaching the highest tiers, is to ensure that the fuel supplier provides the requisite data. However, the fuel supplier must be able to provide evidence that the analysis has been carried out using a suitable standard method and by an ISO17025 accredited laboratory. In addition, the Operator must be able to demonstrate that the analytical results provided by the supplier are representative of each 'batch' of fuel and this should include operator analyses and other quality checks as required for horizontal checks under section 10.3.3 of the M&R Guidelines.
Emission Factor and Net Calorific Value (NCV)	3	**Gaseous fuels** For installations burning gas, in order to comply with Tier 3 the gas composition must be measured using an appropriate measuring device (e.g. gas chromatograph) with its calibration and maintenance underpinned by an organization accredited to ISO 17025 to provide such a service. This organization may be an external third party or an internal service provider. For larger installations that burn natural gas many of these have GCs fitted, sometimes owned and operated by the gas supplier. At least one ISO17025 accredited gas GC calibration/performance checking service is currently available in the UK. An operator may also achieve Tier 3 through taking regular samples of fuel gas and sending these for analysis by an internal or external ISO 17025 certificated laboratory. However, the operator will first need to propose and demonstrate that a robust sampling scheme is in place to ensure that the samples taken are representative of the "batch" of fuel burned and that the sample handling and storage procedures do not lead to sample degradation. There are important safety issues associated with sampling of flammable gases that should only be undertaken by appropriately trained staff with suitable equipment and only after a robust risk assessment has identified that it is safe to do so. Regional (Local Distribution Zone, LDZ) gas NCV and CO_2 emission factors are reported by gas suppliers as calendar year averages. These data will be reported as part of future UK submissions to the UNFCCC and are available for EU ETS application in compliance with Tier 2. These data will be gathered from on-line gas chromatographs approved by OFGEM. Accordingly, whilst only compliant with Tier 2, it is likely that the use of regional NCV data for natural gas should be at least as accurate as that derived from periodic extractive sampling and analysis of the fuel gas and the cost of moving to Tier 3 may therefore be unreasonable.

Combustion Activities		
Variable	**Highest tier**	**Requirement**
Mass Balance approach – Carbon Black and Gas Processing Terminals		
Activity data	4	*"The operator shall analyse and report the mass flows from the installation and respective stock changes for all relevant fuels and materials separately. Where the carbon content of a mass flow is usually related to energy content (fuels), the operator may determine and use the carbon content related to the energy content [$_t$ C/TJ] of the respective mass flow for the calculation of the mass balance."* *"Activity data over the reporting period are determined with a maximum uncertainty of less than ±1.5%"*
Carbon content	2	*"The carbon content of input or output stream shall be derived following the provisions of Section 13 of Annex I in respect to representative sampling of fuels, products and by-products, the determination of their carbon contents and biomass fraction."*
Flares		
Activity data	3	*"Amount of flare gas used over the reporting period is derived with a maximum uncertainty of ±7.5%"*
Emission factor	3	*"Emission factor [$_t$ CO_2/Nm^3 $_{flare\ gas}$] calculated from the carbon content of the flared gas applying the provisions of Section 13 of Annex I"*
Oxidation factor	2	*"The operator applies an oxidation factor 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."*
Flue gas desulphurisation equipment		
Activity data	1	Carbonate input or gypsum output to be metered by the operator or supplier to an accuracy of better than ±7.5%. Accordingly, operators should seek opportunities to improve associated accuracies where possible, for example through replacement or by calibration and maintenance and/or improving the accuracy of their supplier's data regarding carbonate delivered.
Emission factor	1	Stoichiometric ratios are specified in the M&R Guidelines. For the carbonate based method the moisture and gangue (inert material associated with the mineral) content must be measured. For the gypsum' method only the moisture content is required.

Table 2 Mineral oil refineries (M&R Guidelines Annex III)

Mineral oil refineries		
Parameter	**Highest tier**	**Requirement**
Combustion emissions (M&R Guidelines Annex III Section 2.1.1) Combustion processes that take place at Mineral oil refinery installations shall be monitored and reported in accordance with Annex II. See Table 1 (of this note)		
Specific process emissions ***1. Catalytic Cracker Regeneration, Other Catalyst Regeneration and Flexi-Cokers***		
Activity data	4	*"The emissions shall be calculated by a material balance, taking into account the state of the input air and the flue gas. All CO in the flue gas shall be accounted for as CO_2* (applying the mass relation $tCO_2 = tCO * 1.571$) *The analysis of input air and flue gases and choice of tiers shall be according to the provisions of Section 13 of Annex I. The specific calculation approach shall be approved by the competent authority as part of evaluation of the monitoring plan and the monitoring methodology therein.* *For each emission source a total uncertainty of the overall emissions over the reporting period of less than ±2.5% shall be achieved"*
2. Refinery Hydrogen Production		
Activity data	2	*'Amount of hydrocarbon feed [t feed]] processed during the reporting period, derived with a maximum uncertainty of ± 2.5%.'* Accordingly in order to meet Tier 2 the metering devices (e.g. orifice plates) used must deliver an annual uncertainty of better than of ± 2.5% .
Emission factor	2	*'Use of an activity –specific emission factor [CO2/t feed] calculated from the carbon content of the feed gas, determined according to section 13 of Annex I.'* Accordingly, an analysis of the carbon content of the fuel feedstock using a suitable standard method and an ISO17025 accredited laboratory (or demonstrated equivalent, see Annex I section 13.5.2 of the M&R Guidelines) is required. The Operator must be able to demonstrate that the analytical results provided are representative of each 'batch' of fuel and bearing in mind the transient integrity of samples e.g. through comparison with in-house or external sampling and analysis. Alternatively, the operator can look to an on-line gas analysis system operated in accordance with Annex I section 13.5.3 of the M&R Guidelines

Table 3 Coke ovens (M&R Guidelines Annex IV)

Coke ovens		
Parameter	**Highest tier**	**Requirement**
***Mass balance approach* (M&R Guidelines Annex IV Section 2.1.1)**		
Activity data	4	*"The operator shall analyse and report the mass flows into and from the installation and respective stock changes for all relevant fuels and materials separately. Where the carbon content of a mass flow is usually related to energy content (fuels), the operator may determine and use the carbon content related to the energy content [t C/TJ] of the respective mass flow for the calculation of the mass balance."* Accordingly, metering devices (e.g. weighbridge, belt conveyors etc) must be installed to provide an uncertainty in the annual measurement of the activity data of less than ± 1.5 %.
Carbon content	3	*"The carbon content of input or output stream shall be derived following the provisions of section 13 of Annex I in respect to representative sampling of fuels, products and by-products, the determination of their carbon contents and biomass fraction"*
Combustion emissions (M&R Guidelines Annex IV Section 2.1.2) *'Combustion processes taking place at coke ovens where fuels (e.g. coke, coal, and natural gas) are not included in the mass balance approach shall be monitored and reported in accordance with* Annex II.' See **Table 1 (**of this note)**.**		
Process emissions (M&R Guidelines Annex IV Section 2.1.3)		
Activity data	4	*"The mass flow of the fuel into and from the installation over a reporting period is determined with a maximum permissible uncertainty of less than ± 1,5 %."* Accordingly, metering devices (e.g. weighbridge, belt conveyors, orifice plates etc) must be installed to provide an uncertainty in the annual measurement of less than ± 1.5 %.
Net calorific value	3	*"The net calorific value representative for each batch of fuel in an installation is measured by the operator, a contracted laboratory or the fuel supplier in accordance with the provisions of Section 13 of Annex I"*
Emission factor	3	*"Specific emission factors are determined in accordance with the provisions of Section 13 of Annex I."*

Table 4 Metal ore roasting and sintering processes (M&R Guidelines Annex V)

Metal ore roasting & sintering		
Parameter	**Highest tier**	**Requirement**
***Mass balance approach* (M&R Guidelines Annex V Section 2.1.1)**		
Activity data	4	*"The operator shall analyse and report the mass flows into and from the installation and respective stock changes for all relevant fuels and materials separately. Where the carbon content of a mass flow is usually related to energy content (fuels), the operator may determine and use the carbon content related to the energy content [t C/TJ] of the respective mass flow for the calculation of the mass balance"* *"Activity data over the reporting period are determined with a maximum uncertainty of less than ±1.5%"*
Carbon content	3	*"The carbon content of input or output stream shall be derived following the provisions of Section 13 of Annex I in respect to representative sampling of fuels, products and by-products, the determination of their carbon contents and biomass fraction."*
Combustion emissions (M&R Guidelines Annex V Section 2.1.2) *'Combustion processes taking place at metal ore roasting and sintering installations shall be monitored and reported in accordance with* Annex II.' See **Table 1** (of this note).		
Process emissions (M&R Guidelines Annex V Section 2.1.3)		
Activity data	2	*"Amounts [t] of carbonate input material [$tCaCO_3$, $tMgCO_3$ or $tCaCO_3$-$MgCO_3$] and process residues used as input material employed in the process over a reporting period by the operator or his suppliers with a maximum uncertainty of less than ± 2,5 %"* Accordingly, metering devices (e.g. weighbridge, belt conveyors etc) must be installed to provide an uncertainty in the annual measurement of less than ± 2.5 % for process inputs.
Emission factor	1	For carbonates, operators are required (there is only one prescribed tier) to use the stoichiometric emission factors specified: 0.440 t CO_2/t $CaCO_3$, , 0.522 t CO_2/t $MgCO_3$ or 0.380 tCO_2/t $FeCO_3$ adjusted for relevant moisture and gangue content. For process residues, activity-specific factors have to be determined according to the provisions of Section 13 of Annex 1 of the M&R Guidelines.
Conversion factor	2	*"Activity-specific factors determined according to the provisions of Section 13 of Annex I, determining the amount of carbon in the sinter produced and in filtered dust. In case filtered dust is reemployed in the process, the amount of carbon [t] contained shall not be accounted for in order to avoid double counting."* Accordingly, an analysis of the carbon content of the sinter and the filtered dust (if this is not re-employed in the process) is required using a suitable standard method and ISO17025 accredited laboratory (or demonstrated equivalent, see Annex I Section 13.5.2 of the M&R Guidelines). The Operator must be able to demonstrate to the Verifier that the analytical results provided are representative of each 'batch' of raw material e.g. through comparison with in-house sampling and analysis.

Table 5 Pig iron and steel production, including continuous casting, installations (M&R Guidelines Annex VI)

Pig iron and steel production		
Parameter	**Highest tier**	**Requirement**
Mass balance approach **(M&R Guidelines Annex VI Section 2.1.1)**		
Activity data	4	*"The operator shall analyse and report the mass flows into and from the installation and respective stock changes for all relevant fuels and materials separately. Where the carbon content of a mass flow is usually related to energy content (fuels), the operator may determine and use the carbon content related to the energy content [t C/TJ] of the respective mass flow for the calculation of the mass balance."* *"Activity data over the reporting period are determined with a maximum uncertainty of less than ±1.5%"*
Carbon content	3	*"The carbon content of input or output stream shall be derived following the provisions of Section 13 of Annex I in respect to representative sampling of fuels, products and by-products, the determination of their carbon contents and biomass fraction."* *"The carbon content of products or semi-finished products may be determined based on annual analyses following the provisions of Section 13 of Annex I or be derived from mid-range composition values as specified by relevant international or national standards."*
Combustion emissions (M&R Guidelines Annex VI Section 2.1.2) 'Combustion processes taking place at installations for the production of pig iron and steel including continuous casting where fuels (e.g. coke, coal, and natural gas) are not used as reducing agents or do not stem from metallurgical reactions shall be monitored and reported in accordance with Annex II.' See **Table 1** (of this note).		
Process emissions (M&R Guidelines Annex VI Section 2.1.3)		
Activity data	4	*"The mass flow into and from the installation over the reporting period is determined with a maximum uncertainty of less than ±1.5%"* Accordingly, metering devices (e.g. weighbridge, belt conveyors, orifice plates etc) must be installed to provide an uncertainty in the annual measurement of less than ± 1.5 % for mass flows of inputs, products and by products/exports.
Net calorific value (if applicable)	3	"*The net calorific value representative for each batch of fuel in an installation is measured by the operator, a contracted laboratory or the fuel supplier in accordance with the provisions of Section 13 of Annex I"*
Emission factor	3	*"Specific emission factors (t CO_2/t_{INPUT} or t_{OUTPUT}) for input and output materials are used, developed in accordance with the provisions of Section 13 of Annex I."*

Table 6 Production of cement clinker (M&R Guidelines Annex VII)

Cement clinker		
Parameter	**Highest tier**	**Requirement**
Combustion emissions **(M&R Guidelines Annex VII Section 2.1.1)** *Combustion processes involving different types of fuels (e.g. coal, petroleum coke, fuel oil, natural gas and the broad range of waste fuels) that take place at installations for the production of cement clinker shall be monitored and reported in accordance with Annex II.* See **Table 1** (of this note).		
Process emissions **(M&R Guidelines Annex VII Section 2.1.2)** **Calculation Method A – Kiln Input Based**		
Activity data	3	*"Unless raw meal as such is characterised, these requirements apply separately to each of the relevant carbon-bearing kiln (other than fuels) e.g. limestone or shale, avoiding double counting or omissions from returned or by-passed materials. The net amount of raw meal may be determined by means of a site specific empirical raw meal/clinker ratio which is to be updated at least once per year applying industry best practice guidelines"* *"The net amount of relevant kiln input [t] consumed during the reporting period, is determined with a maximum uncertainty of less than ±2.5%"*
Emission factor	1	*"The emission factors shall be calculated and reported in units of mass of CO_2 released per tonne of each relevant kiln input. Stoichiometric ratios, as shown in Table 1 [see Section 2.1.2.1 of Annex VII of the M&R Guidelines], shall be used to convert composition data into emission factors."* *"The determination of the amount of relevant carbonates including $CaCO_3$ and $MgCO_3$ in each relevant kiln input material is carried out according to Section 13 of Annex I. This may be done by means of thermo-gravimetric methods."* N.B. There is only one prescribed tier.
Conversion factor	2	*"Carbonates and other carbon leaving the kiln in the clinker are considered by means of a conversion factor with a value between 0 and 1. The operator may assume complete conversion for one or several kiln inputs and attribute unconverted carbonates or other carbon to the remaining kiln input(s). The additional determination of relevant chemical parameters of the products is carried out according to Section 13 Annex I"* .
Calculation Method B – Clinker Output Based		
Activity data	2	*"The cement /clinker ratio shall either be derived for each of the different cement products based on the provisions of Section 13 of Annex I or be calculated from the difference of cement deliveries and stock changes and all materials used as additives to the cement including by-pass dust and cement kiln dust."*
Emission factor	3	*"The determination of the amount of CaO and MgO in the product is carried out according to Section 13 of Annex I.* *Stoichiometric ratios as shown in Table 2 [see Section 2.1.2.1 of Annex VII of the M&R Guidelines] shall be used to convert composition data into emission factors assuming that all CaO and MgO have been derived from respective carbonates"*
Conversion factor	2	*"The amount of (non-carbonate) CaO and MgO in the raw materials is reflected by means of conversion factors with a value between 0 and 1 with a value of 1 corresponding to a full conversion of raw material carbonates in to oxides. The additional determination of relevant chemical parameters of the raw materials is carried out according to Section 13 of Annex I. This may be done by means of thermo-gravimetric methods."*
Emissions Related to Discarded Dust		

Cement clinker		
Parameter	**Highest tier**	**Requirement**
Activity data	2	*"Amount [t] of CKD or bypass dust (if relevant) leaving the kiln system during a period derived with a maximum uncertainty of less than ± 7.5 %."* Accordingly, metering devices (e.g. weighbridge, belt conveyors etc) must be installed to provide an uncertainty in the annual measurement of less than ± 7.5 % .
Emission factor	2	*"The emission factor [t CO_2/t] for CKD or by-pass dust leaving the kiln system shall be calculated based on the degree of calcination and composition. The degree of calcination and composition shall be determined at least once per year following the provisions of Section 13 of Annex I".*
Emissions from Non-Carbonate Carbon in Raw Meal		
Activity data	2	*"Emissions from non-carbonate carbon in limestone, shale or alternative raw materials (e.g. fly ash) used in the raw meal in the kiln shall be determined using the following expression:* *CO_2- $emissions_{non\text{-}carbonate\ raw}$ = Activity data * Emission factor * Conversion Factor* *Amount of relevant raw material [t] consumed over a reporting period derived with a maximum uncertainty of less than ±7.5%"*
Emission factor	2	*"The content of non-carbonate carbon in the relevant raw material shall be determined at least annually following the provisions of Section 13 of Annex I".*
Conversion Factor	2	*"The conversion factor is calculated applying industry best practice"*

Table 7 Production of lime (M&R Guidelines Annex VIII)

Lime		
Parameter	**Highest tier**	**Requirement**
Combustion emissions **(M&R Guidelines Annex VIII Section 2.1.1)** *Combustion processes involving different types of fuels (e.g. coal, petroleum coke, fuel oil, natural gas and the broad range of waste fuels) that take place at installations for the production of lime shall be monitored and reported in accordance with Annex II.* See **Table 1** (of this note).		
Process emissions **(M&R Guidelines Annex VIII Section 2.1.2)** **Calculation Method A - Carbonates**		
Activity data	3	*"Calculation shall be based on the amount of calcium carbonate and magnesium carbonate in the raw materials consumed. The following formula shall be used:* *CO_2-emission [t CO_2] = ∑ {Activity data $_{INPUT}$ * emission factor *conversion factor}* *The amount of relevant kiln input [t] consumed during the reporting period is determined by the operator with a maximum uncertainty of less than ±2.5%"*
Emission factor	1	*"The emission factors shall be calculated and reported in units of mass of CO_2 released per tonne of each relevant kiln input assuming full conversion. Stoichiometric ratios as shown in Table 1 [see Section 2.1.2 of Annex VIII of the M&R Guidelines] shall be used to convert composition data into emission factors. The determination of the amount of $CaCO_3$,, $MgCO_3$ and organic carbon (where relevant) in each relevant kiln input material is carried out according to Section 13 of Annex I".* N.B. There is only one prescribed tier. .
Conversion factor	2	*"Carbonates leaving the kiln are considered by means of a conversion factor with a value between 0 and 1. The operator may assume complete conversion for one or several kiln inputs and attribute unconverted carbonates to the remaining kiln input(s). The additional determination of relevant chemical parameters of the products is carried out according to Section 13 of Annex I"*
Calculation Method B - Alkali Earth Oxides		
Activity data	2	*"CO2 emissions arise from the calcination of carbonates and shall be calculated based on the amounts of CaO and MgO contents in the lime produced. Already calcined Ca and Mg entering the kiln, for instance through fly ash or fuels and raw materials with a relevant CaO or MgO content shall be considered appropriately by means of the conversion factor. Lime kiln dust leaving the kiln system shall be considered appropriately."* *Amount of lime [t] produced during the reporting period is determined by the operator with a maximum uncertainty of less than ±2.5%*
Emission factor	1	*"The determination of the amount of CaO and MgO in the product is carried out according to Section 13 of Annex I."* *"Stoichiometric ratios as shown in Table 2 [see Section 2.1.2 of Annex VIII of the M&R Guidelines] shall be used to convert composition data into emission factors assuming that all CaO and MgO have been derived from respective carbonates."* N.B. There is only one prescribed tier.
Conversion factor	2	*"The amount of CaO and MgO already in the raw materials is reflected by means of conversion factors with a value between 0 and 1 with a value of 1 corresponding to a full conversion of raw material carbonates into oxides. The additional determination of relevant chemical parameters of the raw materials is carried out according to Section 13 of Annex I.* ". N.B. There is only one prescribed tier.

Table 8 Production of glass (M&R Guidelines Annex IX)

Production of glass		
Parameter	**Highest tier**	**Requirement**
***Combustion emissions* (M&R Guidelines Annex IX Section 2.1.1)** *Combustion processes that take place at installations for the manufacture of glass shall be monitored and reported in accordance with Annex II. S*ee **Table 1** (of this note).		
***Process emissions* (M&R Guidelines Annex IX Section 2.1.2)**		
Activity data	2	*"CO_2 is released during melting in the furnace, from carbonates contained in the raw materials, and from the neutralization of HF, HCl and SO_2 in the flue gases with limestone or other carbonates. Emissions from the decomposition of carbonates in the melting process and from scrubbing shall both be part of the installation's emissions. They shall be added to the emission total but be reported separately if possible."* *"CO_2 from carbonates in the raw materials released during melting in the furnace is directly linked with the glass production and shall be calculated based on the converted quantity of carbonates from raw material – mainly soda, lime/limestone, dolomite and other alkali and alkali earth carbonates supplemented by carbonate free recycled glass (cullet)."* *"Calculation shall be based on the amount of carbonates consumed. The following formula shall be used:* *CO_2 emissions [t CO_2] = ∑{activity data * emission factor} + ∑ {additive * emission factor}"* *"The total mass [t] of the carbonate raw materials or carbon containing additives consumed in the reporting period is determined per type of raw material by the operator or his supplier with a maximum uncertainty of ±1.5%"*
Emission factor	2	*"The emission factors shall be calculated and reported in units of mass of CO_2 released per tonne of each carbonate raw material. Stoichiometric ratios as shown in Table 1 [see Section 2.1.2 of Annex IX of the M&R Guidelines] shall be used to convert composition data into emission factors.* *The determination of the amount of relevant carbonates in each relevant input material is carried out according to Section 13 of Annex I"*

Table 9 Manufacture of ceramic products (M&R Guidelines Annex X)

Ceramics		
Parameter	**Highest tier**	**Requirement**
***Combustion emissions* (M&R Guidelines Annex X Section 2.1.1)** *Combustion processes that take place at installations for the manufacture of ceramic products shall be monitored and reported in accordance with Annex II.* See **Table 1** (of this note).		
***Process emissions* (M&R Guidelines Annex X Section 2.1.2)** **Calculation Method A - Carbon Inputs**		
Activity data	3	*"CO_2 is released during calcination of the raw materials in the kiln and the oxidation of organic material of the clay and additives, and from the neutralization of HF, HCl and SO_2 in the flue gases with limestone or other carbonates and from other flue gas cleaning processes. Emissions from the decomposition of carbonates and the oxidation of organic material in the kiln and from flue gas cleaning shall all be included in the installation's emissions. They shall be added up to the emission total but reported separately if possible. Calculation shall be as follows:* CO_2 $emissions_{total}$ [t] = CO_2 $emissions_{input\ material}$ [t] + CO_2 $emissions_{flue\ gas\ cleaning}$ [t]*."* *Calculation is based on the carbon input (organic and inorganic) in each of the relevant raw materials, e.g. different types of clays, clay mixings or additives. Quartz/silica, feldspar, kaolin and mineral talc commonly do not constitute significant sources of carbon.* *The amount of each relevant raw material or additive [t] consumed during the reporting period (excluding losses), is determined with a maximum uncertainty of less than ±2.5"*

Ceramics		
Parameter	**Highest tier**	**Requirement**
Emission factor	3	*"One aggregate emission factor including organic and inorganic carbon ("total carbon(TC)") may be applied for each source stream (i.e. relevant raw material mix or additive). Alternatively, two different emission factors for "total inorganic carbon (TIC)" and "total organic carbon (TOC)" for each source stream may be applied. Where applicable, stoichiometric ratios shall be applied to convert composition data for individual carbonates as shown in Table 1.[see Section 2.1.2.1 of Annex X of the M&R Guidelines]. The determination of biomass fraction of additives which do not qualify as pure biomass shall follow the provisions of Section 13.4 of Annex I."* *"The determination of composition of the relevant raw materials is carried out according to Section 13 of Annex I"*
Conversion factor	2	*"Carbonates and carbon leaving the kiln are captured by means of conversion factors with a value between 0 and 1 with a value of 1 corresponding to a full conversion of carbonates or other carbon. The additional determination of relevant chemical parameters of the products is carried out according to Section 13 of Annex I."*
Calculation Method B - Alkali Earth Oxides		
Activity data	3	*"Calcination CO_2 is calculated based on the amounts of ceramics produced and the CaO, MgO and other (earth) alkali oxide contents of the ceramics (activity data$_{OUTPUT}$). The emission factor is corrected for already calcined Ca, Mg and for other alkali earth/alkali contents entering the kiln (activity data$_{INPUT}$), for instance alternative fuels and raw materials with a relevant CaO or MgO content."* *"The mass of the products during the reporting period is derived with a maximum uncertainty of less than ±2.5%"*
Emission factor	2	*"The determination of composition of the products is carried out according to Section 13 of Annex I."*
Conversion factor	2	*"Relevant oxides in the raw materials are reflected by means of conversion factors with a value between 0 and 1 with a value of 0 corresponding to a full content of relevant oxide already in the raw material. The additional determination of relevant chemical parameters of the raw materials is carried out according to Section 13 of Annex I"*
CO_2 from Limestone for Reducing Air Pollutants and Other Flue Gas Cleaning **(M&R Guidelines Annex X Section 2.1.2.2)**		
Activity data	1	*"CO_2 from limestone for reducing air pollutants and other flue gas clean shall be calculated based on the amount of $CaCO_3$ input. Double counting from used limestone recycled as raw material in the same installation shall be avoided."* *"The amount [t] of dry $CaCO_3$ consumed during the reporting period determined by weighing by operator or his suppliers with a maximum uncertainty of less than ±7.5%"* N.B. There is only one prescribed tier.
Emission factor	1	*"Stoichiometric ratios of $CaCO_3$ as shown in Table 1 [see Section 2.1.2.1 of Annex X of the M&R Guidelines]"* N.B. There is only one prescribed tier

Table 10 Pulp and paper production (M&R Guidelines Annex XI)

Pulp and paper		
Parameter	**Highest tier**	**Requirement**
Combustion emissions **(M&R Guidelines Annex XI Section 2.1.1)** *Emissions from combustion processes that take place at pulp and paper installations shall be monitored and reported in accordance with Annex II.* See **Table 1** (of this note)		
Process emissions **(M&R Guidelines Annex XI Section 2.1.2)**		
Activity data	2	*"Emissions are caused by the use of carbonates as make–up chemicals in pulp mills. Although losses of sodium and calcium from the recovery system and causticising area are usually made up using non-carbonate chemicals, small amounts of calcium carbonate ($CaCO_3$) and sodium carbonate (Na_2CO_3), which do result in CO_2 emissions are sometimes used. The carbon contained in these chemicals is usually of fossil origin, although in some cases (e.g. Na_2CO_3 purchased from soda-based semi-chem mills) it can be derived from biomass.* *It is assumed that the carbon in these chemicals is emitted as CO_2 from the lime kiln or recovery furnace. These emissions are determined by assuming that all of the carbon in $CaCO_3$ and Na_2CO_3 used in recovery and causticising areas is released to the atmosphere.* *Calcium make-up is required because of losses from the causticising area, most of which are in the form of calcium carbonate."* *"Amounts [t] of $CaCO_3$ and Na_2CO_3 consumed in the process as determined by the operator or his suppliers with a maximum uncertainty of less than ±1.5%"*
Emission factor	1	*"Stoichiometric ratios [t_{CO2}/t_{CaCO3}] and [t_{CO2}/t_{Na2CO3}] for non-biomass carbonates as indicated in Table 1 [see Section 2.1.2 of Annex XI of the M&R Guidelines]. Biomass carbonates are weighted with an emission factor of 0 [tCO_2/ t carbonate]"* *"These values shall be adjusted according to moisture and gangue content of the applied carbonate materials."* N.B. There is only one prescribed tier.

APPENDIX 2 – ETSG Guidance on Assessment of Unreasonable Costs

Introduction

The Emissions Trading Technical Support Group (ETSG) was formed in 2006 to address a range of questions emerging from revision of M&R Guidelines for Phase 2. It was set-up under the invitation of the Dutch Ministry of Environment (VROM) with the support of the UK Environment Agency for England and Wales, and consisted of representatives of Member States, technical experts as well as representatives from industry. A range of notes were prepared and these formed the basis for various comments and suggestions feeding into Member State consideration of monitoring plans for Phase 2 and the Commission's Frequently Asked Questions on monitoring, reporting and verification issues.

The ETSG notes were finalised following presentation to an IMPEL EU ETS project on implementation of the revised M&R Guidelines and having accommodated feedback from their workshop held 10th September 2007. The final notes are included in the final IMPEL report submitted for the project and have also been circulated to all Member States via the Commission's WGIII Emissions Trading Group.

The guidance notes are not intended to impose a mandatory explanation or interpretation of the requirements of the M&R Guidelines, but are considered practical tools and guidance aimed at assisting competent authorities and industry in the implementation of the requirements of the M&R Guidelines. It is up to the Competent Authorities of a particular Member State or industry whether they want to use the tools and guidance submitted in the compendium of ETSG notes.

The following is a copy of the final ETSG note on Assessment of Unreasonable Costs.

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 %;

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.

[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 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 tonne of CO_2.[1]

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.

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 installment 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.

[1] 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.

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).