



Ministerial Decree establishing guidelines for the monitoring and reporting of CO2 emissions and tonne-kilometre data from aviation activities.

THE FLEMISH MINISTER FOR THE ENVIRONMENT, NATURE AND CULTURE,

Having regard to the special Law for reforming the institutions, and in particular article 20;

Having regard to the Decree of 2 April 2004 for reducing greenhouse gas emissions in the Flemish Region as a result of promoting the efficient use of energy, and the use of renewable sources of energy and the application of Kyoto Protocol flexible mechanisms, as most recently amended pursuant to the Decree of 8 May 2009, especially article 20ter;

Having regard to the Decision of the Flemish Government of 13 July 2009 determining the responsibility of the members of the Flemish Government, as most recently amended pursuant to the Decision of the Flemish Government on 24 July 2009, especially articles 27/2, §2, 27/3, §§ 2 en 3, 27/5, 27/7, §2, 27/10, §§2, 3 en 6, 32/2, §5;

Having regard to the Decision of the Flemish Government of 7 December 2007 concerning tradable greenhouse gas emission allowances, as most recently amended pursuant to the Decision of the Flemish Government of 4 September 2009;

Having regard to the advisory opinion 47.645/3 of the Council of State, issued on 12 January 2010 pursuant to article 84, §1, first subparagraph, 1° of the laws of the Council of State, coordinated on 12 January 1973;

DECISION:

Article 1. In accordance with articles 27/2, §2, 27/3, §§ 2 and 3, 27/5, 27/7, §2, 27/10, §§2, 3 and 6 and article 32/2, §5 of the Decision on tradable greenhouse gas emission allowances the items featured in annex I of this Decision constitute “Guidelines for the monitoring and reporting of emissions and tonne-kilometre data from aviation activities”.

Art. 2. This Decision shall come into force on the date it is published in the Belgian Official Journal.

Brussels,... ..,

The Flemish Minister for the Environment, Nature and Culture,

Joke SCHAUVLIEGE

ANNEX I:

GUIDELINES FOR THE MONITORING AND REPORTING OF CO₂ EMISSIONS AND TONNE-KILOMETRE DATA FROM AVIATION ACTIVITIES

CHAPTER 1. INTRODUCTION

This document contains general guidelines for the monitoring and reporting of CO₂ emissions and tonne-kilometre data, resulting from aviation activities in the list referred to in annex III of the Decision of the Flemish Government of 4 September 2009 amending the Decision of 7 December 2007 concerning tradable greenhouse gas emission allowances (hereinafter referred to as the '*Decision on tradable greenhouse gas emission allowances*').

CHAPTER 2. DEFINITIONS

The definitions in the Decree on efficient use of energy and the Decision on tradable greenhouse gas emission allowances are used for the application of this document.

The following basic definitions are also applicable:

- a) activities : activities referred to in annex III of the Decision on tradable greenhouse gas emission allowances;
- b) emission source : a separately identifiable part or point of an individual aircraft from which relevant greenhouse gases are emitted;
- c) source stream : a specific fuel type whose consumption gives rise to emissions of relevant greenhouse gases from one or more emission sources;
- d) monitoring methodology : the sum of approaches used by an aircraft operator to determine CO₂ emissions and tonne-kilometre data of a given aviation activity;
- e) monitoring plan: detailed, complete and transparent documentation of the monitoring methodology of an aircraft operator, including documentation of the data acquisition and data handling activities, and the system to control the trueness thereof;
- f) tier: a specific element of a methodology for determining activity data, emission factors, annual emission as well as the payload;
- g) annual : a period of time covering a calendar year from 1 January to 31 December;
- j) trading period : the year 2012 or the period from 2013 to 2020.

The following definitions shall apply in relation to emissions and fuels:

- a) combustion emissions : greenhouse gas emissions occurring during the exothermic reaction of a fuel with oxygen;
- b) inherent CO₂: CO₂ forming part of a fuel;
- c) conservative: a set of assumptions is defined in order to ensure that no under-estimation of annual CO₂ emissions or tonne-kilometre data occurs;

- d) batch : an amount of fuel or material representatively sampled and characterised and transferred as one shipment or continuously over a specific period of time;
- e) commercially tradable fuels : fuels of specified composition which are frequently and freely traded, if the specific batch has been traded between economically-independent parties, including all commercial standard fuels;
- f) commercially tradable standard fuel : the internationally standardised commercial fuels which exhibit a 95% confidence interval of not more than ± 1 % for their specified calorific value, including jet kerosene (JET A1 or JET A), type JET B jet gasoline and type AvGas jet gasoline.

The following definitions shall apply in relation to measurement:

- a) accuracy: the closeness of the agreement between the result of a measurement and the true value of the particular quantity (or a reference value determined empirically using internationally accepted and traceable calibration materials and standard methods), taking into account both, random and systematic factors;
- b) uncertainty: a parameter, associated with the result of the determination of a quantity, that characterises the dispersion of the values that could reasonably be attributed to the particular quantity, including the effects of systematic as well as of random factors and expressed in percent and describes a confidence interval around the mean value comprising 95 % of inferred values taking into account any asymmetry of the distribution of values;
- c) arithmetic mean: the sum of all the members of a set of values divided by the number of items in the set;
- d) measurement: a set of operations having the object of determining the value of a quantity;
- e) measurement instrument: a device intended to be used to make measurements, alone or in conjunction with supplementary device(s);
- f) measurement system: a complete set of measurement instruments and other equipment, like sampling and data processing equipment, used for the determination of variables like the activity data, the carbon content, the calorific value or the emission factor of the CO₂ emissions
- g) calibration: the set of operations, which establish, under specified conditions, the relations between values indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material and the corresponding values of a quantity realised by a reference standard.

The following definitions relating to calculation-based methodologies (arithmetic methods) for CO₂ emissions shall apply:

- a) Unreasonable costs: costs of a measure disproportionate to its overall benefits. A distinction is made between:
 - measures that immediately improve the accuracy of the calculation of CO₂ emissions. There is said to be an unreasonable cost, if the cost of the measure is higher than the improvement to the level of accuracy of the calculation of CO₂ emissions (as a %) multiplied by the annual CO₂ emissions of the aircraft operator,

multiplied by the measure's period of depreciation and multiplied by the price of an emission right;

- measures improving the level of CO₂ emission reporting but do not have any direct impact on the accuracy of the CO₂ emission calculation : there is said to be an unreasonable cost if the cost of the measure is higher than 1% multiplied by the annual CO₂ emissions of the aircraft operator, multiplied by the measure's period of depreciation and multiplied by the price of an emission right.

Where:

- an improvement in the accuracy = the accuracy of the annual CO₂ emissions achieved after the application of the measure minus the accuracy of the annual CO₂ emissions achieved without the measure;

- the annual CO₂ emissions of the aircraft operator = the average verified CO₂ emissions of the aircraft operator in the verified CO₂ annual emissions report for the last three years. If verified CO₂ emission data is available for only one or two years, the calculation is made on the basis of the verified CO₂ emissions. In the case of aircraft operators without this history, the CO₂ emissions are approached via an estimate on the basis of the best available data or on the basis of instruments implemented by Eurocontrol;

- the period of depreciation = five calendar years;

- the price of an emission right = the current market price of an emission right allocated to an aircraft operator. Towards this end the average market price per quarter shall be published on the website of the Flemish Environment, Nature and Energy Department. Consequently, this average applies as the market price for monitoring plans for CO₂ emissions and changes in CO₂ emissions that may be presented during the following quarter to the competent authority.

- b) technically feasible: the technical resources capable of meeting the needs of a proposed system can be acquired by the operator in the required time;
- c) de minimis source streams: a group of minor source streams selected by the operator and jointly emitting 1 kilotonnes of fossil CO₂ or less per year, or that contribute less than 2% of total annual emissions of fossil CO₂ of that aircraft operator, whichever is the highest in terms of absolute emissions;
- d) minor source streams: those source streams selected by the operator to jointly emit 5 kilotonnes of fossil CO₂ or less per year or to contribute less than 10% to the total annual emissions of fossil CO₂ of an aircraft operator, whichever is the highest in terms of absolute emissions;
- e) major source streams: the group of source streams which do not belong to the group of minor source streams;
- f) biomass : non-fossilised and biodegradable organic material originating from plants, animals and micro-organisms, including products, by-products, residues and waste from agriculture, forestry and related industries as well as the non-fossilised and biodegradable organic fractions of industrial and municipal wastes, including gases and liquids recovered from the decomposition of non-fossilised and biodegradable organic material;
- g) pure relating to a substance: a fuel consists of at least 97% (related to mass) of the specified substance or element corresponding to the commercial classification of

'purum'. For biomass this relates to the fraction of biomass carbon in the total amount of carbon in the fuel.

The following definitions relating to control and verification shall apply:

- a) control risk: the susceptibility of a parameter in the annual CO₂ emission report or in the tonne-kilometre data report to material misstatements that will not be prevented or detected and corrected on a timely basis by the control system;
- b) detection risk : the risk that the verification office will not detect a material misstatement or a material non-conformity;
- c) inherent risk : the susceptibility of a parameter in the annual CO₂ emission report or in the tonne-kilometre data report to material misstatements specific to the monitoring methods used;
- d) verification risk : the risk that the verification office expresses an inappropriate verification opinion. Verification risk is a function of inherent risks, control risks, and the detection risk;
- e) reasonable assurance : a high but not absolute level of assurance, expressed positively in the verification opinion, whether the verified annual CO₂ emission report or the verified tonne-kilometre data report is free from material misstatement and whether the aircraft operator does not have material non-conformities;
- f) materiality level: the quantitative threshold or cut-off point to be used to determine the appropriate verification opinion on the emission data reported in the annual CO₂ emission report or the tonne-kilometre data reported in the tonne-kilometre data report.
- g) materiality : the total quantity of reported CO₂ emission data or reported tonne-kilometre data, in the annual CO₂ emission report presented for verification or the tonne-kilometre data report presented for verification, that is at variance with the CO₂ emission data as featured in the annual CO₂ emission report verified as satisfactory or that is at variance with the tonne-kilometre data as featured in the tonne-kilometre data report verified as satisfactory. This deviation is attributed to non-conformities such as faults, omissions, excessive uncertainty or a misrepresentation of the quantity referred to;
- h) level of assurance : the degree to which the verification office is confident in the verification conclusions that it has been proved whether or not the information reported in the annual CO₂ emission report or in the tonne-kilometre data report for an aircraftoperator is free from material misstatement;
- i) non-conformity means any act or omission of an act by the verified aircraft operator, either intentional or unintentional, that is contrary to the requirements in the monitoring plan for CO₂ emissions or monitoring plan for tonne-kilometre data approved by the competent authority pursuant to article 20ter, §§ 1, 2, 6 or 7 of the Decree on efficient use of energy;
- j) material non-conformity : a non-conformity to the requirements in the monitoring plan for CO₂ emissions or monitoring plan for tonne-kilometre data approved by the competent authority pursuant to article 20ter, §§ 1, 2, 6 or 7 of the Decree on efficient use of energy that could lead to a different treatment of the aircraft operator by the competent authority;

- k) material misstatement : a misstatement (omissions, misrepresentations and errors, not considering the permissible uncertainty) in the annual CO₂ emission report or in the tonne-kilometre data report that, to the professional judgment of the verification office, could affect the treatment of the annual CO₂ emission report or tonne-kilometre data report by the competent authority, e.g. when the misstatement exceeds the materiality level;
- l) accreditation in the context of verification: the issuing of a statement by an accreditation body based on its decision following a detailed assessment related to the verification office conveying formal demonstration of its competence and independence to carry out verification in accordance with specified requirements;
- m) verification: the activities carried out by the verification office to be able to provide a verification opinion as described in 20ter, §7 of the Decree on efficient use of energy and articles 32/2 of the Decision on tradable greenhouse gas emission allowances.

The following definitions shall apply to CO₂ emissions and tonne-kilometre data from aviation activities:

- a) aerodrome of departure : the aerodrome at which a flight constituting an aviation activity listed in annex III of the Decision on tradable greenhouse gas emission allowances begins;
- b) aerodrome of arrival : the aerodrome at which a flight constituting an aviation activity in annex III of the Decision on tradable greenhouse gas emission allowances ends;
- c) aerodrome pair : a pair constituted by an aerodrome of departure and an aerodrome of arrival;
- d) mass and balance documentation : the documentation as specified in the international or national implementation of the Standards and Recommended Practices (SARPs) as laid down in annex 6 to the Chicago Convention ¹, as specified in annex III Subpart J to Regulation (EC) nr. 859/2008 of the European Commission of 20 August 2008, or equivalent international regulations;
- e) passengers : the persons onboard the aircraft during a flight, excluding its crew members;
- f) payload : the total mass of freight, mail, passengers and baggage carried onboard the aircraft during a flight;
- g) distance : the great circle distance between the aerodrome of departure and the aerodrome of arrival plus an additional fixed factor of 95 km;
- h) tonne-kilometre : a tonne of payload carried a distance of one kilometre.

CHAPTER 3. MONITORING AND REPORTING PRINCIPLES

To ensure the accurate and verifiable monitoring and reporting of CO₂ emissions and tonne-kilometre data monitoring and reporting shall be based on the following principles.

¹ Convention on International Civil Aviation and its Annexes signed in Chicago on 7 December 1944.

Completeness. Monitoring and reporting for an aircraft operator shall cover all combustion emissions from all emission sources and source streams and tonne-kilometre data belonging to activities listed in annex III of the Decision on tradable greenhouse gas emission allowances and of all CO₂ emissions and tonne-kilometre data specified in relation to those activities while avoiding double counting.

Consistency. Monitored and reported CO₂ emissions and tonne-kilometre data shall be comparable over time, using the same monitoring methodologies and data sets. Monitoring methodologies can be changed in accordance with the provisions of these guidelines if the accuracy of the reported data is improved. Changes in monitoring methodologies shall be subject to approval from the competent authority and shall be fully documented in accordance with these guidelines.

Transparency. Monitoring data, including assumptions, references, activity data and emission factors shall be obtained, recorded, compiled, analysed and documented in a manner that enables the reproduction of the determination of CO₂ emissions and tonne-kilometre data by the verification office and the competent authority

Trueness. It shall be ensured that the CO₂ emission determination is systematically neither over nor under true CO₂ emissions and the tonne-kilometre data determination is systematically neither over nor under the true tonne-kilometre data. Sources of uncertainties shall be identified and reduced as far as practicable. Due diligence shall be exercised to ensure that the calculation and measurement of CO₂ emissions and tonne-kilometre data exhibit highest achievable accuracy. The operator shall enable reasonable assurance of the integrity of reported CO₂ emissions and the reported tonne-kilometre data to be determined. CO₂ emissions and tonne-kilometre data shall be determined using the appropriate monitoring methodologies set out in these guidelines. All metering or other testing equipment used to report monitoring data shall be appropriately applied, maintained and calibrated, and checked. Spreadsheets and other tools used to store and manipulate monitoring data shall be free from error. Reported CO₂ emissions and reported tonne-kilometre data and related disclosures shall be free from material misstatement, avoid bias in the selection and presentation of information, and provide a credible and balanced account of an aircraft operator's CO₂ emissions and tonne-kilometre data.

Cost effectiveness. In selecting a monitoring methodology, the improvements from greater accuracy shall be balanced against the additional costs. Hence, monitoring and reporting of CO₂ emissions and tonne-kilometre data aim for the highest achievable accuracy, unless this is technically not feasible or, in the case of monitoring of CO₂ emissions, will lead to unreasonably high costs. The monitoring methodology itself shall describe the instructions to the operator in a logical and simple manner, avoiding duplication of effort and taking into account the existing systems used by the aircraft operator.

Faithfulness. A verified annual CO₂ emission report or a verified tonne-kilometre data report shall be capable of being depended upon by users to represent faithfully that which it either purports to represent or could reasonably be expected to represent.

Improvement of performance in monitoring CO₂ emissions and tonne-kilometre data. The process of verifying the CO₂ annual emissions reports or tonne-kilometre data reports shall be an effective and reliable tool in its support of quality assurance and quality control procedures, providing information upon which an operator can act to improve its performance in monitoring and reporting CO₂ emissions and tonne-kilometre data.

CHAPTER 4. DIVISION IN TIERS

The activity-specific guidelines set out in paragraph 5.2.3.2. and paragraph 5.3.1.3.2. contain specific methodologies for determining the following variables: activity data ('fuel flow ') and payload. These different approaches are divided in tiers. The increasing numbering of tiers from one upwards reflects increasing levels of accuracy, with the highest numbered tier as the preferred tier.

If the highest tier methodology or the variable-specific agreed tier is temporarily not feasible for technical reasons an operator may apply the highest achievable tier until such time as the conditions for application of the former tier have been restored. The operator shall, without undue delay, provide proof of the necessity for a change of tiers to the competent authority and details of the interim monitoring methodology. The operator shall take all necessary action to allow the prompt restoration of the original tier for monitoring and reporting purposes.

The choice of tiers shall be subject to approval by the competent authority. A change to the approved tier shall be proposed by means of a notification form for a substantial change in CO₂ emissions or a notification form for a substantial change in tonne-kilometre data. The rules and procedures for changes in CO₂ emissions and changes in tonne-kilometre data are featured in articles 27/11 and 27/12 of the Decision on tradable greenhouse gas emission allowances.

When there is a change to the tier within the reporting year the results for the relevant activity are calculated during the separate parts of the reporting year and reported to the competent authority as separate parts of the annual CO₂ emission report or tonne-kilometre data report.

For the determination of the fuel flow the aircraft operator has to apply the following tiers:

- for all major source streams : the applicable tier in the light of the overall emissions, as described in paragraph 5.2.3.1;
- for all minor source streams at least tier 1 as described in paragraph 5.2.3.1.;

For the "de minimis" source streams the aircraft operator may apply monitoring and reporting methods using the operator's own no-tier estimation methods.

The tiers to be applied have to be established in the monitoring plan and continue to be maintained during the entire reporting year, even when the aircraft operator exceeds the 50 kilotonnes threshold during the reporting year or changes over to annual emissions lower than 50 kilotonnes. In this case, a change of tier is included only in the monitoring plan for the following reporting year.

Payload

See paragraph 5.3.1.3.2.

CHAPTER 5. MONITORING OF CO₂ EMISSIONS AND TONNE-KILOMETRE DATA

5.1. Boundaries and completeness

These guidelines have to be applied for the monitoring and reporting of CO₂ emissions from aviation activities as referred to in annex III of the Decision on tradable greenhouse gas emission allowances.

All flights included in annex III of the Decision on tradable greenhouse gas emission allowances and performed by an aircraft operator during the reporting period shall be included. For the purpose of identifying the unique aircraft operator as defined by Article 1, 38° of the Decree on efficient use of energy, the call sign used for Air Traffic Control

(ATC) purposes shall be used. The call sign is the ICAO² designator in box 7 of the flight plan or, if not available, the registration marking of the aircraft. If the identity of the aircraft operator is not known, the owner of the aircraft shall be regarded as the aircraft operator unless he proves to the satisfaction of the competent authority who was the aircraft operator.

5.2. Monitoring of CO₂ emissions

5.2.1. Determination of CO₂ emissions

CO₂ emissions from aviation activities shall be calculated using the following formula:

$$\text{CO}_2 \text{ emissions} = \text{fuel consumption} * \text{emission factor}$$

The emission factor is directly expressed as tonne CO₂/tonne fuel. No net calorific value or oxidation factor is specified.

5.2.2. Choice of methodology

The aircraft operator shall define in the monitoring plan which monitoring methodology is used for each aircraft type. In case the aircraft operator intends to use leased-in or other aircraft types which are not yet included in the monitoring plan for CO₂ emissions at the time of submission to the competent authority, the aircraft operator shall include in the monitoring plan for CO₂ emissions a description of the procedure to be used for defining the monitoring methodology for these additional aircraft types. The aircraft operator shall ensure that the monitoring methodology, once it has been chosen, is consistently applied.

The aircraft operator shall describe in monitoring plan for CO₂ emissions for each type of aircraft:

- a) which calculation formula will be used (method A or method B);
- b) the data source which is used for determining the data on fuel uplift and fuel contained in the tank, and the methods for transmitting, storing and retrieving that data;
- c) which method is used to determine density, where applicable. When density-temperature correlation tables are used the operator shall specify the source of this data;
- d) the way the data in the central storage system is introduced, for example, manual entry of documents, electronic data that is intermittently read, for example, by plugging in laptops of the pilots, or directly sending on data via satellites (ACARS). If various systems are available for sending on information for the same types of aircraft this shall be reported.

Where necessary due to special circumstances such as fuel suppliers who cannot provide all the required data for a certain methodology, this list of applied methodologies, concerning points b) and c) may contain a list of deviations from the general methodology for specific aerodromes

5.2.3. Fuel consumption

The fuel consumption is expressed as the quantity of fuel, in mass units (tonne), used in the course of the reporting year.

² International Civil Aviation Organisation

Fuel consumed shall be monitored separately for each flight and for each fuel and shall include fuel consumed by the auxiliary power unit if this is included in the aircraft, in accordance with the calculation formulae below.

Fuel uplift may be determined based on the measurement by the fuel supplier, as documented in the fuel delivery notes or invoices for each flight. Alternatively, fuel uplift may also be determined using measurement systems on board of the aircraft. The data shall be taken from the fuel supplier, recorded in the mass and balance documentation, or in the aircraft technical log, or be transmitted electronically from the aircraft to the aircraft operator.

Fuel contained in the tank may be determined using measurement systems on board of the aircraft and recorded in the mass and balance documentation, in the aircraft technical log or transmitted electronically from the aircraft to the aircraft operator.

The operator shall choose the method which provides for the most complete and timely data combined with the lowest uncertainty without incurring unreasonable costs.

5.2.3.1. Calculation formulae

Actual fuel consumed shall be calculated using one of the following two methods:

Method A

The following formula is used:

Actual fuel consumption for each flight (tonnes) = amount of fuel contained in aircraft tanks once fuel uplift for the flight is complete (tonnes) – amount of fuel contained in aircraft tanks once fuel uplift for subsequent flight is complete (tonnes) + Fuel uplift for that subsequent flight (tonnes).

In case there is no fuel uplift for the flight or subsequent flight, the amount of fuel contained in aircraft tanks shall be determined at block-off for the flight or subsequent flight. In the exceptional case that an aircraft performs activities other than a flight, such as undergoing major maintenance involving the emptying of the tanks, after the flight whose fuel consumption is being monitored, an aircraft operator may substitute the figures for "*amount of fuel contained in aircraft tanks once fuel uplift for subsequent flight is complete + fuel uplift for that subsequent flight*" by the "*amount of fuel remaining in tanks at the start of the subsequent activity of the aircraft*", as recorded by technical logs.

Method B

The following formula is used:

Actual fuel consumption for each flight (tonnes) = amount of fuel remaining in aircraft tanks at block-on at the end of the previous flight (tonnes) + Fuel uplift for the flight (tonnes) – amount of fuel contained in tanks at block-on at the end of the flight (tonnes)

The moment of block-on may be considered equivalent to the moment of engine shut down. When an aircraft did not perform a flight previous to the flight whose fuel consumption is being measured, aircraft operators may provide the amount of fuel remaining in aircraft tanks at the end of the previous activity of the aircraft, as recorded by technical logs, instead of the "*amount of fuel remaining in aircraft tanks at block-on at the end of the previous flight*".

5.2.3.2. Quantification requirements

Tier 1

The fuel consumption during the reporting year is determined with a maximum uncertainty of less than $\pm 5.0\%$.

Tier 2

The fuel consumption during the reporting year is determined with a maximum uncertainty of less than $\pm 2.5\%$.

Aircraft operators with average reported annual emissions over the previous trading period (or a conservative estimate or projection if reported emissions are not available or no longer applicable) equal to or less than 50 kilotonnes of fossil CO₂ shall apply as a minimum tier 1 for major source streams. All other aircraft operators shall apply tier 2 for major source streams.

5.2.3.3. Fuel density

If the amount of fuel uplift or the amount of fuel remaining in the tanks is determined in units of volume (litres or m³), the aircraft operator shall convert this amount from volume to mass by using actual density values. Actual density means density expressed as kg/litre and determined for the applicable temperature for a specific measurement. Unless on-board measurement systems can be used, the actual density shall be the one measured by the fuel supplier at fuel uplift and recorded on the fuel invoice or delivery note. If such information is not available, the actual density shall be determined from the temperature of the fuel during the uplift provided by the fuel supplier or specified for the aerodrome where the fuel uplift takes place, using standard density-temperature correlation tables. Only in cases for which it is shown to the satisfaction of the competent authority that actual values are not available, a standard density factor of 0.8 kg/litre shall be applied.

5.2.4. Emission factors

The following reference factors, expressed as t CO₂/t fuel shall be used for each aviation fuel.

Table 1
Emission factors for aviation fuels

Fuel	Emission factor tonne CO₂/ tonne fuel
Aviation gasoline (AvGas)	3.10
Aviation gasoline (JET B)	3.10
Jet kerosene (JET A1 or JET A)	3.15

For reporting purposes, this is considered as an approach of tier 1.

Biomass is regarded as CO₂ neutral. An emission factor 0 [t CO₂/TJ or t or Nm³] has to be applied to biomass.

Should the aircraft operator believe an emission factor has to be used for the operator's fuels other than the standard values shown in table 1 the operator has to report this to the competent authority via a proposal for a monitoring plan for CO₂ emissions or a notification form for a substantial change in CO₂ emissions. A check shall be made during

the verification to see if the change is made according to the European directives in this area.

5.3. Determination of tonne-kilometre data

5.3.1. Methodologies for calculating tonne-kilometre data

5.3.1.1. Calculation formula

Aircraft operators shall monitor and report tonne-kilometre data using a calculation-based methodology. Calculation of tonne-kilometre data shall be based on the following formula:

$$\text{Tonne kilometres (t km)} = \text{distance (km)} * \text{payload (t)}$$

5.3.1.2. Distance

Distance shall be calculated using the formula:

$$\text{Distance (km)} = \text{Great Circle Distance (km)} + 95 \text{ km}$$

The Great Circle Distance is defined as the shortest distance between two points on the surface of the Earth, which shall be approximated using the system referred to in Article 3.7.1.1 of annex 15 to the Chicago Convention (WGS 84).

The latitude and longitude of aerodromes shall be taken either from aerodrome location data published in *Aeronautical Information Publications* (hereinafter AIP) in compliance with annex 215 of the Chicago Convention or from a source using such AIP data.

Distances calculated by software or by a third party may also be used, provided that the calculation methodology is based on the above formula and AIP data.

5.3.1.3. Payload

Payload shall be calculated using the following formula:

$$\text{Payload (t)} = \text{mass of freight and mail (t)} + \text{mass of passengers and checked baggage (t)}$$

5.3.1.3.1. Mass of freight and mail

Actual or standard mass contained in the mass and balance documentation for the relevant flights shall be used for calculating payload. Aircraft operators which are not required to have a mass and balance documentation shall propose a suitable methodology for determining mass of freight and mail in the monitoring plan for approval by the competent authority.

The actual freight and mail mass shall exclude the tare weight of all pallets and containers that are not payload, and the weight of the aircraft that is ready for take-off.

5.3.1.3.2. Mass of passengers and checked baggage

Aircraft operators may apply one of two different tiers to determine the mass of passengers. The aircraft operator may select as a minimum the tier 1 level to determine the mass of passengers and checked baggage. Within the same trading period the chosen tier shall be applied to all flights.

Tier 1

A default value of 100 kg for each passenger and their checked baggage is used.

Tier 2

The mass for passengers and checked baggage contained in the mass and balance documentation for each flight is used.

CHAPTER 6. UNCERTAINTY ASSESSMENT

6.1. General

The aircraft operator shall have an understanding of the main sources of uncertainty when calculating CO₂ emissions and tonne-kilometre data.

The uncertainty determined for the measurement system within the tier system shall comprise the specified uncertainty of the applied measurement instruments, uncertainty associated with the calibration and any additional uncertainty connected to how the measurement instruments are used in practice. The stated threshold values within the tier system refer to the uncertainty associated to the value for one reporting period.

The operator shall base the calculation on the specifications as provided by the supplier of the measurement instruments. If the specifications are not available, the operator shall provide for an uncertainty assessment of the measurement instrument. In both cases, the operator shall take into account necessary corrections of these specifications from effects resulting from the actual use conditions like ageing, conditions of the physical environment, calibration and maintenance. These corrections may involve conservative expert judgement.

Apart from uncertainties attributable to measuring instruments there are also uncertainties because of a shortage of data, the trueness of the data entered, such as the number of passengers and a possible deviation using the default value of 100 kg for passengers, the lack of density data, correctly indicating excluded flight, etc. The aircraft operator has to make an assessment of the possible uncertainty. It is up to the aircraft operator to undertake controls and measurements to ensure a systematic improvement without having to incur unreasonable costs.

If measurement systems are applied, the operator shall take into account the cumulative effect of all components of the measurement system on the uncertainty of the annual activity data using the error propagation law ³, which yields two convenient rules for combining uncorrelated uncertainties under addition and multiplication or respective conservative approximations if interdependent uncertainties occur:

a) For uncertainty of a sum (e.g. of individual contributions to an annual value):

For uncorrelated uncertainties:

³ Annex 1 of the "Good Practice Guidance" from 2000 and annex I of the IPCC Guidelines: <http://www.ipcc-nggip.iges.or.jp/public/public.htm>.

$$U_{total} = \frac{\sqrt{(U_1 \cdot X_1)^2 + (U_2 \cdot X_2)^2 + \dots + (U_n \cdot X_n)^2}}{|X_1 + X_2 + \dots + X_n|}$$

For interdependent uncertainties:

$$U_{total} = \frac{(U_1 \cdot X_1) + (U_2 \cdot X_2) + \dots + (U_n \cdot X_n)}{|X_1 + X_2 + \dots + X_n|}$$

Where:

U_{total} is the uncertainty of the sum, expressed as a percentage;

x_i and U_i are the uncertain quantities and the percentage uncertainties associated with them, respectively.

b) for uncertainty of a product (e.g. of different parameters used to convert a meter reading into mass flow data):

For uncorrelated uncertainties:

$$U_{total} = \sqrt{U_1^2 + U_2^2 + \dots + U_n^2}$$

For interdependent uncertainties:

$$U_{total} = U_1 + U_2 + \dots + U_n$$

Where:

U_{total} is the uncertainty of the product, expressed as a percentage;

U_i are the percentage uncertainties associated with each of the quantities.

The operator, via the quality assurance and control process, shall manage and reduce the remaining uncertainties surrounding the data in the operator's annual CO₂ emission report or tonne-kilometre data report. During the verification process, the verification office shall check the correct application of the approved monitoring methodology, and shall assess the management and reduction of remaining uncertainties via the operator's quality assurance and control procedures.

6.2. CO₂ emissions

The aircraft operator shall have an understanding of the main sources of uncertainty when calculating CO₂ emissions. Aircraft operators shall not be required to carry out a detailed uncertainty assessment as set out in paragraph 6.1. provided the aircraft operator identifies sources of uncertainties and their associated levels of uncertainty. This

information shall be used when selecting the monitoring methodology in accordance with paragraph 5.2.3.

Where fuel uplifts are determined solely on the invoiced quantity of fuel or other appropriate information provided by the fuel supplier such as delivery notes for fuel uplift per flight, no further proof of the associated uncertainty level is required. However, this data is shown in volume units, implying that the conversion still has to be based on weight (tonnes). For this reason a density should be specified together with a specific uncertainty that has to be estimated by the aircraft operator.

Where on-board systems are used for measuring fuel uplift, the level of uncertainty associated with fuel measurements shall be supported by calibration certificates. If such certificates are not available, aircraft operators shall:

- provide the aircraft manufacturer's specifications determining uncertainty levels of on-board fuel measurement systems, and,
- provide evidence of carrying out routine checks of the satisfactory operation of the fuel measurement systems.

Uncertainties for all other components of the monitoring methodology may be based on conservative expert judgement taking into account the estimated number of flights within the reporting period. There is no requirement to take into account the cumulative effect of all components of the measurement system on the uncertainty of the annual activity data. The aircraft operator shall regularly carry out cross-checks between uplift quantity as provided by invoices and uplift quantity indicated by on-board measurement, and take corrective action in accordance with paragraph 14.3.5. if deviations are observed.

6.3. Tonne-kilometre data

The aircraft operator shall have an understanding of the main sources of uncertainty when calculating tonne-kilometre data. A detailed uncertainty analysis, as described in paragraph 6.1. is not required in the context of the methodology for determining the tonne-kilometre data.

The aircraft operator shall regularly carry out appropriate control activities as described in paragraphs 14.2 and 14.3 and take corrective measures immediately, in accordance with paragraph 14.3.5. if an irregularity is discovered.

CHAPTER 7. SIMPLIFIED PROCEDURES FOR SMALL EMITTERS **(solely in the case of CO₂ emissions)**

Aircraft operators operating fewer than 243 flights per period for three consecutive four-month periods and aircraft operators operating flights with total annual emissions lower than 10,000 tonnes CO₂ per year shall be considered small emitters.

Aircraft operators that are small emitters may estimate the fuel consumption using tools implemented by Eurocontrol or another relevant organisation, which can process all relevant air traffic information such as that available to Eurocontrol. The applicable tools shall be used only if they are approved by the Commission including the application of correction factors to compensate for any inaccuracies in the modelling methods.

If at the start of a reporting year an aircraft operator has the competent authority's approval to use the simplified procedure for small emitters, the operator may use this procedure for the entire reporting year.

An aircraft operator making use of the simplified procedure and exceeding the threshold for small emitters during a reporting year shall notify this fact to the competent authority

via the notification form for a substantial change in CO₂ emissions. Unless the aircraft operator demonstrates to the satisfaction of the competent authority, that the threshold will not be exceeded again from the following reporting period onwards, the aircraft operator shall update the monitoring plan for CO₂ emissions for the following reporting year to meet the monitoring requirements laid down in chapters 5.2. and 6.3.

CHAPTER 8. **APPROACHES FOR DATA GAPS (solely in the case of CO₂ emissions)**

The aircraft operator shall take all necessary action to prevent data gaps by implementing suitable control activities as referred to in paragraphs 14.2. and 14.3. in these guidelines.

If a competent authority, an aircraft operator or the verification office detects that for a flight covered by annex III of the Decision on tradable greenhouse gas emission allowances part of the data necessary for determining CO₂ emissions are missing as a result of circumstances beyond the control of the aircraft operator and cannot be determined by an alternative method defined in the monitoring plan for CO₂ emissions the CO₂ emissions for that flight may be estimated by the operator using the tools mentioned in chapter 7.

The aircraft operator deals with data gaps as abnormal circumstances for CO₂ emissions, pursuant to the rules and procedures featured in articles 27/13 and 27/14 of the Decision on tradable greenhouse gas emission allowances.

CHAPTER 9. **MONITORING PLAN FOR CO₂ EMISSIONS AND MONITORING PLAN FOR TONNE-KILOMETRE DATA**

9.1. Monitoring plan for CO₂ emissions

Aircraft operators shall submit their monitoring plan to the competent authority for approval at least four months prior to the start of the first reporting period.

The monitoring plan CO₂ emissions has to be updated every year pursuant to articles 27/8 and 27/9 of the Decision on tradable greenhouse gas emission allowances.

The competent authority shall ensure that the aircraft operator updates his monitoring plan CO₂ emissions before the start of a new trading period and submits a new updated monitoring plan CO₂ emissions if necessary. After submission of the monitoring plan used for reporting CO₂ emissions from 1 January 2010, a review of the monitoring plan CO₂ emissions takes place before the start of the trading period in 2013.

As part of this review the aircraft operator shall investigate, to the satisfaction of the competent authority, to see if the monitoring methodology can be changed so as to improve the quality of the reported data without this leading to unreasonable costs. Any proposals to change the monitoring methodology shall be notified to the competent authority.

The competent authority's permission is needed in the case of substantial changes in monitoring methodology requiring a revision of the monitoring plan for CO₂ emissions. The definition of substantial changes in CO₂ emissions is determined in article 1, point 49° of the Decision on tradable greenhouse gas emission allowances.

The monitoring plan for CO₂ emissions covers the following information:

For all aircraft operators:

1. identification of the aircraft operator, call sign or other unique designator used for air traffic control purposes, contact details of the aircraft operator and of a responsible person at the aircraft operator, and a contact address;
2. identification of the version of the monitoring plan for CO₂ emissions;
3. an initial list of aircraft types in its fleet operated at the time of submission of the monitoring plan for CO₂ emissions and the number of aircraft per type, and an indicative list of additional aircraft types expected to be used including, where available, an estimated number of aircraft per type as well as the fuel streams (fuel types) associated with each aircraft type;
4. a description of procedures, systems and responsibilities used to track the completeness of the list of emission sources over the monitoring year, i.e. for ensuring the completeness of monitoring and reporting of the CO₂ emissions of owned aircraft as well as leased-in aircraft;
5. a description of the procedures used to monitor the completeness of the list of flights operated under the unique designator by aerodrome pair, and the procedures used for determining whether flights are covered by annex III of the Decision on tradable greenhouse gas emission allowances, ensuring completeness and avoiding double-counting;
6. a description of data acquisition and handling activities and control activities, the quality control and assurance activities, including maintenance and calibration of measurement equipment (see paragraph 14.3.);
7. where applicable, information on relevant links with activities undertaken under the Community eco-management and audit scheme (EMAS) and other environmental management systems (e.g. ISO14001:2004), in particular on procedures and controls with relevance to greenhouse gas emissions monitoring and reporting.

In addition to points 1 to 7, for all aircraft operators, except small emitters who want to make use of the simplified procedure defined in chapter 7, the monitoring plan shall contain:

8. a description of the methods for monitoring fuel consumption in both owned and leased-in aircraft, including:
 - a) the chosen methodology (method A or method B) for calculation of fuel consumption; if the same method is not applied for all aircraft types, a justification for this approach is to be provided, as well as a list specifying which method is used under which conditions;
 - b) procedures for measurement of fuel uplifts and fuel in tanks, including the selected tiers, a description of the measurement instruments involved and the procedures for recording, retrieving, transmitting and storing information regarding measurements, as applicable;
 - c) a procedure to ensure that the total uncertainty of fuel measurements will comply with the requirements of the selected tier, referring to calibration certificates of measurement systems, national

laws, clauses in customer contracts or fuel suppliers accuracy standards;

d) the way the data in the central storage system is introduced, manual entry of documents, electronic data that is intermittently read, for example, by plugging in laptops of the pilots, or directly sending on data via satellites (ACARS). If various systems are available for sending on information for the same types of aircraft this shall be reported;

9. the procedures for the measurement of the density used for fuel uplifts and fuel in tanks, including a description of the measurement instruments involved, or if measurement is not feasible, the standard value used and a justification for this approach;
10. emission factors used for each fuel type, or in case of alternative fuels, the methodologies for determining the emission factors, including the approach for sampling, methods of analysis, a description of the laboratories used and of their accreditation and/or of their quality assurance procedures.

In addition to points 1 to 7, for small emitters who want to make use of the simplified procedure defined in chapter 7, the monitoring plan for CO₂ emissions shall contain the following information:

11. evidence that the thresholds defined for small emitters in chapter 7 are met;
12. a confirmation of which tool as described in chapter 7 will be used, including a description of the tool.

All commercial aircraft operators shall enclose with their monitoring plan for CO₂ emissions a copy of their Air Operating Certificate (AOC).

9.2. Monitoring plan for tonne-kilometre data

Pursuant to article 20ter, §§1 and 2 of the Decree on efficient use of energy aircraft operators shall submit a monitoring plan for tonne-kilometre data with measures for monitoring and reporting their tonne-kilometre data.

Aircraft operators have to submit their monitoring plan for tonne-kilometre data to the competent authority for approval at least four months before the start of the first reporting year.

The aircraft operator shall define in the monitoring plan which monitoring methodology is used for each aircraft type. In case the aircraft operator intends to use leased-in or other aircraft types which are not yet included in the monitoring plan at the time of submission to the competent authority, the aircraft operator shall include in the monitoring plan a description of the procedure to be used for defining the monitoring methodology for these additional aircraft types. The aircraft operator shall ensure that the monitoring methodology, once it has been chosen, is consistently applied.

The monitoring plan shall contain the following information:

1. the identification of the aircraft operator, call sign or other unique designator used for air traffic control purposes, contact details of the aircraft operator and of a responsible person at the aircraft operator, and a contact address;

2. identification of the version of the monitoring plan for tonne-kilometre data;
3. an initial list of aircraft types in its fleet operated at the time of submission of the monitoring plan for tonne-kilometre data and the number of aircraft per type, and an indicative list of additional aircraft types expected to be used including, where available, an estimated number of aircraft per type;
4. a description of procedures, systems and responsibilities used to track the completeness of the list of emission sources over the monitoring year, i.e. for ensuring the completeness of monitoring and reporting of the tonne-kilometre data, of owned aircraft as well as leased-in aircraft;
5. a description of the procedures used to monitor the completeness of the list of flights operated under the unique designator by aerodrome pair, and the procedures used for determining whether flights are covered by annex III of the Decision on tradable greenhouse gas emission allowances, ensuring completeness and avoiding double-counting;
6. a description of data acquisition and handling activities and control activities in accordance with paragraph 14.3.;
7. information about relevant links with activities under a quality management system, and particularly, where applicable, about procedures and control mechanisms relevant for monitoring and reporting tonne-kilometre data;
8. a description of the methods for determining tonne-kilometre data per flight, including:
 - a) the procedures, responsibilities, data sources and calculation formulae for determining and recording the distance per aerodrome pair;
 - b) whether a standard mass of 100 kg per passenger (tier 1) is used or the passenger mass from the mass and balance documentation (tier 2). In the case of tier 2, a description of the procedure for obtaining passenger mass is to be provided;
 - c) a description of the procedures used to determine the mass of freight and mail
 - d) a description of the measurement devices used for measuring mass of passengers, freight and mail.

CHAPTER 10.

REPORTING FORMAT

10.1. CO₂ emissions

Aircraft operators shall use the format set out in chapter 11 for reporting their annual CO₂ emissions. CO₂ emissions have to be reported in rounded tonnes of CO₂. For the purpose of emission calculations and reporting, emission factors are rounded so they cover only significant figures (rounding to 2 decimal places). Fuel consumption per flight is rounded to 1 decimal place. Total fuel consumption is rounded in tonnes.

10.2. Tonne-kilometre data

For the purpose of applying for the free allocation of emission rights tonne-kilometre data reporting is required solely for the reporting years specified in the request.

The tonne-kilometre data shall be reported as rounded values of [t km]. All data

Total aggregated CO ₂ emissions from all eligible flights using this fuel	t CO ₂				
Of which departure Member State is the same as arrival Member State (domestic flights)	t CO ₂				
All other flights (international flights both intra and extra EU)	t CO ₂				

Aggregated CO₂ emissions from all flights of which departure Member State is the same as arrival Member State (domestic flights):

Member State 1	t CO ₂				
Member State 2	t CO ₂				
Member State n	t CO ₂				

Aggregated CO₂ emissions from all flights departing from each Member State to another Member State or a third country:

Member State 1	t CO ₂		
Member State 2	t CO ₂		
Member State n	t CO ₂		

Aggregated CO₂ emissions from all flights arriving at each Member State from a third country:⁴

Member State 1	t CO ₂		
Member State 2	t CO ₂		
Member State n	t CO ₂		

The annex to the annual CO₂ emission report of aircraft operator shall also include:

- I. Annual CO₂ emissions and annual numbers of flights per aerodrome pair;
- II. Air traffic information for the reporting year generated by an instrument of Eurocontrol or another competent organisation, provided these instruments are approved by the European Commission;

⁴ Aggregated emissions per third country.

- III. A copy of the logbook of changes in CO₂ emissions and the logbook abnormal circumstances for CO₂ emissions, all containing changes and abnormal circumstances occurring during the reporting year;
- IV. Where appropriate, the approved notification forms for a substantial change in CO₂ emissions and the approved notification forms for high impact abnormal circumstance for CO₂ emissions.
- V. For each aircraft, which performs aviation activities, as defined in Annex III of the EAT decision⁵: a list of all flights to/from a member state of the European Union⁶, with for each flight records of:
 - o the airport of departure
 - o the airport of arrival;
 - o whether the flight was registered in the flight plan on the basis of 'ICAO designator' of 'registration marking of the aircraft'.
 - o whether the concerned flight is exempted or non-exempted according to Annex III of the EAT decision⁷
 - o the fuel use during the flight (in tonnes).

The aircraft operator may ask for the content of these annex to be treated as confidential.

The CO₂ annual emission reports which are in the possession of the competent authority must be made available to the public pursuant to article 30 of the Decree of 26 March 2004 concerning public access to government information en the Decision of the Government of Flanders of 28 October 2005 concerning the distribution of environmental information.

CHAPTER 12. CONTENT OF THE TONNE-KILOMETRE DATA REPORT

Each aircraft operator's tonne-kilometre data report shall contain the follow information:

1. data identifying the aircraft operator:
 - name of the aircraft operator;
 - address of the aircraft operator, with postal code and country;
 - type and number of aviation activities as referred to in annex III of the Decision on tradable greenhouse gas emission allowances;
 - address, telephone, fax and e-mail information of a contact person and
 - the name of the owner of the aircraft operator and any subsidiary company;
 - the call sign or other unique designators used for air traffic control purposes and relevant contact information;
2. name and address of the verification office;
3. the reporting year;
4. a reference to the relevant approved monitoring plan for tonne-kilometre data, mentioning the relevant version number;
5. relevant changes in the operations and deviations from the approved monitoring plan for tonne-kilometre data during the reporting year;
6. the aircraft registration numbers and types of aircraft used in the period covered by the tonne-kilometre data report to perform the aviation activities covered by annex III of the Decision on tradable greenhouse gas emission allowances carried out by the aircraft operator;

⁵ Available on <http://www.lne.be/en/ets-aviation/overview-legislation>.

⁶ After the extension of the EU ETS to the EEA countries, 'EU member state' should be read as 'EU member state or EEA country'.

⁷ Available on <http://www.lne.be/en/ets-aviation/overview-legislation>.

7. the calculation method chosen for the mass of passengers and the checked baggage, as well as for the mass of freight and mail;
8. the total number of passenger kilometres and tonne-kilometres for all flights that are carried out during the reporting year and are covered by the aviation activities referred to in annex III of the Decision on tradable greenhouse gas emission allowances;
9. for each aerodrome pair: ICAO designator of the two aerodromes, distance (= great circle distance + 95 km) in km, total number of flights per aerodrome pair in the reporting period, total mass of passengers and checked baggage (tonnes) during the reporting period per aerodrome pair, total number of passengers during the reporting period, total number of passenger kilometres per aerodrome pair, total mass of freight and mail (tonnes) during the reporting period, and the total tonne-kilometres (t km).

The tonne-kilometre data report shall also include:

- I. Air Traffic Information for the reporting year generated by a tool from Eurocontrol or from any other relevant organisation, provided the tool has been approved by the European Commission.
- II. a copy of the logbook for changes in tonne-kilometre and the logbook for abnormal circumstances for tonne-kilometre data, all containing changes and abnormal circumstances occurring during the reporting year;
- III. where appropriate, the notification forms, approved by the competent authority, for a substantial change to tonne-kilometre data and the notification forms, approved by the verification office, for high impact abnormal circumstance.
- IV. For each aircraft, which performs aviation activities, as defined in Annex III of the EAT decision⁸: a list of all flights to/from a member state of the European Union⁹, with for each flight records of:
 - the airport of departure
 - the airport of arrival;
 - whether the flight was registered in the flight plan on the basis of 'ICAO designator' of 'registration marking of the aircraft'.
 - whether the concerned flight is exempted or non-exempted according to Annex III of the EAT decision¹⁰
 - the Great Circle Distance, determined following the provision of punt 5.3.1.2;
 - the number of passengers;
 - in case of using the 'Mass and balance' approach: the total weight of the passengers in tonnes;
 - the weight of transported freight and mail in tonnes.

The aircraft operator may ask for the content of these annex to be treated as confidential

CHAPTER.13. RETENTION OF INFORMATION

The aircraft operator has to document and archive monitoring data about CO2 emissions of the aircraft operator from all emission sources and/or source streams belonging to activities as specified in annex III of the Decision on tradable greenhouse gas emission allowances.

The aircraft operator also has to document and archive any monitoring data about payload and distance from calendar years for which tonne-kilometre data is reported.

The documented and archived monitoring data shall be sufficient to

⁸ Available on <http://www.lne.be/en/ets-aviation/overview-legislation>.

⁹ After the extension of the EU ETS to the EEA countries, 'EU member state' should be read as 'EU member state or EEA country'.

¹⁰ Available on <http://www.lne.be/en/ets-aviation/overview-legislation>.

allow for the verification of the annual CO₂ emission report or tonne-kilometre data report submitted by the operator pursuant to article 20ter, §§ 1, 2 and 7 of the Decree on efficient use of energy, in accordance with the criteria of the articles 32/2 of the Decision on tradable greenhouse gas emission allowances.

Data that are not part of the annual CO₂ emission report or tonne-kilometre data report shall not be required to be reported or made public otherwise.

To allow reproducibility of the determination of CO₂ emissions and tonne-kilometre data by the verification office or another third party the aircraft operator shall retain the following documentation for at least ten years after the submission of the CO₂ emission report or tonne-kilometre data report pursuant to article 20ter, §3 and §7 of the Decree on efficient use of energy:

- the list of all emission sources and source streams monitored;
- the activity data used for any calculation of CO₂ emissions for each source stream, categorised by fuel type;
- documents justifying the selection of the monitoring methodology and the documents justifying temporal or non-temporal changes of monitoring methodologies and tiers approved by the competent authority;
- documentation of the monitoring methodology and results from the development of activity-specific emission factors and biomass fractions for specific fuels, and oxidation or conversion factors, and respective proofs of approval from the competent authority;
- documentation of the process of collection of activity data for the aircraft operator and its source streams;
- documentation of the responsibilities in connection with CO₂ emission monitoring;
- the annual CO₂ emission report or tonne-kilometre data report;
- any other information that is identified as required for the verification of the annual CO₂ emission report or tonne-kilometre data report;
- the list of aircraft owned and leased-in, and necessary evidence for the completeness of that list;
- the list of flights covered in each reporting year, and necessary evidence for the completeness of that list;
- data used for determination of payload and distance relevant for the years for which tonne-kilometre data is reported;
- documentation on the approach for data gaps if applicable, and the data used for closing the data gaps where they have occurred.

This information may also be kept electronically, subject to the due application of a quality assurance system.

CHAPTER 14. CONTROL AND VERIFICATION

14.1. Data acquisition and handling

The operator shall establish, document, implement and maintain effective data acquisition and handling activities (hereinafter referred to as data flow activities) for the monitoring and reporting of CO₂ emissions or tonne-kilometre data in accordance with the approved monitoring plan for CO₂ emissions or the approved monitoring plan for tonne-kilometre data and these guidelines. These data flow activities include measuring, monitoring, analysing, recording, processing and calculating parameters in order to be able to report on the CO₂ emissions or tonne-kilometre data.

14.2. Control system

The operator shall establish, document, implement and maintain an effective control system to ensure that the annual CO₂ emission report or tonne-kilometre data report resulting from the data flow activities does not contain misstatements and is in compliance with the approved monitoring plan for CO₂ emissions or the approved monitoring plan for tonne-kilometre data and these guidelines.

The operator's control system is made up of the processes aimed at effective monitoring and reporting as designed and implemented by those in charge of annual reporting. The control system consists of the following components:

- a) the operator's own assessment process of inherent and control risks to errors, misrepresentations or omissions (misstatements) in the annual CO₂ emission report or tonne-kilometre data report and non-conformities in relation to the approved monitoring plan for CO₂ emissions or the approved monitoring plan for tonne-kilometre data and these guidelines;
- b) control activities that help to mitigate the identified risks (not for small emitters, as determined in chapter 7).

The operator shall evaluate and improve the operator's control system to ensure that the annual CO₂ emission report or tonne-kilometre data report is not materially misstated or contains a material non-conformity. The evaluations shall include internal audits of the control system and the data reported. The control system may make reference to other procedures and documents, including those being part of the following management systems: EU Eco- Management and Audit Scheme (EMAS), ISO 14001:2004 (*Environmental management systems — Specification with guidance for use*), ISO 9001:2000 and financial control systems. When such a reference has been made, the operator shall ensure that the requirements in the approved monitoring plan for CO₂ emissions or the approved monitoring plan for tonne-kilometre data and these guidelines are arranged for in the respective applicable system.

14.3. Control activities

For the purposes of controlling and mitigating the inherent and control risks pursuant to paragraph 14.2. the operator shall identify and implement control activities in accordance with the following paragraphs 14.3.1. to 14.3.6.

14.3.1. Procedures and responsibilities

The operator shall assign responsibilities to all data flow activities and to all control activities. Conflicting duties shall be segregated, including handling and control activities, where possible and otherwise alternative controls shall be put in place.

The operator shall document the data flow activities pursuant to paragraph 14.1. and the control activities pursuant to paragraphs 14.3.2. to 14.3.6. in written procedures, including:

- the sequence and interaction of data acquisition and handling activities according to 14.1., including the methods of calculations or measurements which are used;
- risk assessment of the definition and evaluations of the control system according to 14.2.;
- management of the necessary competences for the responsibilities assigned according to paragraph 14.3.1.;
- quality assurance of the measuring equipment and information technology used (if applicable) according to paragraph 14.3.2.;
- internal reviews of reported data according to paragraph 14.3.3.;

- outsourced processes according to paragraph 14.3.4.;
- corrections and corrective action according to paragraph 14.3.5.;
- records and documentation according to paragraph 14.3.6.

Each of these procedures shall address (where appropriate) the following elements:

- responsibilities
- records (electronic and physical, whatever is applicable and suitable),
- information systems used (if applicable),
- input and output, and clear linkage with previous and next activity,
- frequency (if applicable).

The procedures shall be suitable to mitigate the identified risks.

14.3.2. Quality assurance

The operator shall ensure that relevant measuring equipment is calibrated, adjusted and checked at regular intervals including prior to use, and checked against measurement standards traceable to international measurement standards where available, in accordance with the risks identified according to paragraph 13.2. The operator shall identify in the monitoring plan for CO₂ emissions or the monitoring plan for tonne-kilometre data if components of the measurement instrument cannot be calibrated, and propose alternative control activities, which need approval of the competent authority. When the equipment is found not to conform to requirements, the operator shall promptly take necessary remedial action. These corrective measures have to be proposed and applied by the aircraft operator pursuant to the rules and procedures for changes in CO₂ emissions or tonne-kilometre data and abnormal circumstances for CO₂ emissions or tonne-kilometre data as determined in articles 27/11 and 27/13 of the Decision on tradable greenhouse gas emission allowances. Records of the results of calibration and authentication shall be retained for a period of 10 years.

If the operator uses information technology, including process-control computer technology, it shall be designed, documented, tested, implemented, controlled and maintained as a way to ensure reliable, accurate and timely processing of data in accordance with the risks identified according to paragraph 14.2. This includes the proper use of calculation formulae contained in the monitoring plan for CO₂ emissions or the monitoring for plan tonne-kilometre data. The control of information technology shall include access control, back up, recovery, continuity planning and security.

14.3.3. Reviews and validation of data

For managing the data flow, the operator shall design and implement reviews and validation of data in accordance with the risks identified according to paragraph 14.2. These validations may be conducted either manually or electronically. They shall be designed in such a way that boundaries for rejecting the data are clear upfront, where possible.

Simple and effective data reviews may be performed at the operational level by comparisons of monitored values using vertical and horizontal approaches.

A vertical approach compares emissions data monitored for the same aircraft operator in different years. A monitoring error is likely if differences between annual data cannot be explained by

- changes in activity levels;
- changes concerning fuels;

- changes concerning the emitting processes (e.g. energy efficiency improvements).

A horizontal approach compares values resulting from different operational data collection systems, including:

- comparison of fuel or material purchasing data with data on stock changes (based on information on end stock and begin stock) and data on consumption for the applicable source streams,
- comparison of emission factors that have been analysed, calculated or obtained from the fuel supplier, to national or international reference emission factors of comparable fuels;
- comparison of measured and calculated CO₂ emissions;
- comparison of the list with emission sources (aircraft) and the list of flights operated with information generated by an instrument of Eurocontrol or another competent organisation, provided these instruments are approved by the European Commission.

14.3.4. Outsourced processes

Where an operator chooses to outsource any process in the data flow, the operator shall control the quality of these processes in accordance with the risks identified according to paragraph 14.2. The operator shall define appropriate requirements for outputs and methods, and review the quality delivered.

14.3.5. Corrections and corrective action

When any part of the data flow activities or control activities (device, equipment, staff member, supplier, procedure or other) is found not to function effectively or to function outside set boundaries, the operator shall promptly take appropriate corrections and the rejected data shall be corrected. The operator shall assess the validity of the outputs of the applicable steps, determine the root cause of the malfunctioning or error, and take appropriate corrective action. These corrective measures have to be proposed and applied by the aircraft operator pursuant to the rules and procedures for changes in CO₂ emissions or tonne-kilometre data and abnormal circumstances for CO₂ emissions or tonne-kilometre data, as determined in articles 27/11 and 27/13 of the Decision on tradable greenhouse gas emission allowances.

14.3.6. Records and documentation

To be able to show and ensure compliance, and to be able to reconstruct emissions data reported, the operator shall keep records of all control activities (including quality assurance/quality control of equipment and information technology, review and validation of data and corrections) and all information listed in chapter I.7 for at least 10 years.

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

14.4. Verification

14.4.1. General principles

The objective of the verification is to ensure that CO₂ emissions and tonne-kilometre data have been monitored in accordance with the guidelines and that reliable and

correct CO₂ emissions and tonne-kilometre data shall be reported pursuant to articles 20ter, §§1, and §7 of the Decree on efficient use of energy.

Pursuant to paragraph 14.4.2, in point e), a verification shall come to a verification opinion that states with reasonable assurance whether the data in the verified annual CO₂ emission report or the verified tonne-kilometre data report is free from material misstatements and whether there are no material non-conformities.

The aircraft operator has to provide the verification office with the annual CO₂ emission report and, where appropriate, the tonne-kilometre data report, a copy of the approved monitoring plan(s) for CO₂ emissions or monitoring plan for tonne-kilometre data for the reporting year, the approved notification forms for abnormal circumstances for CO₂ emissions or tonne-kilometre data for the reporting year and the logbooks of abnormal circumstances for CO₂ emissions or tonne-kilometre data and substantial changes in CO₂ emissions or tonne-kilometre data for the reporting year and any other relevant information.

The scope of the verification is defined by the tasks the verification office needs to perform to achieve the above objective. As a minimum the verification office shall perform the activities described in paragraph 14.4.2.

14.4.2. Verification methodology

The verification office shall plan and perform verification with an attitude of professional scepticism recognising that circumstances may exist that cause the information contained in the annual CO₂ emission report or tonne-kilometre data report to be materially misstated.

As part of the verification process, the verification office shall carry out the following steps:

a) Strategic analysis

The verification office shall:

- verify whether the monitoring plan for CO₂ emissions or the monitoring plan for tonne-kilometre data has been approved by the competent authority and whether it is the right version. If this is not the case, the verification office should not continue the verification except for elements that are obviously not affected by the non-approval;
- understand each activity undertaken by the aircraft operator, the emission sources, the relevant aviation activities, the metering equipment used to monitor or measure activity data, the origin and application of emission factors and oxidation/conversion factors, any other data used to calculate or measure the CO₂ emissions or tonne-kilometre data and the environment in which the aircraft operator operates;
- understand the monitoring plan for CO₂ emissions or the monitoring plan for tonne-kilometre data of the aircraft operator, the dataflow as well as its control system, including the overall organisation with respect to monitoring and reporting;
- apply the materiality level defined in table 3 below;
- in the light of the logbook of abnormal circumstances for CO₂ emissions or tonne-kilometre data, the logbook of substantial changes in CO₂ emissions or tonne-kilometre data and air traffic information (of Eurocontrol, for example,) check to see if special attention has to be paid to specific data featured in the annual CO₂ emission report or tonne-kilometre data report presented.

Table 3: Materiality level

		Materiality level
Aircraft operators with an annual CO ₂ emission of 500 kilotonnes CO ₂ at the most	Aircraft operators with an annual CO ₂ emission of 50 kilotonnes CO ₂ at the most	5%
	Aircraft operators with an annual CO ₂ emission of over 50 kilotonnes CO ₂	
Aircraft operators with an annual CO ₂ emission of over 500 kilotonnes CO ₂		2%

The verification office shall perform the strategic analysis in such a way that the verification office is able to conduct the risk analysis as set out below. When necessary this shall include a site visit.

b) Risk analysis

The verification office shall:

- analyse the inherent risks and control risks related to the scope and complexity of the operator's activities and emission sources and source streams, which could lead to a material misstatements and non-conformities;
- draw up a verification plan which is commensurate with this risk analysis. The verification plan describes the way in which the verification activities are to be carried out. It contains a verification programme and a data sampling plan. The verification programme describes the nature of the activities, at what times they must be carried out and their scope in order for the verification plan to be completed. The data sampling plan sets out what data is to be tested in order to reach a verification opinion.

c) Verification

General

In carrying out the verification, the verification office shall conduct a site visit, when appropriate, to inspect the operation of meters and monitoring systems, conduct interviews, and collect sufficient information and evidence.

Moreover, the verification office shall :

- carry out the verification plan by gathering data in accordance with the defined sampling methods, walkthrough tests, document reviews, analytical procedures and data review procedures, including any relevant additional evidence, upon which the verification office's verification opinion will be based;
- confirm the validity of the information used to calculate the uncertainty level as set out in the approved monitoring plan for CO₂ emissions or the approved monitoring plan for tonne-kilometre data;

- verify that the approved monitoring plan for CO₂ emissions or the approved monitoring plan for tonne-kilometre data is implemented and seek understanding whether the monitoring plan of CO₂ emissions or the approved monitoring plan for tonne-kilometre data is up-to-date;
- request the aircraft operator to provide any missing data or complete missing sections of audit trails, explain variations in the emissions data, or revise calculations, or adjust reported data, before reaching a final verification opinion. The verification office should, in any form, report all non-conformities and misstatements identified to the operator.

The aircraft operator shall correct any reported misstatements. The entire population from which a sample was taken shall be corrected.

Throughout the verification process, the verification office shall determine misstatements and non-conformities by assessing whether:

- the monitoring plan for CO₂ emissions or the monitoring plan for tonne-kilometre data has been implemented to support the determination of non-conformities;
- there is clear and objective evidence obtained through the gathering of data to support the determination of misstatements.

CO₂ emissions

In addition to the verification requirements set out in paragraph 14.4 the following shall be taken into account by the verification office:

- completeness of flight and emissions data compared to air traffic data such as collected by Eurocontrol;
- consistency between aggregated fuel consumption data and data on fuel purchased or otherwise supplied to the aircraft performing the aviation activity.

The verification office may proceed at any time, in locations the aircraft operator uses to carry out aviation activities, to check if the monitoring methodology described in the monitoring plan for CO₂ emissions is properly applied.

Tonne-kilometre data

In addition to the verification requirements set out in paragraph 14.4 the following shall be taken into account by the verification office:

- completeness of flight and tonne-kilometre data compared to air traffic data such as collected by Eurocontrol to ascertain that only eligible flights have been taken into account in the operators report;
- consistency between reported data and mass and balance documentation.

The verification office may carry out verification activities at locations the aircraft operator uses for performing the aviation activities to see if the monitoring methodology described in the monitoring plan for tonne-kilometre data is properly applied. Flight data collected by Euro control has to be available in the aircraft operator's locations at all time.

For tonne-kilometre data the materiality level is 5%.

d) Internal verification report

At the end of the verification process, the verification office shall prepare an

internal verification report. The verification report shall record evidence showing that the strategic analysis, the risk analysis and the verification plan has been performed in full, and provide sufficient information to support verification opinions. The internal verification report should as well facilitate a potential evaluation of the audit by the competent authority and accreditation body.

Based on the findings contained in the internal verification report, the verification office shall make a judgment with respect to whether the CO₂ emission report or tonne-kilometre data report contains any material misstatement as compared to the materiality threshold, and whether there are material non-conformities or other issues relevant for the verification opinion.

e) Verification report

The verification office shall present the verification methodology, the verification office's findings and verification opinion in a verification report, addressed to the operator, to be submitted by the operator with the annual CO₂ emission report or tonne-kilometre data report to the competent authority. An annual CO₂ emission report or tonne-kilometre data report is verified as satisfactory if the total CO₂ emissions or the total tonne-kilometre data are not materially misstated, and if, in the opinion of the verification office, there are no material non-conformities. In the case of non-material non-conformities or non-material misstatements, the verification office may include these in the verification report (verified as satisfactory with non-material non-conformities or non-material misstatements). The verification office may also report these in a separate management letter.

The verification office may conclude an annual CO₂ emission report or tonne-kilometre data report is not verified as satisfactory, if the verification office finds material non-conformities or material misstatements (with or without material nonconformities). The verification office may conclude an annual CO₂ emission report or tonne-kilometre data report is not verified when there was a limitation of scope (when circumstances prevent, or a restriction was imposed that prevents, the verification office from obtaining evidence required to reduce the verification risk to the reasonable level) and/or material uncertainties.

The administering Member State shall ensure that the operator addresses non-conformities and misstatements after consultation of the competent authority in a timeframe set by the competent authority. In addition, any divergences of opinion between operators, the verification office and competent authorities shall not affect proper reporting and shall be settled in accordance with these guidelines, the requirements set forth in articles 32/2 of the Decision on tradable greenhouse gas emission allowances and the relevant national procedures.

CHAPTER 15. CO₂-NEUTRAL BIOMASS

There is an opportunity to use biofuels as an alternative fuel appearing in a pure or impure form or in a mixed form. If the aircraft operator wishes to use such a fuel, this has to be reported to the competent authority which shall arrange for a verification. During this

verification it will be established which analyses and requirements have to appear in the monitoring plan.

The term biomass fraction for the purpose of these guidelines refers to the mass percentage of biomass carbon according to the biomass definition (see chapter 5.2) out of the total mass of carbon in a sample.

Fuel shall being qualified as pure biomass, as a result of which simplified provisions for monitoring and reporting as set out in chapter 4 will be applied, if the nonbiomass content accounts to no more than 3% of the total quantity of the fuel concerned.

The specific procedure to determine the biomass fraction of a specific fuel including the sampling procedure shall be agreed with the competent authority before the start of the reporting period in which it will be applied.

Seen to be annexed to the Flemish Government Decree of (...) establishing guidelines for the monitoring and reporting of CO₂ emissions and tonne-kilometre data from aviation activities.

Brussels,

The Flemish Minister for the Environment, Nature and Culture,

Joke SCHAUVLIEGE