

Distinction between big emitters and small emitters

„big“ Emitters

243 or more flights per period of three consecutive four-month periods

or

Annual emissions 10.000 t or more


„small“ Emitters

Fewer than 243 flights per period of three consecutive four-month periods

or

Annual emissions lower than 10.000 t

+ Simplified procedures



1. Determination of CO₂-emissions: big emitters

Determination of CO₂-Emissions (Section 2 Annex XIV)

CO₂-Emissions = Fuel consumption [t] * emission factor [t CO₂/t fuel]

1. Determination of CO₂-emissions: big emitters

Fuel Consumption I (Section 2.2 Annex XIV)

Fuel consumption shall be monitored for each flight and each fuel type

Choice between method (calculation formulae) A and B

- Criterion for the choice: method which provides for the most complete and timely data combined with the lowest uncertainty without incurring unreasonable cost => method that is yet in use?
- If both methods will be used => justification and clear classification in the monitoring plan
- In both calculation formulae included: fuel consumed by auxiliary power units (APU, see also Annex IV Part B Directive: „fuel consumption shall include fuel consumed by the auxiliary power unit“)



1. Determination of CO₂-emissions: big emitters

Fuel consumption II – Method A and B (Section 2.2.1 Annex XIV)

Method A	Method B
Fuel contained in the tank after fuel uplift for the flight	Fuel contained in the tank at block-on of the previous flight
- Fuel contained in the tank after fuel uplift for the subsequent flight	+ Fuel uplift for the flight
+ Fuel uplift for the subsequent flight	- Fuel contained in the tank at block-on of the flight

Method A

=> APU until fuel uplift for the subsequent flight

Method B

=> APU after fuel uplift until block-on



1. Determination of CO₂-emissions: big emitters

Fuel Consumption IV – Exceptional Cases (Section 2.2 Annex XIV)

No flight before/after the flight that is being monitored

(e.g. major maintenance involving the emptying of the tanks)

Exceptional cases (see calculation formulae), data as recorded by the technical log

Method A (no subsequent flight)	Method B (no previous flight)
Fuel contained in the tank after fuel uplift for the flight	Fuel contained in the tank at block-on of the previous flight
- Fuel contained in the tank after fuel uplift for the subsequent flight	+ Fuel uplift for the flight
	- Fuel contained in the tank at block-on of the flight

1. Determination of CO₂-emissions: big emitters

Fuel Consumption V – Data Sources (Section 2.2 Annex XIV)

fuel supplier (invoices, delivery notes)

onboard measurement systems

Technical log

Electronically transmitted

Description of data sources and methods for transmitting, storing and retrieving of data in the monitoring plan.

1. Determination of CO₂-emissions: big emitters

Fuel consumption VI – density (Section 2.2.3 Annex XIV)

Fuel consumption is determined in units of volume => conversion to mass needed

Hierarchy for the determination of density

„Actual“ density

1. On-board measurement system
2. Measured by the fuel supplier at fuel uplift and recorded on the invoice/delivery note
3. Use of standard density-temperatur correlation table and temperature of the fuel during the uplift (provided by the supplier or the aerodrome)
No „actual“ values available (justification in the monitoring plan) :
4. Standard-density factor of 0.8 kg/l

1. Determination of CO₂-emissions: big emitters

Uncertainty Assessment I (Section 3 Annex XIV)

Operator shall have an understanding of the main sources of uncertainty (fuel consumption, density, alternative fuels: emission factor)

No requirement to carry out a detailed uncertainty assessment as set out in Section 7.1 Annex I, if sources of uncertainty and their associated levels of uncertainty are identified

Special requirements for measurement devices on board if no information fuel uplift of supplier is available

For all other components of the monitoring methodology uncertainties may be based on conservative expert judgement, taking into account the number of flights during the reporting year

1. Determination of CO₂-emissions: big emitters

Uncertainty Assessment II (Section 3 Annex XIV)

Uncertainty Assessment for Fuel Uplift

Solely based on invoices/delivery notes =>

no further proof of the associated uncertainty is required

Based on on-board measurement systems

- Supported by calibration certificates
- No calibration certificates: uncertainty based on aircraft manufacturer's specifications and need to carry out routine checks
(satisfactory operation of the fuel measurement system)

Operator has to carry out regularly cross-checks between fuel uplift quantity provided by the invoices/delivery notes and indicated by the on-board measurement system => if needed: corrective actions according to Section 10.3.5 Annex I

1. Determination of CO₂-emissions: big emitters

Quantification Requirements I (Section 2.2.2 Annex XIV)

Requirements for each fuel type for the complete reporting period

- Tier 1: uncertainty fuel consumption < +/- 5 %
 minimum threshold for emissions <= 50,000 t/a
- Tier 2: uncertainty fuel consumption < +/- 2.5 %
 emissions > 50,000 t/a

1. Determination of CO₂-emissions: big emitters

Quantification Requirements I (Section 2 Annex I)

Use of more than one fuel type => simplifications are possible for

Minor source stream

- Max. 5,000 t CO₂/a or max. 10 % of emissions (up to 100,000 t/a)
- At least tier 1

De-minimis source stream

- Max. 1,000 t CO₂/a or 2 % of emissions (up to 20,000 t/a)
- Estimation method

Pure biofuel => estimation method

1. Determination of CO₂-emissions: big emitters

Emission Factors (and net Calorific Values) (Section 2.3 Annex XIV)

	EF [t/t]	EF [t/GJ]	Hu [GJ/t]
Aviation gasoline	3.10	0.070	44.3
Jet gasoline	3.10	0.070	44.3
Jet kerosene	3.15	0.0715	44.1
Alternative fuels	Individual determination, see Section 5.5 and 13 Annex I		
Pure biofuel	0	0	Estimated value

$$EF = C_{gesamt} * 3.664$$

$$EF_{heizwertbezogen} = \frac{EF_{massebezogen}}{Hu}$$

2. Determination of CO₂-emissions: small emitters

Section 4 Annex XIV MRG 2009

Aircraft operators (AOs) that are small emitters may **estimate the fuel consumption using tools** implemented by Eurocontrol or others which can process relevant air traffic information

Relevant air traffic information: actually flown routes, estimation of fuel consumption for different aircraft types and flight conditions

Tool has to be **approved by COM**

Until now the only tool that will be approved in time by COM is PAGODA by Eurocontrol

Simplified procedure can be used from the beginning.