

# **Project and procedures to improve some Aircraft Types models and Fuel Consumption estimates in the Eurocontrol “Small emitters” tool**

## **1- Background:**

The aim of this project is to update the Eurocontrol Fuel estimator, also called “Small Emitters” tool (“**SE tool**” hereafter) in the Emission Trading Scheme context.

The project planning is to get an operational and on-line updated SE tool before end October 2011 so that every concerned party can use the tool and benefit from its improved performances for the next 2012 reporting period based on 2011 Traffic.

The latest date for Aircraft Operators who are willing to contribute for submitting to Eurocontrol ([antonio.astorino@eurocontrol.int](mailto:antonio.astorino@eurocontrol.int)) their detailed actual fuel burn data is **1st September 2011**. Data submitted after this date will not be considered for the update exercise this year.

The development by Eurocontrol of the SE tool started in 2009 and was sponsored by the European Commission. On 9 July 2010 the Commission adopted a Regulation on the approval of the SE tool developed by Eurocontrol to estimate the fuel consumption of certain small emitting aircraft operators.

The very first application by the European Commission of the Eurocontrol SE tool was the calculation of the aviation historical emission for the ETS, for year 2004-2006 (See publication by Commission of EU ETS Aviation historical emission on 7 March 2011).

Consequently the SE tool was also found reliable and robust enough to be an aid for Aircraft Operators interested and authorised (Small emitter) to use it in the context of the MRV (reference) for simplified monitoring procedure (Part 4 of Annex XIV of the Guidelines on monitoring, reporting and verification (Decision 2007/589/EC), as well as for data gap procedure (Part 5 of Annex XIV..).

The SE tool is actually a computation algorithm based on ANCAT/EMEP CORINAIR methodology that indicates the fuel burn estimation when an ICAO Aircraft type and a distance flown are passed to the algorithm. The SE tool has been built in 2009 using a statistical analysis of actual fuel burn records, on a flight by flight basis, as provided by volunteer Aircraft Operators to Eurocontrol.

Since November 2010 the ETS Support Facilities (ETS-SF) are available for the benefit of Member States and Competent Authorities (CA) and also for Aircraft Operators (AO) who are paying for specific associated services. All these Eurocontrol services and deliverables are also using the fuel estimations of the SE tool in their background.

The SE tool itself can be visualised and used in a standalone for as an excel calculation sheet that can be found at [http://www.eurocontrol.int/environment/public/standard\\_page/small\\_emitters.html](http://www.eurocontrol.int/environment/public/standard_page/small_emitters.html).

In the long term perspective, Eurocontrol is willing to regularly update the SE tool with actual fuel burn data to be collected from Aircraft Operators.

Priority is given to improve the Aircrafts types that are not presently optimally modelled (because of a lack of actual fuel burn data during the initial building phase). The updating of the aircraft types already well modelled, with more recent actual fuel burn data so to reflect ATM or airframes changes (winglets or flaps, new and better routes' network etc..), will be the subject of a separate project.

The evolutions of the SE tool will help every parties, and Aircraft Operators in first place, to answer to the best to the exigencies of the MRV.

This document explains the actual fuel burn data requirements that Aircraft Operators must respect if they wish to contribute to this Eurocontrol project that addresses the aircraft types that are not presently optimally modelled and that are listed hereafter.

The contributing Aircraft operators will get a direct benefice as their data will improve the performances and accuracy of the SE tool and consequently the fuel estimations for their own flights.

## 2- Aircraft Types to be improved:

Small Emitter TOOL Aircraft Types that required updating  
Global statistics

	MTOM ABOVE 5,7			MTOM BELOW 5,7		Grand Total
	"Heavy" Jet	Jet	Turbo Prop	Jet	Turbo Prop	
Nb of Aircrafts Types Models to be improved	<b>35</b>	<b>147</b>	<b>83</b>	231	71	567

It should be understood that these 265 (35+147+83) not optimally modelled Aircrafts types represent in total less than 6 % of the total CO2 that is emitted in EU27.

302 (231+71) Aircraft types are less than 5,7 tonnes so they do not account in the ETS as the related associated traffic can be exempted (see Annex I to Directive 2008/101/CE). As a consequence there is no urgent need to improved them.

So the overall impact of the not optimally modelled 265 Aircraft types at the aviation sector level is not very important but it can be very different from an individual operator perspective who owns one of these Aircraft type even if he has only few flights.

Hereafter is the list of top 127 aircraft types (out of the 265 total types) **AND** that show traffic in 2010. These 127 aircraft types would need to be improved in priority and as soon as possible. As explained earlier this will be realised by the gathering of additional actual fuel burn data from Aircraft Operators.

Small Emitter TOOL Aircraft Types that required improved modelling

**Detailed Lists**

(both tables have the same contents but left table is sorted by Type name and right Table is sorted by Aircraft Type popularity in AOs fleets)

Aircraft Types by Name		
Aircraft Type code	Nb of Operators using the type	Total Nb of 2010 non-exempted but associated flights
A124	10	2.347
A139	26	3.348
A148	2	642
A225	2	13
<b>A388</b>	<b>7</b>	<b>7.133</b>
A4	1	12
AN12	19	2.899
AN22	1	1
AN24	8	383
AN28	6	32
AN32	1	8
AN72	6	56
AS32	12	1.176
ASTR	17	574
AT8T	10	110
ATLA	1	11
B25	1	1
B701	2	7
B703	6	57
<b>B712</b>	<b>7</b>	<b>9.479</b>
<b>B739</b>	<b>8</b>	<b>9.486</b>
BE30	31	1.806
BER2	2	2
C160	4	100
C17	4	16
C212	10	176
C25B	129	16.356
C27J	5	87
C295	3	44
C30J	5	54
C551	2	152

Aircraft Types by Popularity in AOs Fleets		
Aircraft Type code	Nb of Operators using the type	Total Nb of 2010 non-exempted but associated flights
CL60	382	20.321
GLEX	191	9.877
CL30	143	9.984
C25B	129	16.356
FA50	115	6.783
LJ60	111	9.885
C680	101	8.431
C750	85	3.734
GALX	81	5.215
LJ45	76	9.438
FA7X	76	6.098
GL5T	72	3.230
C560	55	8.090
GLF3	55	876
LJ35	54	2.882
<b>E190</b>	<b>43</b>	<b>161.910</b>
FA20	35	1.576
IL76	31	3.779
BE30	31	1.806
L410	30	12.144
SW4	26	15.023
A139	26	3.348
GLF2	26	303
LJ40	25	3.781
T154	25	1.331
J328	24	6.984
HA4T	24	735
LJ55	24	705
G150	22	1.385
YK42	21	850
<b>DH8A</b>	<b>20</b>	<b>81.488</b>

C560	55	8.090
C680	101	8.431
C750	85	3.734
CL2P	2	12
CL2T	5	474
CL30	143	9.984
CL60	382	20.321
CN35	9	45
D228	16	4.948
DC3	10	48
DC3T	1	7
DC6	1	17
DC86	9	826
DC87	4	166
<b>DH8A</b>	<b>20</b>	<b>81.488</b>
DH8B	14	4.824
DHC6	14	204
E120	17	10.832
<b>E190</b>	<b>43</b>	<b>161.910</b>
E2	1	2
E3CF	1	1
E3TF	1	1
EC25	10	265
EH10	1	2
EUFI	3	25
F16	3	4
F18	1	1
F60	2	8
FA10	19	1.584
FA20	35	1.576
FA50	115	6.783
FA7X	76	6.098
G150	22	1.385
G159	3	8
G222	1	1
GALX	81	5.215
GL5T	72	3.230
GLEX	191	9.877
GLF2	26	303
GLF3	55	876
H25A	2	2
H25C	17	787
H53	1	2
HA4T	24	735
HAWK	1	11
HUNT	3	11
IL62	8	134
IL76	31	3.779
IL96	5	1.356
J328	24	6.984
<b>JS32</b>	<b>18</b>	<b>18.990</b>
JU52	1	5

AN12	19	2.899
FA10	19	1.584
<b>JS32</b>	<b>18</b>	<b>18.990</b>
E120	17	10.832
LJ31	17	1.434
H25C	17	787
ASTR	17	574
D228	16	4.948
DH8B	14	4.824
DHC6	14	204
AS32	12	1.176
M18	12	78
T204	11	1.465
A124	10	2.347
EC25	10	265
C212	10	176
AT8T	10	110
DC3	10	48
DC86	9	826
YK40	9	624
CN35	9	45
<b>B739</b>	<b>8</b>	<b>9.486</b>
AN24	8	383
S92	8	302
IL62	8	134
<b>B712</b>	<b>7</b>	<b>9.479</b>
<b>A388</b>	<b>7</b>	<b>7.133</b>
B703	6	57
AN72	6	56
AN28	6	32
KA27	6	13
IL96	5	1.356
L188	5	1.231
CL2T	5	474
C27J	5	87
C30J	5	54
DC87	4	166
C160	4	100
MU30	4	73
S61	4	40
LJ25	4	36
SJ30	4	26
C17	4	16
SBR1	3	164
S64	3	107
C295	3	44
EUFI	3	25
L29B	3	25
HUNT	3	11
PUMA	3	10
G159	3	8
F16	3	4

K35R	1	11
KA27	6	13
L101	3	4
L159	1	2
L188	5	1.231
L29B	3	25
L410	30	12.144
LJ25	4	36
LJ31	17	1.434
LJ35	54	2.882
LJ40	25	3.781
LJ45	76	9.438
LJ55	24	705
LJ60	111	9.885
M28	2	2
M346	1	6
M55	2	4
MI26	2	5
MI8	12	78
MU30	4	73
NH90	1	1
PUMA	3	10
R722	1	1
S2P	1	3
S601	1	5
S61	4	40
S64	3	107
S92	8	302
SB29	1	2
SBR1	3	164
SJ30	4	26
SW4	26	15.023
T134	1	3
T154	25	1.331
T204	11	1.465
TOR	1	3
VC10	1	3
VF14	1	16
W3	1	2
WB57	1	4
WW24	2	8
Y130	1	3
YK40	9	624
YK42	21	850

L101	3	4
A148	2	642
C551	2	152
A225	2	13
CL2P	2	12
F60	2	8
WW24	2	8
B701	2	7
MI26	2	5
M55	2	4
BER2	2	2
H25A	2	2
M28	2	2
DC6	1	17
VF14	1	16
A4	1	12
ATLA	1	11
HAWK	1	11
K35R	1	11
AN32	1	8
DC3T	1	7
M346	1	6
JU52	1	5
S601	1	5
WB57	1	4
S2P	1	3
T134	1	3
TOR	1	3
VC10	1	3
Y130	1	3
E2	1	2
EH10	1	2
H53	1	2
L159	1	2
SB29	1	2
W3	1	2
AN22	1	1
B25	1	1
E3CF	1	1
E3TF	1	1
F18	1	1
G222	1	1
NH90	1	1
R722	1	1

The remaining 138 Aircrafts types that would also need to be updated are in [Annex 1](#). These aircrafts did not show any traffic in Europe in 2010, so it is likely that the related traffic and impact in the next years (if any) will be marginal.

### 3- Actual Fuel Burn data records requirements

The objective of Eurocontrol is to characterise **the aircrafts types as in the Table above** by gathering actual fuel burn data from the Aircraft Operators.

As some aircraft types in the above Table show a limited traffic (less than 1000 movements in average per Operator in 2010), it is recommended that the full year flight and actual fuel burn data for 2010 or 2011 (or both) are provided by the individual AO concerned.

For those aircraft types that are in bold in the above list and that show more than 1000 flights in 2010 per Individual Operator in Average, AOs concerned can provide a sub set of their 2010 or 2011 traffic, it is recommended that data are provided for at least one month in the summer period and one month in winter period in 2010 (or 2011).

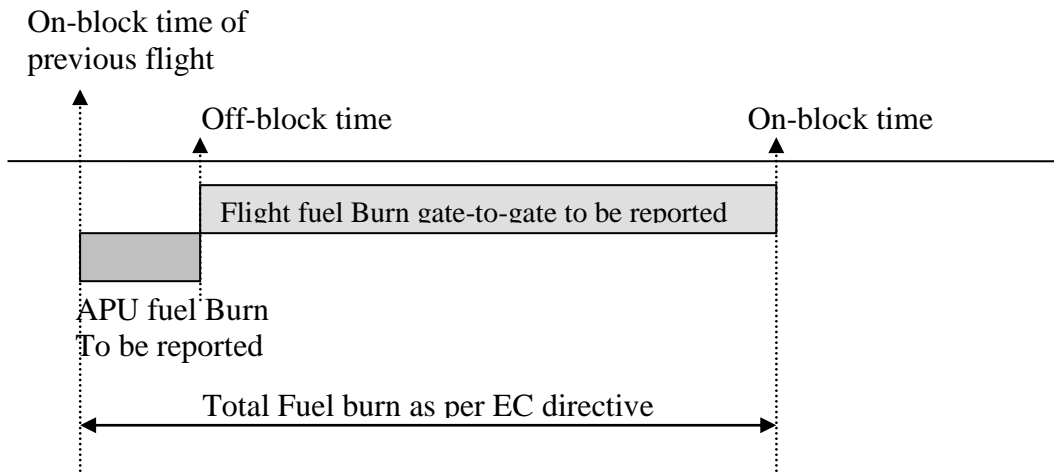
#### **File format and Mandatory minimum data per individual flight record:**

The data will have to be provided to Eurocontrol preferably in a Microsoft Excel file or eventually in a Comma separated value text file (csv).

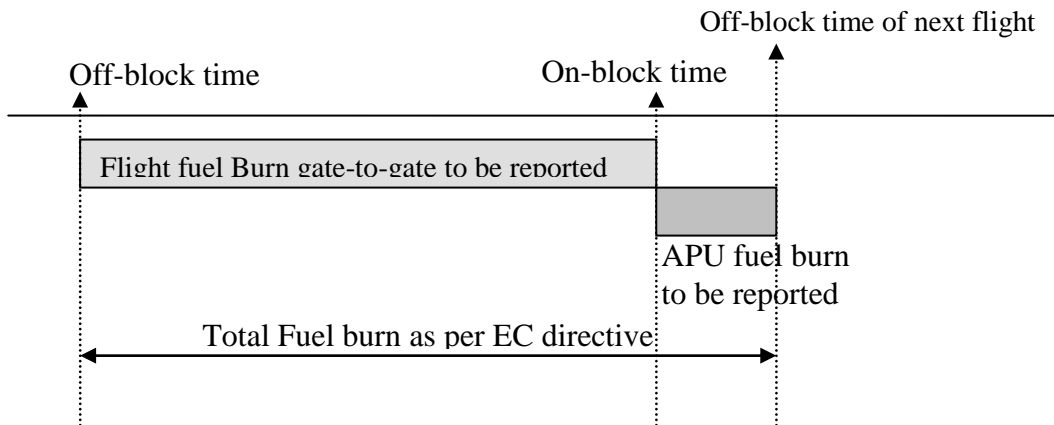
The column fields will be as follows in the proposed order.

- The Aircraft Identification as filed in field 7 of flight Plan for each flight record (Aircraft Registration Number or Operating Agency ICAO Code as in ICAO Doc 8585 followed by Flight Number)
- Departure Airport ICAO Designator (4 letters Code, as per ICAO doc 7910)
- Destination Airport ICAO designator (4 letters Code, as per ICAO doc 7910)
- Aircraft Type ICAO designator (as per ICAO doc 8643) **and that must be one of the types in the above Table**
- Total Fuel burn gate-to-gate (block-consumption) (in kg)
- Total Auxiliary Power Unit (APU) fuel burn (in KG, null or “N/A” if not applicable)
- Off-Blocks date and time (UTC)
- On-blocks date and time (UTC)

The APU fuel that is to be reported can be either before off-block of the flight or after on-block of the flight as presented in the two next diagrams:



Or



Here is an example of an Excel file that is expected:

Field 7 of Flight Plan	ORIG-ADEP	DEST-ADES	AC_TYPE	BLOCK_CONSUMPTION KG	APU CONSUMPTION KG	OFFBLOK _UTC	ONBLOK _UTC
"OPA123" or "RegMark"	LFPG	LFBO	A310	6640	150	01-09-2010 0:04	01-09-2010 1:04

**Complementary Information that could also be provided:**

Each flight record with the above information may be extended with the following additional fields that will ease some of the data quality checks that must be passed by each data records:

- IFPLID, unique number attributed by CFMU composed by 2 letters with 6 numbers (rolling number on 15 years basis) that is included in the confirmation message of the flight plan from CFMU to the Aircraft Operators
- The Aircraft registration Mark if not provided in the Field 7 of Flight Plan
- Actual Route Length according to flight records (in km or NM but indicate the unit).

## **4- Aircraft type Modelling by Eurocontrol**

Eurocontrol will perform data quality and validity checks on each data set submitted. When checks have been passed, the data sets from several AOs with the same Aircraft type will be merged and used to model the aircraft type with an improved precision.

## **5- Confidentiality**

The data provided by Aircraft Operators to Eurocontrol will be used by Eurocontrol only and solely for the exercise of updating the Small Emitter tool.

Individual flight data shall not be published by Eurocontrol.

The resulting Small Emitter tool will only be made public using the Generic ICAO Aircraft Type code with no indication of the actual Aircraft Operator name or owner identity that has provided the data.

## **6- Contact Person in Eurocontrol**

Please forward your data files or any questions to [antonio.astorino@eurocontrol.int](mailto:antonio.astorino@eurocontrol.int)

## ANNEX 1

### AIRCRAFT TYPES IN SE TOOL but without non-exempted traffic in 2010 ALL AIRCRAFT TYPES ARE ABOVE 5,7 TONNES

ICAO_TYPE_CODE	From ICAO Doc 8543			
	WTC	Description type	Nb of engines	Engine type
A1	M	Landplane	1	Piston
A10	M	Landplane	2	Jet
A140	M	Landplane	2	Turboprop
A50	H	Landplane	4	Jet
A6	M	Landplane	2	Jet
A660	L	Landplane	1	Turboprop
A7	M	Landplane	1	Jet
A743	M	Landplane	2	Jet
A748	M	Landplane	2	Turboprop
AJET	M	Landplane	2	Jet
ALIZ	M	Landplane	1	Turboprop
AMX	M	Landplane	1	Jet
AN30	M	Landplane	2	Turboprop
AN70	M	Landplane	4	Turboprop
B1	H	Landplane	4	Jet
B2	H	Landplane	4	Jet
B214	M	Helicopter	1	Turboprop
B24	M	Landplane	4	Piston
B26	M	Landplane	2	Piston
B52	H	Landplane	8	Jet
B609	M	Tilt-wing	2	Turboprop
B720	M	Landplane	4	Jet
BE12	M	Amphibian	2	Turboprop
BE32	M	Landplane	2	Turboprop
BELF	M	Landplane	4	Turboprop
BSTP	M	Helicopter	2	Turboprop
C119	M	Landplane	2	Piston
C123	M	Landplane	2	Piston
C125	M	Landplane	3	Piston
C135	H	Landplane	4	Jet
C141	H	Landplane	4	Jet
C15	M	Landplane	4	Jet
C2	M	Landplane	2	Turboprop
C46	M	Landplane	2	Piston
C5	H	Landplane	4	Jet
C97	M	Landplane	4	Piston
CAT	M	Amphibian	2	Piston
CNBR	M	Landplane	2	Jet
CONI	M	Landplane	4	Piston
CVLP	M	Landplane	2	Piston
CVLT	M	Landplane	2	Turboprop

DC85	H	Landplane	4	Jet
DH83	L	Landplane	1	Piston
DHC4	M	Landplane	2	Piston
DHC5	M	Landplane	2	Turboprop
E121	L	Landplane	2	Turboprop
E6	H	Landplane	4	Jet
ETAR	M	Landplane	1	Jet
F1	M	Landplane	2	Jet
F104	M	Landplane	1	Jet
F117	M	Landplane	2	Jet
F14	M	Landplane	2	Jet
F15	M	Landplane	2	Jet
F2	M	Landplane	1	Jet
F22	M	Landplane	2	Jet
F4	M	Landplane	2	Jet
F5	M	Landplane	2	Jet
FREL	M	Helicopter	3	Turboprop
G4SG	L	Landplane	1	Jet
GFLY	M	Landplane	1	Jet
GSPN	L	Landplane	2	Jet
H46	M	Helicopter	2	Turboprop
H47	M	Helicopter	2	Turboprop
H60	M	Helicopter	2	Turboprop
H64	M	Helicopter	2	Turboprop
HAR	M	Landplane	1	Jet
HERN	L	Landplane	4	Piston
HF20	M	Landplane	2	Jet
I114	M	Landplane	2	Turboprop
IL14	M	Landplane	2	Piston
IL18	M	Landplane	4	Turboprop
IL38	M	Landplane	4	Turboprop
IL86	H	Landplane	4	Jet
JAGR	M	Landplane	2	Jet
JCOM	M	Landplane	2	Jet
JS20	L	Landplane	2	Turboprop
K35E	H	Landplane	4	Jet
L29A	M	Landplane	4	Jet
METR	M	Landplane	2	Jet
MG21	M	Landplane	1	Jet
MG29	M	Landplane	2	Jet
MI14	M	Helicopter	2	Turboprop
MI24	M	Helicopter	2	Turboprop
MI28	M	Helicopter	2	Turboprop
MIR2	M	Landplane	1	Jet
MIRA	M	Landplane	1	Jet
MP20	L	Landplane	1	Piston
MRF1	M	Landplane	1	Jet
N262	M	Landplane	2	Turboprop
NIM	M	Landplane	4	Jet
P38	M	Landplane	2	Piston
P47	M	Landplane	1	Piston
PEMB	L	Landplane	2	Piston

PRM1	L	Landplane	2	Jet
PRTS	L	Landplane	2	Jet
R721	M	Landplane	3	Jet
RFAL	M	Landplane	2	Jet
S2T	M	Landplane	2	Turboprop
S3	M	Landplane	2	Jet
S4	L	Landplane	1	Piston
S61R	M	Helicopter	2	Turboprop
SB05	L	Landplane	2	Jet
SB35	M	Landplane	1	Jet
SB37	M	Landplane	1	Jet
SB39	M	Landplane	1	Jet
SBR2	M	Landplane	2	Jet
SK70	L	Landplane	2	Piston
STAR	L	Landplane	2	Turboprop
SU17	M	Landplane	1	Jet
SU25	M	Landplane	2	Jet
SU27	M	Landplane	2	Jet
SW2	L	Landplane	2	Turboprop
T160	H	Landplane	4	Jet
T2	L	Landplane	2	Jet
T22M	M	Landplane	2	Jet
T33	M	Landplane	1	Jet
T334	M	Landplane	2	Jet
T37	L	Landplane	2	Jet
TBM	M	Landplane	1	Piston
TCAT	M	Landplane	2	Piston
TIGR	L	Helicopter	2	Turboprop
TPIN	L	Landplane	2	Piston
TU95	H	Landplane	4	Turboprop
U2	M	Landplane	1	Jet
UH1	L	Helicopter	1	Turboprop
V22	M	Tilt-wing	2	Turboprop
YS11	M	Landplane	2	Turboprop
YURO	M	Landplane	2	Jet

And also the following unknown types as they have no correspondent in ICAO doc 8543 :

AN74	Jet
AT42	Heavy Jet
B727	Turbo Prop
CNTL	Jet
DA7X	Heavy Jet
DO24	Turbo Prop
HRZN	Turbo Prop
K35A	Heavy Jet
MIR4	Jet
TU142	Turbo Prop