HELLENIC CIVIL AVIATION AUTHORITY

Greece's Aviation Action Plan on Emissions Reduction

June 2015

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SECTION I : INTRODUCTION

1. Contact Information

Name of the Authority:	**Hellenic Civil Aviation Authority**
Point of contact:	**Georgia Lykou**, *Action Plan Focal Point*[1]
Street address:	**1, Vas. Georgiou Str. Elliniko**
	Postal Code 166 04
City:	**Athens**
Country:	**Greece**
Telephone number:	**+30-2109972916**
Fax number:	**+30-2109972911**
E-mail address:	propeenvdaa@hcaa.gr , prope@hcaa.gr

[1] HCAA, Governor's Letter with ref.: D1/C/1981/01-07-2014

2. Common Introductory Section

a) Greece is a member of the European Union since 1981 and a founding member of the European Civil Aviation Conference (ECAC). ECAC is an intergovernmental organisation covering the widest grouping of Member States[2] of any European organisation dealing with civil aviation. It is currently composed of 44 Member States, and was created in 1955.

b) ECAC States share the view that environmental concerns represent a potential constraint on the future development of the international aviation sector, and together they fully support ICAO's ongoing efforts to address the full range of these concerns, including the key strategic challenge posed by climate change, for the sustainable development of international air transport.

c) Greece, like all of ECAC's forty-four States, is fully committed to and involved in the fight against climate change, and works towards a resource-efficient, competitive and sustainable multimodal transport system.

d) Greece recognises the value of each State preparing and submitting to ICAO an updated State Action Plan on emissions reductions, as an important step towards the achievement of the global collective goals agreed at the 38th Session of the ICAO Assembly in 2013.

e) In that context, it is the intention that all ECAC States submit to ICAO an Action Plan[3]. This is the Action Plan of Greece.

f) Greece shares the view of all ECAC States that a comprehensive approach to reducing aviation emissions is necessary, and that this should include:

   i. emission reductions at source, including European support to CAEP work

   ii. research and development on emission reductions technologies, including public-private partnerships

   iii. the development and deployment of low-carbon sustainable alternative fuels, including research and operational initiatives undertaken jointly with stakeholders

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[2] Albania, Armenia, Austria, Azerbaijan, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Moldova, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, The former Yugoslav Republic of Macedonia, Turkey, Ukraine, and the United Kingdom.

[3] ICAO Assembly Resolution A38-18 also encourages States to submit an annual reporting on international aviation CO2 emissions, which is a task different in nature and purpose to that of Action Plans, strategic in their nature. For that reason, the reporting to ICAO on international aviation CO2 emissions referred to at paragraph 11 of ICAO Resolution A38/18 is not part of this Action Plan. This information will be provided to ICAO separately, as this is already part of the existing routine provision of data by ECAC States.

iv. the optimisation and improvement of Air Traffic Management, and infrastructure use within Europe, in particular through the Single European Sky ATM Research (SESAR), and also beyond European borders, through the Atlantic Initiative for the Reduction of Emissions (AIRE) in cooperation with the US FAA

v. Market-based measures, such as open emission trading schemes (ETS), which allow the sector to continue to grow in a sustainable and efficient manner, recognising that the measures at (i) to (iv) above cannot, even in aggregate, deliver in time the emissions reductions necessary to meet the global goals. This growth becomes possible through the purchase under an ETS of CO_2 allowances from other sectors of the economy, where abatement costs are lower than within the aviation sector

g) In Europe, many of the actions which are undertaken within the framework of this comprehensive approach are in practice taken at a supra-national level, most of them led by the European Union. They are reported in **Section 3A** of this Action Plan, where Greece's involvement in them is described, as well as that of stakeholders.

h) In Greece a number of actions are undertaken at the national level, including by stakeholders, in addition to those of a supra-national nature. These national actions are reported in **Section 3B** of this Plan.

i) In relation to actions which are taken at a supranational level, it is important to note that:

i. The extent of participation will vary from one State and another, reflecting the priorities and circumstances of each State (economic situation, size of its aviation market, historical and institutional context, such as EU/ non EU). The ECAC States are thus involved to different degrees and on different timelines in the delivery of these common actions. When an additional State joins a collective action, including at a later stage, this broadens the effect of the measure, thus increasing the European contribution to meeting the global goals.

ii. Nonetheless, acting together, the ECAC States have undertaken to reduce the region's emissions through a comprehensive approach which uses each of the pillars of that approach. Some of the component measures, although implemented by some but not all of ECAC's 44 States, nonetheless yield emission reduction benefits across the whole of the region (thus for example research, ETS).

SECTION II: BASELINE

1. Current State in Greece

Greece is strategically located at the crossroads of Europe, Asia, and Africa. Situated on the southern tip of the Balkan Peninsula, Greece shares land borders with Albania, FYROM and Bulgaria to the north and Turkey to the northeast. Greece has the longest coastline on the Mediterranean Basin (with 13,676 km) in length, featuring a vast number of islands. Most of the Greek islands and many cities of Greece are connected by aviation and marine transportation.

1.1. Hellenic Civil Aviation Authority

The **Hellenic Civil Aviation Authority (HCAA)** is a Civil Service under the Ministry of "Economy, Infrastructure, Shipping and Tourism", directed by its Governor and Deputy Governors. Its mission is the organization, development and control of the country`s air transport infrastructure, as well as the study and laying of proposals to the Ministry concerning the overall policy formulation in air transport. HCAA main activities are:

- Handling and development of air transport inside the country and abroad.
- Care for the development of international aviation relations and participation in International Organizations.
- Care for the organization of the Hellenic Air Space, the exercise of Air Traffic Control, the installation and operation of aeronautical telecommunications and air navigation aids, as well as the provision of aeronautical information.
- Carrying out and following the application of standards, regulations and requirements for aircraft exploitation and operation.
- Inspection of aircraft and Civil Aviation crew suitability and granting of the relevant certificates and licenses.
- Establishment and operation of the Hellenic airports. Continuous care for development, modernization and environmental protection.
- Formulation of air transport legislation.
- Care for the general aviation's development and the promotion of airsporting activities.
- Actions to ensure the inflow of financial resources in return for the services provided to aircraft and passengers, as well as to ensure administrative and financial support for its services.

Greece has established[4] the Hellenic Air Navigation Supervisory Authority (HANSA) to carry out the tasks of supervision and continued oversight for identification of correct implementation of European regulations related to ATM/ANS services. In this frame, HANSA is in charge to monitor the

[4] In accordance with the European Regulations 549/2004 & 550/2004 articles 4 & 2 respectively

effective implementation of ATM/ANS performance plan which, amongst others, incorporates the area of environment.

1.2. Greek Airports

There are 39 state-owned airports in Greece operating with commercial air traffic, where 15 of these are International Airports, 20 are National Airports serving mainly domestic flights and 4 are Municipal Airports, as presented in the graph below:

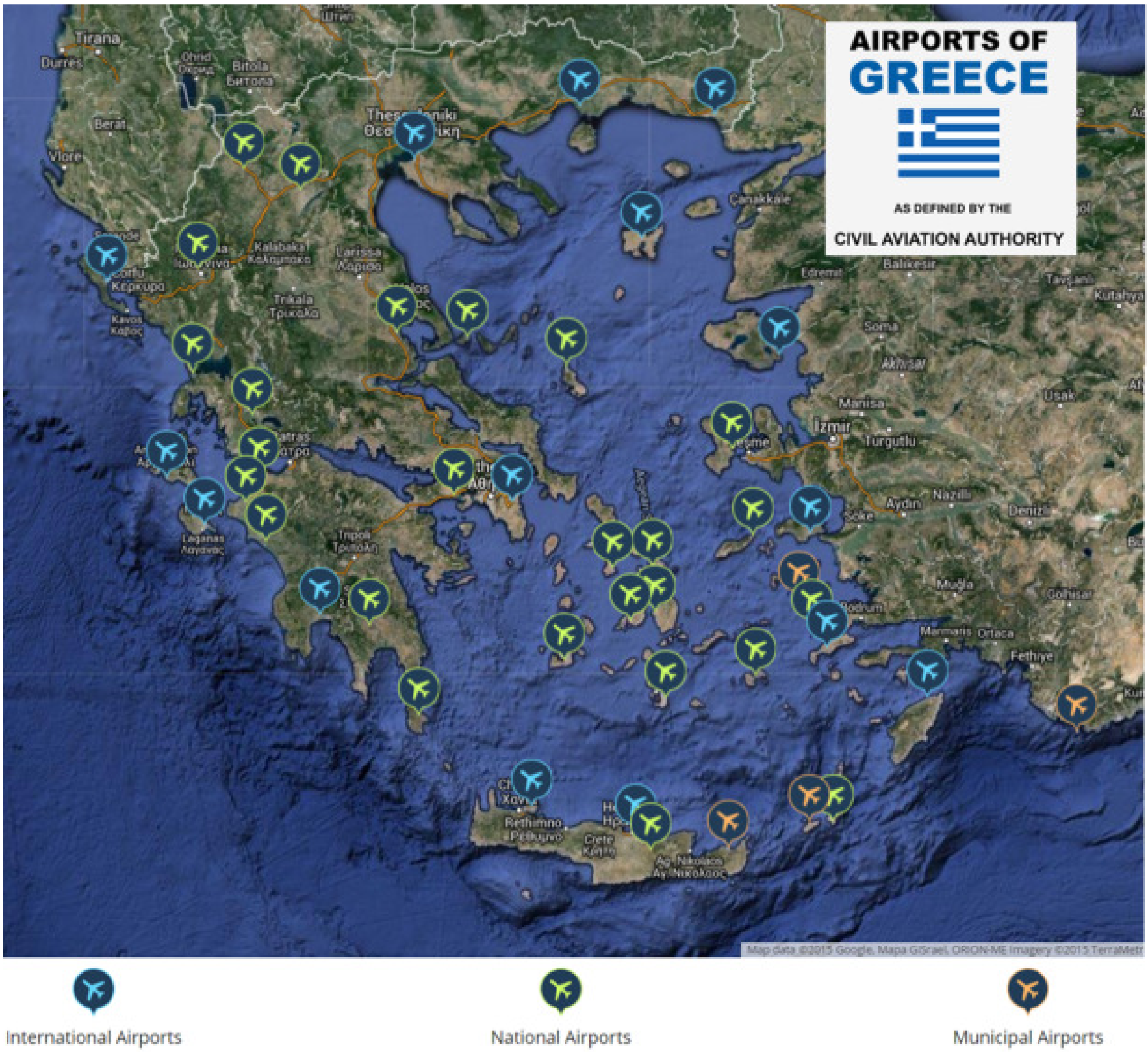

Figure 1: Commercial Airports in Greece

Airports in Greece have two "official" names. The first and most commonly used is the place name with "Airport" or "International Airport" added. The second gets a little trickier - it usually honours a famed local historic or mythological figure.
Figure 1 illustrates Airport location per Airport Category (International, National, Municipal).
Figure 2 presents Greek Airports with Airport name, regional location, ICAO & IATA code.

City served / Location	Region	ICAO	IATA	Airport name
International airports				
Alexandroupoli	Macedonia and Thrace	LGAL	AXD	Alexandroupolis International Airport "Dēmókritos/Democritus"
Athens / Spata	Attica	LGAV	ATH	Athens International Airport "Elefthérios Venizélos"
Chania (Souda)	Crete	LGSA	CHQ	Chania International Airport "Ioánnis Daskalogiánnis"
Corfu (Kerkira)	Ionian Islands	LGKR	CFU	Corfu Island International Airport "Ioánnis Kapodístrias"
Heraklion	Crete	LGIR	HER	Heraklion International Airport "Níkos Kazantzákis"
Kalamata	Peloponnese	LGKL	KLX	Kalamata International Airport "Captain Vassílis Constantakópoulos"
Kavala / Chrysoupoli	Macedonia and Thrace	LGKV	KVA	Kavala International Airport "Mégas Aléxandros/Alexander the Great"
Kefalonia	Ionian Islands	LGKF	EFL	Kefalonia Island International Airport "Ánna Pollátou"
Kos	South Aegean	LGKO	KGS	Kos Island International Airport "Hippokrátēs/Hippocrates"
Lemnos	North Aegean	LGLM	LXS	Lemnos Island International Airport "Hēphaistos/Hephaestus"
Mytilene, Lesbos	North Aegean	LGMT	MJT	Mytilene Island International Airport "Odysséas Elýtis"
Rhodes	South Aegean	LGRP	RHO	Rhodes Island International Airport "Diagóras"
Samos	North Aegean	LGSM	SMI	Samos Island International Airport "Aristarchus of Samos"
Thessaloniki / Mikra	Central Macedonia	LGTS	SKG	Thessaloniki International Airport "Makedonía/Macedonia"
Zakynthos	Ionian Islands	LGZA	ZTH	Zakynthos Island International Airport "Dionýsios Solomós"
National airports				
Astypalaia	South Aegean	LGPL	JTY	Astypalaia Island National Airport "Panaghiá"
Chios	North Aegean	LGHI	JKH	Chios Island National Airport "Hómēros/Homer"
Ikaria	North Aegean	LGIK	JIK	Ikaria Island National Airport "Íkaros/Icarus"
Ioannina	Epirus	LGIO	IOA	Ioannina National Airport "Basileus Pýrrhos/King Pyrrhus"
Kalymnos	South Aegean	LGKY	JKL	Kalymnos Island National Airport "Pothaea"
Karpathos	South Aegean	LGKP	AOK	Karpathos Island National Airport "Ammopi"
Kastoria	West Macedonia	LGKA	KSO	Kastoria National Airport "Aristotélēs/Aristotle"
Kozani	West Macedonia	LGKZ	KZI	Kozani National Airport "Phílippos/Philip"
Kithira	Attica	LGKC	KIT	Kithira Island National Airport "Aléxandros Aristotélous Onássis"
Milos	South Aegean	LGML	MLO	Milos Island National Airport "Áfrodite"
Mykonos	South Aegean	LGMK	JMK	Mykonos Island National Airport "Dḗlos"
Naxos	South Aegean	LGNX	JNX	Naxos Island National Airport "Apóllōn/Apollo"
Paros	South Aegean	LGPA	PAS	Paros Island National Airport "Panteleou Paros Airport"
Patras / Araxos	West Greece	LGRX	GPA	Araxos National Airport "Agamémnon"
Preveza, Lefkada (Aktio)	Epirus	LGPZ	PVK	Aktion National Airport (Lefkada Airport)
Santorini (Thira)	South Aegean	LGSR	JTR	Santorini (Thira) Island National Airport "Zefyros"
Skiathos	Thessaly	LGSK	JSI	Skiathos Island National Airport "Aléxandros Papadiamántis"
Skyros	Central Greece	LGSY	SKU	Skyros Island National Airport "Aegéo"
Syros	South Aegean	LGSO	JSY	Syros Island National Airport "Dēmḗtrios Vikélas/Demetrius Vikelas"
Volos / Nea Anchialos	Thessaly	LGBL	VOL	Nea Anchialos National Airport (Volos Central Greece Airport)
Municipal Airports				
Kasos (Kassos)	South Aegean	LGKS	KSJ	Kassos Island Public Airport "Agia Marína"
Kastelorizo (Megisti)	South Aegean	LGKJ	KZS	Kastelorizo Island Public Airport "Megísti"
Leros	South Aegean	LGLE	LRS	Leros Island Public Airport "Dodekánisos"
Sitia	Crete	LGST	JSH	Sitia Public Airport "Vitséntzos Kornáros"

Figure 2: Greek Airports with Airport name, ICAO & IATA code

In figure, 3 commercial traffic of domestic and international aviation per airport is illustrated for the period January to December 2014.

Airport Name	JANUARY - DECEMBER 2014									
	COMMERCIAL TRAFFIC						TOTAL FLIGHTS		TOTAL PASSENGERS	
	DOMESTIC			INTERNATIONAL						
	FLIGHTS	PASSENGERS		FLIGHTS	PASSENGERS		2014	2013	2014	2013
	ARR+DEP	ARRI.	DEP.	ARR+DEP	ARR.	DEP.	ARR+DEP	ARR+DEP	ARR+DEP	ARR+DEP
ARAXOS	54	150	15	1.158	73.786	72.457	1.212	1.178	146.408	139.689
AKTIO	1.107	2.643	3.218	2.483	175.986	176.398	3.590	3.166	358.245	316.365
ALEX/POLIS	2.736	78.506	79.240	14	448	543	2.750	2.934	158.737	168.771
ASTYPALAIA	800	6.671	7.100	0	0	0	800	802	13.771	11.940
N.ANCHIALOS	82	581	616	662	32.346	31.940	744	774	65.483	70.079
ZAKYNTHOS	1.460	19.252	20.431	7.558	575.009	573.455	9.018	7.504	1.188.147	1.004.486
IRAKLEION	9.708	407.162	453.081	34.170	2.595.702	2.569.013	43.878	43.544	6.024.958	5.778.764
THESSALONIKI	19.675	888.459	1.003.559	26.225	1.569.814	1.488.894	45.900	39.500	4.950.726	4.039.576
IKARIA	1.504	19.074	20.612	0	0	0	1.504	1.776	39.686	36.162
IOANNINA	1.190	39.424	39.965	8	0	6	1.198	1.180	79.395	64.489
KAVALA	1.772	36.423	36.917	1.428	75.370	74.255	3.200	2.886	222.965	209.400
KALAMATA	676	7.977	7.987	2.204	108.623	111.751	2.880	1.976	236.338	136.992
KALYMNOS	1.404	11.377	13.135	0	0	0	1.404	1.340	24.512	20.677
KARPATHOS	2.819	29.318	30.072	1.143	71.986	72.036	3.962	3.658	203.412	168.190
KASOS	1.182	1.654	1.824	0	0	0	1.182	1.164	3.478	3.265
KASTELORIZO	560	4.165	4.027	0	0	0	560	520	8.192	7.946
KASTORIA	640	1.757	2.347	0	0	0	640	596	4.104	5.115
KERKYRA	3.873	115.701	121.294	15.145	1.074.289	1.072.094	19.018	16.656	2.383.378	2.106.827
KEFALLINIA	1.488	28.172	30.271	2.884	209.725	211.264	4.372	4.168	479.432	430.362
KOZANH	340	1.243	1.460	0	0	0	340	400	2.703	3.504
KYTHIRA	1.172	14.788	15.795	96	5.922	2.387	1.268	1.332	38.892	33.183
KOS	3.626	91.265	97.485	13.896	1.011.367	1.013.347	17.522	16.516	2.213.464	2.028.618
LEROS	1.552	14.449	14.772	0	0	0	1.552	1.512	29.221	25.680
LIMNOS	3.140	35.904	37.315	188	9.804	9.934	3.328	2.952	92.957	81.201
MILOS	1.248	19.217	20.021	0	0	0	1.248	1.026	39.238	30.774
MYKONOS	4.779	138.529	148.736	4.649	247.126	244.338	9.428	6.880	778.729	584.559
MYTILINI	4.503	151.913	156.665	1.127	75.139	76.503	5.630	5.334	460.220	400.911
NAXOS	1.014	14.305	15.913	36	804	719	1.050	676	31.741	23.442
PAROS	2.226	24.259	15.600	0	0	0	2.226	2.220	39.859	36.429
RODOS	9.820	339.902	351.138	25.186	1.926.675	1.934.341	35.006	32.624	4.552.056	4.200.059
SAMOS	3.238	73.886	77.221	1.844	122.392	122.809	5.082	4.508	396.308	343.717
SANTORINI	5.323	252.223	296.051	5.143	310.416	321.118	10.466	8.142	1.179.808	898.153
SITEIA	1.908	14.767	15.306	70	2.437	2.363	1.978	2.064	34.873	35.962
SKIATHOS	758	15.575	16.522	2.236	141.609	141.691	2.994	2.368	315.397	265.773
SKYROS	633	6.211	6.620	1	0	2	634	548	12.833	20.368
SYROS	630	6.654	8.778	0	0	0	630	634	15.432	13.715
CHANIA	4.992	285.611	292.675	11.904	935.615	933.665	16.896	15.076	2.447.566	2.078.857
CHIOS	3.358	81.704	87.054	252	8.228	8.095	3.610	3.400	185.081	173.540
ATHENS	64.167	2.674.843	2.574.429	82.383	4.926.099	4.959.158	146.550	131.646	15.134.529	12.459.801
TOTAL	171.157	5.955.714	6.125.267	244.093	16.286.717	16.224.576	415.250	375.180	44.592.274	38.457.341

Figure 3: Commercial Traffic of domestic and international aviation per airport for the period January to December 2014.

The largest 10 aerodromes based upon departing and arriving passengers can be seen in Figure 4.

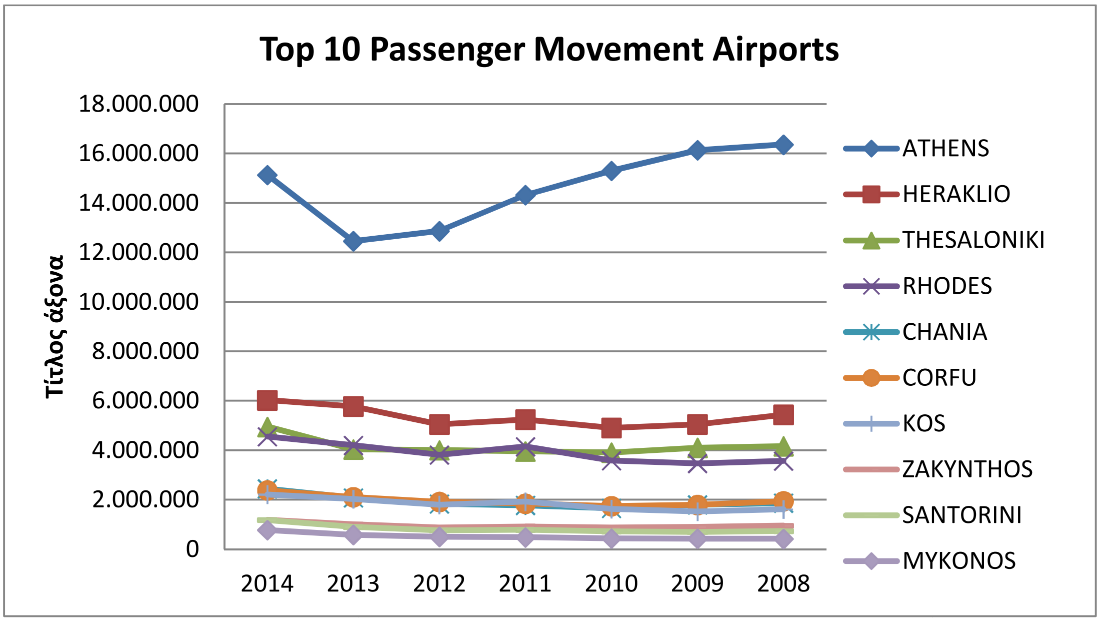

Figure 4: Commercial Airports in Greece

Approximately 15 million passengers travelled to or from Athens in 2014 and approximately 5-6 million to or from Heraklio, Thessaloniki and Rhodes.
Total movements in Greece reached 44,6 million passengers in 2014, increased by 16% versus previous year (38,5 million in 2013), which was a record of moves during last decade, as illustrated in Figure 5.

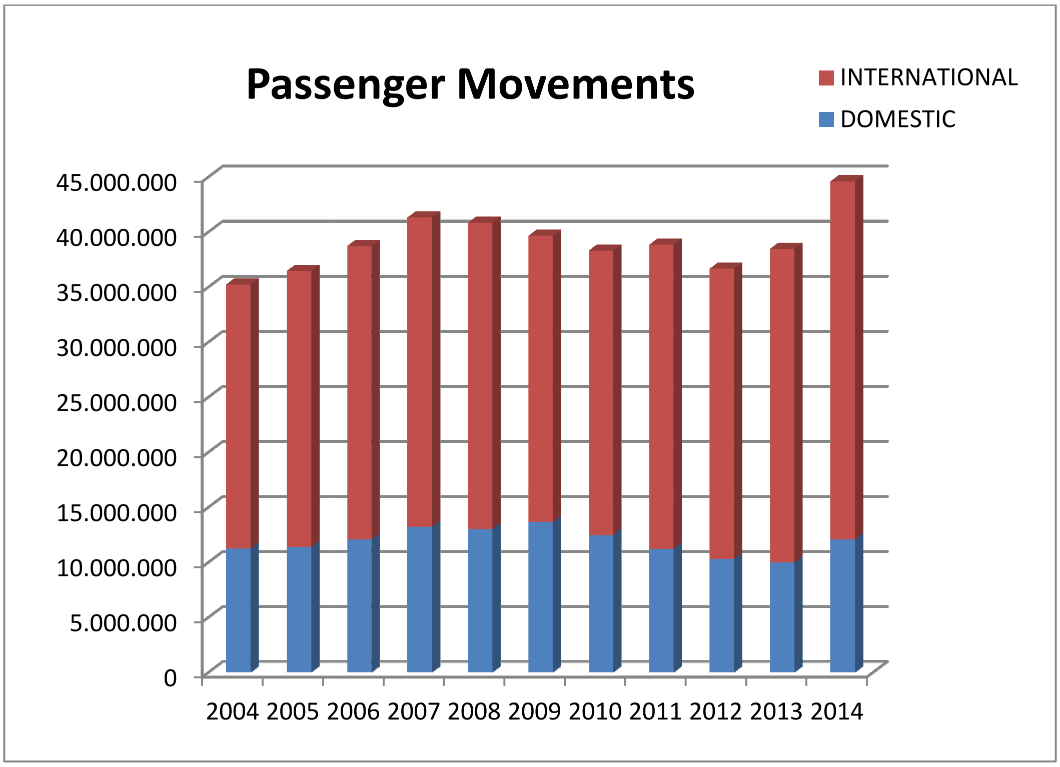

Figure 5: Passenger Movements for period 2004 -2014

Athens airport is the busiest airport in Greece with 34% SOM of passenger traffic, the 10 top airport (including Athens) keep 92% SOM, while 8% of passenger traffic is attributed to 29 smaller airports of Greece, as seen in Figure 6.

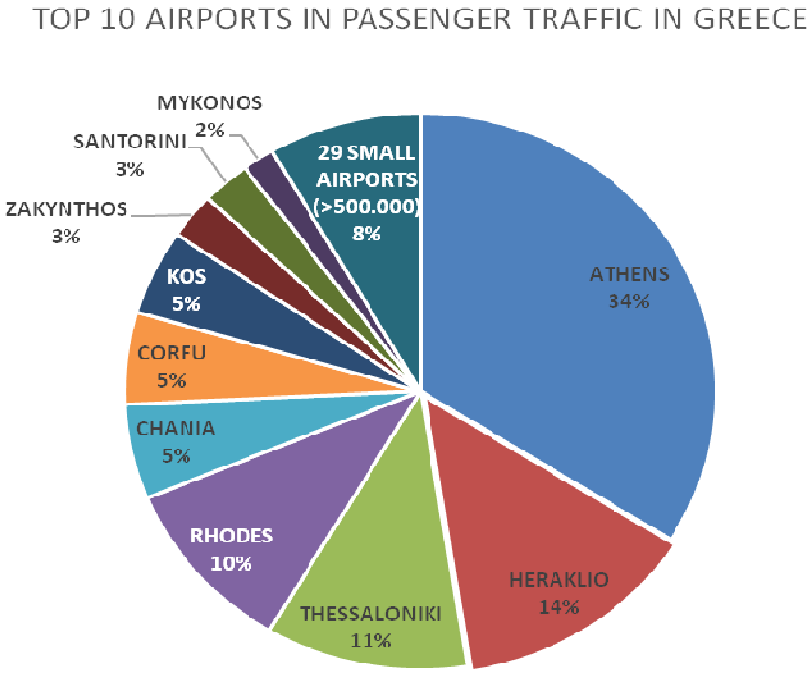

Figure 6: Airport Market Share in Passenger Traffic

1.3. Air Carriers – Operating Licenses

Operating licenses are categorized according to EC Reg.1008/2008 in two categories:

1.3.1 The first category includes air carriers that cover operations with aircraft of more than ten tonnes maximum take off mass (MTOM) and /or more than 20 seats.

Within this category there currently exist twelve (12) operating licenses granted by Hellenic Civil Aviation Authority.

1.3.2 The second category includes air carriers that cover operations with aircraft of less than 10 tonnes maximum take –off mass (MTOM) and/or less than 20 seats.

Within this category there currently exist seven (7) operating licenses granted by Hellenic Civil Aviation Authority.

Three (3) of these licences are granted to air carriers operating with airplanes, three (3) to air carriers operating with helicopters and one (1) to air carrier operating with both airplanes and helicopters.

Number of Air Carriers	2015
Number of Air Carriers with active operating license	19

In 2015 Greece has 513 registered aircrafts (422 are airworthy), which are categorized as illustrated in Figures 7 & 8.

Category	Quantity
Aircraft over 20 t	86
Aircraft 14 to 20 t	9
Aircraft 5.7 to 14 t	19
Single engine aircraft below 2 t	186
Single engine aircraft 2 to 5.7 t	6
Multi engine aircraft below 2 t	14
Multi engine aircraft 2 to 5.7 t	39
Rotorcraft	87
Gliders	8
Powered Gliders	5
Ultra light aircraft	54
Aircraft in Total:	**513**

Figure 7: List of registered aircrafts in HCAA

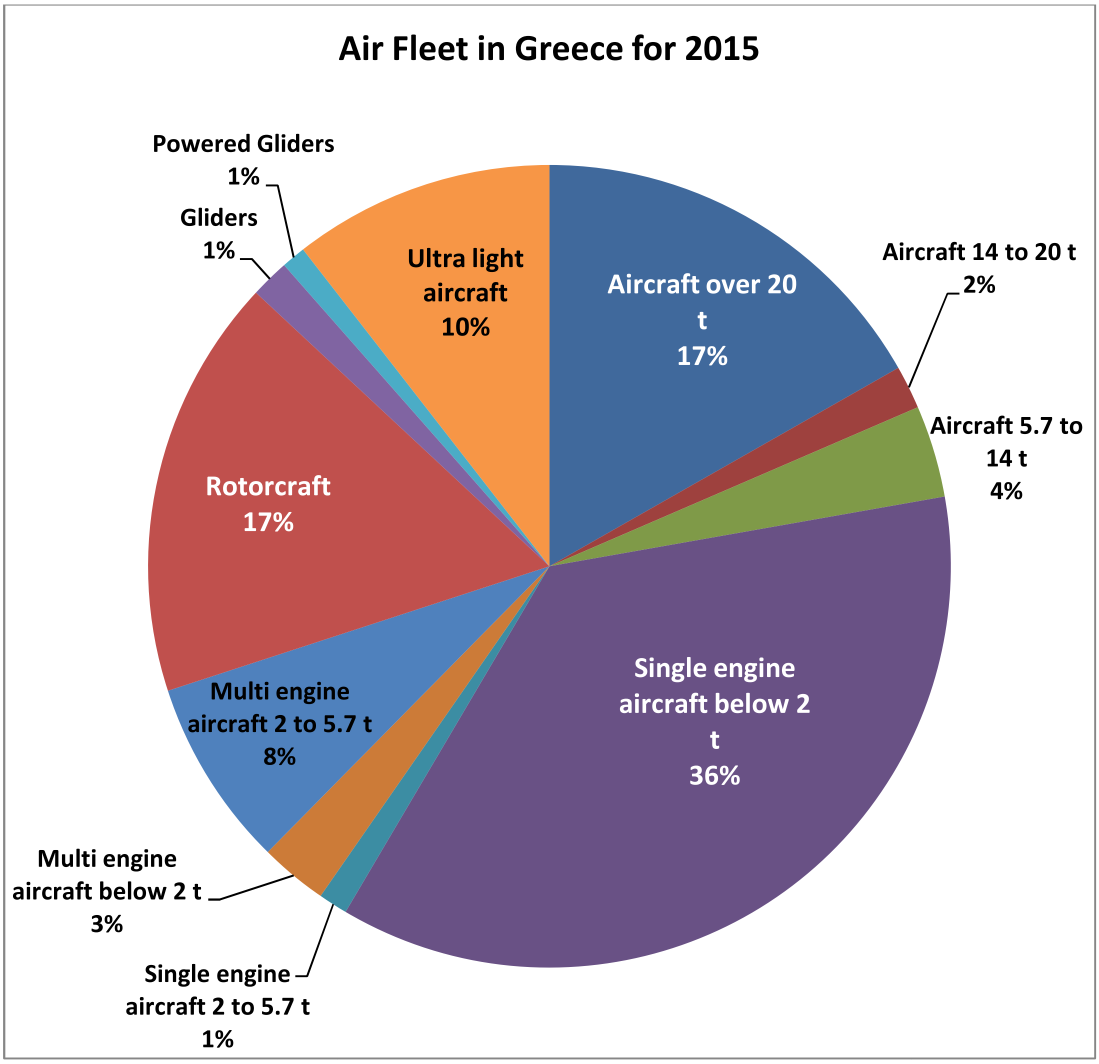

Figure 8: Registered aircrafts in HCAA per Category

1.4. Greece's Greenhouse Gas National Inventory

In response to the emerging evidence that climate change could have a major global impact, the United Nations Framework Convention on Climate Change was adopted on 9 May 1992 and was opened for signature in Rio de Janeiro in June 1992. Greece signed the Convention in Rio and ratified it in 1994 (Law 2205/94).

The Ministry of Environment, Energy and Climate Change, MEECC is the governmental body responsible for the development and implementation of environmental policy in Greece, as well as for the provision of information concerning the state of the environment in Greece in compliance with relevant requirements defined in international conventions, protocols and agreements. Moreover, the MEECC is responsible for the co-ordination of all involved ministries, as well as any relevant public or private organization, in relation to the implementation of the provisions of the Kyoto Protocol, according to the Law 3017/2002 with which Greece ratified the Kyoto Protocol.

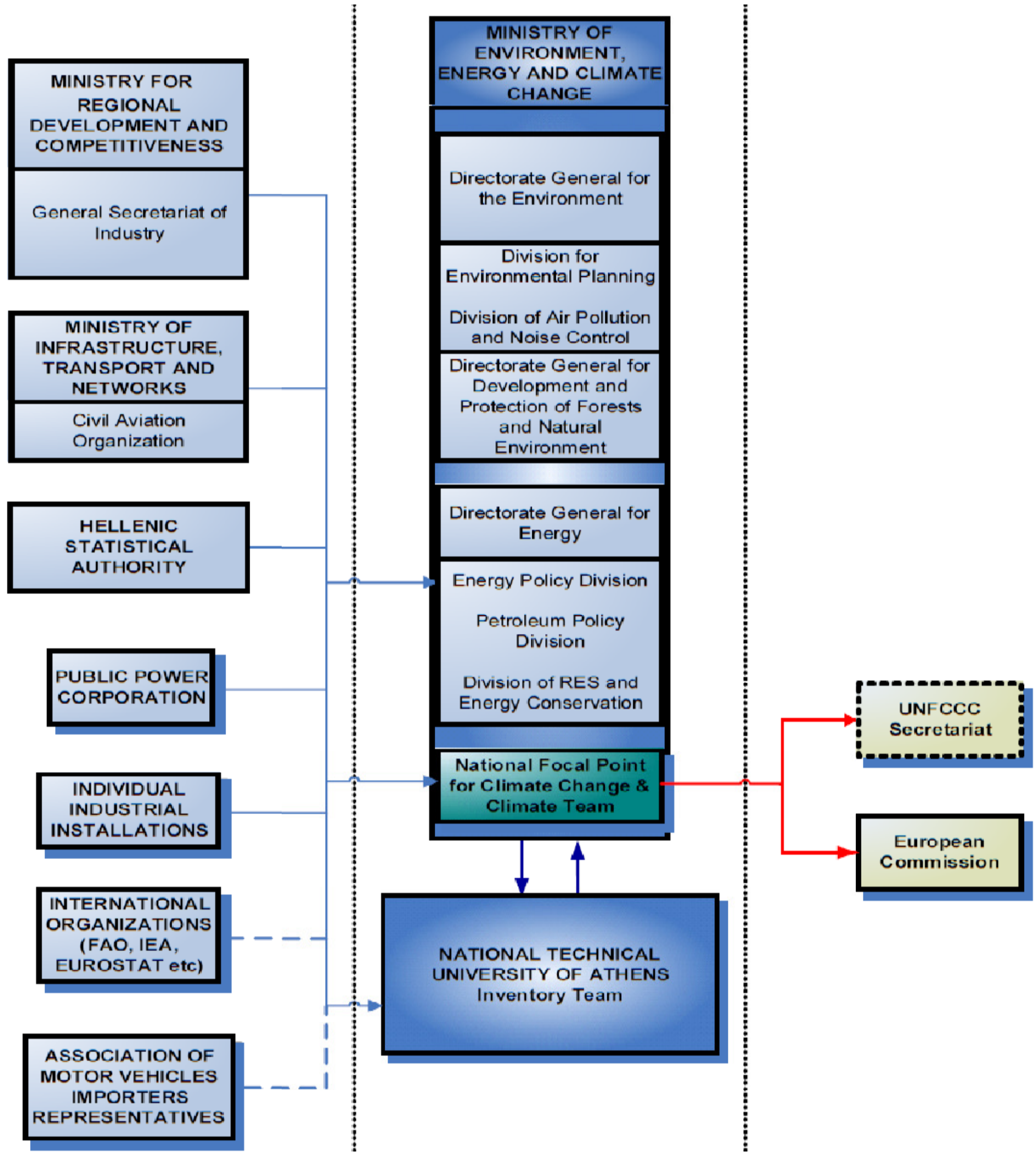

Figure 9: Organizational structure of the National Inventory System.

Figure 9 provides an overview of the organizational structure of the National Inventory System. The entities participating in it are:

- The MEECC designated as the national entity responsible for the national inventory, which keeps the overall responsibility, but also plays an active role in the inventory planning, preparation and management.
- The National Technical University of Athens (NTUA) / School of Chemical Engineering, which has the technical and scientific responsibility for the compilation of the annual inventory.
- Governmental ministries and agencies through their appointed focal persons, ensure the data provision.

Greece is obligated to prepare and submit an annual national greenhouse gas (GHG) inventory covering anthropogenic emissions by sources and removals by sinks. The National Inventory Report (NIR) contains Greece's annual greenhouse gas emission estimates dating back to 1990.
The GHG emissions analysis by sector for the period 2002 - 2012 is presented in Figure 10 (in kt CO2 eq).
It is noted that according to the IPCC Guidelines, emissions estimates for international marine and aviation bunkers were not included in the national totals, but are reported separately as memo items.
The decreasing trend of emissions in all sectors of energy of the years 2008-2012 is attributed among others (i.e. RES, energy efficiency measures, road infrastructure and public transportation improvements, etc) to the economic recession that the country is facing.
The majority of GHG emissions (64.12%) in 2012 derived from energy industries, while the contribution of transport, manufacturing industries and construction and other sectors is estimated at 18.63%, 6.47% and 10.78%, respectively.

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total (with LULUCF)	**101,840.31**	**106,290.88**	**106,344.03**	**110,192.98**	**108,672.94**	**112,032.14**	**107,026.20**	**100,891.03**	**93,847.18**	**91,284.77**	**87,499.84**
Total (without LULUCF)	**104,714.34**	**108,788.75**	**109,112.69**	**112,894.37**	**111,383.53**	**113,848.65**	**110,005.38**	**103,712.60**	**96,758.27**	**94,250.73**	**90,472.39**
1. Energy	**95,907.49**	**99,811.38**	**100,113.26**	**103,302.39**	**102,075.38**	**104,636.76**	**101,429.74**	**97,085.03**	**90,145.93**	**89,334.68**	**85,011.50**
A. Fuel combustion	95,889.64	99,799.75	100,101.79	103,292.93	102,066.27	104,629.80	101,424.41	97,077.51	90,135.33	89,325.51	85,002.75
1. Energy industries	54,572.12	55,809.09	57,129.73	57,939.93	55,765.64	59,232.38	58,019.05	54,480.47	52,036.60	53,838.38	54,507.26
2. Man. industry and Construction	9,444.31	9,133.51	8,491.51	10,170.76	10,383.78	10,102.46	9,346.07	7,411.93	6,717.41	5,271.14	5,496.40
3. Transport	19,487.05	20,572.51	20,992.99	21,052.36	21,890.75	22,637.22	21,675.77	24,571.95	21,862.23	19,474.10	15,838.48
4. Other sectors	12,386.16	14,284.64	13,487.56	14,129.89	14,026.09	12,657.74	12,383.52	10,613.15	9,519.10	10,741.89	9,160.61
B. Fugitive emissions	17.85	11.62	11.47	9.46	9.11	6.96	5.33	7.52	10.60	9.17	8.75
2. Industrial processes	**8,651.25**	**8,821.03**	**8,842.51**	**9,432.35**	**9,146.10**	**9,048.41**	**8,411.27**	**6,462.60**	**6,447.55**	**4,751.31**	**5,294.94**
A. Mineral products	7,323.46	7,361.38	7,369.43	7,932.34	7,640.65	7,475.99	6,962.97	5,324.52	4,925.08	3,115.64	3,740.92
B. Chemical production	165.68	286.61	304.52	296.92	313.93	317.94	338.06	453.25	662.97	584.38	502.02
C. Metal production	1,162.10	1,173.04	1,168.56	1,203.09	1,191.52	1,254.48	1,110.24	684.83	859.50	1,051.28	1,051.99
3. Solvents	**155.12**	**155.50**	**155.87**	**157.70**	**159.64**	**160.34**	**160.68**	**161.38**	**161.64**	**161.75**	**162.72**
5. LULUCF	**-2,874.04**	**-2,497.87**	**-2,768.66**	**-2,701.39**	**-2,710.59**	**-1,816.51**	**-2,979.18**	**-2,821.57**	**-2,911.09**	**-2,965.97**	**-2,972.55**
6. Waste	**0.48**	**0.85**	**1.05**	**1.93**	**2.41**	**3.13**	**3.68**	**3.60**	**3.14**	**2.99**	**3.23**
International transport [1)]	**12,279.69**	**13,220.31**	**13,399.90**	**11,532.90**	**12,736.06**	**13,006.30**	**12,897.04**	**10,982.34**	**10,822.38**	**11,165.41**	**9,793.18**
Aviation	2,313.55	3,011.38	3,095.58	2,376.88	2,850.96	2,913.77	3,029.92	2,606.08	2,084.93	2,268.30	2,514.03
Marine	9,966.15	10,208.93	10,304.32	9,156.02	9,885.10	10,092.53	9,867.12	8,376.25	8,737.45	8,897.11	7,279.15

1) Emissions from International transport are not included in national totals.

Figure 10: Total CO2 emissions in Greece analyzed by sector for period 2002-2012 (in kt)

1.5. Domestic aviation

GHG emissions from domestic aviation are calculated according to the Tier 2a methodology suggested by the IPCC Guidelines, which is based on the combination of energy consumption data and air traffic data (Landing and Take-off cycles, LTOs). The emission factors used and the distribution of consumption in LTOs and cruise are the suggested CORINAIR values for average fleet.

Internal aviation, road transportation, railways and internal navigation are included in the transport sector. Emissions from international marine and aviation bunkers are not included in national totals, but are calculated and reported separately.
Table 1 illustrates domestic transportation emissions per sector (in ktCO2), while table 2 presents the percentage contribution of each transport sector for the years 2000-2012.

Year Emissions	(kt)	2000	2001	2002	2003	2004	2005	2006
Aviation	CO2	591	530	455	520	600	551	590
Road transport	CO2	16.020	16.365	16.964	17.998	18.108	18.308	18.895
Railways	CO2	130	130	130	130	130	129	132
Navigation	CO2	1.559	2.124	1.915	1.896	2.133	2.043	2.240
Other Emmisions (incl.CH_4, NO_2)	CO2eq	602	641	630	636	646	624	590
Total	**CO2eq**	**18.902**	**19.790**	**20.094**	**21.180**	**21.617**	**21.655**	**22.447**

Year Emissions	(kt)	2007	2008	2009	2010	2011	2012
Aviation	CO2	612	588	659	565	495	490
Road transport	CO2	19.785	19.066	20.964	18.907	18.149	14.005
Railways	CO2	119	116	97	63	47	79
Navigation	CO2	2.093	1.877	2.836	2.308	1.651	1.660
Other Emmisions (incl.CH_4, NO_2)	CO2eq	564	465	367	407	330	257
Total	**CO2eq**	**23.173**	**22.112**	**24.923**	**22.250**	**20.672**	**16.491**

Table 1: Total CO_2 Transport emissions by sector for the period 2000-2012 (in kt)

Year Emissions	(%)	2000	2001	2002	2003	2004	2005	2006
Aviation	CO2	3,1%	2,7%	2,3%	2,5%	2,8%	2,5%	2,6%
Road transport	CO2	84,8%	82,7%	84,4%	85,0%	83,8%	84,5%	84,2%
Railways	CO2	0,7%	0,7%	0,6%	0,6%	0,6%	0,6%	0,6%
Navigation	CO2	8,2%	10,7%	9,5%	9,0%	9,9%	9,4%	10,0%
Other Emmisions (incl.CH4, NO2)	CO2eq	3,2%	3,2%	3,1%	3,0%	3,0%	2,9%	2,6%
Total	**CO2eq**	**18.902**	**19.790**	**20.094**	**21.180**	**21.617**	**21.655**	**22.447**

Year Emissions	(%)	2007	2008	2009	2010	2011	2012
Aviation	CO2	2,6%	2,7%	2,6%	2,5%	2,4%	3,0%
Road transport	CO2	85,4%	86,2%	84,1%	85,0%	87,8%	84,9%
Railways	CO2	0,5%	0,5%	0,4%	0,3%	0,2%	0,5%
Navigation	CO2	9,0%	8,5%	11,4%	10,4%	8,0%	10,1%
Other Emmisions (incl.CH4, NO2)	CO2eq	2,4%	2,1%	1,5%	1,8%	1,6%	1,6%
Total	**CO2eq**	**23.173**	**22.112**	**24.923**	**22.250**	**20.672**	**16.491**

Table 2: Share of Transport emissions by sector for the period 2000-2012

The share of internal aviation ranges from almost 2.3% to 3.1% for the period 2000-2012, with the smaller contribution in 2005, while the contribution of internal navigation in the emissions of the transport sector fluctuated from 8-11% during the whole time period. Additionally, the contribution of internal railways is less than 0.7%.

Finally, the aggregated contribution of transport in total National GHG emissions is 18.4%.

Table 3 illustrates Energy Consumption of domestic transportation per sector (in TJ) for the years 2001-2012.

Year	Energy consumption (in TJ) 2001	2002	2003	2004	2005	2006
Aviation	7.183	6.172	7.054	7.640	7.224	7.627
Road transport	232.929	241.641	256.195	257.910	260.893	270.979
Railways	1.773	1.773	1.773	1.773	1.758	1.801
Navigation	27.633	24.929	24.660	27.717	26.573	29.131
Other	37	97	65	40	68	88
Total	269.518	274.515	289.682	295.040	296.448	309.538

Year	Energy consumption (in TJ) 2007	2008	2009	2010	2011	2012
Aviation	8.023	7.717	8.645	7.783	6.817	6.867
Road transport	285.270	274.546	300.900	274.056	250.509	199.354
Railways	1.630	1.587	1.329	859	644	1.074
Navigation	27.207	24.427	36.765	29.961	21.479	21.533
Other	133	257	0	0	0	0
Total	322.130	308.277	347.639	312.659	279.449	228.828

Table 3: Energy Consumption of Transport including domestic aviation for 2001-2012

Table 4 presents Greece's Domestic Aviation Traffic for the years 2000-2014 in terms of flights (LTOs), passenger movements (Arrival and Departures) and Cargo volume (in tonnes).

Total Domestic Air Traffic					
Year	**Flights Arr+Dep**	**Passengers Arrivals**	**Depart.**	**Freight (tonnes) Arrivals**	**Depart.**
2000	222962	6024624	6100445	22188	22004
2001	199529	5233269	5344853	20382	26427
2002	171441	4562874	4672378	17015	18801
2003	195948	4968967	5061410	19841	20480
2004	212216	5615088	5620146	15462	21968
2005	200672	5652345	5733562	16017	20144
2006	211854	6004154	6075932	17073	20516
2007	222848	6569217	6642967	17797	19841
2008	214364	6473941	6521907	17008	19720
2009	240126	6802618	6845291	14357	16141
2010	216203	6200867	6266594	13857	15847
2011	189373	5564753	5632815	10579	11923
2012	176792	5103727	5192540	7631	8537
2013	163595	4933769	5049976	7832	8378
2014	216203	6200867	6266594	13857	15847

Table 4: Allocation of LTOs to domestic aviation for the period 2000-2014

1.6. International Aviation

GHG emissions from international aviation are calculated with same IPCCC methodologies as described for domestic aviation. The fuel consumption data used are taken from the national energy balance, as declared by oil trading companies. The allocation of LTOs between domestic and international aviation is shown in Table 5 for period 2000-2014.

Year	Domestic LTOs	International LTOs
2000	111.481	102.174
2001	99.765	98.332
2002	85.721	94.421
2003	97.974	99.913
2004	106.108	103.818
2005	100.336	101.246
2006	105.927	108.783
2007	111.424	116.176
2008	107.182	113.275
2009	120.063	108.790
2010	108.102	106.330
2011	94.687	110.427
2012	88.396	102.995
2013	81.798	105.884
2014	85.579	122.047

Table 5: Allocation of Domestic and International LTOs for period 2000-2014

Table 6 illustrates Energy Consumption of International Aviation (in TJ) for the years 2001-2012 while table 7 presents GHG emissions (in ktCO_2)

	Energy consumption (in TJ)					
Year	2001	2002	2003	2004	2005	2006
International aviation	32863	32863	42776	43972	33762	40497

	Energy consumption (in TJ)					
Year	2007	2008	2009	2010	2011	2012
International aviation	41389	43039	37018	29614	32220	35711

Table 6: Energy Consumption in TJ for period 2000-2014

	CO2 Emmissions (in kt)					
Year	2001	2002	2003	2004	2005	2006
International Aviation	2,313.49	2,313.55	3,011.38	3,095.58	2,376.88	2,850.96

	CO2 Emmissions (in kt)					
Year	2007	2008	2009	2010	2011	2012
International Aviation	2,913.77	3,029.92	2,606.08	2,084.93	2,268.30	2,514.03

Table 7: CO2 Emmisions in kt for period 2000-2014

International Total Air Traffic is divided to Scheduled and Non-Scheduled Traffic. Table 8 presents Greece's International Scheduled Air Traffic for the years 2000-2014 in terms of flights (LTOs), passenger movements (Arrival and Departures) and Cargo volume (in tonnes), while table 9 presents the Non-Schedulled Air Traffic for the same period.

Scheduled International Total Air Traffic					
Year	Flights	Passengers		Freight (tonnes)	
	Arr+Dep	Arrivals	Depart.	Arrivals	Depart.
2000	89.210	4.045.504	4.235.394	36.229	32.882
2001	90.120	4.150.600	4.320.101	34.550	25.475
2002	91.247	4.393.370	4.393.393	34.005	25.300
2003	91.232	4.449.892	4.374.846	52.834	28.952
2004	103.872	4.852.866	4.857.876	56.355	30.763
2005	98.251	5.156.615	5.180.225	55.969	30.963
2006	104.132	5.508.381	5.537.776	57.463	33.179
2007	113.508	6.007.499	6.093.985	55.129	34.846
2008	110.736	6.120.008	6.164.710	56.750	35.536
2009	112.747	5.904.531	5.965.433	47.372	31.437
2010	107.721	5.940.503	5.985.947	43.100	30.702
2011	106.432	5.946.977	6.054.171	37.255	29.640
2012	97.464	5.726.782	5.791.386	32.249	28.741
2013	87.757	5.648.231	5.627.059	30.131	28.543
2014	101.926	6.739.562	6.664.134	31.799	30.528

Table 8: Scheduled international aviation for the period 2000-2014.

Non-scheduled International Total Air Traffic					
Year	Flights	Passengers		Freight (tonnes)	
	Arr+Dep	Arrivals	Depart.	Arrivals	Depart.
2000	115.137	7.847.818	7.978.099	25.320	4.720
2001	106.543	8.216.819	8.292.869	26.500	3.200
2002	97.594	7.690.181	7.765.973	26.505	3.875
2003	108.593	7.552.936	7.617.175	3.105	1.301
2004	103.763	7.121.727	7.172.088	4.429	2.253
2005	104.240	7.321.137	7.402.952	1.401	880
2006	113.433	7.747.214	7.840.055	876	968
2007	118.843	7.953.122	8.047.589	1.615	802
2008	115.814	7.751.606	7.804.747	2.413	1.590
2009	104.833	7.038.956	7.088.657	1.410	4.510
2010	104.939	6.941.977	6.967.685	655	469
2011	114.421	7.811.117	7.821.488	564	810
2012	108.525	7.429.803	7.413.893	728	472
2013	124.010	8.591.277	8.607.029	790	801
2014	142.167	9.547.155	9.560.442	403	535

Table 9: Non-scheduled international aviation for the period 2000-2014.

SECTION III: MEASURES TO MITIGATE CO_2 EMISSIONS

A. ACTIONS TAKEN AT THE SUPRANATIONAL LEVEL

A.1. EUROPEAN BASELINE SCENARIO

PLACE HOLDER for text describing the baseline scenario, which is summarized in the table underneath.

To be completed during Autumn 2015 for all European Countries according to ECAC's 142 DGCA Decision.

European Baseline Scenario

	CO2 emissions, tons	**Traffic in RTK**[**]	**Fuel consumption, in tons**	**Fuel efficiency**
2010				
2020				
2030? Or 2035? Or 2050?[*]				

Intentionally Uncompleted

To be completed during Autumn 2015

A.2. AIRCRAFT RELATED TECHNOLOGY DEVELOPMENT

Aircraft emissions standards [Europe's contribution to the development of the CO2 standard in CAEP]

European Member States fully support the ongoing work in ICAO's Committee on Aviation Environmental Protection (CAEP), and welcomed the agreement of certification requirements for a global airplane CO2 Standard at CAEP/9 in 2013. Assembly Resolution A38-18 requests the Council to develop a global CO_2 standard for aircraft aiming to finalize analyses by late 2015 and adoption by the Council in 2016. Europe continues to make a significant contribution to this task notably through the European Aviation Safety Agency (EASA) which co-leads the CO_2 Task Group within CAEP's Working Group 3, and which provides extensive technical and analytical support.

In the event that a standard, comprising of certification requirements and regulatory level, will be adopted in 2016, it is expected to have an applicability date set at 2020 or beyond. In addition to being applicable to new airplane types, CAEP is discussing potential applicability options for in-production types. The contribution that such a standard will make towards the global aspirational goals will of course depend on the final applicability requirements and associated regulatory level that is set.

A.2.1. Research and development

Clean Sky is an EU Joint Technology Initiative (JTI) that aims to develop and mature breakthrough "clean technologies" for air transport. By accelerating their deployment, the JTI will contribute to Europe's strategic environmental and social priorities, and simultaneously promote competitiveness and sustainable economic growth.

Joint Technology Initiatives are specific large scale EU research projects created by the European Commission within the 7th Framework Program (FP7) and continued within the Horizon 2020 Framework Program in order to allow the achievement of ambitious and complex research goals. Set up as a Public Private Partnership between the European Commission and the European aeronautical industry, Clean Sky pulls together the research and technology resources of the European Union in a coherent program, and contribute significantly to the 'greening' of aviation.

Clean Sky 1 (2011 to 2017)

Budget: €1.6 billion

CO2 emissions reduction: -20% to -40% (program objective)

Fuel burn CO2 target 2020 (2000 baseline):

-50% per pax.km or tonne.km

The first Clean Sky program was set up in 2011 for a period up to 31 December 2017, with a budget of € 1.6 billion, equally shared between the European Commission and the aeronautics industry, and the aim to develop environmental friendly technologies impacting all flying segments of commercial aviation. Clean Sky objectives for the whole program at aircraft level are to reduce CO2 aircraft emission between 20-40%, NOx by around 60% and noise by up to 10dB compared to year 2000 aircraft.

Clean Sky 2 (2014-2024)

Budget: €4 billion

Fuel burn CO2 target 2025 (baseline: state of the art 2014): -20%

Fuel burn CO2 target 2035 (baseline: state of the art 2014): -30%

A new program – **Clean Sky 2** – was set up in 2014 for a period up to 31 December 2024 in order to make further advancements towards more ambitious environmental targets and to secure the competitiveness of the European aeronautical industry in the face of growing competition. The new Clean Sky 2 Joint Technology Initiative objectives are to increase the aircraft fuel efficiency and reduce aircraft emissions and noise by 20 to 30% with respect to the latest technologies entering into service in 2014. The current budget for the program is approximately €4 billion with more than € 2 billion industrial commitment matched by a similar contribution from the Horizon 2020 transport budget.

It is estimated that the technology developments already made or in progress could reduce aviation CO_2 emissions by more than 20% with respect to baseline levels (in 2000), which represents an **aggregate reduction of 2 to 3 billion tonnes of CO_2 over the next 35 years**.

Technologies, Concept Aircraft and Demonstration Programs form the three complementary instruments used by Clean Sky in meeting its goals:

- **Technologies** are selected, developed and monitored in terms of maturity or 'Technology Readiness Level' (TRL). A detailed list of more than one hundred key technologies has been set. The technologies developed by Clean Sky will cover all major segments of commercial and general aviation aircraft. The technologies are developed in Clean Sky by each Integrated Technology Demonstrators (ITD), and subject to TRL roadmaps. Some technologies may not directly provide an environmental outcome, being 'enabling technologies' without which the global achievements would not be feasible.

- **Concept Aircraft** are design studies dedicated to integrating technologies into a viable conceptual configuration. They cover a broad range of aircrafts: business jets, regional and large commercial aircrafts, as well as rotorcrafts. They are categorized in order to represent the major future aircraft families. Clean Sky environmental results will be measured and reported mainly by comparing Concept Aircraft to existing aircraft and aircraft incorporating 'business as usual' technology in the world fleet.
- **Demonstration Programs** include physical demonstrators that integrate several technologies at a larger 'system' or aircraft level, and validate their feasibility in operating conditions. This helps determine the true potential of the technologies and enables a realistic environmental assessment. Demonstrations in a relevant operating environment enable technologies to reach the maturity level of 6, according to the scale of levels of technology maturity developed by NASA in 1995 and called Technology Readiness Level (TRL).

In the Clean Sky program 12 industry leaders, 74 associated members and more than 400 partners are working together in a number of technology domains to address the common environmental objectives and to demonstrate and validate the required technology breakthroughs in a commonly defined program. All those technology domains have been integrated into 6 Integrated Technology Demonstrators (ITD) that cover the broad range of R&D work and able to deliver together more environmental friendly aircraft manufacturing and operations:

- **Smart Fixed Wing Aircraft** – delivers active wing technologies together with new aircraft configurations, covering large aircraft and business jets. Key enabling technologies from the transversal ITDs, for instance Contra Rotating Open Rotor, are being integrated into the demonstration programmes and concept aircraft.
- **Green Regional Aircraft** – develops new technologies for the reduction of noise and emissions, in particular advanced low-weight & high performance structures, incorporation of all-electric systems, bleed-less engine architecture, low noise/high efficiency aerodynamics, and finally environmentally optimised mission and trajectory management.
- **Green Rotorcraft** – delivers innovative rotor blade technologies for reduction in rotor noise and power consumption, technologies for lower airframe drag, environmentally friendly flight paths, the integration of diesel engine technology, and advanced electrical

systems for elimination of hydraulic fluids and for improved fuel consumption.

- **Sustainable and Green Engines** - designs and builds five engine demonstrators to integrate technologies for low fuel consumption, whilst reducing noise levels and nitrous oxides. The 'Open Rotor' is the target of two demonstrators. The others address geared turbofan technology, low pressure stages of a threeshaft engine and a new turboshaft engine for helicopters.
- **Systems for Green Operations** - focuses on all electrical aircraft equipment and system architectures, thermal management, capabilities for environmentally-friendly trajectories and missions, and improved ground operations to give any aircraft the capability to fully exploit the benefits of the "Single European Sky".
- **Eco-Design** - supports the ITDs with environmental impact analysis of the product life-cycle. Eco- Design focuses on environmentally-friendly design and production, withdrawal, and recycling of aircraft, by optimal use of raw materials and energies, thus improving the environmental impact of the entire aircraft life-cycle.

In addition, the **Technology Evaluator** program, co-led by DLR and Thales, is a set of numerical models predicting the local and global environmental impact of developed technologies and allows independent analysis of the projects Part of the Clean Sky program is performed by partners selected through open calls for proposals addressing specific tasks which fit into the overall technical Work Program and time schedule.

By 2014 most down-selections of key technologies have been completed for integration in demonstrators that will enter the phase of detailed design, manufacturing and testing. Several demonstrators have passed the design phase and have started testing successfully. An Advanced Lip Extended Acoustic Panel, the technology to reduce the Fan noise of large turbofan engine was flown and validated in operational conditions in 2010 with an Airbus A380-800 aircraft. A flight test with Falcon F7X, which validated the technology to visualize laminar flow structure in flight by an infrared camera, was already performed in 2010. Two flight tests started in the last quarter of 2014, namely in the Sustainable and Green Engines ITD with SAGE 3 flight testing on Advanced Low Pressure System (ALPS) configuration and the flight tests of an experimental Liquid Skin Heat Exchanger (LSHX) in the System for Green Operations ITD.

The two Interim Evaluations of Clean Sky in 2011 and 2013 acknowledged that the program is successfully stimulating developments towards environmental targets and that it was highly successful in attracting a high level and wide participation from all EU key industries and a large number of SMEs. The preliminary assessments of the environmental benefits confirm the capability of achieving the overall targets at completion of the program.

Clean Sky: First Assessment (2011)
The first assessment of the Technology Evaluator performed in 2011 demonstrated that short/medium range aircraft equipped with open rotor engines and laminar-flow wing technology could deliver up to **30% better fuel efficiency and related CO2 emissions** and important reductions in noise nuisance are foreseen.

Clean Sky: Second Assessment (2012)
The second assessment performed in 2012 showed similar results and demonstrated that **CO2 emission reduction is in the range of 20 to 30% depending on the type of aircrafts**. Reduction in NOx emissions is up to 70% and in noise footprint up to 68% depending on the concept aircraft.

Based on this success, the Clean Sky 2 program builds upon contents and achievements of the Clean Sky program and makes further advancements towards more ambitious environmental targets.

In terms of program structure, Clean Sky 2 continues to use the Integrated Technology Demonstrators (ITDs) mechanism but also involves demonstrations and simulations of several systems jointly at the full vehicle level through Innovative Aircraft Demonstrator Platforms (IADPs). A number of key areas are coordinated across the ITDs and IADPs through Transverse Activities (TA) where additional benefit can be brought to the Program through increased coherence, common tools and methods, and shared know-how in areas of common interest. As in Clean Sky, a dedicated monitoring function - the Technology Evaluator (TE) - is incorporated in Clean Sky 2.

- **Large Passenger Aircraft IADP** – TRL demonstration of the best technologies to accomplish the combined key ACARE goals with respect to the environment, fulfilling future market needs and improving the competitiveness of future products.
- **Regional Aircraft IADP** – focuses on demonstrating and validating key technologies that will enable a 90-seat class turboprop aircraft to deliver breakthrough economic and environmental performance and superior passenger experience.
- **Fast Rotorcraft IADP** – consists of two separate demonstrators, the NextGenCTR tilt-rotor and the FastCraft compound helicopter. These two fast rotorcraft concepts aim to deliver superior vehicle versatility and performance.
- **Airframe ITD** – demonstrates, as one of the key contributors to the different IADPs flight demonstrators, advanced and innovative

airframe structures like a more efficient wing with natural laminar flow, optimised control surfaces, control systems and embedded systems, highly integrated in metallic and advanced composites structures. It will also test novel engine integration strategies and investigate innovative fuselage structures.

- **Engines ITD** – focuses on activities to validate advanced and more radical engine architectures.
- **Systems ITD** – develops and builds highly integrated, high TRL demonstrators in major areas such as power management, cockpit, wing, landing gear, to address the needs of future generation aircraft in terms of maturation, demonstration and Innovation.
- **Small Air Transport TA** – aims at developing, validating and integrating key technologies on small aircraft demonstrators up to TRL6 and to revitalise an important segment of the aeronautics sector that can bring key new mobility solutions.
- **Eco-Design TA** – coordinating research geared towards high eco-compliance in air vehicles over their product life and heightening the stewardship in intelligent Re-use, Recycling and advanced services.

In addition, the **Technology Evaluator** will continue and be upgraded to assess technological progress routinely and evaluate the performance potential of Clean Sky 2 technologies at both vehicle and aggregate levels (airports and air traffic systems).

A.3. ALTERNATIVE FUELS

A.3.1. European Advanced Biofuels Flightpath

Within the European Union, Directive 2009/28/EC on the promotion of the use of energy from renewable sources ("the Renewable Energy Directive" – RED) established mandatory targets to be achieved by 2020 for a 20% overall share of renewable energy in the EU and a 10% share for renewable energy in the transport sector. Furthermore, sustainability criteria for biofuels to be counted towards that target were established[5].

In February 2009, the European Commission's Directorate General for Energy and Transport initiated the SWAFEA (Sustainable Ways for Alternative Fuels and Energy for Aviation) study to investigate the feasibility and the impact of the use of alternative fuels in aviation.

The SWAFEA final report was published in July 2011[6]. It provides a comprehensive analysis on the prospects for alternative fuels in aviation,

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5 Directive 2009/28/EC of the European Parliament and of the Council of 23/04/2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, Article 17 Sustainability criteria for biofuels and bioliquids, at pp. EU Official Journal L140/36-L140/38.

6 http://www.swafea.eu/LinkClick.aspx?fileticket=llISmYPFNxY%3D&tabid=38

including an integrated analysis of technical feasibility, environmental sustainability (based on the sustainability criteria of the EU Directive on renewable energy[7]) and economic aspects. It includes a number of recommendations on the steps that should be taken to promote the take-up of sustainable biofuels for aviation in Europe.

In March 2011, the European Commission published a White Paper on transport[8]. In the context of an overall goal of achieving a reduction of at least 60% in greenhouse gas emissions from transport by 2050 with respect to 1990, **the White Paper established a goal of low-carbon sustainable fuels in aviation reaching 40% by 2050**.

ACARE Roadmap targets to share alternative sustainable fuels:
2% in 2020
25% in 2035
at least 40% by 2050

As a first step towards delivering this goal, in June 2011 the European Commission, in close coordination with Airbus, leading European airlines (Lufthansa, Air France/KLM, & British Airways) and key European biofuel producers (Choren Industries, Neste Oil, Biomass Technology Group and UOP), launched the **European Advanced Biofuels Flightpath**. This industry-wide initiative aims to speed up the commercialisation of aviation biofuels in Europe, with **the objective of achieving the commercialisation of sustainably produced paraffinic biofuels in the aviation sector by reaching a 2 million tons consumption by 2020**.

This initiative is a shared and voluntary commitment by its members to support and promote the production, storage and distribution of sustainably produced drop-in biofuels for use in aviation. It also targets establishing appropriate financial mechanisms to support the construction of industrial "first of a kind" advanced biofuel production plants.

The Biofuels Flight path is explained in a technical paper, which sets out in more detail the challenges and required actions[9].

More specifically, the initiative focuses on the following:

1. Facilitate the development of standards for drop-in biofuels and their certification for use in commercial aircraft

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7 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

8 Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, COM(2011) 144 final

9 http://ec.europa.eu/energy/technology/initiatives/doc/20110622_biofuels_flight_path_technical_paper.pdf

2. Work together with the full supply chain to further develop worldwide accepted sustainability certification frameworks
3. Agree on biofuel take-off arrangements over a defined period of time and at a reasonable cost
4. Promote appropriate public and private actions to ensure the market uptake of paraffinic biofuels by the aviation sector
5. Establish financing structures to facilitate the realisation of 2nd Generation biofuel projects
6. Accelerate targeted research and innovation for advanced biofuel technologies, and especially algae
7. Take concrete actions to inform the European citizen of the benefits of replacing kerosene by certified sustainable biofuels.

The following "Flight Path" provides an overview about the objectives, tasks, and milestones of the initiative.

Time horizons (Base year - 2011)	Action	Aim/Result
Short-term (next 0-3 years)	Announcement of action at International Paris Air Show	To mobilise all stakeholders including Member States.
	High level workshop with financial institutions to address funding mechanisms.	To agree on a "Biofuel in Aviation Fund".
	> 1,000 tons of Fisher-Tropsch biofuel become available.	Verification of Fisher-Tropsch product quality. Significant volumes of synthetic biofuel become available for flight testing.
	Production of aviation class biofuels in the hydrotreated vegetable oil (HVO) plants from sustainable feedstock	Regular testing and eventually few regular flights with HVO biofuels from sustainable feedstock.
	Secure public and private financial and legislative mechanisms for industrial second generation biofuel plants.	To provide the financial means for investing in first of a kind plants and to permit use of aviation biofuel at economically acceptable conditions.
	Biofuel purchase agreement signed between aviation sector and biofuel producers.	To ensure a market for aviation biofuel production and facilitate investment in industrial 2G plants.
	Start construction of the first series of 2G plants.	Plants are operational by 2015-16.

	Identification of refineries & blenders which will take part in the first phase of the action.	Mobilise fuel suppliers and logistics along the supply chain.
Mid-term (4-7 years)	2000 tons of algal oils are becoming available.	First quantities of algal oils are used to produce aviation fuels.
	Supply of 1.0 M tons of hydrotreated sustainable oils and 0.2 tons of synthetic aviation biofuels in the aviation market.	1.2 M tons of biofuels are blended with kerosene.
	Start construction of the second series of 2G plants including algal biofuels and pyrolytic oils from residues.	Operational by 2020.
Long-term (up to 2020)	Supply of an additional 0.8 M tons of aviation biofuels based on synthetic biofuels, pyrolytic oils and algal biofuels.	2.0 M tons of biofuels are blended with kerosene.
	Further supply of biofuels for aviation, biofuels are used in most EU airports.	Commercialisation of aviation biofuels is achieved.

When the Flightpath 2020 initiative began in 2010, only one production pathway was approved for aviation use; no renewable kerosene had actually been produced except at very small scale, and only a handful of test and demonstration flights had been conducted using it. During the four years since then, worldwide technical and operational progress of the industry has been remarkable.

Three different pathways for the production of renewable kerosene are now approved and several more are expected to be certified. More than 1,600 flights using renewable kerosene have been conducted, most of them revenue flights carrying passengers. Production has been demonstrated at demonstration and even industrial scale for some of the pathways. Use of renewable kerosene within an airport hydrant system will be demonstrated in Oslo in 2015.

Flights
IATA: 1600 flights worldwide using bio-kerosene blends
Lufthansa: 1189 flights Frankfurt-Hamburg using 800 tons of bio-kerosene
KLM: 18 flights Amsterdam-Aruba-Bonaire using 200 tons of bio-kerosene

Production (EU)
Neste (Finland): by batches - Frankfurt-Hamburg (6 months) 1189 flights operated by Lufthansa: 800 tons of bio-kerosene - Itaka: €10m EU funding (2012-2015): > 1 000 tons **Biorefly**: €13.7m EU funding: 2000 tons per year – second generation (2015) – BioChemtex (Italy) **BSFJ Swedish Biofuels**: €27.8m EU funding (2014-2019)

A.3.2 Research and Development projects on alternative fuels in aviation

In the time frame 2011-2016, 3 projects have been funded by the FP7 Research and Innovation program of the EU.

ITAKA: €10m EU funding (2012-2015) with the aim of assessing the potential of a specific crop (camelina) for providing jet fuel. The project aims entail the testing of the whole chain from field to fly, assessing the potential beyond the data gathered in lab experiments, gathering experiences on related certification, distribution and on economical aspects. As feedstock, ITAKA targets European camelina oil and used cooking oil, **in order to meet a minimum of 60% GHG emissions savings compared to the fossil fuel jetA1**.

SOLAR-JET: this project has demonstrated the possibility of producing jet-fuel from CO2 and water. This was done by coupling a two-step solar thermochemical cycle based on non-stoichiometric ceria redox reactions with the Fischer-Tropsch process. This successful demonstration is further complemented by assessments of the chemical suitability of the solar kerosene, identification of technological gaps, and determination of the technological and economical potentials.

Core-JetFuel: €1.2m EU funding (2013-2017) this action evaluates the research and innovation "landscape" in order to develop and implement a strategy for sharing information, for coordinating initiatives, projects and results and to identify needs in research, standardisation, innovation/deployment, and policy measures at European level. Bottlenecks of research and innovation will be identified and, where appropriate, recommendations for the European Commission will be elaborated with respect to re-orientation and re-definition of priorities in the funding strategy. The consortium covers the entire alternative fuel production chain in four domains: Feedstock and sustainability; conversion technologies and radical concepts; technical compatibility, certification and deployment; policies, incentives and regulation. CORE-JetFuel ensures cooperation with other European, international and national initiatives and with the key stakeholders in the field. The expected benefits are enhanced knowledge of decision makers, support for maintaining coherent research policies and the promotion of a better understanding of future investments in aviation fuel research and innovation.

In 2015, the European Commission is launching projects under the Horizon 2020 research programẁ with capacities of the order of several 1000 tons per year.

A.4. IMPROVED AIR TRAFFIC MANAGEMENT AND INFRASTRUCTURE USE

A.4.1.The EU's Single European Sky Initiative and SESAR

SESAR Project

The European Union's Single European Sky (SES) policy aims to reform Air Traffic Management (ATM) in Europe in order to enhance its **performance** in terms of its capacity to manage larger volume of flights in a safer, more cost-efficient and environmental friendly manner.

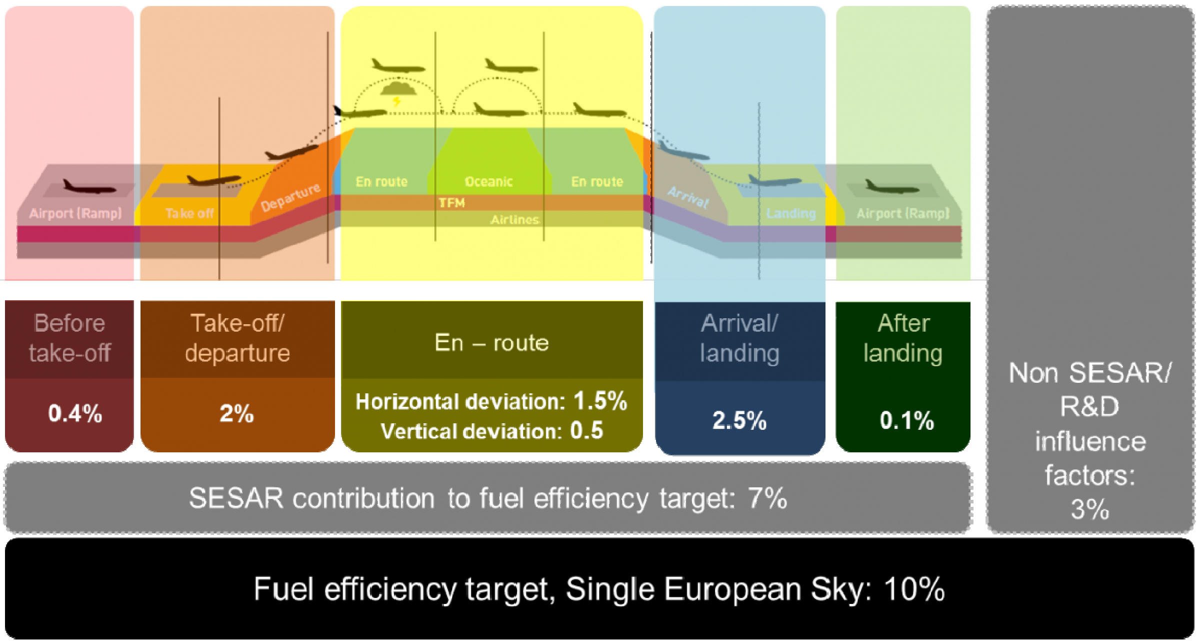
The SES aims at achieving 4 high level performance objectives (referred to 2005 context):

- Triple capacity of ATM systems
- Reduce ATM costs by 50%
- Increase safety by a factor of 10
- **Reduce the environmental impact by 10% per flight**

SESAR, the technological pillar of the Single European Sky, contributes to the Single Sky's performance targets by defining, developing, validating and deploying innovative technological and operational solutions for managing air traffic in a more efficient manner.

SESAR contribution to the SES high-level goals set by the Commission are continuously reviewed by the SESAR JU and kept up to date in the ATM Master Plan.

The estimated potential fuel emission savings per flight segment is depicted below:

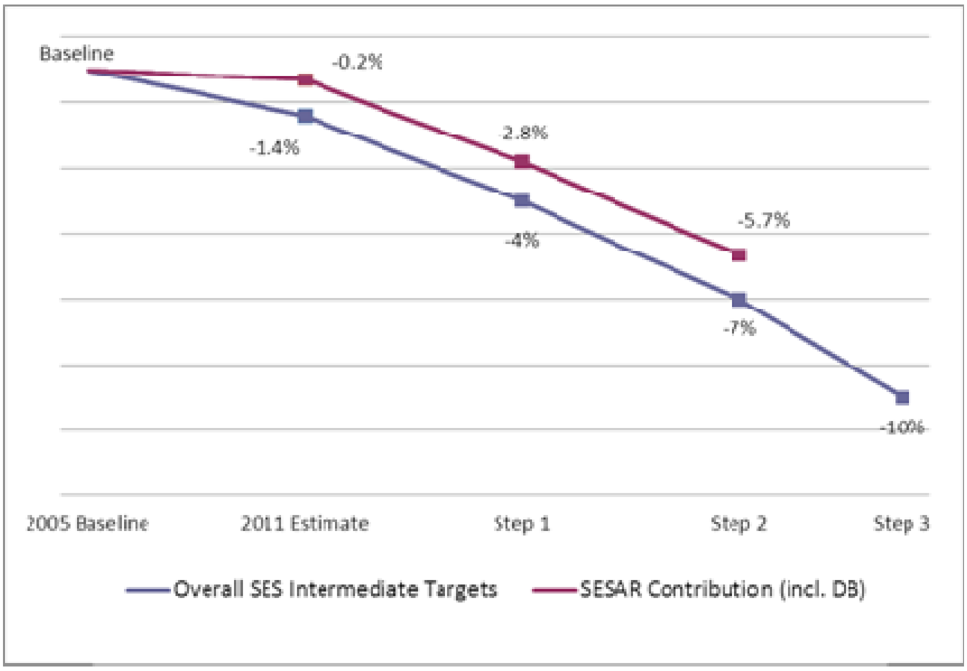


SESAR's contribution to the SES performance objectives is now targeting for 2016, as compared to 2005 performance:

1) 27% increase in airspace capacity and 14% increase in airport capacity;
2) Associated improvement in safety, i.e. in an absolute term, 40% of reduction in accident risk per flight hour.
3) **2.8 % reduction per flight in gate to gate greenhouse gas emissions;**
4) 6 % reduction in cost per flight.

The projection of SESAR target fuel efficiency beyond 2016 (Step 1[10]) is depicted in the following graph:

[10] Step 1, "Time-based Operations" is the building block for the implementation of the SESAR Concept and is focused on flight efficiency, predictability and the environment. The goal is a synchronised and predictable European ATM system, where partners are aware of the business and operational situations and collaborate to optimise the network. In this first Step, time prioritisation for arrivals at airports is initiated together with wider use of datalink and the deployment of initial trajectory-based operations through the use of airborne trajectories by the ground systems and a controlled time of arrival to sequence traffic and manage queues.
Step 2, "Trajectory-based Operations" is focused on flight efficiency, predictability, environment and capacity, which becomes an important target. The goal is a trajectory-based ATM system where partners optimise "business and mission trajectories" through common 4D trajectory information and users define priorities in the network. "Trajectory-based Operations" initiates 4D-based business/mission trajectory management using System Wide Information Management (SWIM) and air/ground trajectory exchange to enable tactical planning and conflict-free route segments.
Step 3, "Performance-based Operations" will achieve the high performance required to satisfy the SESAR target concept. The goal is the implementation of a European high-performance, integrated,



It is expected that there will be an ongoing performance contribution from non-R&D initiatives through the Step 1 and Step 2 developments, e.g. from improvements related to FABs and Network Management: The intermediate allocation to Step 1 development has been set at -4%, with the ultimate capability enhancement (Step 3) being -10% . 30% of Step 1 target will be provided through non-R&D improvements (-1.2% out of -4%) and therefore -2.8% will come from SESAR improvements. Step 2 target is still under discussion in the range of 4.5% to 6%.

The SESAR concept of operations is defined in the European ATM Master Plan and translated into SESAR solutions that are developed, validated and demonstrated by the SESAR Joint Undertaking and then pushed towards deployment through the SESAR deployment framework established by the Commission.

SESAR Research Projects (environmental focus)

Within the SESAR R&D activities, environmental aspects have mainly been addressed under two types of projects: Environmental research projects which are considered as a transversal activity and therefore primarily contribute to the validation of the SESAR solutions and SESAR demonstration projects, which are pre-implementation activities. Environment aspects, in particular fuel efficiency, are also a core objective of approximately 80% of SESAR's primary projects.

network-centric, collaborative and seamless air/ground ATM system. "Performance-based Operations" is realised through the achievement of SWIM and collaboratively planned network operations with User Driven Prioritisation Processes (UDPP).

Environmental Research Projects:

4 Environmental research projects are now completed:

- Project 16.03.01 dealing with Development of the Environment validation framework (Models and Tools);
- Project 16.03.02 dealing with the Development of environmental metrics;
- Project 16.03.03 dealing with the Development of a framework to establish interdependencies and trade-off with other performance areas;
- Project 16.03.07 dealing with Future regulatory scenarios and risks.

In the context of 16.03.01 the IMPACT tool was developed providing SESAR primary projects with the means to conduct fuel efficiency, aircraft emissions and noise assessments at the same time, from a web based platform, using the same aircraft performance assumptions. IMPACT successfully passed the CAEP MDG V&V process (Modelling and Database Group Verification and Validation process). Project 16.06.03 has also ensured the continuous development/maintenance of other tools covering aircraft GHG assessment (AEM), and local air quality issues (Open-ALAQS). It should be noted that these tools have been developed for covering the research and the future deployment phase of SESAR.

In the context of 16.03.02 a set of metrics for assessing GHG emissions, noise and airport local air quality has been documented. The metrics identified by 16.03.02 and not subject of specific IPRs will be gradually implemented into IMPACT.

Project 16.03.03 has produced a comprehensive analysis on the issues related to environmental interdependencies and trade-offs.

Project 16.03.07 has conducted a review of current environmental regulatory measures as applicable to ATM and SESAR deployment, and another report presenting an analysis of environmental regulatory and physical risk scenarios in the form of user guidance. It identifies both those Operation Focus Areas (OFA) and Key Performance Areas which are most affected by these risks and those OFAs which can contribute to mitigating them. It also provides a gap analysis identifying knowledge gaps or uncertainties which require further monitoring, research or analysis.

The only Environmental Research project that is still ongoing in the current SESAR project is the SESAR Environment support and coordination project which ensures the coordination and facilitation of all the Environmental research projects activities while supporting the SESAR/AIRE/DEMO projects in the application of the material produced by the research projects. In particular, this project delivered an Environment Impact Assessment methodology providing guidance on how to conduct an assessment, which metrics to use and do and don'ts for each type of validation exercise with specific emphasis on flight trials.

New environmental research projects will be defined in the scope of SESAR 2020 work program to meet the SESAR environmental targets in accordance to the ATM Master Plan.

Other Research Projects which contribute to SESAR's environmental target:

A large number of SESAR research concepts and projects from exploratory research to preindustrial phase can bring environmental benefits. Full 4D trajectory taking due account of meteorological conditions, integrated departure, surface and arrival manager, airport optimised green taxiing trajectories, combined xLS RNAV operations in particular should bring significant reduction in fuel consumption. Also to be further investigated the potential for remote control towers to contribute positively to the aviation environmental footprint.

Remotely Piloted Aircraft (RPAS) systems integration in control airspace will be an important area of SESAR 2020 work program and although the safety aspects are considered to be the most challenging ones and will therefore mobilise most of research effort, the environmental aspects of these new operations operating from and to non-airport locations would also deserve specific attention in terms of emissions, noise and potentially visual annoyance.

SESAR demonstration projects:

AIRE

The Atlantic Interoperability Initiative to Reduce Emissions (AIRE) is a program designed to improve energy efficiency and lower engine emissions and aircraft noise in cooperation with the US FAA based on existing technologies. The SESAR JU is responsible for its management from a European perspective.

Under this initiative ATM stakeholders work collaboratively to perform integrated flight trials and demonstrations validating solutions for the reduction of CO2 emissions for surface, terminal and oceanic operations to substantially accelerate the pace of change.

3 AIRE demonstration campaigns took place between 2007 and 2014.

The **AIRE 1** campaign (2008-2009), has demonstrated, with 1,152 trials performed, that significant savings can already be achieved using existing technology. **CO_2 savings per flight ranged from 90kg to 1250kg and the accumulated savings during trials were equivalent to 400 tons of CO_2.** Another positive aspect of such pre implementation demonstrations is the human dimension. Indeed the demonstration flight strategy established in AIRE is to produce constant step-based improvements, to be implemented by each partner in order to contribute to reaching the common objective. Hence the AIRE projects boost crew and controller's motivation to pioneer new ways of working together focusing on environmental aspects, and enables cooperative decision making towards a common goal.

The **AIRE 2** campaign (2010-2011) showed a doubling in demand for projects and a high transition rate from R&D to day-to-day operations. 9416 flight trials took place. Table 2 summarises AIRE 2 projects operational aims and results.

Table 2: Summary of AIRE 2 projects

Project	**Location**	**Operation**	**Objective**	**CO2 and Noise benefits per flight (kg)**	**Nb of flights**
CDM at Vienna Airport	Austria	CDM notably pre-departure sequence	CO2 & Ground Operational efficiency	54	208
Greener airport operations under adverse conditions	France	CDM notably pre-departure sequence	CO2 & Ground Operational efficiency	79	1800
B3	Belgium	CDO in a complex radar vectoring environment	Noise & CO2	160-315; -2dB (between 10 to 25 Nm from touchdown)	3094
DoWo - Down Wind Optimisation	France	Green STAR & Green IA in busy TMA	CO2	158-315	219
REACT-CR	Czech republic	CDO	CO2	205-302	204
Flight Trials for less CO2 emission during transition from en-route to final approach	Germany	Arrival vertical profile optimisation in high density traffic	CO2	110-650	362
RETA-CDA2	Spain	CDO from ToD	CO2	250-800	210
DORIS	Spain	Oceanic : Flight optimisation with ATC coordination & Data link (ACARS, FANS CPDLC)	CO2	3134	110
ONATAP	Portugal	Free and Direct Routes	CO2	526	999
ENGAGE	UK	Optimisation of cruise altitude and/or Mach number	CO2	1310	23

RlongSM (Reduced longitudinal Separation Minima)	UK	Optimisation of cruise altitude profiles	CO_2	441	533
Gate to gate Green Shuttle	France	Optimisation of cruise altitude profile & CDO from ToD	CO_2	788	221
Transatlantic green flight PPTP	France	Optimisation of oceanic trajectory (vertical and lateral) & approach	CO_2	2090+1050	93
Greener Wave	Switzerland	Optimisation of holding time through 4D slot allocation	CO_2	504	1700
VINGA	Sweden	CDO from ToD with RNP STAR and RNP AR.	CO_2 & noise	70-285; negligeable change to noise contours	189
AIRE Green Connections	Sweden	Optimised arrivals and approaches based on RNP AR & Data link. 4D trajectory exercise	CO_2 & noise	220	25
Trajectory based night time	The Netherlands	CDO with pre-planning	CO_2 + noise	TBC	124
A380 Transatlantic Green Flights	France	Optimisation of taxiing and cruise altitude profile	CO_2	1200+1900	19
				Total	9416

CDOs were demonstrated in busy and complex TMAs although some operational measures to maintain safety, efficiency and capacity at an acceptable level had to developed.

The AIRE 3 campaign (2012-2014)

Table 3 below summarises the nine projects of the third AIRE campaign. Seven of them are completed. A detailed analysis of the results is on-going.

AIRE III projects			
Project name	**Objectives**	**Expected results**	**Location**
CANARIAS	Reduction of track miles, fuel consumption (and	Reduction of: • 90-180 kg of	La Palma Lanzarote

	therefore CO_2) through optimised vertical and horizontal paths compared with existing arrival procedures.	• fuel burn per flight. • 285-570 kg of CO_2 emissions per flight.	
AMBER	Design, validation and test RNAV STARS and RNP-AR arrivals, in order to reduce CO_2 emissions and noise in the airport's vicinity.	Reduction of: • 70-120 kg of fuel burn per flight. • 220-380 CO_2 emissions per flight.	Riga Airport
REACT-PLUS	Introduction of more efficient flight profiles by identifying and implementing Continuous Descent Approaches (CDA) and Continuous Climb Departures (CCD).	Reduction of: • 70-120 kg of fuel burn per flight. • 220-380 CO_2 emissions per flight.	Budapest Airport
OPTA-IN	Achieve optimised descent procedures (with current systems) using the OPTA speed control concept and an ad-hoc air traffic control tool.	Reduction of: • 22-30% of fuel burn per flight. • 126-228 CO_2 per flight.	Palma de Mallorca Airport
SMART	Optimisation of oceanic flights by seeking the most economical route under actual meteorological conditions. It involves integration of various flight plans, position and meteorological dtas between the ATM system and Airline Operations Centre.	Reduction of: • 2% fuel burn per flight. • 2% CO_2 emissions per flight.	Lisbon FIR Santa Maria FIR New York Oceanic

SATISFIED	Trial and assess the feasibility of implementing flexible optimised oceanic routes.	Reduction of CO_2 emissions per flight.	EUR-SAM corridor
ENGAGE PHASE II	Expands on the work of ENGAGE (AIRE II) and aims at demonstrating safety and viability of progressive step climb or continuous alititude change.	Reduction of: • 416 kg of fuel per flight. • 1310 kg of CO_2 emissions per flight.	North Atlantic
WE FREE	Flight trials for free route optimisation during weekends using flights between Paris CDG and airports in Italian cities.	Reduction of CO_2 emissions per flight.	France Switzerland Italy
MAGGO	Foster quick implementation of enhancements in the Area Control Centres (ACC) and Tower (TWR) communications and surveillance.	Fuel savings of 0.5% per flight.	Santa Maria FIR Santa Maria TMA

Everyone sees the "AIRE way of working together" as an absolute win-win to implement change before the implementation of SESAR solutions.

SESAR next programme (SESAR 2020) includes very large scale demonstrations which should include more environmental flight demonstrations and go one step further demonstrating the environmental benefits of the new SESAR solutions.

SESAR solutions and Common Projects for deployment

SESAR Solutions are operational and technological improvements that aim to contribute to the modernisation of the European and global ATM system. These solutions are systematically validated in real operational environments, which allow demonstrating clear business benefits for the

ATM sector when they are deployed. 17 solutions have already been identified in the key areas of the ATM Master Plan. SESAR Solutions according to a study conducted by the SJU will **help saving 50 million tons of CO_2 emissions.** However to fully achieve SESAR benefits the SESAR solutions must be deployed in a synchronised and timely manner.

The deployment of the SESAR solutions which are expected to bring the most benefits, sufficiently mature and which require a synchronised deployment is mandated by the Commission through legally binding instruments called Common Projects.

The first Common Projects identify six ATM functionalities, namely Extended Arrival Management and Performance Based Navigation in the High Density Terminal Manoeuvring Areas; Airport Integration and Throughput; Flexible Airspace Management and Free Route; Network Collaborative Management; Initial System Wide Information Management; and Initial Trajectory Information Sharing. The deployment of those six ATM functionalities should be made mandatory.

1. The Extended Arrival Management and Performance Based Navigation in the High Density Terminal Manoeuvring Areas functionality is expected to improve the precision of approach trajectory as well as facilitate traffic sequencing at an earlier stage, **thus allowing reducing fuel consumption and environmental impact in descent/arrival phases.**
2. The Airport Integration and Throughput functionality is expected to improve runway safety and throughput, **ensuring benefits in terms of fuel consumption** and delay reduction as well as airport capacity.
3. The Flexible Airspace Management and Free Route functionality is expected to enable a more efficient use of airspace, thus providing significant **benefits linked to fuel consumption** and delay reduction.
4. The Network Collaborative Management functionality is expected to improve the quality and the timeliness of the network information shared by all ATM stakeholders, thus ensuring significant benefits in terms of Air Navigation Services productivity gains and delay cost savings.
5. The Initial System Wide Information Management functionality, consisting of a set of services that are delivered and consumed through an internet protocol-based network by System Wide Information Management (SWIM) enabled systems, is expected to bring significant benefits in terms of ANS productivity.
6. The Initial Trajectory Information Sharing functionality with enhanced flight data processing performances is expected to

improve predictability of aircraft trajectory for the benefit of airspace users, the network manager and ANS providers, implying less tactical interventions and improved de-confliction situation. This is expected to have a positive impact on ANS productivity, **fuel saving** and delay variability.

The fuel efficiency expected benefits from the deployment of these solutions is **66% reduction of fuel burn resulting in EUR 0.8 billion (6%) CO_2 credit savings.**

A.5. ECONOMIC/MARKET-BASED MEASURES

A.5.1 The EU Emissions Trading System

The EU Emissions Trading System (EU ETS) is the cornerstone of the European Union's policy to tackle climate change, and a key tool for reducing greenhouse gas emissions cost-effectively, including from the aviation sector. It operates in 31 countries: the 28 EU Member States, Iceland, Liechtenstein and Norway. The EU ETS is the first and so far the biggest international system capping greenhouse gas emissions; it currently covers half of the EU's CO2 emissions, encompassing those from around 12,000 power stations and industrial plants in 31 countries, and, under its current scope, around 600 commercial and non-commercial aircraft operators that have flown between airports in the European Economic Area (EEA)[11].

The EU ETS began operation in 2005; a series of important changes to the way it works took effect in 2013, strengthening the system. The EU ETS works on the "cap and trade" principle. This means there is a "cap", or limit, on the total amount of certain greenhouse gases that can be emitted by the factories, power plants, other installations and aircraft operators in the system. Within this cap, companies can sell to or buy emission allowances –from one another. The limit on allowances available provides certainty that the environmental objective is achieved and gives allowances a market value.

By the 30th April each year, companies, including aircraft operators, have to surrender allowances to cover their emissions from the previous calendar year. If a company reduces its emissions, it can keep the spare allowances to cover its future needs or sell them to another company that is short of allowances. The flexibility that trading brings ensures that emissions are cut where it costs least to do so. The number of allowances reduces over time so that total emissions fall.

[11] Estimate from Eurocontrol, to be updated following reporting of 2013 and 2014 emissions by 31 March 2015.

As regards aviation, following more than a decade of inaction with respect to the introduction of a global market based measure aiming at reducing the impact of aviation on climate change on the level of the International Civil Aviation Organization (ICAO), legislation to include aviation in the EU ETS was adopted in 2008 by the European Parliament and the Council[12]. The 2006 proposal to include aviation in the EU ETS was accompanied by detailed impact assessment[13]. After careful analysis of the different options, it was concluded that this was the most cost-efficient and environmentally effective option for addressing aviation emissions.

In October 2013, the Assembly of the International Civil Aviation Organization (ICAO) decided to develop a global market-based mechanism (MBM) for international aviation emissions. This is an important step and follows years of pressure from the EU for advancing global action. The global MBM design is to be decided at the next ICAO Assembly in 2016, including the mechanisms for the implementation of the scheme from 2020. In order to sustain momentum towards the establishment of the global MBM, the European Parliament and Council have decided to temporarily limit the scope of the aviation activities covered by the EU ETS, to intra-European flights[14]. The temporary limitation applies for 2013-2016, following on from the April 2013 'stop the clock' Decision[15] adopted to promote progress on global action at the 2013 ICAO Assembly.

The legislation requires the European Commission to report to the European Parliament and Council regularly on the progress of ICAO discussions as well as of its efforts to promote the international acceptance of market-based mechanisms among third countries. Following the 2016 ICAO Assembly, the Commission shall report to the European Parliament and to the Council on actions to implement an international agreement on a global market-based measure from 2020, that will reduce greenhouse gas emissions from aviation in a non-discriminatory manner. In its report, the Commission shall consider, and, if appropriate, include proposals on the appropriate scope for coverage of aviation within the EU ETS from 2017 onwards.

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[12] Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community, http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0101

[13] http://ec.europa.eu/clima/policies/transport/aviation/documentation_en.htm

[14] Regulation (EU) No 421/2014 of the European Parliament and of the Council of 16 April 2014 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in view of the implementation by 2020 of an international agreement applying a single global market-based measure to international aviation emissions http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32014R0421

[15] Decision No. 377/2013/EU derogating temporarily from Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32013D0377:EN:NOT

Between 2013 and 2016, the EU ETS only covers emissions from flights between airports which are both in the EEA. Some flight routes within the EEA are also exempted, notably flights involving outermost regions.

The complete, consistent, transparent and accurate monitoring, reporting and verification of greenhouse gas emissions remain fundamental for the effective operation of the EU ETS. Aviation operators, verifiers and competent authorities have already gained experience with monitoring and reporting during the first aviation trading period; detailed rules are prescribed by Regulations (EU) N°600/2012[16] and 601/2012.[17]

The EU legislation establishes exemptions and simplifications to avoid excessive administrative burden for the smallest aircraft operators. Since the EU ETS for aviation took effect in 2012 a *de minimis* exemption for commercial operators – with either fewer than 243 flights per period for three consecutive four-month periods or flights with total annual emissions lower than 10,000 tonnes CO_2 per year –applies, which means that many aircraft operators from developing countries are exempted from the EU ETS. Indeed, over 90 States have no commercial aircraft operators included in the scope of the EU ETS. From 2013 also flights by non-commercial aircraft operators with total annual emissions lower than 1,000 tonnes CO2 per year are excluded from the EU ETS up to 2020. A further administrative simplification applies to small aircraft operators emitting less than 25,000 tonnes of CO_2 per year, who can choose to use the small emitter`s tool rather than independent verification of their emissions. In addition, small emitter aircraft operators can use the simplified reporting procedures under the existing legislation.

The EU legislation foresees that, where a third country takes measures to reduce the climate change impact of flights departing from its airports, the EU will consider options available in order to provide for optimal interaction between the EU scheme and that country's measures. In such a case, flights arriving from the third country could be excluded from the scope of the EU ETS. The EU therefore encourages other countries to adopt measures of their own and is ready to engage in bilateral discussions with any country that has done so. The legislation also makes it clear that if there is agreement on global measures, the EU shall consider whether amendments to the EU legislation regarding aviation under the EU ETS are necessary.

[16] Commission Regulation (EU) No 600/2012 of 21 June 2012 on the verification of greenhouse gas emission reports and tonne-kilometre reports and the accreditation of verifiers pursuant to Directive 2003/87/EC of the European Parliament and of the Council, http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012R0600&from=EN

[17] Regulation (EU) No 601/2012 of the European Parliament and of the Council of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council, http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32012R0601

Impact on fuel consumption and/or CO_2 emissions

The environmental outcome of an emissions trading system is determined by the emissions cap. Aircraft operators are able to use allowances from outside the aviation sector to cover their emissions. The absolute level of CO_2 emissions from the aviation sector itself can exceed the number of allowances allocated to it, as the increase is offset by CO_2 emissions reductions in other sectors of the economy.

Over 2013-16, with the inclusion of only intra-European flights in the EU ETS, the total amount of annual allowances to be issued will be around 39 million. Verified CO2 emissions from aviation activities carried out between aerodromes located in the EEA amounted to 54.9 million tonnes of CO2 in 2014. This means that the EU ETS will contribute to achieve around 16 million tonnes of emission reductions annually, or almost 65 million over 2013-2016, partly within the sector (airlines reduce their emissions to avoid paying for additional units) or in other sectors (airlines purchase units from other sectors, which would have to reduce their emissions consistently).While some reductions are likely to be within the aviation sector, encouraged by the EU ETS's economic incentive for limiting emissions or use of aviation biofuels, the majority of reductions are expected to occur in other sectors.

Putting a price on greenhouse gas emissions is important to harness market forces and achieve cost-effective emission reductions. In parallel to providing a carbon price which incentivises emission reductions, the EU ETS also supports the reduction of greenhouse gas emissions through €2.1 billion funding for the deployment of innovative renewables and carbon capture and storage. This funding has been raised from the sale of 300 million emission allowances from the New Entrants' Reserve of the third phase of the EU ETS. This includes over €900 million for supporting bioenergy projects, including advanced biofuels[18].

In addition, through Member States' use of EU ETS auction revenue in 2013, over €3 billion has been reported by them as being used to address climate change[19]. The purposes for which revenues from allowances should be used encompass mitigation of greenhouse gas emissions and adaptation to the inevitable impacts of climate change in the EU and third countries, to reduce emissions through low-emission transport, to fund research and development, including in particular in the fields of aeronautics and air transport, to fund contributions to the Global Energy Efficiency and Renewable Energy Fund, and measures to avoid deforestation.

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[15] For further information, see http://ec.europa.eu/clima/policies/lowcarbon/ner300/index_en.htm
[16] For further information, see http://ec.europa.eu/clima/news/articles/news_2014102801_en.htm

In terms of contribution towards the ICAO global goals, the States implementing the EU ETS will together deliver, in "net" terms, a reduction of at least 5% below 2005 levels of aviation CO_2 emissions for the scope that is covered. Other emissions reduction measures taken, either at supra-national level in Europe or by any of the 31 individual states implementing the EU ETS, will also contribute towards the ICAO global goals. Such measures are likely to moderate the anticipated growth in aviation emissions.

A.6. EU INITIATIVES IN THIRD COUNTRIES

A.6.1 Multilateral projects

At the end of 2013 the European Commission launched a project of a total budget of €6.5 million under the name "*Capacity building for CO_2 mitigation from international aviation*". The 42-month project, implemented by the ICAO, boosts less developed countries' ability to track, manage and reduce their aviation emissions. In line with the call from the 2010 ICAO Assembly, beneficiary countries will submit meaningful state action plans for reducing aviation emissions, and also receive assistance for establishing emissions inventories and piloting new ways of reducing fuel consumption. Through the wide range of activities in these countries, the project contributes to international, regional and national efforts to address growing emissions from international aviation. The beneficiary countries are the following:

Africa: Burkina Faso, Kenya and Economic Community of Central African States (ECCAS) Member States: Angola, Burundi, Cameroon, Central African Republic, Chad, Republic of Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon, Sao Tome and Principe.

Caribbean: Dominican Republic and Trinidad and Tobago.

A.7. SUPPORT TO VOLUNTARY ACTIONS: ACI AIRPORT CARBON ACCREDITATION

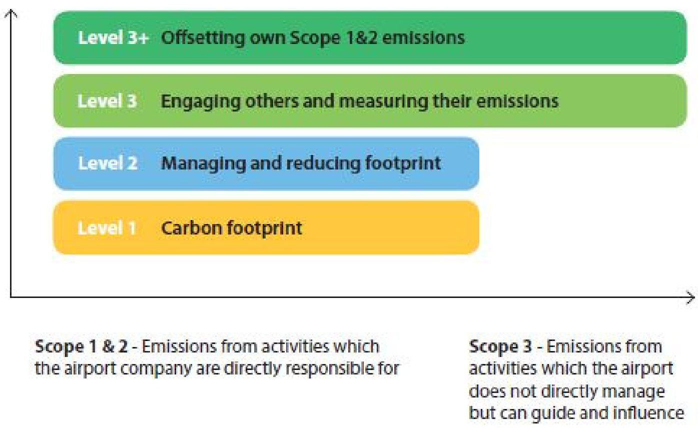
Airport Carbon Accreditation is a certification program for carbon management at airports, based on carbon mapping and management standard specifically designed for the airport industry. It was launched in 2009 by ACI EUROPE, the trade association for European airports.

The underlying aim of the program is to encourage and enable airports to implement best practice carbon and energy management processes and to gain public recognition of their achievements. It requires airports to measure their CO2 emissions in accordance with the World Resources Institute and World Business Council for Sustainable Development GHG

Protocol and to get their emissions inventory assured by an independent third party.

This industry-driven initiative was officially endorsed by Eurocontrol and the European Civil Aviation Conference (ECAC). It is also officially supported by the United Nations Environmental Program (UNEP). The programe is overseen by an independent Advisory Board.

Now covering ACI member airports in three ACI regions, Europe, Asia-Pacific, Africa, it is poised to move to Latin America and North America in the coming years. The number of airports participating in the program has grown from 17 in Year 1 (2009-2010) to 102 at the end of Year 5 – an increase of 85 airports or 500% in participation. Airport participation in the program now covers 23.2% of world passenger traffic.



Airport Carbon Accreditation is a four-step program, from carbon mapping to carbon neutrality. The four steps of certification are: Level 1 "Mapping", Level 2 "Reduction", Level 3 "Optimisation", and Level 3+ "Carbon Neutrality".

Levels of certification (ACA Annual Report 2013-2014)

One of its essential requirements is the verification by external and independent auditors of the data provided by airports. Aggregated data are included in the *Airport Carbon Accreditation* Annual Report thus ensuring transparent and accurate carbon reporting. At level 2 of the program and above (Reduction, Optimisation and Carbon Neutrality), airport operators are required to demonstrate CO2 reduction associated with the activities they control.

In 2014, 5 years after the launch of the program, 85 European airports were accredited, representing 62.8% of European passenger traffic.

Anticipated benefits:

The Administrator of the program has been collecting CO2 data from participating airports over the past five years. This has allowed the absolute CO2 reduction from the participation in the program to be quantified.

	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Total aggregate scope 1 & 2 reduction (tCO2)	51,657	54,565	48,676	140,009	129,937
Total aggregate scope 3 reduction (tCO2)	359,733	675,124	365,528	30,155	223,905

Variable	Year 4		Year 5	
	Emissions	No of airports	Emissions	No of airports
Aggregate carbon footprint for 'year 0'[20] for emissions under airports' direct control (all airports)	2,553,869 tonnes CO2	75	2,044,683 tonnes CO2	85
Carbon footprint per passenger	2.75 kg CO2		2.01 kgCO2	
Aggregate reduction in emissions from sources under airports' direct control (Level 2 and above)[21]	158,544 tonnes CO2	43	87,449 tonnes CO2	56
Carbon footprint reduction per passenger	0.22 kg CO2		0.11 kg CO2	
Total carbon footprint for 'year 0' for emissions sources which an airport may guide or influence (level 3 and above) [22]	12,176,083 tonnes CO2	26	6,643,266 tonnes CO2[23]	31

20 'Year 0' refers to the 12 month period for which an individual airport's carbon footprint refers to, which according to the Airport Carbon Accreditation requirements must have been within 12 months of the application date.

21 This figure includes increases in emissions at airports that have used a relative emissions benchmark in order to demonstrate a reduction.

22 These emissions sources are those detailed in the guidance document, plus any other sources that an airport may wish to include.

Aggregate reductions from emissions sources which an airport may guide or influence	30,155 tonnes CO2		223,905 tonnes CO2	
Total emissions offset (Level 3+)	66,724 tonnes CO2	15	181,496 tonnes CO2	16

Its main immediate environmental co-benefit is the improvement of local air quality.

Costs for design, development and implementation of *Airport Carbon Accreditation* have been borne by ACI EUROPE. *Airport Carbon Accreditation* is a non-for-profit initiative, with participation fees set at a level aimed at allowing for the recovery of the aforementioned costs.

The scope of *Airport Carbon Accreditation,* i.e. emissions that an airport operator can control, guide and influence, implies that aircraft emissions in the LTO cycle are also covered. Thus, airlines can benefit from the gains made by more efficient airport operations to see a decrease in their emissions during the LTO cycle. This is coherent with the objectives pursued with the inclusion of aviation in the EU ETS as of 1 January 2012 (Directive 2008/101/EC) and can support the efforts of airlines to reduce these emissions.

B. ACTIONS TAKEN IN GREECE

B.1. GREECE BASELINE SCENARIO

Aviation activity and associated fuel use data for years 2010 - 2050 have been requested from Greek Airline Operators and stakeholders, so as to analyze and demonstrate continued progress towards reducing GHG emissions. For the first time, air carriers reported domestic and international data, according to ICAO definitions and future projections have been made by Environmental Section of HCAA for Baseline Scenario without any measures taken, as illustrated below:

GREEK OPERATORS BASELINE WITHOUT MEASURES							
Year		Total (Int+Dom) Flight Services			International Flights		
		Fuel Burn (tons)	Traffic RTK (Revenue tonne-kilometre)	CO2 emissions (tons)	Fuel Burn (tons)	Traffic RTK (Revenue tonne-kilometre)	CO2 emissions (tons)
HIstoric Data	2010	376.582	1.000.772.905	1.190.000	197.785	585.772.905	625.000
	2011	348.576	972.432.455	1.101.500	191.930	572.432.455	606.500
	2012	340.190	948.147.360	1.075.000	185.127	551.442.526	585.000
	2013	333.861	997.759.809	1.055.000	181.962	559.527.479	575.000
	2014	356.013	1.130.191.769	1.125.000	208.861	668.868.769	660.000
Forecast Data	2015	384.256	1.220.144.796	1.214.250	229.747	735.755.646	726.000
	2020	453.382	1.439.954.297	1.432.688	275.696	882.906.775	871.200
	2030	557.843	1.772.090.496	1.762.785	344.620	1.103.633.469	1.089.000
	2050	714.535	2.270.294.793	2.257.931	448.006	1.434.723.509	1.415.700

EFFICIENCY INDEX WITHOUT MEASURES							
Year		Total Flight Services		International Flights		Domestic Flights	
		Fuel/RTK	CO2 /RTK	Fuel/RTK	CO2 /RTK	Fuel/RTK	CO2 /RTK
HIstoric Data	2010	0,38	1,19	0,34	1,07	0,43	1,36
	2011	0,36	1,13	0,34	1,06	0,39	1,24
	2012	0,36	1,13	0,34	1,06	0,39	1,24
	2013	0,33	1,06	0,33	1,03	0,35	1,10
	2014	0,32	1,00	0,31	0,99	0,32	1,01
Forecast	2015	0,31	1,00	0,31	0,99	0,32	1,01
	2020	0,31	0,99	0,31	0,99	0,32	1,01
	2030	0,31	0,99	0,31	0,99	0,32	1,01
	2050	0,31	0,99	0,31	0,99	0,32	1,01

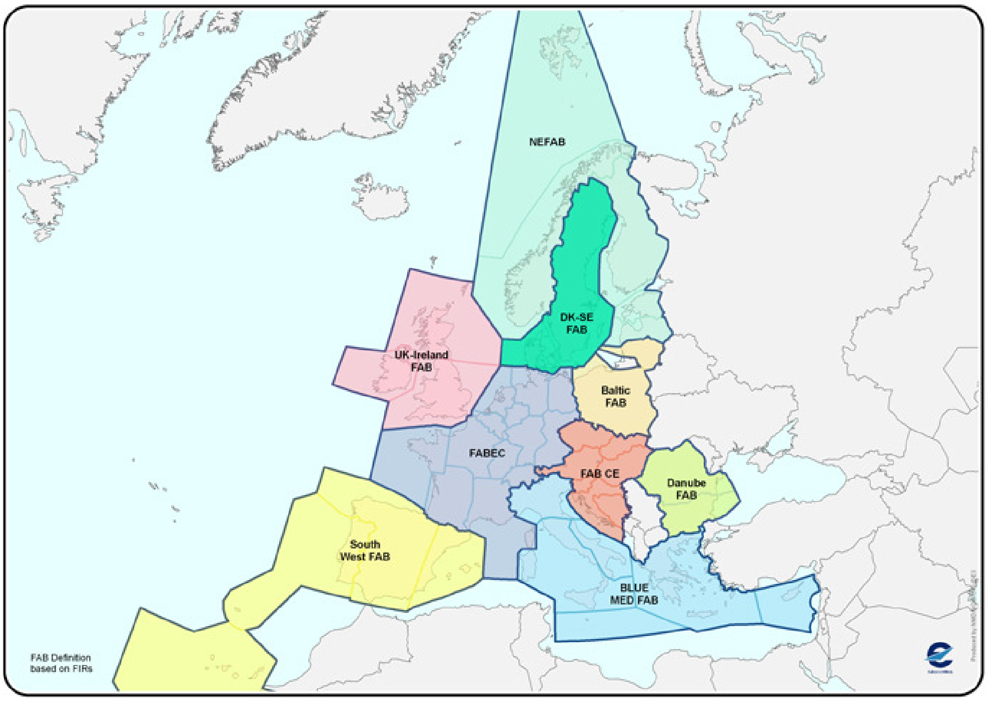
B.2. REGULATORY MEASURES

Greece as Member State of EU and consequently under the European Union Regulatory regime, is obliged to implement the Regulation (EU) 390/2013 (Performance Regulation) which lays down the measures to improve the overall performance of air navigation services at FAB level.

In accordance with the aforementioned Regulation, Greece has, along with the other Member States of Blue-Med Functional Airspace Block (B.M._FAB), drawn up the Performance Plan for the second reference period (RP2) covering the years 2015-2019.

The Performance Plan has been drawn up in consistency with the requirements set out in the Regulations (EU) 390/2013 and 391/2013 (the common charging scheme Regulation) having incorporated specific and measurable key performance indicators (KPIs), for the key Performance Areas (KPAs) of **Safety, Capacity, Environment and Cost effectiveness.**

Effort was made for assignment of achievable, realistic and time-bound corresponding targets, being consistent with European Wide Targets, aiming at effectively steering the sustainable performance of air navigation services.



BLUE MED FAB

The Single European Sky regulatory framework, issued in order to obtain a more efficient and flexible management of the airspace, has the implementation of Functional Airspace Blocks (FABs) by the EU Member States.

According to Project 2008-EU-40004, the **BLUE MED FAB** consists:

- Cyprus, **Greece**, Italy and Malta are the Full Members in the ministerial declaration of political support to the definition phase of BLUE MED FAB Project);
- Albania, Egypt and Tunisia are referred to as "Associated Partners" of the BLUE MED FAB Project
- Jordan and Lebanon are referred to as "Observers" of BLUE MED FAB Project, deciding on a voluntary basis which activities they need to follow.

The BLUE MED FAB initiative involves a large portion of the Mediterranean airspace and covers all the airspace under the responsibility of Member States and Associated Partners (ICAO EUR region and ICAO AFI region as regards Egypt and Tunisia).

The BLUE MED project in fact, aims to fulfill the new requirements introduced by the SES I and II, creating the necessary conditions for the coordinated management of a large portion of the airspace with the Mediterranean countries bordering the North East Africa and the Middle East.

The aim is to harmonize the ATM/ANS systems in use in the states involved, in order to build single system of air traffic management interoperable and also consistent with the results of the research and development SESAR.

The project aims to extend the Single European Sky concept beyond the geographical boundaries of Europe and to achieve a safer, better performing air traffic network for airspace users and the travelling public.

The concurrent implementation of described Operational Improvements, particularly with regards to the FAB optimized ATS Route Network and the Free Route introduction, will improve the overall efficiency.

BLUE MED FAB - Quantitative Benefits

FAB Improvements Areas	Improvements	Scenarios			Key Improvement Areas					
		2012	2015	2020	Flight Efficiency	Capacity	Cost Effectivenes	Safety	Environmental Sustainability	Human Resources
Airspace management	FAB optimized ATS Route Network	✓	✓	✓	✓	✓	✓		✓	✓
	Free Route Operations	✓	✓	✓	✓	✓			✓	✓
	Sector configuration improvements		✓		✓	✓			✓	✓
	Uniform en route Lateral separation minima (5NM)		✓		✓	✓			✓	
Procedures	Flow management procedure: ATFCM H24	✓			✓	✓	✓	✓	✓	✓

The following quantitative benefits can be derived from these improvements:

- Reduction of fuel consumption
- Reduction of CO2 emissions
- Reduction of flight time
- Reduction of NOx emissions
- Increase of capacity

Specifically, with the establishment of BLUE MED FAB a reduction in CO_2 emissions and a reduction in NOx emissions can be achieved in all different BLUE MED FAB scenarios (short, medium e long term), with increasing volumes. In the following table, aviation environmental impact saving (CO_2 and NOx saving) is presented with regards to the different BLUE MED FAB scenarios.

BLUE MED FAB - Yearly Aviation environmental impact saving (CO_2 and NO_X)		
Scenarios	Yearly CO_2 saving [Ton]	Yearly NO_x saving [Ton]
2012	107.899	430.264
2015	176.815	711.619
2015+ Free Route	256.855	1.020.744
2020 + Free Route	346.095	1.414.926

Key Performance indicator for the Area of environment (KPA)

The Key Performance indicator for the area of Environment is defined on the basis of flight efficiency of the actual trajectory and is the result of *"the comparison between the length of the en route[24] part of the actual trajectory derived from surveillance data and the* ***achieved distance[25]****, summed over all IFR flights within or traversing the B.M_FAB airspace";*

The following tables summarize the list of KPAs for performance plans as well as the definition of "local level" as established in the performance Regulation:

24 '**En route**' refers to the distance flown outside a circle of 40 NM around the airports.

25 **"Achieved distance'** is a function of the position of the entry and exit points of the flight into and out of the B.M._FAB airspace. Achieved distance represents the contribution that these points make to the distance used in the Union- wide indicator. The sum of these distances over all traversed local airspaces equals the distance used in the Union-wide indicator.

KPA	KPIs for Local Target Setting in RP2	Definition of local level
Safety	Effectiveness of Safety Management	FAB level with contribution at national level
	Application of severity classification scheme	FAB level with contribution at national level
	Just Culture	FAB level with contribution at national level
Environment	Horizontal en route flight efficiency	FAB level
Capacity	En route ATFM delay per flight	FAB level with breakdown at most appropriate level
	Terminal and airport ANS ATFM arrival delay per flight	National level with breakdown at airport level
Cost-efficiency	Determined unit cost (DUC) for en route ANS	En route charging zone level and consolidation at FAB level
	Determined unit cost(s) (DUC) for terminal ANS	Terminal charging zone level

KPA	Performance indicators	Level
Safety	Application of automated safety data recording systems	FAB level with contribution at national level
	Level of occurrence reporting	FAB level with contribution at national level
	Trends of separation minima and airspace infringements, runway incursions, and ATM-specific occurrences	FAB level with contribution at national level
Environment	Additional time in the taxi-out phase	National level with breakdown at airport level
	Additional time in terminal airspace	National level with breakdown at airport level
	Effectiveness of booking procedures for flexible use of airspace (FUA),	National level
	Rate of planning of conditional routes (CDRs)	National level
	Effective use of CDRs	National level

In accordance with the European Commission Implementing Decision 2014/132/EU the average horizontal *en route* flight efficiency has to be of at **least 2,6 % in 2019** for the actual trajectory. Key En Route Flight Efficiency –KEA at **Blue Med_FAB level has been set at 2,45% in 2019,** as proposed by European Network Manager**.**

Following the above, the ATM/ANS providers of Blue-Med_FAB, Member States have made efforts to design as direct as possible en route lines focusing in particular on the exit and entry points at national FIRs and in consistency within the corresponding Flight Information Region of their responsibility, in order to achieve the following values **of Key En Route Flight Efficiency (KEA):**

Year	KEA
2015	2,78 %
2016	2,70 %
2017	2,62 %
2018	2,54 %
2019	2,45 %

A. En -route performance Indicators (PIs)

For our own performance monitoring and as part of the performance plan, B.M._FAB Member States decided to establish performance indicators (PIs) (although it is an optional request) for the Environment KPA, with the purpose to support the achievement of the Union-wide targets and the resulting targets at FAB level. These performance Indicators are:

- **PI 1 - ER DES - Airspace Design Improvements:** This PI is referred to FAB en route Airspace Design Assessment and evaluates improvements for the Route Network Structure to obtain the measure/value of the B.M._FAB contribution to the Network Manager DES Indicator (Horizontal ER Flight Efficiency on Airspace Design). The PI will contribute to rating (percentage and absolute value) of changes relating to New ER segments established in the FAB Airspace compared with the previous shortest available Routes serving same NTW (i.e.: City Pairs, Traffic Flows, etc).
- **PI 2 - ER RAD - VFE Improvements:** (RAD= Route Availability Document, VFE Vertical Flight Efficiency). This PI is referred to FAB ER Airspace RAD Assessment and evaluates both Vertical and Time Availability improvements on the Route Network Structure, in order to obtain the measure/value of the B.M.FAB contribution to the Network Manager Route Availability Indicator (Vertical ER Flight Efficiency on Airspace Design).
- **PI 3 - ER FPL vs NTW Availability:** This PI is referred to Optimal ER Plannable Trajectory and Available into the B.M._FAB Airspace vs Latest Filed Flight Plan Trajectory Planned by AOs. The benefits of the resulting improvements support the Network Manager KEP Indicator (Horizontal ER Flight Efficiency on Best NTW Availability vs Last Filed Flight Plan Trajectory) to permit to understand how much (measure/value) the AOs have incorporated the improvements in their own planning activity.

- **PI 4 - AOs Flight Plan vs Best NTW Availability**: Through this PI we will compare the Optimal ER Plannable NTW into the BM Airspace vs the Last Filed Flight Plan by AOs, both on Horizontal and on Vertical, in order to evaluate the AOs reactivity in their own Flight Planning Process to intercept the ANSP NTW improvements introduced on the FAB Route Structure (NTW).

B. Terminal Areas and Performance Indicators for Environment Area

- **PI - Additional ASMA time**: The additional ASMA[26] Time (mins) is the difference between the Actual ASMA Transit Time vs the Unimpeded ASMA Transit Time, monitored to obtain the measure/value of Greece contribution to the ASMA PI for the whole B.M._FAB. According to the EU Reg 390/2013, the 4 Member States of B.M.FAB shall monitor the Airports with more than 70.000 movements (or should there be none, the National Airport/s with the highest number of IFR Traffic). Among airports across Greece, the Athens International Airport (LGAV) is falling under the above prerequisite and for the time being, it is the only one where the measurement of Additional ASMA Time will take place.
- **PI - Additional Taxi-Out Time:** Additional Taxi-Out Time (mins) is the difference between the Actual Taxi-Out Time from the Stand to the Departure RWY vs the Unimpeded Taxi-Out Time calculated for each Stand Group to the Departure RWY, monitored to obtain the measure/value of Greece contribution to the Taxi-Out PI for the whole B.M._FAB.

  Regulation (EU) 390/2013, the additional Taxi- Time on the Airports is described as the indicator is the difference between the actual taxi-out time and the unimpeded time based on taxi-out times in low periods of traffic. It is expressed in minutes for taxi per departure for the whole calendar year. The only airport in Greece with more than 70.000 IFR air transport movements per year is the Athens International Airport (LGAV). As the B.M._FAB Member States have decided to monitor only the Airport where the Actual Taxi Time Information are originated by an A-CDM System, the monitoring of Athens International Airport (LGAV) will take place as soon as the A-CDM implementation is finalized.

[26] ASMA = Arrival Sequencing and Metering Area. The additional time in the ASMA Terminal Airspace is defined as follows:
- the ASMA is a Traffic Volume with a cylindrical shape with a radius of 40 NMs centered on the Airport Reference Point (ARP);
- the indicator made reference to the Arrival Traffic and take in account the difference between the Actual ASMA Transit Time vs ASMA Unimpeded Time (based on transit time in ASMA in low periods of traffic);
- the indicator is expressed in minutes per arrival for the whole calendar year;
- for each Airport involved (for Greece the Athens International Airport) the Unimpeded ASMA Transit Time Reference Value is established as reference.

Performance Plan Monitoring procedure

According to Regulation (EU) 390/2013, article 20.1(a), the National supervisory Authorities of B.M._FAB member States have "*to examine, in relation to all key performance areas, documents and any other material relevant to the establishment of performance plans and targets also to take copies or extracts from such documents; to ask for an oral explanation on site*".

Following the above requirement, the Hellenic Air Navigation Supervisory Authority[27] (HANSA) has already established a procedure aiming at monitoring, at National level, the KPIs and Performance Indicators (PIs) set out in the Performance Plan for all KPA including of course the KPA of Environment.

To this effort the established PIs will render the whole monitoring procedure more effective.

B.3. IMPROVED AIR TRAFFIC MANAGEMENT & INFRASTRUCTURE

B.3.1 Free Route Airspace implementation within HELLAS UIR

It is still common practice over most of the European Airspace that air transport flights operate along a fixed network of airways/way-points rather than flying directly from a departure airport to the arrival destination. With the availability of current Satellite Navigation, Air Traffic and Network Management systems, soon this will no longer be the case.

In particular, Free Route allows airspace users to freely plan a route between fixed published entry and exit points, with the possibility to route via intermediate (published or unpublished) way points, without reference to the published European route network, subject to airspace availability. Free Route may be deployed both through the use of permanent Directs (DCTs), published within the fixed-route network, and through Free Route Airspace (FRA), where airspace users are free to define and fly via user-defined points and segments not previously published.

Following optimized trajectories, airspace users can sensibly improve the overall flight efficiency and predictability. In turn, reducing the distance flown results in time savings, significant cut in tons of fuel burnt/lower fuel carriage and so in fuel costs, last not least in reduction of gaseous emissions (tons of CO_2 and NO_X) alleviating the environmental impact.

[27] The "Hellenic Air Navigation Supervisory Authority" (H.A.N.S.A.) is a civil aviation specialist government body under the Ministry of Economy, Infrastructure, Shipping and Tourism, in charge of certification and supervision of the air navigation service providers in Greece.

Focusing on the South-eastern Europe, the BLUEMED FAB partners are implementing the FRA concept according to the agreed BLUEMED FAB Implementation Program, based on gradual steps ranging from the implementation of night DCTs up to more ambitious Free Route scenarios on regional scale. Under this scope, the Hellenic ANSP has recently developed an ambitious project regarding the gradual FRA implementation within Hellas UIR.

The HANSP project, aims to implement Free Route operations in Greece through a seamless integration of the two Greek ACCs enabling airspace users to flight-plan their preferred trajectories within the airspace of HELLAS UIR. The deployment will also cover the prerequisites for enabling Free Route operations such as: ATS-route network optimization, including arrival and departure procedures and sector adaptation to accommodate the changes in traffic flows where needed.

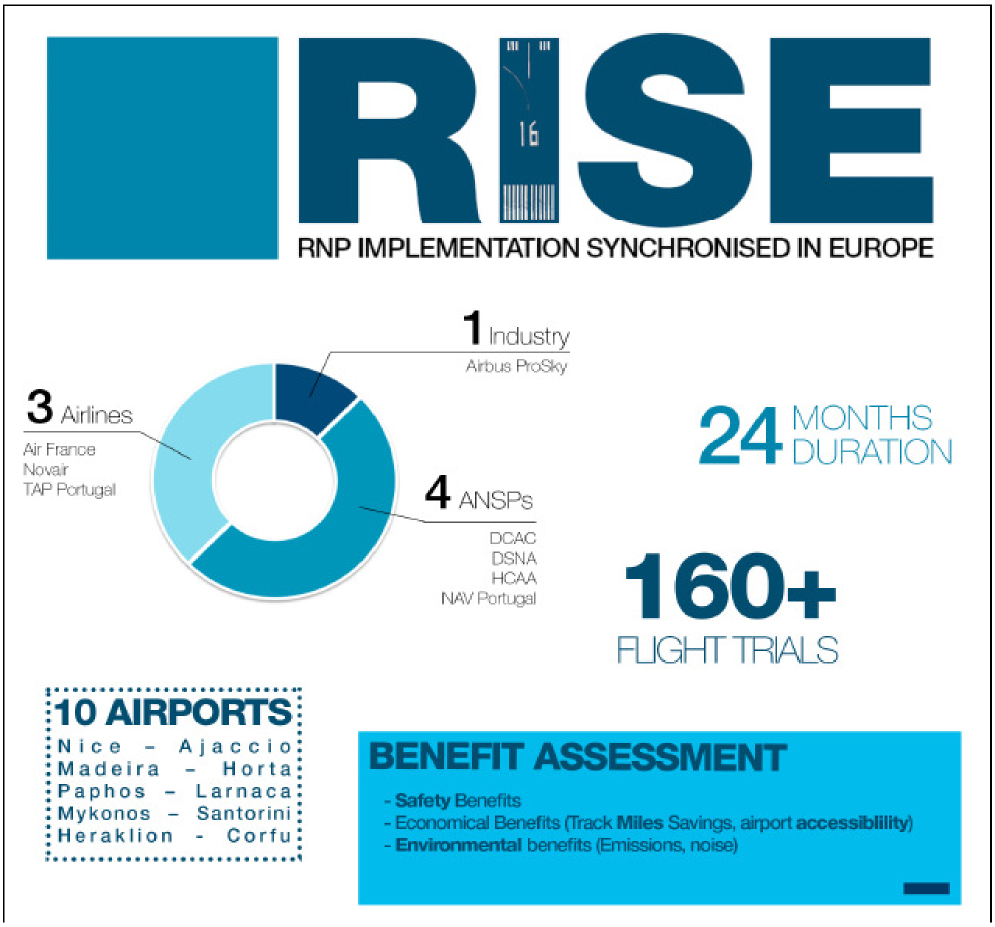
The basic implementation elements of the HANSP Free Route project are presented in the table below. The Free Route operations over the Mediterranean Basin, will be in full cooperation with the other BLUEMED members.

	Phase I	Phase II	Future Plan
Implementation Timeframe	**11/2015-12/2016**	**01/2017-12/2019**	**01/2020 and beyond**
Airspace	FL355 to FL460	FL355 to FL460	FL355 to FL460
Time Availability	2100-0400 UTC	(a) H24 (b) 2100-0400 UTC	H24
Objectives	Implementation of DRA within HELLAS UIR from specific published entry- to specific published exit points	(a) Enhanced DRA implementation (b) FRA Implementation	Full FRA implementation

B.3.2 Performance Based Navigation Procedures

RISE PROJECT

RNP Implementation Synchronisation in Europe (RISE) Project has been set up within SESAR with the objective to help set up large scale demonstrations showing the benefits of SESAR solutions in a real life environment, specifically addressing Precision Arrival and Departure Procedures Focus Area.



RISE project will demonstrate several successful PBN implementations across Europe, and detail how these results have been achieved. That experience will raise awareness and motivate for subsequent PBN Implementation. After the RISE project, a significant number of airports in Europe will yet propose RNP procedures.

The RISE project proposes to develop or validate PBN/RNP procedures over ten European small and medium size airports. A variety of procedures will be designed and flight trials will be conducted.

Content and outcomes of RISE Project can be synthetized as following:

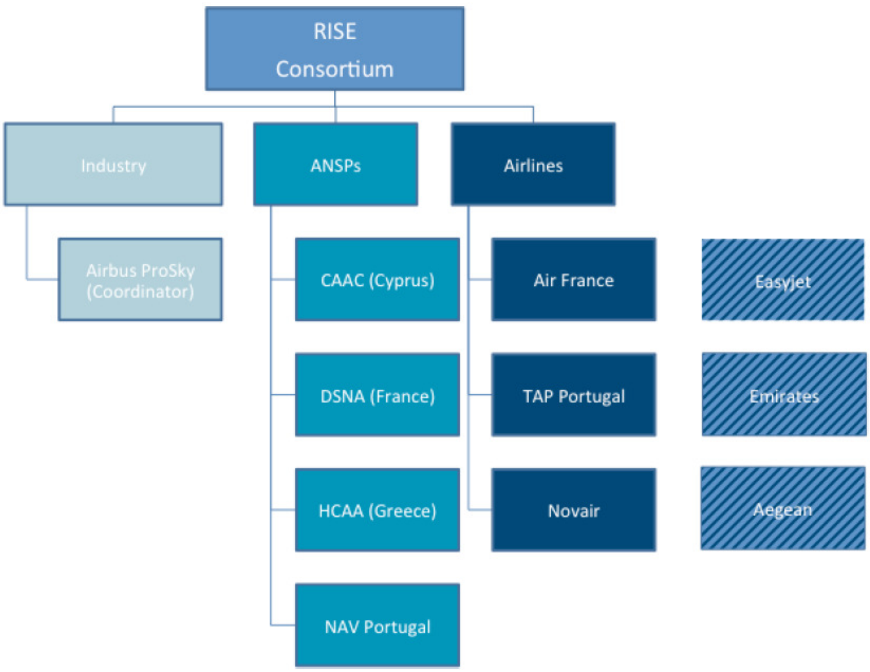
- Development of 14 RNP procedures, for 8 terrains in Europe, enhancing safety, accessibility or fuel consumptions and emissions.

- Validation only of already developed RNP procedures at two airports in Greece (Heraklion and Corfu)
- Flight trials operated by commercial airlines: average of 20 flight trials are planned per terrain in order to prepare submission of the procedure to the authority as well as gather initial benefits (totalising 160 flight trials as a minimum). Additional flight trials are forecast when the procedure is approved and flown during standard airline operations at that airport (expected 1000+ flight trials during the project duration).
- Submission of the procedures to the Regulator for approval
- Dissemination of experience about efficient RNP procedure implementation, raising the ATM community awareness.
- Dissemination of actual benefits (both air and ground), helping other stakeholders build their business case

Bringing together expertise of the ANSPs and Airlines operators, Airbus ProSky will coordinate the implementation of PBN procedures and air traffic controllers training.

Flight trials will be performed in airports in France (Nice, Ajaccio), Cyprus (Paphos and Larnaca), Portugal (Madeira and Horta), and Greece (Corfu, Iraklion, Santorini and Mykonos). The implementation of RNP procedures is expected to significantly reduce fuel consumption in descent and arrival phases, thereby reducing environmental impact.

The two-year project will improve airport access and enhance safety of operations by removing the Circle-to-Land approaches, without relying on the ground navigation infrastructure, lowering the weather minima and allowing shorter tracks resulting in track miles savings and Continuous Descent operations.



B.4. AIRCRAFT RELATED TECHNOLOGY

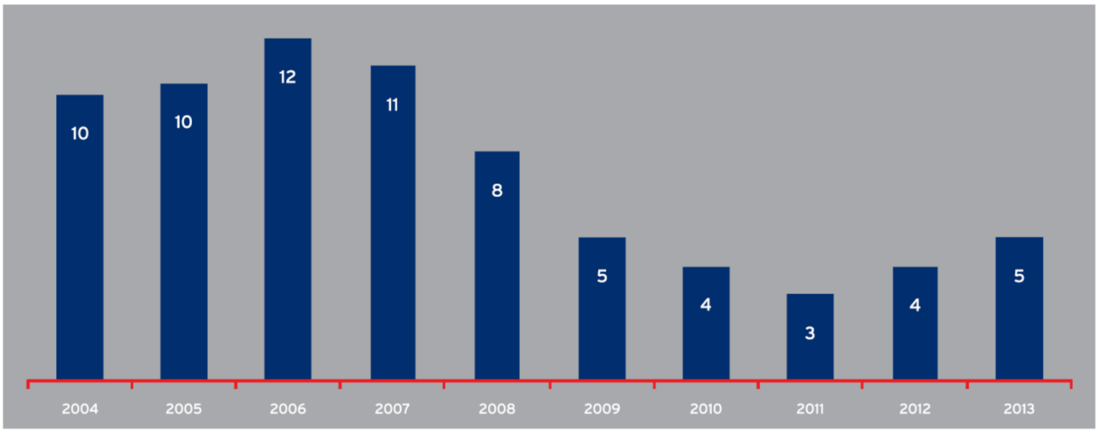
Greek Aircraft Operators initiatives to improve fuel efficiency

Environmental protection is a matter of great importance to Aegean Airlines[28] & Olympic Air. Various departments work together efficiently within the company in order to achieve best possible results in environmental management. Their goal is to reduce fuel consumption by 1,5% per year. Therefore, the company invests in ways to reduce emissions and constantly updates its practices and procedures, including its fuel policy, in order to comply with current environmental management initiatives.

Fleet modernization

Aegean's commitment to the improvement of the environmental management is demonstrated by the average fleet age, which is one of the youngest in Europe.

Average fleet age (years)



Aegean fleet consists mainly of new generation A320 aircraft equipped with the latest technology engines. As a part of its strategic development, the company invests in ever evolving technologies by increasing its size of its fleet through the order of 7 new Airbus A320's. The aircrafts will be equipped with Airbus "Sharklet" fuel efficient wing tip devices and will be powered by IAE V2500 engines. Sharklets are newly designed wing-tip devices that cut the aircraft's fuel burn and emissions by up to 3% on longer sectors. They are made from light-weight composites and are 2.4 meters tall. The delivery of the 7 new aircraft will begin in June 2015 and will be completed by early 2016.

[28] Aegean Airlines was founded in 1987. It is the first carrier in Greece with more than 7 million passengers per year. In October 2013, Aegean Airlines has acquired Olympic Air. Their international flights connect popular holiday destinations in Greece to Italy, France, United Kingdom, Poland, Israel, Romania, Russia, Sweden, Denmark, Finland, Norway, Austria, Germany, Hungary and Ukraine. Their fleet is composed of 14 Bombardier (10 D8-Q400, 4 D8-100), 39 Airbus A320F (1 A319, 30 A320, 8 A321), 1LR 60. Additional 8 A320 are expected in years 2015-2016.

Flight Procedures

Flight Operations have adopted procedures recommended from International Organizations, the aircraft manufacturer (Airbus Green Operating Procedures) and aviation industry always in cooperation with Air Traffic Control in order to improve fuel efficiency and reduce CO2 emissions such as flying techniques during approach, taxiing procedures before takeoff and after landing, careful use of the aircraft's auxiliary power unit while on the ground and takeoff profiles. The fuel savings resulting from the use of these techniques amounts to 350 tonnes of carbon dioxide per month.

Annual CO_2 Emission Savings: 350 t CO_2 X 12 = 4200 t CO_2 / year

Route optimization

In 2014 Aegean Airlines improved its operational performance by acquiring a new flight planning system software. It is an exceptionally accurate and complex system that provides important operational information, as it calculates specific in-flight functions (e.g. flying at an optimum altitude and at an optimum speed for each individual flight). The new software contributes significantly to the improvement of environmental management as it reduces CO2 emissions around 800 tonnes per month.

Moreover, all of the aircraft documentation that is essential for pilots and cabin crews is now available in electronic form. Previously, all of the aircraft manuals, company manuals, aircraft performance and navigational charts were available in paper form, now they have been withdrawn and the information is now available electronically, on iPads. These developments have considerable benefits for the environment as the printed materials for each flight have been reduced by 75%.

Annual CO_2 Emission Savings: 800 t CO_2 X 12 = 9600 t CO_2 / year

Aircraft Weight Reduction

Aegean Airlines has introduced weight reduction initiatives that result in positive economic and ecological impact:

- By investing in new seats that are lighter and more anatomic. The new seats have been installed to all A320 and A321 aircraft. The result is that around 450 tonnes of CO2 are conserved every month.

- New lightweight trolleys have been utilized to all aircraft. Consequently, carbon footprint has been reduced by around 50 tonnes of CO2 every month.

• Optimized quantity of potable water needed for each flight. The environmental impact of this initiative reduces CO2 emissions by around 40 tonnes every month.

• Reduction in fuel consumption on aircraft due to reduced weight through the elimination of the bulky manuals that are no longer carried on board which corresponds to 15 tonnes of CO2 per month.

Annual CO_2 Emission Savings: 555 t CO_2 X 12 = 6660 t CO_2 / year

Aircraft Engine Washes

Aegean Airlines Technical department is performing engine pure water washes on a regular basis using an eco-friendly engine wash system. Dust, pollen, sand, salt, chemicals, hydrocarbons and insects pollute an engine over the course of time, thereby reducing its performance. To maintain the same performance, the engine consumes more fuel and its exhaust gases are also hotter. After washing, an engine regains its performance and fuel consumption is reduced. The eco-wash system enables Aegean to perform regularly engine washes without environmental penalties since the water that is used for the engine wash is collected behind the engine and recycled as per the established environmental procedures of the airport.

Noise Reduction

Noise caused by aircraft is one of the leading concerns in the operation of airline companies. Aegean Airlines conforms to the noise specifications of each airport as aircraft are equipped with new generation turbofan engines so that the area around them is not disturbed by passing airplanes. Furthermore, Flight Operations in order to further improve the environmental management of the company has designed takeoff profiles that produce less noise.

Totalς Greek Operators CO_2 Emission Savings: 20460 t CO_2 / year **or** **2,2% Annual CO_2 Emission Savings**

B.5. ECONOMIC/MARKET-BASED MEASURES

Aviation in Emissions Trading System (EU ETS)

From 1 January 2012 the EU ETS includes also aviation emissions (according to Directive 2008/101/EC, which amends Directive 2003/87/EC). These aircraft operators have been assigned to an administrating EU Member State.

The Greek Greenhouse Gas Registry is part of the Union Registry. The Union Registry is an online database that holds accounts for stationary installations as well as for aircraft operators. It ensures accurate accounting for all allowances issued under the EU emissions trading system (EU ETS), precise tracking of holdings, issuances, transfers, cancellations and retirements of general allowances and Kyoto units. Therefore, all companies registered in the Greek Registry can perform all the necessary actions (e.g. transactions, surrendering), in this way.

In line with the legislation, the Greek part of the Union Registry is managed by the Office for Greek Greenhouse Gas Emissions Allowances which also serves as a contact point for national and international authorities. The Office for Greek Greenhouse Gas Emissions Allowances is also responsible for the operational management of the registry and provides account holders with the required information and support.

Since the start of 2012 emissions from all flights from, to and within the European Economic Area (EEA) - the 28 EU Member States, plus Iceland, Liechtenstein and Norway - are included in the EU Emissions Trading System (EU ETS). The legislation, adopted in 2008, applies to EU and non-EU airlines alike.

The Commission has updated the list of aircraft operators covered by the EU Emissions Trading System (ETS). This annual update provides information on which Member State regulates a particular operator if it comes under the scope of the EU ETS. Only around 600 aircraft operators are covered by the system in 2013-2016. These are mostly commercial aircraft operators, as all non-commercial aircraft operators emitting less than 1000 tonnes CO2 have been temporarily exempted by Regulation No. 421/2014.

The allocations of free allowances to these around 600 operators have been published on Member States' websites. Table allocation of free allowances to aircraft operators, as amended to the annual allowances to be allocated for the period 2013- 2016 in Greece is as follows:

Unique ID	Aircraft Operator	Annual CO2 2013-2016
20514	AEGEAN AIRLINES S.A.	396.419
34238	ASTRA AIRLINES S.A.	2.226
35729	Cassel Invest Limited	8
23232	CJSC "AEROSVIT AIRLINES"	131
19644	COSTAIR	10
35228	First Airways	9
31621	Jadayel Aviation Ltd	1
33560	Kenrick Ltd (MarvelAir Aircraft Management Ltd)	1
22404	OXY USA	1
34624	OLYMPIC AIR	208.642
21711	JSC "Orenburg Airlines"	31
9012	S&K Bermuda Ltd	55
31109	SKY EXPRESS S.A.	2.956
9459	Universal Air Link Inc	13
24805	Yamal	-
17957	GREENLEAF CORPORATION	-

B.6. ALTERNATIVE FUELS

The Greek legislation for biofuels has adopted the EU Directive 2003/30/EC since 2005 by the Law 3423/2005 "Insertion of biofuels and other alternative fuels in the Greek market".

The distribution of biodiesel in Greek is implemented through the refineries. There is a specific procedure that defines the biodiesel quantities which every biodiesel company can sell to the refineries. Biodiesel is mixed with diesel and is distributed to the petrol stations and finally to the end users.

The current law imposes the obligatory use of all detaxed biodiesel in the existing refineries (in an up to 7% blend). Detaxed quantities are decided on an annual basis under a quota scheme.

Since 2001 in Athens there are two CNG filling (refueling) stations in Athens for serving the public gas vehicle fleet (manly buses). The geo-information system European Environmental Atlas lists 18 LPG fuelling stations on Greek mainland (10 in the wider Athens region and 5 in the Thessalonica region) as well as two on the Island of Creta. Also one hydrogen refueling station in installed in CRES demonstration wind park.

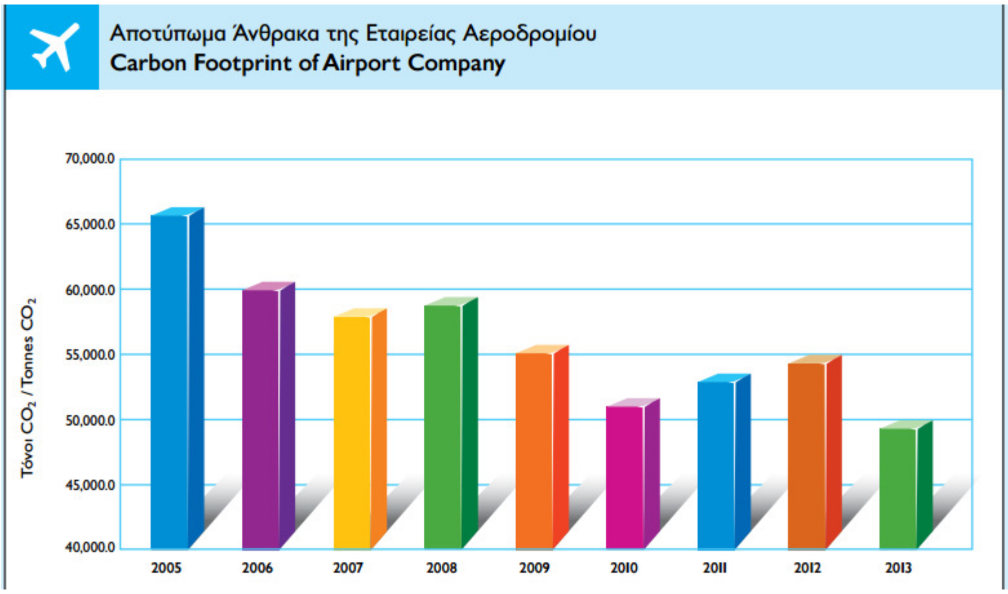
Biofuels in Greece (biodiesel and bioethanol) are produced from a variety of energy crops, of which the output per acre varies depending on the type of crop and cultivation method used.

In 2015, a new Directive has been approved for the Deployment of Alternative Fuels Infrastructure, which aims to minimize oil dependence for the transport sector and mitigate its environmental impact, ensuring the build-up of alternative fuels infrastructure and the implementation of common technical specifications for this infrastructure in the European Union.

Regarding the use of alternative fuel (biofuel) in aviation, an interest from Greek Aircraft Operators has been expressed, inasmuch that their use is assured by technology, there is adequate production, and the use is cost effective.

B.7. AIRPORT IMPROVEMENTS: CONTRIBUTION OF ATHENS INTERNATIONAL AIRPORT

Athens International Airport (AIA) began operation in 2001. It is Greece's busiest airport with 34% of Total Passenger[29] traffic and it serves as the hub and main base of Aegean Airlines, Olympic Air as well as other Greek airlines. The airport is owned by Public/Private consortium and as of 2014, it is the 31st busiest airport in Europe.



7.1. AIA Climate Change Corporate Action Plan

In the context of AIA's Climate Change Corporate Action Plan, which consists of measures to reduce consumption of electricity, natural gas and vehicle fuels (gasoline, diesel, LPG) from sources under its direct control that are proposed by AIA employees and implemented in collaboration with the responsible departments, a number of important initiatives have been undertaken since 2008 that have led to significant reductions in AIA's carbon footprint:

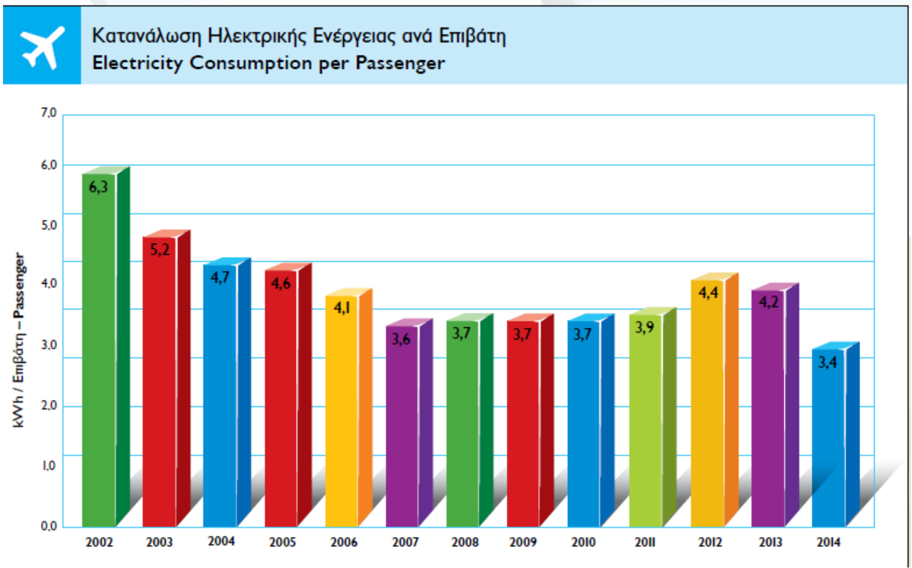
in the decade between 2005 and 2014
AIA has managed to reduce its carbon footprint by 34%

These measures that AIA has taken include, but are not limited to, the following:

- replacement of traditional lighting technology with LED technology for signage (decorative lighting, illumination of exhibition areas, etc.) in the Main Terminal Building as well as for obstruction lights -- following the success of these pilot projects, additional projects to introduce LED technology are being planned (e.g. runway lighting)

[29] Statistic Data are presented in Section II.

- restriction of the usage of Ground Power Units (GPUs) and Auxiliary Power Units (APUs) by airlines through the provision of Fixed Electrical Ground Power and Pre-Conditioned Air
- conversion of AIA's vehicle fleet to operate with more environmentally friendly, low emission fuels such as LPG
- replacement of older vehicles with more fuel efficient models, including hybrid technology
- replacement of older equipment used to remove rubber deposits from runways with more fuel efficient models
- optimization of people movers (e.g. escalators)
- optimization of AIA's Baggage Handling System (one of AIA's most energy-demanding systems)
- conversion of a significant portion of AIA's physical servers (computer equipment) to virtual ones



AIA has been disclosing its carbon footprint (Scope 1 & 2) in a number of its corporate publications for the past several years, including:

- Corporate Responsibility Report
  http://www.aia.gr/ebooks/CSR/2013/index.html
- Care for the Environment -- an annual publication dedicated entirely to environmental issues
  www.aia.gr/ebooks/ENC/CareForTheEnvironment/Issue17/index.html
- Green Care -- a new annual publication entitled distributed to passengers and visitors

These publications are distributed in hard copy and are also available from AIA's corporate website (www.aia.gr) and corporate Intranet. Information about AIA's activities to reduce its carbon footprint and to engage other members of the airport community to do the same are also communicated to state authorities and regulators.

In addition, further to involvement in *Airport Carbon Accreditation*, AIA also requires that all Third Parties (airlines, ground handlers, caterers, retail, etc.) submit a carbon footprint to AIA on an annual basis. Up to now, 50 companies submit an annual carbon footprint.

AIA was amongst the first airports to become accredited when *Airport Carbon Accreditation* was launched in June 2009. AIA was initially accredited at the Mapping level having mapped its carbon emissions from the following sources:

- Electricity consumption (from purchased electricity)
- Natural gas consumption (for heating purpose)
- Petrol, diesel and LPG consumption by AIA's vehicle fleet
- Heating oil consumed by AIA's boilers
- Diesel consumed by AIA's generators

AIA upgraded its accreditation to Level 2 (Reduction) in 2010 after having set itself an ambitious target of reducing its carbon emissions by 25% by the year 2020 using 2005 as a baseline. Between 2010 and 2013, AIA renewed its certification for Level 2 on an annual basis and in early 2014 AIA upgraded to Level 3, and has subsequently renewed its accreditation at this level.

7.2. Reduced energy demand and preferred cleaner energy sources

Carbon reduction is an important factor taken under consideration in AIA's corporate decision-making processes as demonstrated by a number of key projects including its investment in the construction and operation of an 8MWp Photovoltaic Park, which was the largest unified facility at an airport worldwide when it began operation in mid-2011. In 2012, its first full year of operation, it produced 13.6 million kWh of clean energy, 19% more than expected. This corresponds to more than 10% of the airport community's energy demands and over 20% of AIA's energy demands.

AIA has also undertaken a number of initiatives to reduce the energy required for heating and especially cooling its buildings during the warm Greek summers as well as for operation of other infrastructure. These measures include, but are not limited to, the following:

- installation of harmonic filters in the electricity network of AIA's Main Terminal Building in order to improve efficiency and reduce unnecessary electricity production
- exploitation of AIA's extensive network of energy meters and its advanced Building Automation System (BAS) to reduce energy consumption for heating, cooling, lighting and ventilation of airport buildings, operation of people movers as well as other infrastructure
- replacement of six (6) of the Main Terminal Building's existing Air Cooled Chillers with four (4) much more energy efficient Water Cooled Chillers

7.3. Improved transportation to and from airport

AIA has sought to reduce the emissions associated with the transport of passengers, visitors and staff to and from the airport through the following measures:

- collaboration with surface transport organizations to provide special incentives to airport employees that use mass transit
- special incentives to promote environmentally-friendly means of transport to/from work such as staff coaches, financial incentives for staff that carpool, subsidy of the use of mass transit
- ensuring that the airport maintains its well-developed mass transit infrastructure (Metro, suburban rail, public bus, etc.)

7.4. AIA's Environmental Performance Certification


CERTIFICATE
of ACCREDITATION

airport carbon accredited
OPTIMISATION

Valid until the 2nd of July 2014

This is to certify that **Airport Carbon Accreditation**, under the administration of WSP Environment & Energy Ltd, confirms that the carbon management processes at

ATHENS INTERNATIONAL AIRPORT
implemented by Athens International Airport

have earned the accreditation level of **OPTIMISATION**, in recognition of their exemplary work in managing, reducing and engaging other stakeholders on the airport site, in minimising CO_2 emissions as part of the European airport industry's response to the challenge of Climate Change.

airport carbon accreditation
MAPPING | REDUCTION | OPTIMISATION | NEUTRALITY
www.airportcarbonaccreditation.org

Olivier Jankovec
Director General
ACI EUROPE

Simon Clouston
Global Director
WSP Environment & Energy

AIA's Environmental Services Department has an Environmental Management System that's been certified according to the ISO 14001 standard since 2000. It targets environmental compliance and continuous improvement of all environmental aspects including noise, air quality & climate change, water & soil quality, waste management & recycling, the natural environment and social initiatives. We regularly monitor surface and groundwater, treat wastewater onsite and adopt measures to reduce water consumption. In addition, ecosystems at and in the vicinity of the airport have been monitored continuously since 1997, well before the airport opened.

AIA is one of very few airports worldwide that monitors air quality both inside and outside the airport fence. Measures are taken to reduce emissions of air pollutants of concern for local air quality as well as climate change, including a series of successful initiatives to reduce energy and fuel consumption in airport buildings as well as mobile and stationary equipment.

Noise Abatement Procedures have been developed with and are implemented in collaboration with relevant stakeholders. AIA maintains an active dialogue with local communities on noise issues and concerned citizens can register their complaints via a 24-hour "We Listen" telephone line or via AIA's website, where they can also retrieve data from our Noise Monitoring System.

An integrated waste management system has been established based on the "Polluter Pays" principle, with economic incentives for companies that recycle. This combined with awareness, training and other initiatives has helped AIA to increase recycling rate from 3% in 2001 when the airport opened to 52% in 2014. A short video for AIA's environmental activities is available at: www.aia.gr/environmental/EN/index.html

7.5. Conferences/workshops

Since the company was founded, a large emphasis has been placed on training AIA's staff with respect to environmental protection. All employees take part in an induction training course that includes a session on environmental awareness and protection, so to increase corporate awareness regarding climate change. To date, over 90% of AIA's current staff has attended this seminar. In addition, similar training is also provided to the staff of Third Parties operating at the airport.

Moreover, corporate emails are sent to all employees every year on the occasion of World Environment Day that highlight AIA's activities concerning environmental protection. Volunteers are frequently sought for environmentally-related activities such as cleaning up local wetlands, planting new shrubs and trees in local parks, etc.

Regarding Third Parties, AIA works closely with them in order to raise awareness and improve environmental protection and performance across the airport site. This applies not only to the issue of carbon management, but also to other environmental aspects such as proper waste management, recycling, legal compliance, etc. In this framework, there is on-going environmental awareness training to Third Parties which also includes site tours. Since the airport opening, representatives from over 120 companies have attended such training sessions.

B.8. GREECE EXPECTED RESULTS OF MEASURES TAKEN

Table below illustrates the combined results for Greek air carriers for historic years 2010 to 2014 and Forecast data up to year 2050. It shows trends in RTK (Revenue tonne-kilometre), fuel consumption and its conversion to GHG emissions, expressed in CO_2.

GREEK OPERATORS BASELINE WITH EXPECTED RESULTS

	Year	Total (Int+Dom) Flight Services			International Flights		
		Fuel Burn (tons)	Traffic RTK (Revenue tonne-kilometre)	CO2 emissions (tons)	Fuel Burn (tons)	Traffic RTK (Revenue tonne-kilometre)	CO2 emissions (tons)
HIstoric Data	2010	376.582	1.000.772.905	1.190.000	197.785	585.772.905	625.000
	2011	348.576	972.432.455	1.101.500	191.930	572.432.455	606.500
	2012	340.190	948.147.360	1.075.000	185.127	551.442.526	585.000
	2013	333.861	997.759.809	1.055.000	181.962	559.527.479	575.000
	2014	356.013	1.130.191.769	1.125.000	208.861	668.868.769	660.000
Forecast Data	2015	377.373	1.220.144.796	1.192.500	221.392	735.755.646	699.600
	2020	415.111	1.439.954.297	1.311.750	243.532	882.906.775	769.560
	2030	456.622	1.772.090.496	1.442.925	267.885	1.103.633.469	846.516
	2050	479.453	2.270.294.793	1.515.071	281.279	1.434.723.509	888.842

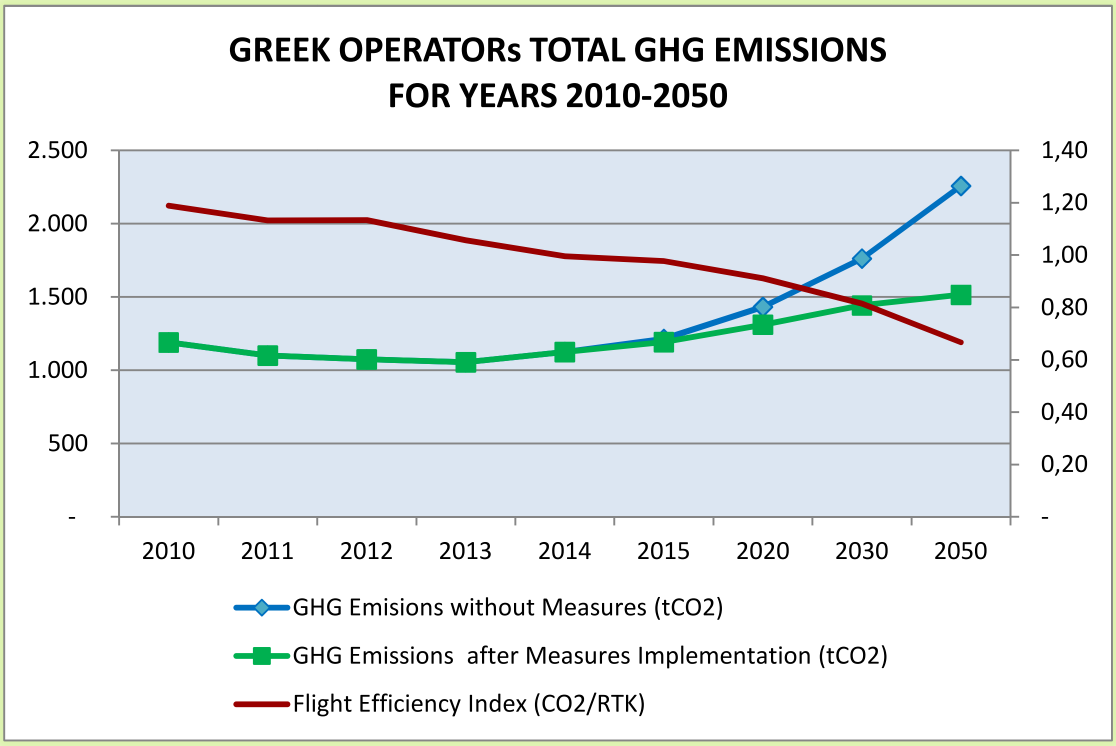
Revenue RTK during 2014 was 1,13 billion in total flights (0,67 billion RTK in International Flights), which is an average annual increase between 2010 and 2014 of 2,6 % (2,5 % increase in International Flights).

CO_2 emissions during 2014 was 0,66 million in International Flights, which is an average annual decrease between 2010 and 2014 of -1,06 %.

Ratios of tons of fuel and tons of CO_2 per RTK in slightly rounded figures are illustrated in table below:

- The combined fuel consumption rate in International flights was 0,31 tons per RTK in 2014, which is an average annual improvement between 2010 and 2014 of 1,8 %.
- CO_2 emissions per RTK during 2014 was 0,99, which is an average annual decrease between 2010 and 2014 of 1,06 %.

EFFICIENCY INDEX WITH MEASURES							
Year		Total (Int+Dom) Flight Services		International Flights		Domestic Flights	
		Fuel/RTK	CO2 /RTK	Fuel/RTK	CO2 /RTK	Fuel/RTK	CO2 /RTK
HIstoric Data	2010	0,38	1,19	0,34	1,07	0,43	1,36
	2011	0,36	1,13	0,34	1,06	0,39	1,24
	2012	0,36	1,13	0,34	1,06	0,39	1,24
	2013	0,33	1,06	0,33	1,03	0,35	1,10
	2014	0,32	1,00	0,31	0,99	0,32	1,01
Forecast Data	2015	0,31	0,98	0,30	0,95	0,32	1,02
	2020	0,29	0,91	0,28	0,87	0,31	0,97
	2030	0,26	0,81	0,24	0,77	0,28	0,89
	2050	0,21	0,67	0,20	0,62	0,24	0,75



SECTION IV: CONCLUSION

The Action Plan provides an overview of the actions undertaken by Greece in order to mitigate climate change and to develop a resource efficient, competitive and sustainable aviation system.

The Greek Government and Hellenic Civil Aviation Authority are committed to addressing the climate change impacts of commercial aviation and achieving greenhouse gas (GHG) emissions reductions through an integrated strategy of technology, operations and policy framework.

Greece has already achieved significant reductions in GHG emissions and energy efficiency improvements in the aviation sector over the past years through public and private efforts, and it is on a trajectory to continue that progress in coming years.

The National Actions of this Action Plan were finalised on 30 June 2015, and will be considered as subject to updating after that date.