ICAO STATE ACTION PLAN FOR CO_2 EMISSIONS
SAF ROADMAP
GREECE

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Hellenic Civil Aviation Authority (HCAA)

- ✓ **HCAA** has been established by National Law 4757/2020 as **Independent Civil Aviation Authority** and started its operation on January of 2022 with headquarters in Athens International Airport.
- ✓ Supported by the Ministry of Infrastructure and Transport, enjoys operational independence and financial autonomy. Subject to parliamentary control, submits annual report of its activities to the **Minister of Infrastructure and Transport and Hellenic Parliament.**
- ✓ Responsible for **national aviation strategy**, exercising **supervision** over the operation of civil aviation, the **implementation of national and EU law** and international conventions. Performs the duties of the Regulatory Authority of economic activity in the field of air transport, air traffic services and airports.
- ✓ It supervises the operation of the HASP - Hellenic Aviation Service Provider.

39 Greek Airports – National and International

Table 1: Greek commercial airports

City / Location	Region	ICAO	IATA	Airport name	Operated by
Alexandroupoli	Macedonia and Thrace	LGAL	AXD	Alexandroupolis / Dimokritos	HCAA
Astypalaia	South Aegean	LGPL	JTY	Astypalaia	HCAA
Athens / Spata	Attica	LGAV	ATH	Athinai / Eletherios Venizelos	AIA
Chania (Souda)	Crete	LGSA	CHQ	Chania /Ioannis Daskalogiannis	FRAPORT
Chios	North Aegean	LGHI	JKH	Chios / Omiros	HCAA
Corfu (Kerkira)	Ionian Islands	LGKR	CFU	Kerkira / Ioannis Kapodistrias	FRAPORT
Heraklion	Crete	LGIR	HER	Iraklion /Nikos Kazantzakis	HCAA
Ikaria	North Aegean	LGIK	JIK	Ikaria / Ikaros	HCAA
Ioannina	Epirus	LGIO	IOA	Ioannina /King Pyrros	HCAA
Kalamata	Peloponnese	LGKL	KLX	Kalamata	HCAA
Kalymnos	South Aegean	LGKY	JKL	Kalymnos	HCAA
Karpathos	South Aegean	LGKP	AOK	Karpathos	HCAA
Kasos (Kassos)	South Aegean	LGKS	KSJ	Kassos	HCAA
Kastelorizo (Megisti)	South Aegean	LGKJ	KZS	Kastelorizo	HCAA
Kastoria	West Macedonia	LGKA	KSO	Kastoria /Aristotelis	HCAA
Kavala / Chrysoupoli	Macedonia and Thrace	LGKV	KVA	Kavala /Megas Alexandros	FRAPORT
Kefalonia	Ionian Islands	LGKF	EFL	Kefallinia/ Anna Pollatou	FRAPORT
Kithira	Attica	LGKC	KIT	Kithira /Alexandros Aristotelous Onassis	HCAA
Kos	South Aegean	LGKO	KGS	Kos /Ippokratis	FRAPORT
Kozani	West Macedonia	LGKZ	KZI	Kozani /Filippos	HCAA
Lemnos	North Aegean	LGLM	LXS	Limnos /Ifaistos	HCAA
Leros	South Aegean	LGLE	LRS	Leros	HCAA
Milos	South Aegean	LGML	MLO	Milos	HCAA
Mykonos	South Aegean	LGMK	JMK	Mykonos	FRAPORT
Mytilene, Lesbos	North Aegean	LGMT	MJT	Mytilini /Odysseas Elytis	FRAPORT
Naxos	South Aegean	LGNX	JNX	Naxos	HCAA
Paros	South Aegean	LGPA	PAS	Paros	HCAA
Patras / Araxos	West Greece	LGRX	GPA	Araxos	HCAA
Preveza (Aktio)	Epirus	LGPZ	PVK	Preveza/Aktion	FRAPORT
Rhodes	South Aegean	LGRP	RHO	Rodos /Diagoras	FRAPORT
Samos	North Aegean	LGSM	SMI	Samos /Aristarchos of Samos	FRAPORT
Santorini (Thira)	South Aegean	LGSR	JTR	Santorini	FRAPORT
Sitia	Crete	LGST	JSH	Sitia / Vitsentzos Kornaros	HCAA
Skiathos	Thessaly	LGSK	JSI	Skiathos /Alexandros Papadiamandis	FRAPORT
Skyros	Central Greece	LGSY	SKU	Skiros	HCAA
Syros	South Aegean	LGSO	JSY	Syros /Dimitrios Vikelas	HCAA
Thessaloniki	Central Macedonia	LGTS	SKG	Thessaloniki / Makedonia	FRAPORT
Volos / Nea Anchialos	Thessaly	LGBL	VOL	Almiros/Nea Anchialos	HCAA
Zakynthos	Ionian Islands	LGZA	ZTH	Zakinthos /Dionisios Solomos	FRAPORT

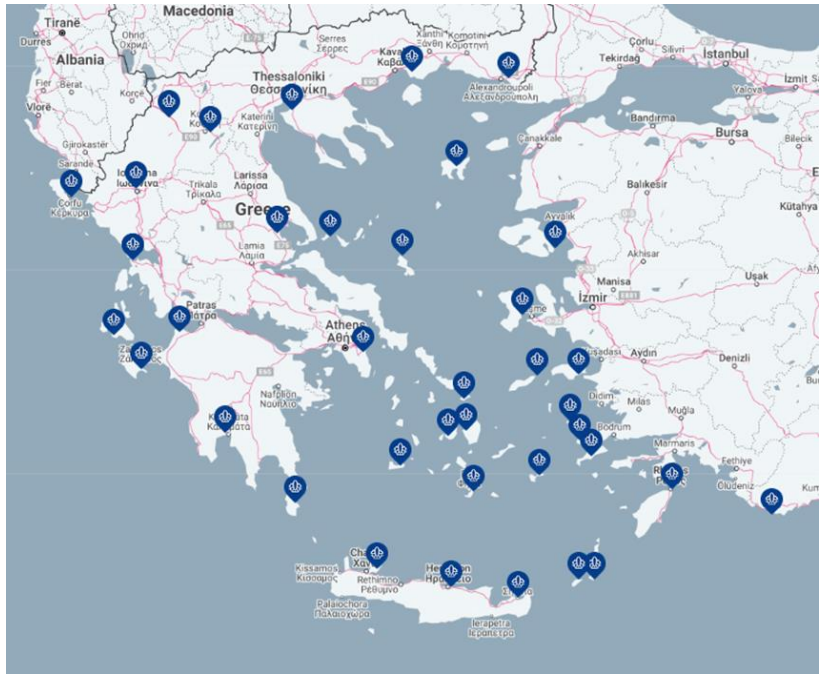
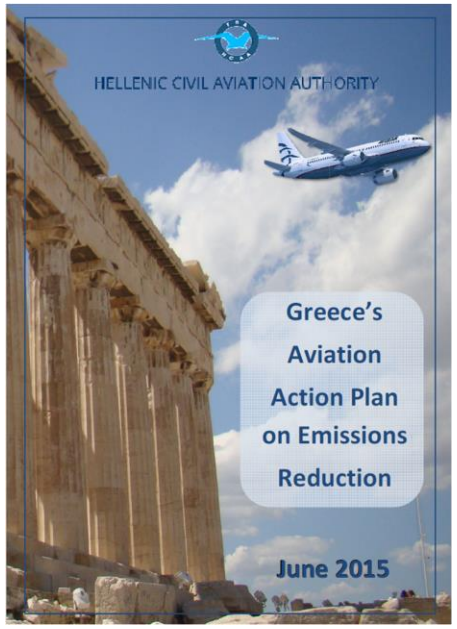
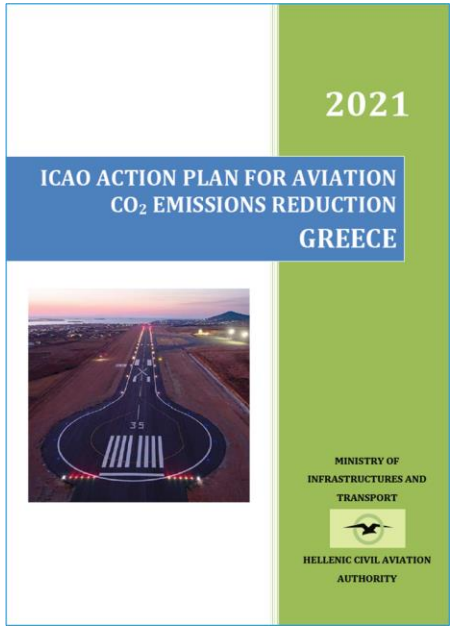


Figure 1: Map of Greece airports located over the country

- Biggest airport of Greece is Athens International Airport /Eleftherios Venizelos (AIA)
- 24 aerodromes are owned and operated by the State (Ministry for Infrastructure and Transport, Hellenic Aviation Service Provider, and/or Ministry of Defense)
- 14 aerodromes are operated by Fraport Greece

Greek State Action Plans submitted to ICAO





- A living document updated every three years, according to ICAO Doc 9988
- SAF roadmap - initiatives to decarbonize the aviation sector by increasing the use of Sustainable Aviation Fuel
- Greek baseline scenario analysis for CO_2 emissions.

State Action Plans - Development and Evolution

- The development and implementation of State Action Plans is fundamental to **achieving the Long-Term Aspirational Goal (LTAG) of net-zero emissions**, serving as cornerstone for sustainable aviation development, through **advancements in technology**, **operational improvements**, **alternative fuels**, and **market-based measures.**
- Regular updates to the State Action Plan, facilitated through **continuous coordination among government, industry stakeholders, and relevant partners** involved in action plan development, are essential to maintain its alignment with evolving national and global objectives, and to ensure its continued effectiveness.
- **APERTG** - Action Plans Reduction Task Group of EAEG (ECAC Aviation and Environment Group), aims to support an effective and **harmonized submission of action plans for emissions reduction from all 44 ECAC Member States to ICAO**, in accordance with the ICAO Assembly Resolution A40-18.
- For every three-year round of SAP updates, **APERTG is reactivated** to update the European common section for the action plans.

Encourages States to submit and update their **voluntary action plans** outlining respective policies, actions and roadmaps, including long-term projections

(A41-21 Para. 10)

Invites States to **prepare or update** action plans to submit them to ICAO **as soon as possible preferably by the end of June 2024** and once every three years thereafter

(A41-21 Para. 11)

Encourages to share information contained in action plans and **build partnerships** with other Member States

(A41-21 Para. 11)

Greece National Action Plan Team

HCAA
FOCAL POINT (CO ORDINATOR)

AIA, HASP, FRAPORT GREECE
AVIATION SERVICE PROVIDERS

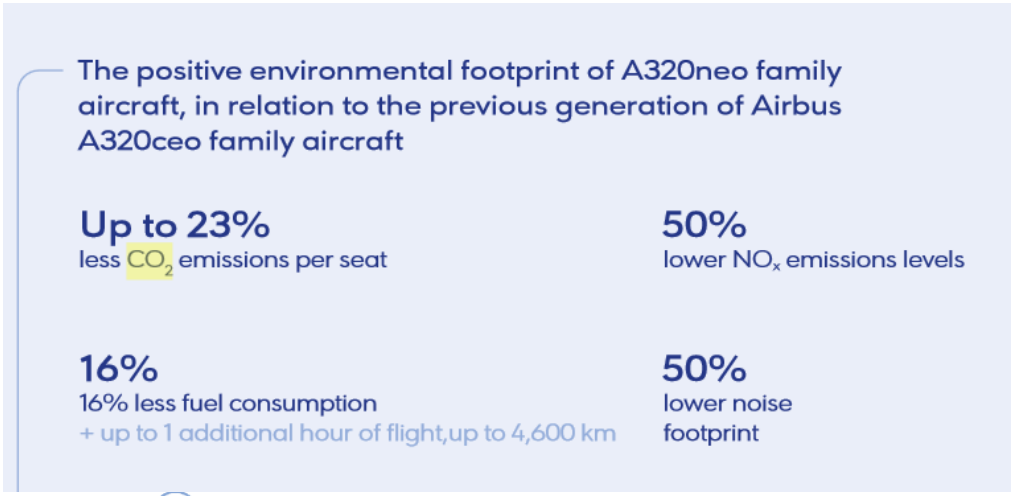
MINISTRY OF INFRASTRUCTURE AND TRANSPORT

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
ΥΠΟΥΡΓΕΙΟ ΥΠΟΔΟΜΩΝ ΚΑΙ ΜΕΤΑΦΟΡΩΝ

GREEK AIR OPERATORS

GROUND HANDLERS, ANSPs

Greek Air Operators Environmental Initiatives



- Greek aircraft operators has achieved significant improvements in flight planning with **Route Optimization** and **On-time performance KPIs**
- **Sustainable Aviation Fuel (SAF) program** has been launched to power their fleet with sustainable aviation fuel
- They are committed to the **long-term sustainability goals of the aviation industry** and are taking an active role to support various initiatives towards achieving net zero by 2050.
- As part of its sustainability strategy, Greek aircraft operators have managed to significantly reduce CO_2 emissions by investing **in fleet renewal programs**
- Also, significant reductions have been achieved for **NO_X emissions by 50%** below the CAEP 6 standard, per passenger seat, according to new aircrafts manufacturer data.

Aircraft Operators Obligations

EU ETS

- EU ETS Directive 2003/87/EC

UK ETS

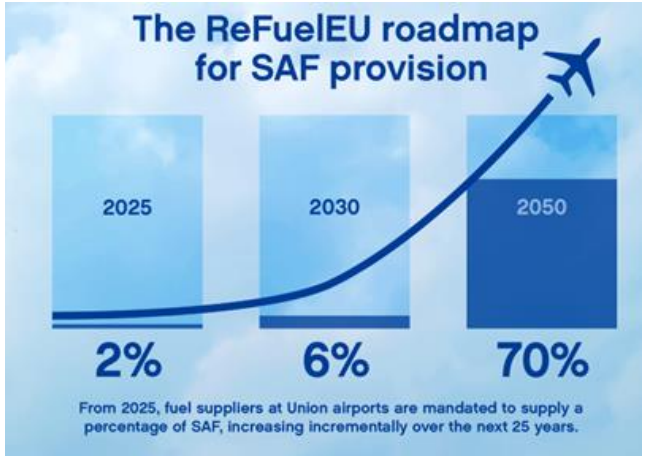
- Greenhouse Gas Emissions Trading Scheme Order 2020.

CH ETS

- Art. 46.d CO2 Swiss Ordinance & Annex 13.1.

- In Europe, all Aircraft Operators that perform international flights have the obligation to report under Regional Emission Trading Schemes like the EU-ETS, UK-ETS and CH-ETS along with ICAO/CORSIA.
- In 2023, Directive 2003/87/EC was amended by Directive (EU) 2023/958 to pursue the implementation of CORSIA for EU States. In addition, this regulation requires aircraft operators to start monitoring and reporting their **non-CO_2 aviation effects**
- Aviation non-CO_2 emissions refer to pollutants other than carbon dioxide (CO_2) that have a climate impact, including nitrogen oxides (NO_X), aerosol particles (soot and Sulphur-based) and water vapors. Some types of SAF have the potential to offer significant non-CO_2 emissions reductions.

Sustainable Aviation Fuels (SAF) – ReFuel Aviation



- European States are embracing the introduction of SAF in line with the 2050 ICAO Vision and are taking **collective actions** to address the many current barriers for SAF widespread availability or use in European airports

- At European Union level, the Refuel EU Aviation Regulation, which applies since **1 January 2024** will boost the supply and demand for SAF in the EU. According to the Regulation, SAF are defined as various types of **drop-in aviation fuels.**

- According to the Regulation, the percentage of SAF used in air transport gradually ramps from **2%** in **2025**, up to **20%** in **2035** and **70%** in **2050**.

- A decarbonation factor value of 70% of CO_2 emissions is forecasted for 2050, based on sufficient development of **synthetic aviation fuels** and **aviation biofuels**

EE Regulation 2023/2405 ReFuelEU Aviation

Table 2: Twelve (12) Greek Union Airports for **2026**

GREECE	
ICAO Code	*Airport Name*
LGAV	Athens
LGSA	Chania
LGIR	Iraklion
LGKF	Kefallinia
LGKR	Kerkira
LGKO	Kos
LGMK	Mikonos
LGPZ	Preveza/Aktion National
LGRP	Rodos
LGSR	Santorini
LGTS	Thessaloniki
LGZA	Zakinthos

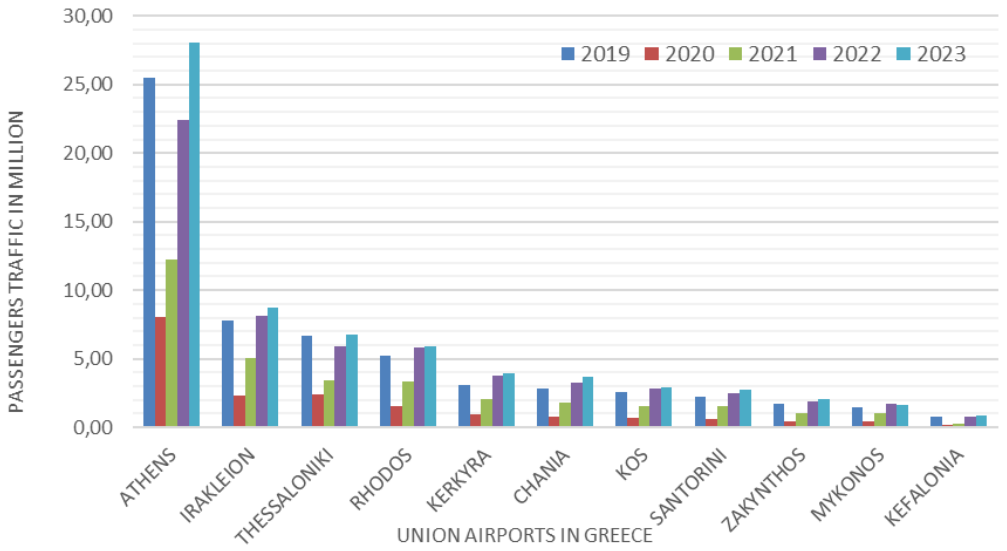
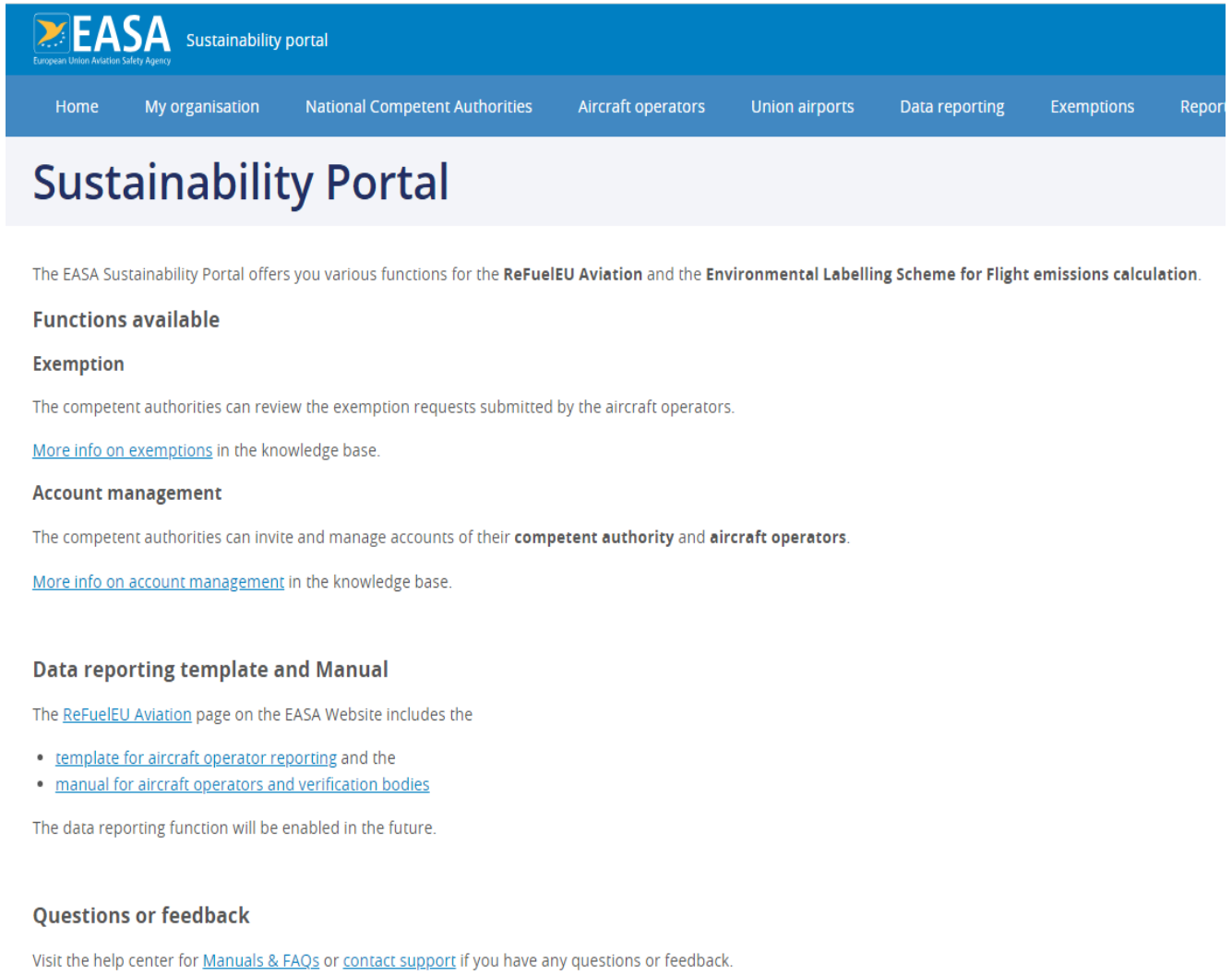


Figure 2: Passenger Evolution in Union Airports in Greece (2019-2023)

- **Union airports** in scope of the Regulation are the airports where **passenger traffic** was over **800.000**, or **freight traffic** was over **100,000 tonnes**, in the previous reporting period.
- An aircraft operator is subject to the ReFuelEU Aviation rules if they operated than **500 commercial passenger flights** from Union airports.
- Alternative rule of operating more than **52 commercial all-cargo flights** from airports within the European Union in the previous reporting period.

EASA Sustainability Portal

https://sustainabilityportal.easa.europa.eu/



- The EASA Sustainability Portal is a digital platform designed to streamline and simplify reporting for ReFuelEU Aviation and the Flight Emissions Label.
- It provides a centralized, secure, and user-friendly environment that enhances collaboration through automated data validation and structured workflows.
- The portal is an invitation-only platform for key stakeholders, including the European Commission, EASA, Competent Authorities, Aircraft Operators and Verifiers.
- Air Carriers submit their Annual Report on fueling and all requests for justified exceptions from Refueling as per Refuel EU obligations (EC/2023/2405)

SAF in EUROPE

- SAF production capacity currently under construction could supply the 3.2 Mt of SAF required under ReFuelEU Aviation in 2030 but would be required to ramp up quickly thereafter.
- SAF prices are currently 3 to 10 times more expensive than conventional fuel although they are expected to reduce substantially as production technologies scale up.
- A sub-mandate for synthetic aviation fuels, starting at 1.2% in 2030 and increasing to 35% in 2050, underlines their significant potential for emissions reductions.
- All SAF supplied under the ReFuelEU Aviation mandate must comply with the sustainability and greenhouse gas emissions saving criteria as set out in the Renewable Energy Directive (RED) and the revised Gas Directive.

Table 3: ReFuelEU Aviation fuel categories

Type of ReFuelEU Aviation fuel	Definition in RFEUA Article	Comments
Categories of sustainable aviation fuels (SAF)		
Synthetic aviation fuels	Art 3(12)	Renewable fuel of non-biological origin in Directive (EU) 2018/2001
Advanced aviation biofuels	Art 3(8)(a)	Produced from the feedstock listed in Part A Annex IX of Directive (EU) 2018/2001
Aviation biofuels	Art 3(8)(b)	Produced from feedstock listed in Part B Annex IX of Directive (EU) 2018/2001
Other aviation biofuels	Art 3(8)(c)	Produced from feedstock not listed in Annex IX of Directive (EU) 2018/2001 and except for those produced from food and feed crops
Recycled carbon aviation fuels	Art 3(9)	Produced from waste streams of non-renewable origin which are not suitable for material recovery

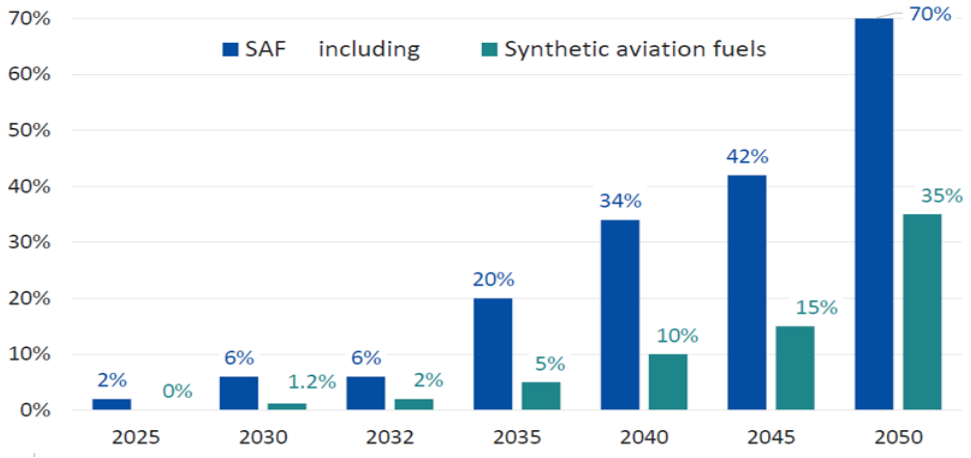


Figure 3: SAF and synthetic fuels percentages by 2050

European approach to the submission/update of state action plans for CO_2 emissions reductions

➢ For European States Action Plans, specific guidelines have been developed by the **Action Plans for CO_2 Emissions Reduction Task Group of the European Aviation and Environment Working Group (EAEG/APER TG),** reviewed and endorsed by Directors General of ECAC States.

➢ European Common Section was elaborated in cooperation with the European Union Aviation Safety Agency (EASA) and EUROCONTROL

➢ Common section on the basis of the use of the Intergovernmental Panel on Climate Change (IPCC) methodology, while encouraging ECAC Member States to comply to the extent possible with the ICAO Guidance for the national sections of their State action plans.

EU / ECAC CONTENTS

- Common Outline for European State Action Plans for CO2 emissions reduction
- Common introductory section for European State Action Plans
- Current State of Aviation in [ECAC - COUNTRY]
- ECAC/EU Common section for European State Action Plans

  EXECUTIVE SUMMARY
  A. ECAC Baseline Scenario and estimated benefits of implemented measures
  B. Actions taken collectively in Europe
     1. **TECHNOLOGY AND DESIGN**
     2. **SUSTAINABLE AVIATION FUELS (SAF)**
     3. **AIR TRAFFIC MANAGEMENT AND OPERATIONAL IMPROVEMENTS**
     4. **MARKET-BASED MEASURES**
     5. **ADDITIONAL MEASURES**

- National Actions in [ECAC - COUNTRY]
- Conclusion

European approach to the submission/update of SAP Sustainable Aviation Fuels

- **The common European section** of the Action Plan also provides an overview of the current sustainability and life cycle emissions requirements applicable to SAF in the European Union's States as well as estimates of life cycle values for several technological pathways and feedstock.
- Collective work has also been developed through EASA on addressing barriers of SAF penetration into the market.
- The European Research and Innovation programme is also giving impulse to innovative technologies to overcome such barriers as it is highlighted by the number of recent European research projects put in place and planned to start in the short term.

Table 4: Summary characteristics of EUROCONTROL scenarios

	High	*Base*	*Low*
7-year flight forecast 2024-2030	High ↗	Base →	Low ↘
Passenger Demographics (Population)	Aging UN Medium-fertility variant	Aging UN Medium-fertility variant	Aging UN Zero-migration variant
Routes and Destinations	Long-haul ↗	No Change →	Long-haul ↘
High-Speed&Night trains (new & improved connections)	32 HST/29 NT city-pairs faster implementation	31 HST/29 NT city-pairs	26 HST city-pairs later implementation.
Economic conditions GDP growth	Stronger ↗	Moderate →	Weaker ↘↘
EU Enlargement	+7 States, Later	+7 States, Earliest	+7 States, Latest
Free Trade	Global, faster	Limited, later	None
Price of travel Operating cost	Decreasing ↘↘	Decreasing ↘	No change →
Price of CO_2 in Emission Trading Scheme	Moderate, increasing ↗	Moderate, increasing ↗	Moderate, Increasing ↗
Price of oil/barrel	Moderate	Moderate	High
Price of SAF	Relatively High ↗	Relatively High ↗	Highest ↗↗
Structure Network	Hubs: Mid-East ↗↗ Europe ↘ Türkiye ↗ Point-to-point: N-Atlantic. ↘	Hubs: Mid-East ↗↗ Europe & Türkiye ↗ Point-to-point: N-Atlantic ↗, European Secondary Airports.↗	No change →
Market Structure	Industry fleet forecast, Clean Aviation and STATFOR assumptions	Industry fleet forecast, Clean Aviation and STATFOR assumptions	Industry fleet forecast, Clean Aviation and STATFOR assumptions
Fuel mix	In line with ReFuelEU Aviation (2%SAF in 2025 to 70% in 2050)	In line with ReFuelEU Aviation (2% SAF in 2025 to 70% in 2050)	5 years behind ReFuelEU Aviation (0.5% SAF in 2025 to 42% in 2050)

European approach to the submission/update of state action plans for CO_2 emissions reductions

Table 5: Baseline forecast for international traffic departing from ECAC airports

Year	Passenger Traffic (IFR movement) (million)	Revenue Passenger Kilometres[177] RPK (billion)	All-Cargo Traffic (IFR movements) (million)	Freight Tonne Kilometres transported ([178]) FTKT (billion)	Total Revenue Tonne Kilometres[179] RTK (billion)
2010	4.71	1,140	0.198	41.6	155.6
2019	5.88	1,874	0.223	46.9	234.3
2023	5.38	1,793	0.234	49.2	228.5
2030	6.69	2,176	0.262	55.9	273.5
2040	7.69	2,588	0.306	69.0	327.8
2050	8.46	2,928	0.367	86.7	379.5
Note that the traffic scenario shown in the table is assumed for both the baseline and implemented measures scenarios.					

Table 6: Fuel burn and CO_2 emissions forecast for the baseline scenario

Year	Fuel Consumption (10^9 kg)	CO_2 emissions (10^9 kg)	Fuel efficiency (kg/RPK)	Fuel efficiency (kg/RTK)
2010	38.08	120.34	0.0327	0.327
2019	53.30	168.42	0.0280	0.280
2023	48.41	152.96	0.0268	0.268
2030	54.46	172.10	0.0250	0.250
2040	62.19	196.52	0.0240	0.240
2050	69.79	220.54	0.0238	0.238

Table 7: Fuel burn and CO_2 emissions forecast for the implemented measures scenario. Aircraft technology and ATM improvements after 2023

Year	Fuel Consumption (10^9 kg)	CO_2 emissions (10^9 kg)	Well-to-Wake CO_2 equivalent emissions (10^9 kg)	Fuel efficiency (kg/RPK)	Fuel efficiency (kg/RTK)
2010	38.08	120.34	148.02	0.0327	0.327
2019	53.30	168.42	207.16	0.0280	0.280
2023	48.41	152.96	188.14	0.0268	0.268
2030	52.57	166.11	204.31	0.0241	0.241
2040	53.20	168.11	206.78	0.0205	0.205
2050	49.29	155.75	191.58	0.0168	0.168

Effects of Aircraft technology, ATM improvements and SAF after 2023 on eu27+efta international departures

Table 8: Fuel Consumption

Year	Fuel Consumption (10^9 kg)	CO_2 emissions (10^9 kg)	Tank-to-Wake Net CO_2 emissions (10^9 kg)
2010	27.84	87.97	87.97
2019	38.19	120.69	120.69
2023	34.08	107.71	107.71
2030	36.97	116.84	112.21
2040	35.63	112.60	87.15
2050	32.80	103.63	54.67

For reasons of data availability, results shown in this table do not include cargo/freight traffic.

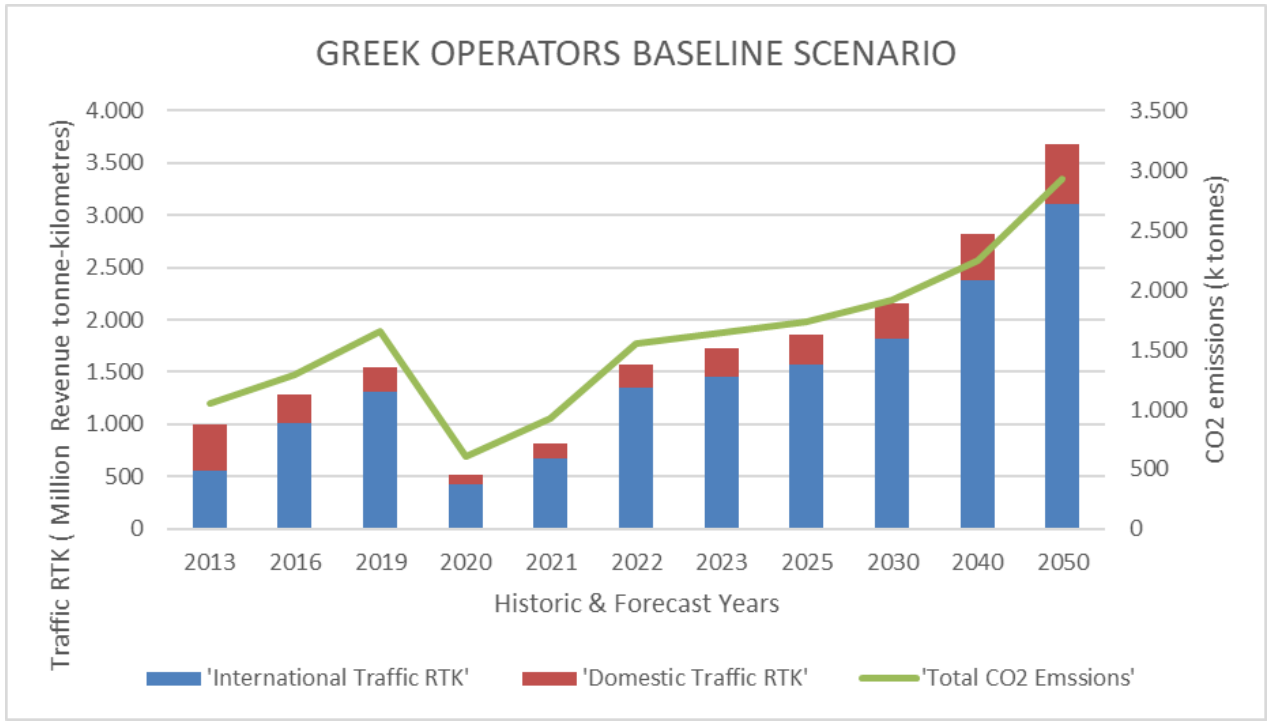
The Net CO_2 emissions and **expected benefits of SAF use** are calculated where regional measures are taken (e.g. ReFuelEU Aviation) in the European scenario with measures.

- *Fuel consumption, CO_2, Net CO_2 emissions of international passenger traffic departing from EU27+EFTA airports, with aircraft technology and ATM improvements after 2023*
- *The tank-to-wake Net CO_2 emissions are based on the use of Sustainable Aviation Fuels (ReFuelEU Aviation, 70% decarbonation factor for the synthetic aviation fuels, and 65% for aviation biofuels).*

GREECE BASELINE SCENARIO

Table 9: Baseline Scenario of Greece without any measures taken

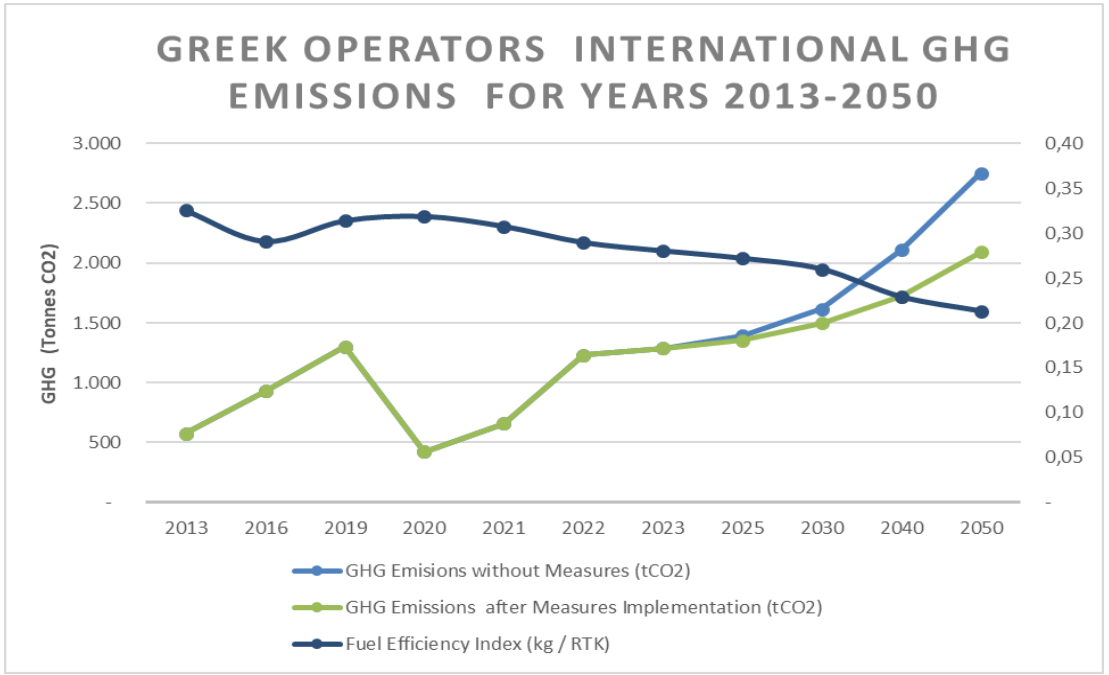
GREEK OPERATORS BASELINE SCENARIO							
Year		International Flights			Total (Int+Dom) Flight Services		
		Fuel Burn (k tonnes)	Traffic RTK (Millions of tonne-kilometres)	CO_2 emissions (k tonnes)	Fuel Burn (k tonnes)	Traffic RTK (Millions of tonne-kilometres)	CO_2 emissions (k tonnes)
Historic Data	2013	182,0	559,5	575,0	333,9	997,8	1.055,0
	2016	294,4	1.012,5	930,4	407,9	1.283,5	1.289,0
	2019	412,0	1.313,2	1.301,9	523,8	1.551,2	1.655,1
	2020	134,2	421,0	423,9	191,1	522,0	603,9
	2021	208,2	677,0	658,0	294,3	823,0	929,9
	2022	390,0	1.347,0	1.232,4	490,0	1.572,0	1.548,4
	2023	407,6	1.454,3	1.288,1	521,2	1.722,1	1.647,1
Forecast Data	2025	440,9	1.572,9	1.393,2	563,8	1.862,7	1.781,5
	2030	511,1	1.823,4	1.615,1	653,5	2.159,3	2.065,2
	2040	666,9	2.379,2	2.107,4	852,7	2.817,4	2.694,6
	2050	870,1	3.104,3	2.749,7	1.112,6	3.676,1	3.515,9



GREECE BASELINE SCENARIO

Table 10: Baseline Scenario of Greece with implemented measures

GREEK OPERATORS IMPLEMENTED MEASURES SCENARIO							
Year		International Flights			Total (Int+Dom) Flights		
		Fuel Burn (k tons)	Traffic RTK (Millions of Revenue tonne-kilometre)	CO2 emissions (k tons)	Fuel Burn (k tons)	Traffic RTK (Millions of Revenue tonne-kilometre)	CO2 emissions (k tons)
Historic Data	2013	182,0	559,5	575,0	333,9	997,8	1.055,0
	2016	294,4	1.012,5	930,4	407,9	1.283,5	1.289,0
	2019	412,0	1.313,2	1.301,9	523,8	1.551,2	1.655,1
	2020	134,2	421,0	423,9	191,1	522,0	603,9
	2021	208,2	677,0	658,0	294,3	823,0	929,9
	2022	390,0	1.347,0	1.232,4	490,0	1.572,0	1.548,4
	2023	407,6	1.454,3	1.288,1	521,2	1.722,1	1.647,1
Forecast Data	2025	427,8	1.572,9	1.351,8	547,0	1.862,7	1.728,4
	2030	473,9	1.823,4	1.497,6	606,0	2.159,3	1.914,9
	2040	544,9	2.379,2	1.721,9	711,0	2.817,4	2.246,6
	2050	661,5	3.104,3	2.090,4	927,6	3.676,1	2.931,3



- CO_2 emissions during 2023 reached **1,288 million tons** for International Flights and presented an increase of only 5% related to previous year. This is the result or continuous improvement in Air Traffic Management and Greek Aircraft Operators initiatives to improve fuel efficiency and carbon footprint.
- Fuel Efficiency Indexes from International Flights and GHG Emissions evolution are presented in Table 10. It is noticeable that Fuel Efficiency Index was 0,28 kg/RTK during 2023, which is **3.5 % improvement** versus previous year. Over the last 10 years of International Aviation activity in Greece, an improvement of **15 % of Fuel Efficiency** has been achieved, since in 2013.

Closing Summary & Discussion

- The Greek Government, Hellenic Civil Aviation Authority and Aviation Stakeholders are fully committed to address the climate change impacts of commercial aviation and achieve CO_2 emissions reductions through an integrated strategy of technology, operations and policy framework.
- Greece has already achieved significant reductions in Green House Gas emissions and energy efficiency improvements in the aviation sector over the past years, through public and private efforts, and is on a trajectory to continue that progress in the coming years.
- Greek Action Plan provides an overview of past and future actions decided both at European and National level in order to mitigate climate change and to develop a resource efficient, competitive, and sustainable aviation system. The national actions presented in Section B of this Action Plan cover the majority of measures taken at state level by State authorities and the Private sector including main aviation stakeholders of air transport industry.
- Both Sections A and B of Action Plan were finalized by December 2024 and shall be considered as subject to update after that date.

Thank You

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