



Fourteenth North American, Central American and Caribbean Directors of Civil Aviation Meeting **NACC/DCA/14** **P/18 Agenda Item 7**

1 to 3 June 2026

Study of the Promotion of Sustainable Aviation Fuels in the SICA Region, with Special Emphasis on the States of Guatemala and Belize

COCESNA/SICA



Estudio de prefactibilidad

Currently, the project in question is being carried out jointly with the Central American Commission for Environment and Development (CCAD) with the support of the Republic of China (Taiwan). Within the project, an initiative related to the development of a pre-feasibility study for an SAF plant in the SICA Region is included.





Webinar results

The Webinar on Perspectives and Challenges of Sustainable and Low Carbon Aviation Fuels (SAF/LCAF) in Central America, held on February 5, 2026 in virtual mode, had the participation of 131 people from 17 countries, covering three continents: America, Europe and Asia, which shows a consolidated regional reach with international projection.



SICA
Sistema de la Integración Centroamericana

Promoviendo la Gestión de Riesgo Climático y la reducción de emisiones de carbono en la región SICA

La Corporación Centroamericana de Servicios de Navegación Aérea (COCESNA)

Webinario Internacional

En el marco del día Internacional de la reducción de emisiones presenta su reunión con el tema:
Conociendo las perspectivas y desafíos de SAF/LCAF en Centroamericana

Conozcamos los factores clave en la región en voz de los expertos, promotores del desarrollo de combustibles sostenibles de aviación y bajos en carbono (SAF/LCAF) en la región SICA.

 Juan Carlos Trabonino DE-CEO COCESNA	 Oscar Liang Asesor de Cooperación República de China (Taiwán)	 Kevin Ou Experto de Taiwán ICDF	 Pedro de la Fuente Especialista IATA
 Giovanni Tobar GMA COCESNA	 Cristhian Flores Coordinador Proyecto CCAD	 Edwin Castellanos Viceministro MARN - GUA	 Alfredo Iglesias Experto SAF/LCAF

El próximo 5 de febrero de 09:00 a 11:00 horas, horario de Centroamérica, registre en el siguiente enlace:
<https://bit.ly/49NdTqG> 



Logos of partner organizations: Consejo Integracion Centroamericana, CEPREDENAC, CRRH, FOCASO-APS, and CCAD.



Webinar

Participation was concentrated mainly in countries of the SICA region, with Guatemala (28.2%), Honduras (26.7%) and El Salvador (17.6%) standing out, which together represented 72.5% of the total participants.

From an institutional perspective, the private sector had the largest share, with 114 participants (87.0%), followed by the public sector with 12 participants (9.2%), and, to a lesser extent, civil society organizations with 4 participants (3.1%). This composition confirms a strong interest from the productive, industrial, and business sectors in the development of SAF/LCAF initiatives.



The sector's commitments

Civil aviation operations should achieve net-zero emissions by 2050.”



ACI
Luis Felipe de Oliveira
Director General

IBAC
Kurt Edwards
Director General

CANSO
Simon Hocquard
Director General

IATA
Willie Walsh
Director General

GARA
Pete Bunce
President and CEO

ICAO • OACI • ICAO

Supported by innovation and action throughout the supply chain:

AIRBUS
Guillaume Faury
Chief Executive Officer

BOEING
Stan Deal
President and CEO

ATR
Stefano Bortoli
Chief Executive Officer

cfm
Gaël Méheust
President and CEO

GE
John S. Slattery
President and CEO

SAFRAN
Olivier Andriès
Chief Executive Officer

EMBRAER
Francisco Gomes Neto
President and CEO

Collins Aerospace
Stephen Timm
President

Rolls Royce
Warren East
Chief Executive Officer

CRJ
Christopher Calio
President

Commitment signed by the industry on October 5, 2021



UN CLIMATE CHANGE CONFERENCE UK 2021

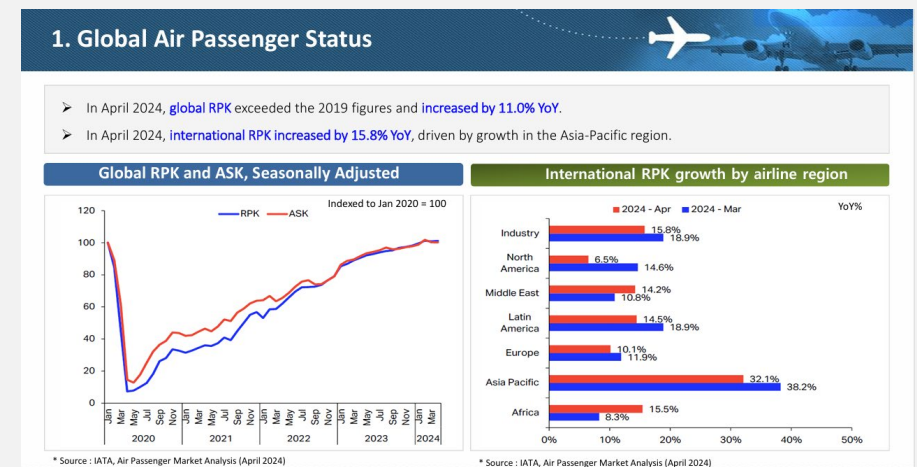
IN PARTNERSHIP WITH ITALY

INTERNATIONAL AVIATION CLIMATE AMBITION COALITION

Commitment signed by various countries, within the framework of ICAO in November 2021

Overview of global aviation growth

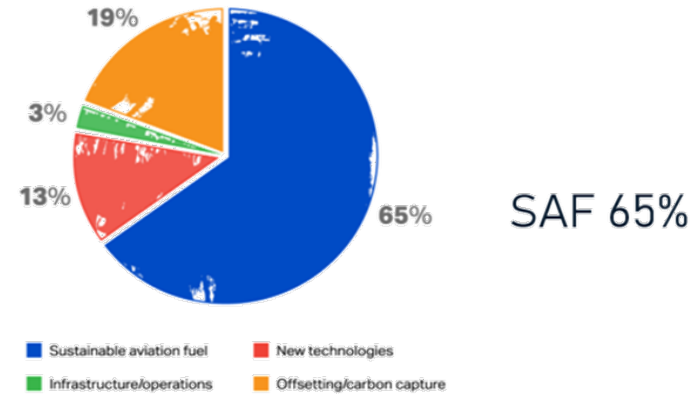
- **Expanding passenger demand:**
 - Global passenger traffic grew 10.6% year-on-year in 2024 and is projected to increase by 5.8% in 2025.
 - In April 2024, global RPKs surpassed 2019 levels with an 11% year-on-year increase, driven by Asia-Pacific.
- **Long-term projections:**
 - The number of passengers is expected to increase from 4.54 billion (2019) to 4.96 billion (2024), with a growth rate of 3.8% between 2023-2043.
- **Air demand is structurally growing:**
 - Global cargo grew 11.1% year-on-year in April 2024, driven by e-commerce.
 - Long-term projection: from 250 billion FTK (2019) to 520 billion FTK (2042), with growth of 3.2%.



Emission reduction tools



Contribution to achieving Net Zero Carbon in 2050



SAF 65%

- The entire industry and major international organizations reach the same conclusion: Long-term projections:

SAFs will be the main vector for decarbonizing the aviation sector.

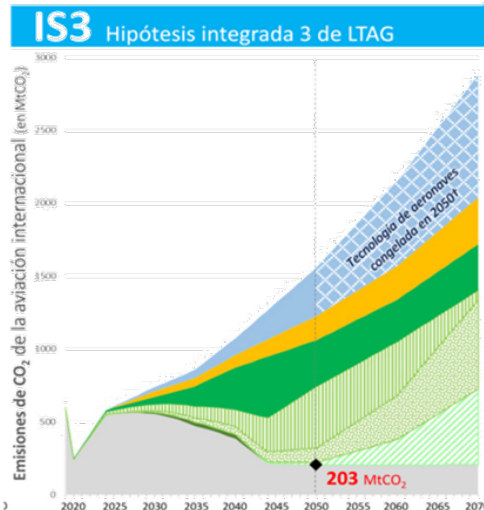
- Other reduction measures such as technology, airspace, operational improvements, and emissions trading have much less potential.

- Additional points:

- Hydrogen is not an alternative. An aircraft needs to fly to multiple destinations.
- No infrastructure changes are needed with SAF.
- Lack of revolutionary new designs from Airbus and Boeing.



LTAG



SAF 55%




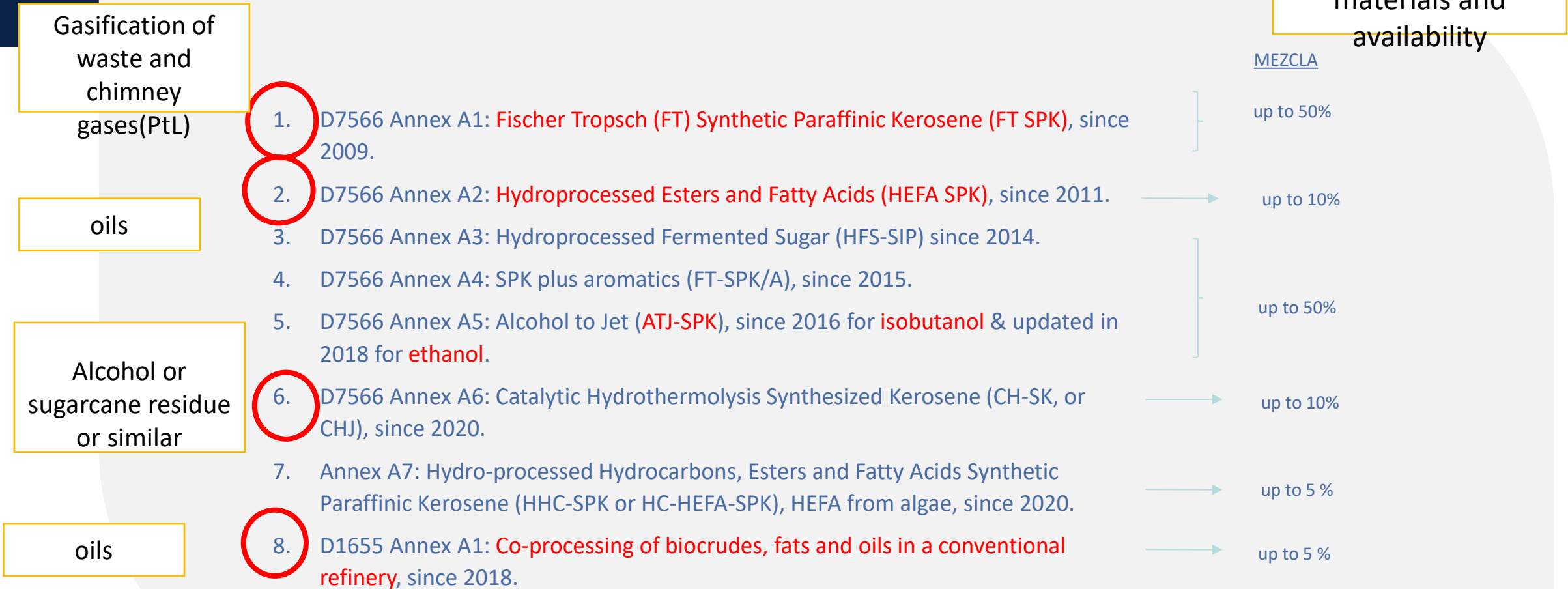
SAF Certification: What must we comply with?

- Generally, SAFs must meet two requirements:
- *Aviation fuels:*
 - They must comply with current technical safety and quality specifications (for direct replacement or drop-in fuels):
 - ASTM specification D1655 (Jet A-1)
 - DEF STAN 91-91 (Jet A-1)
- *Sustainable:*
 - They must meet certain sustainability specifications:
 - European Renewable Energy Directive (EU-RED)
 - CORSIA Sustainability Criteria (OACI)
 - Voluntary schemes : ISCC, RSB...



Types of SAF - Product Certification: Pathways

 Key factors are raw materials and availability

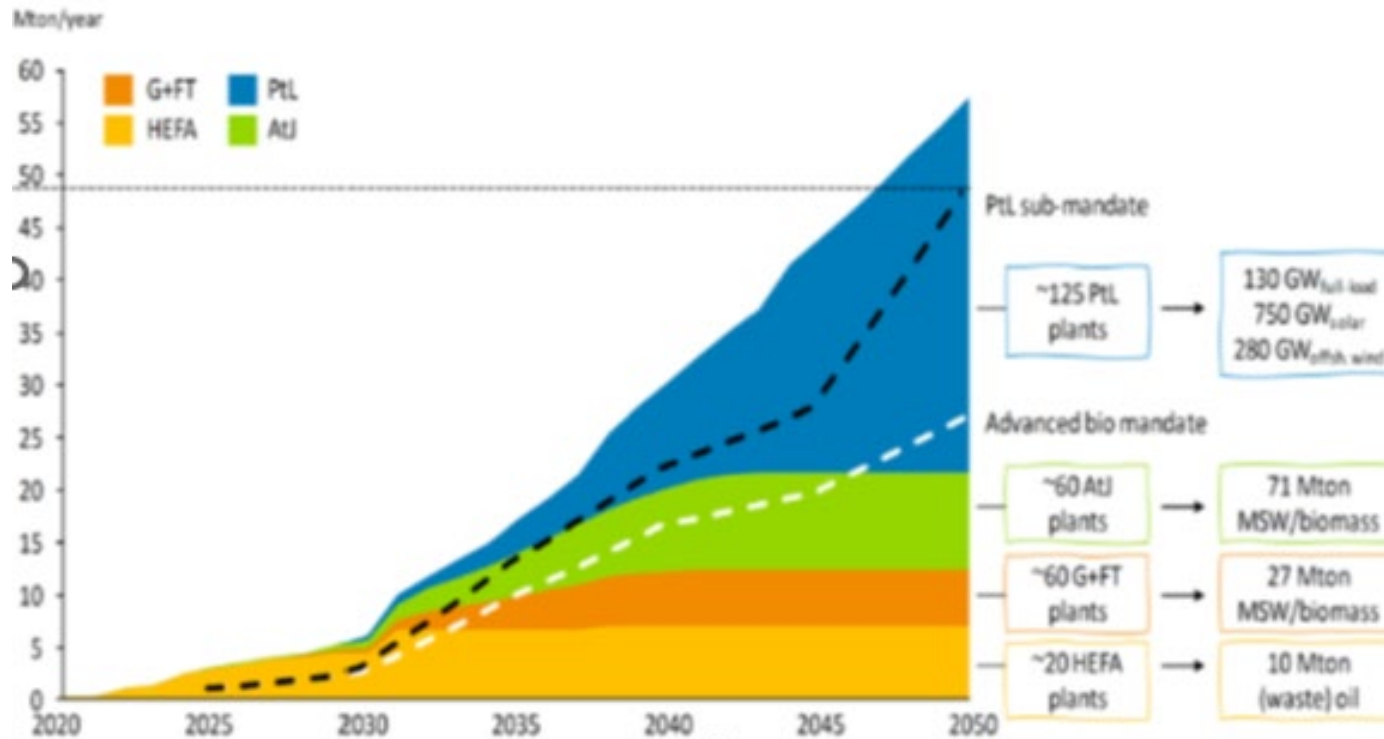


DIFFERENT TECHNOLOGIES AND NEEDS OF THE SAF

SAF TECHNOLOGIES



No single technology can produce the quantities needed to decarbonize the sector



THE SECTOR HAS NO OTHER REALISTIC WAY TO DECARBONIZE THAN THE SAF. IF AS A SECTOR WE DO NOT FACE THE TECHNOLOGICAL CHALLENGE, INCLUDING PRICE DIFFERENTIALS, WE WILL LOSE THE HISTORIC OPPORTUNITY PRESENTED TO US AND FUEL TAXES AND FEES WILL BECOME A REALITY

IMPACT ON TICKET PRICES - AN EXAMPLE

- **CASE 1.-SHORT/MEDIUM-**

- Input data.- Distance GUATEMALA (LA Aurora) - Mexico City - 2 FLIGHT HOURS
- Reference aircraft A-320
- Passengers per flight with average load factor 165 passengers
- Fuel consumption according to Airbus data and methodology: ICAO Fuel Consumption Table 4750 kg of fuel per trip
- Consumption per round trip/passengers - $(4750 \times 2)/165$ - 57.5 kg
- Therefore, the fuel consumption per passenger for a round trip ticket from Guatemala City to Mexico City would be 57.5 kg per Passenger
- Comparative consumption a l/100 km.- 3,4 liters/100 Km
- Operating cost per flight hour: 4500 Euros. Flight time: 3.55 hours round trip.
- Operating cost of a round trip flight from Madrid to Paris per passenger - 110 Euros
- **Impact of the price of SAF blended at 10% \$4.3**
- **Remember this fact: 1 Dollar per flight hour**

ALGUIEN RECUERDA CUANTO COSTABA UN BILLETE DE AVION EN EL AÑO 1970:
Ocho veces el valor actual

IMPULSO AL DESARROLLO DE SAF EN LA REGION SICA



Availability of ethanol in almost all countries and production of SAF from sugarcane bagasse.

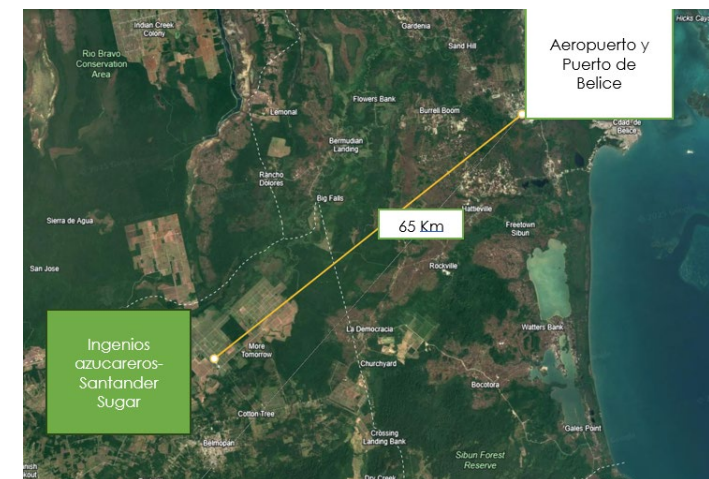
 Possibility of medium-term gasification plants to solve the waste problem and obtain a cheap way to produce SAF

STUDY CONDUCTED FOR GUATEMALA AND BELIZE - SUMMARY

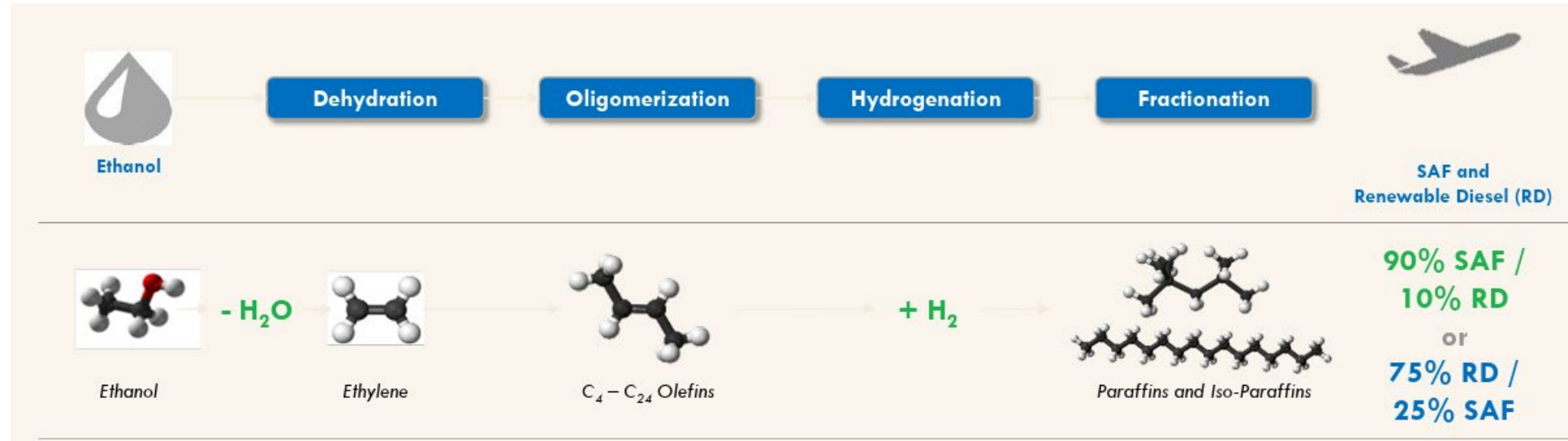
- Raw materials available in sufficient quantity and suitable for the SAF: Sugarcane and waste (municipal, industrial, and forestry).
- No fats suitable for the HEFA technology route were detected.
- Potential technologies to be used: Alcohol to Jet and, potentially in the medium term, waste gasification.
- Based on the analysis of consumption in both countries, it is estimated that the best option is exporting or sharing a scheme between exporting and domestic use.
- Both Guatemala and Belize possess suitable conditions and raw materials for the construction of a SAF plant. These conditions would be as follows:
 - Availability of sufficient raw materials for the plants
 - Proximity to ports for export
 - Possibility of limited domestic consumption
 - Viability of plant size and industry

STUDY CONDUCTED FOR GUATEMALA AND BELIZE - ATJ ROUTE

- Ethanol offers the best price/investment ratio for SAF production in Guatemala and Belize
- Very low technological risk due to the maturity of the processes
- Limited investment cost for a plant.
- Viability of plants in the Escuintla area of Guatemala and the Santander Group plant in Belize.

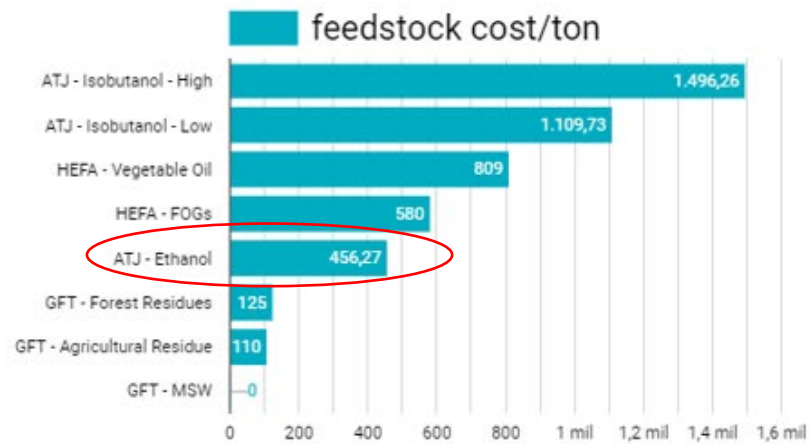


What is the ethanol to JET process?

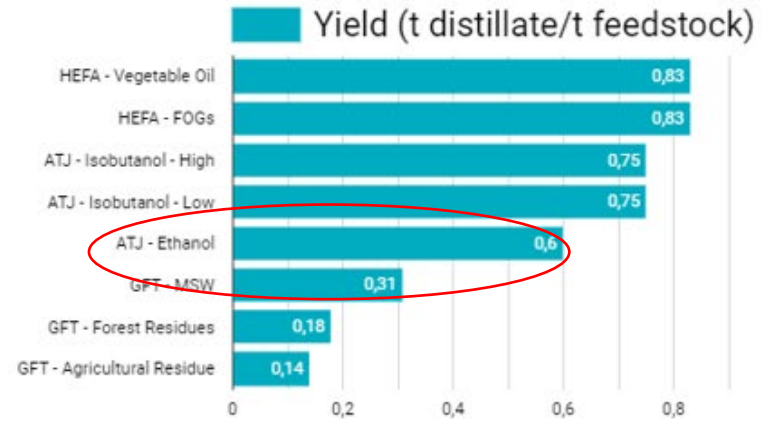


All the processes are technologically mature.
The issue is industrializing the process.

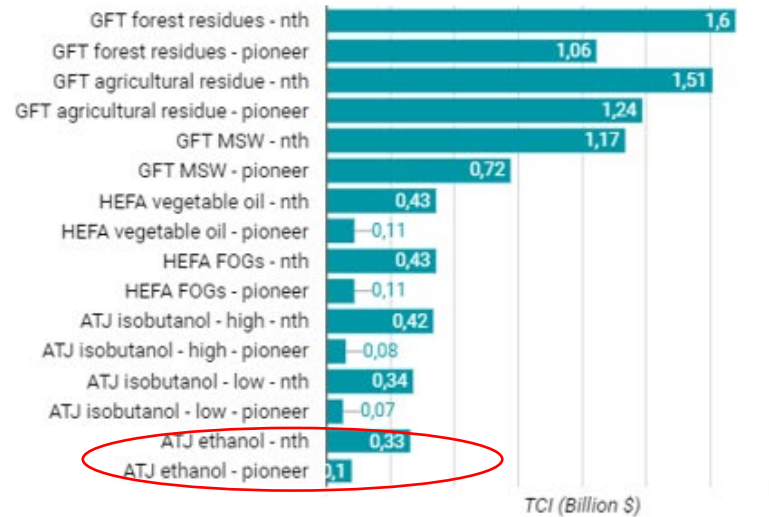
Feedstock cost per ton



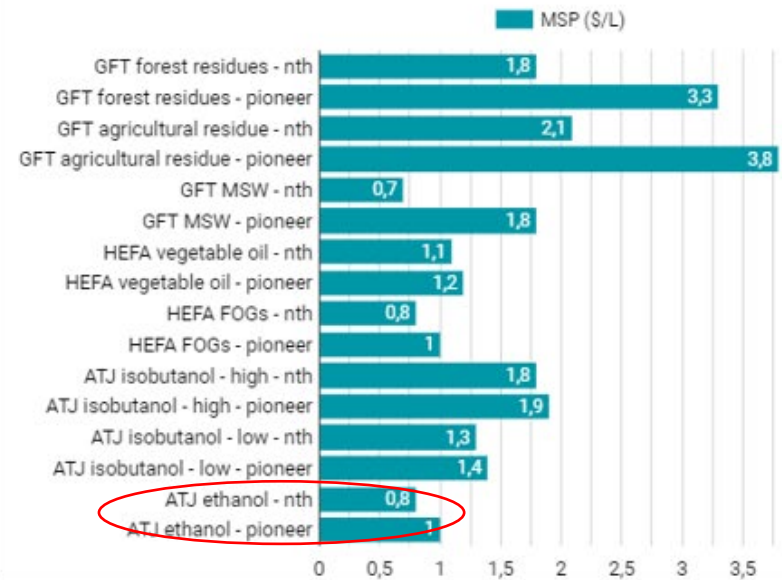
Feedstock Yield
(ton of distillate yielded per ton of feedstock)



Relación de inversión entre tecnologías



Minimum selling price for SAF (USD/ liter)



why ethanol?

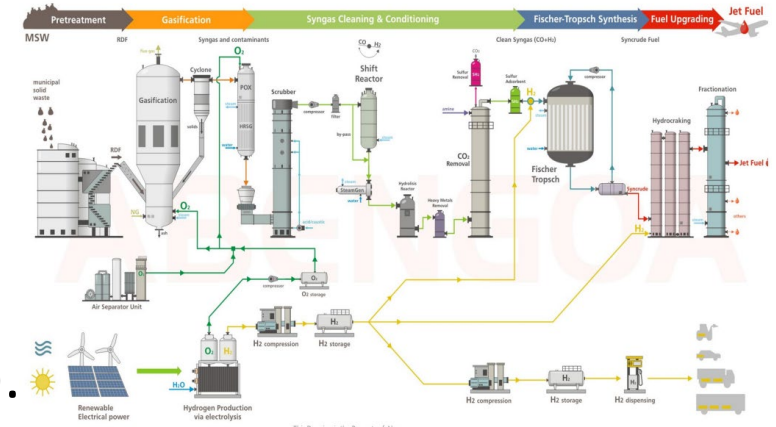
SAF Maturity - Timeline



STUDY CONDUCTED FOR GUATEMALA AND BELIZE - The potential of waste

The opportunities or advantages of using waste gasification processes in the case of Guatemala and Belize are the following:

- Continuous access to waste: from landfills, industrial waste, and forestry waste to produce SAF (Soft Forestry Equipment).
- Low or zero raw material costs:
- Reduction in landfills or sanitary disposal sites.
- Increased recycling: Promotes separation and pretreatment processes that improve waste recovery rates.
- Industrial impetus: Generates an innovative industry that contributes to the country's economic and technological development.

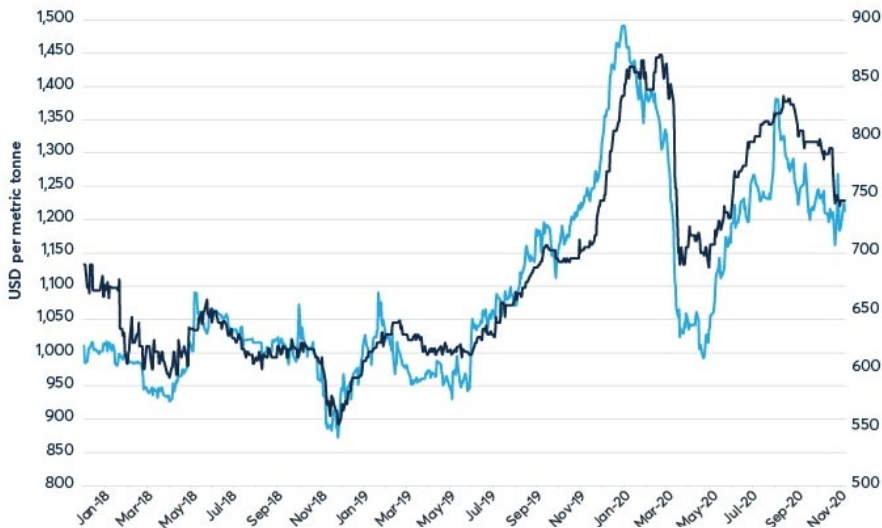


Challenges: Overcoming the failure of Fulcrum



Why the Lessons of the Fulcrum Fiasco must not be Wasted

Feasibility Analysis and Pricing Development in Business Plan - Key to the Process



Variables: capacity, transport, production location, land availability, technologies used, etc.

The economic analysis shows the viability of AtJ plants in Guatemala and Belize.

CONSUMABLES

Feedstocks pretreated €/Tm	€	433.125.000	1.375
Feedstocks pretreated Costs	€	100%	
Hydrogen efficiency annual factor	0,50%		
Hydrogen unit cost	€/kg	2,35	
Hydrogen cost	€	26.555.000	
Utilities and Energy costs	€	3.140.187	
Catalysts costs	€	10.616.822	
Total consumables	€	473.437.009	
MAINTENANCE	€	6.168.224	
Total maintenance	€	6.168.224	

LABOUR

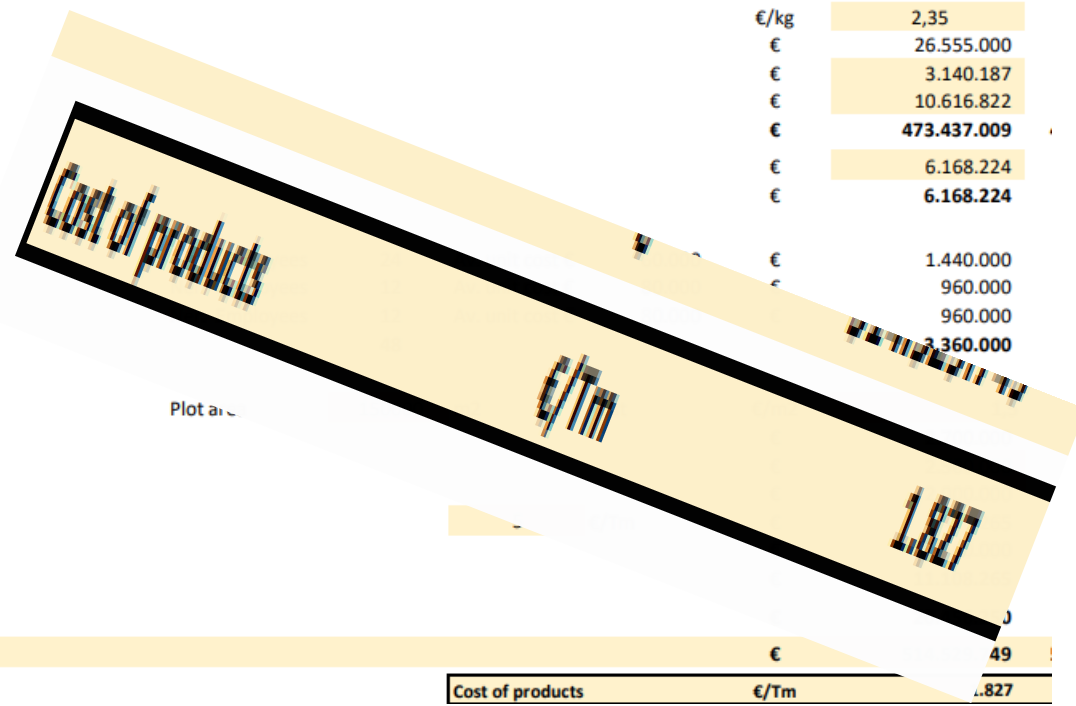
Operators	€	1.440.000
Supervisors	€	960.000
Staff	€	960.000
Total staff	€	3.360.000

OTHER OPEX

Rent land	Plot area	
Rent land cost	€/Tm	1.827
External services		
Operating tax		
Quality		
Other		
Total other opex		

DEPRECIATION

TOTAL COSTS	€	49
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Cost of products	€/Tm	1.827
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CONCLUSIONS ON POLICIES AND ACTION PLAN

- The production of SAF (Supplemental Alcohol Fuel) from alcohols represents a historic opportunity for the economic development of the SICA region, especially in Guatemala and Belize. This opportunity could position the region as a producer of a high value-added commodity, with profitability distributed among sectors such as transportation, industry, and agriculture.
- The analysis confirms the viability of SAF production projects in both Guatemala and Belize.
- Based on the consumption potential analysis, it is logical that a large portion of the production will be destined for export.
- A key opportunity for regional marketing would be to reach agreements with foreign companies—primarily European and North American—to have their SAF compensations carried out at airports in the region. (Including Book and Claim uses)
- Collaboration between different projects would improve economic viability and development opportunities.
- Cooperation between countries would facilitate the transfer of raw materials, primarily ethanol, guaranteeing the necessary quantities for production at the plants and distributing the benefits equitably.
- Elements to be developed for establishing policies
- Establishment, in each country or group of countries, of working groups and national coordinators to analyze and develop government mechanisms to strengthen fuel oil production policies.
- Promotion of public-private partnerships for the development of fuel oil policies and facilities.
- Adaptation of regulatory codes regarding the taxation of petroleum products to ensure the development and strengthening of fuel oil production policies.
- Seeking international collaboration to strengthen national capacities and develop projects.

Agreement proposal



The decarbonization of the international aviation sector undoubtedly depends on the sustained production of sustainable aviation fuels (SAF/LCAF), in accordance with the environmental certification and eligibility parameters established by ICAO. This represents both a challenge and a significant opportunity for Central American and Caribbean states, given the diversity of raw materials related to these energy processes.

Based on the above, you are invited to the NACC/DCA14 meeting:

- a) Take Note of the Information Presented.
- b) To manage, through the ICAO CDI office, feasibility studies that will attract capital investments to carry out SAF/LCAF projects and, consequently, the indirect effect that this implies on the various aspects of Sustainable Development for their respective States.
- c) That the ICAO NACC office can integrate the SAF/LCAF studies carried out to date in the region of its competence for the search for financing of the same via FINVEST, or some other investment platform.

Central American Plan for the Reduction of Emissions



Background on regional action plans



Organización de Aviación Civil Internacional
 Oficina para Norteamérica, Centroamérica y Caribe (NACC)
96ª Reunión de Directores Generales de Aeronáutica Civil de Centroamérica y Panamá (DGAC/CAP/96)
 Ciudad de México, México, 22 al 25 de mayo de 2012

DGAC/CAP/96 — NE/06
 30/04/12

Cuestión 3 del
 Orden del Día:

Asuntos de Navegación Aérea

— 3 —

DGAC/CAP/96 — NE/06

3.7 Asimismo, es posible que los Estados desarrollen planes de acción de forma conjunta. Esta sería una valiosa opción para los Estados que comparten servicios de navegación aérea o medidas de mitigación para hacer frente a las emisiones de CO₂ de la aviación internacional. Como los Estados Centroamericanos que forman COCESNA.

de la OACI relacionados al proyecto para asistir a los Estados en la preparación de planes de acción sobre las actividades de reducción de emisiones de CO₂.

Referencias:

- Comunicación a los Estados AN 13/61-12/4 de fecha 6 de enero de 2012 sobre IFSET.
- Resolución A37-19 de la 37ª Sesión de la Asamblea de la OACI.
- Carta EMX 250 de fecha 15 de marzo de 2012.
- <https://portal.icao.int/APER>
- <http://www.icao.int/environmental-protection/Pages/Tools.aspx>

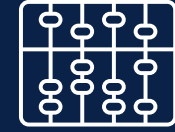
Objetivos Estratégicos

Esta nota de estudio se relaciona con los Objetivos estratégicos C. Protección al medio ambiente y desarrollo sostenible del transporte aéreo.

3.7 Asimismo, es posible que los Estados desarrollen planes de acción de forma conjunta. Esta sería una valiosa opción para los Estados que comparten servicios de navegación aérea o medidas de mitigación para hacer frente a las emisiones de CO₂ de la aviación internacional. Como los Estados Centroamericanos que forman COCESNA.

3.8 Entre el conjunto de medidas que los Estados pueden elegir e incluir en sus planes de acción, por ejemplo, las tecnologías relacionadas con aeronaves, mejoras operacionales, medidas basadas en el mercado y combustibles alternativos sostenibles, la herramienta de estimación de ahorro de combustible de la OACI (IFSET), puede ser utilizada para cuantificar los resultados esperados de la implementación de mejoras operativas, como parte del desarrollo de los planes de acción de los Estados.

Benefits of having a regional action plan



- Logical organization of information in nationally determined contributions (NDCs) when defending regional positions before the COPs.
- The assistance needed to achieve mitigation measures is usually more attractive when it can be negotiated regionally with one or more donor partners.

Action Plan published

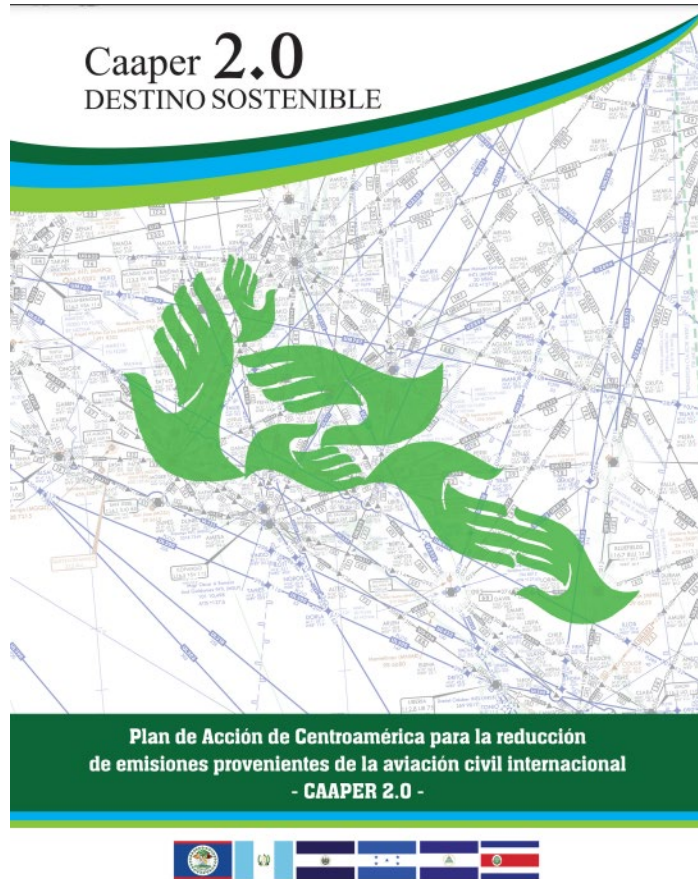
During 2013 was made a Central American Plan for the Reduction of Emissions

- Belize
- Costa Rica
- El Salvador
- Guatemala
- Honduras
- Nicaragua



Plan de acción de Centroamérica para la
reducción de emisiones provenientes de la
aviación civil internacional





COCESNA updated the plan in 2016; however, the active participation of the focal points of each and every State was not achieved, so ICAO cannot consider the plan as the Central American plan.



COCESNA updated the plan in 2019; however, without knowing the commitment made each state to the selected measures, it is not possible to estimate the benefit.



PLAN DE ACCIÓN NACIONAL SOBRE LA REDUCCIÓN DE EMISIONES DE LA AVIACIÓN COSTARRICENSE

Elaborado por: Evelyn Quirós Badilla, Punto Focal ante OACI de la DGAC para CORSIA y SAF. Coordinadora Comisión de Sostenibilidad Ambiental de la Dirección General de Aviación Civil.

Revisado por: Fernando Villegas, NAV-ATC, Daniel Wong Proceso de Control Interno. Unidad de Planificación Institucional y Miguel Alonso Solano García, Encargado Proceso Regulación Aeronáutica. Miembros: Comisión de Sostenibilidad Ambiental de la Dirección General de Aviación Civil.

Colaboradores: María Umaña y Jefry Orozco, Planificación Institucional. Miembros: Comisión de Sostenibilidad Ambiental de la Dirección General de Aviación Civil.

Aprobado por:

**Fernando Naranjo Elizondo, Director General
Dirección General de Aviación Civil
Costa Rica**

os datos fueron aportados por:
Departamento de Transporte Aéreo,
Departamento de Navegación Aérea (ATC/ATM), Unidad de Planificación,
Operadores de aeropuertos: AERIS y CORIPORT,
Operadores aéreos: AVIANCA CR y VOLARIS CR.

V.2. 2023

www.dgac.go



In the specific case of El Salvador and Costa Rica, both have independent action plan from each State, presented in 2020 and 2023 respectively.

Código: AAC-UA-003-D	AUTORIDAD DE AVIACION CIVIL	Sección: PORTADA
Edición: 01	Plan de Acción Estatal para la Reducción de Emisiones de CO₂ procedentes de la Aviación	Página: 1
Fecha: 19/Oct/2020		



Costa Rica	Sep-13	Nov-23	Costa Rica State Action Plan
Côte d'Ivoire	Jan-22	Sep-25	Côte d'Ivoire State Action Plan 2025
Croatia			
Cuba	Oct-12	Jul-15	
Cyprus	Jul-12		
Czech Republic	Dec-13	Jun-21	Czech Republic State Action Plan 2021
Democratic Republic of Congo	Mar-16		Plan d'action de la République Démocratique du Congo pour la réduction des émissions de CO₂ Issues de l'aviation internationale
Denmark	Jun-12	Jan-25	
Dominican Republic	Dec-13	Sep-25	Dominican Republic State Action Plan
Ecuador	Oct-21	Jun-25	PLAN DE ACCIÓN DE REDUCCIÓN DE CO₂ DEL ESTADO ECUATORIANO
Egypt	Jul-16	Jan-26	
El Salvador	Sep-13	Oct - 20	El Salvador, Plan de Acción Estatal para la Reducción de Emisiones de CO₂ procedentes de la Aviación
Equatorial Guinea	Mar-16		Plan de acción de la República de Guinea Ecuatorial para la mitigación de emisiones de CO₂ procedente de la aviación internacional

PLAN DE ACCIÓN ESTATAL PARA LA REDUCCIÓN DE EMISIONES DE CO₂ PROCEDENTES DE LA AVIACIÓN

Octubre 2020.

Planes de Acción publicados

For the following States, this is the plan that has been published in ICAO as the most recently submitted (2013) there is a Regional plan at the Central American level.

- Belice
- Guatemala
- Honduras
- Nicaragua

https://www.icao.int/sites/default/files/sp-files/environmental-protection/Documents/ActionPlan/CentralAmericanStates-Caaper_es.pdf



Plan de acción de Centroamérica para la
reducción de emisiones provenientes de la
aviación civil internacional



Resolution A42-21: Consolidated statement of continuing ICAO policies and practices related to environmental protection - Climate change

A42-21

13. Invites those States that choose to prepare or update action plans to submit them to ICAO as soon as possible preferably by the end of June 2027 and once every three years thereafter, in order that ICAO can continue to compile the quantified information in relation to achieving the global aspirational goals and the global aspirational Vision, and the action plans should include information on the basket of measures considered by States, reflecting respective national capacities and circumstances, quantified information on the expected environmental benefits from the implementation of the measures chosen from the basket, and information on any specific assistance needs for the implementation of the measures so that ICAO can tailor capacity building and implementation support measures including facilitating access to financing and funding in line with the State's needs

Purposes of the Action Plans

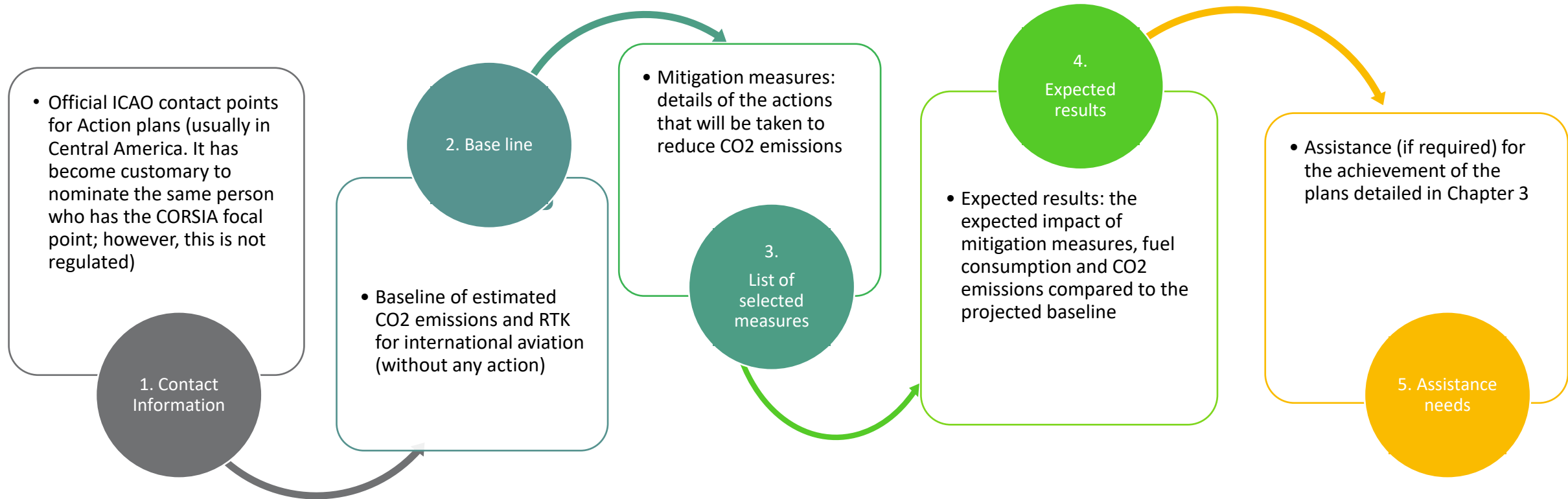
For OACI

- Gather information related to the achievement of aspirational global goals (LTAG).
- To provide guidance and other technical assistance for the preparation of States' action plans.
- Identify and respond to the technical and financial assistance needs of States, with a view to responding appropriately through the development of processes and mechanisms to provide assistance to States.
- Harmonization, standardization of policies

• For States

- Report CO2 emissions from international aviation to ICAO.
- To develop their respective policies and actions.
- Provide information on the set of measures considered, reflecting the savings benefits according to the respective national capacities and circumstances, and on any specific assistance needs.
- It allows bringing together all stakeholders in the design and implementation of actions, such as aircraft and engine manufacturers, airlines, air navigation service providers, airport operators and local authorities.

Action Plans Phases



The ICAO support program for Action Plans



The program supports and facilitates international cooperation among ICAO Member States. States that have developed plans assist other States in developing and implementing their own plans.

In the case of Central America, which is assisted by the NAAC regional office, the action plans are carried out with the support of regional officers.



ICAO tools and guides

- Document 9988 - Guide for the preparation of state action plans on CO2 emission reduction activities.
- UNITAR Training Course – State Action Plans to Reduce CO2 Emissions
- ICAO website for Emission Reduction Plans
- Tool EBT (Environmental Benefit Tool)
- Tool for graphing the cost of reduction (Marginal Abatement Cost (MAC) curve Tool)
- ICAO Fuel Savings Estimation Tool (IFESET)
- ICAO Carbon Emissions Calculator (ICEC)

Agreement proposal



Given the nature of Central America's upper airspace, a "seamless sky" in which air navigation services and mitigation measures to address carbon emissions from international civil aviation are shared, it is considered important to develop a "Central American Action Plan for Reducing Carbon Emissions from International Civil Aviation," as recommended in NE 06, paragraph 3.7, presented by the Secretariat at the Meeting of Directors General of Civil Aeronautics of Central America and Panama (DGAC/CAP96). This plan should be presented at the next session of the ICAO Assembly, in accordance with the aspirational objectives of international aviation.

Based on the above, you are invited to the NACC/DCA14 meeting:

- a) Take Note of the Information Presented.
- b) Agradecer a COCESNA por este ejemplo de colaboración regional
- c) We respectfully request that the ICAO NACC office assist in the development of this regional initiative.



Thank you