



Feasibility studies on SAF under the project framework

Second Phase of the ICAO Assistance Project with the EU Funding :
“Capacity Building for CO₂ Mitigation from International Aviation

3 to 5 April 2023
Harare, Zimbabwe

Bruno Silva
Environment Officer, ICAO





Objectives of the feasibility studies

- Identify **singularities and opportunities** of a potential SAF Supply Chain
- Define **potential capacity**: Feedstocks and SAF production
- Define **demand**, considering cost/benefit and prices
- Evaluate the **environmental impact** (GHG, water, resources) and local development impact
- Look for **implementation keys** (policies, challenges and alternatives)



SAF Needs and Benefits

- Mitigates CO₂ emissions
 - Savings of up to 80%
- Contributes to meet International GHG reduction agreements
 - cannot be achieved just with technological measures
- Improves energy security
- Promotes **new internal industries** and production schemes
- Improves **competitiveness** at long term of the sector: **Green Tourism**
- Improves Local Air Quality (LAQ)



SAF feasibility studies already conducted

ICAO ENVIRONMENT



SAF Feasibility Study

DOMINICAN REPUBLIC





Feedstock

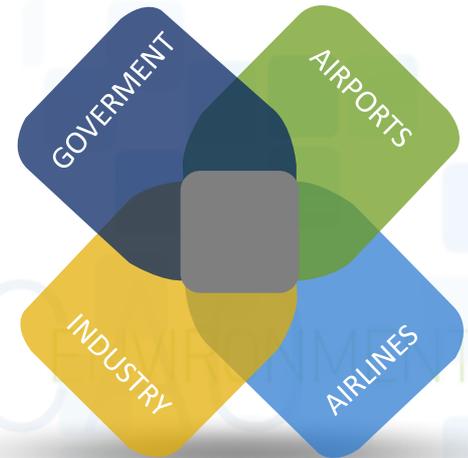
- **vegetable oils & fats** → low potential
- production of municipal or industrial **wastes** is limited and disperse
- major **agricultural residues** are being currently used
- However, the country has a **significant potential** on **sugarcane** which could be renewed to produce SAF with the SIP or ATJ conversion projects.





Roapmap Strategy

- Short Term (2017 – 2018):
 - Establish information sharing mechanisms for SAFs
- Medium term (2018 – 2020)
 - Adapt regulations & standards
 - Disseminate the relevance of the use SAFs
 - Increase R&D on feedstock capacity
- Long term (from 2020)
 - Promote sustainable implementation of a value chain
 - Establish incentive measures for stable demand





DECLARACIÓN DE PUNTA CANA

IMPLEMENTACIÓN DE UNA HOJA DE RUTA PARA EL DESARROLLO Y USO DE COMBUSTIBLES ALTERNATIVOS SOSTENIBLES PARA LA AVIACIÓN EN LA REPÚBLICA DOMINICANA

Los representantes del Estado Dominicano, reunidos en Punta Cana, República Dominicana, el 16 de Diciembre de 2016, conscientes de la importancia y trascendencia de las cuestiones de medio ambiente y cambio climático, y alentados por las iniciativas globales para el desarrollo y uso de combustibles sostenibles para la aviación, como una estrategia a largo plazo para el transporte aéreo;

Considerando: Que la aviación es una industria clave a nivel mundial, particularmente relevante en un estado insular como la República Dominicana. El sector turístico e industrial en el país depende enormemente de un transporte aéreo eficiente y sostenible, que apoye el desarrollo y crecimiento económico;

Considerando: Que el cambio climático es uno de los mayores retos a los que se enfrenta la humanidad y, particularmente, la República Dominicana como país en vías de desarrollo altamente vulnerable a los efectos resultantes de este fenómeno global;

Considerando: Que a nivel global, la industria de aviación ha establecido de forma proactiva un conjunto de ambiciosas metas para reducir sus emisiones, mejorando la eficiencia energética de la flota mundial en promedio un 1,5% anual, estabilizando las emisiones de CO₂ netas de la aviación a los niveles de 2020 (crecimiento neutro en carbono) y emitiendo en 2050 la mitad de las emisiones que se alcanzaron en 2005.

Considerando: Que una estrategia de sostenibilidad, seguridad e innovación energética a través de combustibles alternativos puede contribuir a alcanzar la visión de nación para largo plazo reflejada en la Ley 1-12 Estrategia Nacional de Desarrollo – END 2030, la cual, establece en dos de los cuatro ejes estratégicos: i) Una economía articulada, innovadora y sostenible, con una estructura productiva que genera crecimiento alto y sostenido con empleo decente, y que se inserta de forma competitiva en la economía global; y ii) Un manejo sustentable del medio ambiente y una adecuada adaptación al cambio climático;

Considerando: Que para fomentar el crecimiento sostenible de la aviación internacional y lograr las metas mundiales a las que se aspira, es necesario adoptar un enfoque integral que consista en un conjunto de medidas, que incluyen tecnologías y normas, combustibles alternativos sostenibles, mejoras operacionales y medidas basadas en el mercado para reducir las emisiones;



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Do not expect the others to change your reality. YOU can make a change that would inspire all



SAF Feasibility Study

Trinidad & Tobago





Feedstock

- Feedstocks considered: **agricultural products** (sugarcane), **algae**, **waste gases** from petrochemical industry, and **Municipal solid wastes**.
- **Low volumes of feedstock availability** - insufficient for scale production with current production technologies.
- Due to existing **expertise in fuel management and processing**, Trinidad and Tobago could play a primary role in the supply of SAF in the Caribbean region, using imports from neighboring nations





Roapmap Strategy



- **Short-Term (2018-2023)**
 - Develop national strategy for carbon pricing and GHG emissions.
 - Support Gas To liquid industry from Natural Gas
- **Medium-Term (2023-2028)**
 - Adapt waste disposal policies to increase availability for SAF production
- **Long Term (2028-)**
 - Conduct a feasibility study for SAFs produced from imported and local renewable biomass.

SHORT TERM (1-5 YEARS) Provide direct support to specific industry developments	MEDIUM TERM (5- 10 YEARS) Plan for the deployment and promote SAFs	LONG TERM (10+ YEARS) Support R&D on large scale production of SAFs
ACTION	ACTION	ACTION
<ul style="list-style-type: none"> • Develop a nationwide strategy for carbon pricing and GHG emission, and the use of biofuels for aviation, marine, and land transport. • Reinforce government's support to ensure the efficient development of the GTL-FT industry to gain a comparative advantage in future markets for BTL-SAFs. • Evaluate the feasibility, and if viable install a solar farm at Piarco International Airport to supply renewable energy for airport operations including powering EVs for GSE. • While evaluations are on-going to incorporate EVs powered by solar panels at Piarco International Airport, TT can rapidly begin to reduce GHG from GSE through the following transitional measures: <ul style="list-style-type: none"> i. The provision of 7.6 per cent biodiesel processed from used cooking oil to fuel diesel powered GSE. ii. The installation of two mobile high-flow fueling CHG stations in the north and south terminals to power GSE fitted to run on CNG. 	<ul style="list-style-type: none"> • Revise and modify existing policy on the handling and disposal of waste from residential, industrial, and commercial sectors to ensure selective disposal of the organic portion: <ul style="list-style-type: none"> i. Develop and launch capacity building workshops on recycling and organic waste separation for the general public, and academic and public institutions. ii. Explore the idea of updating the nation's waste-sites to engineered advances landfills to allow for the capture of LFG and use of the CH4 portion as an affordable local source of renewable feedstock for BTL-SAFs production. • Investigate and if feasible, increase to 30 per cent the blend mix of biodiesel produced from UCO for GSE. 	<ul style="list-style-type: none"> • Evaluate supplementing volumes of existing waste biomass, including MSW, with imports from neighboring nations. • Develop nationwide specific routes for the collection of organic residential and industrial waste as well as agricultural waste separately from MSW collection routes. • Conduct a feasibility study, including economic analysis, and consequent pilot project for the deployment of BTL-SAFs processed from imported and local renewable waste biomass. • Enact policy to support the use of EVs for private and public vehicles owners.



SAF Feasibility Study

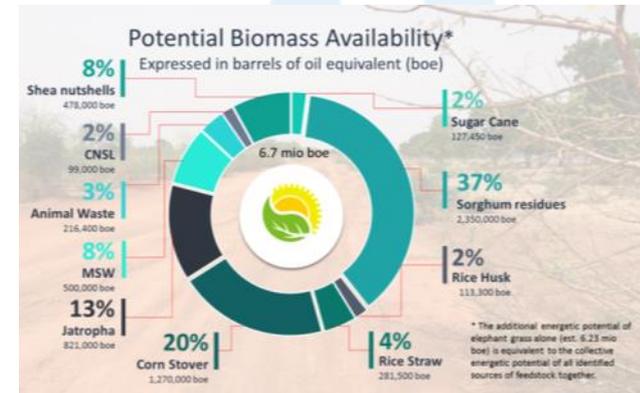
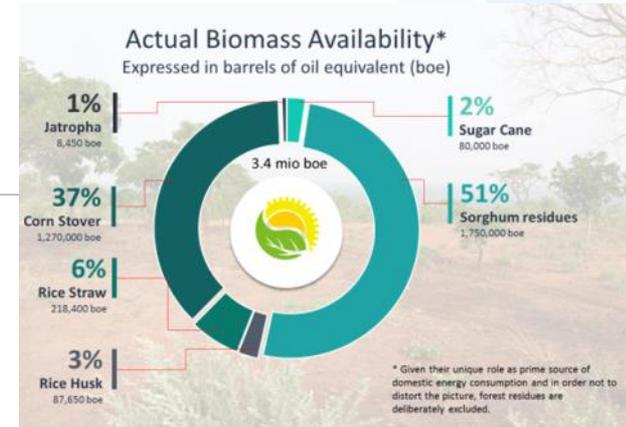
Burkina Faso





Feedstocks

- **Positive outlook for the use of cashew and shea nutshells**
- **Significant potential** for increased use of sorghum residues and jatropha
- Expansion of **sugarcane** seems limited
- **Animal waste fats and municipal solid waste-** potentially attractive for SAF production





Roapmap Strategy



- **Short-Term (2018-2023)**
 - Secure buy-in from national stakeholders
 - Set up central coordinating platform
- **Medium-Term (2023-2028)**
 - Provide small holders with financing
 - Promote central purchasing
 - Explore potential for carbon financing
- **Long Term (2028-)**
 - Investigate concept for a multi-feedstock processing plant.

First Stage (2018)	Second Stage (2018-2020)	Third Stage (from 2020)
<ul style="list-style-type: none"> • Secure critical buy-in among national stakeholders from across the political and sectoral spectrum to formulate a shared vision and facilitate critical mobilization; • Unity of effort and stakeholder integration: set-up of an independent central coordinating platform (representing government, civil society, private sector and strategic partners/investors) to be equipped with operational autonomy and budget authority; • Business White Paper: Draft business plan for a national biofuel supply chain that allows to secure public climate finance and international development 	<ul style="list-style-type: none"> • Improve overall market functionality for farmers and feedstock suppliers <ul style="list-style-type: none"> ➢ Promote establishment of (i) central purchasing counterparty and (ii) agricultural seed production company; • Provide smallholders with access to micro-finance (e.g. loans for farm inputs and crop-insurance); • Explore potential for carbon finance and REDD+; • Reallocate revenues from mining operations; • Quantify and credit socio-economic co-benefits towards the cost of production; • Encourage and incentivize strategic 	<ul style="list-style-type: none"> • Facilitate international cooperation and coordination: <ul style="list-style-type: none"> ➢ Capacity building, technical assistance and technology transfer; ➢ Scientific and technical R&D conducted under multi-lateral and bilateral agreements to mutually share risks, minimize duplication of effort, and benefit from international best practices; • Investigate concept for a multi-feedstock processing plant;



SAF Feasibility Study

Kenya





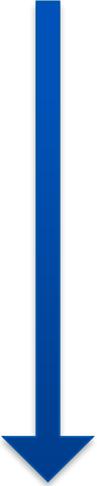
Feedstocks

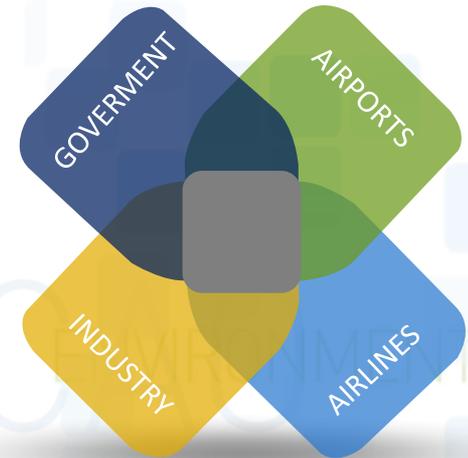
- **Seventeen feedstock types evaluated**
- **Significant potential** for waste-based feedstocks (sugar-cane by-products, water hyacinth, used cooking oil, MSW)
- available in **significant quantities** and already aggregated or localised in specific regions





Roapmap Strategy

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- Short-Term (2018-2023)
 - Develop cooperation and capacity building initiatives
 - Medium-Term (2023-2028)
 - Demonstrate the potential and prove viability of projects
 - Long Term (2028-)
 - Determine implementation plan of a waste-based SAF supply chain





ACT»SAF

What is the ICAO ACT-SAF?

- ACT-SAF is an ICAO initiative to facilitate the development and deployment of SAF
- Tailored support for States
- Facilitate cooperation under ICAO coordination
- A Platform to facilitate knowledge sharing and progress monitoring

Many additional feasibility studies will be developed in the ACT-SAF programme

- **Three new feasibility studies under the existing ICAO-EU project (Cote d'Ivoire, Rwanda and Zimbabwe).**
- Additionally, financial resources provided by Cote D'Ivoire, France, Netherlands and the European Commission will allow several additional feasibility studies
- ICAO and World Bank project being structured
- Studies also being pursued by ACT-SAF partners



The ACT-SAF Partners



<https://www.icao.int/environmental-protection/Pages/act-saf.aspx>



ACT»SAF

ACT-SAF website provides the details on ACT-SAF participation and initiatives

Latest news on ACT-SAF

Date	Latest news	Link
16/02/2023	ACI joins ACT-SAF	
12/01/2023	Cote d'Ivoire offers financial resources to ACT-SAF	
22/12/2022	Netherlands offers financial resources to ACT-SAF	
20/12/2022	France offers financial resources to ACT-SAF	
17/11/2022	ICAO launches the ACT-SAF Series of training events on SAF	

States

Acceptance to ... Pending Yes



International Organizations

Acceptance T&C Pending Yes



- States
- Name of State
- Albania
 - Argentina
 - Bhutan
 - Botswana
 - Brazil
 - Burkina Faso

- Organizations
- Name of Organization
- AACO - Arab Air Carriers' Organization
 - ACI - Airports Council International
 - Airbus
 - Airports Company of Zimbabwe
 - All Nippon Airways (ANA)

To become a partner, any interested party can accept the Terms and Conditions on the ICAO website.

• States and Organizations that expressed intention to actively participate in the ACT-SAF Programme



Feasibility Study Template

Comprehensive Version

1. EXECUTIVE SUMMARY

- **Background:**
This section will provide a brief overview of the background of the feasibility study, including the reasons for conducting the study and its main objectives.
- **Key findings:**
This section will summarize the key findings of the feasibility study, highlighting the most important and relevant information for the Requesting State and its stakeholders. This should include an overview of the different types of feedstock that were evaluated, the potential for expanding the use of different types of feedstock, and the critical success factors for the development, deployment and commercialisation of Sustainable Aviation Fuels (SAF), including the key findings from the Roadmap developed.
- **Policy environment:**
This section will provide an overview of the current policy environment related to SAF, including any relevant regulatory standards, and guidelines. It will also provide an analysis of the policy environment in the Requesting State and the policy implications of the study's findings.
- **Opportunities:**
This section will identify and describe the opportunities for implementing SAF, including the potential for feedstock expansion, the availability of financing, and the potential for reducing greenhouse gas emissions. It will also highlight any challenges and barriers that need to be addressed in order to realize these opportunities.

The Executive Summary will provide a concise, high-level overview of the entire feasibility study, highlighting the most important and relevant findings and recommendations for decision-makers. It will provide an overview of the background, the key findings of the study, policy environment and the opportunities mapped.

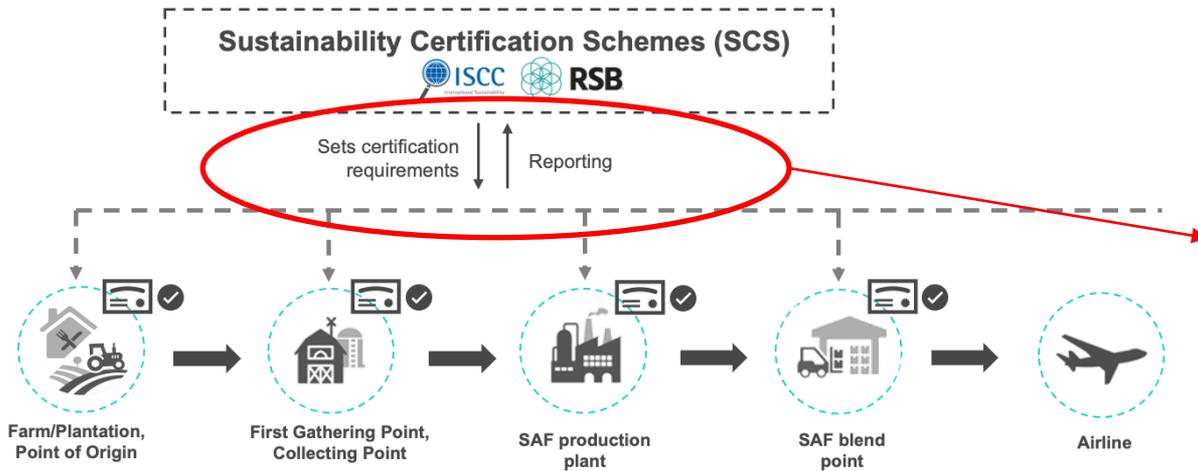
Abbreviations & Acronyms

List of Figures & Tables

ICAO is currently developing a template for SAF Feasibility Studies

- Ensure coherence across studies, increased quality
- Harmonized structure (more practical/quantitative)
- Ensure alignment with ICAO's methodologies and guidance
- Include information relevant to facilitate financing
- Facilitate outreach of results of the studies

ACT-SAF can assist in the SAF sustainability certification processes



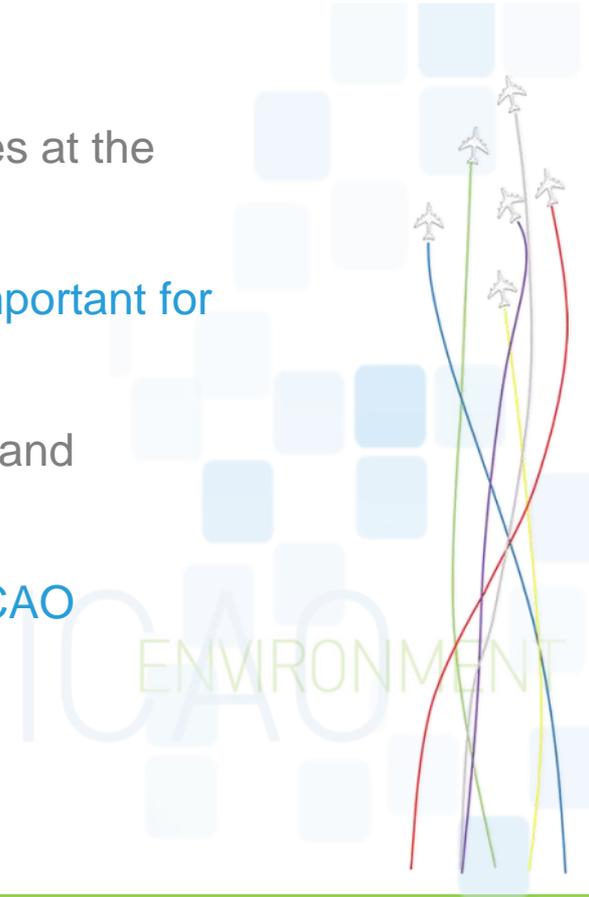
Potential support from ACT-SAF partners or ICAO

- Support to data gathering and reporting
- Assistance with the certification process



Conclusions

- **Technical Assistance can be a catalyst** to trigger initiatives at the State Level
- **Advocacy** and mobilization of different stakeholders is important for SAF projects
- Important **role of ICAO** at providing **technical assistance** and outreach
- **ACT-SAF** programme will increase cooperation under ICAO coordination





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Beijing

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THANK YOU