

# Capacity Building for CO<sub>2</sub> Mitigation from International Aviation

## Results of the feasibility studies on SAF: Africa and the Caribbean

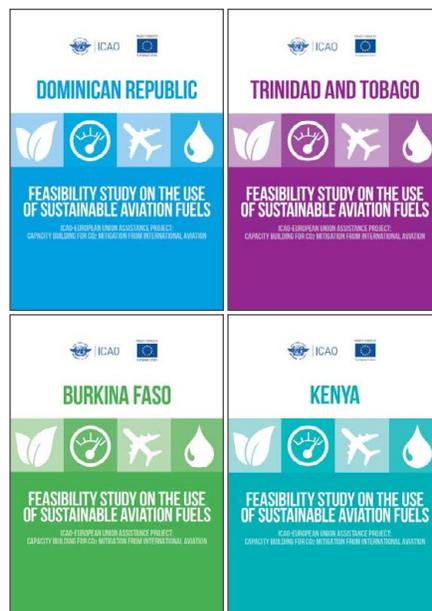
By ICAO Secretariat

### BACKGROUND

From December 2013 to June 2019, ICAO and the European Union have cooperated under the “Capacity Building for CO<sub>2</sub> Mitigation from International Aviation” partnership. This partnership, referred to simply as the “ICAO-EU Project”, is a project funded by the EU and implemented by ICAO to support fourteen selected States in Africa and the Caribbean with the development of their State Action Plans (see Chapter 9 for more information on State Action Plans), the installation of tailor-made CO<sub>2</sub> emissions reporting software (the Aviation Environmental System (AES)), and the implementation of pilot mitigation measures and commissioning of feasibility studies.

The feasibility studies developed within the context of the ICAO-EU Project included studies on the use of sustainable aviation fuels (SAF) in the Dominican Republic, Trinidad and Tobago, Kenya, and Burkina Faso. While SAF are only one of the mitigation measures that can be considered for reducing a State’s CO<sub>2</sub> emissions from international aviation, broader environmental, economic, and social benefits can stem from the establishment of a SAF supply chain within

a State. In order to assess the potential benefits, it is important for States to consider their specific national circumstances. Therefore, conducting a feasibility study can be a valuable first step toward the establishment of a SAF supply chain, and a valuable tool to include more States from across the ICAO Regions as suppliers of SAF, hence escalating the production of such SAF.

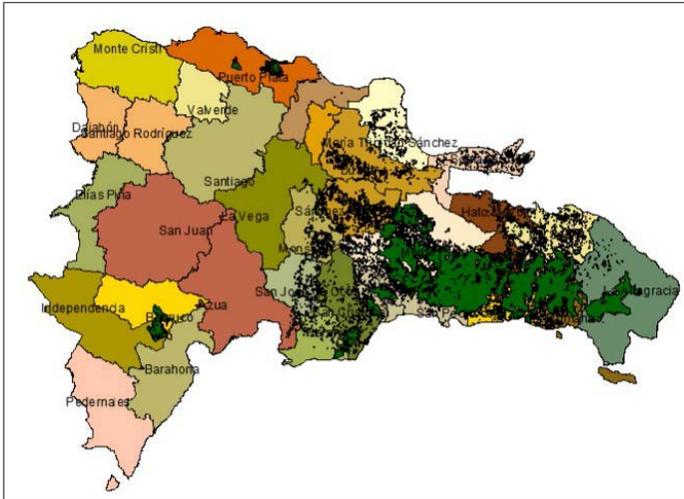


In order to identify the national conditions of the State, each feasibility study began with an assessment of the regulatory context, the existing infrastructure, key stakeholders, roles of government and industry, and on-going and implemented actions in the field of alternative fuels. The main objectives were to define the potential capacity and demand for such fuels, while also taking the environmental, economic, and social impacts into account.

These SAF feasibility studies each include a proposed roadmap for the State to develop a SAF supply chain,

which has been validated at the national level with all the stakeholders from the government and the industry. These detailed roadmaps include specific actions that the State can take in order to achieve their SAF goals. While each study focuses on the unique context of a single State,

**FIGURE 1:** Suitable land for sugarcane cultivation (Dominican Republic Feasibility Study on the Use of Sustainable Aviation Fuels, 2017)



**FIGURE 2:** Declaración de Punta Cana (Dominican Republic Feasibility Study on the Use of Sustainable Aviation Fuels, 2017)



these documents can provide guidance to other States that are interested in conducting feasibility studies or establishing SAF supply chains.

## DOMINICAN REPUBLIC<sup>1</sup>

The first feasibility study under this project was conducted in the Dominican Republic. While several potential feedstock types were analysed, sugarcane was identified as the feedstock with the most significant potential for the State. Importantly, the use of sugarcane as a SAF feedstock would not displace other crops or interfere with the use of sugarcane as a food crop.

As an outcome of the study, the Dominican Republic has created a national committee for environment and aviation to facilitate information sharing related to SAF at the national level. This cooperation has led the major Ministries and government institutions of the State to sign the “Punta Cana Declaration” which includes a commitment to pursue the main actions outlined in the feasibility study roadmap.

In the medium-term, the feasibility study recommended that the Dominican Republic prepare a framework for

potential investments in the production and use of SAF. This can be accomplished through adapting existing regulations and standards to include SAF, disseminating information to national stakeholders about the relevance of SAF for the State, and by increasing research and development on feedstock capacity in order to guarantee a sustainable and affordable supply for a production facility.

Once the regulatory market is favourable for the use of SAF, and there is reliable information on the availability of feedstock, the Dominican Republic would be prepared to define the actual implementation of SAF production from 2020, including the establishment of stable demand through the definitions of technology and incentive measures. The support defined within the Punta Cana Declaration will be instrumental to achieving these implementation goals.

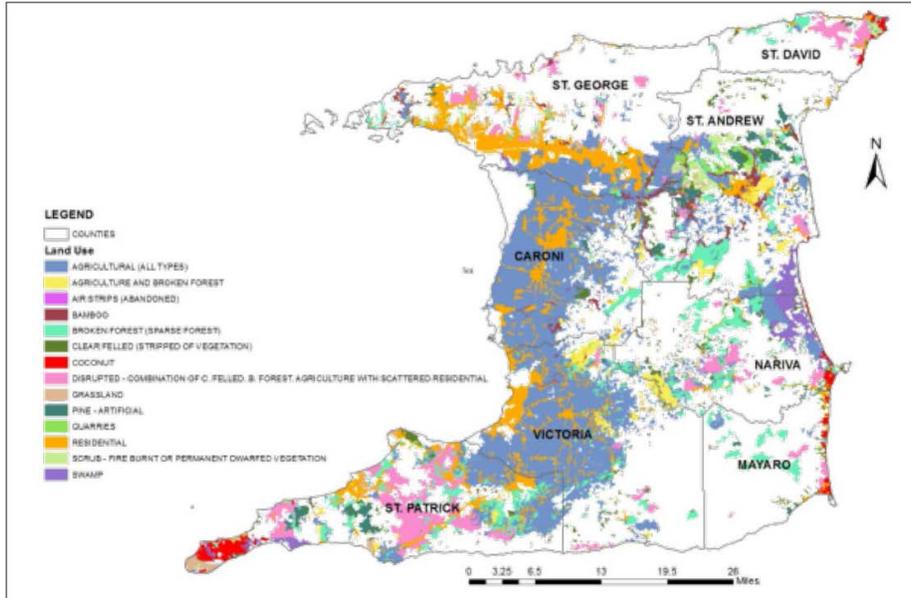
## TRINIDAD AND TOBAGO<sup>2</sup>

The feasibility study developed in Trinidad and Tobago was particularly unique, as the study found that the current volumes of feedstock available within the State are insufficient for commercial scale production of SAF with

1 [https://www.icao.int/environmental-protection/Documents/FeasibilityStudy\\_DomRep\\_ENG\\_Web.pdf](https://www.icao.int/environmental-protection/Documents/FeasibilityStudy_DomRep_ENG_Web.pdf)

2 [https://www.icao.int/environmental-protection/Documents/FeasibilityStudies\\_TrinidadTobago\\_Report\\_Web.pdf](https://www.icao.int/environmental-protection/Documents/FeasibilityStudies_TrinidadTobago_Report_Web.pdf)

**FIGURE 3:** Land use by county in Trinidad, 2016 (Trinidad and Tobago Feasibility Study on the Use of Sustainable Aviation Fuels, 2017)



current technologies. Contrary to the roadmaps developed within the other feasibility studies, the strategy developed for Trinidad and Tobago included a recommendation that the State focus on the development of gas-to-liquid fuels from natural gas. While this feedstock is not considered sustainable, it can help the State reduce GHG emissions in the short-term, while work continues to further assess the possibility of using of municipal solid waste (MSW) as a feedstock in the medium-term. This would include improving waste management techniques and related policies, which could support the development of a waste-to-jet supply chain in the long-term.

Trinidad and Tobago also has a significant level of experience in fuel management and processing; thus, in the short- to medium-term, the State could develop strategic partnerships for the production and deployment of SAF. By developing SAF from feedstock available in nearby States, Trinidad and Tobago could play a primary role in the production and distribution of SAF throughout the Caribbean region. This possibility highlights the important role of international and regional cooperation in order to scale-up SAF deployment.

### KENYA<sup>3</sup>

While further research is required on potential feedstock yields, sustainability, and techno-economic potential, Kenya has favourable conditions for the development of a SAF supply chain. The feasibility study suggests that specific attention be given to used cooking oil

**FIGURE 4:** Proximity of Three Feedstock Types to Kisumu (Kenya Feasibility Study on the Use of Sustainable Aviation Fuels, 2018)



3 [https://www.icao.int/environmental-protection/Documents/FeasibilityStudy\\_Kenya\\_Report-Web.pdf](https://www.icao.int/environmental-protection/Documents/FeasibilityStudy_Kenya_Report-Web.pdf)

(UCO) as a feedstock in the short- and medium-term, while other feedstocks, such as MSW, agricultural waste from sugarcane harvesting, and water hyacinth could be considered in the long-term. Initial analyses suggest that up to 200 million litres of SAF could be derived from UCO by 2030.

In order to attract project developers, the study highlights the importance of developing strong governance and policy. Specifically, the study recommended that the Biofuel Department of the Ministry of Energy and Petroleum take the lead on advancing the study's recommendations. Such definitions of stakeholder roles are a fundamental aspect of feasibility studies, in order to ensure that the recommendations of the study are carried out.

Additionally, the feasibility study provided a list of potential funding sources that may be able to support the further research that is required. This list of resources could also benefit other States within the region that may be interested in assessing the potential for developing a SAF supply chain in their own State.

## BURKINA FASO<sup>4</sup>

In Burkina Faso, several feedstock types are already available for the development of SAF. The feasibility study in Burkina Faso emphasized the important role that SAF could play in the State's strategies, such as the achievement of energy security; however, considering the experiences of previous projects in the region, the study suggests that the State take a cautious approach when scaling up the production of any SAF feedstock.

In the short-term, the study recommended that the State focus on the production of feedstock and on the conversion of biomass for ground transportation fuels. The development of such infrastructural facilities will be less capital-intensive for the State than it would be to develop SAF production facilities, while these actions could raise awareness of alternative fuels and potentially attract future investors. The ground transportation fuels could specifically be used for airport ground support

equipment at Ouagadougou Airport, the State's main airport. Such actions could support the gradual adoption of SAF in the long-term.

**FIGURE 5:** Belwet Biocarburant biofuel crushing and biodiesel processing facilities, Kossodo (Burkina Faso Feasibility Study on the Use of Sustainable Aviation Fuels, 2018)



**FIGURE 6:** SN CITEC in Bobo-Dioulasso (Burkina Faso Feasibility Study on the Use of Sustainable Aviation Fuels, 2018)



4 [https://www.icao.int/environmental-protection/Documents/FeasibilityStudy\\_BurkinaFaso\\_Report-Web.pdf](https://www.icao.int/environmental-protection/Documents/FeasibilityStudy_BurkinaFaso_Report-Web.pdf)

Additionally, several of the specific actions recommended for Burkina Faso were highlighted as potentially relevant throughout sub-Saharan Africa. The replication of such actions would further multiply the related positive environmental, social, and economic impacts of moving towards the adoption of SAF.

## CONCLUSIONS

The SAF feasibility studies developed through the ICAO-EU Project demonstrate how assistance can lead to concrete actions for CO<sub>2</sub> mitigation, and proved that SAF can be a catalyst to reach decision-makers and mobilize political support for SAF projects. The process enabled close interactions with key stakeholders, which were subsequently translated into political support from various government institutions, and ultimately became a part of the national strategy on environment.

ICAO, other international organizations, and donors continue to play an important role in the success of such initiatives, through the planning stages to actual implementation. Further technical assistance and outreach will be instrumental for similar initiatives to succeed in the future, in order to ensure that they continue to be supported within States at the political level. ICAO encourages the dissemination of similar experiences, in order to promote the replication of such projects in other Member States and to support the development of a more environmentally sustainable aviation sector.

In this regard, it is paramount that States, while preparing their State Action Plans to Reduce CO<sub>2</sub> Emissions Reductions, identify their assistance needs and their willingness for developing such feasibility studies. In addition, under the 2050 ICAO Vision for SAF (see the Chapter 5 introductory article from the ICAO Secretariat) and as part of the ongoing SAF Stocktaking process, States are invited to express their willingness to undertake similar SAF feasibility studies, as Buddy Partnerships are being encouraged to facilitate this process.



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## CHAPTER SIX

# Climate Change Mitigation: CORSIA

