Feasibility Study on the Use of Sustainable Aviation Fuels In Jamaica

April 2026

This report is funded by the UK Department for Transport and developed using the ICAO ACT-SAF template and guidance for feasibility studies on Sustainable Aviation Fuels Version 1

Acknowledgement

ICF would first like to thank the UK Department for Transport for funding this study in full and for its continued support, advice and insights throughout.

This study would also not have been possible without the generous support and commitment of the Jamaica Civil Aviation Authority (JCAA). The JCAA played an essential role in bringing stakeholders together and ensuring that the study reflects Jamaica's context and priorities. In particular, ICF would like to thank Mr. Michael Hepburn, Director of Economic Regulation at the JCAA, and Mrs. Nichole Morgan, Acting Director General of the JCAA, for their hands-on guidance and engagement.

We are also deeply grateful to the Ministry of Energy, Transport, and Telecommunications for their sustained engagement and commitment to the study. ICF especially extends its sincere thanks to The Honourable Daryl Vaz, Minister of Transport, Telecommunications and Energy, and the Minister's team for their warm welcome.

Finally, ICF would like to thank all stakeholders who contributed to this study for their time, engagement, and thoughtful feedback throughout. Their input was essential in shaping the analysis and findings. A list of stakeholders is provided in Appendix A.

Executive Summary

Background

Aviation is the backbone of Jamaica's economy, connectivity, and long-term development. As an island nation, Jamaica depends heavily on air transport to connect people, support trade and business, and sustain its tourism-based economy. Aviation is therefore not only a transport mode, but an enabler of economic growth, inward investment, and international connectivity. Continued aviation growth will be important for Jamaica's development, but it must increasingly be aligned with wider sustainability and climate objectives.

Jamaica's vulnerability to climate change makes emissions reduction a national priority. Recent hurricanes and other climate-related shocks are a reminder of the country's exposure to the physical impacts of climate change. For Jamaica, reducing emissions is a matter of national resilience, economic security, and long-term development. This gives added importance to decarbonising sectors that are strategically important to the country, including aviation.

Decarbonising aviation is essential, but it remains one of the more difficult sectors to abate. Jamaica's well-to-wake aviation emissions are currently estimated at around 890 kt of CO_2, and the sector must be able to continue growing in a way that is consistent with broader climate ambitions. However, aviation is inherently hard to decarbonise in the near term because it relies on high-energy liquid fuels and has few alternatives for medium and long haul flights, unlike other sectors, for example road transport and electricity generation, where lower-carbon alternatives such as electric vehicles and renewable power are already available. Sustainable Aviation Fuel (SAF) is one of the most important emerging options for reducing emissions from aviation, particularly over the short to medium term, because it can be used within existing aircraft and fuel infrastructure while delivering lower lifecycle emissions than conventional jet fuel.

This study examines Jamaica's potential to develop a domestic SAF sector. Funded by the UK Department for Transport and delivered in collaboration with ICF, this study forms part of the feasibility work undertaken under ICAO's Assistance, Capacity-building and Training for SAF (ACT-SAF) programme. It assesses domestic feedstock availability, SAF supply pathways, the economic and emissions implications of deployment, and the policy, financing, and implementation requirements that would need to be met for Jamaica to establish a SAF sector.

Key Findings

Jet fuel consumption is expected to increase over time, and without intervention aviation emissions will rise accordingly. Following technology and operational efficiency improvements, Jamaica's jet fuel consumption is still expected to rise by around 32% between 2025 and 2050, reaching approximately 279 kt in 2050. This would correspond to annual well-to-wake CO_2 emissions of more than one million tonnes by 2050 in the absence of SAF. Many of the airlines serving Jamaica are already active in the SAF market, whether through SAF targets, offtake agreements, or direct investment, which means that the wider aviation system is already moving in this direction even if Jamaica itself does not yet produce SAF domestically.

An existing refinery gives Jamaica a clear near-term opportunity to begin domestic SAF production. Waste fats, oils, and greases (FOGs) should be seen as the most immediate and practical route for Jamaica to start producing SAF, although limited feedstock availability means this route is unlikely to support production at larger scale over the longer term. Co-processing via the HEFA pathway is already fully commercial and can be integrated into existing refinery operations, avoiding many of the risks associated with building a standalone facility. Jamaica therefore has a significant advantage in Petrojam, which provides a realistic near-term opportunity to begin domestic SAF production. The main implementation challenge is not the conversion route itself, but scaling feedstock collection and making the targeted refinery investments needed to receive, pretreat, and co-process these feedstocks.

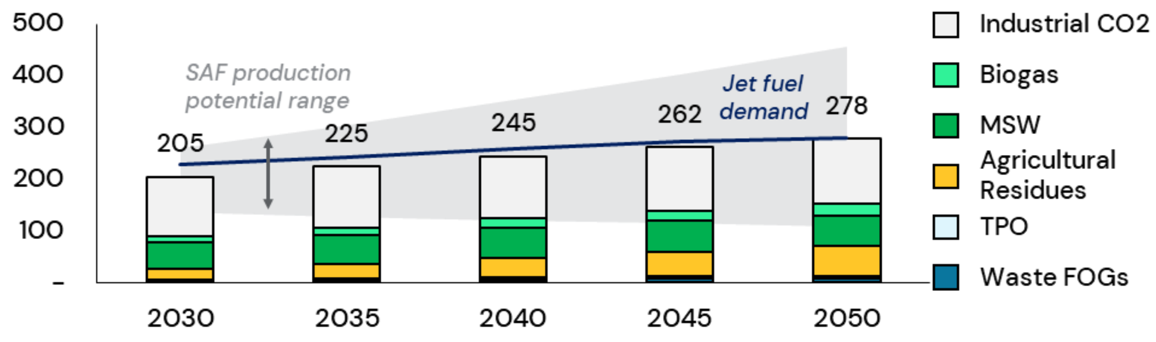
Revitalisation of the sugarcane sector could unlock wider economic benefits while also enabling one of Jamaica's strongest SAF pathways. Jamaica's sugarcane sector has historically been significant, but it has declined over recent decades due to weak economics, underinvestment, and ageing infrastructure. Recent studies and investment activity suggest that recovery is possible, and such recovery could generate important wider benefits, including supporting rural economic activity, reducing the trade deficit, and improving energy security. Sugarcane itself is not expected to be a major direct SAF feedstock once domestic needs for sugar, molasses, and road ethanol are taken into account. However, the residues associated with a stronger sugarcane sector, particularly sugarcane bagasse and straw, represent one of the strongest medium to long-term SAF opportunities in Jamaica. Realising this pathway would require improved yields, modern mills, and a new residue supply chain, as well as global maturation of second-generation ethanol and alcohol-to-jet technologies.

Other advanced pathways could diversify SAF production over time, but each carries distinct opportunities and constraints. *Wet wastes* such as manure and sargassum could support biogas-to-SAF and benefit from Jamaica's existing experience with anaerobic digestion, particularly because the pathway can be deployed at smaller scale. However, these feedstocks are dispersed and require active collection and aggregation. *Municipal solid waste* (MSW) is another potentially significant pathway, particularly given Jamaica's relatively high biogenic MSW content and the concentration of waste near Kingston, but the pathway requires extensive sorting, preprocessing, and technical de-risking before a first project would become bankable. In the longer term, *Power-to-liquids* (PtL) from industrial CO_2 and renewable electricity could offer one of the largest SAF opportunities in Jamaica, but this pathway depends on a much more renewable power system and should therefore be treated as a strategic long-term option rather than a near-term industry starter.

Jamaica's theoretical feedstock base is large enough to exceed projected domestic SAF demand. As shown in the figure below, when converted into theoretical SAF potential, the domestic feedstocks considered in this study could yield 128.0–304.9 kt of SAF by 2035 and 108.2–456.3 kt by 2050[1]. Additional volumes could also arise from feedstocks not fully quantified in the core scenarios, such as further wet waste streams or direct air capture (DAC) for PtL. In theory, Jamaica's domestic resource base could produce sufficient SAF to meet the entirety of its jet fuel demand.

Theoretically, domestic feedstock availability could enable SAF production sufficient to meet projected jet fuel demand

Projected mid-case SAF production potential (bars) and jet fuel demand (line), kt



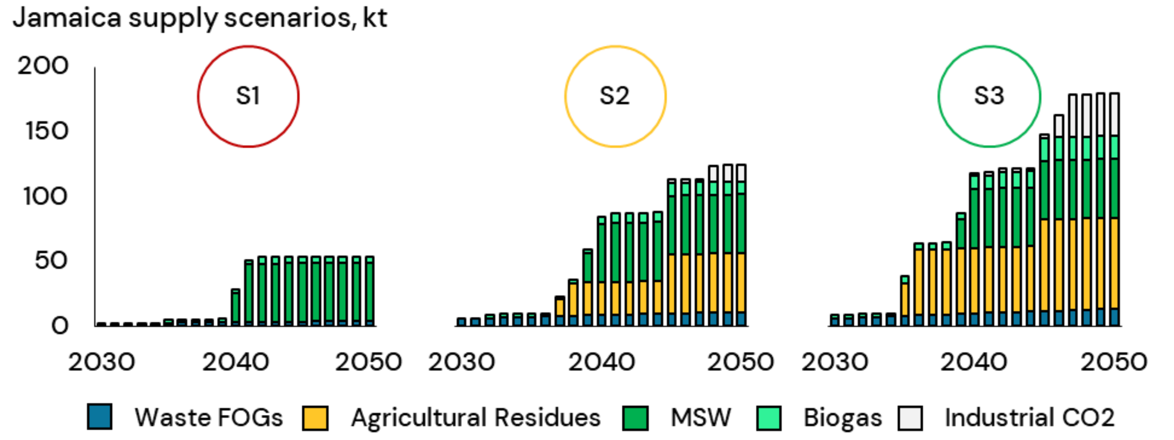
Source: ICF analysis

Theoretical potential does not mean immediate or automatic supply. While resource availability is promising, much of the identified SAF potential depends on pathways that are not yet commercially mature or cannot realistically be deployed in Jamaica before they are proven more widely at global scale. The study therefore developed three supply scenarios to illustrate realistic rather than purely theoretical development trajectories, as shown on the figure below. These range from a business-as-usual case, in which domestic production remains modest and meets under 20% of jet fuel demand in 2050, to an ambitious case in which stronger support and faster global

[1] The decline to the low-case reflects the potential impact of decarbonisation on industrial CO_2 availability.

technology progression allow Jamaica's SAF production to exceed 60% of its jet fuel demand and create export opportunities.

Three SAF supply scenarios were developed for Jamaica, based on differing levels of policy support and global technology development.



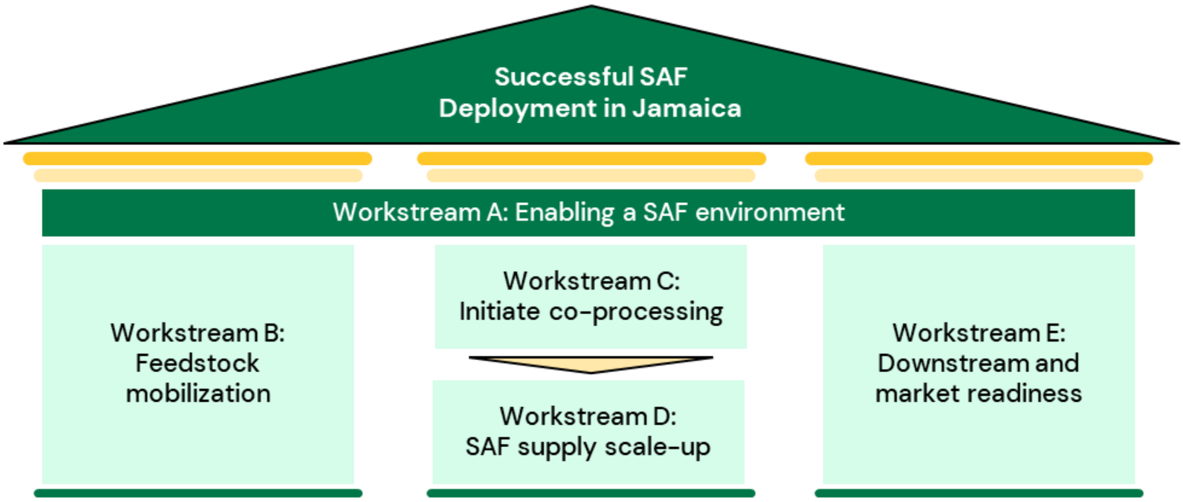
Source: ICF analysis

Domestic SAF production could create meaningful economic and environmental benefits, but would require substantial investment. While SAF could theoretically be imported to meet demand, domestic production can reduce transport and supply chain costs while retaining more value within Jamaica and supporting local jobs and investment. Depending on the supply scenario, domestic SAF deployment could save approximately 1.6–5.6 Mt of cumulative CO_2 emissions between 2030 and 2050. It could also support domestic economic activity through both direct and indirect jobs, with the study indicating the potential for several hundred long-term jobs and a significant number of temporary construction jobs. In addition, SAF production could contribute to energy security, reduce the trade deficit, and provide useful co-products such as renewable diesel that support decarbonisation in other transport sectors. However, these benefits come alongside substantial capital requirements, with estimated CAPEX across the scenarios ranging from around USD 450 million to USD 800 million.

The price premium of SAF means that policy support will be essential. Although the cost of advanced SAF pathways is expected to decline over time as technologies mature and scale globally, SAF is still expected to remain more expensive than conventional jet fuel for the foreseeable future. Given that fuel is a major operating cost for airlines, SAF premiums are likely to be passed through into fares unless policy or other support mechanisms reduce the cost gap. This is especially important in Jamaica, where aviation is central to economic activity and tourism is highly sensitive to price changes. Bringing down the final cost of SAF, or at minimum avoiding unmanaged cost pass-through, will therefore be a critical condition for successful SAF deployment in Jamaica.

SAF deployment in Jamaica must be approached as a phased, multi-decade process. Each pathway assessed in this study requires a distinct implementation process. On top of these pathway-specific requirements, an environment must be created that attracts investment, coordinates stakeholders, and supports both production and uplift. The study therefore identifies five critical workstreams for Jamaica, as shown on the figure below: enabling a SAF environment; feedstock mobilisation; initiating co-processing; scaling up SAF supply; and developing downstream and market readiness. Together, these workstreams provide the structure through which Jamaica can move from first SAF volumes to a broader domestic SAF ecosystem.

Key pillars for SAF deployment in Jamaica



Source: ICF Analysis

Policy Implications

A domestic SAF sector aligns closely with Jamaica's wider climate, energy, and industrial ambitions. Jamaica has already set ambitious objectives around greenhouse gas reduction, renewable electricity deployment, and sustainable economic growth. A domestic SAF sector fits well within this broader agenda, particularly because it can support climate mitigation, waste management, energy security, industrial development, and rural value creation at the same time. For this reason, SAF policy should not be treated as a stand-alone aviation issue, but should be integrated into Jamaica's wider energy, biofuels, waste, and industrial policy framework.

Jamaica's improving macroeconomic position provides an important foundation for SAF investment. Through fiscal discipline and wider economic reform, Jamaica has improved its debt position and investment profile in recent years. This matters because SAF projects are capital-intensive and highly sensitive to financing conditions. While this does not remove the need for policy support and de-risking, it does mean that Jamaica is better positioned than it once was to attract investment into first SAF projects and associated supply chains.

Policy design must be carefully matched to Jamaica's stage of market development. The strengths and weaknesses of SAF policy instruments vary significantly depending on local context. In Jamaica, policies that help initiate the sector, reduce the cost of SAF production, mobilise feedstocks, and support first-project development are likely to be most important in the near term. Establishing long-term commitments, including a clear national ambition for SAF, will be critical to providing the certainty needed to attract investment. The study therefore concludes that policy will be central not only to attracting investment and kick-starting production, but also to managing the cost implications of SAF in a way that supports Jamaica's wider economic interests.

Opportunities and Challenges

The SWOT analysis below summarises the high-level factors affecting SAF implementation in Jamaica, drawing on the feedstock assessment, supply scenarios, implementation requirements, and wider policy and financing context discussed throughout this study.

Strengths
Jamaica has a credible near-term entry point through waste FOG co-processing at Petrojam.
The country has multiple potential feedstock pathways rather than relying on a single resource.
SAF production could deliver significant economic benefits, including job creation and reduced reliance on fuel imports, helping to improve the trade balance

Jamaica has the potential to produce SAF from waste and residue streams that do not directly compete with food use and can meet the most stringent global sustainability standards.
SAF production aligns with the Government's ambitions for a green transition, and steps are already being taken to make inward investment more attractive.
Weaknesses
Domestic waste oils and fats are sufficient to justify co-processing, but not to support very large long-term volumes.
The strongest medium-term bio-based pathway depends on successful sugarcane sector revitalisation.
Most advanced pathways remain commercially immature or high-risk.
SAF production is likely to remain more expensive than conventional jet fuel, leading to potential demand impacts in an economy that relies on aviation.
Jamaica's electricity system remains largely fossil-based, a major constraint for PtL.
Opportunities
Jamaica can use SAF development to strengthen energy independence.
Petrojam could act as a stepping stone into a broader low-carbon fuels system.
Revitalising the sugarcane sector could unlock benefits beyond SAF.
Biogas offers a useful modular diversification pathway.
Over the longer term, Jamaica could develop a strategic opportunity in PtL fuel production, aligned with its renewable electricity ambitions.
Jamaica could build a longer-term strategic position as a regional SAF supplier.
Threats
The required investment may not materialise at the right time or scale.
The sugarcane sector may not recover sufficiently to unlock residues at scale.
Global commercialisation of advanced pathways may proceed more slowly than expected.
Feedstock competition could weaken SAF deployment.
Higher SAF costs could affect aviation affordability and tourism if not managed carefully.
The renewable power transition may be slower than required for PtL.

Table of Contents

List of Abbreviations and Acronyms

ADO	Automotive Diesel Oil
ALEX	Agri-Linkages Exchange
AtJ	Alcohol-to-Jet
Avgas	Aviation Gasoline
CAF	Development Bank of Latin America and the Caribbean
CCS	Carbon Capture and Storage
CDB	The Caribbean Development Bank
CEF	CORSIA-eligible fuel
CI	Carbon Intensity
CREP	Crop Restoration and Establishment Programme
CTF	Clean Technology Fund
DAC	Direct Air Capture
DBJ	Development Bank of Jamaica
EAC	Environmental Attribute Certificate
EEU	Eligible Emissions Units
ELT	End of Life Tyres
EMS	Environmental Management System
EU RED	EU Renewable Energy Directive
FAME	Fatty Acid Methyl Ester (Biodiesel)
FAO	Food and Agriculture Organization of the United Nations
FEED	Front-End Engineering Design
FOGs	Fats, Oils and Greases
FSRU	Floating Storage and Regasification Unit
FT	Fischer-Tropsch
GCF	Green Climate Finance
GEF	Global Environment Facility
GLHI	Global Logistics Hub Initiative
HDT	Hydrotreater
HEFA	Hydrotreated Esters and Fatty Acids
HFO	Heavy Fuel Oil
HRI	Hotel, Restaurant, and Institutional
HTL	Hydrothermal Liquefaction
HTMP	Hospitality and Tourism Management Programme
HVO	Hydrotreated Vegetable Oil
HYK	Hydrocracker
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICCT	International Council on Clean Transportation
IDB	Inter-American Development Bank
IFC	International Finance Corporation
ILUC	Indirect Land-use Change
IRENA	International Renewable Energy Agency
IRR	Internal Rate of Return

ISCC	International Sustainability and Carbon Certification
ITC	Investment Tax Credits
JAMPRO	Jamaican Promotions Agency
JARS	Jamaica Aircraft Refuelling Service
JBCO	Jamaican Black Castor Oil
JBI	Jamaica Bauxite Institute
JCAA	Jamaica Civil Aviation Authority
JHTA	Jamaica Hotel and Tourist Association
JSWIFT	Jamaica Single Window for Trade
KIN	Norman Manley International Airport
KTP	Tinson Pen Airport
LNG	Liquefied Natural Gas
LTAG	ICAO's Long-Term Aspirational Goal
MBJ	Montego Bay International Airport
MJ	Megajoules
MSW	Municipal Solid Waste
MW	Megawatts
NBC	Non-Biogenic Carbon
NDC	Nationally Determined Contribution
NEG	Negril Airport
NREL	National Renewable Energy Laboratory
NSWMA	National Solid Waste Management Authority
OCJ	Ocho Rios Airport
PCJ	Petroleum Corporation of Jamaica
PEL	Petrojam Ethanol Limited
PJ	Petajoules
POS	Proof of Sustainability
PPA	Power Purchase Agreement
PPP	Public-Private Partnerships
PtL	Power-to-Liquids
RDD&D	Research, Development, Demonstration & Deployment
RSB	Roundtable on Sustainable Biomaterials
SABA	Sustainable Aviation Buyers Alliance
SCS	Sustainability Certification Schemes
SEEC	Sustainable Energy for the Eastern Caribbean
SIA	Jamaica Sugar Industry Authority
T&E	Transport & Environment
TEF	Tourism Enhancement Fund
TPO	Tyre Pyrolysis Oil
TRL	Technological Readiness Level
UCO	Used Cooking Oil
ULSD	Ultra-Low Sulfur Diesel
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VLSFO	Very Low Sulfur Fuel Oil
WTTC	World Travel & Tourism Council

List of Figures

List of Tables


BLUE PLANET D.P. 38

1 SECTION 1: State-specific Information

1.1 Geography and climate

Jamaica is an island nation in the Caribbean, and part of the Greater Antilles, as shown in the map below. Spanning 11,420 sq. km, Jamaica is the third-largest island in the Caribbean, after Cuba and Hispaniola[2]. Located between key sea routes to the Panama Canal, the island holds significant geographic importance.

Jamaica's landscape is defined by a series of mountain ranges that run longitudinally, with the Blue Mountain Peak being the country's highest point at 2,256 m. Jamaica's coastline is 1,022 km in length, and comprises natural harbours, bays, beaches, and cliffs.

The country is divided into three counties and fourteen parishes. The capital city, Kingston, located on the southeast coast, serves as the primary cultural and commercial centre, while Montego Bay on the northwest coast is the island's leading tourism hub.

Jamaica, part of the Greater Antilles, is the third-largest island in the Caribbean by land area

Source: Microsoft, OpenStreetMap, Overture Maps Foundation

Figure 1 Map of Jamaica and geographical location

Jamaica's climate varies significantly based on elevation and season. On the coastal plains, the average annual temperature is approximately 27°C, while in the central highlands above 900 meters, it averages around 22°C. The island generally experiences cooler winters from December to March, with the hottest months occurring in late summer, between July and September.

Jamaica typically receives rainfall through sharp showers and thunderstorms, with maximum rainfall occurring in May and October. This pattern is influenced by the northeast trade winds, which prevail from November to March. Rainfall along the northern coast ranges between 1,100 and 1,800 mm (43 to 70 inches) annually[3]. In contrast, the southern coasts and plains receive less rainfall due to the sheltering effect of the Blue Mountains and the west-central hills, which block the winds.

[2] https://www.embassyofjamaica.org/about_jamaica/geography.html ; https://web.archive.org/web/20210111023238/https://www.cia.gov/the-world-factbook/countries/jamaica/

[3] https://www.climatestotravel.com/climate/jamaica

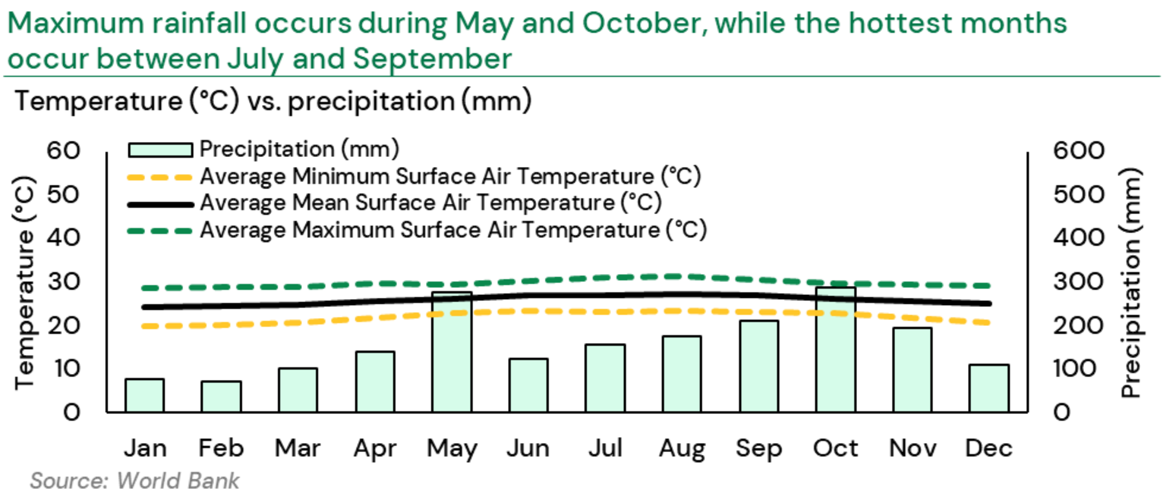


Figure 2 Precipitation and Temperature pattern in Jamaica[4]

1.2 Trade and governance

Jamaica's economic growth over the past decade has been steady but modest, with GDP projected to grow at an annual rate of around 1.6% through 2030[5]. This reflects a combination of structural constraints, including a business environment that has previously made private investment difficult, limited innovation, and ongoing challenges in human capital development.

However, since 2013, Jamaica has made significant progress in reducing its debt-to-GDP ratio, supported by clear policy direction and a stable financial sector. As shown on the figure below, Jamaica's debt-to-GDP ratio has decreased from 140% in 2013 to 62.4% in 2025[6]. This fiscal discipline is likely to strengthen Jamaica's attractiveness to investors and has been reflected in multiple credit rating upgrades by international institutions in recent years[7].

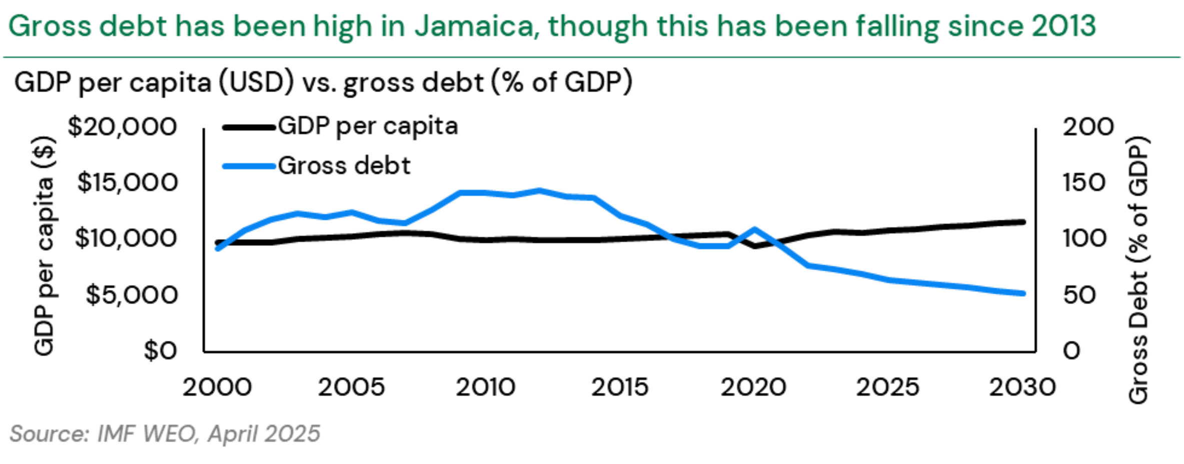


Figure 3 GDP per capita, constant prices (2021 international dollar) & government gross debt[8]

[4] https://climateknowledgeportal.worldbank.org/country/jamaica
[5] https://thedocs.worldbank.org/en/doc/e408a7e21ba62d843bdd90dc37e61b57-0500032021/related/mpo-jam.pdf
[6] https://dmb.mof.gov.jm/debt-to-gdp-falls-to-62-4-per-cent-under-revised-methodology/
[7] https://www.spglobal.com/ratings/en/regulatory/article/-/view/type/HTML/id/3447974
[8] https://www.imf.org/en/Publications/WEO/weo-database/2025/april/download-entire-database

Other developments that further support Jamaica's investment credibility include strengthening of the central bank, tax reforms, and efforts to build resilience to weather events[9]. The government has also made efforts to diversify the economy.

1.2.1 Tourism

Tourism remains one of Jamaica's most vital economic sectors, contributing over 30% of GDP and serving as a major source of employment[10]. In 2024, the industry supported ~390,500 jobs, 3.1% higher than pre-pandemic levels in 2019. Looking ahead, the World Travel and Tourism Council (WTTC) projects the creation of an additional 120,000 jobs by 2034, with tourism GDP expected to grow at a rate of 4% annually, outpacing the projected national average.

In 2024, Jamaica hosted 2.9 million stopover visitors and 1.3 million cruise passengers, generating an estimated USD 4.2 billion and USD 142 million in expenditure, respectively[11]. In terms of overall performance, Jamaica remains among the region's top tourism markets, closely following the Dominican Republic and Puerto Rico.

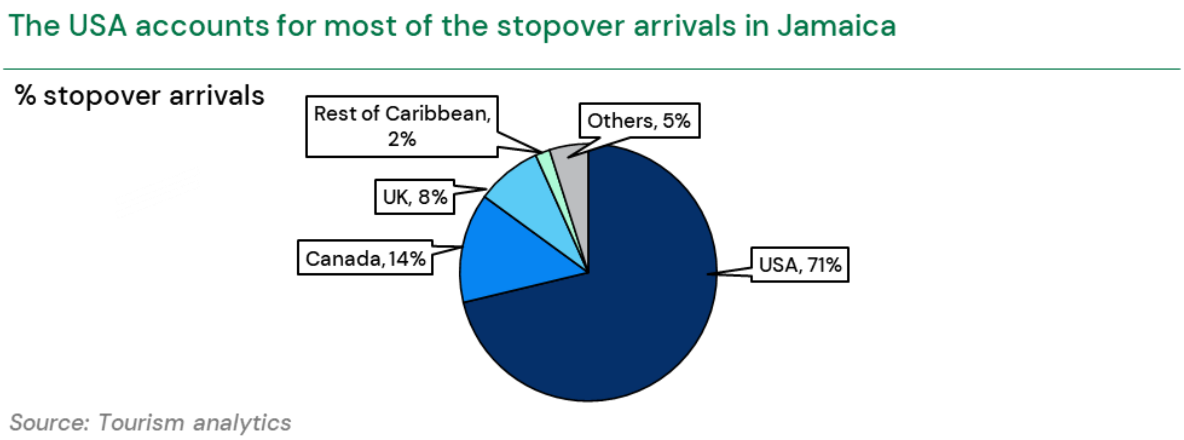


Figure 4 Stopover visitor arrivals by key markets, 2024

The United States is the dominant source market, accounting for 71% of stopover arrivals in 2024, followed by Canada and the United Kingdom, as shown below

Most visitors to Jamaica travel for leisure purposes, with vacation-related trips accounting for 68% of total arrivals in 2023, similar to 2022[11]. This is followed by travel visiting friends and relatives (17%), while business and conference travel represent a smaller proportion of arrivals[11]. The predominance of leisure tourism reflects the central role of Jamaica's hospitality sector and natural attractions in driving visitor demand, highlighting the need to enhance the island's tourism offerings in line with sustainable development priorities.

Tourism activity is concentrated in a few key regions:

- **Montego Bay (St. James):** A premier beach destination known for its white-sand beaches (e.g., Doctor's Cave Beach), golf courses, and cruise port.
- **Negril (Westmoreland):** Popular for its iconic Seven Mile Beach and dramatic cliffs at Negril Point.
- **Ocho Rios (St. Ann):** Famous for attractions like Dunn's River Falls and Dolphin Cove, and a busy cruise terminal.
- **Kingston (southeast coast):** Serves as a cultural hub, featuring sites such as the Bob Marley Museum, Devon House, and Old Harbour, and acts as a gateway to the Blue Mountains.

[9] https://www.spglobal.com/ratings/en/regulatory/article/-/view/type/HTML/id/3447974; https://jamaica.un.org/en/293270-taxes-advancing-sdgs-jamaica
[10] https://www.maritimebell.com/jamaica-reaches-300000-visitors-as-tourism-rebounds-strongly
[11] https://tourismanalytics.com/jamaica-statistics.html

In 2023, almost 40% of the visitors stayed in Montego Bay, followed by Ocho Rios and Negril[11]. Kingston, despite being the capital and Jamaica's political and commercial centre, attracted only about 9% of total visitors in 2023[11]. The city's lower share reflects its limited focus on leisure tourism, fewer beachfront resorts, and a visitor profile skewed more toward business, government, and diaspora travel. Additionally, persistent concerns around urban crime and safety perceptions among international travellers have contributed to Kingston's comparatively lower appeal as a mainstream tourism destination, reinforcing the concentration of visitor activity along the northern coast.

Jamaica boasts a well-developed tourism infrastructure, featuring over 25,000 rooms across a diverse mix of world-class hotels, boutique properties, and all-inclusive resorts. Most accommodations are concentrated along the northern coast, particularly in Montego Bay, Negril, and Ocho Rios, which cater primarily to international leisure travellers and generate a substantial share of the island's tourism revenue. To further expand capacity and attract new visitor segments, a hotel construction boom is currently underway. The Government of Jamaica has announced a pipeline of new projects valued at approximately USD 2.5 billion, expected to add around 2,000 rooms in 2024 and up to 20,000 additional rooms over the next five to ten years.

To sustain and expand this booming industry, the Jamaican government has launched several strategic initiatives[12]:

- **There's Always More to Jamaica Campaign[13]:** Led by the Jamaica Tourist Board, this campaign promotes community-based tourism, encouraging visitors to explore authentic local experiences, including food, crafts, culture, and eco-adventures.
- **Tourism Innovation Incubator:** Introduced in September 2022, this incubator fosters innovation in tourism by supporting new ideas and providing funding to entrepreneurs.
- **Tourism Future Proof Strategy:** Announced in July 2022, this strategy aims to enhance the sector's resilience through three pillars: training, finance, and marketing. It focuses on building business capacity, improving access to funding, and strengthening marketing capabilities.
- **Hospitality and Tourism Management Programme (HTMP):** Launched in 2018 as a joint initiative between the Ministries of Tourism and Education and Youth, HTMP offers two years of free training for students in grades 11–13, enabling them to earn entry-level certification for tourism jobs.
- **Tourism Enhancement Fund (TEF):** Established in 2005, TEF supports tourism development through partnerships across regional, global, public, and private sectors.

At the national level, Jamaica has committed to reducing greenhouse gas emissions by 73% below 2020 levels by 2050, with the goal of achieving net-zero emissions by 2060[14]. Given the tourism sector's central role in the Jamaican economy, advancing sustainable tourism is critical to achieving these national targets[14].

In April 2024, during the United Nations General Assembly Sustainability Week, the Hon. Edmund Bartlett, Minister of Tourism, underscored the need for stronger international collaboration to advance sustainable tourism practices[15]. At the industry level, the Jamaica Hotel and Tourist Association (JHTA) actively promotes sustainability through initiatives such as environmental management system (EMS) adoption, energy efficiency improvements, and support for renewable energy integration among its members[16].

Major hotel groups are also aligning with global decarbonization efforts. For instance, Iberostar, which has a significant presence in Jamaica, has committed to achieving carbon neutrality across

[12] https://jis.gov.jm/information/get-the-facts/goj-programmes-supporting-the-tourism-sector/
[13] https://www.travelandtourworld.com/news/article/jamaica-launches-new-theres-always-more-to-jamaica-campaign-to-promote-community-based-tourism-and-authentic-experiences/
[14] https://unfccc.int/sites/default/files/resource/JamaicaLTS%202050.pdf
[15] https://www.jtbonline.org/wp-content/uploads/JAMAICAS-MINISTER-OF-TOURISM-CALLS-FOR-CONCERTED-GLOBAL-EFFORT-TO-BOOST-SUSTAINABLE-TOURISM.pdf
[16] https://jhta.org/projects/

Scopes 1, 2, and 3 by 2030[17]. Similarly, international chains such as Hilton and Hyatt are implementing their science-based targets and 2030 environmental programs locally, extending corporate sustainability commitments to their Jamaican properties.

1.2.2 Cruise opportunities

Jamaica ranks among the top ten cruise destinations in the Caribbean. Within the country, Ocho Rios led the market in 2023 with 528 thousand arrivals, followed by Falmouth Pier and Montego Bay. Major cruise lines serving Jamaica include Carnival Cruise Lines, Celebrity Cruises, Costa Cruise Lines, Holland America Line, Norwegian Cruise Line, P&O Cruises, Pullmantur Cruises, Princess Cruises, and Royal Caribbean International.

Despite its strong cruise tourism potential, Jamaica has experienced a slower recovery in cruise passenger numbers following the COVID-19 pandemic than many other Caribbean destinations[18]. Between 2019 and 2024, cruise visitor numbers in Jamaica declined by 19.4%, compared with an average increase of 14.5% across 23 islands in the region. According to tourism officials, Jamaica's decline is partly attributed to the Cayman Islands' lack of docking facilities, which has led cruise operators to modify itineraries, making combined stops in Jamaica and Cayman less feasible. Additionally, TUI Marella relocated its homeport from Montego Bay, Jamaica, to La Romana, Dominican Republic, beginning in winter 2024/25, citing itinerary diversification, better integration of resort-cruise packages, and logistical efficiencies.

These developments present an opportunity for Jamaica to revitalise and expand its cruise tourism segment. Key priorities include regaining partnerships such as TUI's Montego Bay operation and advancing the "Cruise + Resort" model, encouraging visitors to split their holidays between sea and land. Given Jamaica's strong inland tourism appeal, this integrated approach could enhance visitor experience and drive sustainable growth in the sector.

1.2.3 Crime concerns

Persistent concerns about crime and public safety have influenced Jamaica's overall tourism dynamics, shaping traveller perceptions and destination choices across the country. While most resort areas remain secure and well-patrolled, broader safety concerns continue to affect the nation's image and travel advisories issued by key source markets. The US, Jamaica's largest source market, currently maintains a "Level 2: Exercise Increased Caution" travel advisory, citing risks related to armed crime and limited medical infrastructure. Similarly, the United Kingdom has issued comparable guidance, advising caution, particularly in areas of Kingston.

In response, the Government of Jamaica has intensified its efforts to address crime through a combination of enforcement, legislative, and tourism-focused measures. These include enhanced police presence in major resort areas, stricter anti-gang and firearms legislation, and the periodic declaration of states of emergency in high-crime parishes. Authorities have also improved interagency coordination and expanded specialised courts, such as the Gun Court, to expedite serious cases. Alongside these enforcement measures, the government continues to counter negative travel advisories by highlighting declining crime rates in tourist zones and positioning improved public safety as central to Jamaica's economic and tourism growth agenda. Encouragingly, the country reported a 15% reduction in overall crime between January and October 2025 compared with the same period in 2024[19].

1.2.4 Foreign trade and foreign direct investments (FDI)

To promote economic growth and job creation, Jamaica has actively pursued policies to attract and retain foreign investment by creating a stable, transparent, and facilitative business environment. The National Investment Policy (2022) provides an overarching framework, emphasising regulatory clarity, streamlined approval processes, and a level playing field for investors[20]. Agencies such as the Jamaican Promotions Agency (JAMPRO) serve as investment

[17] https://waveofchange.com/wp-content/uploads/2022/10/Iberostar-Hotels-Resorts-Decarbonization-Roadmap.pdf
[18] https://tourismanalytics.com/cruisevisitors-statistics.html
[19] https://jcf.gov.jm/stats-2/
[20] https://dobusinessjamaica.com/wp-content/uploads/2022/12/National-Investment-Nov.2022.pdf

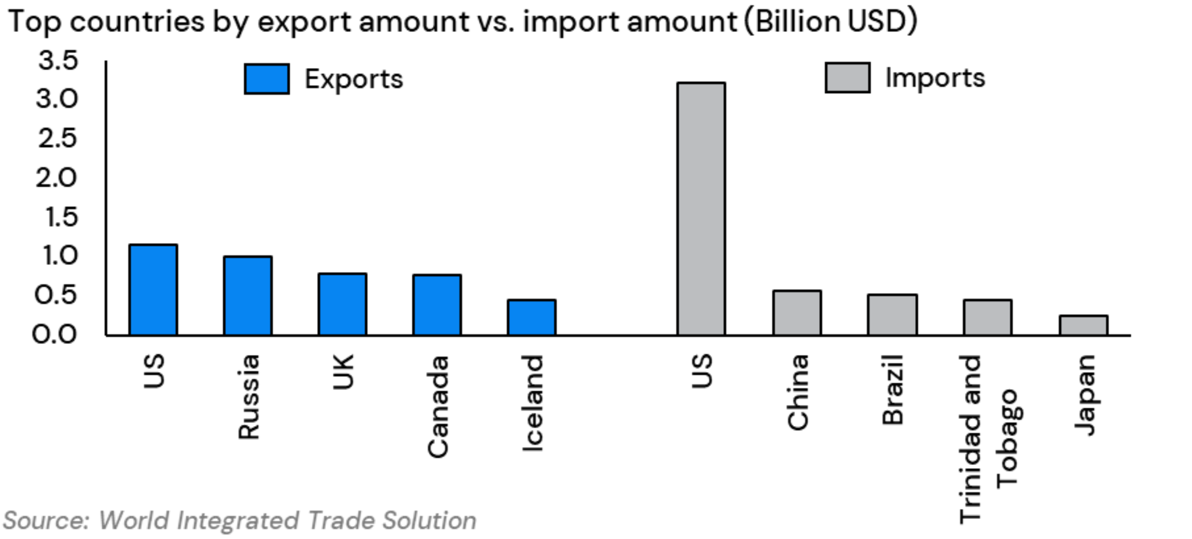
facilitators, helping to reduce bureaucratic delays and connect foreign businesses with local opportunities[21]. Ongoing trade facilitation reforms include the Jamaica Single Window for Trade (JSWIFT), a single electronic submission point to streamline the transmission of standardised data for all trade-related regulatory requirements, which simplifies customs procedures[22].

Jamaica has also launched the Global Logistics Hub Initiative (GLHI) to tap into trade opportunities along major corridors via the Panama Canal. Key projects under consideration include expanding container throughput at the Port of Kingston, developing commodity ports for petroleum, coal, minerals, and grain, establishing a dedicated air cargo airport, and constructing large-scale ship repair dry docks.

Jamaica is a net importer, with global imports exceeding exports by nearly USD 5 billion in 2022[23]. The United States remains Jamaica's largest trading partner, serving as both the top source of imports and the leading destination for exports. In 2022, other key export markets included the Russian Federation, the United Kingdom, Canada, and Iceland (Figure 5). Jamaica's primary exports consist of alumina, bauxite, sugar, rum, coffee, yams, beverages, chemicals, and mineral fuels[24].

On the import side, aside from the United States, major trading partners include China and Brazil. Jamaica's main imports include food, consumer and industrial goods, fuel, and machinery[24].

The US is Jamaica's biggest import and export market



Source: World Integrated Trade Solution

Figure 5 Top importing and exporting countries, 2022

1.2.5 Vision 2030

Vision 2030 Jamaica is the country's first long-term national development plan, covering the period 2009–2030. Its central vision is: *"Jamaica, the place of choice to live, work, raise families and do business."* The plan is designed to transform Jamaica into a developed, inclusive, and resilient society by 2030, bringing together economic growth, social equity, environmental sustainability, and governance reform under one unified framework.

The plan is built around four national goals:

- Jamaicans are empowered to achieve their fullest potential
- The Jamaican society is secure, cohesive and just
- Jamaica's economy is prosperous

[21] https://dobusinessjamaica.com/about-us/
[22] https://www.jswift.gov.jm/
[23] https://wits.worldbank.org/CountryProfile/en/Country/JAM/Year/2022/TradeFlow/Import#
[24] https://www.embassyofjamaica.org/about_jamaica/export_import.htm

- Jamaica has a healthy natural environment

The goals are reflected in 15 national outcomes, which are implemented through corresponding national strategies. To implement the plan in manageable stages, Jamaica uses Medium-Term Socio-Economic Policy Frameworks (MTFs), which set three-year priorities and actions for government, private sector, and civil society. The plan is also aligned with international frameworks, particularly the United Nations Sustainable Development Goals (SDGs), ensuring that Jamaica's development trajectory contributes to global sustainability targets.

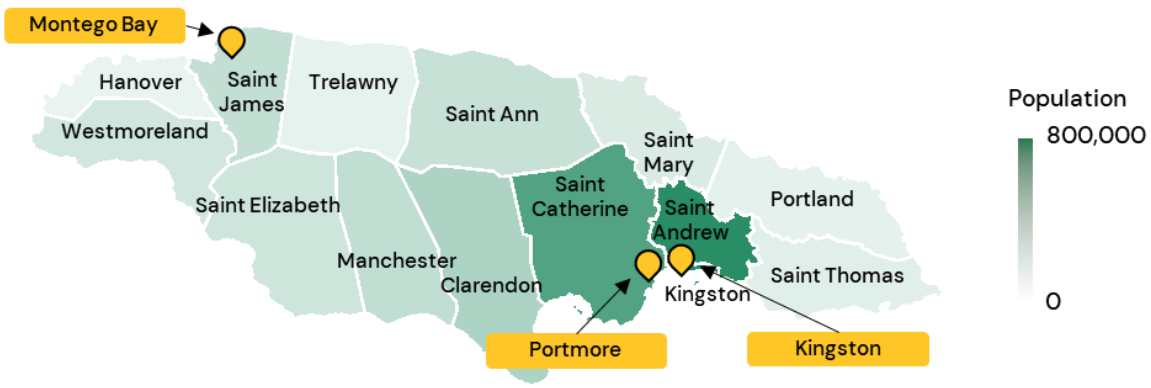
1.3 Demographics

Jamaica's most recent Population and Housing Census, conducted in 2011, recorded a total population of 2,697,983. Of this, 1,334,533 were male, representing 49%, and 1,363,450 were female, accounting for 51%, resulting in a gender ratio of 98 males per 100 females. With a land area of 11,420 square kilometres, the country had a population density of 236 persons per square kilometre.

In terms of parish-level distribution, St. Andrew had the largest share of the population, with 21% or 573,369 residents. This was followed by St. Catherine, which accounted for 19% or 516,218 residents, and Clarendon, with 9% or 245,103 residents.

The Statistical Institute of Jamaica defines an urban area as any location with 2,000 or more residents. Nationally, there were 881,078 households, of which 477,201 (54%) were urban, and 403,877 (46%) were rural. Only three locations in Jamaica have been officially designated as cities: Kingston, Montego Bay, and Portmore. The map below shows the location of these three cities, as well as the population across parishes.

Jamaica's population is concentrated around the Kingston area

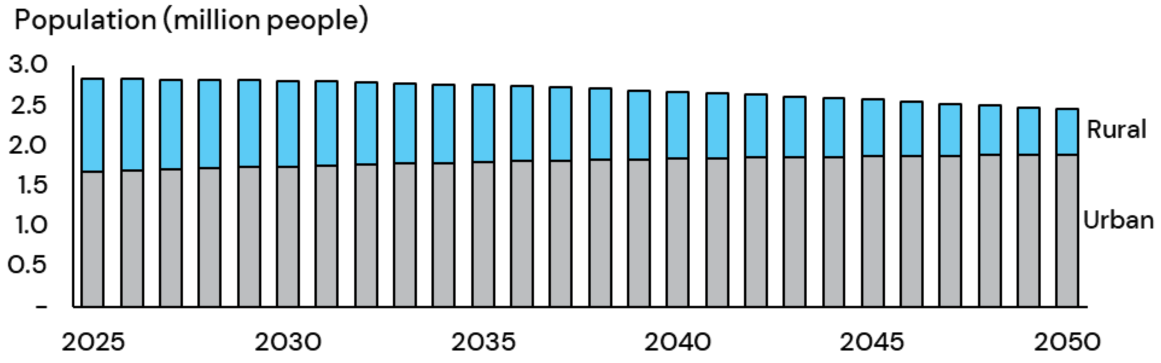


Source: STATIN; Microsoft; OpenStreetMap; Overture Maps Foundation
Notes: Kingston and Saint Andrews considered jointly for population; Kingston is a parish and city

Figure 6: Jamaica's population by parish

According to the United Nations, Jamaica's population grew at a modest CAGR of 0.34% between 2000 and 2025, driven largely by urban population growth over the past 25 years. However, this trend is expected to reverse, as shown below, with the population projected to decline at a CAGR of 0.58% between 2025 and 2050, falling from approximately 2.8 million to 2.5 million.

Jamaica's total population is expected to decline, alongside a significant shift in population from rural areas to urban centers



Source: UN population Division Data

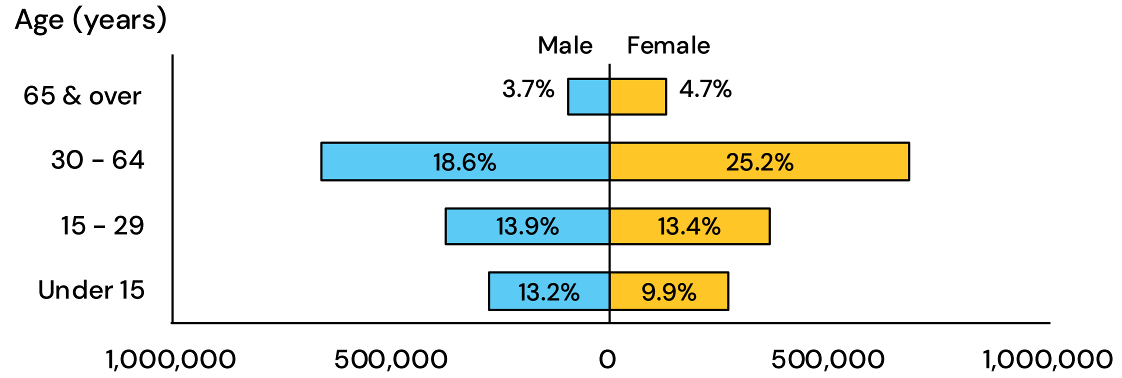
Figure 7 Jamaica's population growth by area of settlement, 2025-2050

This anticipated reduction stems from ongoing migration outflows, fertility levels that remain below replacement, and a demographic shift toward an older population. In 2014, Jamaica recorded 48.3 dependents per 100 working-age individuals, a ratio that declined to 44 in 2023, reflecting short-term demographic shifts[25]. At the same time, the total fertility rate fell to 1.9 in 2021, below the replacement threshold of 2.1[25]. Jamaica has also experienced high emigration rates, particularly among younger women, to destinations such as the United States, Canada, and the United Kingdom. The continued outflow of highly trained and skilled professionals has contributed to a "brain drain," with potential implications for the country's long-term economic and social development.

1.3.1 Age and gender structure #00B0F0 #034279

In Jamaica, the working age group between 15 and 64 accounted for 80% of the overall population in 2023, indicating a strong labour force and consumer base[26]. The under-15 group of the population is still significant but smaller than the working-age group, suggesting that the population is transitioning from youthful to mature segments. Jamaica's population age structure reflects an ageing population, where the child population is declining, and the working age population and elderly segments are expanding.

80% of the overall population in Jamaica is between 15 and 64 years old



Source: World Population Prospects 2024, UN

Figure 8 Jamaica population by age and gender, 2023

[25] https://estatements.un.org/estatements/31.0080/20250410100000000/jK-u-j-f/etBCbeLmUwqA_nyc_en.pdf

The figure below illustrates employment distribution across Jamaica's economic sectors. While services, particularly tourism, continue to be the dominant source of employment, the agricultural sector has experienced a steady decline, with its share now surpassed by both industry and services. This downturn is driven by a combination of economic hardship, climate vulnerability, rising labour costs, institutional weaknesses, and low productivity. These challenges have led to land abandonment, urban migration, and reduced traditional crop output, making agriculture a less viable and attractive livelihood.

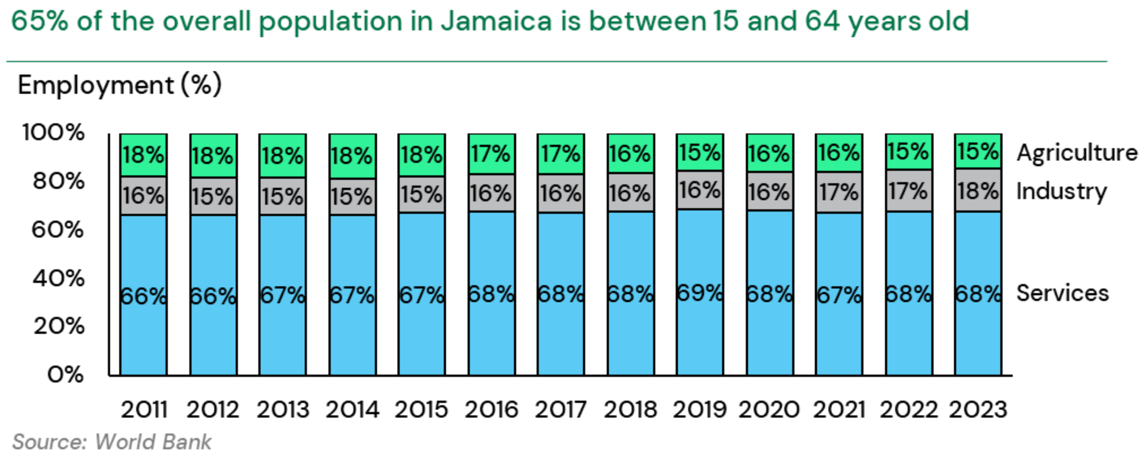


Figure 9 Distribution of employment by economic sector[27]

1.3.2 Migration challenges

Like other Caribbean nations, Jamaica continues to grapple with a range of migration-related challenges, including:

- **Brain drain:** Jamaica continues to experience a significant brain drain, with large numbers of highly trained and skilled professionals emigrating, nearly one million over recent decades to the UK, US, and Canada. This sustained outflow has far-reaching economic and social implications, eroding the country's skills base and complicating long-term workforce and education planning.
- **Economic dependence on remittances:** Jamaica receives an average of USD 2.2 billion annually in remittances, equating to approximately 16% of its GDP[28]. In 2024, the number increased to USD 3.6 billion, accounting for almost 19% of its GDP. The vast majority of remittances (90%) come from countries with the highest concentration of Jamaicans (Canada, UK, USA)[28]. This overdependence exposes the economy to global shocks and fluctuations in external economic conditions.
- **Demographic shifts:** Migration has contributed to a declining and ageing population. In 2020, Jamaica recorded 33,800 births and 18,100 deaths, which would have resulted in a net population increase of approximately 15,700[29]. However, net emigration led to the departure of an additional 18,000 individuals, resulting in a slight population decline and a demographic shift toward an older population.

Jamaica's migration landscape reflects social, economic, and demographic pressures. While remittances from the diaspora continue to sustain household incomes and foreign exchange reserves, the long-term effects of sustained emigration, particularly the loss of skilled talent and the ageing of the population, pose structural challenges to national development. However, the development of advanced technologies and new investments in emerging sectors, including the

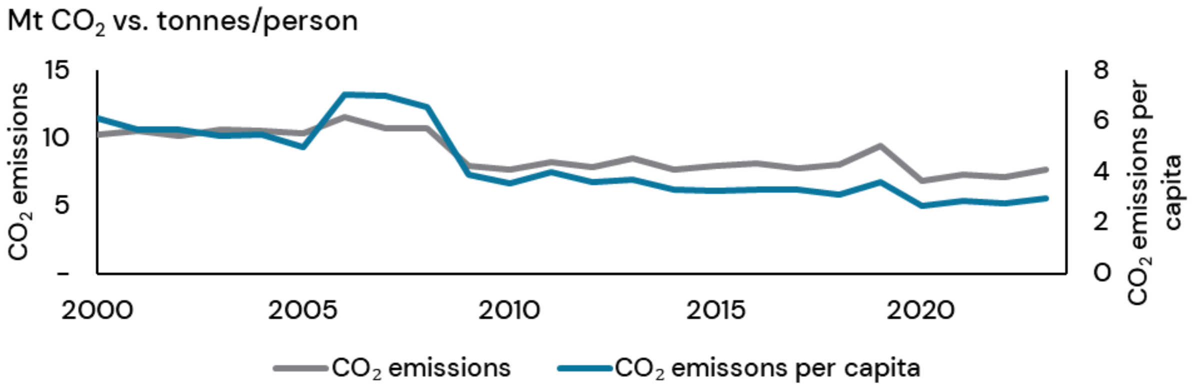
[27] https://genderdata.worldbank.org/en/indicator/sl-empl-zs?view=bar&geos=JAM&gender=total
[28] https://diasporafordevelopment.eu/wp-content/uploads/2020/11/CF_Jamaica.pdf#:~:text=In%202024%2C%20the%20number%20increased%20to%20USD,highest%20concentration%20of%20Jamaicans%20(Canada%2C%20UK%2C%20USA).
[29] https://jamaica.un.org/sites/default/files/2022-01/JEP%20Discussion%207.pdf

SAF industry, presents an opportunity to curb migration by generating high-skilled employment and fostering economic resilience.

1.4 Emissions

Since 2000, Jamaica's carbon emissions have been declining at an average annual rate of 1.3%, with per capita emissions falling even more sharply at 3.1% per year, as shown in the figure below.

Jamaica's emissions have been declining, both in real terms and per capita

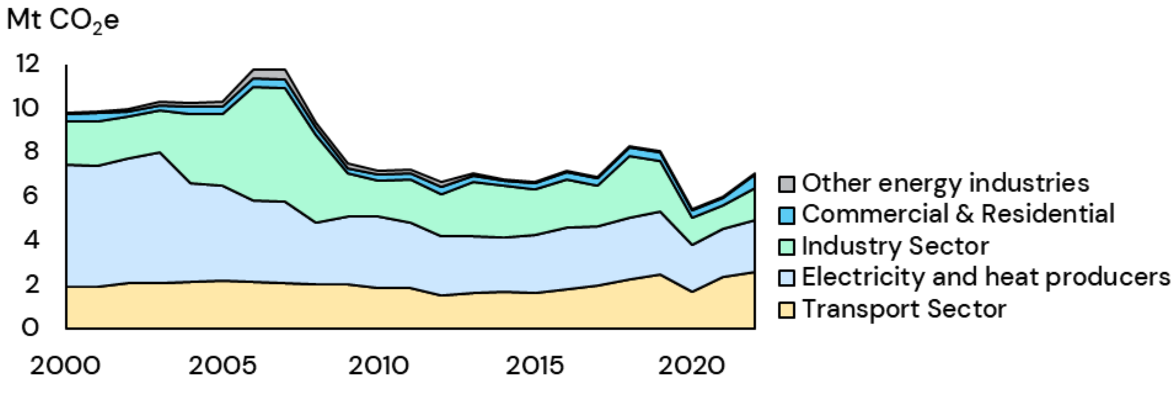


Source: Jones et al. (2024); Population based on various sources (2024); ourworldindata.org

Figure 10 Jamaica's overall and per capita carbon emissions

As shown on the figure below, the volatility in Jamaica's total emissions can be largely attributed to the industrial sector. Following the global financial crisis in 2009, three of Jamaica's largest alumina plants closed[30]. Only one closure was temporary, and one facility reopened in 2010. Jamaica's largest alumina facility resumed operations in 2017 before once again pausing in 2019 to undergo upgrades. Moreover, emissions from electricity generation have fallen as fossil fuels have been progressively displaced by renewables.

Emissions have been falling across all sectors



Source: IEA

Figure 11 Jamaica's carbon emissions by sector

1.5 Vulnerability to climate change and climate mitigation

The country is highly vulnerable to climate-related impacts, including more frequent and intense storms and hurricanes, prolonged droughts, and rising sea levels. The effects of Hurricane Melissa in 2025 were devastating, with damages estimated at around 30% of GDP and more than 100,000 homes affected[31]. Climate change has significantly increased the likelihood of such events:

[30] https://jbi.org.jm/industry/

[31] https://news.un.org/en/story/2025/11/1166301

compared to pre-industrial conditions, the return period of maximum landfall wind speeds has fallen from around 8,100 to 1,700 years, while the return period for peak eyewall rainfall has decreased from 56 to 39 years[32].

Sea-level rise, driven by global warming, poses another significant threat. About 82% of Jamaica's population lives within five miles of the coast, making them particularly susceptible[33]. Jamaica's Climate Change Policy Framework projects a sea-level rise of 26 to 82 centimetres by 2100, which could severely affect coastal communities and the country's tourism infrastructure, most of which is located along the shoreline. Temperature increases are also a major concern. Jamaica's mean annual temperature is projected to rise by up to 3.09°C by 2100, as illustrated below.

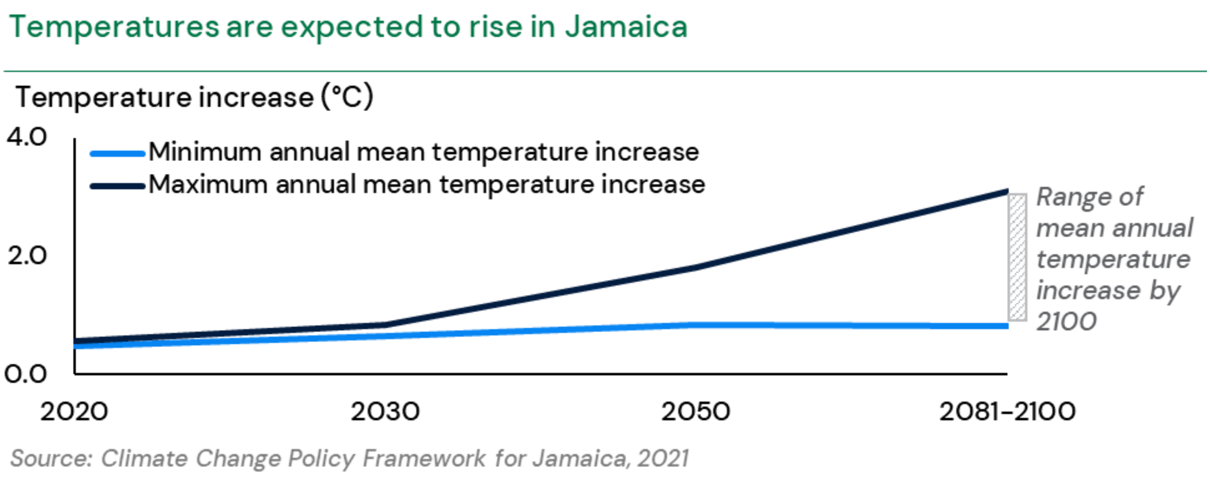


Figure 12 Range of mean annual temperature increase in Jamaica[34]

By 2080, drought conditions are expected to intensify by up to 40%, threatening Jamaica's already vulnerable water resources and placing further strain on agricultural systems. In response, Jamaica is taking proactive steps to build resilience and achieve its goal of becoming a developed country by 2030. These efforts are outlined in Jamaica's Climate Change Policy Framework. The goals of the framework are threefold[34]:

- Strengthening of Jamaica's adaptive capacity and resilience to reduce its vulnerability to climate change
- Pursuit of low-carbon development and enhancement of access to and mobilisation of climate finance
- Promotion of public education and awareness raising, research, and technology transfer towards ambitious climate action

The government plans to elaborate with relevant stakeholders at the local, national, regional, and international levels to improve the governance framework related to climate action to ensure transparency and accountability. Some of the key strategies include[35].

- **Governance:** Improve governance, transparency, and accountability in climate action. Enhancing institutional capacity and legal/regulatory frameworks.
- **Adaptation:** Reduce Jamaica's vulnerability to the harmful effects of climate change; increase ability to respond. This includes supporting sectoral and community-level adaptation planning.

[32] https://www.imperial.ac.uk/grantham/research/climate-science/modelling-tropical-cyclones/hurricane-melissa/
[33] https://climatepromise.undp.org/news-and-stories/jamaica-green-growth-and-climate-resilience
[34] https://www.forestry.gov.jm/resourcedocs/FINAL_15_07_21_Updated_Climate_Change_Policy_Framework___002_.pdf
[35] https://www.pioj.gov.jm/product/the-state-of-the-jamaican-climate-2019-historical-and-future-climate-changes-for-jamaica/

- **Mitigation / Low-carbon development:** Reduce greenhouse gas (GHG) emissions, promote clean technologies, energy efficiency, etc. This agenda provides support for low-carbon technologies such as SAF.
- **Loss and damage:** Recognising that some climate impacts can't be fully prevented, the framework gives weight to addressing 'loss and damage' in sectoral development plans.
- **Finance & resources:** Improve access to climate finance, mobilise domestic and international resources. Strengthen transparency, measurement, and reporting.
- **Public awareness, research & technology transfer:** Foster science-based decision making; expand research; support clean technologies and their diffusion.

In 2017, Jamaica ratified the Paris Agreement, committing to advance climate action through its Nationally Determined Contribution (NDC) and to strengthen these commitments over time. In July 2020, Jamaica submitted its updated NDC, which, for the first time, included emissions from forestry and land use change, sectors of critical importance, given that forests account for over half of the island's total land area. The update also raised the ambition of energy sector commitments, outlining a comprehensive decarbonisation pathway that spans electricity generation and all major energy-using sectors. Overall, Jamaica's NDC targets emissions reductions in the land use change, forestry, and energy sectors of 25.4% (unconditional) and 28.5% (conditional on international support) below a 2005 baseline by 2030. Notably, 83% of the unconditional reductions are expected from the energy sector.

1.6 Agriculture

The agricultural sector continues to play a vital role in Jamaica's economy, contributing significantly to GDP, employment, foreign exchange earnings, and rural livelihoods. In 2021, agriculture accounted for approximately 39%[36] of the total land area, or 4,170 sq. km[37]. During 2025, the agriculture, forestry, and fishing industry contributed 8%[38] to gross value added (at 2015 prices) and employed 14%[39] of the labour force in 2024. Vegetables, fruits, and tubers grown in Jamaica play both an important role for both domestic use and exports, with Jamaica's largest agricultural export being yams[40].

Despite its importance, agricultural production remains highly vulnerable to extreme weather events, such as hurricanes, driven by climate change. For example, Hurricane Beryl in 2024 affected approximately 23,040 hectares of farmland and resulted in the loss of 323,412 animals, including small ruminants, poultry, and cattle[41]. Later in the same year, the flood rains from Tropical Storm Rafael contributed to a further significant loss to the agricultural sector[42]. Nevertheless, the sector has shown resilience, recording a growth of 13.7% in Q2 2025.

To address climate-related challenges, Jamaica has implemented strategic policies. The Climate Change Policy Framework for Jamaica (2015)[43] identifies agriculture as a priority sector for both mitigation and adaptation. Key strategic objectives include promoting water- and energy-efficient farming practices, enhancing food storage systems, and diversifying production methods through agroforestry and aquaculture.

Several ongoing projects align with these priorities and contribute to greenhouse gas (GHG) emissions reduction, carbon sequestration, and climate resilience. Among them, notable is the Essex Valley Agriculture Development Project[44], funded through a grant from the United Kingdom

[36] https://data.worldbank.org/indicator/AG.LND.AGRI.ZS?locations=JM
[37] https://data.worldbank.org/indicator/AG.LND.AGRI.K2?locations=JM
[38] https://statinja.gov.jm/NationalAccounting/Quarterly/NewQuarterlyGDP.aspx#
[39] https://statinja.gov.jm/LabourForce/NewLFS.aspx
[40] Stakeholder feedback
[41] https://reliefweb.int/report/jamaica/agriculture-sector-sustains-473b-losses-hurricane-beryls-passage
[42] https://www.moa.gov.jm/content/preliminary-estimate-damage-agricultural-sector-heavy-rains-put-621m
[43] https://unfccc.int/sites/default/files/NDC/2022-06/Updated%20NDC%20Jamaica%20-%20ICTU%20Guidance.pdf
[44] https://www.nicjamaica.com/our-projects-and-programmes/essex-valley-agriculture-development-project/

Caribbean Infrastructure Partnership Fund, which aims at enhancing production and farmers' productivity of farmers in a socially inclusive, gender-equitable, and climate-sensitive manner.

Jamaica also faces competitive pressures from neighbouring countries and remains heavily import-dependent. In 2022, the country exported agricultural products worth USD 273 million, compared to imports totalling USD 1.4 billion[45]. The United States accounted for nearly half of Jamaica's agricultural imports. Approximately 60% of these imports serve the hotel, restaurant, and institutional (HRI) sector, while the remainder are distributed through retail outlets such as supermarkets, convenience stores, and small "mom-and-pop" shops[45].

To enhance domestic capability and align with UN Sustainable Development Goals 2 (zero hunger) and 12 (responsible consumption and production), the country has launched several projects to strengthen the agriculture sector and fill the national food basket:

- Jamaica has set a national goal of producing 70% of its locally consumed food by 2030.
- The National Irish Potato Development Project and the Onion Development Programme are focused on expanding the variety and quality of produce available for the domestic market. Additionally, the Ministry of Agriculture, Fisheries, and Mining is considering the introduction of the Crop Restoration and Establishment Programme (CREP) to improve yield and productivity among coffee farmers.
- Jamaica also operates eight designated agro-parks, which promote intensive agricultural production and attract large-scale investments.
- To support tourism-driven demand, the country has developed the Tourism Agri-Linkages Exchange (ALEX), its first e-commerce platform, connecting farmers, and primarily those of small scale, directly to hotels and buyers online.

The agricultural sector in Jamaica faces challenges such as the low productivity of its more than 200,000 farmers. Farming is a low-technology industry using mostly hand tools, and farming plots are small, averaging about two acres[46]. However, recent investments to modernize and expand Jamaica's agricultural sector are an encouraging signal[47].

1.7 Land use

Land use trends in Jamaica reflect ongoing shifts driven by both natural processes and human activities. As of 2023, forested areas dominated the landscape, accounting for 47.9% of the mainland's total area, a rise from 40% in 2013[48]. These forests are extensively distributed across the island, with dense forest concentrations associated with protected areas and mountainous regions, and dry forests dominating the southern part of the island. Secondary forest is the most widespread forest type and is well-distributed throughout the country.

Within the 'non-forest' land use category, pasture and grassland, agricultural plantations, and fields occupy 184,487 hectares, representing 17% of the total land area, which reflects a 4% decline compared to earlier assessments[48]. Built-up areas, including buildings and infrastructure, have expanded, particularly around towns and tourist centres. While some degraded land exists, the Jamaican government's express goal under its NDC is the reforestation of degraded land.

The observed land use patterns are shaped by urbanisation, infrastructure development, and fluctuations in agricultural activity. Notably, natural forest regeneration is contributing to increased forest cover, especially in areas of abandoned or underutilised agricultural land. This trend is influenced by socioeconomic and environmental factors, with economic hardship being a key driver of agricultural land abandonment. Such challenges are causing increasing migration from rural to urban hubs, contributing towards the declining agricultural trends and booming infrastructure.

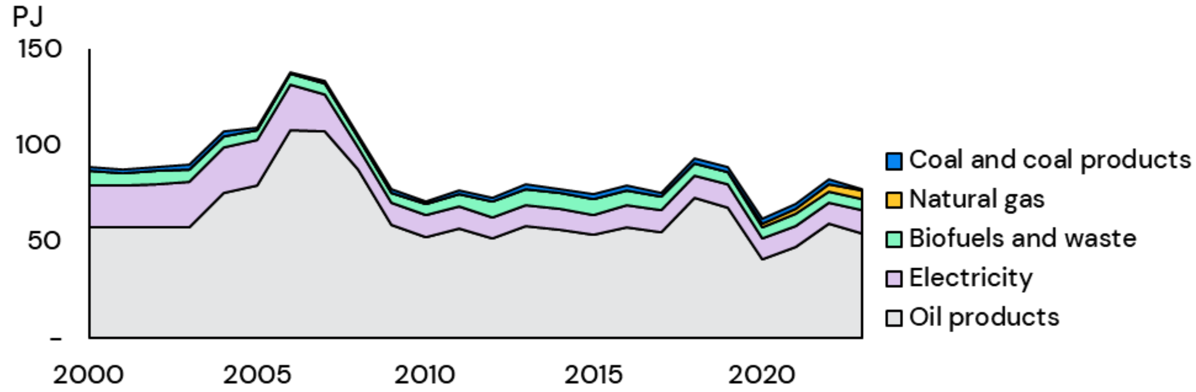
45 https://www.trade.gov/country-commercial-guides/jamaica-agriculture
46 https://jamaica-gleaner.com/article/commentary/20250520/editorial-reviving-agriculture
47 https://www.jamaicaobserver.com/2025/05/28/us50-m-sweetener/
48 https://www.forestry.gov.jm/resourcedocs/State_of_Jamaica_s_Forests_Report_2024.pdf

1.8 Energy

1.8.1 Demand patterns

Conventional petroleum products account for more than 70% of Jamaica's final energy consumption, followed by electricity and biofuels as shown in the figure below. In recent years, other fuels, such as natural gas, have emerged as an increasing part of the country's energy mix.

Conventional petroleum accounts for the majority of Jamaica's energy mix

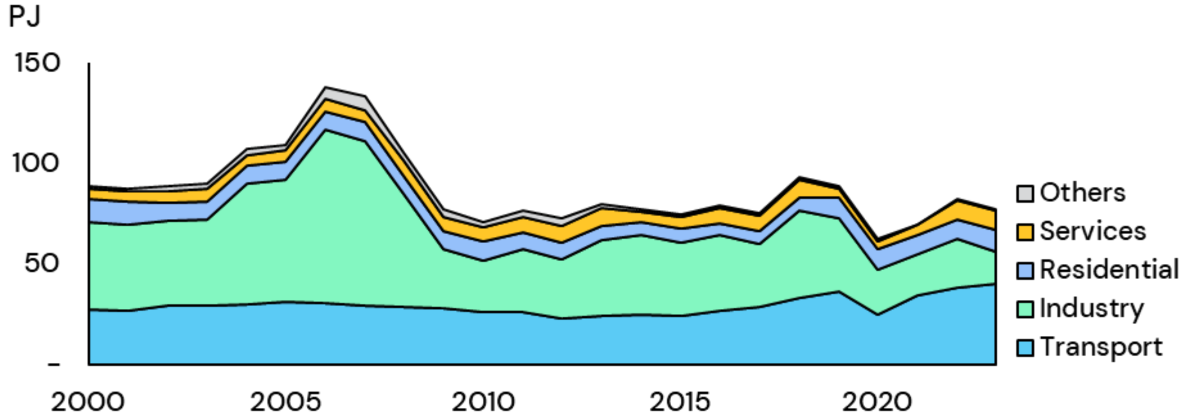


Source: IEA

Figure 13 Jamaica's energy consumption by type[49]

Among the sectors, transport is the largest consumer of energy, followed by industry, which includes manufacturing and related activities. As shown on the figure below, although industry accounted for the largest share of energy consumption in 2000, its share has fluctuated as several alumina plants closed following the global financial crisis in 2009, with some reopening in later years. Moreover, decreasing demand across industry and transport as a result of the COVID-19 pandemic caused another noticeable shock to Jamaica's energy consumption in the early 2020s.

Transport is the largest consumer of energy per sector



Source: IEA
Note: Services = Commercial and Public Services

Figure 14 Jamaica's energy consumption by sector[49]

1.8.2 Supply patterns

Jamaica's energy sector has traditionally been heavily reliant on imports, as shown in the figure below, including fossil fuels, natural gas and coal, presenting ongoing challenges to energy security and economic resilience. This dependence has exposed the country to fluctuations in global oil prices, resulting in substantial foreign exchange outflows and contributing to economic instability.

[49] https://www.iea.org/countries/jamaica/energy-mix

The country's energy exports are confined to bunkering fuel and residual products, primarily heavy fuel oil.

The persistent reliance on fossil fuel imports has highlighted the urgency of transitioning to a more resilient and self-sufficient energy system, encouraging the exploration of alternative energy sources to mitigate associated risks.

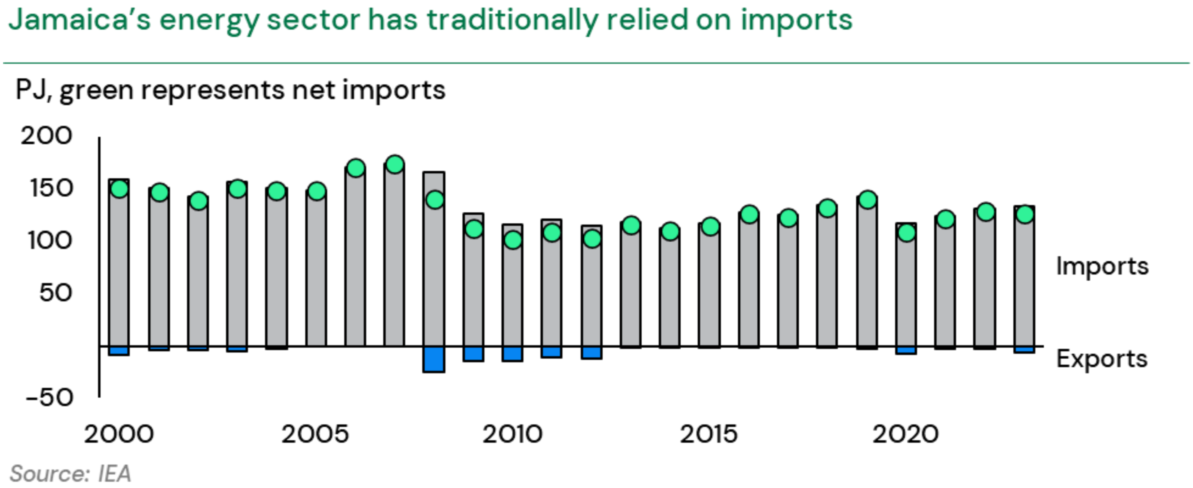


Figure 15 Energy trade in Jamaica[50]

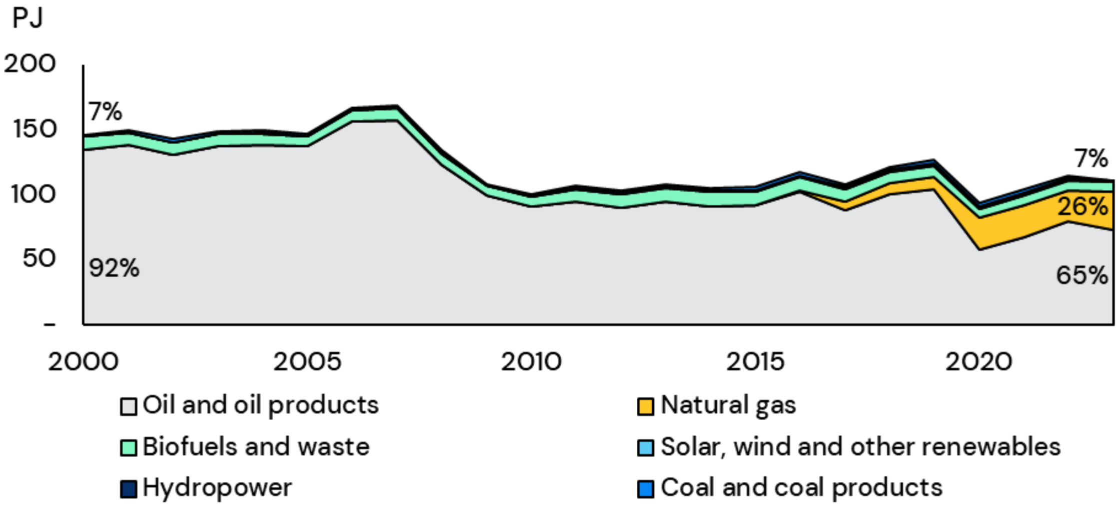
Between 2000 and 2023, the share of conventional oil and oil products in the energy supply mix (inclusive of domestic production and imports) declined from 92% to 65%, as shown in the figure above. This reduction is largely driven by the increasing use of natural gas in power generation. Natural gas imports commenced in 2016 with the commissioning of the Montego Bay LNG terminal. In 2019, a second facility, the Old Harbour Floating Storage and Regasification Unit (FSRU), began operations, supplying the Jamaica Public Service Company's 190-megawatt power plant in Old Harbour and New Fortress Energy's 150-megawatt cogeneration power plant at Jamalco in Clarendon. As of 2023, the United States remained the largest source of natural gas imports, followed by Nigeria and Trinidad and Tobago[51].

Moreover, the country has witnessed notable growth in wind and solar energy generation. The rising adoption of renewable energy aligns with global trends and reflects Jamaica's commitment to diversifying its energy sources.

[50] https://www.iea.org/countries/jamaica/energy-mix

[51] https://wits.worldbank.org/trade/comtrade/en/country/JAM/year/2023/tradeflow/Imports/partner/ALL/product/271111

Jamaica has seen an increase in adoption of renewable energy

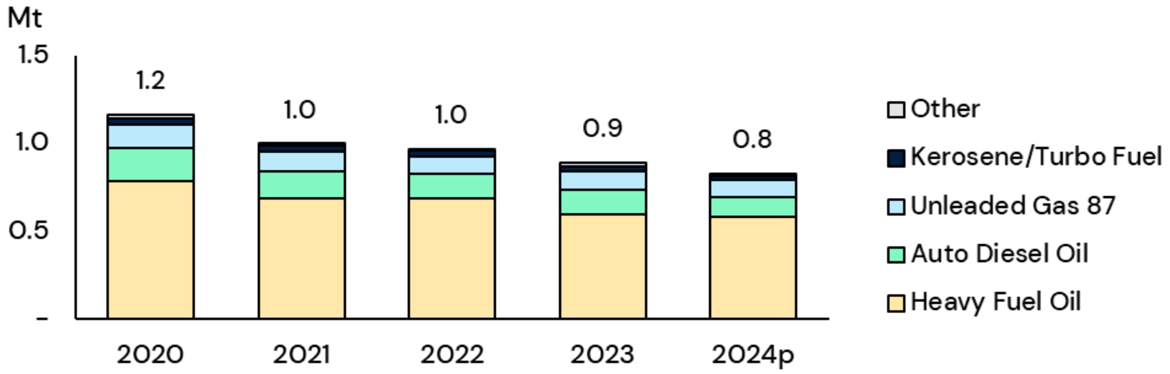


Source: IEA

Figure 16 Evolution of total energy supply in Jamaica[50]

Jamaica also imports crude oil and refines it into finished products, including gasoline, diesel, jet fuel, heavy fuel oil, and asphalt, as shown in the figure above[52]. Domestic refining has, however, reduced over the last decade, declining by 17% between 2000 and 2023[53]. The Petrojam refinery produces a significant fraction of heavy fuel oil, which targets the maritime shipping industry. The ability of the refinery to increase the volumes of higher-specification fuel products is limited by the refinery configuration and available processing units, which has led to higher imports of finished fuels such as ultra-low sulfur diesel.

The Petrojam refinery has been consistently primarily producing heavy fuel oil



Source: Jamaica energy statistics, bp, ICF analysis (p=projected)

Figure 17 Jamaica's total production of petroleum products from crude at the Petrojam refinery[52,54]

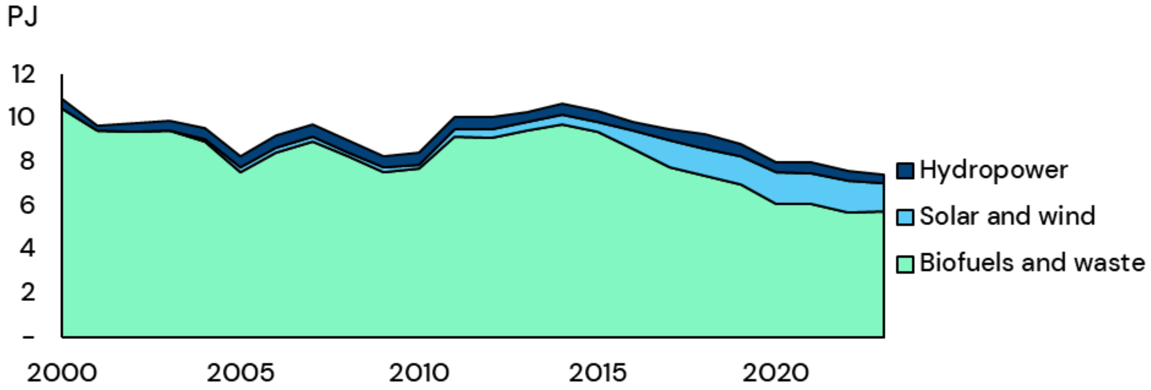
Jamaica's domestic energy production remains modest relative to overall supply but is largely centred on sources such as biofuels, solar, wind, and hydropower (excluding the crude oil imported and refined into fossil fuel). This focus reflects the country's effort to reduce dependence on imported fossil fuels, which raise electricity costs and leave the economy vulnerable to global price

[52] https://www.mset.gov.jm/wp-content/uploads/2021/07/JAMAICA-ENERGY-STATISTICS-2024.pdf
[53] https://www.iea.org/countries/jamaica/energy-mix
[54] https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2022-approximate-conversion-factors.pdf

shocks. Expanding clean energy also enhances energy security, supports climate commitments, attracts green investment, and builds resilience as a small island state exposed to climate risks.

While bioenergy still dominates domestic energy production, its share has dropped from 96% in 2000 to 77% in 2023, reflecting Jamaica's gradual shift toward a more diversified renewable mix led by solar and wind. This is shown in the figure below. Commercial wind energy production in Jamaica began in 2004 with the commissioning of Wigton Wind Farm Phase 1 (20.7 MW) in Manchester and was later expanded through additional phases[55]. Commercial solar followed in 2016 with the Content Solar Project (20 MW) in Clarendon[56], marking the country's first utility-scale solar farm, and was further scaled by the Paradise Park Solar Farm (51 MW) in 2019[57].

Bioenergy share has dropped, reflecting a shift towards more diversified renewable energy sources



*Source: IEA (*CAGR is calculated from the year commencing 2004; excludes the crude imported and refined into the final refined product)*

Figure 18 Evolution of domestic renewable energy production in Jamaica

1.8.3 Electricity sector

Jamaica's electricity grid is largely powered by oil and natural gas, with renewable sources accounting for only around 11% of generation in 2023[58]. However, the 2022 Jamaica Integrated Resource Plan raised the country's previous 2030 renewable energy target from 30% to 50% and sets out a robust pathway to reach nearly 80% renewables by 2041[59]. The plan identifies a portfolio of 1,705 MW of new capacity to be deployed by 2041, the majority of which is expected to come from solar PV projects, as illustrated in the figure below.

---

[55] https://xenogyre.com/tag/content-solar/
[56] https://wrbenterprises.com/energy/jamaica-28mw-content-solar-project/
[57] https://neoen.com/en/news/2019/energization-of-the-paradise-park-solar-farm-in-jamaica-and-commencement-of-its-operations/
[58] https://www.iea.org/countries/jamaica/electricity
[59] https://www.mset.gov.jm/wp-content/uploads/2024/11/2022-Jamaica-Integrated-Resource-Plan.pdf

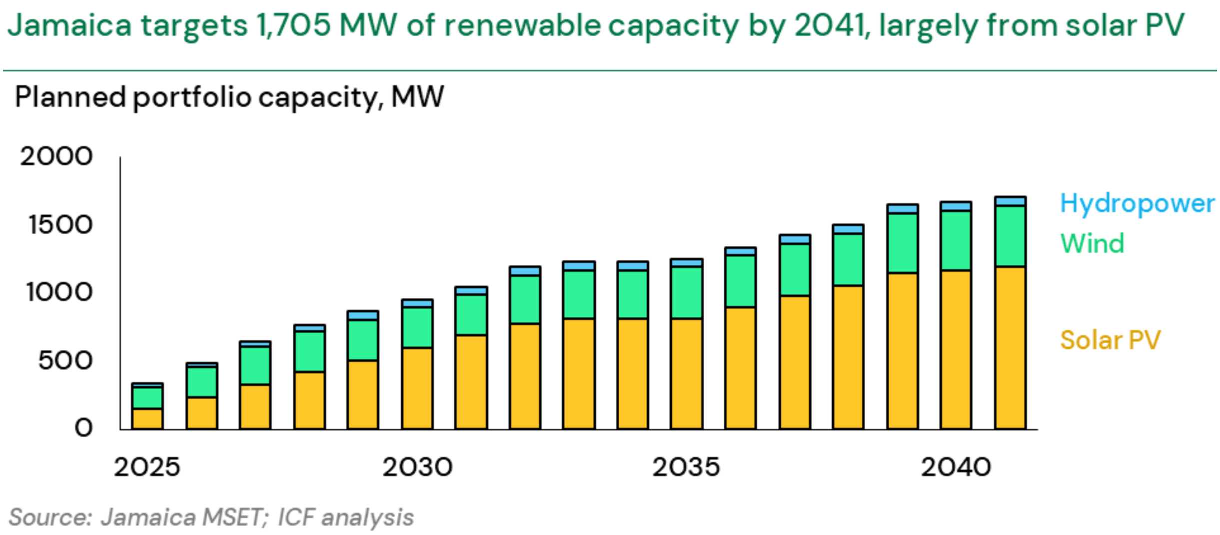


Figure 19 Projected renewable capacity in Jamaica up to 2041

1.8.4 Conventional oil sector

Jamaica's fuel consumption trend is largely dependent on imported oil to power its transportation, residential, and industrial sectors. Road and rail account for the largest share of petroleum consumption, followed by electricity generation. Since 2023, aviation has comprised the fourth-largest consumer of petroleum, as shown on the figure below. Petroleum is also heavily used in industry, including bauxite and alumina production.

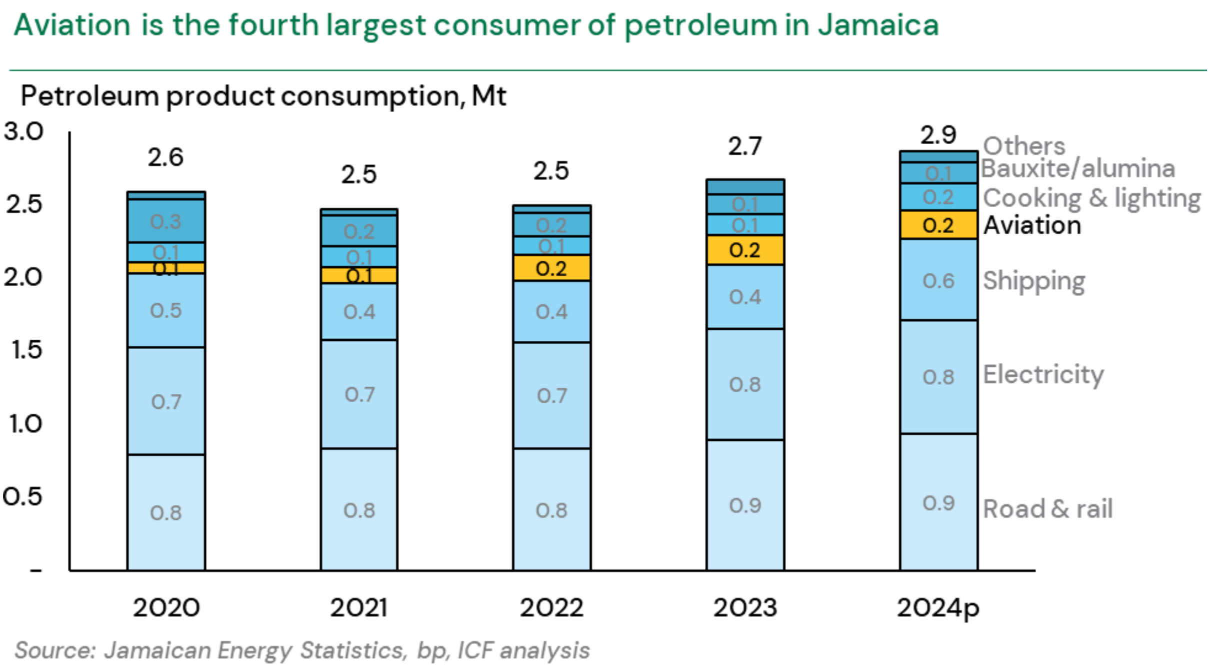


Figure 20 Petroleum consumption by activity[52,54]

Jamaica has one refinery, Petrojam, which was established in 1982 when the Government of Jamaica purchased the ESSO Kingston Refinery, and is 100% owned by the Government of Jamaica[60]. Petrojam is located on the shoreline of Kingston Harbor and is a hydro-skimming plant with a refining capacity of 36,000 barrels per day (~1.8 Mt/year) and a throughput capacity of 28,000 to 30,000 barrels per day (~1.4 Mt/year). As a hydro-skimming refinery, Petrojam has some

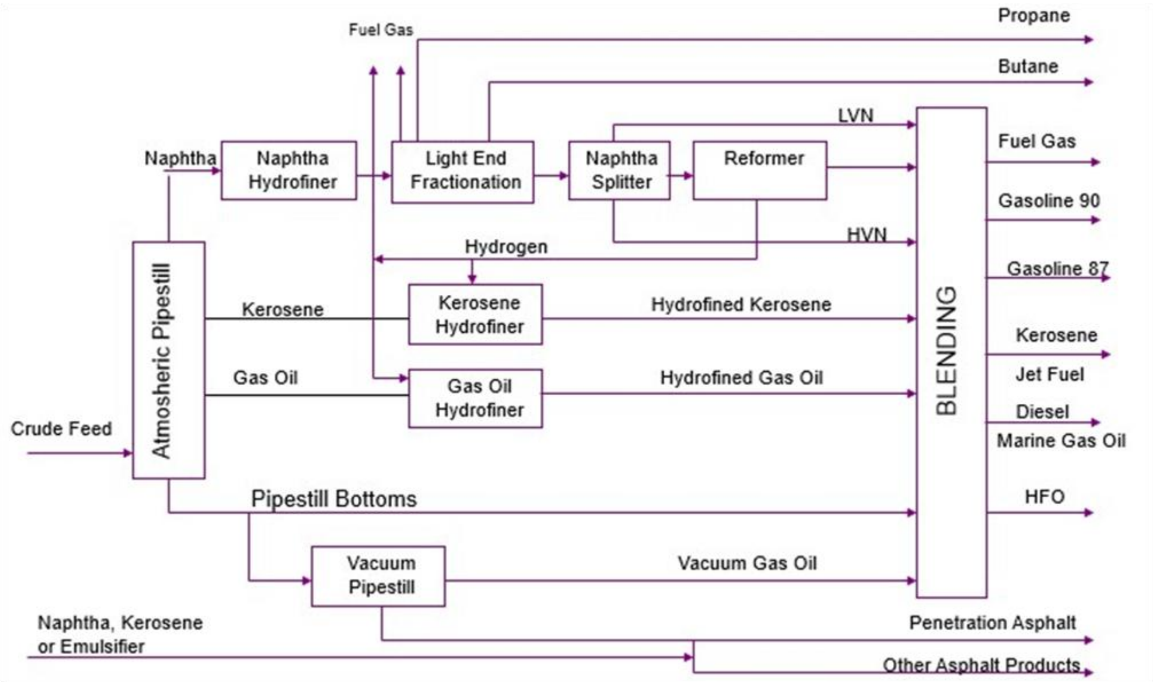
[60] Petrojam Annual Report 2021/2022

limitations because it does not have cracking capacity. Petrojam supplies liquefied petroleum gas (propane and butane), gasoline (E10-87 and E10-90 octane), jet fuel (kerosene), automotive diesel oil (ADO), ultra-low sulphur diesel (ULSD), heavy fuel oil (HFO 3% and 2.2% sulphur), very low sulphur fuel oil (VLSFO 0.5% sulphur), and asphalt. The company also imports other finished products to meet transportation, industrial, and domestic needs.

Petrojam operates a fully equipped petroleum and ethanol-testing laboratory in Jamaica for testing fuels against specifications, for example ASTM D1655 for Jet A. If SAF were to be co-processed at the facility, the need for additional testing may need to be assessed, which could also be done abroad. For example, in the case of co-processing, sustainability certification under CORSIA must include C14 testing.

Petrojam does not have a fluid catalytic cracker or hydrocracker unit for co-processing heavier biobased intermediates. However, the kerosene hydrotreater is a potential insertion point for co-processing of fats and oils, as shown in the figure below. The kerosene hydrotreater is reported to have a capacity of 6,000 b/d (~0.30 Mt/year) and on a theoretical basis, co-processing fats and oils at 5% insertion volume would require ~0.015 Mt/year of fats and oils feedstock[61]. Depending on the specific catalyst and operating conditions, more than 90% of the biogenic carbon could be present in the jet product.

Petrojam does not have a fluid catalytic cracker or hydrocracker unit



Source: Petrojam

Figure 21 Petrojam Refinery block flow diagram[62]

Production of SAF from biobased feedstocks would require increased hydrogen supply compared to production of conventional jet fuel. Jamaica currently imports hydrogen from the USA, Trinidad and Tobago, and other sources.

Another option for a small further contribution to reduce the emissions associated with aviation fuel is production of lower carbon aviation fuels (LCAF). This entails reducing the carbon intensity

[61] https://www.ogj.com/refining-processing/refining/optimization/article/17297340/jamaicas-sole-refinery-due-upgrade-expansion
[62] https://www.petrojam.com/hydroskimming-refinery-process/

of conventional jet fuel production through measures such as using green hydrogen (via electrolysis of water) and other process improvements.

1.9 Road transportation industry

Jamaica's motor vehicle fleet is moderate in size and growing. Passenger cars, light commercial vehicles and buses remain the dominant road transport modes, with used-vehicle imports playing a big role in fleet composition. In 2022, as per the Economic and Social Survey of Jamaica, 575,041 motor vehicles were certified fit by the Island Traffic Authority to utilise the island's roadways, compared with 578,811 during 2021[63]. Regarding public passenger service, some 34,928 vehicles were licensed to offer that service in 2022, compared with 32,145 in 2021, a ~9% increase.

Jamaica is largely dependent on imports of its motor vehicles. In 2022, the country imported 50,786 motor vehicles worth USD 514 million in 2022, marking a year-on-year rise of roughly 26% compared to 2021.

In 2023, Jamaica published a National Electric Vehicle (EV) Policy aimed at encouraging electric vehicle uptake and providing guidelines and adequate tools for the EV market in the country. The country aims to account for 12% of EVs being privately owned fleet by 2030 and 16% of EVs being public transport fleet by 2030. There has also been an increase in the number of registered EVs: while there were only 10 EVs registered in 2018, this number has increased to 150 by the end of 2022.

1.9.1 Biofuels

Ethanol

In response to the challenges facing its declining sugar industry, the Government of Jamaica introduced an E10 mandate in 2009, requiring all gasoline sold domestically to contain 10% ethanol[64]. To comply, the country initially imported hydrous ethanol from established producers in Brazil and the United States, while investing in dehydration facilities to make the fuel market ready. Building on this foundation, the government launched the National Biofuels Policy, setting long-term objectives through 2030 in areas such as sustainability, intersectoral collaboration, technology development, legal frameworks, and capacity building. It is worth noting, however, that the policy does not establish regulations to verify the sustainability or carbon intensity of ethanol production and use, and emissions reductions from ethanol consumption are neither measured nor included in Jamaica's GHG inventory.

Several studies have confirmed the strong potential of sugarcane as Jamaica's primary feedstock for developing a domestic biofuels industry[65]. Despite this, the country remains dependent on fuel ethanol imports, with no large-scale domestic fuel ethanol production to date. The privatization of government-owned sugar estates, once expected to catalyse investments in ethanol plants and modernized infrastructure, did not translate into projects of meaningful scale. Nonetheless, efforts to revive domestic production have continued.

In 2020, the Government of Jamaica commissioned the National Renewable Energy Laboratory (NREL) to assess pathways for ethanol production that could support both economic growth and greenhouse gas (GHG) reduction, identifying sugarcane as the most viable feedstock through 2030, compared to alternatives such as sweet sorghum or cellulosic ethanol. One of the key benefits identified in the study is that meeting the E10 mandate through domestic ethanol production could reduce foreign exchange outflows by USD 60 million in 2030 and USD 122 million in 2050. This would allow more capital to circulate within Jamaica's economy, supporting broader GDP growth.

However, achieving meaningful production would require significant improvements in sugarcane yields or expansion of cultivated land. Labour shortages, increased production costs and

[63] https://jamaica-gleaner.com/article/news/20230813/jamaica-records-26-jump-motor-vehicle-imports-2022
[64] https://docs.nrel.gov/docs/fy20osti/76011.pdf
[65] https://www.oas.org/en/sedi/dsd/generaldocs/publications/jamaica_biofuels_report_final.pdf

antiquated equipment are limiting production of sugar in the country[66]. Another major barrier to Jamaica's ethanol ambitions is financing. Unlike Brazil's Pro-Alcohol program in the 1970s, backed by subsidies, low-interest loans, and favourable tax policies, Jamaica has lacked the scale of support needed to launch competitive projects.

Before a domestic ethanol sector can be redeveloped, the underlying issues in the sugarcane sector and its economic viability must be addressed, which are discussed in depth in Section 2.3.4. Other technologies for ethanol production, such as waste gas fermentation, could potentially offer an alternative source of ethanol, although this technology is still being commercialized.

Biodiesel

While Jamaica's National Energy Policy (2009–2030) set a target of 20% renewable energy by 2030[67] and emphasizes the development of biofuels, the country does not yet produce biodiesel on a commercial scale. The Petroleum Corporation of Jamaica (PCJ) has conducted pilot projects, including a 2017 trial of a B5 biodiesel blend made from castor oil[68]. At present, however, Jamaica remains dependent on biodiesel imports, with a limited flow of biodiesel into the country. Efforts are underway to build self-sufficiency: in 2021, the Ministry of Transport and Mining, through the Jamaica Bauxite Institute (JBI), partnered with small farmers to expand castor oil cultivation, with plans to secure 5,000 acres of unused land for biodiesel production[69].

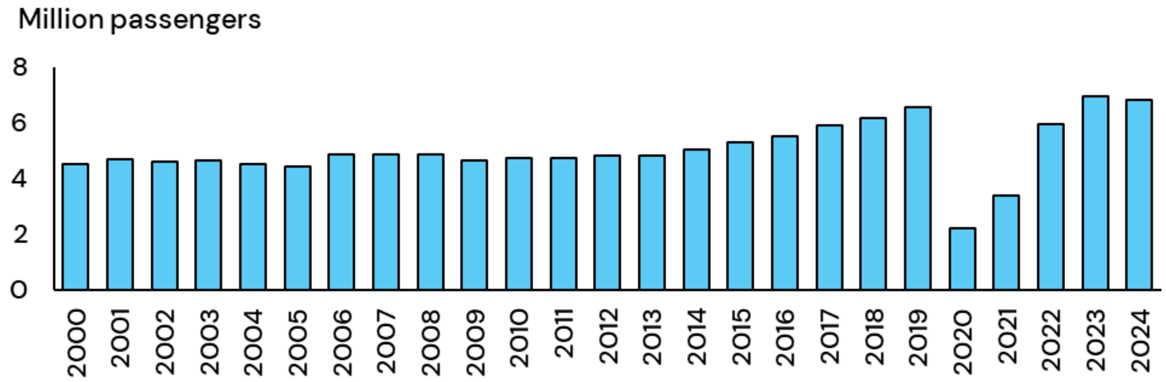
Biodiesel production uses the same oils and fats feedstocks as the HEFA process for SAF, and decarbonisation of the aviation sector therefore competes with decarbonisation of the road sector. However, it should be noted that the main fuel product of the HEFA process is generally renewable diesel, with SAF produced as a co-product. Therefore, diversion of oil and fats feedstocks to SAF can accomplish decarbonisation of both sectors as the renewable diesel can be blended with petroleum diesel.

1.10 Aviation industry

Given Jamaica's island geography and tourism-driven economy, aviation serves as a backbone for Jamaica. It is an enabler of economic growth, as well as connecting its residents to personal and family needs across the world. The share of arrivals by air has risen from 63% in 2019 to 70% in 2024, highlighting the growing importance of aviation to the country's connectivity and tourism growth. Overall, air passenger traffic has grown steadily at an average annual rate of 1.7% between 2000 and 2024, surpassing pre-pandemic (2019) levels in 2023 by ~400,000 passengers. This sustained growth underscores the sector's resilience and long-term demand outlook.

[66] https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Sugar%20Annual_Kingston_Jamaica_JM2025-0002.pdf
[67] https://www.mset.gov.jm/wp-content/uploads/2019/07/National-Energy-Policy_0.pdf#:~:text=It%20provides%20a%20framework%20for,coherence%20and%20fulfill%20its%20goals
[68] https://jis.gov.jm/pcj-biodiesel-blend-cut-oil-imports-boost-agricultural-sector/#:~:text=The%20oil%2C%20derived%20from%20castor,engine%20vehicles
[69] https://jis.gov.jm/transport-ministry-partners-with-farmers-to-produce-castor-oil-for-biodiesel/#:~:text=The%20Ministry%20of%20Transport%20and,JUTC

Jamaica's air passenger traffic has grown since 2000

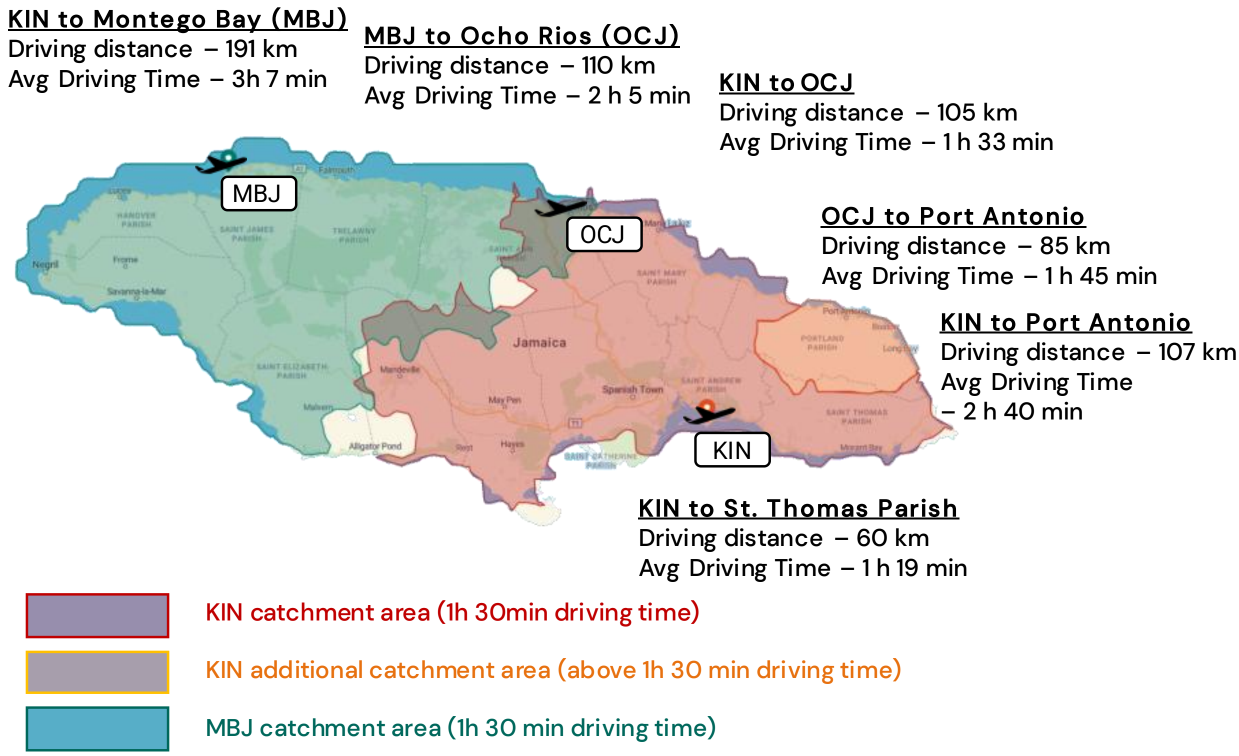


Source: CAPA

Figure 22: Jamaica's air passenger traffic

The country's aviation infrastructure comprises three international airports: Montego Bay (MBJ), Norman Manley International (KIN), and Ocho Rios (OCJ), and several smaller aerodromes, including Tinson Pen (KTP), and Negril (NEG). Among these, only MBJ, KIN, and OCJ currently handle scheduled passenger services, but KTP and NEG have only limited operations. At Ocho Rios (OCJ), only one commercial service is currently in operation, operated by American Airlines to Miami. As the main international gateway, Montego Bay dominates passenger traffic and connectivity, accounting for 74% of the market in 2024, making the performance of its aviation infrastructure critical to Jamaica's overall economic outlook.

Three airports in Jamaica currently handle schedules passenger services

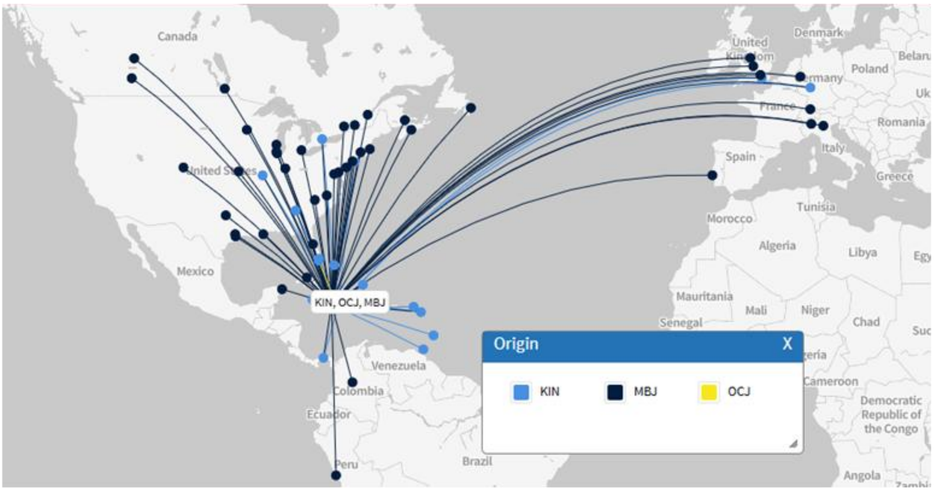


Source: ICF analysis, Google Maps

Figure 23 Main Jamaican airports & the average drive times to the points of interest

Jamaica maintains non-stop connections to over 60 destinations across 20 countries, with air routes concentrated in North America and Europe, as illustrated in the figure below. The United States alone accounts for 22 destinations, underscoring its significance as Jamaica's main tourism and aviation partner, followed by Europe, Canada and other Caribbean nations.

Jamaica's airports are connected to over 60 destinations



Source: OAG, ICF analysis

Figure 24 Published route network from Jamaica, 2025

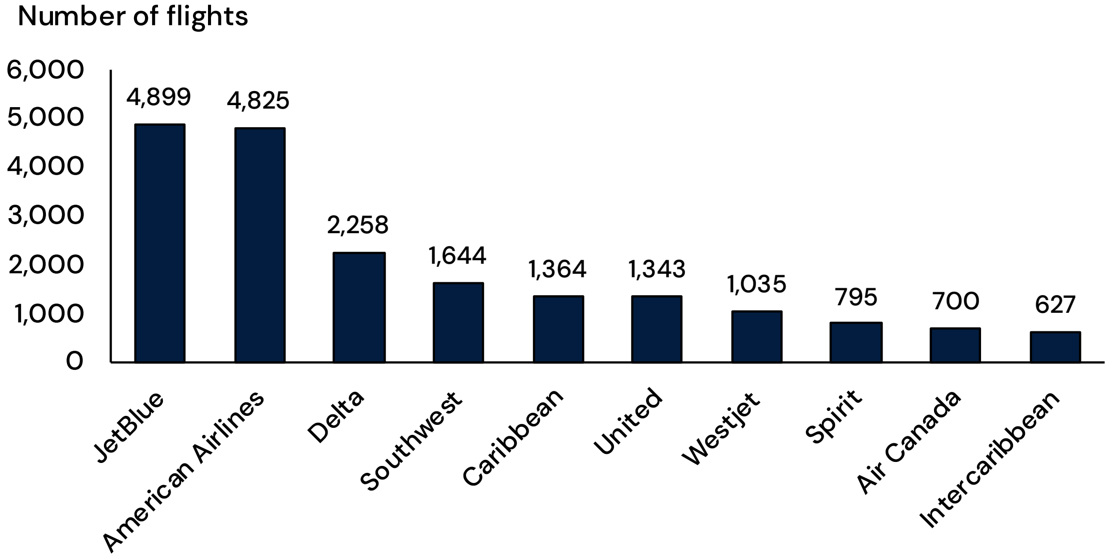
However, inbound passenger traffic from the U.S. declined by around 6.5% in 2024 compared to 2023, driven by factors such as the U.S. travel advisory issued that year, intensified competition from regional destinations like the Dominican Republic, and heightened traveller concerns related to US immigration policies. In parallel, arrivals from other countries showed growth, including those from Canada, the UK, the Cayman Islands and Germany**Error! Reference source not found.**. Emerging markets such as Colombia, Argentina, and Chile have also shown strong double-digit year-on-year growth in inbound arrivals in 2024, reflecting expanding connectivity and rising interest from Latin American travellers.

Today, Jamaica no longer has a national flag carrier of its own. Air Jamaica was operated by the government until 2011, served as the country's national flag carrier and connected Kingston and Montego Bay with major international hubs such as New York and Miami. At its inception, the Government of Jamaica held a majority stake, with Air Canada maintaining a minority share. In 2011, Air Jamaica was acquired by Caribbean Airlines, a full-service carrier based in Trinidad and Tobago. Following the acquisition, the Government of Jamaica retained a 16% ownership stake in Caribbean Airlines. However, the airline has since faced persistent financial transparency issues. Despite spending USD 8.8 million on audits up to 2025, Caribbean Airlines has not submitted a single audited financial statement in the past nine years[70]. As a result of this ongoing financial opacity, the Jamaican government's ownership has been diluted to 11.9%.

As of 2025, more than 30 airlines operate flights to and from Jamaica. The network is supported primarily by U.S.-based airlines, including JetBlue, American Airlines and Delta, while InterCaribbean Airways and Caribbean Airlines remain the only notable regional carriers, as shown in the figure below.

[70] https://mail.caribbeantoday.com/sections/business-blog/t-t-finance-minister-says-cal-spent-millions-of-dollars-on-audits-without-submitting-a-single-audited-statement

JetBlue and American Airlines are the primary airlines operating in Jamaica



Source: OAG, ICF analysis

Figure 25 Top 10 airlines with non-stop service in Jamaica in 2025 by frequency

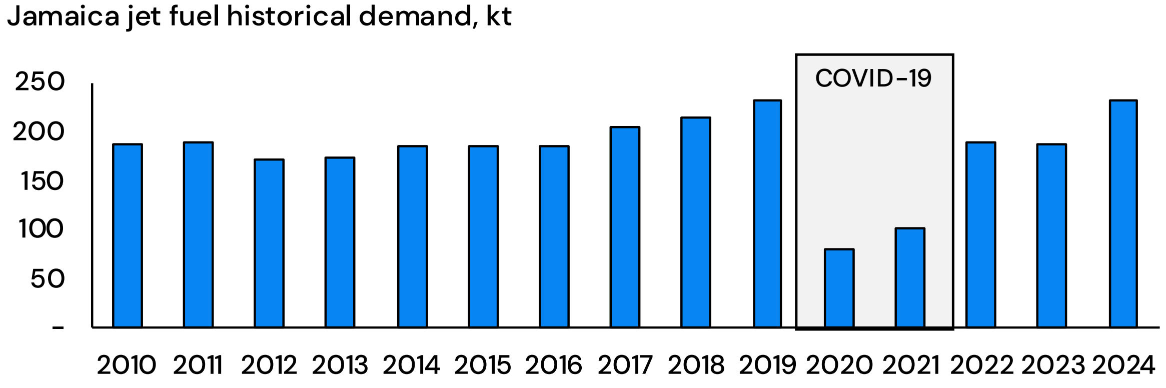
With regards to sustainability, Jamaica has endorsed ICAO's Long-Term Aspirational Goal (LTAG) of achieving net-zero carbon emissions from international aviation by 2050 and submitted a State Action Plan ICAO outlining its aviation sector emissions strategy, but this document has not been made public. As air transport plays a critical role in supporting Jamaica's economy, developing a clear national aviation emissions strategy, incorporating operational efficiency improvements, airport sustainability initiatives, as well as SAF, will be essential to align Jamaica's aviation sector with its broader net-zero ambitions.

1.11 Jet fuel in Jamaica

In 2024, total consumption was estimated at 215 kt, representing almost a full recovery to pre-pandemic (2019) levels. This recovery aligns with the gradual rebound in international tourism and the reinstatement of major air routes serving the island.

Both aviation gasoline (avgas) and Jet A-1 fuel are used in Jamaica. Aviation gasoline (Avgas) is mainly used in Jamaica by smaller turboprop and piston-engine aircraft, which support domestic, charter, and training flights. Jet A-1 fuel, the standard grade for commercial jet operations, is supplied at all three international airports, ensuring comprehensive fuel availability across Jamaica's primary aviation network.

Jamaican jet fuel demand has grown at an annual rate of ~2% between 2010 and 2024



Source: IEA, ICF analysis

Figure 26 Jet fuel consumption in Jamaica

Jamaica has a single refinery, operated by Petrojam Limited, which processes imported crude oil into refined petroleum products, including jet fuel. However, the refinery's 2023 output was limited to around 20% of jet fuel demand[71]. To meet its consumption needs, Jamaica relies heavily on imports of jet fuel, primarily from the United States, Brazil, Trinidad and Tobago, Ecuador, and Colombia. Previously, Venezuela was a major supplier, but imports have significantly declined due to political circumstances.

Imported jet fuel is delivered primarily through Kingston Terminal (via Petrojam's marine terminal) and Port of Montego Bay (through the Coconut Drive terminal and jetty), from where it is distributed to the island's airports for use in both commercial and general aviation operations.

Jet A-1 fuel is supplied by several companies, including Sol Aviation and I.A.M. Jet Centre. Finished fuels are imported through ocean-going tankers and distributed across the island, as there are no direct pipelines connecting the refinery to any of the airports. Aviation fuel supply in Jamaica is managed primarily by the Jamaica Aircraft Refuelling Service (JARS), with into-plane refuelling systems available at all three operational international airports[72]. Hydrant systems are in place at Montego Bay and Kingston, while bowser truck refuelling is utilized at Ocho Rios. The potential introduction of SAF into this system would likely necessitate additional infrastructure for blending and storage, either at the refinery or within airport fuel farms, to ensure compatibility with existing logistics and quality control systems.

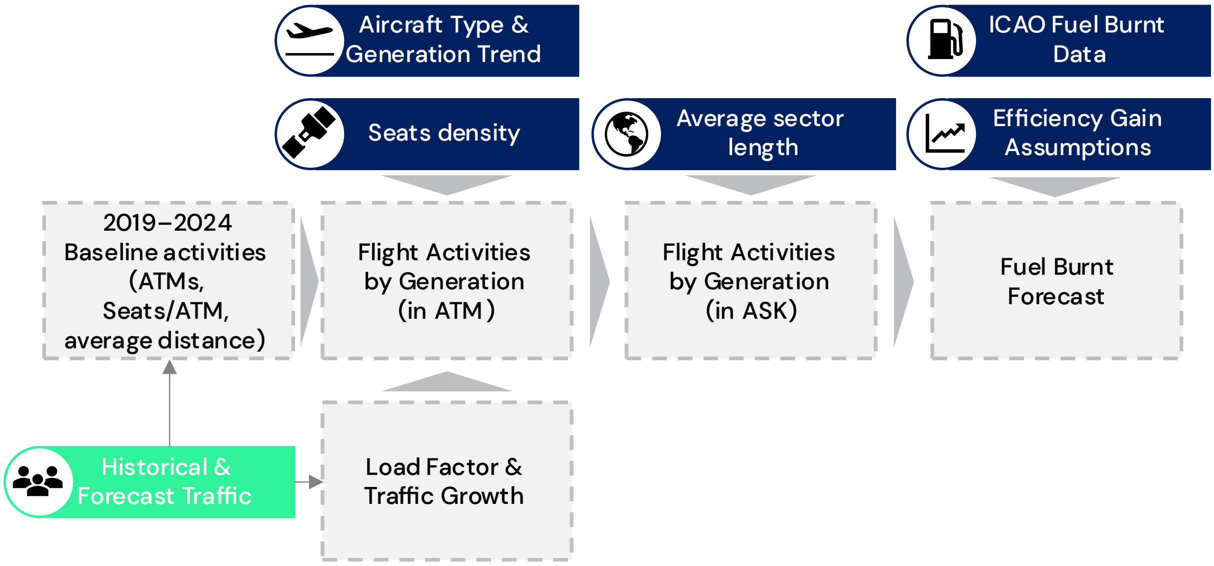
1.11.1 Jet fuel demand projection

Jet fuel demand projections reflect the scale of aviation activity and fuel consumption patterns potentially expected in a country. To capture this relationship, ICF has modelled Jamaican jet fuel demand, using detailed forecasts of passenger and cargo movements derived from historical trends and industry growth projections. This approach, as shown on the figure below, ensures that variations in traffic growth, fleet composition, and regional operating characteristics are accurately represented.

[71] https://www.mset.gov.jm/wp-content/uploads/2021/07/JAMAICA-ENERGY-STATISTICS-2024.pdf
[72] https://www.petrojam.com/wp-content/uploads/2025/04/Bidding-Doocument-EOI-Jet-Fuel-Supply-Agreement-2.pdf

ICF jet fuel demand model uses historical passenger traffic to forecast future traffic, accounting for aircraft type, new generation and efficiency improvements

Jet fuel demand methodology



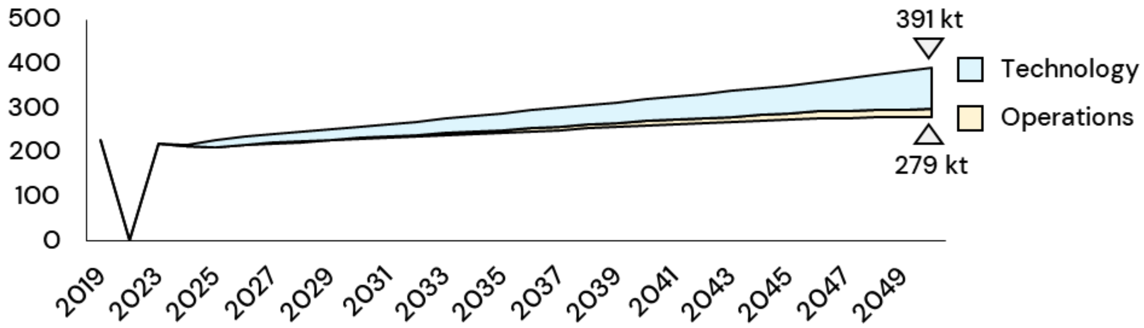
Source: ICF analysis

Figure 27 ICF jet fuel demand model inputs

Available seat kilometres (ASKs) in Jamaica are projected to grow at an annual rate of 2.5%, which would, in a baseline scenario, drive jet fuel consumption up to 391 kt by 2050. However, due to technological and operational improvements, fuel consumption is expected to increase at a significantly lower annual rate of 1.1% between 2025 and 2050, reaching 279 kt, as illustrated in the figure below.

Jamaica's jet fuel demand is projected to reach up to 279 kt by 2050, following improvements to aircraft technology and operations

Jamaica jet fuel demand projections, kt



Source: ICF analysis

Figure 28 Jamaica's jet fuel demand

1.12 SAF demand

1.12.1 Overview

This section provides a high-level overview of how SAF demand is generated and how SAF is typically purchased. It then highlights SAF initiatives undertaken by airlines operating flights to Jamaica, before presenting projections of Jamaica's SAF demand through 2050. Globally, SAF demand can be divided into mandated and voluntary volumes.

- **Mandated demand** arises when policy requires obligated parties, typically fuel suppliers (and in some cases airlines), to ensure that a defined share of fuel provided or uplifted is SAF, or that the fuel mix achieves a defined emissions reduction. Two of the earliest SAF mandates are the EU's ReFuelEU Aviation framework and the UK SAF mandate. Under ReFuelEU, the SAF minimum starts at 2% in 2025 and rises to 70% by 2050, including a power-to-liquid (PtL) sub-mandate[73]. Where fuel suppliers fall short, the framework includes financial consequences that effectively doubles the cost of compliance. Similarly, the UK mandate starts at 2% and increases to 22% by 2040, including a PtL sub-mandate, and includes a buy-out mechanism whereby obligated parties can pay an alternative charge, higher than the expected SAF price, for volumes not supplied[74]. Other countries, including Brazil, Indonesia, and Türkiye, have also planned or adopted mandates in recent years.
- **Voluntary demand** is driven by commitments from airlines, corporates, and governments. Many airlines have established SAF targets as part of their net-zero plans, and several countries, such as the UAE and Japan, have planned or adopted SAF targets. In voluntary markets, the cost impact of SAF may be alleviated through the ability to commercialise the environmental attributes of SAF use (for example, through Scope 3-related claims) to corporate customers.

While conventional jet fuel is typically purchased on spot markets, SAF procurement often takes a wider range of forms, reflecting the immaturity of supply and the need for long-term revenue certainty for producers. The main purchase types include[75]:

- **Spot purchases:** As with conventional jet fuel, SAF can be purchased on spot markets. In practice, this is expected to be limited to the most mature SAF types (particularly HEFA) from operational producers for the foreseeable future.
- **Offtake agreements**: These arrangements involve a purchaser agreeing to buy a defined quantity of SAF at an agreed price over a defined period. For buyers, this can help manage price uncertainty and secure supply. For producers, long-term offtake provides revenue certainty, which is often critical for project financing, particularly for advanced pathways. Offtake structures can also involve multiple parties. For instance, American Airlines, SAF producer Infinium, and investor Breakthrough Energy Catalyst agreed a structure in which Breakthrough Energy Catalyst provides investment to Infinium, American Airlines commits to purchase and uplift Infinium's SAF, and American Airlines separately sells the environmental attributes of its SAF uplift to Citi Bank to reduce the net cost of SAF use[76]. This structure was among the enablers for Infinium's PtL project to begin construction.
- **Investments:** In these arrangements, airlines or other customers invest directly in a SAF producer or facility, often alongside an offtake at a preferential rate. Similar to offtake agreements, this is more common for advanced SAF pathways. For example, United Airlines Ventures has invested over USD 200 million in sustainable aviation initiatives and technologies, including SAF[77].

1.12.2 Airline SAF initiatives

Most major airlines serving Jamaica have established targets and launched initiatives to accelerate SAF adoption. Even airlines based in mandated regions, such as British Airways and Virgin Atlantic, may have demand for SAF uplift in Jamaica as their voluntary targets exceed their mandated uplift. Similarly, airlines flying to Jamaica from North America have, for the most part, been active in setting targets and developing partnerships. A summary of selected initiatives is provided on the table below.

[73] https://www.easa.europa.eu/en/domains/environment/refueleu-aviation/eu-saf-market-report
[74] https://www.gov.uk/government/collections/sustainable-aviation-fuel-saf-mandate
[75] https://www.alkcon.com/documents/Pathways-to-Commercial-Liftoff_Sustainable-Aviation-Fuel.pdf
[76] https://www.infiniumco.com/news/infinium-receives-75m-equity-commitment-from-breakthrough-energy-catalyst-for-investment-in-project-roadrunner
[77] https://www.greenairnews.com/?p=5377

Airline	SAF initiative
IAG	• IAG's[78] core target is to have 10% of its fuel use made up of SAF by 2030, and around 70% of its fuel mix by 2050. • In 2025, IAG airlines used more than 291,000 tonnes of SAF, equal to 3.3% of total fuel consumption, up 79% versus 2024[79]. • IAG signed a major e-SAF deal with Twelve for 785,000 tonnes over 14 years, which will achieve one-third of the SAF needed for its 2030 target. • In September 2025, IAG joined the Oneworld/Breakthrough Energy SAF technology fund and committed €21 million ($25 million) as part of a broader $150 million fund to help commercialise new SAF technologies.
jetBlue	• JetBlue[80] is committed to achieve net zero carbon emissions by 2040 and views SAF as one of the most promising solutions. • The airline began regular use of SAF in 2020 and has 8 public SAF partners for current and future supply • The airline has been receiving regular SAF delivery at New York since late 2024 • The airline offers SAF certificates to its business customers to help reduce their Scope 3 emissions
American Airlines	• American Airlines[81] has set a SAF blend goal of 10% by 2030 • The airline used 2.9 million gallons of SAF in 2024, a 9.7% year-on-year increase • It has offtake agreements with organisations like Valero, Infinium, etc. • The airline has been selling SAF attribute to its corporate customer since 2021 and has sold attributes worth 9 million gallons of SAF since then
DELTA	• Delta Airlines[82] has set a SAF blend target of 10% by 2030, aiming to procure over 400 gallons of SAF by then. The airline is committed to achieving 95% SAF blend by 2050. • In 2024, the airline procured over 13 million gallons of SAF, tripling its deliveries as compared to 2023 • The airline was named the world's Most Innovative Companies by Fast Company for its efforts in scaling SAF • It has also relaunched its Elevate Your Status program[83], which allows its members to upgrade their status, 100% of proceeds diverted towards the airline's SAF program
Southwest	• Southwest[84] is committed to achieving net zero carbon emissions by 2050 and has set a SAF blend target of 10% by 2030. • In 2024, Southwest Airline Renewable Ventures (SARV), the airline's subsidiary, announced a $30 million investment in Lanzajet, an AtJ SAF provider • The airline has also partnered with Valero, Prime Energy, Neste, Phillips 66, etc. to procure SAF

[78] https://www.iairgroup.com/sustainability/sustainable-aviation-fuel/
[79] https://www.iairgroup.com/investors-and-shareholders/financial-reporting/annual-reports/
[80] https://www.jetblue.com/sustainability
[81]https://s202.q4cdn.com/986123435/files/images/esg/American-Airlines-Sustainability-Report-2024.pdf#page=22
[82] https://esghub.delta.com/content/esg/en/2024/path-to-sustainability.html
[83] https://news.delta.com/delta-partners-maeve-aerospace-advance-hybrid-regional-aircraft
[84] https://www.southwest.com/citizenship/planet/sustainable-aviation-fuels/

Airline	SAF initiative
UNITED	• United Airlines[85] is committed to reducing 100% of its GHG emissions by 2050, with SAF expected to play a major role • In 2023, the airline launched UAV Sustainable Flight Fund, to support startups associated with SAF • Customers can contribute to United's sustainable flight account, used to invest in SAF research, technology and production.
AIR CANADA	• Air Canada aims to achieve 30% GHG net reduction by 2030 and net zero emissions by 2050 (as compared to 2019) • The airline has developed a $50 million investment fund for new technologies such as SAF

Table 1 SAF targets set by primary airlines serving Jamaica

As these airlines expand SAF use, uplifting SAF in Jamaica could be particularly attractive if Jamaica further positions itself as a sustainable tourism destination, enabling collaboration between airlines and tourism stakeholders and supporting broader sustainability propositions around leisure travel. In practice, however, demand will depend heavily on the SAF premium relative to conventional jet fuel. That premium can be reduced through policy options that improve availability, lower delivered cost, and support uptake, which are likely to be key enablers of domestic SAF demand.

1.12.3 Jamaica SAF demand projections

Using the jet fuel demand forecast and applying a range of SAF blends, three SAF demand scenarios were developed to capture a broad, but plausible, range of outcomes. These scenarios will depend on several factors, including:

- **Supportive domestic policy:** the extent to which Jamaica encourages SAF uplift by supporting availability and enabling uptake, including through measures that improve cost competitiveness or reduce other barriers.
- **Global SAF development:** the pace at which global SAF supply scales, particularly the commercialisation of advanced technologies and associated cost declines.
- **Global sector net-zero ambition:** the extent to which the aviation sector remains committed to net-zero goals, which will be influenced by broader international policy and market signals.

The SAF blend targets applied in this study are summarised on the table below.

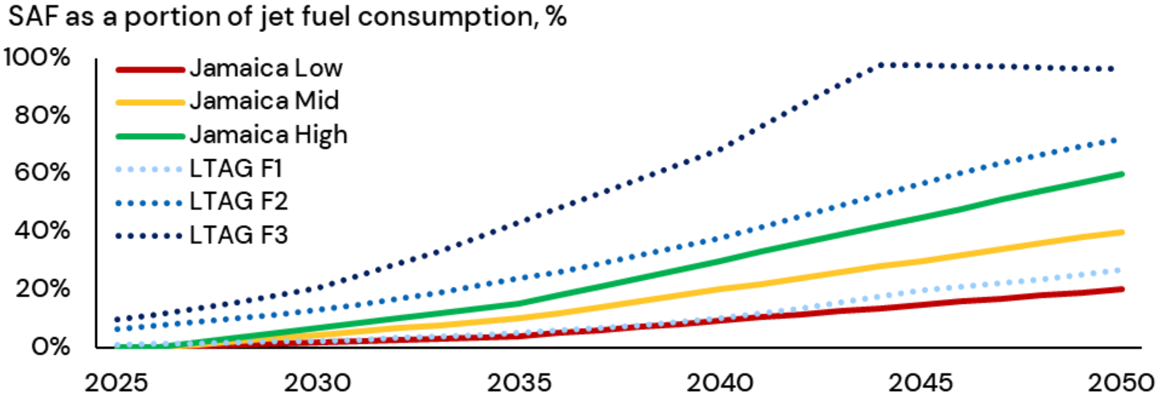
Scenarios	2035 SAF blend target	2050 SAF blend target
Low	4%	20%
Medium	10%	40%
High	15%	60%

Table 2 SAF blend targets

In 2022, ICAO adopted the long-term global aspirational goal (LTAG) for decarbonising international aviation. Three scenarios were developed across different traffic levels and different decarbonisation levers, including aircraft technology improvements, operational efficiencies, and fuels[86]. The SAF blend scenarios used for Jamaica are compared to the LTAG fuel scenarios (F1, F2, F3) on the figure below. The scenarios proposed for Jamaica remain relatively modest compared to the LTAG, with Jamaica's low-demand case falling below LTAG F1, and both the medium and high cases falling below LTAG F2. This reflects that regions with existing mandates or established SAF industries are likely to achieve higher SAF blends earlier, and it also reflects Jamaica's context as a developing nation with a relatively small but highly important air travel market and renewable energy infrastructure that remains in earlier phases of development.

[85] https://www.united.com/en/us/fly/company/responsibility/our-environmental-commitment.html
[86] https://www.icao.int/environmental-protection/ltag-report

ICF developed three national SAF scenarios each with a varying level of ambition and feasibility

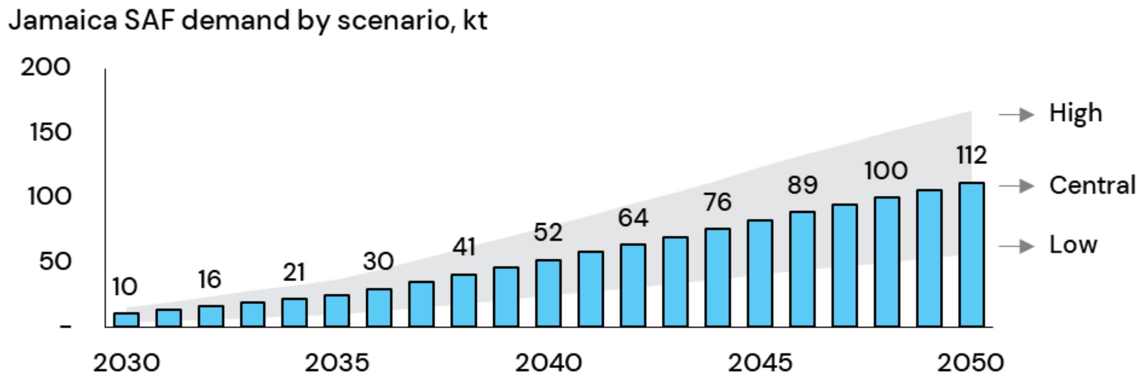


Source: ICAO LTAG; ICF analysis

Figure 29 SAF scenarios

On the other hand, Jamaica's jet fuel market is relatively small compared to larger aviation regions. As a result, achieving a given blend target requires lower absolute SAF volumes than in larger markets. Combining the jet fuel consumption forecast with the blend assumptions results in 2035 uplift estimates of 10 kt, 24 kt, and 37 kt for the low, medium, and high scenarios, respectively. By 2050, these increase to 56 kt, 112 kt, and 168 kt, as shown on the figure below.

Based on the proposed scenarios, Jamaica's SAF demand is projected at 24-78 kt by 2040, rising to 56-168 kt by 2050



Source: ICF analysis

Figure 30 Jamaica's projected SAF demand

Using the same methodology, SAF demand across the wider Caribbean is projected to reach 0.7–2.2 Mt. This presents an opportunity for Jamaica to capture a meaningful share of regional demand and position itself as a SAF hub, subject to its competitiveness, logistical capabilities, and ability to scale supply.

2 SECTION 2: Evaluation of Feedstocks and Pathways for SAF Production

2.1 Introduction

One of the most important elements of having a self-sustaining domestic SAF industry is domestic feedstock availability. While feedstocks can technically be imported for SAF production, there are many reasons why using domestic feedstocks would be beneficial in the case of Jamaica. On the economic side, building domestic feedstock supply chains can create jobs and value. On the supply side, it reduces reliance and exposure on global markets, that are volatile and increasingly shaped by policy. While a number of feedstocks are already heavily traded commodities in the context of biofuels, such as Used Cooking Oil (UCO), these flows can be volatile as policy and markets shift. For instance, the Asia Pacific region has been a large exporter of feedstocks over the past few years to the U.S. and Europe. However, as the region scales its own SAF production capacity and mandates come into effect, countries are enacting measures such as removing export tax rebates, which are likely to constrain global flows[87].

Moreover, many advanced feedstocks have relatively low energy and bulk densities. This means the volume of feedstock that would have to be transported is high compared to the SAF it could produce, increasing both transportation costs and the carbon intensities of the feedstock.

This section therefore explores a number of key feedstocks that could be potential sources for SAF production in Jamaica.

2.1.1 Methodology

This section starts by giving a high-level description of feedstock-to-SAF conversion technologies, followed by a similarly high-level overview of the sustainability attributes of SAF. Following this, feedstocks are assessed in detail under six key groups:

1. Fats, oils, and greases (FOGs);
2. Crop-based ethanol;
3. Agricultural residues;
4. Solid waste;
5. Wet waste;
6. and CO_2 and renewable energy.

Each sub-section provides (i) an overview of the feedstock, (ii) its technological conversion pathways, (iii) its sustainability, (iv) an availability assessment., and (v) its opportunities and challenges for SAF. The availability assessment, capturing 2025 to 2050, answers the following questions for each feedstock:

- **How much will be generated?** The total amount of potential feedstock generated.
- **How much will be uncollectable?** The portion of total possible feedstock supply that would be economically unviable or unsustainable to collect.
- **How much will be utilized by other sectors?** The portion of supply that is projected to be used outside the aviation sector.

The methodology then subtracts the volumes considered uncollectable and those projected to be utilised by other sectors from total generation to estimate the feedstock availability for aviation. The estimated availability of all feedstocks is presented in Appendix B.

The sources and assumptions used for the availability assessment vary by feedstock, but they are labelled throughout. Jamaica-specific statistics were used wherever possible to characterise

[87] https://www.spglobal.com/energy/en/news-research/latest-news/agriculture/022125-interactive-used-cooking-oil-market-trade-dynamics-uco-prices

current conditions, drawing mainly on publicly available information from relevant Government Ministries and global databases such as United Nations Food and Agriculture Organization (FAO). International benchmarks were then used to inform forward-looking assumptions, including how collection rates could scale under different support and market conditions. These assumptions were evaluated and refined through stakeholder consultation undertaken during the on-site visit, as well as through a survey.

Three scenarios are derived for each feedstock:

- ***Business as usual (BAU)***, which would likely be driven by the free market only;
- ***Mid-case***, driven by supportive policies;
- and ***Ambitious***, where support matches the top of global standards and, in some cases, global technology trends scale at a rapid rate.

Different feedstocks translate to different amounts of SAF[88] and have unique challenges and opportunities. The SAF opportunities and challenges sub-section therefore draws on the high-level SAF potential for each scenario, what is required to realise that potential, and a conclusion on what the feedstock means for Jamaica. This is done on a feedstock category basis, but Section 2.9 will tie these outputs together into potential supply scenarios for SAF production in Jamaica, including economic benefits and potential co-products.

2.1.2 Overview of feedstock to SAF conversion processes

SAF can be produced through numerous technology pathways from different feedstocks. As shown on the table below, there are eleven SAF production pathways approved, with eight direct conversion processes under ASTM D7566 and its related annexes, and three co-processing pathways under ASTM D1655[89]. Eleven more pathways are under consideration. However, ASTM approval is not a reflection of the commercial status of a technology or its sustainability. Rather, it is a measure of jet fuel quality and whether it is fit for purpose.

ASTM approved pathways	ASTM pathways under evaluation
Fischer-Tropsch hydroprocessed synthesized paraffinic kerosene	Synthesized aromatic kerosene
Synthesized paraffinic kerosene from hydroprocessed esters and fatty acids	Integrated hydropyrolysis and hydroconversion
Synthesized iso-paraffins from hydroprocessed fermented sugars	Single Reactor HEFA (Drop-in Liquid Sustainable Aviation and Automotive Fuel)
Synthesized kerosene with aromatics derived by alkylation of light aromatics from non-petroleum sources	Coprocessing of Pyrolysis bio-oil from non-recyclable plastics
Alcohol to jet synthetic paraffinic kerosene	Co-processing of pyrolysis oil from used tires
Catalytic hydrothermolysis jet fuel	Methanol to jet
Synthesized paraffinic kerosene from hydrocarbon - hydroprocessed esters and fatty acids	Increase in fatty acid/ester co-processing from 5% to 30%
Synthetic Paraffinic Kerosene with Aromatics	HEFA with higher cycloparaffins
co-hydroprocessing of esters and fatty acids in a conventional petroleum refinery	Biomass pyrolysis
co-hydroprocessing of Fischer-Tropsch hydrocarbons in a conventional petroleum refinery	Biomass/Waste pyrolysis
Co-Processing of HEFA	Cycloalkanes from Ethanol

[88] See Appendix B for the conversion factors used in this study, which may vary by facility
[89] https://www.icao.int/SAF/saf-conversion-processes

Table 3 Overview of ASTM pathways

Only the HEFA pathway, based on standalone and co-processing methods, is currently fully commercial with numerous operational facilities on a large scale. However, most HEFA facilities primarily produce renewable diesel (HVO), driven by feedstock chemistry, policy, and economic factors, with only a few producing SAF. Globally, the HEFA pathway is expected to dominate SAF production through the 2030s[90].

While the feedstock and technology analysis is discussed as SAF pathways, these technologies generally produce multiple products that can be used to decarbonise other transportation sectors, such as the gasoline and diesel pools, fuels for marine shipping, and even the chemical industry. Whether SAF is produced as one of several products in a biorefinery (or produced at maximum potential volumes) is based on economics and driven by policy measures that support SAF production. Shifting production to maximum SAF generally comes at an increased cost, and policy drivers are essential.

2.1.3 Overview of feedstock sustainability

Sustainability is a central consideration for SAF, as it determines whether a given pathway delivers genuine emissions reductions, avoids adverse land-use impacts, and can be demonstrated through a transparent and traceable supply chain. CORSIA is the United Nations framework that establishes the international benchmark for SAF sustainability and defines whether a fuel can be recognised as a CORSIA-eligible fuel (CEF), which affects marketability and the ability for airlines to use SAF towards their decarbonisation requirements. The key principles for CORSIA eligible are shown in the table below[91].

Theme	Principle
Greenhouse Gases (GHG)	CORSIA SAF should generate lower carbon emissions on a life cycle basis.
Carbon stock	CORSIA SAF should not be made from biomass obtained from land/aquatic systems w/high biogenic carbon stock.
Greenhouse gas Emissions Reduction Permanence	Emissions reductions attributed to CORSIA SAF should be permanent.
Water	Production of CORSIA SAF should maintain or enhance water quality and availability.
Air	Production of CORSIA SAF should minimize negative effects on air quality.
Conservation	Production of CORSIA SAF should maintain biodiversity, conservation value, and ecosystem services.
Waste and Chemicals	Production of CORSIA SAF should promote responsible management of waste and use of chemicals.
Seismic and Vibrational Impacts	Production of CORSIA SAF should minimize seismic, acoustic, and vibrational impacts from CCS.
Human and labour rights	Production of CORSIA SAF should respect human and labour rights.
Land use rights and land use	CORSIA SAF production should respect land rights & land use rights including indigenous and/or customary rights.
Water use rights	Production of CORSIA SAF should respect prior formal or customary water use rights.
Local and social development	Production of CORSIA SAF should contribute to social and economic development in regions of poverty.

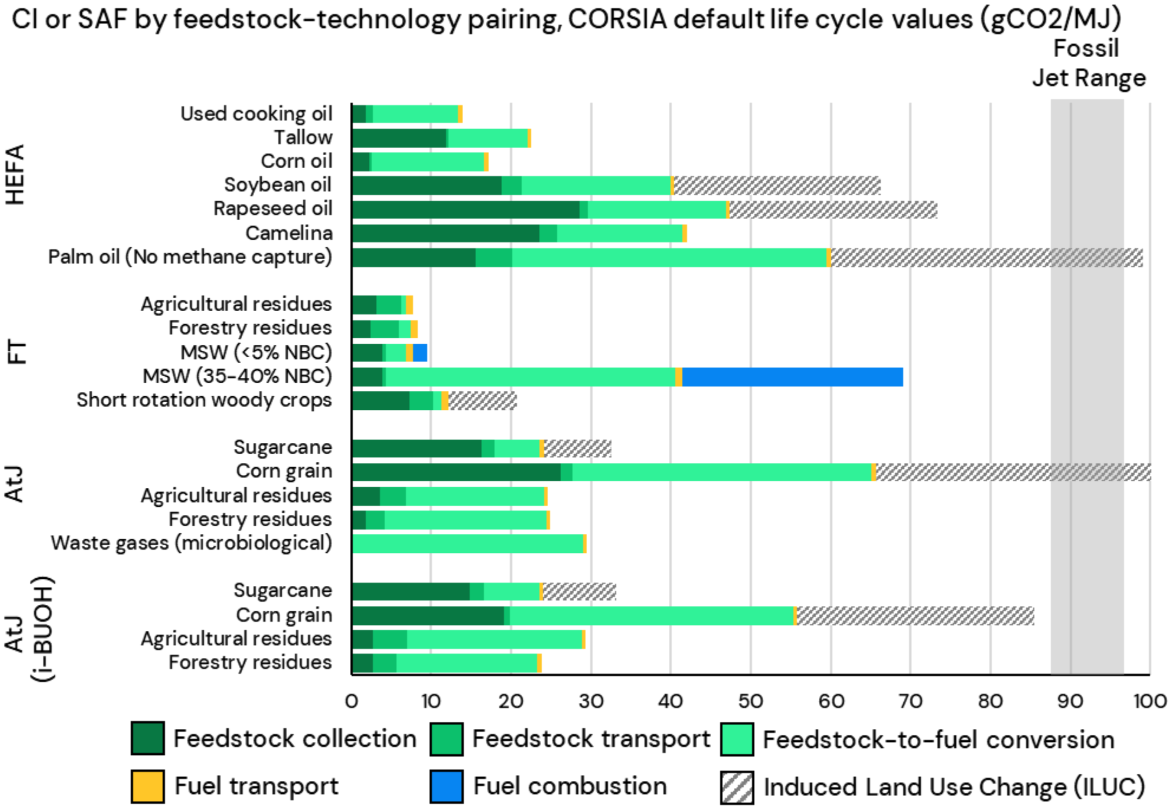
[90] https://skynrg.com/safmo25/
[91] https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Fuels/ICAO-document-05-Sustainability-Criteria-June-2025.pdf

Theme	Principle
Food security	Production of CORSIA SAF should promote food security in food insecure regions.

Table 4 Overview of feedstock sustainability

In terms of emissions reductions, each feedstock and technology combination can vary significantly in carbon intensity, and in some cases can actually be higher than that of conventional aviation fuel. The chart below highlights the CORSIA default carbon intensities of different feedstock-technology combinations[92]. However, it must be noted that carbon intensity will vary on a facility-by-facility basis, as each will have its own characteristics.

The carbon intensity (CI) of a SAF depends on factors including feedstock, technology pathway, and supply chain specifics



Source: CORSIA - The first internationally adopted approach to calculate life-cycle GHG emissions for aviation fuels. Note: Some of these feedstocks (e.g., food crops) are not eligible under EU or UK schemes

Figure 31 Carbon intensity by feedstock-technology pairing

A notable component of SAF carbon intensity is indirect land-use change (ILUC), which refers to the potential increase in emissions that occurs when feedstock production displaces existing agricultural activities, leading to land conversion elsewhere.

Beyond the global objective to reach net-zero, there are a number of reasons why the carbon intensity of a pathway is critical:

- **Eligibility thresholds differ by jurisdiction.** Choosing a sustainability threshold is a key design choice for any SAF policy, which varies across the world. Compared to a fossil jet baseline of

[92] https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Fuels/ICAO-document-06-Default-Life-Cycle-Emissions-June-2025.pdf

89 gCO_2/MJ, eligible SAF under CORSIA must meet a 10% reduction, whereas to meet the UK SAF mandate it must meet a 40% reduction. Similarly, in the US, to generate 45Z tax credits, a 50% carbon intensity reduction is required.

- **Market design can reward lower carbon intensity.** The value of SAF is not always driven by volume, but by carbon intensity under certain frameworks, which can shift the attractiveness of pathways under similar production costs. In the UK, for instance, lower carbon intensity scores generate more certificates towards the mandate, effectively linking market value to carbon intensity on a certificate basis[93]. Similarly, mandates such as Brazil are set on an abatement basis, making carbon intensity a central factor.
- **Environmental attributes can have differentiated value.** SAF consumers (e.g., airlines) can sell the environmental attributes of SAF to corporates, making fuels with lower carbon intensities more valuable on the commercial side.

Measures such as carbon capture at facilities can significantly reduce carbon intensity beyond the CORSIA default values, even to negative values in some cases. A year-on-year emissions reduction is also assumed in this study for each pathway to 2050 as a result of efficiency improvements and other measures such as the electrification of transport, as detailed in Section 2.9.2.

2.2 Fats, oils, and greases

2.2.1 Feedstock overview

Fats, oils, and greases (FOGs) include both waste FOGs and virgin oils. The two most common waste FOGs used in biofuel production are UCO and animal fats. UCO, commonly classified as yellow grease in North America, is the waste generated from commercial and domestic food preparation. It is the most prominent SAF feedstock today because the conversion technology is mature and its carbon intensity is comparatively low[94].

Animal fats are primarily produced as by-products of meat processing and rendering. Like UCO, they are an attractive SAF feedstock due to their low carbon intensity, particularly inedible fractions that do not compete with food uses.

SAF can also be produced from vegetable oil crops such as soybeans and rapeseed. Although these feedstocks are not eligible under policies such as ReFuelEU due to their alternative uses for food, CORSIA does not prohibit the use of such feedstock provided the sustainability criteria for CEF is met and at least a 10% reduction in carbon intensity is achieved.

FOGs can be upgraded to SAF via the HEFA pathway through hydroprocessing in standalone facilities or through co-processing within existing petroleum refineries. HEFA offers the strongest near-term potential to deliver SAF volumes because it is fully commercial and the feedstock is relatively straightforward to upgrade. When applied via co-processing, existing refinery infrastructure and supply chains can reduce the capital and operating burden of SAF production.

Waste FOG-based HEFA, particularly from UCO, currently dominates global supply due to mature technology and favourable sustainability attributes. The issue, however, is that the global supply of waste FOGs is finite, as the amount of UCO available is constrained by vegetable oil consumption and the amount of animal fats available is tied to livestock production. It is estimated that this supply will only meet global demand until the early 2030s, at the latest, at which point other SAF technologies will be required[95].

2.2.2 Technology pathways

The primary technological pathway for waste FOGs is HEFA, an established and commercialised technology used globally today, the steps of which are illustrated in the figure below. If only hydrotreatment is carried out, the entire liquid product can be sold as renewable diesel. With additional isomerisation, cold-flow properties can be improved, and if fractionation is carried out

[93] 1 litre of SAF with a GHG reduction of 70% yields approximately 1 SAF certificate under the UK mandate
[94] https://research-hub.nrel.gov/en/publications/sustainable-aviation-fuel-state-of-industry-report-hydroprocessed/
[95] https://skynrg.com/safmo25/

after isomerisation, a SAF fraction of about 15–20% can be produced, with the remainder being renewable diesel.

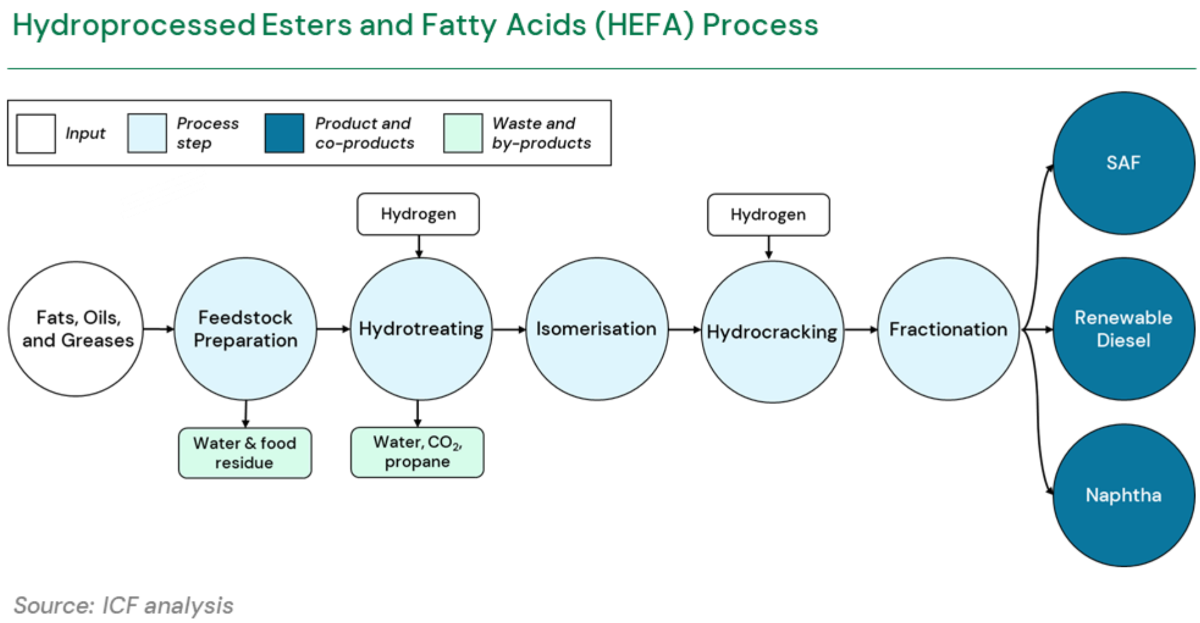


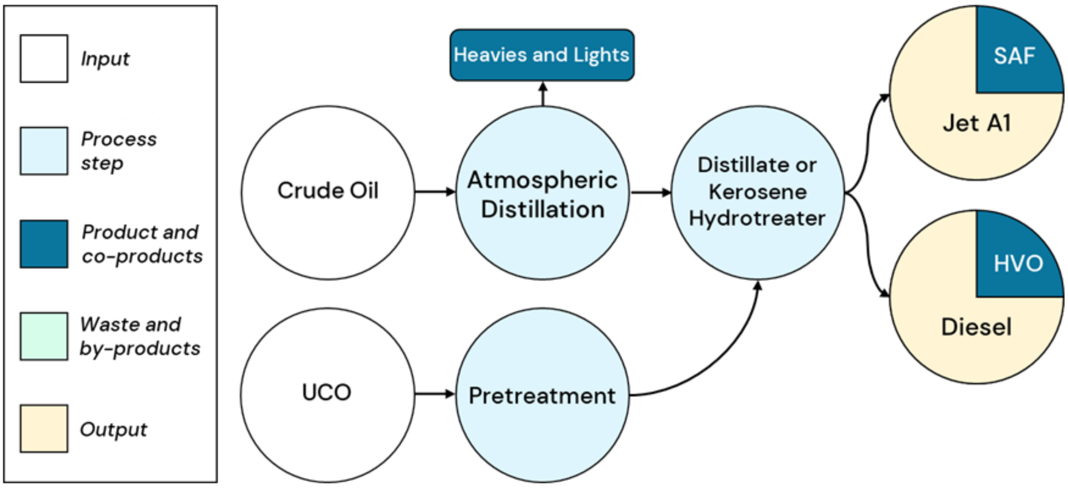
Figure 32 HEFA process

The SAF fraction can be increased by applying hydrocracking, which creates shorter hydrocarbons in the naphtha range. Depending on the extent of hydrocracking, the SAF fraction can be increased, potentially as high as 70%. However, higher SAF fractions result in more naphtha and gases and reduce total liquid yield. The biorefinery can adjust the product slate based on market conditions, the availability of processing units, and hydrogen[96].

One of the key opportunities for HEFA is integration into existing refineries via co-processing. The figure below shows a basic refinery configuration and potential insertion points for biobased feedstocks at the fluid catalytic cracker, hydrotreater, or hydrocracker. Under ASTM D1655, up to 5% oils and fats feedstocks can be co-processed to produce jet fuel, and hydrotreatment must form part of the processing. Co-processing can also be used using FT liquids, with further potential integration based on alcohol-to-jet, pyrolysis, and hydrothermal liquefaction technologies.

[96] https://doi.org/10.1002/bbb.1378

Co-processing with HEFA Process



Source: ICF analysis

Figure 33 Co-processing with HEFA process

2.2.3 Sustainability

The CORSIA default values of the waste FOGs considered in this study (namely UCO and animal fats), for both a freestanding facility and co-processing, are shown on the table below[97]. Part of the reason for their global popularity relative to other FOG feedstocks is their high carbon intensity reduction, at 84% for UCO and 68% for mixed animal fats under the default values shown.

Feedstock	CORE value (gCO2eq/MJ)	ILUC value (gCO2eq/MJ)	Emission Reduction (%)	Additional Specifications
Standalone Facility				
UCO	13.9	N/A	84%	Correction value if hydrogen used is produced from coal: + 5.7 gCO2e /MJ Correction value if process heat is produced from coal: +4.9 gCO2e /MJ
Mixed Animal Fats	28.6	N/A	68%	Correction value if hydrogen used is produced from coal: + 6.6 gCO2e /MJ Correction value if process heat is produced from coal: +5.3 gCO2e /MJ
Co-processing				
UCO	16.7	N/A	81%	Maximum of 5% of used cooking oil in volume

[97] https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Fuels/ICAO-document-06-Default-Life-Cycle-Emissions-June-2025.pdf

Feedstock	CORE value (gCO2eq/MJ)	ILUC value (gCO2eq/MJ)	Emission Reduction (%)	Additional Specifications
				Feedstock inserted at either the hydrotreater (HDT) or hydrocracker (HYK) points
Tallow	27.2	N/A	69%	Maximum of 5% in volume Feedstock inserted at either the hydrotreater (HDT) or hydrocracker (HYK) points

Table 5 CORSIA default values of waste FOGs

It is also worth noting that the values and correction factors shown below are not the only variables that can affect the true carbon intensity of SAF produced from these feedstocks. In practice, carbon intensity depends on case-specific characteristics, such as hydrogen sourcing, process heat, logistics, plant integration, and facility efficiency. In the case of the inedible fraction of animal fats, SAF produced from these feedstocks is likely to qualify under most regulatory frameworks[98]. In this study, only the inedible fractions are considered, as edible fractions face additional competing demand and to avoid additional trade-offs with food uses.

One of the key global sustainability challenges with UCO, however, is fraudulent activity, where virgin vegetable oil is sold as, or mixed with and sold as, UCO[99]. The main driver for this is economics: as global biofuel demand has pushed up UCO prices, UCO can become more valuable than virgin vegetable oils, especially in developing economies. A mitigation option is robust auditing and traceability, but audits are not consistently applied internationally. This highlights the importance of certification systems, which will be described in later chapters.

This issue matters particularly in jurisdictions such as the EU and UK because virgin oils are not waste feedstocks and many have significantly higher carbon intensities than UCO. As an example, soybean oilseed has a base carbon intensity of 40.4 and an ILUC value of 22.5, meaning the overall reduction is under 30% when ILUC is included. This also illustrates differences in policy design. In the US, ILUC values are excluded from the carbon intensity calculation in many policy requirements, meaning the reduction would be 55% under that approach. These facets highlight the importance of Jamaica's choice in sustainability criteria if it develops a SAF framework. A caveat is that certain non-waste crops can have low, or in some cases negative, ILUC values. These include intermediate oilseeds (as later described, such as camelina) which may not displace other crops.

2.2.4 Availability assessment

Vegetable Oils

In 2023, Jamaica consumed approximately 73 kt of vegetable oils[100]. Within this total, about 49% was used for food and about 22% for processing. Jamaica imported more than half of the vegetable oil it consumed, which highlights a structural reliance on external supply, as visualized below. Given the relatively limited volumes of domestically produced vegetable oils coupled with its use for food, as well as its limited emission reduction potential, it was not deemed as a viable feedstock for SAF in Jamaica.

[98] For instance, under the EU's Renewable Energy Directive, animal fats are categorized into three categories: Categories 1 and 2 are high and medium risk, respectively, and both are unfit for human consumption and qualify as waste-based, while Category 3 animal fats are low risk and edible; https://www.transportenvironment.org/uploads/files/202304_Animal_fats_briefing_TE_2024-04-29-153801_lrqe.pdf
[99] https://www.transportenvironment.org/articles/uco
[100] FAO

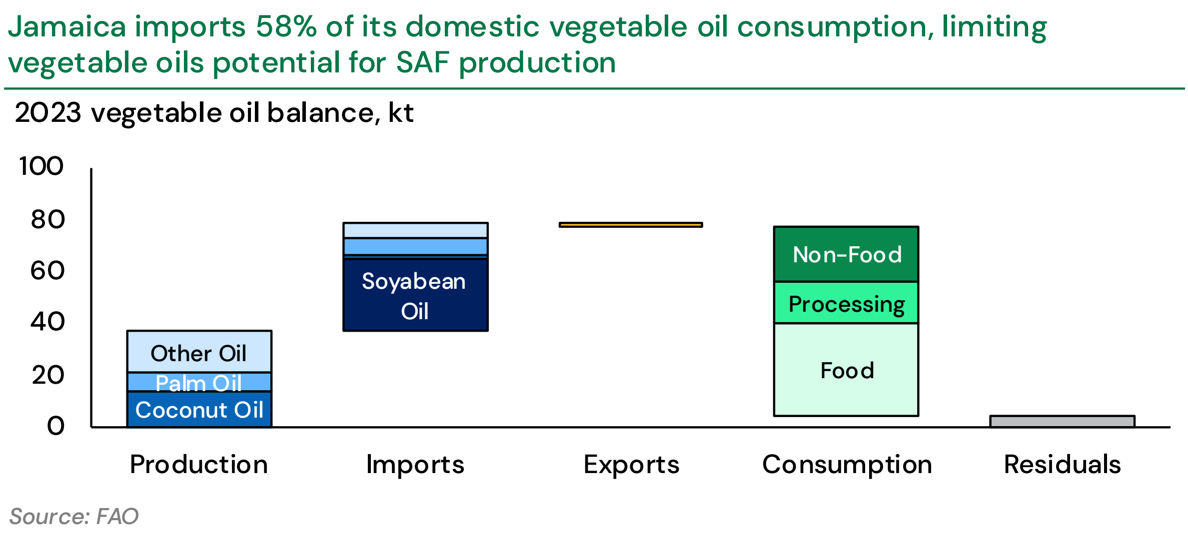


Figure 34 Jamaica's vegetable oil balance

UCO

UCO generation depends on the level of vegetable oil consumption across the population and as a rule of thumb, one tonne of vegetable oil consumed generates approximately 320 kg of UCO[101]. For this study, UCO generation per capita was estimated based on the vegetable oil consumption figures described in the previous section. Per capita food-use consumption of vegetable oil was calculated for both residents and tourists at approximately 12 kg per year[102]. These per capita figures were then multiplied by urban resident population projections, non-urban resident population projections, and tourism population projections to estimate annual UCO generation by group. For residents, approximately 41% of UCO generation was estimated to occur at restaurants, using benchmarks from the EU[103]. Processing-related generation was apportioned on a per capita basis for residents and projected forward with population growth.

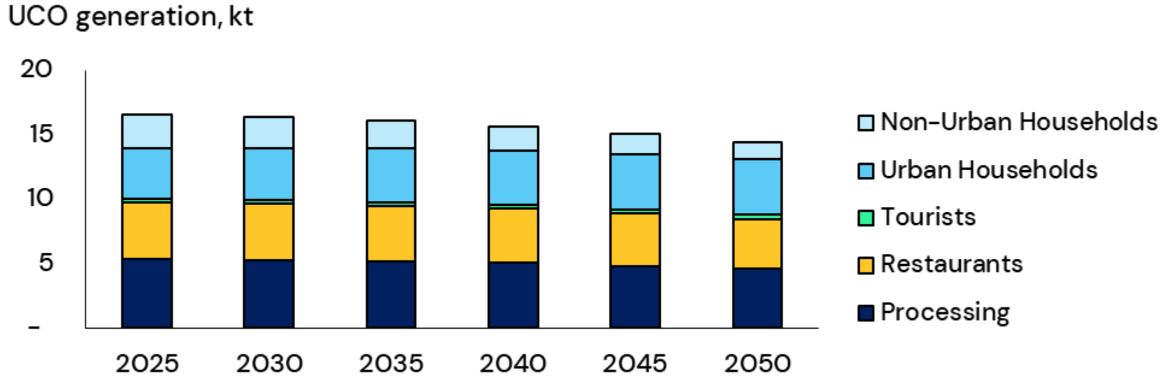
UCO generation can be categorized across several source categories, each with distinct collection characteristics, which are ordered below from lowest to highest ease of collection[104]:

- **Food processing facilities** generate UCO at larger, centralized sites, where collection is expected to be straightforward due to scale and regularity of operations.
- **Tourism-related** generation is concentrated at large hotels and restaurants, resulting in mostly straightforward logistics
- **Restaurants** generate significant and concentrated quantities of UCO, making collection most viable at larger, high-volume venues.
- **Urban households** produce small quantities per household, which can be economically collected in dense neighbourhoods with organized programs.
- **Non-urban households** are more dispersed and produce small per-site volumes, which makes collection challenging and often uneconomic.

The estimated generation per each category is shown on the figure below.

[101] https://www.sciencedirect.com/science/article/abs/pii/S0956053X18303945
[102] Based on the vegetable oil consumption figures previously described
[103] https://assets.publishing.service.gov.uk/media/5a74ebade5274a3cb286840c/ecofys-trends-in-the-uco-market-v1.2.pdf
[104] https://theicct.org/wp-content/uploads/2022/02/UCO-from-Asia_wp_final.pdf

Jamaica is estimated to generate approximately 16.5 kt of UCO at present, around half of which originates from food processing and restaurants



Source: ICF analysis, FAO

Figure 35 Jamaica's UCO generation

Availability is determined not only by generation but also by collection rates, which vary by source and jurisdiction, as seen on the table below. Cross-country estimates from the ICCT and T&E indicate household collection rates ranging from 0% to approximately 23%, restaurant collection rates ranging from about 8% to 88%, and food processing collection rates commonly in the 45–80% range, as presented in the table below[105].

Country	Households	Restaurants	Food Processing
China	0%	70%	80%
Europe	12%	75%	75%
India	1%	8%	45%
Indonesia	8%	25%	80%
Japan	4%	30%	45%
Malaysia	16%	35%	80%
Korea	23%	88%	80%
ICCT Maximum	50%	100%	100%

Table 6 UCO collection rates

In Jamaica, several firms already collect UCO, including RE3 Recovery Services Ltd[106]. Based on discussions with stakeholders, majority of UCO from tourism establishments as well as large eateries is already collected. There was said to be significant potential still, however, at small and medium-scale restaurants, of which many are pouring UCO down the drain.

Three scenarios were derived for UCO collection potential. In the mid-case the weighted average of collection doubles from around 25% to 50% between 2025 and 2030, driven by significantly increased collection rates at small and medium-scale restaurants rapidly scale, as well as in the food processing sector[107]. To 2050, these sectors continue to develop while a modest amount from urban households becomes viable to collect, leading overall collection to become almost 60%. In the BAU scenario, collection remains unchanged through 2030 with a moderate increase from there on out, while in the ambitious case, the maximum collectable potential of 75% is reached by 2050.

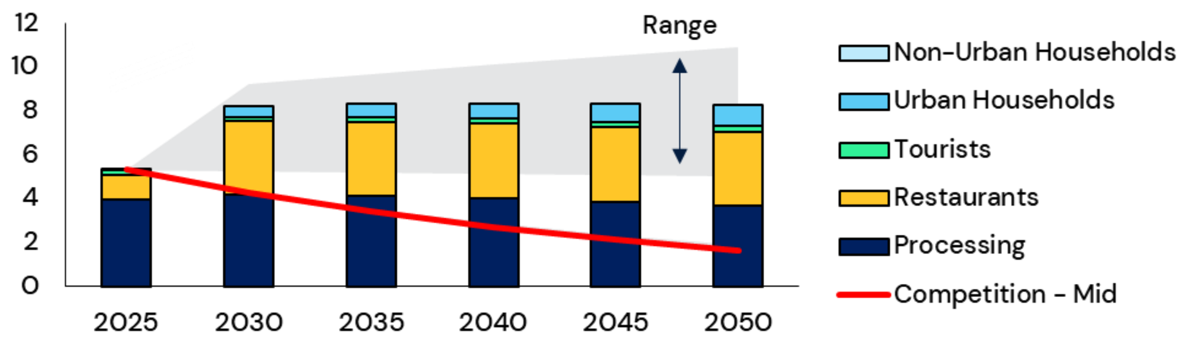
[105] https://theicct.org/wp-content/uploads/2022/02/UCO-from-Asia_wp_final.pdf; https://www.transportenvironment.org/uploads/files/TE_UCO-Study_Stratas_11062024_2024-06-17-103904_bjrt.pdf
[106] https://www.re3jamaica.com/about-us
[107] Based on industry benchmarks and discussions with stakeholders

As understood from discussions with stakeholders, all currently collected UCO volumes are being utilised by the animal feed and soap sectors. With rising global demand expected to tighten waste FOG supply, international prices are likely to increase. In the absence of domestic SAF production, waste FOGs would become more valuable as an export than for use in animal feed and soap production, prompting domestic industries to substitute alternative inputs. Consequently, the assumed annual decline in competing uses of waste FOGs, set at 4% plus the change in population, is treated as a reduction in domestic competition, with the displaced volumes assumed to be exported.

Aviation-available UCO is defined as expected collection minus competing uses. As seen on the figure below, under the mid-case scenario, availability is projected at approximately 3.9 kt in 2030 and 6.6 kt in 2050. Depending on collection rates, the range of outcomes could be 0.9–4.9 kt in 2030 and 3.1–9.3 kt in 2050. As will be explored further in this study, the SAF production potential associated with these volumes is limited and significantly below the levels required to support a standalone HEFA facility.

UCO collection volumes could reach 0.9-4.9 kt by 2030 and 3.1-9.3 kt by 2050, contingent on the level of ambition

UCO collection (bars) and competing use (line), kt



Source: ICF analysis

Figure 36 Forecast UCO collection volumes

The potential for imports: Given relatively limited domestic volumes, Jamaica could consider importing UCO from nearby islands. Applying the same assessment framework, mid case UCO collection potential in the Dominican Republic and Haiti totals around 30 kt in 2030. If 10% of that volume were diverted to Jamaica, this would be approximately 3 kt in 2030. A similar 10% diversion in 2050 could be 4.7 kt, with potential upside if Jamaica improves its own collection rates and establishes itself as a regional importer.

This is similar to the model that has emerged in Singapore, driven by Neste's 2.6 Mt renewable fuel facility[108]. Despite limited domestic generation, the island imports around 1.2 Mt of UCO per year from nearby countries such as Malaysia[109]. Among factors such as established ports and favourable policy, a key driver has been first-mover advantage. Understood from stakeholder feedback, one of the key challenges for Jamaica will be establishing trade routes with other islands, as these routes are understood to be underdeveloped today.

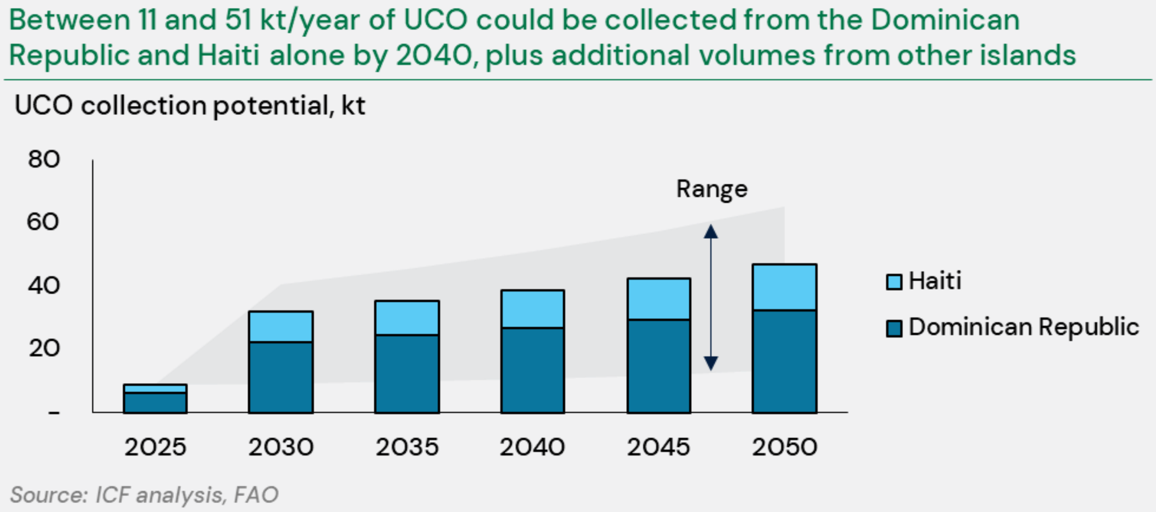


Figure 37 UCO collection potential from Dominican Republic and Haiti

Animal fats

In 2024, Jamaica's livestock sector processed around 160 kt of animals, with poultry accounting for around 90% of total output[110]. This produced approximately 28 kt of animal fats, of which about 7 kt is considered inedible, as shown on the figure below[111]. These estimates draw on academic literature and case studies and serve as the basis for the availability analysis. Production of fish, pig, and cattle is assumed to grow at the same rate as Jamaica's population. For poultry, announced plans call for an expansion of the sector by 200 kt by 2025. That target forms the ambitious case in this assessment, with the mid case represented by achievement of half the target.

[108] https://www.neste.com/en-sg/about-neste/how-we-operate/production/singapore-refinery
[109] Based on UN COMTRADE
[110] https://www.moa.gov.jm/sites/default/files/livestock_statistics_2024.pdf; Fisheries-Quartely-Statistics-Report-_-Volume-3-Issue-3-FINAL.pdf
[111] Cattle and Poultry: https://www.researchgate.net/publication/305345394_Perspectives_on_the_utilization_of_waste_fat_from_beef_cattle_and_fowl_for_biodiesel_production_in_Mexico_Potential_production_of_biodiesel_from_animal_fat_in_Mexico; Pigs: https://www.transportenvironment.org/uploads/files/202304_Animal_fats_briefing_TE_2024-04-29-153801_lrqe.pdf; Fish: https://bioenergyinternational.com/green-fuels-research-to-head-salmo-fish-waste-to-biofuel-project

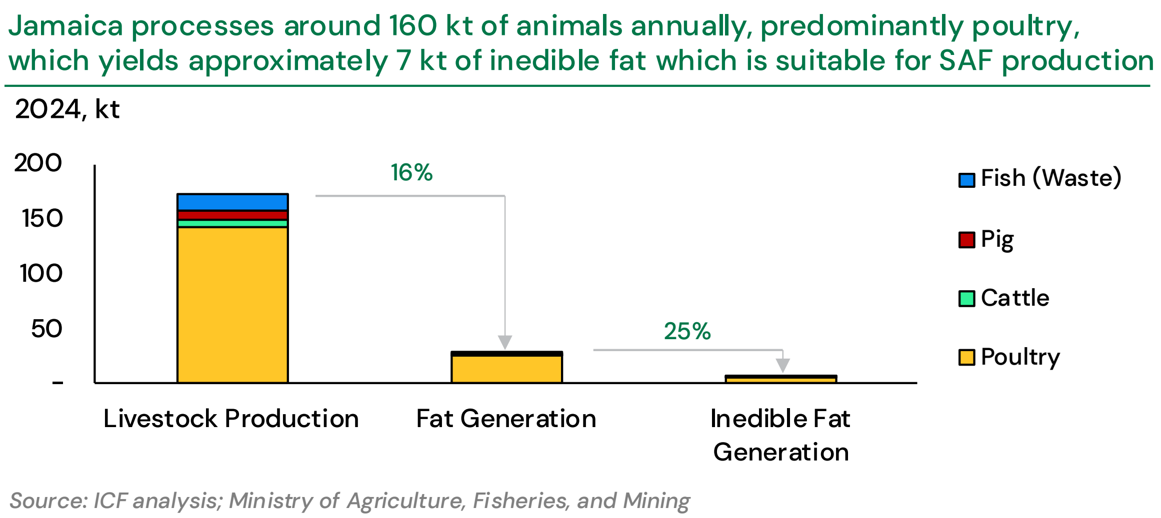


Figure 38 Volume of animal fats suitable for SAF production

Jamaica has two large, commercial broiler chicken farms that can be potential sources of animal fats, the Jamaica Broilers Group and the CB Group (Caribbean Broilers). CB Group recently commissioned a dedicated, rendering plant to produce protein meal and tallow from residues. However, it is understood from stakeholders that significant collection potential of animal fats remain, particularly from poultry. This study assumes that under the mid-case, collection of inedible animal fats could theoretically be scaled from around 40% to 80% by 2030, with the low and high case being 70% and 90%, respectively[112]. Onwards from 2030, it is projected that supply scales mostly due to increased output from the sector rather than increased collection.

There is competition from other sectors for inedible animal fats, particularly the industry. Similar to UCO, it is assumed that all inedible animal fats being collected today are utilized by these sectors, but that competition will reduce at an annual rate of 4% plus population change as a result of global market prices.

This translates into an estimated 2.4–5.3 kt of inedible animal fats available for SAF production by 2030 (3.8 kt in the mid-case), increasing to 3.7–13.7 kt by 2050 (8.5 kt in the mid-case).

Other FOGs

Brown grease, including trap grease that enters sewer systems, was suggested by stakeholders as a potential HEFA option given its abundance. However, it entails additional costs and complexity to collect, and requires substantial pre-treatment compared to UCO. These factors are likely to make it economically unviable into the future[113].

Castor oil has been explored as a supplementary feedstock. Jamaican Black Castor Oil (JBCO) has gained prominence in export markets, particularly in the United States for cosmetic applications. Annual demand for castor oil in the United States is approximately 4.2 kt, of which 15% is labelled as JBCO, and only 29% of that JBCO volume originates in Jamaica[114]. Even if Jamaica were to expand supply beyond current levels (under 200 tonnes), available volumes would remain negligible relative to SAF requirements. JBCO is also far more valuable than UCO based on its current application.

Intermediate oilseeds are those planted on marginal land or in the off-season and therefore do not compete with food. While these crops have been explored, large-scale adoption has been constrained by agronomic challenges and concerns around economic viability for farmers[115]. Based on stakeholder inputs, some land with high salt content could potentially be used for cultivating

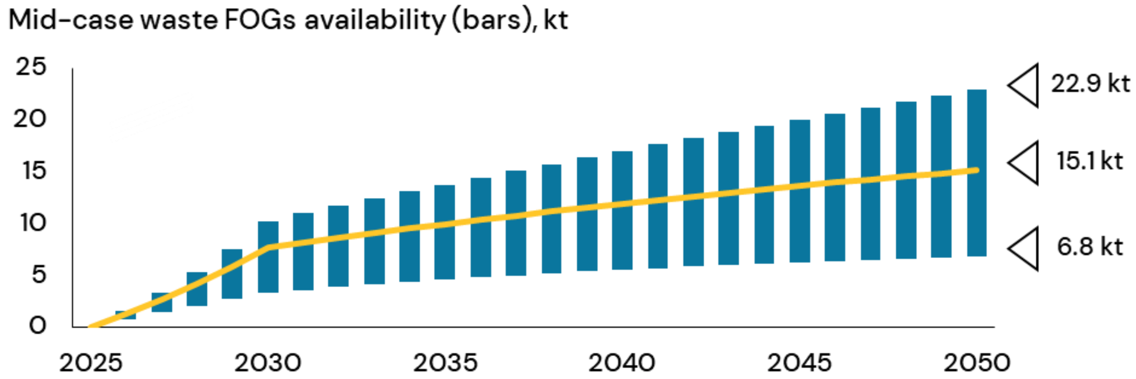
[112] Based on industry benchmarks and discussions with stakeholders
[113] https://research-hub.nrel.gov/en/publications/sustainable-aviation-fuel-state-of-industry-report-hydroprocessed/
[114] https://www.competecaribbean.org/wp-content/uploads/2019/09/Castor-Oil-Research-and-Strategy-Report-Final-March-2019-1.pdf
[115] https://www.energy.gov/sites/default/files/2023-06/beto-09-energy-crops-saf-d1-3x5-june-2023-liu.pdf

salt-tolerant halophytes such as Salicornia, which has been the subject of trials in the UAE for SAF production by extracting oil from seeds as a HEFA feedstock[116]. Despite Jamaica having a sizeable amount of degraded land, global research and development is required before intermediate oilseeds can become a viable feedstock.

2.2.5 SAF opportunities and challenges

Jamaica has enough waste FOGs to make co-processing viable, but collection networks will need to scale rapidly for Jamaica's HEFA potential to be realised. As shown in the figure below, available volumes of UCO and animal fats for aviation are projected to reach 3.3–10.2 kt by 2030 and 6.8–22.9 kt by 2050.

Depending on collection rates, between 6.8 and 22.9 kt of UCO and animal fats could be available for aviation by 2050

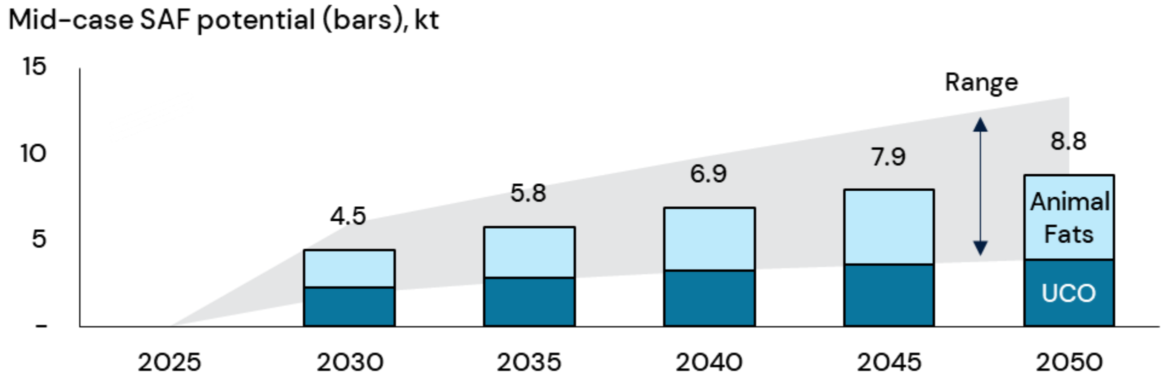


Source: ICF analysis

Figure 39 Projected availability to aviation of waste FOGs

This availability of waste FOGs could enable the production of approximately 1.9–5.9 kt of SAF by 2030 and 3.9–13.3 kt by 2050, as shown on the figure below. While modest in absolute terms, these volumes could justify coprocessing and contribute meaningfully to supply. Achieving these volumes, however, requires scaling up collection networks.

SAF production potential from waste FOGs is estimated at 1.9–5.9 kt by 2030, increasing to 3.9–13.3 kt by 2050



Source: ICF analysis

Figure 40 SAF production potential from FOGs

[116] https://www.zawya.com/en/projects/oil-and-gas/uae-bio-energy-research-project-to-enter-demonstration-phase-in-2024-o18f4h27

The key driver for commercial collection is economic viability, which comes down to both the market value of UCO and the cost and logistics required for collection. The value of UCO is already rising, and scaling collection networks can ease logistical costs through economies of scale. Policy mechanisms can also support scale-up, with measures such as banning disposal of UCO into sewer systems or providing financial incentives to collectors, both of which have been applied in South Korea, have contributed to some of the highest collection rates globally[117]. Household collection rates can also be scaled through collection points, which likely requires involvement of municipal authorities. As early as 2016, the Netherlands had around 2,000 household collection points, which pushed collection rates to around 40%[118]. Similar rates were seen in Belgium and Sweden under comparable initiatives, while many neighbouring countries had negligible household collection, highlighting that it is primarily a matter of initiative. Beyond incentives and infrastructure, public awareness will be a key driver, ensuring both commercial operators and households understand the benefits.

Jamaica benefits from having a refinery, Petrojam, but technical challenges remain. Jamaica has a significant advantage for becoming a regional SAF producer given it has an established refinery. Nevertheless, changes would be required to make SAF production viable. Petrojam is a hydroskimming refinery with limited processing units that could be used for SAF production, with the kerosene hydrotreater as the main current option. Specialised catalysts are available commercially for co-processing in distillate or kerosene hydrotreaters, adapted to deal with coking risk and the formation of water and CO/CO_2 due to oxygen removal.

Co-processing oils and fats, even at 5%, will require higher hydrogen volumes than fossil kerosene alone, so hydrogen supply and demand at the refinery would need to be assessed. The hydrotreater would also need to be evaluated for its ability to handle increased temperatures associated with co-processing. Oils and fats also contain contaminants and catalyst inhibitors that must be removed through pretreatment. Therefore, initiating co-processing at Petrojam would require storage tanks for feedstocks, pretreatment infrastructure, additional piping, and catalyst replacement in the target processing unit.

The kerosene hydrotreater is reported to have a capacity of 6,000 b/d (~278 kt)[119]. On a theoretical basis, co-processing fats and oils at 5% insertion volumes would require ~14 kt of fats and oils feedstock if the unit is operated continuously at maximum theoretical capacity, although co-processing output is often lower than theoretical due to practical constraints. Seasonal co-processing campaigns can also be carried out where feedstock volumes are limited.

Another option could be construction of a small, dedicated hydrotreater at Petrojam that could produce renewable diesel and SAF, with further integration and blending of these products within the existing refinery downstream supply chain.

SAF produced from FOGs will likely compete with biodiesel, but HEFA product slates can support multiple fuel pools. FOG feedstocks can also be used to produce biodiesel (FAME). While Jamaica has ambitions for biodiesel use, there is no formal regulation and very limited volumes have been produced locally. Using oils and fats as feedstocks for SAF production may therefore appear to compete with decarbonisation of road transport through biodiesel blending. However, HEFA production can yield a large fraction of renewable diesel that can simultaneously support aviation and the road diesel pool. Where the SAF fraction is increased through hydrocracking, renewable naphtha is also produced as a co-product and can support decarbonisation of the gasoline pool.

An integrated biofuels policy framework that addresses aviation, road diesel, and gasoline can manage feedstock competition while advancing decarbonisation across sectors. Current data indicate that no biodiesel is produced domestically in Jamaica, suggesting that a coordinated

[117] https://www.sciencedirect.com/science/article/abs/pii/S0921344915000816

[118] https://theicct.org/sites/default/files/publications/Greenea%20Report%20Household%20UCO%20Collection%20in%20the%20EU_ICCT_20160629.pdf

[119] https://www.ogj.com/refining-processing/refining/optimization/article/17297340/jamaicas-sole-refinery-due-upgrade-expansion

approach to importing, collecting, and upgrading oils and fats via HEFA could support multiple fuel pools with product slates optimised for national objectives.

Co-processing waste FOGs is a low-hanging fruit because the technology is mature and avoids the requirement of a standalone facility. While Jamaica does not have the domestic waste FOG supply to justify a full-scale HEFA refinery, under the right collection incentives it has enough to justify co-processing and benefits from having an existing refinery. Given the maturity of these technologies, co-processing waste FOGs should be seen as an immediate step towards kickstarting a SAF industry.

2.3 Crop-based ethanol

2.3.1 Feedstock overview

Ethanol can be produced from a variety of sugars and starches, including corn and sugarcane. The production of first generation, or crop-based, ethanol is fully commercial globally, with over 90 million tonnes produced each year, the majority from the US, with Brazil also producing a significant share[120]. The main global use of ethanol is blending with gasoline, which is therefore in direct competition with SAF.

Ethanol can be converted to SAF through the alcohol-to-jet (AtJ) process, which is currently the only SAF production route operating at commercial scale globally beyond HEFA (LanzaJet's Freedom Pines facility in the US[121]). Using crop-based ethanol, such as corn or sugarcane, is considered first-generation AtJ and would not qualify under mandates in the EU and UK because it is not from a waste feedstock. By contrast, waste-based ethanol can be produced from feedstocks including agricultural residues and industrial waste gases, commonly referred to as second-generation AtJ, which will be detailed in Section 2.4.

2.3.2 Technology pathways

Production of ethanol from sugar or starch via fermentation is a fully commercial technology used globally, especially for road transport. The second stage required to convert ethanol to SAF via the AtJ pathway is less established, but the technology has recently begun operating at commercial scale at LanzaJet's Freedom Pines facility.

The figure below shows the basic AtJ process. While the SAF share can reach 90% via this pathway, there is flexibility to change the product slate and supply co-products that could decarbonise the road sector as well.

[120] https://afdc.energy.gov/data

[121] https://ir.lanzatech.com/news-releases/news-release-details/worlds-first-commercial-ethanol-jet-fuel-plant-operational

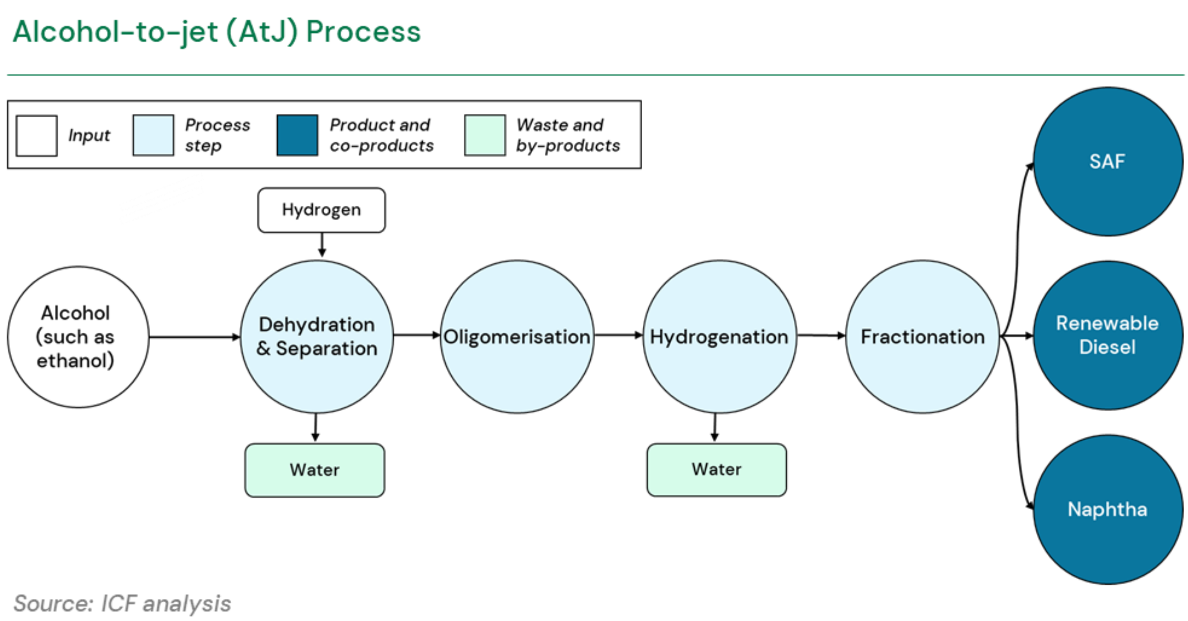


Figure 41 AtJ production process

2.3.3 Sustainability

As shown on the table below, SAF produced from sugarcane ethanol can have a carbon intensity reduction of up to 63%[122]. This reduction is based on an integrated conversion design, defined as when the facility that produces the intermediate product (ethanol in this instance) is co-located and heat is integrated between the two facilities, minimising energy requirements. Alternatively, the carbon intensity reduction from sugarcane ethanol-based SAF is 41% when the two facilities are separate.

Feedstock	CORE value (gCO2eq/MJ)	ILUC value (gCO2eq/MJ)	Emission Reduction (%)	Additional Specifications
Integrated conversion design				
Sugarcane	24.1	8.5	63%	N/A
Standalone conversion design				
Sugarcane	41	11.9	41%	Correction value if there is international ethanol transportation: +6.4 gCO2e/MJ

Table 7 Sugarcane carbon intensities

Therefore, sugarcane-based SAF would qualify under international standards such as CORSIA. However, due to food versus fuel rules under the UK and EU frameworks, sugarcane-based SAF would not qualify in these jurisdictions.

In contrast to sugarcane ethanol-based SAF, corn ethanol-based SAF has a carbon intensity of 90.7 gCO_2e/MJ under CORSIA default values, of which 34.9 gCO_2e/MJ is from ILUC. While this value can be reduced through measures such as carbon capture at facilities, it illustrates why sugarcane ethanol is generally preferred to that of corn as a feedstock for SAF production. For instance, Freedom Pines, continued to use sugarcane ethanol imports from Brazil despite high tariffs and the

[122] https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Fuels/ICAO-document-06-Default-Life-Cycle-Emissions-June-2025.pdf

fact that it would not qualify for production credits requiring domestic production, as US ethanol feedstocks have too high carbon intensities[123].

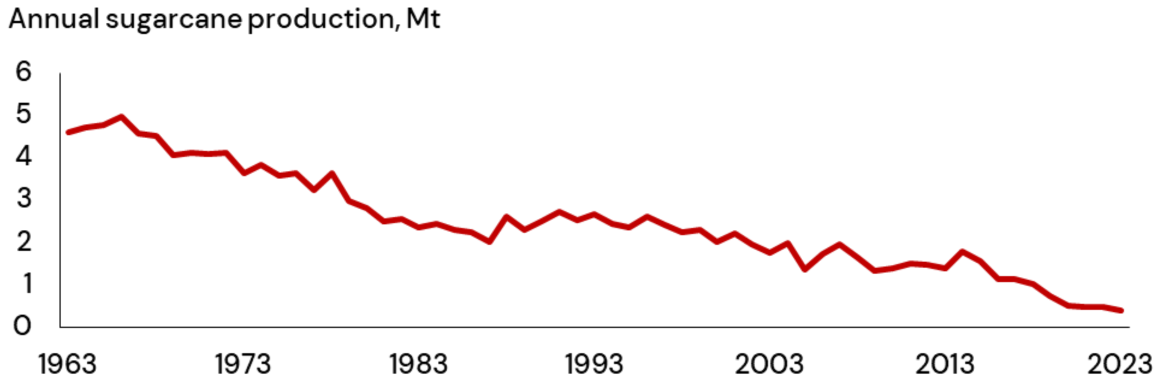
2.3.4 Availability assessment

The past and present of Jamaica's sugarcane sector

Jamaica's sugarcane industry has a long and cyclical history, with periods of growth and decline. While its history on the island dates back further, the industry expanded rapidly in the 17th century[124]. By 1805, Jamaica was a leading exporter of sugar, producing over 100 kt per year. Across the following century, however, the sector declined significantly, with sugar output falling to only 5 kt in 1913, partly because of changing labour circumstances.

The sugarcane industry recovered strongly over the following half a century, with sugar output reaching an all-time high of 515 kt in 1965, produced from 4.8 Mt of sugarcane. Since then, however, the industry has experienced a steep decline in output, with sugar and sugarcane production falling to 35 kt and 0.4 Mt, respectively, as seen in the figure below[125].

Sugarcane production in Jamaica has declined at an average annual rate of around 4% over the past 60 years, falling from 4.6 Mt to 0.4 Mt



Source: FAO

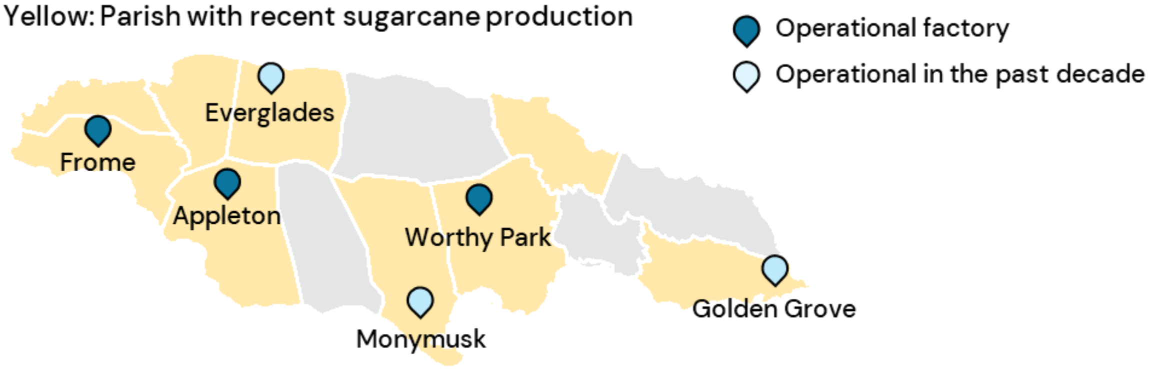
Figure 42 Annual sugarcane production

The recent decline reflects outdated and unreliable infrastructure, as well as poor practices and management[126]. These factors have reduced yields, increased costs, and lowered Jamaica's competitiveness, contributing to factory closures and discouraging crop harvesting. The harvested area has fallen from 59 kha in 1963 to 8 kha in 2023, a CAGR of -3.3%. Not all land from 1963 remains available, since some has been repurposed for housing and other uses[127]. However, as of 2023, more than 26.5 kha are classified as temporary meadows and pastures or temporary fallow, and previous studies have used these categories as proxies for land that could be reallocated to sugarcane[128].

[123] https://www.energyconnects.com/news/renewables/2025/july/world-s-first-ethanol-to-jet-plant-to-start-running-after-delay/
[124] https://www.jamaicasugar.org/files/Overview_im6up04z.pdf
[125] FAO
[126] https://jamaicasugar.org/files/Overview_im6up04z.pdf
[127] https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Sugar%20Annual_Kingston_Jamaica_JM2024-0001
[128] FAO; https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Feb/IRENA_Sustainble_bioenergy_Caribbean_SIDS_2024.pdf?rev=fa0dfc6f84be4101ab08adc3cbf2e02f

As seen on the figure below, out of the six sugarcane factories operational in recent years, only three are operational today: Worthy Park Estate; Appleton; and Frome.

Only half of the six sugarcane factories operating a decade ago remain active, though new investment aims to revive the sector

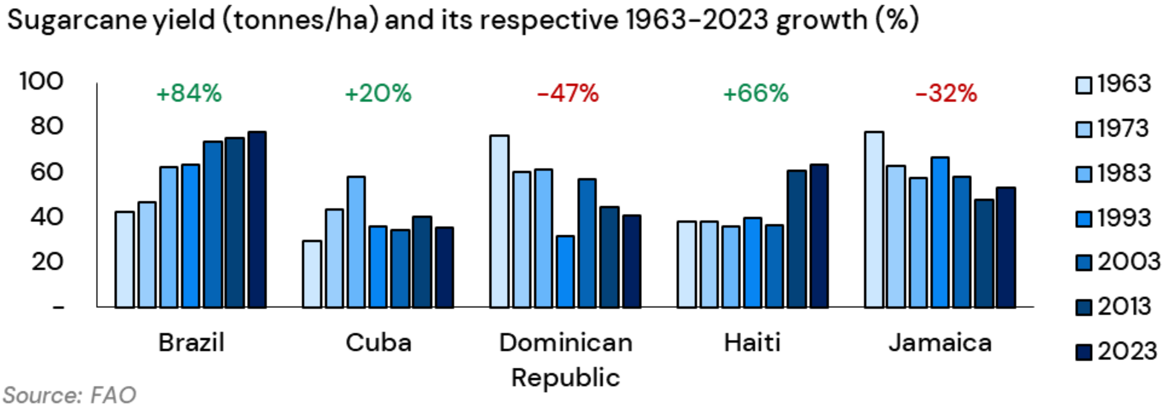


Source: NREL; Jamaica Observer; Microsoft; OpenStreetMap; Overture Maps Foundation; ICF analysis

Figure 43 Map of sugarcane factories

On the yield side, sugarcane yields have declined from approximately 78 t/ha to 53 t/ha between 1963 and 2023[129]. Comparative figures for other countries are shown in the figure below against nearby Caribbean States as well as Brazil, the world's largest sugarcane producer. Alongside Jamaica, yields have fallen in the Dominican Republic, while yields in Cuba have stagnated. By contrast, yields have increased in Brazil as the industry scaled, and also in Haiti, where sugarcane yields rose from 36 t/ha in 2003 to 61 t/ha by 2013, alongside harvested area growth from 17 kha to 24 kha during the same period. According to an IRENA study, Haiti's recent gains are due to financial support for irrigation and agricultural infrastructure, as well as subsidies for technology transfer and sustainable practices[130].

Jamaica's once strong sugarcane yields have fallen over the past few decades and now trail countries like Brazil and Haiti, where yields have improved



Source: FAO

Figure 44 Sugarcane yields across the region

Despite current headwinds, Jamaica's sugarcane sector retains potential for revival, and the government has signalled strong ambitions to support the industry. Notably, the Sugar Transformation Unit's Cane Expansion Fund, launched in 2007, aimed at supporting the sector,

[129] FAO
[130] https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Feb/IRENA_Sustainble_bioenergy_Caribbean_SIDS_2024.pdf?rev=fa0dfc6f84be4101ab08adc3cbf2e02f

received J$2.259 billion (USD 14 million) through the Ministry of Industry, Commerce, Agriculture and Fisheries[131]. The scheme delivered short-term improvements, including a 27% year-on-year in production between 2013 and 2014, but was not sustained. As of 2018, the loan balance stood at J$2.03 billion (USD 12.6 million) across 1,787 loans and 13 kha, with more than 56% of the value delinquent. Cited reasons included the 2014–2015 drought, declining sugar prices in European markets, mismanagement, and poor cultivation practices.

Although the program ended and production continued to decline, several new announcements in 2025 have given the sector renewed momentum. In January 2025, the Ministry of Agriculture, Fisheries and Mining launched the Sugar Industry Authority Training Institute to provide stakeholders with expertise in crop improvement and technology adoption[132]. Later in January 2025, the Pan Caribbean Sugar Company announced a USD 1 million investment to mechanise the Frome Sugar Factory in Westmoreland, Jamaica[133].

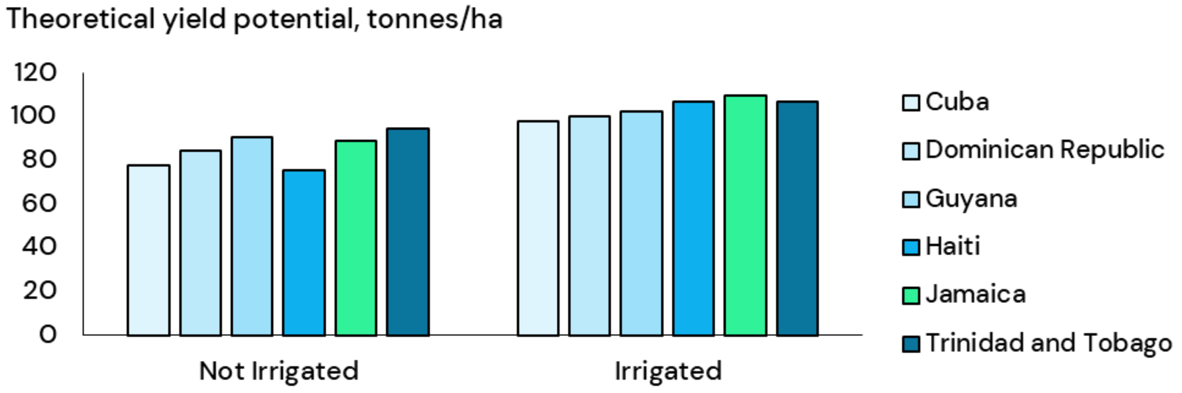
> "And for those persons who are also looking on at the other 38,000 acres [15.4 kha] that are available, I have given directives to the Ministry of Agriculture, minister of investment, industry and commerce, through to JAMPRO, that we welcome your interest and we will support you through the process to develop sustainable business plans for the remaining unused and underutilised."
>
> *Prime Minister Dr. Andrew Holness*

Most notably, Tropical Sugar Company Limited announced a USD 50 million investment in 2025 to revive 13,000 acres (5.3 kha) of idle land from the now-defunct Monymusk operations and to construct a modern processing facility with a 50 kt capacity[134]. Construction is expected from January 2026 to June 2027, with an estimated 2,000 jobs created. Following the announcement, Prime Minister Dr Andrew Holness stated:

Two recent studies have assessed the potential for expanding Jamaica's sugarcane sector: the IRENA study and an NREL study commissioned by the Government of Jamaica. Using 2019 as a baseline, the IRENA study estimates sugarcane potential across Caribbean countries by evaluating temporary meadows, pastures, and temporary fallow land as proxies for potential expansion[135]. The study estimates Jamaica's non-irrigated yield potential at 89.21 t/ha, the third highest among examined countries after Guyana and Trinidad and Tobago, and an irrigated potential of 109.81 t/ha, the highest among all selected countries. The study goes on to estimate that an additional 3.2 Mt of sugarcane could be produces in Jamaica with expanded land use and improved yields.

[131] https://jamaicasugar.org/files/Completed-Annual-Report---2018.pdf
[132] https://www.moa.gov.jm/content/jamaica-launches-siati-revitalize-sugar-industry
[133] https://jamaica-gleaner.com/article/news/20250111/farmers-urged-get-back-sugar
[134] https://www.jamaicaobserver.com/2025/12/03/sweet-us50-m-revival/
[135] https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Feb/IRENA_Sustainble_bioenergy_Caribbean_SIDS_2024.pdf?rev=fa0dfc6f84be4101ab08adc3cbf2e02f

With irrigation, Jamaica's sugarcane yields have greater potential than those of nearby states due to favourable land and climate conditions



Source: IRENA

Figure 45 Theoretical sugarcane yields across the region

The NREL study examines how Jamaica could meet domestic road ethanol demand by 2030, with blend targets ranging from the current 10% (E10) up to 25% (E25)[136]. It considers 13 scenarios, comprising six variations of output and multiple land and yield assumptions[137]. At the lower end of production, achieving E10 while producing 100 kt of sugar and 50 kt of molasses would require approximately 37 kha of planted land with a yield of 60 t/ha, with adjustments possible to increase or decrease land and yield requirements. At the upper end, it estimates that meeting E25 and producing 200 kt of sugar alongside 100 kt of molasses would require 72 kha and a yield of 70 t/ha. The study also estimates that meeting domestic ethanol demand could reduce foreign expenditure and increase GDP by USD 60 million in 2030 under E10 (or USD 138 million under E25), and by USD 122 million in 2050 under E10 (or USD 331 million under E25).

Three production scenarios were developed for this study and applied both in this section and in the agricultural residue estimates (Section 2.4) as the residue yield depends on the primary crop. The production scenarios combine yield trajectories with harvested area expansions.

Three sugarcane yield scenarios were developed for this study:

- **BAU:** Yields remain constant at 53.4 t/ha through 2030 and gradually increase to Haiti's current level of 63.6 t/ha by 2050.
- **Mid:** Yields reach Haiti's level (63.6 t/ha) by 2030 and the potential non-irrigated level (89.2 t/ha) by 2050.
- **Ambitious:** Yields achieve Brazil's level (77.8 t/ha) by 2030 and the average of the potential non-irrigated and irrigated potentials (99.5 t/ha) by 2050.

While these scenarios are optimistic given recent trends, they are justified for several reasons:

1. Sugarcane yields exceeded 80 t/ha in 1978, and given the technological progress since, similar yields are assumed to be attainable
2. The theoretical maximum under irrigation (109.8 t/ha) surpasses the figures assumed here and is the highest among neighbouring Caribbean states, highlighting Jamaica's advantage. Moreover, countries such as Peru have consistently achieved yields exceeding 120 t/ha on 10 Mt of production.
3. Jamaica's Government has demonstrated strong support for the sugarcane sector, and case studies such as Haiti show the impact that targeted interventions can have.

[136] https://docs.nrel.gov/docs/fy20osti/76011.pdf
[137] A linear regression was performed on these scenarios to estimate the required sugarcane for different demand levels of ethanol, sugar, and molasses.

The three sugarcane harvested area scenarios developed for this study are:

- **BAU:** Harvested area expands by 5.3 kha (to 13.0 kha) by 2030, due to Tropical Sugar Company Limited's operations, then stabilises.
- **Mid:** Harvested area grows by 12.7 kha (to 20.5 kha) by 2030 through utilisation of 50% of available land. By 2050, this area, plus another 25% of additional available land, will be utilised (24.3 kha).
- **Ambitious:** Harvested area expands by 16.5 kha (to 24.3 kha) by 2030, incorporating all planted but non-harvested land and 75% of additional available land. By 2050, all available land is harvested (28.0 kha).

The table below visualises each of these three scenarios, as well as their corresponding production values.

Scenario	2023 Sugarcane Production (land, yield)	2030 Sugarcane Production (land, yield)	2050 Sugarcane Production (land, yield)
BAU	0.41 Mt (8 kha, 53 t/ha)	0.70 Mt (13 kha, 53 t/ha)	0.83 Mt (13 kha, 64 t/ha)
Mid	0.41 Mt (8 kha, 53 t/ha)	1.30 Mt (21 kha, 64 t/ha)	2.16 Mt (24 kha, 89 t/ha)
Ambitious	0.41 Mt (8 kha, 53 t/ha)	1.89 Mt (24 kha, 78 t/ha)	2.79 Mt (28 kha, 100 t/ha)

Table 8 Sugarcane production scenarios

There is, however, significant demand for sugarcane-derived commodities in Jamaica, of which a significant amount is currently being imported. The first is raw sugar. Previous research estimates annual sugar demand in Jamaica at around 37 kg per capita, equivalent to approximately 105 kt in 2023, which is slightly below the 109 kt reported by USDA[138]. Actual production was 35 kt in 2023 (32% of demand), down from 80 kt in 2018. Molasses is the second major competing use. Molasses demand in 2011 was estimated at 105 kt to meet the needs of Jamaica's rum distillers and is estimated to have increased to around 108 kt by 2023[139]. Production in 2023 was 27.8 kt (26% of demand), up from 21.6 kt in 2018, highlighting the trade-off between raw sugar and molasses derived from sugarcane.

Road ethanol is the other main competing use. Jamaica does not currently produce ethanol domestically, although an E10 mandate has been in place since 2009. It is estimated that around 64 Mt of ethanol was required to meet the mandate in 2025, which is expected to increase out to 2050 as the road sector grows. All of these volumes are currently being imported, as Jamaica currently has no ethanol production. The government has considered increasing this mandate to reduce greenhouse gas emissions, which motivated the NREL study[140].

The figure below combines the three production scenarios described above with demand for raw sugar, molasses, and E10. Only by 2050, and under the ambitious scenario, do available volumes outpace competition. Therefore, the availability of sugarcane to the aviation sector is deemed to be negligible across all scenarios.

138 https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Sugar%20Annual_Kingston_Jamaica_JM2024-0001
139 https://jamaica-gleaner.com/gleaner/20120914/business/business3.html
140 https://docs.nrel.gov/docs/fy20osti/76011.pdf

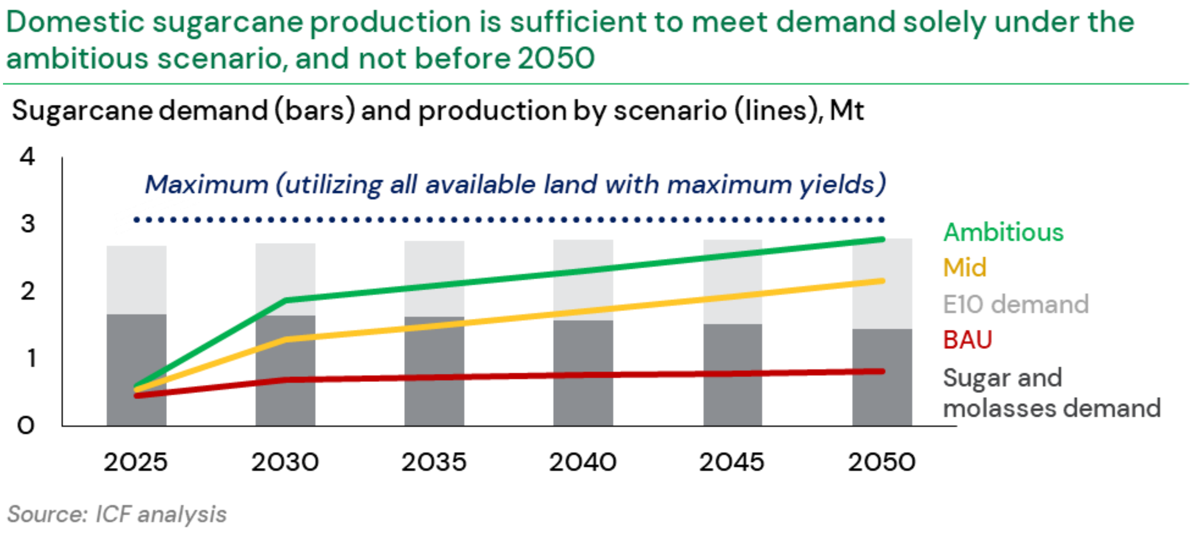


Figure 46 Domestic sugarcane demand and supply

2.3.5 SAF opportunities and challenges

Restoring Jamaica's sugarcane sector brings challenges but would bring significant economic benefits. Significant increases in sugarcane production will require improvements and modernisation at the farm level to improve efficiencies, yields, and economics. While examples such as Haiti show the impact that support can have, several steps would need to happen in Jamaica. A first step would likely be attracting investment to upgrade existing processes. TSCL's planned investment in a modern and efficient facility is a step in the right direction, as well as Pan Caribbean Sugar Company's investment, but further upgrades across existing farms and processing plants are also required. As yields improve and sector economics strengthen, more of the remaining available land could become viable to utilise for sugarcane.

To meet domestic demand for sugarcane-based products, improvements are also needed beyond cane production itself. This includes sugar refining, which Jamaica is previously believed to have lacked, but which TSCL is planning to develop through a modern facility. It also includes an ethanol facility. Much of the groundwork is there, as Petrojam has an idle dehydration facility, but significant investment would still be required. The upside is that, given the E10 mandate, there is already domestic demand for ethanol.

While these are significant hurdles, the potential economic benefits are also significant. These include creating both conventional jobs (e.g., farming) and technical roles (e.g., ethanol production). Revitalisation would also reduce exposure of key sectors (e.g., rum production) to global trade disruptions, align with national policy, improve the country's trade balance, and provide energy security to the road fuel pool.

Competition is high for sugarcane, and after accounting for it, the SAF potential is limited. Domestic demand for sugarcane-derived products is large, and SAF production would directly compete with uses such as raw sugar, molasses, and road ethanol. In the most ambitious case of this study, 2050 demand for these products is only just met, and this study does not imply that sugarcane should be diverted from these other needs to meet SAF demand. The outcome is therefore that no sugarcane is expected to be available for SAF production by 2050.

However, reviving the sugarcane sector would likely result in an increased availability of by-products that could be used as SAF feedstocks. Even though there is not expected to be SAF potential from sugarcane ethanol itself, meeting the mid or ambitious scenario in this section would involve increasing sugarcane production and developing the foundations of an ethanol sector. Increased availability of sugarcane residues, together with this foundation for ethanol production, could provide SAF potential through residue-based pathways, as discussed in the following section.

2.4 Agricultural residues

2.4.1 Feedstock overview

Agricultural residues are one of the most abundant feedstock sources for potential SAF production across the world. Both on-field residues and processing residues fall into this category. Processing residues are produced at the sugar mill, while on-field residues must be collected at the harvesting location. Using processing residues has several advantages compared to on-field residues, as it avoids many of the supply chain challenges associated with collection, transport, and storage of a low bulk-density feedstock and reduces overall feedstock costs. On-field residues also typically require drying and size reduction, which adds energy inputs and costs. Sugarcane bagasse, a processing residue, and sugarcane straw, an on-field residue, are picture below.

Sugarcane bagasse (left) and straw (right)

Source: SAF Maps; CNPEM; Portal Ambiente Legal

Figure 47: Sugarcane bagasse and straw

Both types of residues present substantial challenges for alcohol production due to their complex chemistry. Multiple process steps, including pretreatment (such as steam explosion), enzyme production, and enzymatic hydrolysis, increase the cost of this pathway compared to conventional ethanol production. In addition, lignin content and the presence of different sugar types affect ethanol yields and process economics.

Multiple cellulosic ethanol facilities based on agricultural residues have closed over the past 12 years, with feedstock and supply chain challenges identified as major obstacles to commercial success. These facilities largely targeted on-field residues such as corn stover. By contrast, using processing residues such as sugarcane bagasse can overcome many of the supply chain challenges seen with dispersed on-field residues. Sugarcane bagasse is a process-integrated residue with relatively consistent quality specifications and limited upstream logistics, whereas stover carries additional costs and complexity associated with collection and transport.

While there have been numerous failures of cellulosic ethanol projects, commercial-scale success been achieved in Brazil by Raízen, which operates two 2G ethanol facilities with a combined production capacity of around 88 kt per year[141]. The main feedstock used by the company is sugarcane bagasse, although sugarcane straw is also used.

2.4.2 Technology pathways

Agricultural residues can be used in several conversion processes, but the main pathway considered in this study is the biological production of ethanol (cellulosic or advanced ethanol), which can then be converted to SAF via the AtJ pathway, as described in section 2.3.2. Converting agricultural residues to ethanol requires multiple steps, as shown on the figure below.

[141] https://tankterminals.com/news/brazils-raizen-launches-second-generation-ethanol-plant-mulls-new-contracts/

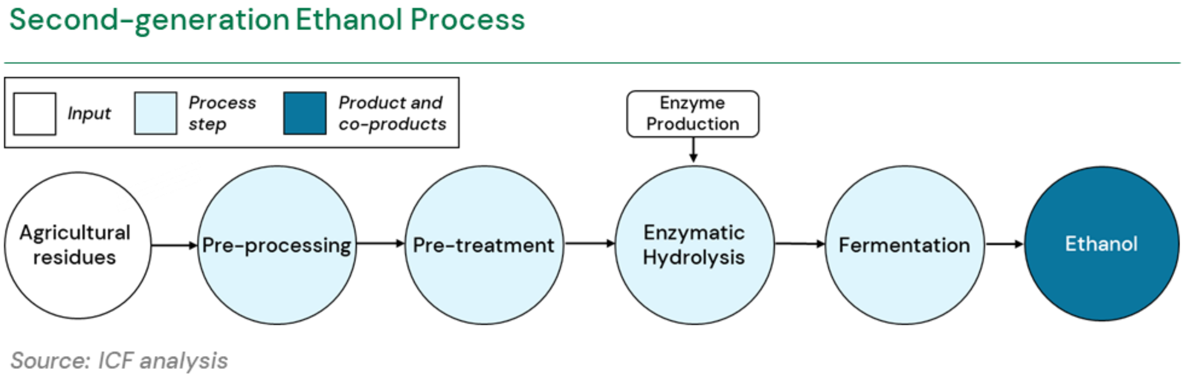


Figure 48 Second-generation ethanol production process

Alternatively, residues can be gasified, with the syngas converted through Fischer-Tropsch (FT) into fuels such as SAF. The gasification process can also be combined with methanol production and the methanol-to-jet conversion process. Methanol-to-jet is not currently ASTM-approved but is undergoing evaluation. Syngas can also be used in a gas fermentation process to produce ethanol.

A third pathway that can use agricultural residues is fast pyrolysis or hydrothermal liquefaction, which produces a liquid bio-oil or biocrude that can be upgraded into SAF and other products. Fast pyrolysis is fully commercial, but upgrading of bio-oil into finished fuels is at a lower technology readiness (around TRL 6). A fourth pathway is the use of agricultural residues in anaerobic digestion (in combination with manure) to produce biogas, which can then be converted to SAF.

The reason AtJ is considered as a suitable conversion technology in this study for agricultural residues is that if the sugarcane industry is revitalised, then domestic ethanol production would likely also develop alongside it, creating expertise and infrastructure that provide a stronger foundation for AtJ production.

2.4.3 Sustainability

Unlike sugarcane, agricultural residues are considered a waste and therefore have no associated ILUC values. Similar to sugarcane, however, CORSIA default values vary significantly depending on whether heating for SAF production is integrated with ethanol production, as shown on the table below[142]. In the case of an integrated facility design, the carbon intensity reduction from agricultural residues under the AtJ pathway is 72% relative to conventional jet fuel, compared to 55% when using a standalone facility.

Feedstock	CORE value (gCO2eq/MJ)	ILUC value (gCO2eq/MJ)	Emission Reduction (%)	Additional Specifications
Integrated conversion design				
Agricultural residues	24.6	N/A	72%	Residue removal does not necessitate additional nutrient replacement on the primary crop.
Standalone conversion design				
Agricultural residues	39.7	N/A	55%	Residue removal does not necessitate additional nutrient replacement on the primary crop.

[142] https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Fuels/ICAO-document-06-Default-Life-Cycle-Emissions-June-2025.pdf

Feedstock	CORE value (gCO2eq/MJ)	ILUC value (gCO2eq/MJ)	Emission Reduction (%)	Additional Specifications
				Correction value if process heat is produced from coal: +13.6

Table 9 Agricultural residues carbon intensities

It is also worth noting that if agricultural residues are converted to SAF through FT gasification, the carbon intensity can be significantly lower. Under the values referenced in this study, the FT route can reach around 7.7 gCO_2e/MJ, equivalent to a 91% reduction, but has significantly higher CAPEX requirements.

2.4.4 Availability assessment

Agricultural residues

Based on the sugarcane scenarios outlined in Section 2.3.4, the availability of two key agricultural residues has been assessed: sugarcane straw and sugarcane bagasse. Sugarcane straw, an on-field residue, is produced during harvesting at approximately 0.14 tonnes per tonne of sugarcane harvested[143]. For agronomic reasons, about 7.5 tonnes of straw per hectare must remain on the field. Under the scenarios described, sustainable availability of sugarcane straw is projected to range from 0 to 82 kt in 2030 and from 18 to 180 kt in 2050. This large range is due to both the dependence on the sugarcane sector growing and the strong influence of yield on availability. Under lower yields, most straw must remain on the field, significantly limiting recoverable volumes.

Sugarcane bagasse is generated during processing at an estimated 0.28 tonnes per tonne of sugarcane, and the dry basis generation rate is half this figure[144]. Based on the sugarcane scenarios, bagasse availability could range from 97 to 264 kt in 2030 and from 116 to 390 kt in 2050. The figure below illustrates the projected sustainable availability of both sugarcane straw and bagasse. Residue availability is inextricably linked to sugarcane cultivation and harvesting, as residues are produced as a by-product.

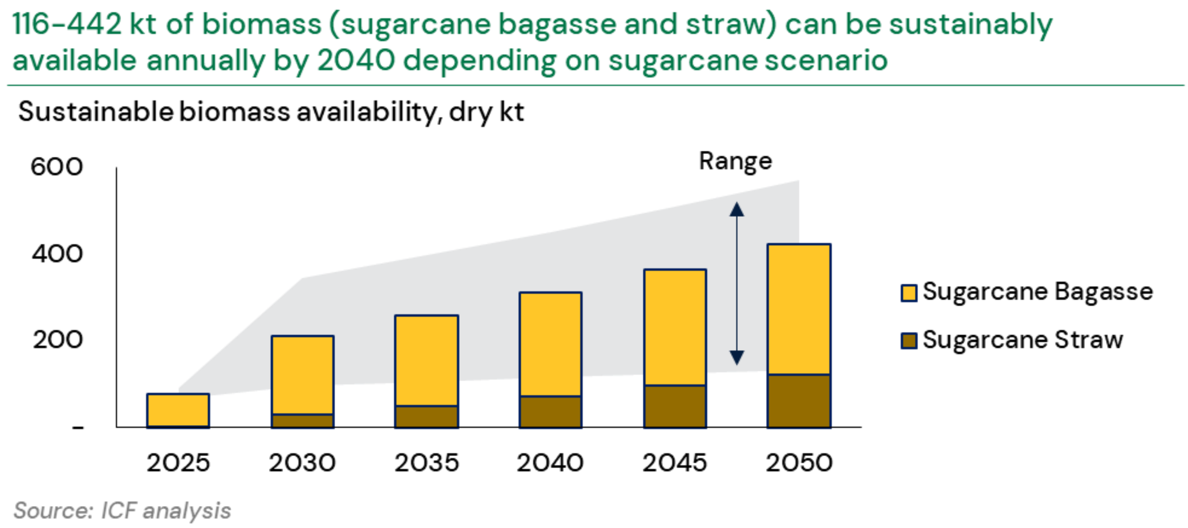


Figure 49 Forecasted sustainable biomass availability

Both sugarcane straw and bagasse can be used for power production for operation of the facility, and additional power can be diverted to the grid. Sugarcane bagasse provides renewable power for the production process which lowers the carbon intensity of the products compared to using electricity from a fossil-based grid.

143 https://www.safmaps.com/dbms-app/#sugarcane_reports_residues
144 https://www.safmaps.com/dbms-app/#sugarcane_reports_residues

In Jamaica, most sugarcane bagasse is currently used for power at sugar mills, but quantities can be freed up as technology processes become more efficient. A study in Brazil examined the amount of sugarcane bagasse required for sugarcane mills to be self-sufficient based on boiler pressure[145]. Mills with boiler pressure under 21 bar required 70% of their sugarcane bagasse for self-sufficiency, whereas those with boiler pressure over 65 bar required only 30%. It was also estimated that across all mills, 10% of sugarcane bagasse was stored.

For instance, the new and highly efficient TSCL facility will use a 66-bar boiler and generate 12.5 MW of power from sugarcane bagasse, of which only 3.5 MW will be consumed by factory operations[146]. Another 3 MW will be exported to other farms, and the remainder supplied to the national grid. In the longer term, as Jamaica's grid becomes more renewable, there could be opportunities to redirect these volumes for SAF production.

Availability for aviation, therefore, depends not only on residue generation, but also on competition for residues from factory self-sufficiency and the grid. In the BAU scenario, it is assumed that factories do not reach higher efficiency levels and that residual sugarcane bagasse continues to be diverted to the grid. In the mid and ambitious scenarios, efficiency improves more rapidly and the share required by the grid is assumed to be lower, at 20% and 10% respectively. Under these assumptions, the sugarcane bagasse freed up by 2050 in the mid and ambitious scenarios is assumed to reach 45% and 54% respectively.

Translating this into residues available to aviation, the combined availability of sugarcane bagasse and straw is estimated to range from 0 to 213 kt by 2030, with 111 kt as the mid-case. By 2050, the range is projected at 18 to 391 kt, with 257 kt as the mid-case.

Other lignocellulosic biomass

Bamboo is a fast-growing lignocellulosic biomass with high annual yields and the ability to grow on marginal or degraded land, making it an attractive potential feedstock. In Jamaica, Bamboo Bioproducts has ambitions to turn 7,000 ha of idle land into farms yielding 1 Mt of sustainable bamboo annually[147]. The downstream aim of the project, expected to cost around USD 300 million and create 5,500 jobs (including 500 direct), is to export pulp to the Americas and Europe for transformation into consumer goods[148]. In principle, these volumes could also be used for SAF production, either via ethanol production or via the FT pathway. A project in Ghana, for example, has been announced with ambitions to convert bamboo into bioethanol and SAF[149].

However, bamboo supply chains for energy use are still relatively underdeveloped, and bamboo is a complex feedstock that can create technology challenges, depending on the conversion route. While not quantified in this study, if the sugarcane sector is not revitalised and there are insufficient residues to meet SAF supply requirements, bamboo farms could be developed on degraded sugarcane land and become an alternative lignocellulosic biomass feedstock for SAF production. There may be a land-use trade-off with sugarcane and its residues, although there is believed to be additional degraded land available, and only the most ambitious sugarcane scenario utilises all available sugarcane land.

Energy crops, such as switchgrass, are high-yield crops planted for bioenergy rather than food. Their ability to grow on marginal land reduces direct competition with food production and gives them low ILUC values under many sustainability frameworks[150]. Globally, however, commercialisation of energy crops has lagged. Similar to intermediate oilseeds, supply chains are underdeveloped and profitability for farmers remains uncertain, which disincentivises adoption.

145 https://studenttheses.uu.nl/bitstream/handle/20.500.12932/47812/Master%20Thesis%20Ioannis%20Spyropoulos%202024.pdf?sequence=1
146 https://www.nepa.gov.jm/sites/default/files/2025-06/ANNEX%202%20-%20TSCL%202025%20Air%20Emissions%20Inventory%20Final.pdf
147 https://www.bamboobioproducts.com/jamaica
148 https://scjholdings.gov.jm/2023/06/2322/
149 https://bioenergytimes.com/kambic-industrial-partners-announces-1-3-billion-bamboo-bio-refinery-project-in-ghana/
150 https://www.energy.gov/sites/default/files/2022-09/beto-saf-gc-roadmap-report-sept-2022.pdf

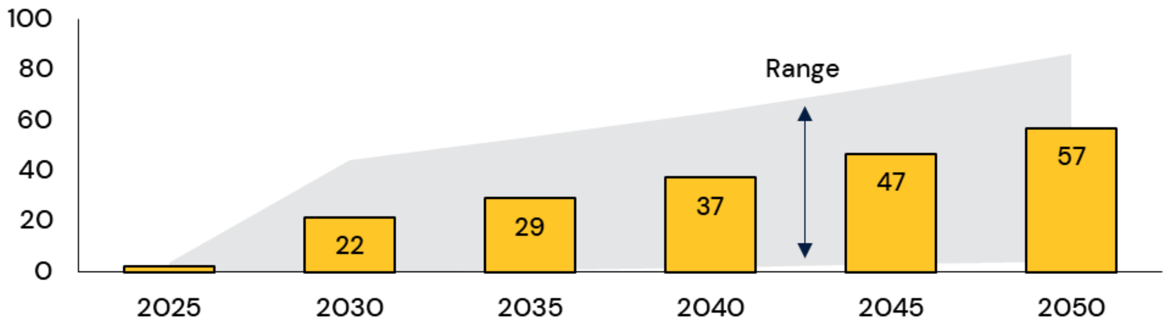
Energy crops could play a role in the long term, including on previous sugarcane land, but they would likely compete with both bamboo farms and sugarcane production for land use.

2.4.5 SAF opportunities and challenges

Sugarcane residues could yield a significant amount of SAF while also generating the benefits of reviving the sugarcane sector. As shown on the figure below, there is significant SAF potential from converting sugarcane residues to SAF via ethanol production and the AtJ process. By 2040 this reaches up to 63 kt (or 37 kt in the mid-case), and by 2050 it rises to up to 86 kt (or 57 kt in the mid-case). Even the mid-case volumes would likely be enough to justify a mid-sized SAF plant to contribute towards Jamaica's SAF demand and potentially support Jamaica becoming a regional hub. Achieving these volumes would also come with the broader benefits of reviving the sugarcane sector, as described in the previous section. By revitalising the sugarcane sector while producing SAF, Jamaica could create indirect economic value through job creation and reduce its trade balance by moving closer to meeting domestic demand for sugarcane-derived products. However, if the sugarcane sector does not grow, there will be limited SAF potential from sugarcane residues.

4-86 kt of SAF can be produced from sustainably available sugarcane biomass (bagasse and straw) by 2050, depending on sugarcane scenario

SAF potential from sugarcane biomass, kt



Source: ICF analysis

Figure 50 Forecasted SAF potential from sugarcane biomass

However, the challenges of revitalising the sugarcane sector must be overcome. As previously described, Jamaica's sugarcane sector has seen declining yields over recent decades, leading to poor economics and, in turn, reduced harvested land. While Jamaica's potential is clear, realising it will require significant investment in the sector. In practice, this will likely require government support to encourage investment and reduce risk, particularly in the near term.

Sugarcane factories must become more efficient to generate excess bagasse. As competition for sugarcane bagasse decreases and residue availability rises with more efficient factory systems, it is important that investment is made both in upgrading existing factories and in ensuring new facilities bring in efficient processes. Awareness, market signals, and policy can all support this transition. If a SAF sector begins to develop and sugarcane factories see stronger demand for residues and a higher market value for sugarcane bagasse and straw, investment in modern processes can become more justifiable. Government can also help spur this transition through targeted support mechanisms, such as loans or other forms of assistance.

2.5 Solid waste

2.5.1 Feedstock overview

Municipal solid waste (MSW) is considered an important feedstock for meeting global SAF demand because it is abundantly available in almost all urban areas. A critical parameter for MSW viability as a sustainable SAF feedstock is its biogenic content (e.g., paper, wood, and garden waste). Higher biogenic content generally translates into higher carbon intensity reductions for the resulting fuel.

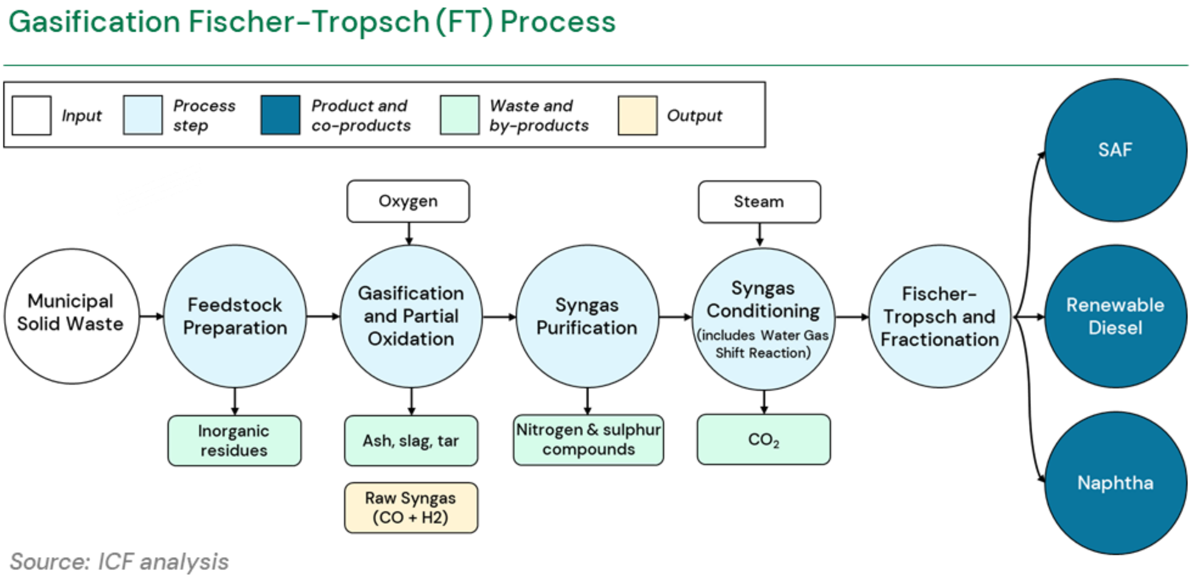
While this study focuses on gasification and FT pathways for converting MSW to SAF, alternative conversion routes exist, including landfill capping to capture biogas, which can subsequently be upgraded for SAF production. MSW as a feedstock is also associated with notable technology and execution risk. Globally, one of the most high-profile project failures was the bankruptcy of Fulcrum Bioenergy in 2024, despite the project raising more than USD 1 billion in funding[151]. A key underlying challenge is the complexity and variability of MSW as a feedstock.

Sorting, separation, and cleanup are critical for downstream applications because contaminants can impact catalysts used in FT synthesis and contribute to operational issues. Non-combustible materials such as stones, glass, metal, and concrete must be removed, and waste streams containing acids, chlorine, sulfur, nitrogen, and other problematic compounds should be avoided where possible. While this has increased perceived risk for MSW-to-SAF projects, the pathway is beginning to regain traction, highlighted by the recent announcement of a mid-sized facility in Ghana[152].

Other categories of solid waste, including waste tyres and non-recyclable plastics, can be processed through different technology routes, such as pyrolysis or hydrothermal liquefaction. These technologies produce a liquid biocrude that can potentially be upgraded via co-processing in an existing petroleum refinery. Using tyre pyrolysis oil (TPO) for fuel production is gaining more attention. TPO production is carried out globally, usually as part of a recycling process, with TPO often used for energy generation. However, using TPO to produce SAF is not ASTM-approved and poses potential sustainability and eligibility challenges.

2.5.2 Technology pathways

Gasification and Fischer-Tropsch synthesis are the main technologies considered for SAF production from MSW. The process includes gasification of solid biomass to create syngas, followed by FT synthesis to convert syngas into liquid hydrocarbons, including a jet-range fraction. FT synthesis is well established as a core technology. Gasification, especially when integrated with MSW handling and preprocessing systems, has proven more challenging. MSW requires substantial sorting and conditioning, and the syngas cleanup step can be technically complex and costly due to contaminants and variable composition. These integration challenges have contributed to delays and reliability issues in the sector and were central to the operational difficulties experienced by Fulcrum Bioenergy.



Source: ICF analysis

Figure 51 Gasification FT process

[151] https://www.wastetodaymagazine.com/news/clean-fuels-company-verges-on-collapse-after-financial-troubles-layoffs-fulcrum-bionergy/
[152] https://www.safinvestor.com/news/148863/ghana-saf/

Waste tyres and plastics are suitable for pyrolysis, producing a liquid biocrude (such as TPO) that can be inserted into oil refinery processing units via co-processing. The company Wastefront in the UK is pursuing SAF production from tyre pyrolysis oil co-processing. The Swedish company Preem is already co-processing tyre pyrolysis oil in the refinery's fluid catalytic cracker, although this is not targeted specifically for SAF production. The overall process, including production of TPO and co-processing of TPO in an existing refinery, is shown on the figure below.

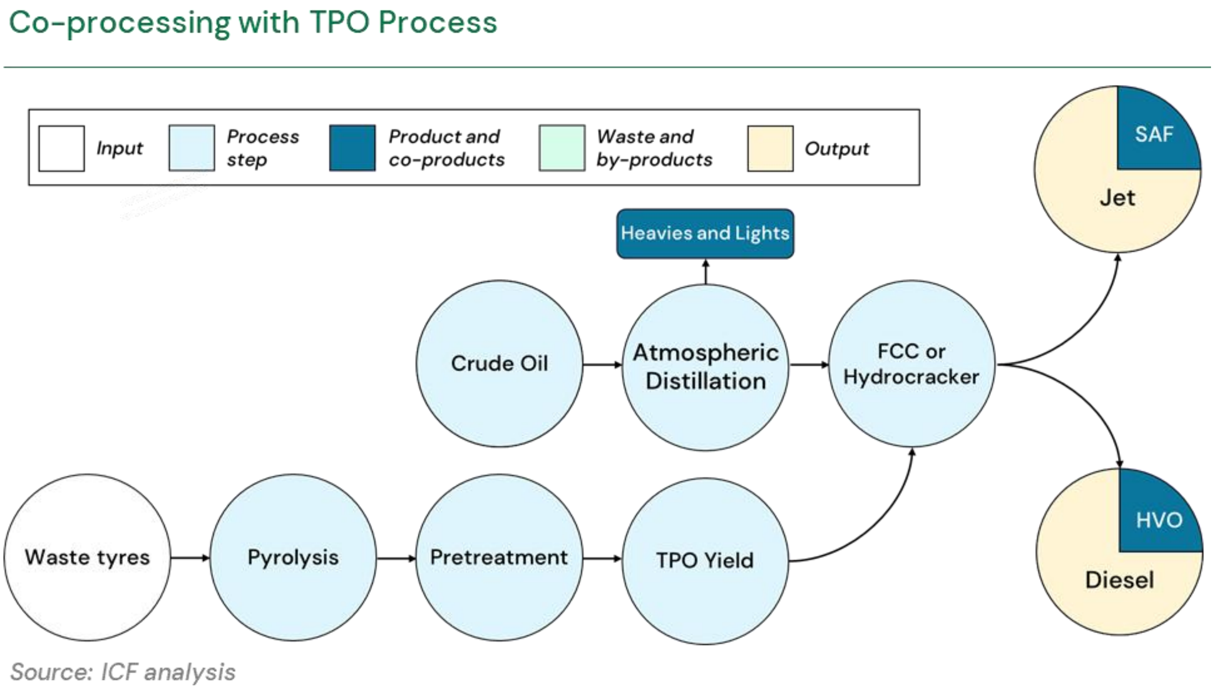


Figure 52 Co-processing with TPO process

2.5.3 Sustainability

Under CORSIA, the lifecycle carbon intensity of SAF produced from MSW is calculated based on the proportion of non-biogenic carbon in the waste stream. As shown on the table below, where MSW has 0% non-biogenic content, the carbon intensity of the resulting SAF is 5.2 gCO_2e/MJ[153]. Under the CORSIA default value approach, achieving at least a 10% reduction in lifecycle carbon intensity requires a non-biogenic carbon content below 44%.

Feedstock	CORE value (gCO2eq/MJ)	ILUC value (gCO2eq/MJ)	Emission Reduction (%)	Additional Specifications
MSW	NBC*170.5 + 5.2[154]	N/A	56%	N/A

Table 10 MSW carbon intensity

In practice, there are complexities and costs associated with sorting MSW and determining the bio versus non-biogenic content. For this study, it is assumed that the initial non-biogenic carbon fraction is 20%, leading to a carbon intensity reduction of 56% and thus qualifying under applicable international standards.

SAF produced from MSW may also generate avoided landfill emissions credits and a recycling emissions credit depending on the specific composition of the MSW and the counterfactual

[153] https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Fuels/ICAO-document-06-Default-Life-Cycle-Emissions-June-2025.pdf

[154] Note: NBC refers to the non-biogenic carbon fraction of the MSW feedstock.

treatment pathway. Where applicable, these credits can further improve emissions reductions beyond the default assumptions.

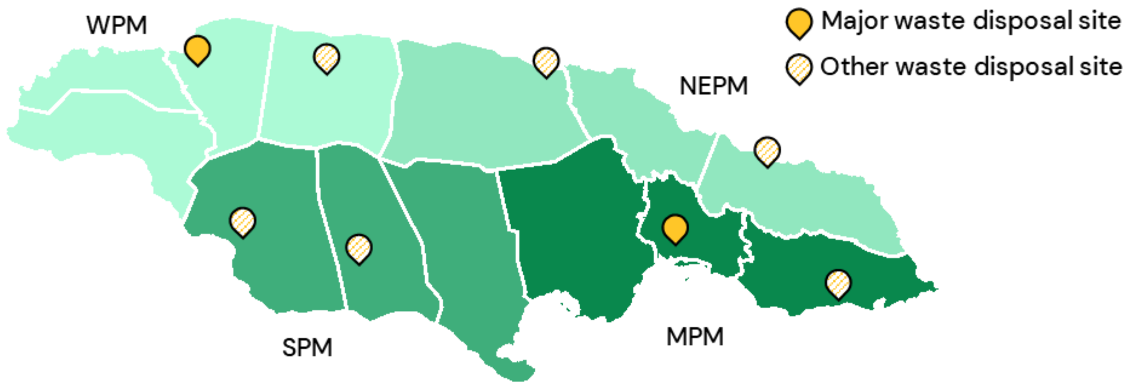
Using waste tyres for SAF production may potentially reduce lifecycle carbon intensity due to the biogenic carbon component in natural rubber, but a full lifecycle assessment is required to determine whether reduction thresholds are met and whether the pathway qualifies under relevant sustainability frameworks.

2.5.4 Availability assessment

MSW

The Jamaica National Solid Waste Management Authority (NSWMA) is responsible for the management of solid waste in Jamaica, having been established under the National Solid Waste Management Act, 2001. Four companies manage Jamaica's MSW under the NSWMA, as shown on the figure below: MPM, NEPM, SPM, and WPM. Jamaica's annual MSW generation has been estimated to be around 1 million tonnes per year as of 2020[155]. The majority (51%) of MSW is generated in the MPM region, driven by both the highest per-capita generation and collection rate. The SPM region accounts for around 21% of national generation, while WPM and NEPM each account for around 14%.

Over half of Jamaica's MSW is generated in the MPM market



Source: Auditor General's; ICF analysis

Figure 53 MSW generation in Jamaica

In terms of MSW composition, Jamaica's biogenic content has been estimated to be as high as 70% in recent years, dominated by compostables and paper[156]. While illegal dumpsites remain, Jamaica has significantly increased its collection rate in recent years, from 78% in 2017 to 92% in 2020. Despite various recycling pilot projects over the past decade, Jamaica has no national recycling policy, and it is believed that recycling volumes remain limited today.

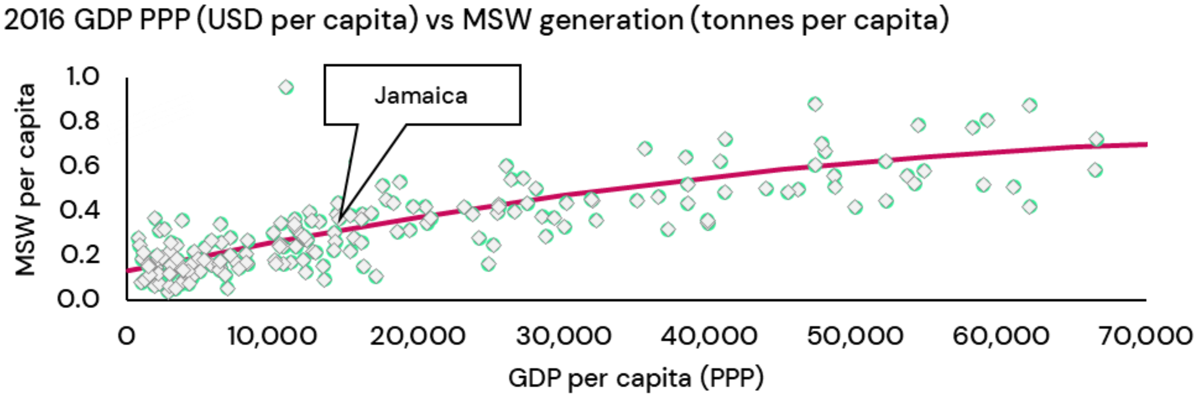
There are two major landfills in Jamaica: the Riverton (City) landfill in the Kingston/St Andrews parish, and the Retirement landfill in Western Jamaica in the St James parish. These are shown on the figure above. While these sites have been considered for waste-to-energy plant locations, no explicit plans have been announced.

As shown on the figure below, per-capita MSW generation tends to rise as GDP per capita increases. This relationship was used to project that national MSW generation will increase at an annual rate of 0.8% until 2050. It is also assumed in this study that the share of uncollected MSW continues to decline, becoming negligible by the late 2030s, which increases available volumes. At the same time, recycling networks are projected to mature at around 4.5% per year, representing

[155] https://dbankjm.com/wp-content/uploads/2020/06/2022-06-Waste-characterization-Results-website-v2-1.pdf
[156] https://auditorgeneral.gov.jm/wp-content/uploads/2022/07/Performance-Audit-Report-NSWMA-July-25-2022-FINAL.pdf

direct competition for the residual MSW stream. This competition is considered sustainable, but it reduces the MSW volume available for conversion to fuels.

Per capita MSW generation tends to increase with GDP

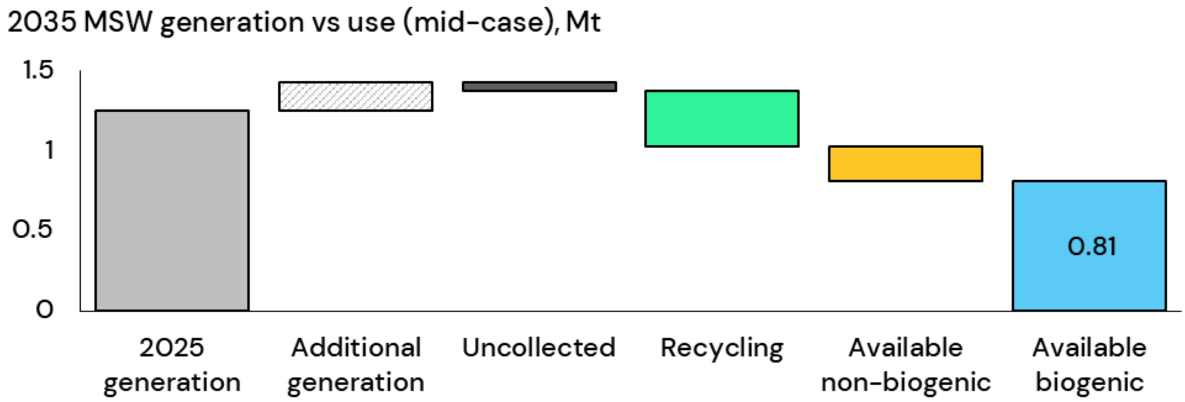


Source: The World Bank What a Waste 2.0, OECD, ICF analysis

Figure 54 MSW generation per capita compared to GDP

The figure below illustrates projected MSW trends for 2035, around the earliest time that MSW could become a viable feedstock for SAF production in Jamaica. It is estimated that around 1.4 Mt will be generated, and that the collection rate will exceed 96%. Of the collected volumes, recycling rates could rise to 25%. This leaves a residual stream of just over 1 Mt of MSW, of which around 0.8 Mt is expected to be biogenic. This residual biogenic stream represents the volume that can sustainably be used for SAF in this assessment.

0.77-0.85 Mt of biogenic MSW is expected to be available for aviation in Jamaica by 2035



Source: ICF analysis

Figure 55 Biogenic MSW generation compared to use cases

End of life tyres

Jamaica generates approximately two million waste tyres each year, yet only 185,700 reach landfills[157]. The remainder are typically abandoned along roadways or other improper areas, contributing to an increasing environmental challenge. In line with vehicle activity projections, end-of-life tyre generation is expected to increase to almost 2.4 million by 2040 (approximately 19 kt) and 2.5 million by 2050 (approximately 20 kt)[158].

[157] https://www.nswma.gov.jm/wp-content/uploads/2023/06/NSWMAAnnualReport2021-22.pdf
[158] https://docs.nrel.gov/docs/fy19osti/73380.pdf

The government has signalled its intention to develop an action plan to manage end-of-life tyres more systematically. Several companies have explored potential solutions, for instance, Cool Energy Ltd. and Recycling Partners of Jamaica have explored tyre pyrolysis and co-processing, while Carib Cement signed an MoU to utilise 320,000 tyres annually between 2026 and 2031 as part of its production process[159].

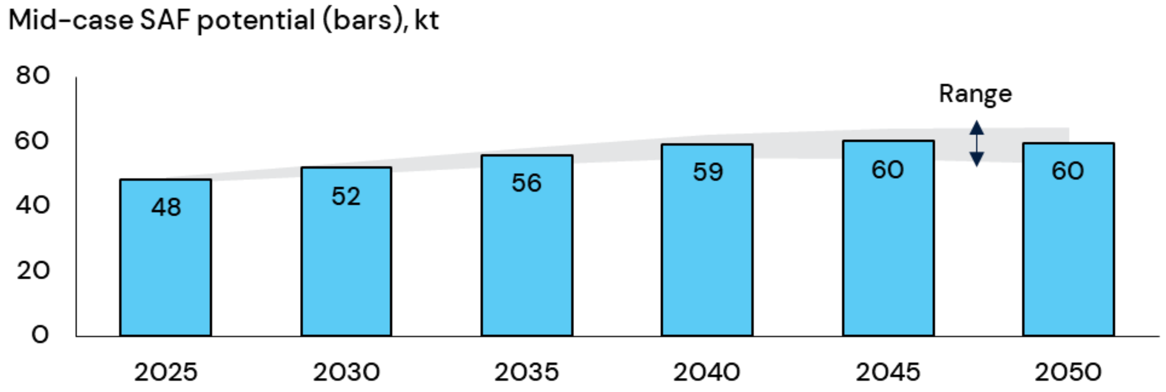
International benchmarks illustrate what is achievable under more developed collection systems. Brazil, which implemented a formal end-of-life tyre programme in 1999, reaches recovery rates of around 92%, while Mexico reaches around 63%[160]. These case studies were utilized to derive three long-term trajectories for Jamaica in this study.

Competition for collected tyres shapes potential availability. In the BAU scenario, it is assumed that 320,000 tyres continue to be consumed annually by the cement sector, unless recovery volumes fall below this level. In the ambitious scenario, all collected tyres are assumed to be available for processing such as pyrolysis, reflecting uncertainty around whether the cement sector agreement will proceed over the long term.

2.5.5 SAF opportunities and challenges

Jamaica's MSW has a relatively high biogenic content, and this can translate into significant volumes of SAF. As a result of biogenic content of around 70% and limited current competition, there is enough MSW available to support around 50 kt of SAF production in the near term, increasing to 53–64 kt by 2050. This range, shown on the figure below, would likely be sufficient to justify a mid-sized SAF facility. Beyond producing sustainable fuel, diverting waste from landfills can also deliver broader environmental benefits.

By 2050, municipal solid waste could be used to produce 53–64 kt of SAF



Source: ICF analysis

Figure 56 MSW SAF potential mid scenario

CAPEX requirements are high, and significant feedstock and technology hurdles remain. While MSW can have low or even negative feedstock value, MSW-to-SAF projects typically require high upfront investment due to the complexity of MSW handling, preprocessing, gasification, and syngas cleanup. The failure of Fulcrum Bioenergy has also increased perceived risk in the pathway, which can raise financing costs and strengthen requirements for technical proof[161]. Fulcrum's challenges included contaminants and operational issues that contributed to corrosion, delays, and ultimately bankruptcy. Among the practical lessons highlighted from this outcome are the importance of scaling from smaller systems before pursuing large-scale designs, and the need for extensive feedstock testing and cleanup validation. It is positive, however, to see MSW-to-SAF

[159] https://global-recycling.info/archives/9602; https://www.jamaicaobserver.com/2021/06/22/carib-cement-govt-sign-mou-to-dispose-of-used-tyres/
[160] https://docs.wbcsd.org/2018/02/TIP/WBCSD_ELT_management_State_of_Knowledge_Report.pdf
[161] https://www.thechemicalengineer.com/features/why-the-lessons-of-the-fulcrum-fiasco-must-not-be-wasted/

facilities reaching key development milestones elsewhere, including projects such as the facility in Ghana.

Despite sufficient current volumes, MSW-to-SAF should be seen as a mid- to long-term solution, while co-processing TPO is less likely to develop given its uncertainties. Given the cost and integration challenges of MSW-to-SAF, this pathway is unlikely to be an immediate option in Jamaica and is more likely to become suitable from the mid-2030s as additional global projects come online and de-risk the technology.

Co-processing TPO derived from end-of-life tyres could be a complementary option. While a dedicated TPO-to-SAF facility could have higher SAF yields than co-processing, Jamaica does not generate sufficient end-of-life tyres to justify a standalone facility unless significant imports are relied upon. Under co-processing, the range of SAF potential is estimated at 0.3–1.8 kt by 2035, and 1.5–2.8 kt by 2050[162]. While these volumes are relatively small, the process can produce co-products such as recovered black carbon and conventional refinery products.

However, challenges remain. High aromatic content and elevated sulfur can require hydrocracking and higher hydrogen consumption, and Petrojam does not currently have the most suitable processing units for this. In addition, TPO-based SAF is not yet ASTM-approved, and whether it will meet global sustainability standards remains uncertain. It is therefore assessed that TPO-based-SAF is unlikely to develop as a viable SAF option in Jamaica.

2.6 Wet waste

2.6.1 Feedstock overview

Biogas is produced through the anaerobic digestion of organic materials such as food waste, animal manure, sewage sludge, and agricultural residues. This biological process is widely used in wastewater treatment facilities and on farms, and it also occurs naturally in landfills, where capping systems can capture biogas and reduce methane emissions. When upgraded to biomethane, also referred to as renewable natural gas, the cleaned product can substitute directly for fossil natural gas across power generation, heat production, and mobility. Compressed biomethane is also used as a vehicle fuel in several markets.

Growing interest has emerged around using biogas and biomethane as feedstocks for SAF production. Multiple companies are advancing technologies that convert renewable natural gas into intermediates such as synthesis gas or methanol, which can then be upgraded into aviation-fuel. A relevant example is the NovaSAF 1 project in Uruguay, which aims to begin commercial operations in 2027 and plans to convert manure from approximately 14,000 cows into roughly 1.1 kt of SAF annually[163]. While project characteristics vary, biogas is generally produced at small scale in anaerobic. The biogas or biomethane can then be aggregated and transported to centralised facilities for upgrading into fuels such as SAF.

2.6.2 Technology pathways

Wet waste can be used in anaerobic digesters to produce biogas, a mixture consisting mostly of methane, with carbon dioxide and other minor gases and water vapour. Biogas is then cleaned by removing CO_2 and other compounds to produce biomethane (renewable natural gas). Biomethane can be used in several routes to produce SAF, including:

- Biomethane – syngas – Fischer-Tropsch – SAF
- Biomethane – syngas – ethanol - AtJ
- Biomethane – methanol – methanol-to-jet – SAF
- Biogas - biogenic CO2 plus hydrogen – eSAF

[162] https://wastefront.com/wastefront-breaks-ground-in-sunderland
[163] https://velocys.com/wp-content/uploads/2025/07/Syzygy-NovaSAF-1-Whitepaper_Solving_the_SAF_Trilemma.pdf

The process for the FT-involved pathway is shown on the figure below.

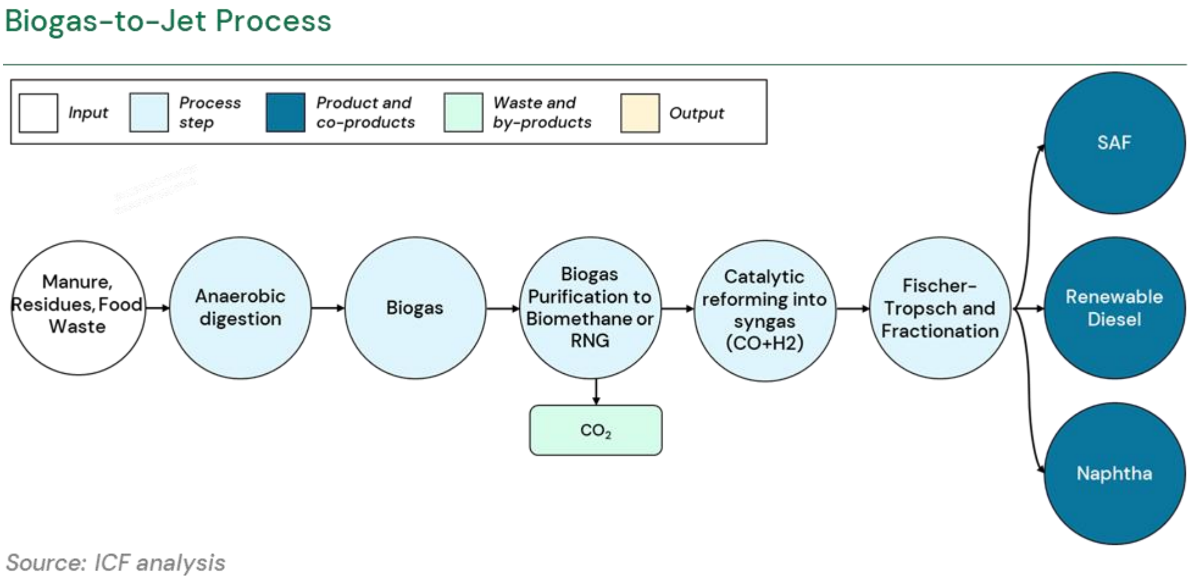


Figure 57 Biogas-to-jet process

Raw biogas can be used for electricity generation without cleanup. However, when used in vehicles or for SAF production, upgrading to biomethane is typically required. There is currently no infrastructure in Jamaica that carries out biogas-to-biomethane cleanup, which is a key practical constraint for pathways that require biomethane as the starting point.

Hydrothermal liquefaction (HTL) is another technology route relevant to wet waste. HTL uses water in its supercritical state to produce a liquid biocrude from wet feedstock. This biocrude can be upgraded into drop-in fuels such as SAF through hydrotreatment or hydrocracking. HTL is suitable for a wide range of wet wastes, including food processing waste, manure, sewage sludge, algae, seaweed, and more. While the liquid biocrude still requires upgrading into finished fuels, it can be transported and potentially upgraded in an existing petroleum refinery through co-processing. HTL is at a lower TRL (6–7) and is not currently ASTM-approved. This technology could therefore support distributed production of biocrude combined with centralised upgrading.

2.6.3 Sustainability

CORSIA does not yet provide default lifecycle values for SAF produced from biogas. However, there are industry estimates that provide an indication of potential performance. The NovaSAF project described above projects a carbon intensity of 6 gCO_2e/MJ when using biogas, and 23 gCO_2e/MJ when using landfill gas[164]. While these are estimates for one project and will vary by facility and feedstock, they highlight how wet waste to SAF can yield significant carbon intensity savings and, as a waste pathway, can align with stringent sustainability standards.

2.6.4 Availability assessment

Several companies in Jamaica already produce biogas from organic residues. CaribShare Biogas and AgriShare convert organic waste from hotels and farms into renewable energy as well as fertiliser, and a large-scale project developed with DECARB at a rum estate uses anaerobic digestion of cane juice together with combustion of sugarcane bagasse to generate approximately 14 MW of electricity[165]. It is difficult to establish how many biogas facilities are in operation in Jamaica, with some reports suggesting that as many as 600 small-scale systems may exist[166].

[164] https://velocys.com/wp-content/uploads/2025/07/Syzygy-NovaSAF-1-Whitepaper_Solving_the_SAF_Trilemma.pdf
[165] https://decarbllc.com/project/biomass-biogas-to-energy-plant/
[166] https://thrivingearthexchange.org/project/braco-trelawney-jamaica/#:~:text=AgriShare%20is%20an%20organic%20waste,in%20the%20parish%20of%20Trelawny.

One advantage of biogas pathways is that they can use niche wet waste streams that are not suitable for other technologies. Biogas yields can also be improved through co-digestion, for example by adding agricultural residues such as sugarcane bagasse or straw, which may provide an alternative use for such residues in certain circumstances. The use of sargassum seaweed for biogas production has also been proposed[167].

While there are various wet waste feedstock options in Jamaica, this study quantifies the potential of biogas from animal manure and sargassum. It then qualitatively discusses capping lagoons, using organic MSW streams, and using agricultural residues in the biogas pathway. This is because manure volumes alone provide enough availability for a potential biogas-to-SAF sector as well as that MSW and agricultural residues are quantified elsewhere in this study for other potential uses.

Animal manure

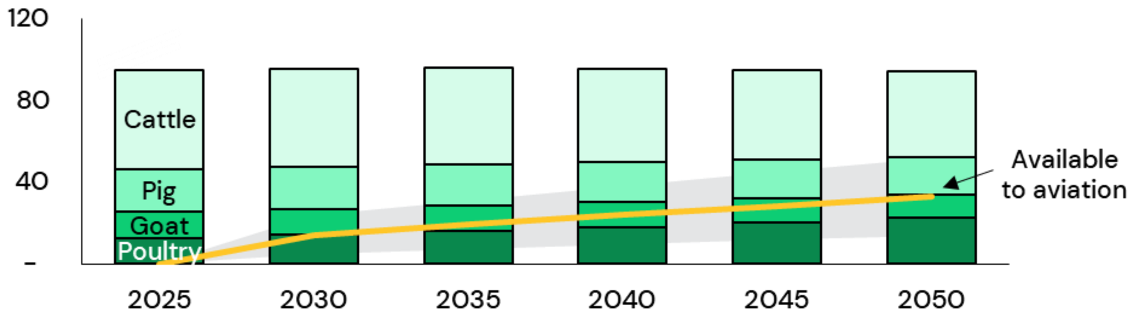
As discussed in the previous section on animal fats, the majority of livestock in Jamaica is poultry. Different types of livestock have different manure generation rates (for example, poultry has been estimated at 0.04 kg/day compared to 2.86 kg/day for cattle)[168]. These rates were applied to livestock numbers in Jamaica to estimate that around 158 kt per year of manure is generated, translating to approximately 145 million m³ of biogas[169].

Not all manure is viably collectable for biogas production, particularly from animals that roam in fields[170]. As noted by stakeholders, residues from poultry should have high collection potential because poultry is confined. A higher potential collection factor was therefore assigned to poultry (70%), while other animals use collection rates from previous research in Jamaica.

It was also understood that there is significant potential to scale up manure collection for biogas production. Assuming current collection is around 5% of the potential and that all currently collected volumes continue to be utilised for other purposes, scaling collection to 20% by 2030 could make around 14 million m³ of biogas available for the aviation sector. Scaling to 40% by 2050 could increase annual potential to around 33 million m³. The figure below summarises the projected biogas availability from manure under the scenarios described.

Between 5 and 24 million m³ of biogas from manure could be available for SAF production by 2030

Biogas potential by livestock (bars) and projected aviation availability (line), million m³



Source: ICF analysis

Figure 58 Biogas potential and projected availability

[167] https://thrivingearthexchange.org/project/braco-trelawney-jamaica/#:~:text=AgriShare%20is%20an%20organic%20waste,in%20the%20parish%20of%20Trelawny.

[168] https://acris.aalto.fi/ws/portalfiles/portal/7092673/2012_Rahman_Biomass_Bioenerg_postprint_A_methodological_approach_residue_potentials.pdf; https://agris.fao.org/search/en/providers/122535/records/65df51086eef00c2cea27426

[169] FAO; Syzygy-NovaSAF-1-Whitepaper_Solving_the_SAF_Trilemma.pdf

[170] https://www.wisdomlib.org/uploads/journals/mdpi-sust/2022-volume-14-issue-11--2071-1050-14-11-6457-.pdf

Sargassum

Another potential feedstock for biogas production is sargassum, a brown seaweed (macroalgae) that is a significant problem in the Atlantic Ocean. As shown on the figure below, Jamaica falls within the Great Atlantic Sargassum Belt. While sargassum provides ecosystems for marine life, large amounts washing up can create a health hazard for the public and has been found to cost the region hundreds of millions in lost tourism[171].

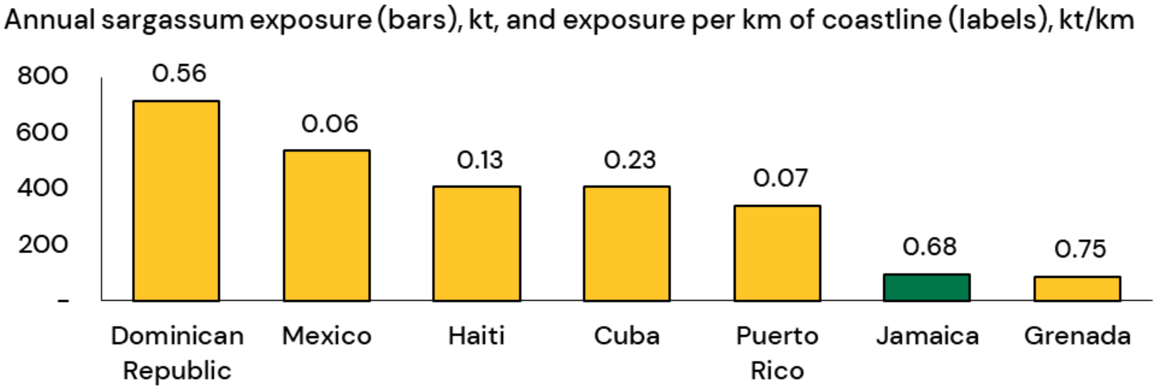
Jamaica is within the Great Atlantic Sargassum Belt, exposing it to sargassum influxes that can disrupt tourism

Source: Seagen

Figure 59 Jamaica's location in relation to the Great Atlantic Sargassum Belt

As shown on the figure below for selected countries, it has been estimated that almost 100 kt of sargassum washes up on the shores of Jamaica annually, equating to 0.09 tonnes per metre of shoreline[172]. While Jamaica is not as severely impacted as some other islands in the region, the impact remains significant. Three countries have pledged to collect sargassum volumes across 2026 and 2027: Grenada (10 kt), Dominican Republic (150 kt), and Mexico (250 kt)[173]. These collection rates relative to estimated generation were used to inform Jamaica's potential collection rates in this study.

Nearly 100 kt of sargassum washes up on Jamaica's shores each year



Source: Nature.com; ICF analysis

Figure 60 Sargassum exposure in the region

[171] https://scienceinsights.org/the-growing-impact-of-sargassum-on-coastal-areas/; https://www.wired.com/story/there-is-more-sargassum-than-ever-in-the-caribbean-and-they-want-to-turn-it-into-energy/
[172] https://www.nature.com/articles/s41598-025-94475-3
[173] https://global-gateway-forum.ec.europa.eu/news/global-gateway-forum-new-value-chains-and-new-jobs-caribbean-eu-and-caribbean-tackle-sargassum-2025-10-08_en

Several studies at Caribbean universities have explored the use of sargassum, in combination with feedstocks such as bagasse, for biogas production. A range of technologies are under consideration, including anaerobic digestion and hydrothermal liquefaction. Complex polysaccharides in macroalgae could also form the basis of biochemical processes to produce fermentable sugars that can be converted into ethanol. For this study, biogas-to-SAF is considered, and it is assumed that one tonne of biogas equates to around 44 m^3 of biogas[174].

It is understood that tests are underway to develop fertiliser from sargassum in Jamaica, but the volumes are expected to be relatively small compared to potential. With these assumptions, it is estimated that around 0.2–1.8 million m^3 of biogas from sargassum could be available for SAF by 2030, and 1.0–2.5 million m^3 by 2050.

Other biogas sources

MSW: The NSWMA has reported that more than half of the waste generated annually consists of yard and food waste, which are ideal feedstocks for anaerobic digestion[175]. These organic wastes could potentially be separated and valorised to produce biogas, or used in an HTL process to make a biocrude that could be upgraded into SAF. MSW in Jamaica is also reported to have high organic content, as waste separation does not occur at disposal[176]. Improved separation of organic waste before landfilling can increase available volumes for biogas production. These organic streams can also be co-digested with bagasse or other agricultural residues to expand biogas production.

Agricultural Residues: Agricultural residues, namely sugarcane bagasse and straw as quantified previously, can also be converted to SAF via the biogas pathway. This would likely be a smaller-scale approach to utilise these residues without relying on the investments required to revive ethanol production, with the trade-off of smaller SAF volumes. This could be used as a near-term option if factories modernise and free up residues before production grows to the point that a dedicated SAF facility is justified.

Lagoons: Stakeholders have highlighted potential to cap anaerobic lagoons in Jamaica to capture biogas from agricultural and organic waste streams, which could then be upgraded and used as a feedstock for SAF. This approach could deliver dual benefits by reducing methane emissions from waste management while supporting early SAF development.

2.6.5 SAF opportunities and challenges

Jamaica's biogas-derived SAF potential is estimated to be 10–36 kt by 2050 from only manure and sargassum, with additional streams available. By 2035, and as shown on the figure below, it is estimated that biogas in Jamaica could support 3–17 kt of SAF, rising to 10–36 kt by 2050. Given the modular nature of biogas-to-SAF facilities, coupled with Jamaica's history of small-scale digesters, there is likely sufficient volume in the near to midterm for SAF development, even before considering additional wet waste streams.

[174] https://blog.geogarage.com/2025/08/the-plan-to-turn-caribbeans-glut-of.html
[175] https://auditorgeneral.gov.jm/wp-content/uploads/2022/07/Performance-Audit-Report-NSWMA-July-25-2022-FINAL.pdf
[176] https://www.mdpi.com/2071-1050/14/11/6457

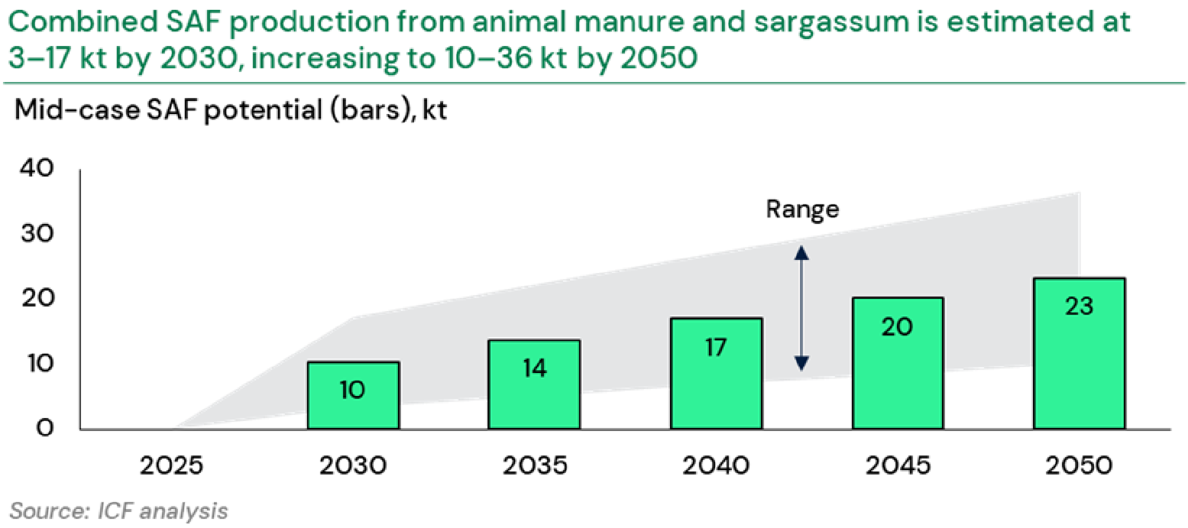


Figure 61 SAF production from animal manure and sargussum

Biogas-to-SAF can be implemented at a modular level, avoiding the high upfront costs and challenges associated with a single large-scale facility. While biogas-to-SAF production can operate at larger scales, it is also well suited to modular deployment. This means facilities could be developed in Jamaica without the same scale of upfront investment and corresponding financing burden associated with a single large plant. A further benefit is that modules can be located close to feedstock sources, reducing transport distances and some logistics challenges.

While biogas generation has many co-benefits, collection challenges remain. This pathway has co-benefits across the feedstock and production system. On the feedstock side, reducing sargassum accumulation can help reduce losses in tourism. On the production side, some biogas upgrading and conversion configurations can generate additional co-products, including green hydrogen. Challenges remain around collection, however, because feedstocks such as manure and sargassum are not naturally aggregated. Reliance on collection from individual entities such as farmers or fishers can therefore be required.

An example of the challenges which arise is that between 2016 and 2019, CaribShare collected over 5,000 tonnes of food waste from eight hotels to produce biogas and fertiliser[177]. However, when funding ended, the programme also ended because only one hotel was willing to pay for the collection service. In 2021, the organisation hosted Jamaica's first Food Waste Conference, after which five of fifteen hotels expressed interest in recycling their food waste, although three of these were driven by corporate mandates.

While this example is most applicable to food waste, it highlights a broader point that incentives and policy can be required to make collection sustainable. One option is policy changes surrounding food waste recycling and diversion. More broadly, incentives can be used to support collection, whether from collection agencies or from individual entities themselves. This could occur if the market for feedstocks such as manure or sargassum becomes large enough in volume and price that collection chains can operate at greater economies of scale and sell what they collect at a profit, or if individual entities can receive revenue for collection activities. Public education around the benefits is also an important enabling factor.

Biogas-to-SAF should be seen as a near- to mid-term low-risk option for SAF production as the technology begins scaling globally. Announcements of biogas-to-SAF facilities are increasing, but the pathway remains less established than some of the other technologies discussed. As additional projects come online globally, this will help de-risk the pathway, reduce financing costs, and potentially improve efficiency and performance. On that basis, the early 2030s

[177] https://www.caribshareja.com/post/fighting-food-waste-in-the-caribbean-tourism-sector-a-case-for-massive-cost-savings

is a reasonable timeframe for Jamaica to plan around for this technology, even if earlier deployment becomes possible under the right conditions.

2.7 CO_2 and renewable energy

2.7.1 Feedstock information

Captured CO_2 is expected to be one of the most critical feedstocks in the future of SAF development, particularly through the power-to-liquid (PtL) pathway, in which captured CO_2 is combined with renewable hydrogen to produce synthetic hydrocarbons suitable for aviation. In fact, both the UK and EU have PtL sub-mandates, with the EU requiring 35% of all jet fuel to be PtL by 2050[178]. The reason PtL has received so much attention is that it offers a route to very large SAF volumes without relying on finite biomass resources, provided that low-carbon electricity and hydrogen can scale.

CO_2 can be sourced either from point sources or via direct air capture (DAC), and may be biogenic or non-biogenic, with implications for cost, scalability, and lifecycle emissions performance. Point-source CO_2 is captured from concentrated industrial exhaust streams and includes both process emissions and combustion emissions. Process emissions arise from chemical reactions, such as limestone calcination in cement production, and are unavoidable even if energy inputs are fully decarbonised. These streams are typically higher purity and lower cost to capture, making them attractive for near-term SAF deployment. Combustion emissions, on the other hand, result from fuel use for heat or power and are more dilute and energy-intensive to capture. While both can support SAF production in the near term, long-term strategies tend to prioritise process CO_2 because it persists even as industrial energy use shifts towards electrification.

DAC represents a different approach, extracting CO_2 directly from the atmosphere rather than from industrial sources. DAC offers a theoretically large and geographically flexible CO_2 supply but remains significantly more expensive and energy-intensive than point-source capture, meaning most SAF roadmaps envisage a gradual transition from point-source CO_2 in the near term towards greater reliance on biogenic sources and DAC as technologies mature and costs decline.

Captured CO_2 can also be classified by origin as biogenic or non-biogenic. Biogenic CO_2 is released during processing of renewable carbon, such as fermentation in ethanol plants, anaerobic digestion of waste biomass, or biogas upgrading. It can be integrated into SAF pathways and, when reused for fuel production, can enable very low lifecycle carbon intensity fuels because the carbon originates from recent atmospheric uptake. Non-biogenic CO_2, typically derived from fossil-based industrial activities, remains a viable CO_2 source for SAF production, particularly where point-source capture is practical and renewable power is available for hydrogen.

Ultimately, the climate performance of CO_2-based SAF pathways is constrained by renewable energy availability, particularly for PtL routes, which require large volumes of low-carbon electricity to produce hydrogen via electrolysis, as well as for CO_2 capture, compression, and fuel synthesis. AtJ pathways, utilizing CO_2 fermented into ethanol, also rely on low-carbon energy inputs for conversion and upgrading. If fossil-based electricity or hydrogen is used, lifecycle emissions increase sharply, eroding climate benefits. Consequently, large-scale deployment of CO_2-based SAF assumes access to abundant, additional renewable electricity and hydrogen, making parallel investment in renewable energy infrastructure a critical prerequisite for achieving low CI SAF production.

2.7.2 Technology pathways

There are two main SAF production pathway families that can use waste gases (CO_2 and CO) as a feedstock:

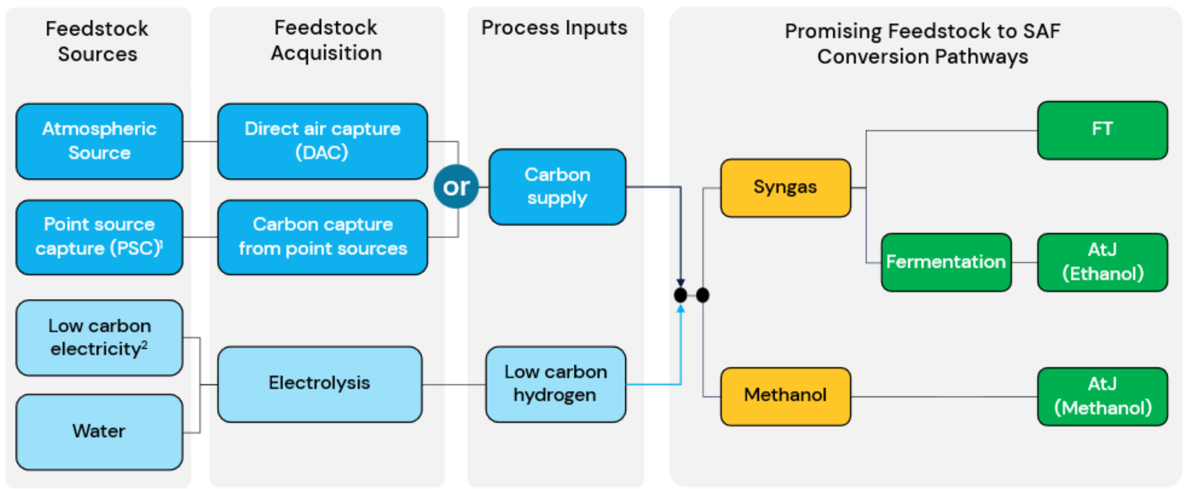
1. **Power-to-liquids (PtL):** In CO_2 is converted to CO (typically through the reverse water-gas shift reaction) and combined with hydrogen to produce hydrocarbon fuels through a synthesis technology such as Fischer-Tropsch. PtL can also proceed through

[178] https://transport.ec.europa.eu/transport-modes/air/environment/refueleu-aviation_en

intermediates such as methanol, followed by methanol-to-jet, depending on the process configuration.

2. **Ethanol via gas fermentation combined with ethanol-to-jet (AtJ):** Gas fermentation is a microbial process that converts gases such as CO, CO_2, and hydrogen into ethanol using microorganisms such as Clostridium ljungdahlii. A range of CO_2/CO sources can be used, including industrial waste gases, biogenic CO_2, CO_2 from DAC, or gases derived from biomass gasification.

CO_2 can be converted to SAF through many pathways



Source: ICF analysis

Figure 62 Power-to-Liquid pathways

Different point sources emit waste gas streams with distinct compositions, which affects both technology choice and downstream requirements. Both pathway families require carbon monoxide and hydrogen, although in different ratios: The FT synthesis process (as part of PtL production) typically requires a H_2:CO ratio of around 2:1 for jet-range hydrocarbon production; Gas fermentation is more flexible and can use mixtures of CO, CO_2, and hydrogen in different ratios, but it generally performs best on gas streams with higher CO content; For methanol synthesis, the required H_2:CO ratio is higher than 2:1.

In most cases, additional hydrogen is required to reach target ratios. This increases cost and can increase emissions if the hydrogen is not produced using low-carbon electricity. As a result, waste gas streams that contain both a carbon source (CO or CO_2) and hydrogen are typically most desirable, because external hydrogen sourcing comes with a much higher cost and energy demand. For PtL, CO can be produced from CO_2 within the process, but hydrogen remains the major requirement.

In practice, whether waste gases can be used effectively depends on both the concentration of CO_2 and whether the stream contains CO and/or hydrogen. More concentrated CO_2 streams tend to be easier to capture and utilise for PtL, whereas gas fermentation is generally better suited to CO-rich gases and benefits where hydrogen is already present.

Evaluation of waste gas sources in Jamaica indicates gas compositions that are generally high in CO_2, with only one stream likely containing hydrogen, the Petrojam refinery, although the exact hydrogen content in the flue gases is not known. For the other gas streams, substantial additional hydrogen would be required from external sources such as electrolysis of water, which has implications for cost and feasibility.

Emission source	Potential for PtL	Potential for gas fermentation
Refinery	Medium *(CO, CO_2 and H_2)*	Medium *(CO, CO_2 and H_2)*
Electricity generation from natural gas	Low *(Diluted CO_2 is costly to utilise)*	Low *(No CO and H_2)*
Alumina production	Medium	Low *(Wet gas)*
Cement manufacture	High *(High CO2 concentration)*	Low *(Lacks hydrogen)*

Table 11 Potential pathways per emissions source

In this study, PtL is considered the primary waste-gas pathway for SAF production over gas fermentation for two reasons: (i) it diversifies Jamaica's SAF pathway portfolio and hedges risk, given that other pathways assessed rely heavily on developing an ethanol sector, and (ii) it aligns with Jamaica's renewable electricity ambitions, which are a prerequisite for PtL at scale.

2.7.3 Sustainability

Waste gases are defined under CORSIA as unavoidable, unintentionally generated, and gases that would otherwise have been discarded. The definition for residue gases also includes that the economic value of the gas stream must be insignificant at the point of origin (less than 10% of the value of all products) [179].

For PtL, there are no default carbon intensity values under CORSIA, and carbon intensity is calculated using the CORSIA LCA[180]. Where fossil-derived gas streams are used, emissions reductions are assessed relative to the counterfactual that these gases would otherwise have been released to the atmosphere. However, in practice, the electricity source is the most critical factor in calculating PtL lifecycle performance because it drives emissions from hydrogen production and the conversion process itself[181].

- Where electricity is sourced from a highly decarbonised grid, PtL SAF can be eligible under CORSIA.
- Otherwise, renewable electricity must be secured through mechanisms such as a power purchase agreement (PPA) or an environmental attribute certificate (EAC).
- A further option is to build dedicated renewable generation for the PtL facility, although this can be costly.

Over time, requirements for electricity sourcing are expected to become stricter, reinforcing the importance of renewable electricity availability as an enabling factor for PtL SAF. Industry estimates suggest PtL can achieve very high lifecycle reductions of 85-100%, where the 100% case reflects DAC and a fully decarbonised supply chain[182].

Unlike PtL, waste gas fermentation to ethanol combined with ethanol-to-jet does have CORSIA default values. As with other ethanol-based pathways, the carbon intensity depends on whether

[179] https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Fuels/ICAO-document-07-Methodology-for-Actual-Life-Cycle-Emissions-June-2025.pdf
[180] https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Fuels/ICAO-document-07-Methodology-for-Actual-Life-Cycle-Emissions-June-2025.pdf
[181] Detailed in Section 10 of the CORSIA LCA methodology
[182] https://www3.weforum.org/docs/WEF_Clean_Skies_for_Tomorrow_Power_to_Liquid_Deep_Dive_2022.pdf; WEF_Scaling_Sustainable_Aviation_Fuel_Supply_2024.pdf

the SAF conversion design is standalone or integrated with ethanol production, as shown on the table below.

Feedstock	CORE value (gCO2eq/MJ)	ILUC value (gCO2eq/MJ)	Emission Reduction (%)	Additional Specifications
Integrated conversion design				
Waste gases	29.4	N/A	67%	AtJ
Standalone conversion design				
Waste gases	42.4	N/A	52%	AtJ

Table 12 Waste gas carbon intensity

2.7.4 Availability assessment

Industrial CO_2

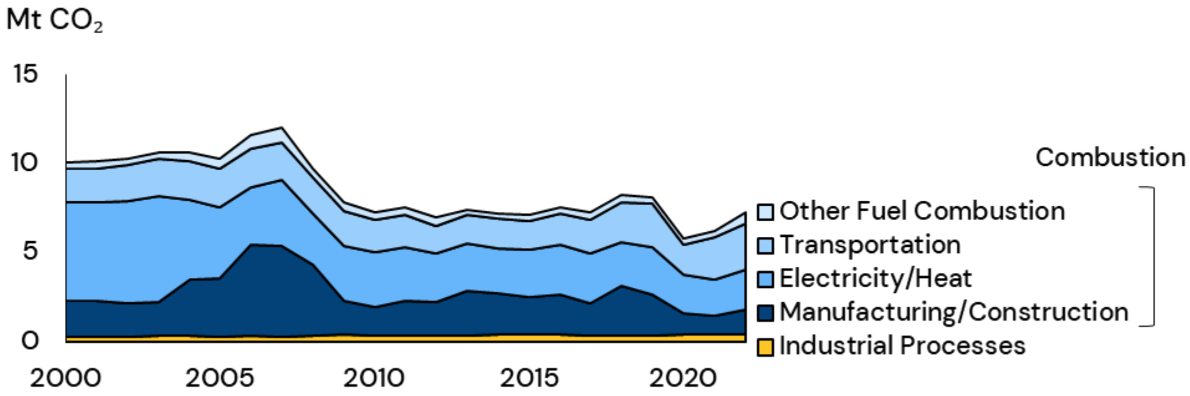
In 2023, Jamaica emitted around 7.12 Mt of CO_2[183]. As shown on the figure below, around 16% came from the industrial sector, including both combustion emissions (denoted under the Manufacturing/Construction category) and process emissions. The majority of industrial emissions are from the alumina/bauxite and cement sectors[184].

For alumina/bauxite, emissions are primarily combustion-related. Jamaica has a large sector, with the largest alumina refinery being Jisco Alumina Jamaica II Limited. The facility closed in 2009 as a result of the global financial crisis, but reopened in 2017 with a capacity of 1.65 Mt, and has been undergoing upgrades since 2019, highlighting some of the ups and downs in emissions in the figure below, and also the potential growth in the sector[185]. Other large refineries include JAMALCO (1.4 Mt capacity) and WINDALCO Ewarton Works (0.6 Mt capacity), which also closed for a year in 2019. WINDALCO's Kirkvine facility has not been revived following its closure in 2009. While alumina emissions are combustion-related, they can have comparatively favourable capture economics in some cases due to relatively high CO_2 concentrations.

Cement is the other major contributor, notably Carib Cement's Rockfort facility, which produced around 0.87 Mt of cement in 2024[186]. Unlike alumina, a large share of cement emissions arise from the process itself, specifically limestone calcination, and these emissions are typically high concentration.

[183] https://www.climatewatchdata.org/
[184] https://documents1.worldbank.org/curated/en/394231631778039389/pdf/Jamaica-s-Long-Term-Climate-Change-Strategy-Recommendations.pdf
[185] https://jbi.org.jm/industry/
[186] https://caribcement.com/wp-content/uploads/2025/05/Carib-Cement-Annual-Report-2024.pdf

Approximately 25% of Jamaica's CO_2 emissions are generated by industrial combustion and process emissions



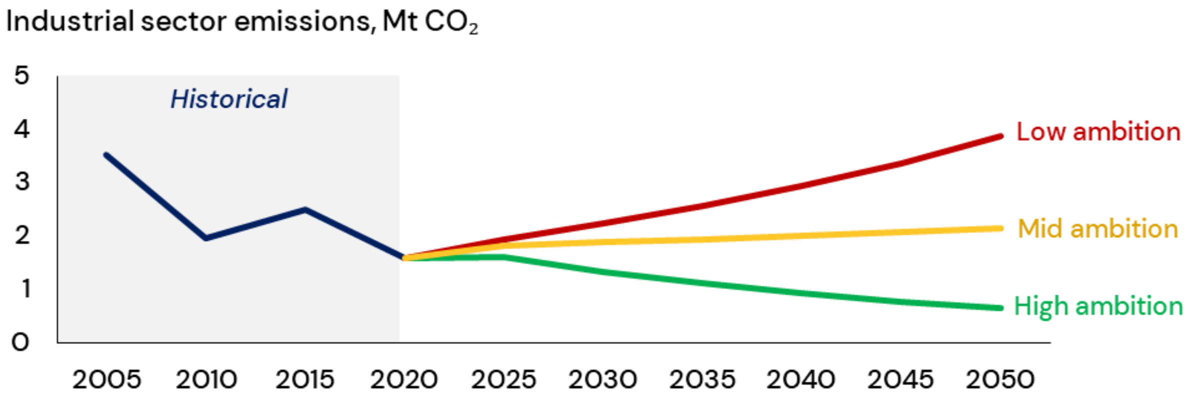
Source: Climate Watch; ICF analysis

Figure 63 Historical and future emissions sources in Jamaica

While industrial emissions availability is broadly understood today, future availability depends on two key drivers: industrial growth and industrial decarbonisation. Jamaica's industrial sector is expected to change in both the near term and longer term, including through Carib Cement's planned 150 kt expansion in 2026 and changes in alumina operations[187].

To estimate future availability, three 2050 scenarios from the World Bank's Long-Term Climate Change Strategy Recommendations were adapted in this study[188]. In the BAU scenario, industrial emissions are assumed to grow to around 4.1 Mt by 2050. In the mid and ambitious climate ambition scenarios, emissions fall to 2.2 Mt and 0.7 Mt by 2050, driven by measures such as switching combustion fuels to lower-carbon options, increasing efficiency across factories, and broader decarbonisation actions. A capture factor (the share of emissions that can be captured) of 0.9 is then applied to estimate capturable volumes for this study.

Industrial CO_2 emissions in Jamaica are projected to range from 0.7 to 3.9 Mt in 2050, depending on the level of decarbonisation achieved



Source: Climate Watch; World Bank; ICF analysis

Figure 64 Industrial emissions projections in Jamaica to 2050

It is worth noting that lower industrial CO_2 availability can correspond to higher climate ambition. From a sustainability perspective, avoiding emissions is always preferable to relying on capture, particularly because not all emissions can be captured. There is also potential competition for

[187] https://www.cemnet.com/News/story/179539/carribean-cement-optimises-capacity-increase.html
[188] https://documents1.worldbank.org/curated/en/394231631778039389/pdf/Jamaica-s-Long-Term-Climate-Change-Strategy-Recommendations.pdf

captured CO_2, in the form of carbon capture and storage rather than utilisation. In the high climate ambition scenario, it is assumed that 20% of residual emissions will be captured and stored, and 10% in the mid-case.

Other CO_2 sources

- **Biogenic CO_2**: Potential biogenic sources in Jamaica include burning of bagasse in sugar mills, fermentation for rum production, and biogas. Two waste-to-energy facilities are also planned that would use MSW to generate electricity, with the organic fraction potentially producing biogenic CO_2 alongside fossil-based CO_2[189]. However, these plans are not yet solidified, and overall it is believed that biogenic CO_2 volumes from these sources will be limited and unlikely to be viable as a primary CO_2 supply for SAF production.
- **Direct Air Capture:** DAC removes CO_2 from ambient air rather than from an industrial point source. A key challenge relative to point-source capture is that CO_2 concentration in ambient air is far lower (around 0.04%) than in industrial exhaust streams (20-99%)[190]. This means DAC must process far more air per unit of CO_2, increasing power requirements and costs. As the technology matures, costs are expected to decline, but DAC is not believed to be an economical pathway for SAF production in the near or mid-term. In the long term, under deep decarbonisation, DAC may mature sufficiently to supplement declining point-source CO_2 and support PtL SAF production.

Renewable energy

As described above, PtL SAF production is highly electricity-intensive. To ensure low emissions, electricity must come from renewable sources. Producers can achieve this either by operating in regions with a largely renewable grid or by securing renewable electricity through long-term power purchase agreements (PPAs). Without this, PtL SAF is unlikely to meet sustainability requirements and is unlikely to be cost-competitive. In that sense, renewable electricity is an imperative "feedstock" for PtL SAF.

As of 2023, Jamaica's electricity grid is predominantly oil and natural gas-based, with only 11% coming from renewable sources[191]. However, in the 2022 Jamaica Integrated Resource Plan, the previous 2030 target of 30% renewables was raised to 50%, and a roadmap was laid out to reach almost 80% renewables by 2041[192]. The plan also estimates that reaching these targets would reduce annual emissions by 0.86 Mt in 2030 relative to 2022, while reducing generation costs and imports.

[189] https://jamaica-gleaner.com/article/news/20221130/govt-identifies-two-waste-energy-sites
[190] https://www.energy.gov/sites/default/files/2024-04/point-source-carbon-capture.pdf
[191] https://www.iea.org/countries/jamaica/electricity
[192] https://www.mset.gov.jm/wp-content/uploads/2024/11/2022-Jamaica-Integrated-Resource-Plan.pdf

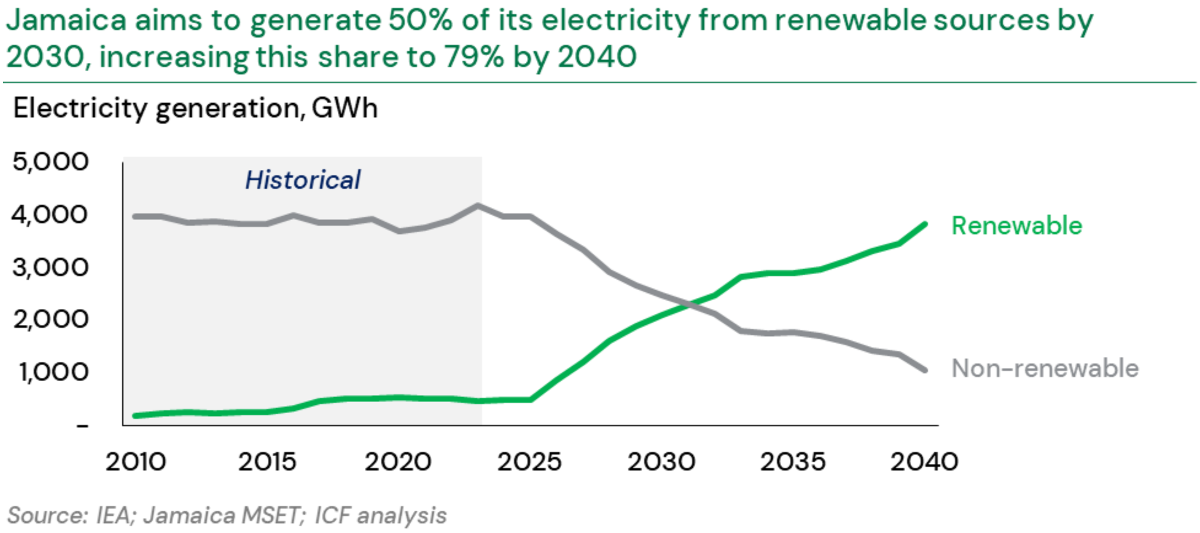


Figure 65 Renewable electricity generation in Jamaica by 2040

The plan details the transition in renewable capacity. A rapid rollout in renewable capacity is expected out to 2040, with portfolio capacity reaching 1,705 MW by 2041. Solar PV is the predominant source, followed by wind, and smaller volumes from hydropower. Reaching this capacity requires significant investment, estimated at USD 836 million by 2030 and USD 1.3 billion by 2041, including deployment of battery energy storage systems.

2.7.5 SAF opportunities and challenges

While Jamaica has significant potential to produce SAF from captured carbon, it is likely to be a long-term strategy given current economics. Based on the availability assessment, industrial sector emissions could support 53 and 185 kt of SAF by 2040, and by 2050 could support 33–249 kt of SAF (mid-case 125 kt). These volumes are sufficient to support a commercial-scale PtL facility. It is also worth noting that even in a deep decarbonisation case where available industrial CO_2 falls significantly, volumes could potentially be supplemented by DAC if the technology matures and becomes more economical.

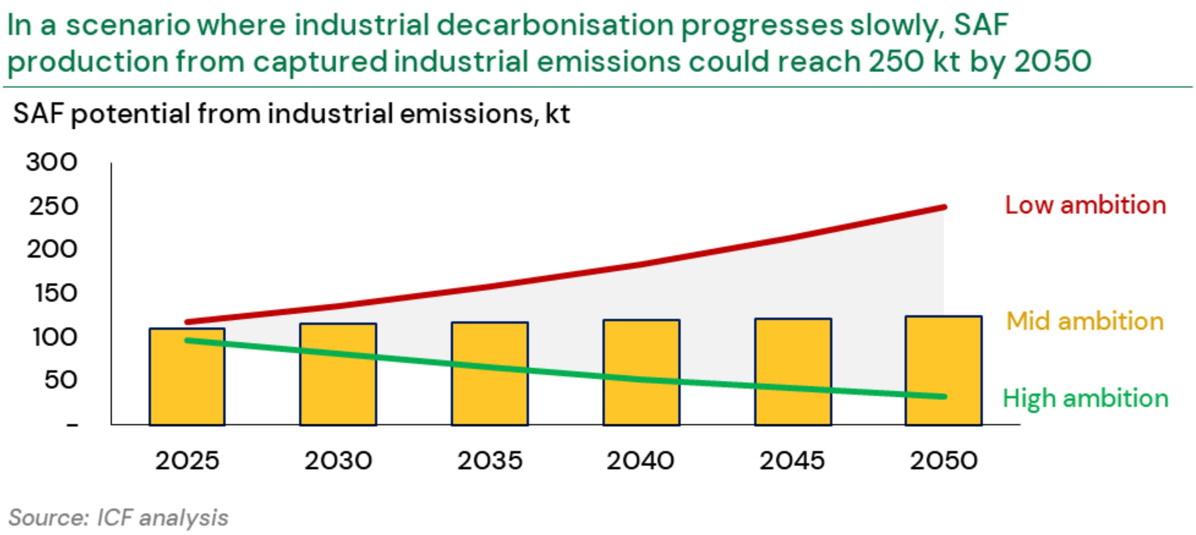


Figure 66 Potential SAF produced from industrial emissions up to 2050

While producing PtL SAF would require a significant scaling of renewable electricity, it would align with existing policy and provide many co-benefits. Beyond SAF production, meeting Jamaica's renewable targets would inject investment into the economy, create high-skilled jobs, improve energy security by reducing reliance on energy imports, likely reduce household electricity costs, and reduce national emissions. The costs involved are significant and accordingly require support. The government has previously provided support mechanisms for renewables in Jamaica, including tax incentives and feed-in tariffs[193].

The cost of PtL SAF is expected to be high, but mandated demand in other regions provides a potential market. Given PtL sub-mandates in markets such as the EU and UK, and potential constraints in those regions around renewable energy availability and costs, Jamaica could potentially become an exporter of PtL SAF. This would require Jamaica to achieve lower costs than competing regions, which would likely depend on access to low-cost renewables and supportive enabling conditions.

PtL should be seen as a long-term opportunity in Jamaica, rather than a kick-starter of an industry. PtL is viewed in many policy frameworks as a key part of the future SAF mix, given its potential to scale beyond finite biomass resources and to deliver very low carbon intensity when powered by renewable electricity. For Jamaica, the near- and mid-term priority is therefore less about bringing PtL online immediately and more about achieving the prerequisite conditions, particularly the renewable electricity transition set out in current policy. Once the grid has materially decarbonised and technology learning curves have progressed, PtL production can then be brought online.

2.8 Summary of feedstock availability analysis

This study evaluated the potential for seven feedstock categories, comprising a combination of quantifying and assessing the technical, collectable, and aviation-available potential of ten feedstock options, alongside qualitative discussion of additional options where relevant. Across the assessed feedstocks, the total resource potential is estimated at 33.4–38.9 PJ/year today, and 19.6–77.0 PJ/year in 2050, equating to a potential SAF output of 108.2–456.3 kt in 2050. A brief recap of each feedstock category is provided below.

Waste FOGs: Co-processing of waste FOGs is the low-hanging fruit option. It is fully commercial and offers a near-term opportunity for Jamaica to produce meaningful volumes of low-carbon-intensity SAF and kick-start a SAF industry. Based on the availability assessments, the SAF output ranges from 1.9–5.9 kt in 2030 to 3.9–13.3 kt in 2050. Realising this potential depends on substantial increases in UCO collection and expansion of tallow rendering. Jamaica has an advantage relative to many countries due to the presence of a refinery, Petrojam. Nevertheless, additional technology requirements and competition with road fuels and other users must be addressed for this pathway to scale.

Sugarcane Ethanol: Jamaica's sugarcane sector was previously among the largest globally, but it has declined in yields and planted area since the 1960s, largely due to outdated infrastructure and equipment. Studies indicate Jamaica has the potential to revitalise the sector, and recent momentum and investment, including a state-of-the-art processing facility, point in a positive direction. Further barriers remain in attracting investment across both existing and future operations, but the upside could be significant economic value. However, due to competition with raw sugar, molasses, and road ethanol, sugarcane ethanol-to-SAF potential is deemed negligible under realistic scenarios. The main relevance of a revived sugarcane sector is therefore its role in enabling agricultural residues as a SAF feedstock.

Agricultural Residues: In parallel with revitalisation of the sugarcane sector, agricultural residues, namely sugarcane bagasse and straw, were estimated to have significant SAF potential. This rises from 0.9–53.3 kt in 2035 to 4.0–86.4 kt in 2050, with the wide range reflecting uncertainty around whether the sugarcane sector scales in line with the mid and ambitious trajectories. Under the mid or ambitious scenarios of this study, residue availability is likely sufficient to justify a facility. If AtJ is selected as the conversion pathway, residue-based SAF production could also align with the development of domestic ethanol production and associated expertise. Achieving these scenarios, however, requires investment across the sugarcane value chain, including improving factory efficiency so that less sugarcane bagasse is required for power generation. Agricultural residues

[193] https://www.sciencedirect.com/science/article/abs/pii/S0301421524004348

are therefore seen as one of the strongest opportunities for SAF production in Jamaica, but significant groundwork is required.

Municipal Solid Waste: Jamaica has a large volume of biogenic MSW and sufficient availability to produce 52.6–58.2 kt of SAF by 2035, rising to 53.0–64.4 kt by 2050. Alongside producing lower-carbon fuel, MSW conversion offers potential co-environmental benefits by reducing landfilled volumes. MSW is also a challenging feedstock that requires substantial sorting and preprocessing to ensure sustainability and compatibility with gasification and FT. Given technical and execution risks, financing is expected to remain challenging until more projects are proven at commercial scale. MSW-to-SAF should therefore be explored as a potentially important option for Jamaica, but its timing is more likely mid- to long-term as global deployment continues and the pathway is de-risked.

Tyre Pyrolysis Oil: Similar to waste FOGs, TPO is a feedstock that can be co-processed, but the hurdles are more significant and the SAF potential is smaller. The estimated 2050 SAF potential is 1.5–2.8 kt. Additional technology would be required, the pathway is not yet ASTM-approved for SAF, and carbon intensity performance remains uncertain. Producing SAF from TPO in Jamaica is therefore not seen as a long-term solution, unless significant volumes of ELTs were to be imported.

Biogas: With an existing base of small-scale anaerobic digestion, Jamaica has the potential to expand biogas production and produce meaningful volumes of SAF. Based on manure and sargassum only, the SAF potential ranges from 5.1–22.3 kt in 2035 to 10.1–36.4 kt in 2050. Additional feedstock streams could contribute further, including capping lagoons and using organic MSW streams. A key benefit of biogas-to-SAF is the potential for modular deployment, avoiding the financing and risk profile associated with single large-scale facilities. The central challenge is feedstock aggregation, as inputs such as manure and sargassum are not naturally centralised and can require collection effort at the farm or community level.

CO_2 and Renewable Electricity: Jamaica has substantial industrial CO_2 emissions, particularly associated with the alumina and cement sectors, and DAC offers longer-term potential to supplement CO_2 supply. The key challenge is that PtL production utilising CO_2 requires large volumes of renewable electricity to produce green hydrogen, as well as to support capture and synthesis. Jamaica has ambitious and well-defined plans to decarbonise its grid, but the current system remains fossil-heavy. An alternative is sourcing renewable electricity through PPAs or dedicated renewable generation, which are typically more costly. PtL SAF is expected to remain more expensive than other pathways in the near term, but given its long-term relevance to global SAF supply and Jamaica's potential for wind and solar PV, PtL should be viewed as a promising long-term option for Jamaica.

The table below summarises technology and feedstock readiness, general sustainability, and SAF potential estimates in 2035 and 2050 for each feedstock category.

Feedstock	Technology	Technology / Feedstock Readiness	Sustainability	2035 SAF Potential, kt *(Low, High)*	2050 SAF Potential, kt *(Low, High)*
Waste FOGs* *(UCO, Animal Fats)*	HEFA	High	High	5.8 *(2.7, 8.0)*	8.8 *(3.9, 13.3)*
Sugarcane Ethanol	**AtJ**	High	Medium	0.0 *(0, 0)*	0.0 *(0, 0)*

Feedstock	Technology	Technology / Feedstock Readiness	Sustainability	2035 SAF Potential, kt *(Low, High)*	2050 SAF Potential, kt *(Low, High)*
Sugarcane Residues *(Bagasse, Straw)*	AtJ	Medium	High	29.1 *(0.9, 53.3)*	56.9 *(4.0, 86.4)*
Municipal Solid Waste	FT	Medium	Medium	55.9 *(52.6, 58.2)*	59.7 *(53.0, 64.4)*
Tyre Pyrolysis Oil*	Co-processing	Medium	Low	1.1 *(0.3, 1.8)*	2.2 *(1.5, 2.8)*
Biogas *(Manure, Sargassum)*	FT	Medium	High	13.7 *(5.1, 22.3)*	23.3 *(10.1 ,36.4)*
Industrial CO_2	PtL	Medium	Medium	117.9 *(65.9, 159.0)*	124.5 *(33.5, 249.4)*
Total				**224.8** ***(128.0, 304.9)***	**278.1** ***(108.2, 456.3)***

Table 13 Feedstocks available in Jamaica

Putting the demand scenarios described in Section 1 together with the feedstock analysis above, the following points summarise how Jamaica's domestic feedstock potential could align with potential SAF demand over time.

2030: SAF demand could be 4.0–15.3 kt by 2030, with a mid-case of 10.2 kt. While the BAU feedstock scenario indicates a theoretical SAF potential of 137.3 kt, much of this is from MSW (49.7 kt) and CO_2 (82.1 kt). Excluding these two pathways, supply potential is 5.5 kt, driven mainly by waste FOGs and biogas, which only meets the low-demand case. Under the mid and ambitious feedstock scenarios, total potential meets demand, but the majority is still reliant on advanced pathways utilizing MSW, CO_2, and agricultural residues.

From a practical standpoint, given the time required to scale non-HEFA value chains and develop larger facilities, co-processing waste FOGs is the most likely option by 2030, with the potential exception of small-scale biogas facilities. **A realistic 2030 benchmark would therefore be the combined production from coprocessing waste FOGs and a 2.5 kt biogas-to-SAF facility, yielding 4.4–8.4 kt of SAF and meeting approximately 1.9–3.7% of projected jet fuel demand.**

2040: By 2040, SAF demand could be 24.2–77.8 kt, with a mid-case of 51.9 kt. Across all supply scenarios, Jamaica's theoretical resource base is sufficient, ranging from 120.9–353.6 kt of SAF potential. However, much of this comes from industrial CO_2, MSW, and agricultural residues (the latter mainly in the mid and ambitious feedstock scenarios). Multiple large-scale PtL facilities are unlikely by 2040. Capping PtL production at 20 kt, which is still ambitious, results in a refined SAF potential range of 88.2–188.9 kt. If MSW technologies do not materialise, and applying the same PtL cap, the range falls to 33.3–126.7 kt. If, in addition, the sugarcane sector does not grow and agricultural residues are not available at scale, Jamaica's SAF potential would be 31.3–63.3 kt, or

12-24% of projected jet fuel consumption, inclusive of a 20 kt PtL facility and relying on a significant share of biogas-to-SAF.

While Jamaica's domestic resources are theoretically sufficient, the outcome becomes sensitive to a small number of domestic and international factors, including whether feedstock value chains scale and whether key technologies mature and are deployed successfully elsewhere.

2050: By 2050, SAF demand in Jamaica could reach 56.4–167.6 kt, with a mid-case estimate of 109.0 kt. With a SAF availability range of 108.2–456.3 kt, the theoretical supply in this study does not meet demand under the low feedstock availability case, largely due to deep decarbonisation reducing industrial CO_2 emissions. This outcome would still represent a sustainable pathway. If additional SAF volumes are required, DAC and other CO_2 sources could be used to supplement supply, albeit at a higher cost.

As in 2040, a significant portion of potential availability in 2050 depends on industrial CO_2, MSW, and agricultural residues (particularly in the mid and ambitious feedstock scenarios). Available volumes could therefore shift substantially based on domestic developments and global technology progress. Longer-term alternatives could also support the same technology pathways, including options such as bamboo or energy crops under AtJ or FT. Overall, Jamaica has the potential to meet meaningful SAF demand, but the challenge will be how to realise that potential in practice.

The figure below illustrates how theoretical feedstock availability to aviation compares to the three demand scenarios described in Section 1.12.

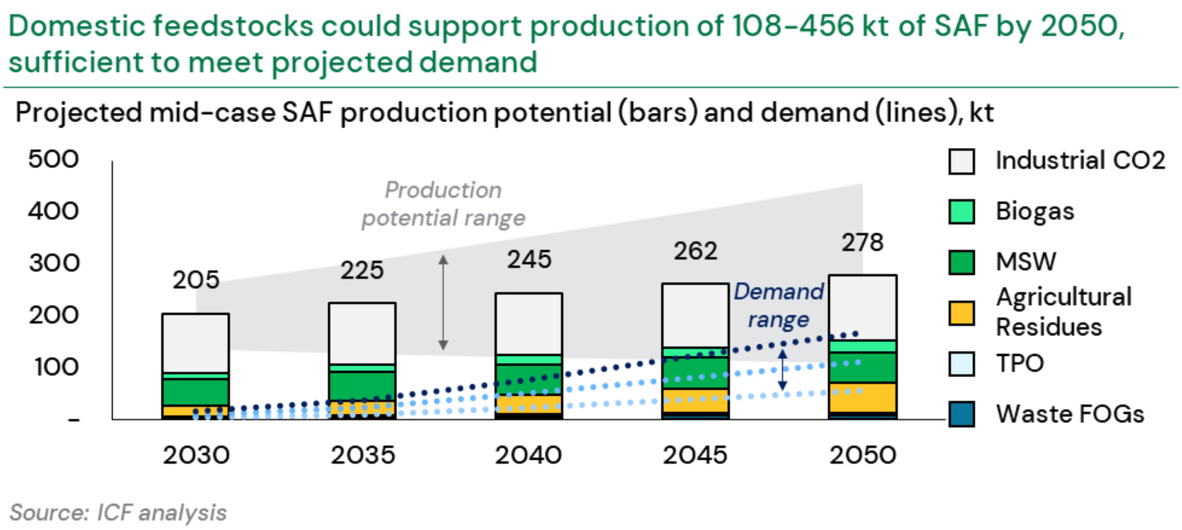


Figure 67 Mid-case SAF supply and demand projections based on feedstock availability

2.9 Supply side scenarios for Jamaica

2.9.1 Scenarios

Methodology

As established in the feedstock assessment, Jamaica theoretically has the domestic resources to outpace SAF demand with supply. However, it would not be realistic to assume that all of this technical potential can come online exactly when demand is required. In practice, the timing of supply will depend on factors such as how quickly value chains scale, whether certain technologies require minimum scale to be viable, and whether pathways are proven at commercial scale globally before they can be financed and deployed in Jamaica.

This section therefore illustrates three realistic supply pathways for Jamaica:

- **A business-as-usual (BAU) supply case** driven primarily by the free market,

- **A mid-supply case reflecting high levels of support** across the SAF value chain, and
- **An ambitious supply case where support matches the top of global standards** and SAF technologies scale globally ahead of schedule.

Each supply scenario corresponds to the scenarios used in the feedstock assessment. In other words, supply in the BAU case does not exceed BAU feedstock availability, and the same constraint applies to the mid and ambitious cases.

Business-as-usual supply scenario

The BAU supply scenario relies largely on the free market, with limited or no supporting mechanisms. Under this case, waste FOG collection lags, but Petrojam may still proceed with **co-processing** limited volumes given the presence of an existing refinery and some baseline demand for SAF uplift from departing aircraft. In this scenario, SAF production via co-processing waste FOGs begins at 1.9 kt in 2030, rising to 3.9 kt by 2050.

In addition, given the existing anaerobic digestion activity in Jamaica and interest in the sector from stakeholders, two pilot-scale **biogas-to-SAF** facilities (each 2.5 kt of SAF) are assumed to come online under the BAU scenario, one in the mid-2030s and another in the early 2040s. Even with these additions, production remains modest, reaching 5.7 kt by 2040 and 8.9 kt by 2050. This falls short of the low-demand cases in those years (24.2 kt in 2040 and 56.4 kt in 2050).

Under a free-market case, limited support also implies lower likelihood of a rapid scale-up in feedstock value chains. In that context, the only feedstocks that could plausibly deliver the additional volumes required to meet even low-demand cases are MSW and CO_2. However, PtL production from CO_2 also requires renewable electricity scale-up to be sustainable, which in turn typically depends on support, making it less likely in a BAU setting. This leaves **MSW-to-SAF** as the most plausible “bridge” option in the BAU case, out of those examined is this study.

This does not imply that an MSW-to-SAF facility is certain, or even likely, in a free-market setting. Demand could be met through SAF imports, and technology risk could deter financing. However, if projects in other countries demonstrate the pathway’s viability at commercial scale, and if voluntary demand remains in Jamaica, the BAU scenario assumes that a full-scale 45 kt MSW-to-SAF facility could come online in the early-2040s. This would enable Jamaica to meet its low-demand case. A facility of this type would be best located in the MPM collection region near Kingston, where most MSW is generated. Including the nearby SPM region would capture around 72% of Jamaica’s total MSW generation, helping to minimise transport costs given the low energy density of MSW, while also locating production closer to Kingston’s airport and seaports.

This BAU supply scenario, relative to the three demand scenarios, is illustrated on the figure below. **Supply reaches 28.2 kt by 2040 (around 11% of projected jet fuel consumption) and 53.9 kt by 2050 (around 19% of projected jet fuel consumption). It becomes sufficient to meet the low-demand case from the early 2040s, but it falls significantly short of the mid-demand case.**

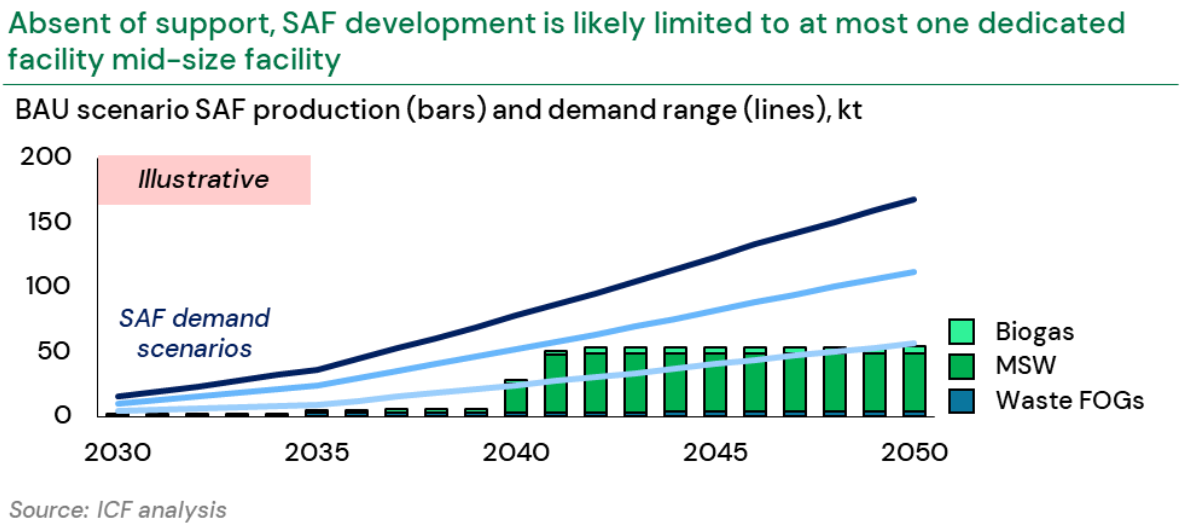


Figure 68 BAU SAF supply and demand projections

Mid-case supply scenario

The mid-case scenario reflects significant support across all facets of the SAF value chain. As in the BAU case, the first SAF production comes from **co-processing** waste FOGs beginning in 2030. In this scenario, however, output is higher, rising from 5.8 kt in 2030 to 11.0 kt in 2050, driven by stronger increases in collection, particularly UCO from small and mid-sized restaurants, as well as expanded animal fat collection and rendering. Achieving this would likely require support mechanisms that improve the economics for collectors and help scale collection networks.

As in the BAU case, the next facility assumed in this scenario is a pilot-scale 2.5 kt **biogas-to-SAF** facility. Under the mid-case, support for academia and other biogas-related stakeholders enables broader deployment, and four demonstration-scale facilities of this type are assumed to come online by 2050.

The largest differentiator between the mid-case and BAU, however, is the development of an **AtJ** facility using sugarcane residues, specifically bagasse and straw. A 25 kt AtJ facility could come online by the late 2030s, expanding to 45 kt in the mid-2040s. By 2050, the mid agricultural residues scenario indicates that an additional 10+ kt of SAF could be produced, but no further expansion is assumed in this supply scenario as a conservative safety net. Realising this pathway would require significant work and investment across the sugarcane value chain, including improvements in factory performance and equipment, and potentially the development of an ethanol sector, depending on facility design. This facility would be most suitably placed near ethanol production to minimize the cost of logistics and maximize the carbon intensity reduction..

Similar to the BAU case, a 45 kt **FT MSW-to-SAF** facility is assumed to come online in the mid-case, in the late 2030s, driven by: (i) successful deployment of similar facilities globally, (ii) clearer demand signals in Jamaica, and (iii) enabling frameworks that support investment. In addition, under this scenario, a pilot-scale 2.5 kt **PtL** facility could come online in the mid-2040s, followed by demonstration-scale 10 kt production. For this to occur without reliance on PPAs at scale, Jamaica's grid would need to become far more renewable, and support would likely need to be provided for research and academia to enable a pilot project and early learning.

This mid-case supply scenario, compared against the three demand scenarios, is illustrated on the figure below. **Supply surpasses the low-demand case in the mid-2030s but sits close to it prior to that, reflecting that beyond waste FOGs, meaningful volumes are unlikely to ramp up before this point. From the late 2030s, when a second commercial-scale facility is commissioned, supply begins to outpace the mid-demand case as well. Maximum production reaches 123.5 kt in 2050 (around 44% of projected jet fuel consumption).**

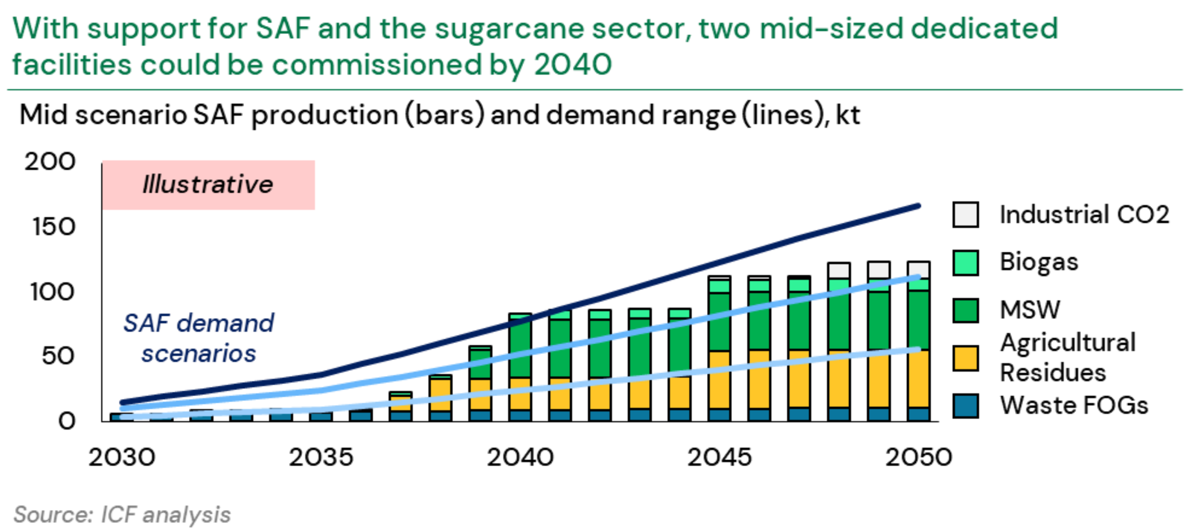


Figure 69 Mid-scenario SAF supply and demand projections

Across the 2040s, an excess supply against central demand reaches 31.8 kt at its peak, which could be exported to generate value, or the product slate could be adjusted to increase coproduct output (for example, producing additional road fuels where relevant). It is also worth noting that these supply scenarios do not have to correspond to a particular demand scenario. If this supply trajectory occurs under the low domestic demand case, the surplus could reach 72.0 kt (in 2045), representing meaningful export opportunity. The key risk, however, is that strong domestic demand signals would likely be important, if not imperative, to achieve initial investment decisions unless export plans and regional demand are sufficiently credible.

Ambitious supply scenario

The ambitious scenario reflects support across the SAF value chain matching the top of global standards, alongside advanced technologies commercialising globally on accelerated timelines. While the feedstock-technology mix mirrors the mid-case, production scales faster, achieves higher volumes, and comes online earlier.

SAF produced from **co-processing** waste FOGs starts at 5.9 kt in 2030, rising to 13.3 kt by 2050. These volumes reflect domestic waste FOG availability. Production could be scaled further through imports if co-processing blend limits increase and/or Petrojam expands infrastructure, but this is not assumed in the core scenario.

Supported by grants for research and other stakeholders, the first pilot-scale 2.5 kt **biogas-to-SAF** facility comes online in 2030, followed by additional pilot-scale facilities and two demonstration-scale 5 kt biogas-to-SAF plants. While these plants are individually small, they are relatively low risk and together amount to a meaningful 17.5 kt of SAF production by 2050.

In this scenario, the sugarcane sector receives strong support and becomes attractive for international investment. Yields rise rapidly and harvested area expands, alongside development of domestic ethanol production. As early as 2035, a 50 kt **AtJ** facility could come online using sugarcane residues from expanded production, followed by a 20 kt expansion in the mid to late 2040s. As with the mid case, an **MSW** facility with capacity to produce 45 kt of SAF is assumed to come online in the late 2030s.

Building on the success of **biogas-to-SAF** deployment and the learning generated through earlier pilot projects, similar support is assumed for stakeholders to develop a pilot-scale 2.5 kt **PtL** facility in 2040. Following this, and assuming the national renewable electricity objectives remain on track, a mid-sized 20 kt PtL facility could come online by the mid-2040s.

The figure below compares the ambitious supply case to the three demand scenarios. From 2035, supply remains above the projected high-demand case and significantly outpaces the low and mid-demand cases. Prior to this, supply still falls short of mid and high demand. This highlights an important consideration for Jamaica that even under ambitious supply trajectories, near-term limitations persist due to the time required to scale non-HEFA value chains and wait for global technology progress.

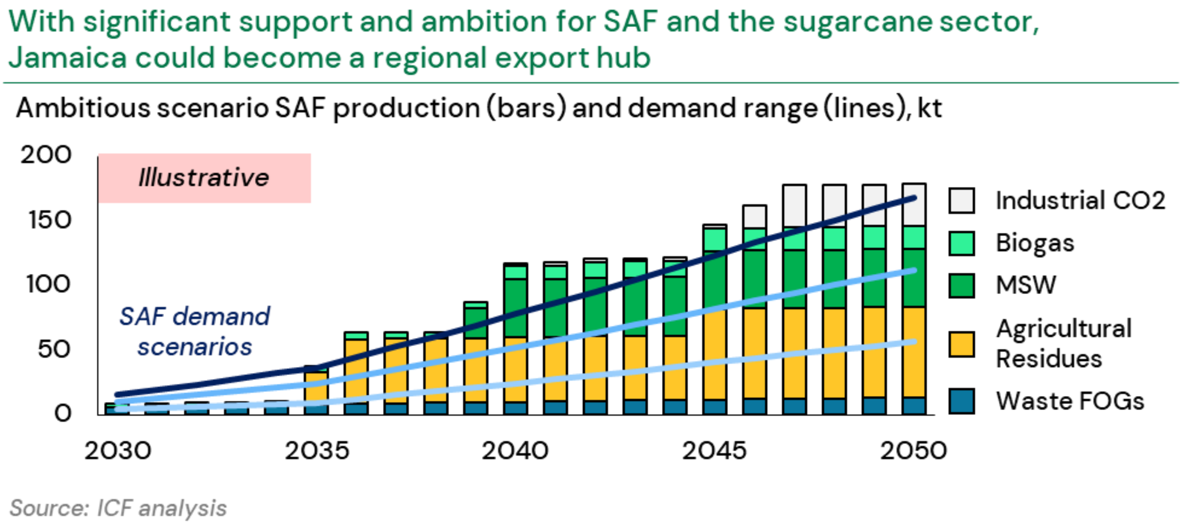


Figure 70 Ambitious SAF supply and demand projections

By 2040, total production reaches 117.4 kt (around 45% of projected jet fuel consumption). The supply surplus above the demand scenarios of 39.5-93.2 kt. By 2050, total supply reaches 178.3 kt (around 64% of projected jet fuel consumption), with surpluses of 10.7-121.9 kt against the demand scenarios. The same dilemma highlighted in the previous scenario holds here: despite meaningful export potential, upfront investment would likely require similarly strong demand signals unless export plans and regional demand are sufficiently clear and bankable.

2.9.2 Benefits

Emissions reduction

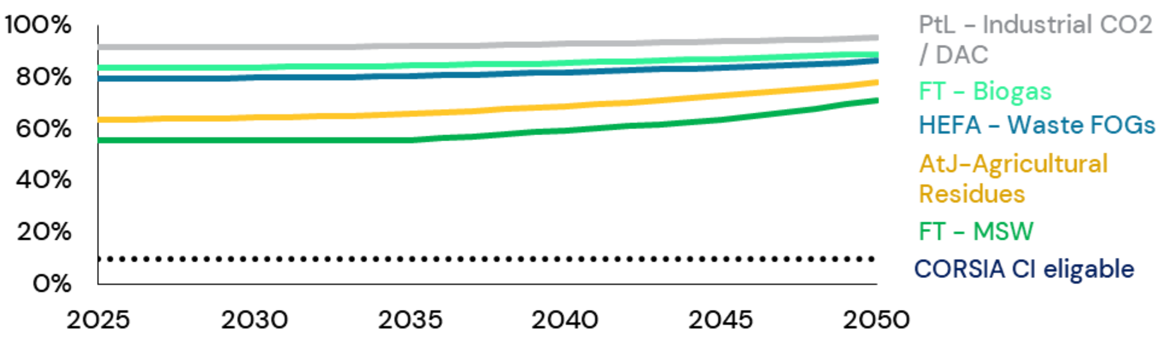
Jamaica's jet fuel consumption is projected to rise from 234 kt in 2025 to 273 kt in 2050, following efficiency gains from both fleet renewal and operations, and corresponding to well-to-wake CO_2 emissions of 891 kt in 2025 rising to 1,038 kt in 2050 in the absence of SAF. While SAF can deliver meaningful in-sector emissions reductions, there are still likely to be residual emissions after SAF use. For example, if a SAF pathway achieves an 80% carbon intensity (CI) reduction, then even 100% SAF use would leave a residual 20% of aviation emissions, meaning out-of-sector measures, including carbon credits and removals, would still be required to reach net-zero.

In addition, the CI of SAF is expected to decline over time, as illustrated on the figure below. This is driven by a number of considerations, including: (i) declining energy-related emissions as electricity and hydrogen supply decarbonises, (ii) improved separation and classification of biogenic CO_2 within MSW pathways, and (iii) PtL process improvements that reduce overall energy intensity[194]. Assuming pathways meet the non-CI requirements of CORSIA eligibility as described in Section 2.1.3 all of the pathways considered would meet the CI threshold. Moreover, given these pathways do not compete with food uses, they would most likely meet sustainability criteria even in the most stringent jurisdictions.

[194] The projected CI scores used in this study are presented in Appendix B

The carbon intensity associated with SAF pathways is expected to decline progressively over time

Carbon intensity reduction by SAF pathway, %



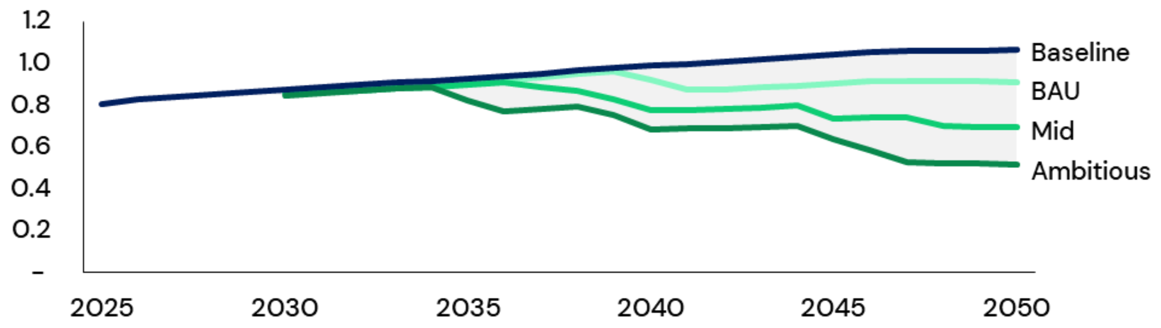
Source: ICF analysis

Figure 71 Projected carbon intensity per SAF pathways

The figure below highlights how the decarbonisation impact of SAF varies significantly by supply scenario.

Uplifting all domestically produced SAF in Jamaica could reduce national aviation CO_2 emissions by an estimated 14–52% in 2050

Aviation emissions by supply scenario, Mt CO_2



Source: ICF analysis
Note: Well-to-wake emissions

Figure 72 Jamaica's aviation emissions in Jamaica by supply scenario

- **BAU supply scenario:** In the first year of uplift (2030), SAF reduces Jamaica's aviation emissions by 0.7%. Once a pilot-scale biogas-to-SAF plant and a mid-scale MSW-to-SAF facility are commissioned in the early 2040s, decarbonisation rises around 14%. In 2050, this corresponds to a 19% SAF uplift with an average CI reduction of 74%, driven by improved MSW sorting and the addition of a second pilot-scale biogas-to-SAF facility. The cumulative 2030–2050 CO_2 saving under this BAU supply scenario is 1.6 Mt. **It is worth noting that the impact of just one pilot-scale (2.5 kt) biogas-to-SAF facility, for example in 2035, can be as large as 0.9% of Jamaica's total aviation emissions.**
- **Mid supply scenario:** Assuming all supply is uplifted domestically, decarbonisation begins at 2.0% in 2030, then rises to 21.4% by 2040 as two mid-sized facilities come online. By 2050, the reduction reaches 34.9%, reflecting 44% SAF uplift with an average CI reduction of 79%. The cumulative 2030–2050 CO_2 saving under this mid supply scenario is 3.7 Mt.
- **Ambitious supply scenario:** Assuming all production is uplifted domestically, aviation decarbonisation reaches 3.0% in 2030 and 31.0% by 2040. By 2050, it reaches 51.8%, reflecting

64% SAF uplift and an average CI reduction of 81%. This higher reduction reflects both a higher SAF share and a higher proportion of SAF coming from pathways with larger CI reductions. The cumulative 2030–2050 CO_2 saving under this ambitious supply scenario is 5.6 Mt.

Job creations

One of the key benefits of developing a domestic SAF industry is the potential to create both high- and low-skilled jobs, and therefore generate domestic economic value. The jobs created can be grouped into three broad categories:

- **Direct jobs:** Roles associated with operating SAF production facilities. These include high-skilled positions such as science, operations, and business development, alongside roles in maintenance and administration.
- **Construction jobs:** Short-term jobs associated with building SAF-related infrastructure. While many roles are lower-skilled, construction also includes engineering and specialist contractor roles. Although temporary, construction of a mid- or large-scale SAF project can span several years and therefore still generate meaningful economic value.
- **Indirect jobs:** Roles created across the SAF value chain outside direct fuel production. Examples include waste FOG collection, agricultural residue aggregation, and waste management. These jobs can include both low- and high-skilled labour depending on the pathway and supply chain design.

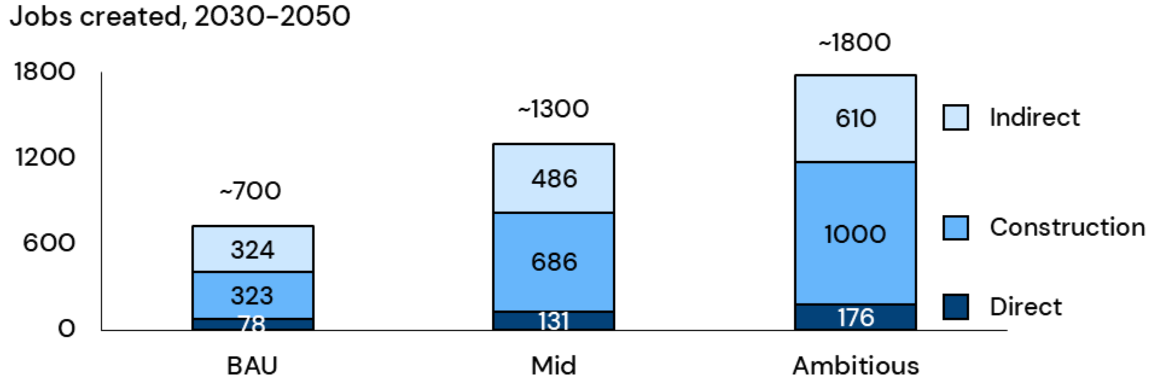
In Jamaica, job creation is expected to vary significantly by pathway. The estimates in this study are based on planned or operating facilities in other markets, applied at a high level to the facility sizes and timelines assumed in the supply scenarios.

For example, co-processing modest volumes of waste FOGs at Petrojam would likely create only 1–2 direct jobs, mainly to oversee development of a SAF capability, as many required roles and competencies already exist within refinery operations and would require limited additional training. Construction jobs would also be modest given the existing infrastructure, while indirect jobs would largely relate to expanded UCO and animal fat collection. Across the supply scenarios, total long-term jobs created from co-processing are estimated at 3–11, with 3–10 temporary construction roles.

Although PtL is important for long-term SAF supply, it also has relatively low labour intensity on a jobs-per-tonne basis. This is because it relies heavily on technology and on renewable electricity supply. Job creation associated with building renewable electricity capacity would be significant, but those jobs are not treated as SAF jobs within this study. Across the mid and ambitious supply scenarios (as there is no PtL production in the BAU case), the long-term PtL job creation is estimated at 12–31, with 80–208 temporary construction roles.

By contrast, AtJ and FT pathways tend to be more labour-intensive, both in facility operations and across the upstream value chain. AtJ requires residue aggregation and preprocessing, ethanol production, and upgrading into SAF. FT pathways can require extensive waste management and preprocessing in the case of MSW-to-SAF, or feedstock aggregation and biogas production in the case of biogas-to-SAF. The figure below summarises the indicative job creation estimates across pathways.

Based on the three supply scenarios assessed, SAF development could support approximately 700–1,800 jobs across Jamaica's economy



Source: ICF analysis

Figure 73 SAF development job creation

During stakeholder consultation, it was highlighted that Jamaica may currently lack some of the workforce skills required to develop a SAF sector, as many graduates leave to work abroad. Under the three supply scenarios, early SAF production can be integrated within Petrojam's existing operations for at least the first decade and therefore does not require large increases in specialised labour. Over time, however, as larger-scale SAF production becomes viable and more labour-intensive pathways are deployed, targeted training and education could help build the required skills base and support retention of high-skilled workers within Jamaica's economy.

Co-products

SAF production via the pathways assessed in this study can generate co-products, most notably renewable diesel and renewable naphtha. Both products have established markets and can therefore provide additional revenue streams alongside SAF, while also offering decarbonisation value in other fuel pools. Based on the price assumptions applied in this study, renewable diesel is valued at around USD 1,700/tonne, while renewable naphtha is valued at approximately USD 1,400/tonne[195].

The share of SAF versus co-products depends on both the conversion pathway and the product slate choices available to the producer. In practice, producers have some flexibility in tailoring output, but that flexibility is constrained by process design and efficiency trade-offs, as well as by market demand for different products. The product slate therefore varies by technology and can change over time as markets evolve and pathways mature. For example, this study assumes a 61% SAF, 36% renewable diesel, and 3% renewable naphtha split for FT pathways in 2025, compared with a 78% SAF, 7% renewable diesel, and 15% renewable naphtha split for AtJ pathways. Over time, the share of SAF is assumed to increase, reflecting both process design improvements and market dynamics that increasingly prioritise SAF.

Linking these product slates to the three supply-side scenarios highlights that co-products can reach meaningful volumes in Jamaica, particularly under scenarios with higher overall production. Under the supply scenarios assessed:

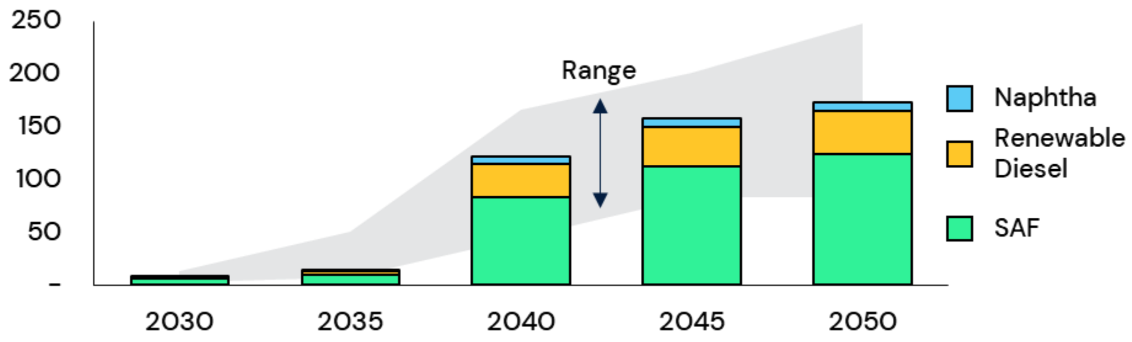
- **By 2040,** Jamaica could produce 13.7–38.9 kt of renewable diesel and 2.2–9.4 kt of renewable naphtha alongside 28.2–117.4 kt of SAF.
- **By 2050,** this increases to 24.2–59.2 kt of renewable diesel and 4.4–10.0 kt of renewable naphtha alongside 53.9–178.3 kt of SAF.

[195] https://afdc.energy.gov/files/u/publication/alternative_fuel_price_report_april_2025.pdf; https://www.spglobal.com/content/dam/spglobal/ci/en/images/news-research/special-reports/bio-petrochemicals-2025/Bio-chemicals_2025.pdf https://afdc.energy.gov/files/u/publication/alternative_fuel_price_report_april_2025.pdf;

While the precise co-product share varies by pathway and facility configuration, the overall takeaway is that co-products can play a meaningful role in supporting Jamaica's wider ambitions, including decarbonisation of road fuels, while also improving the economics of SAF production through diversified revenue streams.

Alongside SAF production, the supply scenarios generate meaningful quantities of co-products

Mid-case projected SAF and co-product production (bars), kt



Source: ICF analysis

Figure 74 Mid-case SAF production projection

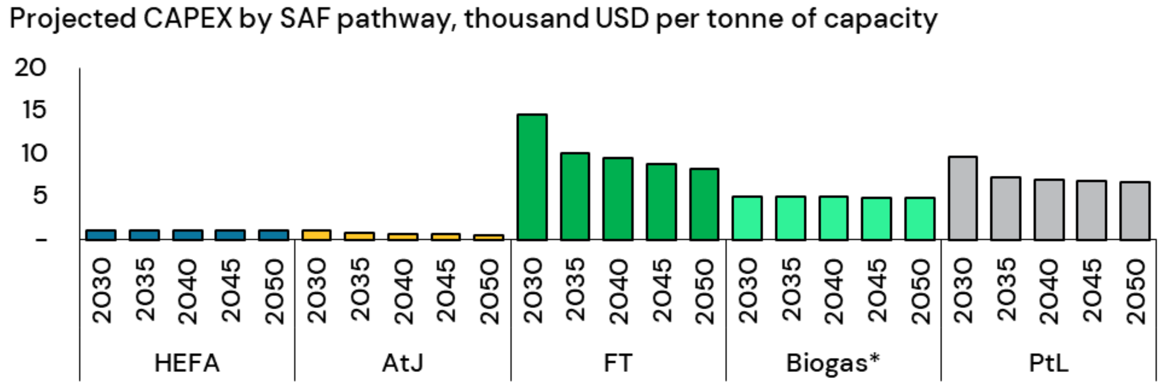
3 SECTION 3: Implementation Support and Financing

3.1 The cost of developing a SAF sector in Jamaica

3.1.1 Required investment

Among the challenges of spurring domestic SAF production is the investment required. Capital expenditures (CAPEX) vary significantly by pathway, with general estimates over time presented on the figure below[196]. Among the most capital-intensive processes are FT and PtL largely due to the breadth and complexity of the technologies required. On the less capital-intensive end is HEFA, reflecting both its maturity and its compatibility with existing refinery infrastructure. AtJ is also not especially capital intensive in the conversion stage, but it is worth noting that these estimates exclude ethanol production, which in Jamaica's case would represent additional expenditure.

CAPEX varies widely across SAF pathways, and pathways with lower upfront capital costs often face higher operating expenditures



Source: Adapted from IATA Finance Net-Zero Roadmap; Velocys and Syzygy Plasmonics; ICF analysis
*Note: * – Producer estimates*

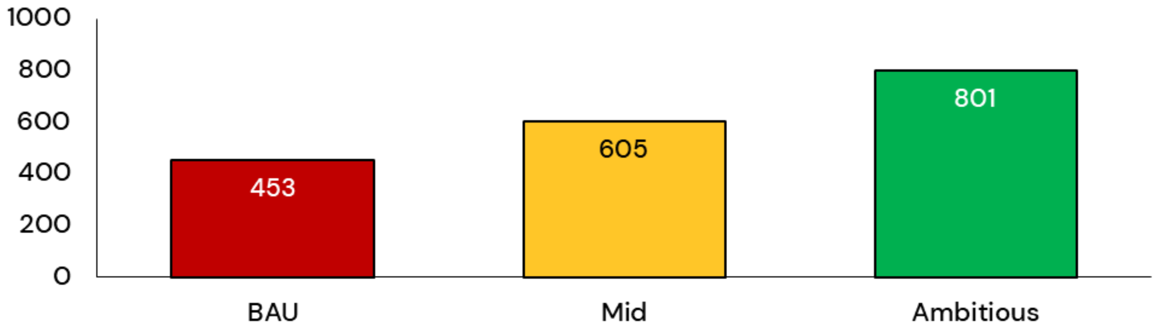
Figure 75 Projected CAPEX by SAF pathway

In the three supply scenarios proposed for Jamaica, total expected CAPEX ranges from around USD 450 million in the BAU scenario to USD 800 million in the ambitious scenario[197]. These totals are not necessarily proportional to SAF production volumes themselves. For instance, in the BAU scenario, a higher proportion of production comes from the FT pathway, which is expected to have a significantly higher CAPEX per tonne of SAF produced than the other technologies considered. To illustrate the scale of capital requirements for facilities assumed in these scenarios, and noting that these figures are global estimates that can vary significantly on a facility-by-facility basis, the following examples apply: a 2.5 kt biogas-to-SAF facility in 2032 could cost around USD 13 million; a 25 kt AtJ facility in 2037 could cost around USD 17 million (excluding a corresponding ethanol facility); and a 45 kt FT facility in 2039 could cost around USD 432 million. The figure below summarises CAPEX requirements across the supply scenarios.

[196] https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/finance-net-zero-roadmap.pdf
[197] The CAPEX projections used in this study are presented in Appendix B

Depending on the supply scenario, the total investment required to develop a domestic SAF sector is estimated at approximately USD 450-800 million

Projected CAPEX by supply scenario, million USD



Source: ICF analysis

Figure 76 Projected CAPEX for Jamaica SAF supply scenarios

Given the scale of these costs, a key challenge becomes how projects are funded. Financing terms have a material impact on the total cost of producing SAF, because the minimum selling price depends not only on CAPEX but also on how that CAPEX is financed. In practice, projects are typically funded through a mix of debt and equity. More mature technologies, such as HEFA, generally have a higher share of debt financing, meaning funding from banks and other financial institutions (including development banks). Riskier pathways typically require a higher share of equity financing, meaning capital from project partners and other equity investors.

For the debt portion of financing, the repayment rate is often driven by the national interest rate plus a risk premium. Jamaica's interest rate of 5.5% compares broadly in line with nearby Dominican Republic (5.25%) and favourably against several other nearby countries and larger markets across Latin America (for example, Haiti: 17%; Mexico: 7%; Brazil: 15%; and Argentina: 29%)[198].

The risk premium reflects both the risk profile of the SAF pathway and the perceived investment risk of the country. Technology risk tends to be lower for mature pathways and declines further as technologies are proven and scaled. Jamaica's policymakers have strengthened frameworks to reduce debt, and its credit rating, which can be used as a proxy for its risk, has improved multiple times in recent years, with expectations that targets will be met earlier than anticipated[199]. Jamaica's current rating of BB is equal to that of nearby Dominican Republic and Brazil[200]. While it remains below countries such as Mexico (BBB) and developed economies such as the US, it has been improving.

Equity investors, by contrast, generally target a required internal rate of return (IRR) that reflects both the risk profile of the project and the returns available from alternative investment options. While IRRs vary by project, the underlying dynamic is consistent: mature technologies such as HEFA generally support lower required returns than more advanced pathways, and the country's risk profile is also a key determinant.

Overall, economic policy will play a critical role in making Jamaica investable for SAF production and in ensuring that SAF produced domestically can be competitive in global markets. Based on recent upgrades to Jamaica's rating, progress is already being made in that direction.

[198] https://tradingeconomics.com/countries
[199] https://dmb.mof.gov.jm/standard-and-poors-upgrades-jamaica-from-bb-to-bb-outlook-remains-positive/; https://www.spglobal.com/ratings/en/regulatory/article/-/view/type/HTML/id/3447974
[200] https://www.spglobal.com/ratings/sri/

3.1.2 The price of SAF

One of the critical elements of SAF production is the SAF minimum selling price (MSP). MSP is the minimum price at which SAF can be sold without incurring a loss. It incorporates the CAPEX and financing costs discussed above, as well as operating expenditures (OPEX). OPEX includes feedstock costs, utilities, and other factors such as labour, and can vary significantly by pathway. Feedstock costs are a major driver of differences across pathways. For example, under AtJ in Jamaica's case, the feedstock cost is driven by ethanol produced from agricultural residues, which is expected to be higher-cost than MSW used in an FT pathway. MSW can, in some cases, have a low or even negative cost depending on how waste management economics are structured. These dynamics can bring MSPs closer together than CAPEX alone might suggest. Utilities also play a significant role. PtL pathways in particular require large volumes of green hydrogen, produced from renewable electricity and water, making electricity availability and price a key cost driver.

General MSP estimates over time, adapted from IATA, are shown on the figure below[201]. For all pathways besides HEFA, MSP is expected to decrease significantly over time. This reflects a common learning-curve effect for novel pathways, where early pioneer facilities carry higher risk, require specialised components, and have higher costs. Once pioneer facilities operate successfully, optimisation and standardisation can reduce both investment and operating costs. By contrast, HEFA MSP is expected to increase marginally over time due to global constraints on waste FOG supply. As demand grows, the cost of UCO and inedible tallow is expected to rise. It is worth noting that, despite the expected decline in MSP for advanced SAF pathways, all pathways are still expected to remain above the cost of conventional aviation fuel, which is why either supply-side or demand-side policies are generally imperative to encourage SAF deployment.

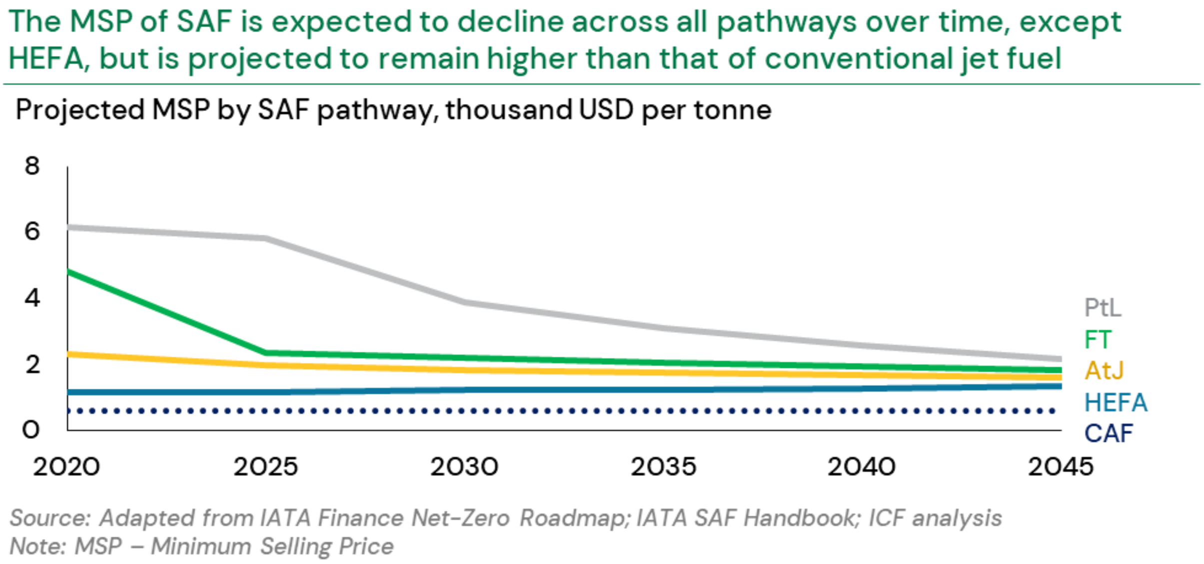


Figure 77 Projected MSP by SAF pathway

The market price that airlines pay for SAF is typically higher than the MSP, as it does not consider profits or additional costs such as logistics and blending must be accounted for. Across the world, the price airlines pay for SAF varies significantly depending on how markets are structured. In voluntary markets, where sustainability attributes can be commercialised and airlines can monetise environmental value, the cost to use SAF can be brought closer to parity with conventional jet fuel. In mandated markets, the price paid by airlines can rise above production costs because limited SAF supply can increase the price that buyers are willing to pay.

[201] https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/finance-net-zero-roadmap.pdf

3.2 Role of policies for SAF development in Jamaica

Given the tight margins airlines operate on, and the fact that jet fuel is a significant portion of operating costs, the price gap between SAF and fossil jet fuel prices (SAF premium) is likely to be passed on to consumers. This is particularly important for Jamaica because: (i) as an island, air transport is critical for residents to travel, visit relatives, and conduct business; and (ii) Jamaica's economy relies significantly on tourism, and tourists tend to be price sensitive to changes in ticket prices. **SAF deployment must therefore be planned with caution around these factors, with policy designed in a way that reduces the impact on passenger ticket prices.**

The figure shows an illustrative example of a policy stack that will assist in bridging the SAF premium gap. By providing incentives and other financing mechanisms, SAF policies can reduce the SAF premium and improve the financial viability of SAF producers. SAF policies can also address other parts of the SAF supply chain to reduce costs, such as supporting feedstock supply chains. Without enabling policies, SAF development will likely be limited in Jamaica.

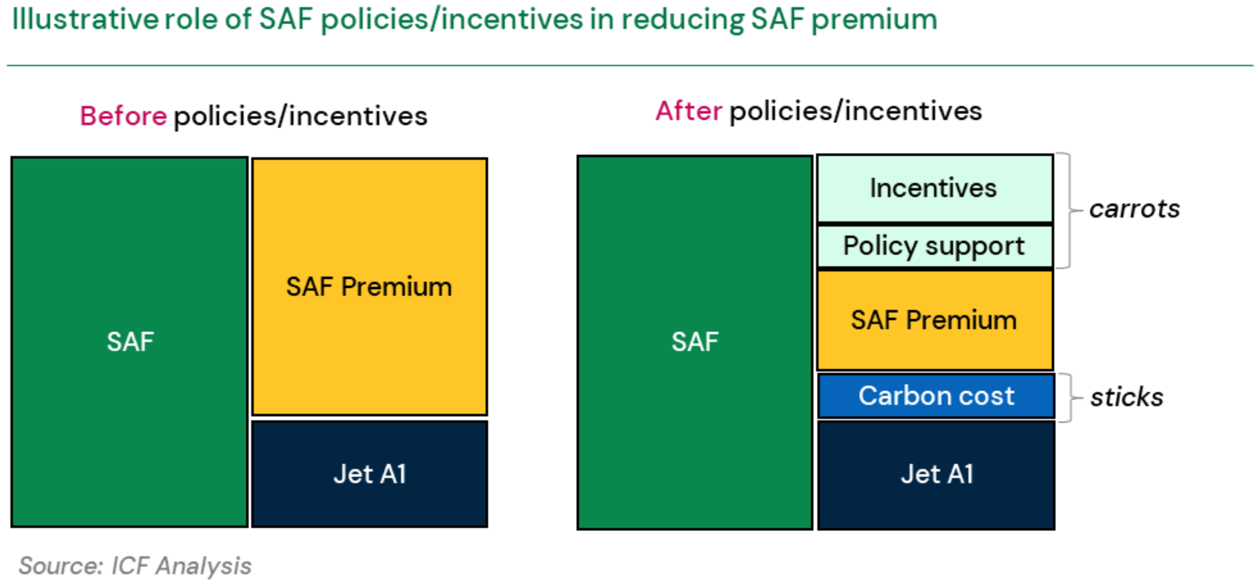


Figure 78 Role of SAF policies/incentives in reducing SAF premium (illustrative example)

3.2.1 SAF policy toolkit

Establishing a full SAF ecosystem is inherently complex and requires a range of supportive policies. Designing these policies around Jamaica's specific circumstances is essential, as a tailored approach can address local challenges while advancing broader government priorities.

Policies that stimulate growth of SAF production and supply

Policies that stimulate growth of SAF production and supply are focused on reducing project risk and lowering the cost of SAF, particularly in the early stages of market development. This includes measures that improve bankability, reduce the cost of capital, and narrow the price gap between SAF and conventional jet fuel. In doing so, these policies can also help stimulate demand by improving the commercial viability of SAF across the supply chain. The table below shows a longlist of such policies, grouped into four categories: revenue de-risking, capital assistance or direct funding instruments, fuel price reduction, and purchaser price reduction.

Type of policy	Description
Revenue de-risking Creates revenue certainty for SAF producers, by reducing price volatility.	
Revenue Certainty Mechanism (RCM)	**Definition:** A government-led mechanism which guarantees a minimum price for producers, reducing investment risks. This can be funded by, for example, an industry levy, or allocation from ETS revenues. **Example:** UK Revenue Certainty Mechanism[202] is under consultation, but will provide a guaranteed strike price per litre of SAF for producers to de-risk production. **Applicability:** Low – An RCM mechanism is effective where there is a reasonably large, predictable market for SAF, creating investor confidence in the longevity of the system.
Auction mechanism	**Definition:** A competitive procurement process designed to bridge the price gap between expensive, low-carbon fuels and traditional jet fuel, providing price stability for producers and supporting market development. **Example:** UK Contracts for Difference[203] (CfD) provides developers of low-carbon electricity generation with long-term price stability. **Applicability:** Low – An effective auction mechanism requires a number of early stage SAF producers, alongside a reasonably large, predictable market for SAF.
Capital Assistance / Direct funding instruments Reduces the cost and perceived investment risk, helping to lower the cost of capital and encourage private sector investment. These can also valorise SAF environmental benefits.	
Capital Grants	**Definition:** Provide capital to reduce upfront CAPEX required for new projects. **Example:** Canadian Clean Fuels Fund[204] provides funding often up to 30% of total project costs. **Applicability:** High – Capital grants require can be effective in supporting early-stage SAF projects progress to production.
Loans / loan guarantees	**Definition:** Government-backed loans and loan guarantees are provided to reduce risks for lenders. **Example:** US Department of Energy Loan Programs Office[205] focuses on high-impact projects that might not secure traditional private financing, including solar, wind, and advanced energy storage systems. **Applicability:** High – Directly finances early-stage SAF producers, and guarantees return on investment.
Green Bonds	**Definition:** A debt instrument where the proceeds are earmarked for environmentally sustainable projects. These can be issued directly by government, government-backed, or can be stimulated through a regulatory or policy framework. **Example:** Sovereign Green Bonds issued in Germany to support renewable energy & transport. **Applicability:** High – Directly finances early-stage SAF producers, and guarantees return on investment.

[202] https://www.gov.uk/government/consultations/saf-revenue-certainty-mechanism-approach-to-industry-funding/sustainable-aviation-fuel-revenue-certainty-mechanism-approach-to-industry-funding
[203] https://www.gov.uk/government/collections/contracts-for-difference
[204] https://natural-resources.canada.ca/energy-sources/clean-fuels/clean-fuels-fund
[205] https://www.energy.gov/edf/articles/getting-know-loan-programs-office

Equity financing	**Definition:** The government, or a government-backed entity such as a Development Bank, takes an equity stake in the project or company, sharing in both the risk and potential future profits. **Example:** National Wealth Fund[206] (UK), sponsored by HM Treasury, mobilises capital for clean energy and industrial transformation. **Applicability:** High – Directly supports in funding SAF production, particularly in early stages.
Indirect funding instruments	**Definition:** Instruments that do not directly fund SAF production facilities but supports ancillary costs that contributes to the development of SAF. **Example:** Tax credits for research and development. **Applicability:** High – Jamaica has a strong academic ecosystem that could be leveraged for developing pilot facilities.
Fuel Price reduction Provide financial incentives to key stakeholders in the SAF supply chain.	
Producer's tax credit	**Definition:** Incentivises the production of sustainable fuel, often based on carbon intensity. **Example:** US Producer Tax Credits per volume of SAF produced, which can increase with CI score. Available for SAF production facilities located and operating in the USA and therefore targets domestic production capacity and the long-term supply of SAF. **Applicability:** High - Producer tax credits directly benefit the SAF producer and support lower production costs based on output. They can also be used to target domestic production.
Blender's tax credit	**Definition:** A financial incentive, typically a set price per gallon of SAF, claimed by taxpayers who blend fuels. Designed to increase the supply of SAF at a reduced cost. **Example:** Biodiesel Blender's Tax Credit[207] in the US provided $1.00 per gallon incentive. **Applicability:** High – Where the credit applies only to domestically produced SAF, it can support domestic supply growth. If imports also qualify, part of the policy benefit may flow to imported SAF.
Excise tax credits	**Definition:** Reduction in the duty payable on specific goods. Excise tax credits have been used worldwide to support the development and use of renewable fuels and can be applied at different points in the SAF value chain, including feedstocks, intermediate products, processing inputs, or the final fuel itself. **Example:** The Excise Tax Exemption on Green Electricity[208] (EU) makes electricity generated from renewable sources completely exempt from excise duties. **Applicability:** High – Excise tax credits can reduce costs at different stages of the SAF value chain, including feedstock supply, processing, and final fuel purchase. Where applied to SAF itself, they can be a useful tool to help bridge the price gap between conventional jet fuel and SAF.
Investment credits	**Definition:** Reduces the amount of income tax a business owes. **Example:** US Solar Investment Tax Credit[209] is a 30% tax credit to stimulate provision of solar systems. **Applicability:** High – Investment credits reduce the cost of SAF.

[207] https://afdc.energy.gov/laws/5831
[208] https://taxation-customs.ec.europa.eu/taxation/other-taxes/green-taxation_en
[209] https://seia.org/initiatives/tax-policy/

Purchaser price reduction Purchaser price reduction mechanisms provide financial incentives to SAF purchasers.	
Credit reallocation	**Definition:** Reduction in the duty payable on specific goods. **Example:** EU ETS reallocates emissions allowances through a "cap-and-trade" mechanism **Applicability:** Low – Requires a broad and active market of producers to function
Airport incentives	**Definition:** Financial or non-financial measures offered by airports to airlines to incentives SAF use. **Example:** London Heathrow's SAF incentive programme subsidises up to 50% of the cost premium for using SAF **Applicability:** Low –Requires a large, predictable market to be effective.
Passenger levy	**Definition:** Levies implemented on passengers to fund SAF consumption. **Example:** Singapore recently introduced a levy that will come into effect on 1 October 2026[210]. These fees range from USD$0.77 for an economy-class passenger on a short haul flight, to USD$31.95 for a business-class long-haul flight. **Applicability:** Low – a passenger levy is effective in a market with a well-developed SAF ecosystem, so is not suitable as an early-stage mechanism

Table 14 Policies that stimulate growth of SAF production and supply

Policies that create demand for SAF

Policies that create demand for SAF are focused on SAF users and purchasers. These can include blending mandates, SAF targets, or carbon intensity reduction requirements, as well as the extension of existing fuel policies to cover SAF. Where mandates are not yet appropriate, clear government leadership and long-term commitments can still help create market certainty and signal the direction of travel until domestic SAF volumes are available at scale.

Type of policy	Description
Mandating SAF use Requiring the use of SAF within the country to meet specific targets.	
SAF blending mandate	**Definition:** Establishes a requirement for SAF to be blended into the existing jet fuel supply. **Example:** The ReFuelEU Aviation[211] mandate requires fuel suppliers to blend specific SAF volumes into conventional jet fuel supply. The mandate includes a separate obligation for eSAF to promote the development of this technology pathway. **Applicability:** Low - Implementing a mandate for SAF where production is not in place to supply SAF can place a burden on fuel suppliers, particularly where penalties are in place for non-compliance. Introduction of a mandate should only proceed in step with domestic SAF production capacity.
Carbon intensity reduction mandate	**Definition:** Establishes a requirement for carbon intensity reductions. The core requirement is meeting carbon intensity reduction requirements, and any renewable fuels supplied into these markets must undergo rigorous life cycle assessment to determine the fuels' carbon intensity. Where mandates are based on carbon intensity reductions, the SAF pathways with the lowest carbon intensity has the most "value". This supports the use of waste

[210] https://www.caas.gov.sg/who-we-are/newsroom/Detail/new-SAF-levy-to-apply-from-1-apr-2026-for-flights-departing-from-1-oct-2026

Type of policy	Description
	feedstocks and other measures that can deliver the lowest carbon intensity fuels. **Example:** Brazil's mandate requires airlines operating domestic flights to reduce their CO_2 emissions through SAF use, starting at 1% in 2027 and rising progressively to 10% from 2037 onwards[212]. **Applicability:** Low - Implementing a mandate for SAF where production is not in place to supply SAF can place a burden on fuel suppliers, particularly where penalties are in place for non-compliance. Introduction of a mandate should only proceed in step with domestic SAF production capacity.
Incorporate SAF into existing frameworks Building on pre-existing, effective policies to add SAF allowances/requirements.	
Update existing policies to incorporate SAF	**Definition:** Existing relevant policies, such as those related to biofuels, can be updated to include provisions for SAF. This can be done at all levels: national, sub-national, regional or local. **Example:** The EU implemented the ReFuelEU Aviation Regulation in alignment with existing Renewable Energy Directive II (RED II) principles, which included a biofuels blending mandate mainly for road transport. **Applicability:** High – Existing policies such as the National Energy Policy and National Biofuels Policy could be expanded to include SAF.
Demonstrate government leadership Lead by example, setting a clear direction and vision for SAF.	
Policy statement to establish direction	**Definition:** The national government takes a clear position in favour of SAF by issuing a policy statement to establish a clear direction. **Example:** The national Civil Aviation Authority of Singapore (CAAS) published the Singapore Sustainable Air Hub Blueprint, a government-backed action plan for decarbonising the aviation sector. **Applicability:** High – Making a policy statement shows commitment to progressing SAF in the country and creates demand signals.
Government commitment to SAF use, carbon neutral air travel	**Definition:** The national government takes a clear position in favour of SAF by leading by example and committing to using SAF and/or carbon neutral air travel. **Example:** Norway has required SAF use on domestic flights, including those used by government employees traveling for work. **Applicability:** High – A clear commitment to use SAF creates strong demand signals and encourages others to follow. However, requires a reliable source of SAF to ensure this commitment is met.

Table 15: Policies that create demand for SAF

Other enabling policies

While policies supporting SAF supply and demand form the core of policy development, the establishment of a domestic SAF ecosystem will also require additional enabling measures. These are particularly important for feedstock supply chains, sustainability systems, and broader implementation conditions.

In Jamaica, feedstock policies are likely to be especially important. For waste oils and fats, this includes measures such as restrictions on disposal and support for collection systems. For sugarcane and residues, it includes policies that help strengthen the sector, improve yields, and support residue mobilisation. More broadly, targeted research, development, and feasibility work

[212] https://www.icao.int/sites/default/files/sp-files/environmental-protection/Documents/EnvironmentReport-2010/2025/Envreport2025_50.pdf

can help address feedstock-specific bottlenecks and improve the economics of collection, transport, storage, and preprocessing.

Type of policy	Description
Downstream enablers Focusing on sustainability and verification for end users.	
Sustainability and verification	**Definition:** Transformation of broader schemes such as ICAO's carbon offset and reduction scheme for international aviation (CORSIA) into national-level binding targets. **Example:** UK, Canada, Japan and Australia are just some of the countries which have integrated CORSIA to at least some extent into national law. By adopting CORSIA into national legislation, a country provides the necessary legal certainty and regulatory enforcement mechanisms such as monitoring protocols, reporting mandates, and non-compliance penalties. Without this domestic integration, the agreement at ICAO remains a voluntary pledge. **Applicability:** High – Jamaica is already participating in CORSIA. Sustainability standards must be adopted and legislated, and systems established to ensure these mechanisms are effective.
Upstream enablers Supporting supply chain development.	
Feedstock policies	**Definition:** Policies supporting feedstock supply chain development. **Example:** Brazil passed legislation guaranteeing sugarcane farmers a share of carbon credit revenue[213]. **Applicability:** High – Jamaica has a range of feedstocks which could grow under enabling policies (e.g. UCO, MSW and sugarcane). Regulations in Jamaica could prohibit discarding of UCO and mandate drop-off schemes at central collection points. Other types of feedstock policies could attract investment in the sugarcane sector or provide incentives for farmers to collect and aggregate sugarcane residues.

Table 16: Other enabling policies for SAF

3.2.2 Current relevant policies in Jamaica and incorporation of SAF

Jamaica has two broad policy frameworks relevant to this study, although neither of which consider aviation emissions:

- **The National Energy Policy (2009–2030)** explicitly targets diversification, renewables and biofuels as part of a modern, efficient, diversified, and environmentally sustainable energy sector.[214]
- **The National Biofuels Policy (2010–2030)**, while directly relevant, was only released in draft form and not officially enacted[215]. However, the government continues to support and fund the goals under the policies, although the focus is mostly on renewable energy and ethanol blending[216].

For SAF development in Jamaica, the recommended approach is to integrate SAF policies into the Energy and Biofuels Policies so that it's not a freestanding SAF policy framework. Any SAF policy framework must include sustainability standards regulations that are harmonised with CORSIA, but also applicable to other biofuels. **Where no sustainability standards are in place across the**

[213] https://www.spglobal.com/energy/en/news-research/latest-news/agriculture/010325-new-law-ensures-brazilian-sugarcane-producers-benefit-from-renovabio-credits
[214] https://www.mset.gov.jm/wp-content/uploads/2019/07/National-Energy-Policy_0.pdf
[215] https://www.mset.gov.jm/wp-content/uploads/2019/07/Draft-Biofuels-Policy_0.pdf
[216] https://jis.gov.jm/information/get-the-facts/fuelling-jamaica-with-energy-diversification/

board for all biofuels, SAF will be at a distinct disadvantage as it will be held to a higher standard. Government funding and incentives can be linked to the sustainability metrics.

Currently, ethanol blending in Jamaica is carried out on a volumetric basis and the reduction in the carbon intensity of the petrol is not calculated and no sustainability standards are applied to ensure climate mitigation from the use of ethanol. Establishing a framework will allow Jamaica to claim reductions for using biofuels in all transportation sectors under their Nationally Determined Contributions under the UNFCCC, while creating a harmonised system that will prevent the requirement for multiple parallel LCA methodologies which could affect feedstock allocation and create competition between different fuels.

3.3 Funding and financing sources for SAF development in Jamaica

As discussed in Section 3.1.1, financing terms can have a significant impact on the cost of SAF projects. This section therefore focuses on the sources of finance available to Jamaica and how different forms of capital can be combined to manage risk across project stages.

Scaling SAF production in Jamaica will ultimately require private capital, but public or concessional support will likely be needed to attract it at scale. Blended finance structures, which combine concessional funding with private capital, are therefore likely to be necessary for funding SAF development in Jamaica. As projects mature and risks become better understood, private and commercial finance is more likely to play a larger role.

While aviation is the immediate use case, SAF projects in Jamaica can be positioned within a broader development context, including energy security, waste management, industrial development, and climate mitigation. Framing projects in this way is important, as it aligns SAF with existing national priorities and expands the range of financing options that may be available.

Domestic and public financing

At the domestic level, public institutions can play a crucial role in developing a SAF industry across the entire value chain. Potential initiatives include supporting feedstock collection and aggregation, financing infrastructure, and facilitating investment through guarantees and risk-sharing mechanisms. Domestic institutions can also provide local-currency financing, helping to reduce foreign exchange risk, and often remain involved across the project lifecycle, which adds to investor confidence and supports alignment with national policy objectives.

The **Development Bank of Jamaica (DBJ)** is central in this context. As Jamaica's national development bank and a Green Climate Fund-accredited entity, DBJ can manage and deploy climate finance for eligible green projects[217]. It provides low-cost financing, partial guarantees, technical assistance, and support for private capital. DBJ also hosts a Public-Private Partnerships (PPP) and Privatisation (P4) division, which manages the full lifecycle of its partnerships and has supported at least 38 PPPs since 2009, generating approximately USD 1.7 billion in value[218]. This includes renewable energy projects as well as the PPP for Kingston's Norman Manley International Airport.

Regional and international climate finance

Regional and international climate finance are important for project development as well as improving overall project viability. These sources can support feasibility studies and engineering assessments, while also providing concessional finance. They can remain part of the financing structure, helping to reduce the cost of capital and absorb risk.

For Jamaica, this type of finance is especially important for first-of-a-kind projects and for pathways that remain higher risk. Example institutions include the **Caribbean Development Bank**, the **Green Climate Fund**, the **Global Environment Facility**, and the **Climate Investment Funds**.

[217] https://www.greenclimate.fund/ae/dbj

[218] https://jis.gov.jm/dbj-enhances-public-services-and-drives-economic-growth/

Multilateral development banks

Multilateral development banks (MDBs) can play a key role across the lifecycle of SAF projects. Beyond the scale of finance they can deploy, MDBs can help prepare projects, reduce risk through guarantees and other tools, and attract private capital.

For Jamaica, institutions such as the **Inter-American Development Bank Group** and the **World Bank Group** can be important for larger SAF projects, especially where infrastructure, regulation, and private investment all need to be developed in parallel.

Revenue support and market-based financing

In addition to upfront financing, revenue certainty will be important for improving project bankability. Long-term offtake agreements, as described in Section 1.12.1, can play a key role by reducing demand risk and supporting financing decisions. Over time, access to international SAF markets through mechanisms such as Book-and-Claim, may strengthen the revenue case for Jamaican production, provided sustainability requirements are met. In some cases, additional revenue streams from co-products or carbon-related value may also support project economics.

3.4 Pathway-specific implementation requirements

Throughout this study, the viability of several SAF pathways has been considered in the context of Jamaica. Beyond the funding requirements and potential financing sources described above, successful deployment of these pathways, and progression toward the mid or ambitious supply scenarios, will require a distinct set of implementation steps. These span:

- **Upstream**, i.e., scaling feedstock collection and supply
- **Midstream**, i.e., implementing production technologies
- **Downstream**, i.e., enabling SAF blending, distribution, and uplift

In light of the policy toolkit previously described, all pathways are likely to require some level of policy support to reduce the final cost of SAF and thereby incentivise demand. These policies will likely need to be announced early and integrated into the policy framework from the outset, helping improve the investment outlook for facilities while also motivating stakeholders to participate across the supply chain.

With the exception of co-processing via the HEFA pathway, the technologies considered in this study have yet to reach full commercial scale. Their deployment in Jamaica will therefore depend, at least in part, on further commercialisation and de-risking at a global level. Until then, these pathways are likely to remain high risk from an investment perspective and are not expected to make a material contribution to Jamaica's SAF landscape before 2030.

In some cases, it would be premature to develop feedstock supply chains before a SAF facility is planned, as there would be no market for the feedstock. In others, however, practical steps can already be taken to begin scaling supply and establishing the foundation for future SAF production.

This subsection sets out the key upstream and midstream implementation steps required for the pathways assessed most closely in this study. Cross-cutting considerations relating to downstream implementation are then discussed separately on a more general basis.

3.4.1 Fats, oils, and greases – HEFA co-processing

Waste FOGs should be seen as the most immediate and practical pathway for Jamaica to begin domestic SAF production, with production potential ranging from 1.9 to 4.0 kt by 2030 and from 3.9 to 9.4 kt by 2050, depending on the level of ambition. The conversion route is already commercial, Jamaica benefits from having an existing refinery at Petrojam, and the assessed domestic waste oils and fats resource appears sufficient to justify co-processing, even if it is not large enough to support a standalone HEFA facility. As such, the central implementation challenge is not proving the core technology, but building the systems needed to collect, aggregate, prepare, certify, and process domestic feedstocks in a way that is reliable and commercially workable.

In practice, implementation depends on action across three areas. UCO and animal fat collection must scale materially; Petrojam must develop the infrastructure and operating procedures needed to receive, pretreat, and co-process these feedstocks without compromising refinery performance; and the supporting framework for sustainability verification, traceability, and feedstock allocation must be established so that the resulting fuel can be CORSIA-compliant and managed alongside wider biofuels objectives. The main distinction across the supply scenarios in this study is therefore the depth of support, breadth of participation, and degree of refinery readiness, rather than a change in the conversion route.

Implementation steps to scale SAF production from waste FOGs
Upstream
1. UCO collection system scale-up **What needs to happen:** UCO collection must move from only large-scale restaurants and hotels to smaller restaurants and urban household sources as well. These volumes are more dispersed, so participation must be made simple and collection must be made economically viable. **Delivery options:** For the commercial sector, prohibit disposal of UCO into drains; require regular collection by licensed collectors for businesses above a certain size; establish registration or reporting requirements for Proof of Sustainability; and provide guidance on compliant storage. For households, establish central collection points with support from municipal authorities, alongside simple storage and disposal guidance. Across both segments, targeted collection support could include tanks, vehicles, aggregation points, collection incentives such as coupon-style payments, and tax relief for collector.
2. Animal fat recovery and rendering expansion **What needs to happen:** Recovery of animal fats must improve so that a larger share of available fats becomes usable refinery feedstocks through improved rendering and recovery of fats from slaughterhouses and related sources. **Delivery options:** Improve collection from slaughterhouses and related facilities; strengthen or upgrade rendering capacity; define quality requirements for rendered fats; and establish supply agreements so material can enter a feedstock pool. Support may be needed for rendering equipment, storage, quality management, and logistics.
3. Feedstock quality specification system **What needs to happen:** Petrojam must define a formal feedstock specification so that any fats and oils feedstocks from multiple suppliers can be accepted without damaging catalysts or downstream units. Given that supply is likely to remain fragmented, standardisation is essential. **Delivery options:** Petrojam establishes contaminant limits, testing procedures, storage and handling requirements, and supplier acceptance criteria. These should then be reflected in contracts with collectors, renderers, and aggregators. Local suppliers are unlikely to be able to pretreat UCO and tallow themselves as it will not be financially viable for small companies. A pretreatment facility at Petrojam is therefore essential.
Midstream
4. Refinery pretreatment unit **What needs to happen:** Pretreatment infrastructure must be installed to remove contaminants before feedstocks enter the hydrotreater. This is critical because oils and fats contain contaminants and catalyst inhibitors, and most Jamaican collectors are unlikely to be able to pretreat feedstocks themselves. A refinery-based pretreatment system would therefore be needed if Petrojam is to accept feedstocks from multiple small and mid-sized suppliers while protecting downstream units **Delivery options:** Install a Petrojam-based pretreatment unit capable of accepting feedstocks from multiple small and mid-sized suppliers; begin with throughput suited to campaign-scale co-processing; and expand later if volumes justify it.
5. Feedstock storage and handling upgrade **What needs to happen:** Petrojam must be able to receive, store, and transfer UCO and animal fats safely and consistently. This includes handling different physical properties, particularly where tallow requires heated storage, and ensuring that feedstocks can be managed in a way that supports both quality control and refinery operability. **Delivery options:** Install dedicated feedstock tanks, heated storage where needed, transfer lines, and batch handling systems suited to co-processing operations.
6. Hydrotreater, hydrogen, and utilities readiness programme **What needs to happen:** The target hydrotreater must be assessed and prepared for co-processing renewable feedstocks, while the wider refinery utility system must be able to support the resulting process changes. Biological feedstocks behave differently from fossil feeds, and oils and fats contain oxygen that must be removed through hydrotreatment, increasing hydrogen demand and generating

Implementation steps to scale SAF production from waste FOGs
additional heat within the process. This can affect temperature control, catalyst performance, and operating stability, and may also increase wastewater volumes. The target reactor would therefore need to be assessed, and modified where required, before co-processing volumes increase. **Delivery options:** Assess the kerosene hydrotreater; replace existing catalysts with commercially available co-processing catalysts suited to renewable feedstocks; update operating procedures; and begin with limited co-processing before moving to more regular operation. In parallel, conduct a hydrogen balance study, assess cooling and wastewater treatment implications, and make incremental utility upgrades where needed. If additional hydrogen demand exceeds current refinery capability, this may trigger a wider refinery review and potentially more significant investment in hydrogen supply.

Table 17 SAF implementation steps: Waste FOGs

3.4.2 Agricultural residues – AtJ

Agricultural residues, specifically sugarcane bagasse and straw, represent one of the strongest medium- to long-term SAF opportunities in Jamaica. However, the wide SAF production potential range of 1.9–63.4 kt in 2040 and 4.0–86.4 kt in 2050 reflects the pathway's dependence on revitalisation of the sugarcane sector as a prerequisite. Although AtJ is unlikely to be viable in Jamaica until the mid-2030s, implementation should begin well before then, starting with efforts to attract investment and improve yields, which could also deliver wider economic co-benefits, including reducing the trade balance and improving energy security.

Beyond expanding sugarcane production, the success of agricultural residues as a feedstock will depend on mills becoming efficient enough to release excess bagasse and on the development of a new supply chain for straw. In parallel, second-generation ethanol production and AtJ, neither of which is yet commercial at widespread scale, will need to continue maturing globally, with the resulting lessons and best practices then applied in Jamaica.

Implementation steps to scale SAF production from agricultural residues
Revitalise Jamaica's sugarcane sector
a. Sector investment mobilisation and coordination framework **What needs to happen:** The sugarcane sector will require significant investment across current and future farms, mills, refining, as well as ethanol production if it is to move beyond gradual recovery. **Delivery options:** Continue strengthening investor confidence through coordinated and stable policy frameworks. Deploy targeted industrial incentives, concessional financing, development-bank support, and proactive investment promotion to attract capital into the sector.
b. Farm productivity, harvesting, and field operations improvement programme **What needs to happen:** Sugarcane yields must improve if the sector is to recover and if larger residue volumes are to become available later. This means addressing low yields, weak farm economics, poor field performance, and inefficient harvesting practices, all of which currently limit production through the economic unviability of land use, and weaken the attractiveness of investment. **Delivery options:** Support investment in improved in better agronomic practices, irrigation, more effective fertiliser use, better farm management, and other infrastructure. Explore more mechanised harvesting where viable, support shared equipment models, and teach best practices from high yield countries. Support may include, grants for farm upgrades and technical assistance. Small farmers may require different support from large estates, particularly regarding assistance with contracts, price certainty, and crop insurance.
c. Land reactivation and viable cane expansion **What needs to happen:** More of the remaining available land must become economically viable for sugarcane if the sector is to grow meaningfully. Yield improvement alone may not be sufficient to support the stronger residue trajectories assumed in the higher supply cases. **Delivery options:** Alongside improving the economics of cane production through better yields and stronger downstream demand, support investment in degraded land, irrigation, and ease land use administrative processes.
d. Sugar mill and refining upgrade programme **What needs to happen:** Mills and related processing facilities must scale and become more efficient to support a growing sugarcane sector. Improving refining and processing capability is important for strengthening the economics of the wider sector.

Implementation steps to scale SAF production from agricultural residues
Delivery options: Upgrade processing equipment, improve plant efficiency, support process modernisation in existing and new facilities, and strengthen refining capability where needed. Support may include concessional finance, targeted industrial incentives, or broader investment promotion aimed at modernising factory systems.
Upstream
1. Mill efficiency **What needs to happen:** Existing and future sugarcane refineries need to improve process efficiency so that less bagasse is required for internal energy needs. This would allow a larger share of bagasse to be diverted to higher-value application such as 2G ethanol and SAF. Without such gains, bagasse availability for SAF will remain limited even if sugarcane production rises. **Delivery options:** Investment in more efficient milling operations including factory systems, improved energy efficiency, and modernised boilers. Raising awareness of the potential economic value of bagasse will also be important to encourage mills to prioritise efficiency improvements. Targeted financial support mechanisms, such as concessional loans or dedicated financing facilities, may be required to enable these upgrades.
2. Straw mobilisation, aggregation, logistics, and contracting framework **What needs to happen:** A new supply chain must be created for sugarcane straw and other field residues, as these are not currently collected at scale. A workable system for collection and densification, clear commercial arrangements so that mills and farmers have a reason to participate, and transport and storage systems that preserve residue quality and reduce losses before conversion will be required. Poor handling, high moisture, or inconsistent quality would undermine plant performance and economics. **Delivery options:** To enable collection, establish sustainable removal guidelines; reduce or prohibit cane burning where needed; develop protocols for collection after harvest; support baling or other densification methods; establish aggregation points; and develop residue purchase agreements with payment mechanisms linked to quality and quantity. Initially, support may be needed for pilot collection systems, early incentive support where additional collection effort would otherwise not be economical, and training across the supply-chain. Storage standards, moisture control practices, and quality specifications must be developed to ensure conversion performance.
Midstream
3. 2G ethanol production capability **What needs to happen:** If residues are converted via ethanol and then AtJ, Jamaica would need access to 2G ethanol production linked to sugarcane bagasse and straw. **Delivery options:** Initially develop a small-scale 2G ethanol facility based on existing commercial technology, with future facilities strategically located to minimise logistics costs and improve integration with the wider supply chain. Support for technical studies and other financial incentives will likely be essential for a small-scale facility. As projects scale to mid- or large-scale 2G ethanol production, risk-mitigating support mechanisms are likely to be required.
4. AtJ project development and logistics viability support **What needs to happen:** Residue-derived ethanol would need to be upgraded to SAF through the AtJ route, and the full supply chain would need to be shown to work at acceptable cost. The key challenge is therefore not only technology choice, but ensuring that feedstock logistics, residue quality, and ethanol supply are all strong enough to support a commercial project. **Delivery options:** Undertake project preparation for a first AtJ facility; integrate plant with a sugarmill and 2G ethanol production to maximize the emissions reduction of the final fuel; fund feasibility studies and support commercial development with incentives.

Table 18 SAF implementation steps: Agricultural residues

3.4.3 Municipal solid waste – FT gasification

Biogenic MSW represents one of the most significant opportunities for Jamaica. It could produce around 54.9–62.2 kt of SAF by 2040 and 53.0–64.4 kt by 2050. The relatively narrow range reflects the high likelihood that this waste stream will continue to be generated. However, while MSW is among the most abundant potential SAF feedstocks globally, its main challenge lies in establishing a feedstock stream that is sufficiently sorted, prepared and consistent to support gasification and FT synthesis.

In practice, this means the pathway depends on both waste-system improvement and project de-risking. Jamaica would need stronger collection, sorting, and preprocessing so that the feedstock is technically suitable, while also undertaking the feedstock testing, engineering studies, and project preparation needed to make a first plant bankable. Given the capital intensity and execution risk of MSW-to-SAF, support for project preparation, financing, and regulatory alignment would be central to implementation.

Implementation steps to scale SAF production from MSW
Upstream
1. MSW feedstock supply and collection assurance programme **What needs to happen:** A reliable supply of MSW must be secured to support a future facility. Collection rates will need to continue increasing, while ensuring that sufficient and consistent volumes of waste are available. **Delivery options:** Continue to strengthen collection coverage and consistency; improve data on waste quantities and composition; prioritise waste contracts or delivery arrangements that ensure long-term feedstock availability for a future SAF facility. Coordination with the National Solid Waste Management Authority would be central.
2. Waste sorting, preprocessing, and feedstock validation system **What needs to happen:** The MSW stream must be sorted and prepared so that problematic materials are removed and the biogenic fraction is better defined. This is important both for technical plant performance and for sustainability outcomes. Contaminated or poorly separated waste would undermine gasification, syngas quality, and overall project viability. At the same time, local MSW must be tested in detail so that the composition, contamination profile, and conversion suitability of the feedstock are properly understood before a first plant is financed. **Delivery options:** Improve source separation where feasible; expand material recovery for metals, glass, e-waste, and other contaminants; strengthen sorting before conversion; and develop a dedicated preprocessing system capable of removing problematic components such as metals, stones, batteries, and glass. In parallel, conduct detailed waste characterisation studies, assess local feedstock composition and variability, and run feedstock testing and validation studies so that preprocessing design and plant specification are based on local conditions. Support could include grants for studies, funding for sorting infrastructure and preprocessing equipment, as well as technical assistance,
Midstream
3. Financing, regulatory alignment, and integration with waste strategy **What needs to happen:** A first MSW-to-SAF plant is unlikely to be financeable on purely conventional commercial terms, and it would also require a clear regulatory path covering waste supply, siting, permitting, and integration with Jamaica's wider waste-management strategy. Without this, project risk would remain too high. **Delivery options:** Alongside measures that attract investment to Jamaica, use project grants, loans, or development-bank participation to reduce first-plant risk. In parallel, align the pathway with national and municipal waste-management priorities, clarify how recycling and conversion interact, and ensure that the project is integrated within wider energy and waste policy rather than treated as a stand-alone industrial investment.
4. First-project development and technical de-risking programme **What needs to happen:** A first MSW-to-SAF project would require strong preparation covering technical design, site selection, permitting, waste contracts, engineering validation, and commercial structuring. Given the pathway's high CAPEX and execution risk, weak project preparation would likely prevent financing. A dedicated facility would then need to be designed and financed, including gasification, syngas cleanup, FT synthesis, and associated upgrading systems. Upgrading of FT liquids at Petrojam via a coprocessing strategy would be the most economical route and is already ASTM approved. **Delivery options:** Support pre-FEED and FEED studies; prepare environmental and social assessments; define plant scale and location; structure feedstock supply agreements; and build a credible project execution plan. A staged de-risking approach would likely be appropriate, drawing on international operating experience and lessons from comparable projects. For plant development, a mid-sized facility would most likely be located near the main waste-generation region, Kingston, to reduce transport costs and support supply logistics, with strong technical partners and conservative engineering assumptions to reduce execution risk. Support may also be needed for syngas cleanup validation and overall plant reliability.

Table 19 SAF implementation steps: MSW

3.4.4 Wet waste – Biogas-to-SAF

Wet wastes, namely manure and sargassum as quantified in this study, represent a promising mid-term SAF opportunity for Jamaica, with a potential SAF yield of 3.4-17.3 kt by 2030, and 10.1-36.4 kt by 2050, plus additional volumes from additional waste streams. The pathway is attractive because it can be deployed at a smaller scale, avoiding some of the financing and execution challenges associated with a single large facility, and because Jamaica already has experience with anaerobic digestion projects.

The main implementation challenge will be building on the existing base of anaerobic digestion projects so that biogas production can be scaled, better integrated with feedstock collection systems, and linked to SAF conversion. The wet wastes discussed in this study are dispersed, not naturally aggregated, and often require active collection from farmers, hotels, restaurants, fishers, or other local actors. The pathway therefore depends on structured collection and diversion systems, as well as economically viable logistic,

Implementation steps to scale SAF production from biogas
Upstream
1. Wet waste aggregation, diversion, and collection framework **What needs to happen:** Feedstocks such as manure, sargassum, food waste and other wet organic wastes must be diverted from unmanaged disposal and aggregated into a reliable supply chain. This requires a logistics model to move dispersed wet feedstocks to digestion facilities, alongside stronger awareness so stakeholders understand the value of participation and collection requirements. **Delivery options:** Establish collection for key wet waste streams and support agreements with potential suppliers, including farms, fisherman, hotels, restaurants, and collection operation, and consider policies or incentives that make collection financially sustainable. This could include collection payments, tipping-fee style arrangements, or revenue-sharing mechanisms for suppliers. Collection routes can be established around key feedstock clusters, using municipal or contracted collection systems, and provide support for storage containers, handling systems, and early operating costs while systems are still scaling. Alongside this, run targeted education and awareness activities for potential suppliers on how and why to participate.
Midstream
2. Expansion and optimisation of anaerobic digestion capacity **What needs to happen:** Jamaica's existing base of anaerobic digesters must be scaled up to better align with SAF-related capacity requirements and feedstock logistics. **Delivery options:** Expand existing digestion capacity by planning centralised digesters in locations where wet waste streams can be brought together efficiently. Early projects could be supported through grants and other direct funding mechanisms, particularly for academia and research programmes given the relatively small scale of these facilities. Existing digestion projects can also provide practical starting points for building local operating experience and confidence before wider deployment.
3. Biogas upgrading and SAF conversion project development (Midstream) **What needs to happen:** Once biogas is produced, it must be upgraded into biomethane and converted into SAF through a suitable pathway. The key challenge is not only the conversion step itself, but ensuring that biogas is produced at sufficient scale and consistency to justify a dedicated SAF facility. In the absence of gas pipelines, transporting raw biogas over long distances is likely to be difficult and potentially uneconomic, which makes plant configuration and siting especially important. **Delivery options:** Develop project designs that integrate digestion, upgrading and SAF conversion as closely as possible; locate facilities to minimise transport requirements; and undertake project preparation studies to determine the most viable scale and configuration. Early support could include feasibility studies, engineering work, and, similar to anaerobic digesters, grants and other direct funding for academic and technical research.

Table 20 SAF implementation steps: Biogas

3.4.5 CO_2 and hydrogen – PtL

PtL production represents one of the largest long-term SAF opportunities in Jamaica, with industrial waste CO_2 estimated to support 52.8–184.8 kt of SAF by 2040 and 33.5–249.4 kt by 2050, depending on the extent of industrial decarbonisation, while DAC offers a potentially unlimited longer-term source of CO_2. Although PtL should be treated as a strategic future pathway rather than a near-term industry kick-starter, given its current costs and prerequisite conditions, there is still much that can be done today to lay the foundation for future production while delivering wider economic and environmental co-benefits.

Above all, Jamaica will need to continue making progress towards its renewable electricity ambitions so that PtL can eventually be produced on both a cost-effective and low-carbon basis. A CO_2 sourcing strategy would also need to be developed, initially focused on the most suitable point sources and, over time, potentially incorporating DAC. In parallel, global deployment of PtL technologies will need to progress further towards a credible investment pathway. Given the high-cost nature of the pathway, early support should focus less on immediate construction and more on creating the conditions that allow a small first commercial project to become viable later on.

Implementation steps to scale SAF production with PtL
Upstream
1. Renewable electricity scale-up and power access strategy **What needs to happen:** PtL requires large volumes of renewable electricity to produce green hydrogen and support synthesis, so the pathway cannot progress materially unless Jamaica's renewable power system expands in line with its policy objectives. **Delivery options:** Accelerate deployment of renewable generation in line with national energy objectives; improve grid decarbonisation; and, where relevant, assess whether dedicated renewable generation or power purchase arrangements would be needed for PtL projects. Support may include renewable energy incentives, grid investment, direct financing, and policy alignment between energy and SAF planning.
2. CO_2 source development strategy **What needs to happen:** A CO_2 sourcing strategy must be established, focused initially on the most suitable industrial point sources. While Jamaica appears to have substantial industrial CO_2 emissions, not all streams will be equally suitable, and future availability may change as the wider economy decarbonises. While not currently cost-effective, DAC could offer long-term supplies. **Delivery options:** Identify and assess the most suitable industrial CO_2 streams in terms of volume, concentration, location, and long-term availability; evaluate capture options for the most promising sources; and monitor the potential future emergence of biogenic CO_2 streams from ethanol production, biogas upgrading, reforming of biomethane, or waste-to-energy processes. DAC can remain a longer-term option if costs fall sufficiently.
Midstream
3. Early pilot support and long-term investment framework **What needs to happen:** Because PtL remains expensive and depends on system-wide conditions that are still developing, early action should focus on de-risking the pathway rather than expecting near-term commercial deployment. The aim is to move PtL from a long-term theoretical option to a credible future project pathway once enabling conditions improve. **Delivery options:** Support early pilot or demonstration activity through grants, direct financing, technical assistance, and research partnerships; align PtL planning with renewable electricity policy and industrial decarbonisation strategy; and begin shaping the investment framework that would be needed for future commercial deployment. Over time, export opportunities could also strengthen the case for larger-scale investment, provided Jamaican PtL can meet the relevant sustainability requirements and become cost-competitive.
4. Green hydrogen and PtL project development **What needs to happen:** PtL requires the integrated development of green hydrogen production, CO_2 capture and fuel synthesis. An economically viable scale, configuration and market strategy must be identified that aligns with Jamaica's future power and industrial system, alongside securing the necessary financing. **Delivery options:** Undertake project preparation studies for green hydrogen and PtL; assess plant scale, location, and integration with renewable electricity and CO_2 supply; and develop a phased project concept that could begin with pilot or small-scale demonstration activity before moving to larger commercial production. Support with feasibility studies, engineering work, technical partnerships, and direct funding.

Table 21 SAF implementation steps: PtL

3.4.6 Downstream requirements

Sustainability, certification, and traceability

For SAF produced or supplied in Jamaica to be usable by airlines for compliance purposes, it must meet the sustainability requirements set out under ICAO's CORSIA, as described in Section 2.1.3. Only CORSIA-eligible fuels can be recognised by airlines under the scheme, making sustainability verification and traceability a core downstream requirement rather than an administrative add-on[219].

CORSIA assesses emissions using a well-to-wake lifecycle approach, which accounts for emissions across the full supply chain, from feedstock production through fuel combustion in the aircraft. This includes emissions from feedstock cultivation or collection, fuel processing and upgrading, transport and distribution, and combustion. While SAF combustion does release CO_2, this CO_2 is treated as biogenic under lifecycle accounting, meaning the overall climate impact is driven primarily by upstream emissions rather than by combustion itself.

In practical terms, this means that sustainability must be demonstrated across the entire supply chain, not just at the point of fuel production or uplift[220]. The figure below demonstrates the points in the supply chain at which Proof of Sustainability (POS) must be verified through documented evidence. This requires clear chain-of-custody arrangements, consistent record-keeping, and transparent lifecycle emissions data from feedstock sourcing through to final fuel delivery.

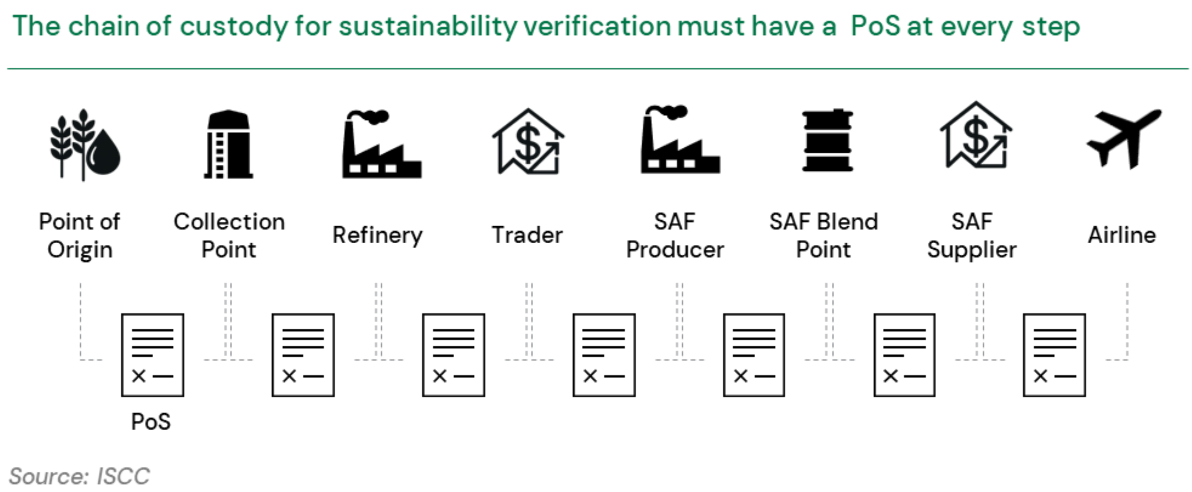


Figure 79 Chain of custody for sustainability verification[221]

Compliance with CORSIA sustainability requirements is demonstrated through recognised sustainability certification schemes, including ISCC, RSB, and Class-NK. These schemes do not audit companies directly. Instead, they set the sustainability criteria and verification rules, and rely on accredited third-party auditors to carry out document reviews, data checks, and on-site inspections. Where compliance is confirmed, the scheme issues a certificate or sustainability declaration that can be used for regulatory reporting and supply-chain claims.

Auditors can be drawn from internationally accredited bodies, and there is also scope to establish local auditing capacity over time if SAF volumes justify it. For Jamaica, incorporating CORSIA requirements into national policy and regulatory frameworks would provide clarity and certainty for market participants, ensuring that SAF produced domestically can be verified as sustainable and recognised by airlines without additional barriers.

[219] https://www.icao.int/CORSIA/corsia-eligible-fuels
[220] https://www.iata.org/contentassets/0bf212bfcb0548f2b6ad4c1e229f7e94/guidance-document-on-saf-sustainability-certification-v0.41_rm-indepth.pdf
[221] https://www.iscc-system.org/wp-content/uploads/2024/01/ISCC_EU_203_Traceability_and_Chain-of-Custody_v4.1_January2024-1.pdf

For more fragmented feedstock supply chains, such as household UCO or small farmers supplying residues, simplified approaches such as self-declaration can be used. However, these still require clearly defined procedures and oversight to maintain traceability and avoid undermining downstream certification.

Book-and-claim and access to global SAF markets

Book-and-claim is a mechanism that allows the environmental attributes of SAF to be separated from the physical fuel. Under this approach, SAF is produced and physically supplied in one location, while the associated sustainability certificate is transferred to an airline or corporate buyer elsewhere, allowing them to claim the emissions reduction even if they do not uplift the fuel themselves.

This mechanism is particularly relevant as it would allow domestic SAF producers to access a wider customer base, including airlines that do not operate flights to Jamaica and corporate buyers seeking to reduce aviation-related Scope 3 emissions. It also reduces the need to transport SAF long distances solely to meet uplift requirements in specific locations.

Book-and-claim systems are administered through established registries (e.g., RSB, ISCC, IATA, and SABA) that issue, track, transfer, and retire SAF certificates, ensuring that emissions reductions are claimed only once[222]. While some regulatory frameworks, such as ReFuelEU Aviation, require physical SAF supply within specific jurisdictions, book-and-claim remains compatible with CORSIA and voluntary corporate demand. As such, it provides an important flexibility mechanism for Jamaica, particularly in the early stages of SAF deployment

Education, awareness, and skills development

As SAF remains an emerging sector, awareness and skills development will be important across the downstream value chain. Airports, fuel suppliers, airlines, regulators, and feedstock suppliers all need a clear understanding of what SAF is, how it is handled, and what is required to meet safety and sustainability requirements.

In the near term, efforts in Jamaica should focus on practical issues, particularly sustainability documentation, traceability requirements, and fuel handling procedures. This is especially important for feedstock collectors and aggregators, where decisions taken upstream directly affect whether SAF can be certified and recognised downstream.

Over time, SAF deployment will also create demand for more specialised skills, including in fuel handling, process operations, sustainability management, and certification. As the sector develops, there may be value in incorporating these skills into formal education and training pathways, for example through updates to existing engineering, science, or technical programmes. Doing so would help build local capacity to support domestic SAF production and enable longer-term participation in regional SAF supply chains.

Downstream fuel handling, blending, and airport readiness

The downstream SAF supply chain, covering storage, blending, certification, distribution, and uplift at airports, plays a critical role in the SAF ecosystem. Whether SAF is produced domestically or imported, effective downstream infrastructure and operational readiness are required to ensure fuel quality, regulatory compliance, traceability, and safe integration with existing jet fuel systems. Delivering this requires coordination between fuel suppliers, airport operators, airlines, regulators, and certification bodies, as well as alignment with international fuel specifications and sustainability reporting frameworks.

In practical terms, downstream activities include the transport of SAF from the producer to the airport, blending in accordance with ASTM D7566, storage and handling within the airport fuel tank farm, and compliance with Joint Inspection Group (JIG) standards. They also include the management of fuel quality and sustainability documentation, selection of appropriate transport modes to the airport, and final uplift of SAF to aircraft via bowser trucks or hydrant systems.

[222] https://rsb.org/registry/

In Jamaica, aviation fuel handling is governed by internationally recognised JIG and Energy Institute standards, which are applied as industry best practice by airports, fuel suppliers, and airlines. Once SAF blends are re-certified as equivalent to conventional jet fuel, they can enter the airport fuel tank farm and be distributed through the hydrant system in the same way as Jet A-1.

Blending SAF components requires dedicated infrastructure capable of actively mixing fuels to achieve a homogeneous final product. In practice, this typically involves separate tanks for neat SAF and conventional jet fuel, as well as a dedicated blending tank. Depending on the airport and supply-chain configuration, blending facilities may be located close to the airport but outside the main fuel tank farm. Additional training is required for personnel at blending and terminal facilities to ensure compliance with ASTM and JIG requirements. Where SAF is co-processed at the refinery, compliance with ASTM D1655 is addressed upstream, and additional blending infrastructure at the airport is not required.

4 SECTION 4: Action Plan

This section sets out a practical action plan for advancing SAF development in Jamaica. As shown throughout this study, Jamaica has a credible near-term opportunity to begin domestic SAF production through waste FOG co-processing at Petrojam, alongside a broader set of medium- and long-term pathways that could support future scale-up. This opportunity will require more than feedstock availability alone, it will depend on coordinated action across policy, financing, feedstock mobilization, project development, downstream readiness, and long-term strategic planning. In line with achieving the vision below, this action plan sets out the required workstreams and their critical success factors, key performance indicators, and a timeline of action across workstreams. Based on the findings from the feedstock analysis and consultations with local stakeholders, the vision for SAF deployment in Jamaica is outlined as follows:

A thriving, self-sustaining and evolving SAF industry and agricultural sector, driven by national ambition, delivering substantial economic, social, and environmental value, including:

i. **Reducing aviation emissions through SAF deployment**
ii. **Attracting long-term domestic and international investment across the SAF value chain**
iii. **Stimulating economic growth and reducing reliance on imports, including through the revitalisation of the sugarcane sector**
iv. **Creating high-quality jobs across the SAF and agricultural value chains, both directly and indirectly**
v. **Enhancing national energy and fuel security through diversified domestic feedstock production**
vi. **Positioning the country as a leading regional hub for SAF production, innovation, and sustainable biomass supply**

The study identifies five critical workstreams for Jamaica, illustrated in the figure below. Together, these workstreams provide a structured pathway for Jamaica to progress from initial SAF production to a broader domestic SAF ecosystem.

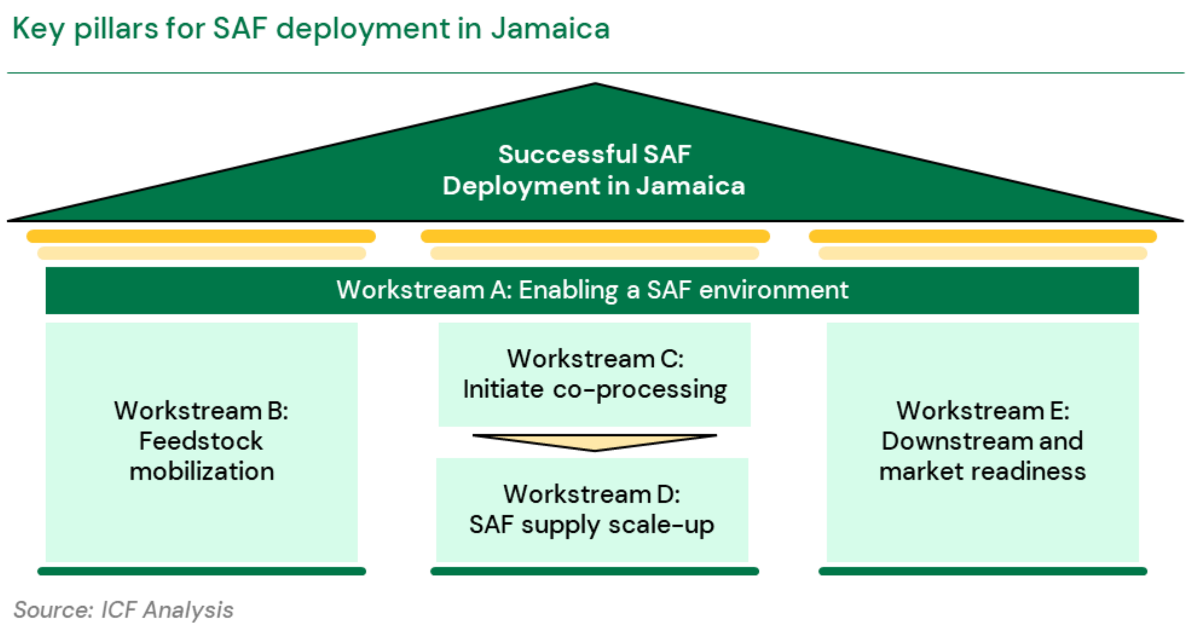


Figure 80 Workstreams for SAF deployment in Jamaica

4.1 Pillars of SAF deployment in Jamaica

4.1.1 Workstream A — Enabling a SAF environment

This workstream establishes the institutional, policy, financing, and regulatory conditions needed for SAF development in Jamaica. It is overarching to all other workstreams, as domestic SAF production will require coordination across government, industry, and the wider supply chain. The immediate priority is therefore to establish a clear long-term direction for SAF, backed by a governance structure that can coordinate implementation and respond to changing domestic and international conditions.

Jamaica will need a clear long-term ambition for SAF production and consumption, supported by a Jamaica SAF Council. It is recommended that the Ministry of Energy, Transport, and Telecommunications acts as the oversight authority of the SAF council, providing cross-sector policy direction and strategic coordination, while the Jamaica Civil Aviation Authority acts as the delivery lead, responsible for day-to-day implementation and stakeholder engagement. Other ministries and agencies, including the Ministry of Agriculture, Fisheries and Mining, the National Solid Waste Management Authority, and the Ministry of Tourism, should support this structure through policy coordination and by enabling development in their respective areas.

Beneath this, a wider set of delivery partners will be needed across the value chain. This should include upstream actors to support feedstock mobilisation, such as collectors; midstream actors, notably fuel producers including Petrojam; and downstream actors, including airlines, airports, and enabling bodies such as IATA. A non-exhaustive list of stakeholders, along with the workstreams relevant to each, is provided in Appendix A.

The Jamaica SAF Council would help coordinate the policy and regulatory framework needed to support feedstock mobilisation, first-project development, refinery adaptation, sustainability verification, and later market creation. The priority is not to introduce a binding blending mandate, but to create the conditions under which supply can emerge and scale in a coordinated way.

Critical success factor: Jamaica is recommended to establish a clear long-term SAF commitment, supported by effective governance and an enabling policy and investment environment that gives stakeholders confidence to participate across the supply chain.

4.1.2 Workstream B — Feedstock mobilisation

A successful Jamaican SAF industry depends not only on theoretical feedstock availability, but on whether feedstocks can be mobilised at sufficient scale, quality, and cost. This is likely to be one of the most important practical constraints across all SAF production pathways. While the study identifies meaningful opportunities in waste oils and fats, sugarcane residues, wet wastes, MSW, and industrial CO_2, each of these requires a distinct supply chain that does not yet exist at the scale needed for SAF production.

The near-term priority should be to expand UCO and animal fat collection, along with improving the aggregation of these waste streams so that co-processing at Petrojam can begin. In parallel, work should begin on laying the foundations for medium-term pathways by strengthening the sugarcane sector, trialling residue mobilisation systems, improving wet waste aggregation, and continuing to improve MSW collection and sorting.

Critical success factor: Jamaica is recommended to establish reliable, sustainable, and cost-effective feedstock supply chains that can support the first SAF projects and provide a foundation for medium- and long-term scale-up.

4.1.3 Workstream C — Initiate co-processing

Co-processing of waste oils and fats at Petrojam is the clearest near-term opportunity for domestic SAF production as the conversion route is well demonstrated at a commercial scale and can build on existing refinery infrastructure.

However, the opportunity requires investment. Petrojam will need to assess and upgrade its systems to process UCO and animal fats. This includes feedstock quality management, pretreatment, storage and handling, hydrotreater readiness, and assessment of hydrogen and utility implications. Early production through Petrojam is important not only for delivering the first SAF volumes, but also for building technical confidence, creating visibility for SAF in Jamaica, and demonstrating that domestic production is feasible.

Critical success factor: **Jamaica is recommended to convert the Petrojam opportunity into actual domestic SAF production.**

4.1.4 Workstream D — SAF supply scale-up

Beyond Petrojam, the medium-term growth of a domestic SAF industry will depend on bringing forward more advanced SAF pathways. In the context of this study, the most important scale-up opportunities are agricultural residues, biogas, and MSW, with PtL positioned as a strategic longer-term pathway. These pathways differ in maturity and risk, but they share a common requirement for active project preparation, feedstock development, and technical and commercial de-risking.

This workstream is therefore about turning future potential into a credible project pipeline. Jamaica will need to identify the strongest medium-term project concepts, carry out detailed project preparation, and support their progression. For agricultural residues, this means mobilizing investment in the sugarcane sector and linking it to 2G ethanol and AtJ development. For biogas, it means increasing biogas production and encouraging its use in SAF-linked projects. For MSW, it means improving MSW collection and sorting, as well as supporting the diversion of such waste streams into SAF-linked projects. Although preparatory, with PtL likely to form part of the long-term pathway, expanding renewable energy capacity will be essential.

Critical success factor: **Jamaica is recommended to move beyond a single early SAF project and develop a credible pipeline of medium-term pathways that can be progressed into bankable projects as technologies and supply chains mature.**

4.1.5 Workstream E — Downstream and market readiness

A functioning SAF ecosystem also requires the ability to blend, certify, transport, distribute, uplift, and sell SAF aligned with international standards. This includes downstream fuel logistics, airport readiness, sustainability verification, traceability, and the ability to create confidence among buyers.

Jamaica will therefore need to develop a downstream readiness framework covering storage, blending, quality assurance, and compliance with ASTM and JIG standards. In addition, for the SAF to create value in regulated aviation markets it must meet relevant sustainability and chain-of-custody systems.

To kickstart these initiatives, a campaign could be organised to demonstrate the safe blending, certification, and uplift of SAF at a selected airport. This demonstration would help streamline operational processes while also serving as an awareness initiative to promote the adoption of SAF in Jamaica. Over time, book-and-claim mechanisms may also become important in widening the market for Jamaican SAF, particularly if local production exceeds direct domestic uptake or if producers wish to access international buyers with no operation footprint in Jamaica.

Critical success factor: **Jamaica is recommended to ensure that SAF can be certified, delivered, uplifted, and sold through a credible downstream and market framework.**

4.2 Key performance Indicators

Progress across these workstreams should be monitored against defined milestones. The following presents an illustrative timeline for the development of a domestic SAF sector.

By Q3 2027:

- The SAF Council, Technical Committee, and Administrator are established, and a regular meeting structure is in place.
- The SAF Council frames a broad long-term vision and commitment towards SAF development in Jamaica, including an indicative pathway to 2050.

- Initial enabling policies are identified for SAF development, including feedstock mobilisation, first-project support, sustainability verification, and downstream readiness.
- A national UCO and waste fats collection programme is launched with supporting and enabling policies.
- An assessment is carried out at Petrojam to identify feedstock volumes, feedstock specifications, and infrastructure requirements for co-processing, including pretreatment, storage, hydrotreater readiness, and hydrogen and utilities implications.
- Petrojam begins engagement with airlines on non-binding offtake arrangements for co-processed SAF.
- The Jamaican government agrees in principle to procurement of domestic SAF for offsetting Scope 1 or Scope 3 emissions associated with business travel.
- Petrojam begins exploring financing options for expansion into co-processing, including potential government support through tax credits, concessional finance, or other direct funding instruments.

By Q3 2028:

- Petrojam negotiates feedstock contracts for UCO and tallow, either domestically or through imports where needed, to secure sufficient volumes for initial co-processing campaigns in the kerosene hydrotreater.
- Petrojam begins infrastructure development for pretreatment, storage, handling, and operational readiness.
- Petrojam puts in place the refinery procedures needed for qualification of co-processed SAF, including carbon intensity accounting and the sustainability documentation required under the wider CORSIA-aligned framework.
- A financing route and application for funding are identified for the first SAF project investment cost, beginning with co-processing at Petrojam.
- An airport is selected for a SAF demonstration event based on the import of a small volume of blended SAF. This event is used to develop a SAF logistics plan for the downstream supply chain, and quality assurance standard operating procedures are drafted and tested.
- Key actions are identified for revival of the sugarcane sector, and an action plan is developed with timelines for implementation.
- An education and awareness programme is also developed with key actions and timelines for implementation over the following three years.

By 2030:

- The first domestic SAF volumes produced through co-processing at Petrojam are supplied to a local airport. This event is used as part of a marketing and awareness campaign for Jamaica as a more sustainable destination for tourists and international visitors.
- UCO and waste fats collection expands beyond the largest generators, and a more organised feedstock supply chain is in place.
- The first downstream SAF-ready airport has established logistics, documentation, and quality assurance procedures for handling and uplift.
- A strategy is developed to create an enabling business environment that can attract companies to Jamaica to build further SAF facilities, including exploration of policy options such as business tax credits, revenue support, and other financing mechanisms.
- Project preparation for the next generation of pathways is underway, with residues, biogas, and MSW all progressed beyond broad feasibility into defined development concepts.

During the 2030s:

- Co-processing at Petrojam moves from initial production to constant production.
- Feedstock mobilisation expands further, including stronger collection of UCO and rendered fats, more structured wet waste aggregation, and the early development of residue supply chains linked to sugarcane recovery.
- At least one pathway beyond co-processing progresses and begins production.
- One airport has a functioning SAF-ready downstream chain, and book-and-claim participation is operational if relevant to market development.
- The policy and support framework is reviewed and strengthened based on implementation experience, with a continued focus on supporting supply growth.

During the 2040s:

- Jamaica moves into broader SAF supply scale-up. At least a second medium-term pathway beyond co-processing reaches operation or final commercial development.
- The feedstock systems that have proven most reliable and cost-effective are scaled further, while the wider policy framework is refreshed in light of actual production, technology maturity, and market conditions.
- Downstream readiness expands beyond the first airport .
- PtL readiness is advanced through progress in renewable electricity deployment, CO_2 source assessment, and hydrogen planning, and a pilot or early demonstration project is considered if enabling conditions are sufficiently strong.
- Jamaica updates its SAF roadmap based on delivery experience and the balance between domestic use, export opportunity, and long-term scale pathways.

4.3 Jamaica SAF action plan

Workstream A focuses on creating the enabling environment required for SAF development to progress in a coordinated and investable way. The actions below are intended to establish the governance structure, long-term ambition, and policy framework needed to support SAF from the earliest stage through to later scale-up. The emphasis in the immediate period is on creating clarity, coordination, and confidence, with later actions focused on refining and strengthening the framework as domestic production begins to emerge.

Workstream A: Enabling a SAF environment
Immediate
Establish Jamaica SAF Council and delivery structure: Establish an executive-level SAF council to coordinate SAF development including members from government, Petrojam, fuel operators, and airlines as well as airports.
Adopt a long-term SAF vision: Set a long-term target for SAF production and consumption to 2050.
Integrate SAF into the wider policy framework: Include SAF within the broader energy, biofuels, waste, industrial, and aviation policy framework.
Develop the enabling policy package: Begin implementing the core policy package needed for feedstock mobilisation, and implement policies which will bring the price of SAF down to incentivise investment across the value chain.
Launch stakeholder engagement and awareness: Begin structured engagement with ministries, Petrojam, airports, airlines, waste aggregators, agricultural stakeholders, and potential investors so that the roles and benefits are clearly understood.
2030-2040

Review and refine the policy framework: Update the policy framework based on early project experience and use it to strengthen support for supply-chain development, first facilities, and early market formation.
Introduce implemented support mechanisms: Move from broad policy intent to functioning mechanisms that support feedstock collection, project development, sustainability compliance, and downstream readiness.
Assess stronger market support options: Reassess whether stronger demand-side measures become appropriate as the Jamaican SAF sector moves beyond the first-project phase.
2040 Onwards
Refresh long-term SAF roadmap: Update the roadmap, governance model, and policy framework based on actual deployment experience, technology maturity, and the balance between domestic use and export potential.

Table 22 Action plan: Workstream A

Workstream B is feedstock mobilisation. This is one of the most important practical requirements for SAF development in Jamaica, as none of the pathways assessed can progress without feedstocks being available at the right quality, cost, and scale. The actions below therefore focus on building the supply chains needed for the first projects, while also laying the groundwork for the medium-term pathways assessed in this study.

Workstream B: Feedstock mobilisation
Immediate
Launch national UCO and waste fats mobilisation programme: Establish a national programme to expand UCO and waste fat recovery through disposal restrictions, mandatory collection for larger generators, and support for collection and aggregation systems.
Expand animal fat recovery and rendering: Strengthen recovery from slaughterhouses and related facilities, improve rendering capacity, and put in place the quality requirements needed for refinery use.
Develop sugarcane recovery plan: Begin a structured programme to improve yields, strengthen field practices, improve harvesting, support viable cane expansion, and attract investment into mills and refining.
Trial agricultural residue mobilisation: Begin pilot work on straw collection, densification, aggregation, storage, and supply agreements so that a residue supply chain can be tested before commercial deployment.
Establish durable wet waste collection systems: Put in place more stable and economically viable systems for aggregating manure, food waste, sargassum, and other priority wet waste streams.
2030-2040
Expand UCO collection coverage: Move beyond the largest generators and early collection areas to include more small and medium-sized generators and broader household participation.
Build a credible residue feedstock base: Move from trials to a more reliable supply of bagasse and straw that can support 2G ethanol and AtJ project development.
Complete MSW characterisation and validation: Carry out the feedstock testing and validation work needed to support project preparation for a future MSW-to-SAF facility.
2040 Onwards

Reassess feedstock allocation and competition: Review how feedstocks are being used across aviation, road fuels, and other sectors, and adjust policy or coordination mechanisms where needed.

Table 23 Action plan: Workstream B

Workstream C deals with the clearest near-term SAF opportunity, which is to convert the Petrojam co-processing opportunity into actual domestic SAF production. This is the pathway most likely to deliver Jamaica's first SAF volumes and to demonstrate that domestic production is feasible in practice. The actions below focus on moving Petrojam from technical opportunity to operational readiness.

Workstream C: Initiate co-processing
Immediate
Complete Petrojam co-processing readiness assessment: Assess feedstock volumes, pretreatment requirements, storage and handling, hydrotreater suitability, catalyst needs, hydrogen demand, and wastewater implications for co-processing.
Establish feedstock specifications and supplier requirements: Put in place the formal feedstock quality and acceptance system needed for Petrojam to receive UCO and rendered fats from multiple suppliers.
Begin pretreatment and handling preparation: Start preparatory investment in pretreatment, feedstock storage, and handling systems so Petrojam can move from technical feasibility to practical implementation.
Develop refinery operating procedures: Prepare the operational procedures needed for co-processing, including unit readiness, feed handling, and integration with normal refinery operations.
Engage early offtakers: Open discussions with airlines and government buyers on non-binding offtake arrangements to improve confidence in the first domestic SAF volumes.
2030-2040
Bring co-processing into operation: Begin regular campaign-based co-processing at Petrojam using domestically collected UCO and rendered fats.
Improve refinery integration: Refine pretreatment, storage, and operating procedures so that co-processing becomes more stable and efficient over time.
2040 Onwards
Maintain and optimise co-processing: Continue co-processing as a stable but resource-constrained pathway, improving efficiency and integration while recognising that domestic feedstock availability limits scale.

Table 24 Action plan: Workstream C

Workstream D deals with SAF supply beyond Petrojam to ensure supply scales materially over time. The actions in this workstream are therefore focused on developing a project pipeline for residues, biogas, MSW, and, over the longer term, PtL. The immediate emphasis is on concept development and project preparation, with later actions focused on moving the strongest pathways toward delivery.

Workstream D: SAF supply scale-up
Before 2030
Prepare the next SAF project pipeline: Conduct business implementation studies and project preparation for the identified medium-term pathways beyond co-processing, including agricultural residues to 2G ethanol and AtJ, biogas-to-SAF, and MSW-to-SAF. This should

identify likely sites, feedstock bases, project configurations, and support needs, as well as determining the their viability.
Begin planning a small-scale 2G ethanol facility: As the sugarcane sector expands, begin assessing a small-scale 2G ethanol facility to establish the foundation for future SAF production. In the near term, the facility could serve alternative markets until an AtJ facility emerges.
2030-2035
Deliver first small-scale biogas-to-SAF project: Bring forward a first dedicated biogas-to-SAF project to test the pathway, build operating experience, and de-risk future expansion.
Advance first agricultural residue-based project: Move the first 2G ethanol and AtJ pathway from concept and feedstock preparation into formal project development.
Complete pre-FEED and development for first MSW project: Move MSW from feedstock validation into formal project preparation, including technical, commercial, and permitting work.
2035-2040
Bring agricultural residue-based commercial pathway into operation: Move the agricultural residue-based pathway into final development or operation, provided the sugarcane and residue supply chain has developed sufficiently.
Move first MSW facility into implementation: If technical and commercial de-risking has progressed sufficiently, move the first MSW-to-SAF facility from development into delivery and operation.
2040 Onwards
Consider small-scale PtL pilot or early demonstration: Only if renewable electricity, hydrogen, and CO_2 sourcing conditions are sufficiently advanced, begin a PtL pilot or early demonstration pathway.
Scale the strongest performing pathways: Focus future scale-up on the pathways that prove technically, economically, and institutionally viable in practice.

Table 25 Action plan: Workstream D

Workstream E deals with ensuring that SAF can be handled, certified, delivered, and sold through a functioning downstream and market framework. This focuses on airport readiness, fuel logistics, sustainability systems, and the early market mechanisms that will help connect domestic SAF production to actual use and value creation.

Workstream E: Downstream and market readiness
Immediate
Launch downstream awareness and training: Build awareness and technical readiness among airports, airlines, fuel suppliers, regulators, and feedstock suppliers.
Select an airport for a SAF pilot: Choose one airport as the focus for early SAF readiness, demonstration activity, and operational learning.
Develop downstream logistics and quality assurance plan: Prepare the logistics, storage, handling, blending, documentation, and quality assurance procedures needed for SAF delivery and uplift.
Implement CORSIA-aligned sustainability and chain-of-custody framework: Establish the traceability, proof of sustainability, and documentation systems needed for Jamaican SAF to create value in regulated aviation markets.
2030-2040

Use early volumes to test full downstream chain: Use first domestic SAF volumes to validate the full operational chain.
Develop early market channels: Begin formal market development around local uplift, government procurement, and book-and-claim participation.
2040 Onwards
Reassess domestic versus wider market strategy: Review the balance between local uplift, book-and-claim sales, and potential export positioning as the SAF sector matures.

Table 26 Action plan: Workstream E

Taken together, these five workstreams provide a practical pathway for Jamaica to move from early enabling actions and first production at Petrojam toward a broader domestic SAF ecosystem that can support medium-term project development and longer-term scale-up.

Appendix

Appendix A: Stakeholder engagement

As part of the feasibility study, an in-person workshop was held in Kingston, Jamaica in January 2026, followed by a second engagement in April 2026 to present the study findings. These sessions included detailed discussion on the potential roles different stakeholders could play in developing a SAF sector in Jamaica. The table below lists all invited stakeholders, noting that not all were able to attend, along with their potential roles in SAF development and the workstreams in which they are most likely to be involved.

Stakeholder	Industry	Potential Role	Workstreams Supported
Oversight Authority			
Ministry of Energy, Transport, and Telecommunications	Government	Provide strategic policy oversight and cross-sector coordination	A, B, C, D, E
Programme Manager			
Jamaica Civil Aviation Authority	Government	Lead programme implementation, including stakeholder engagement	A, E
Supporting Entities			
Ministry of Agriculture, Fisheries and Mining	Government	Provide policy coordination and enablement for agricultural pathways	A, B, D
National Solid Waste Management Authority	Government	Provide policy coordination and enablement for waste-based pathways	A, B, C, D
Ministry of Tourism	Government	Support SAF demand creation through sustainable tourism	A, E
Delivery Partners			
Campari	Sugarcane Producer	Support feedstock mobilization	A, B
CaribShare	Biogas	Support feedstock mobilization	A, B, D
Caribbean Airlines	Airline	Support SAF demand creation	A, E
Cool Energy Ltd. (Jamaica)	Tyre Pyrolysis	Support feedstock mobilization	A, B, D
IATA	Airline Association	Provide industry coordination and policy support	A, E
Ian Fleming Airport	Airport	Support supply chain readiness and demand creation	A, E
Jamaica Aircraft Refuelling Services (JARS)	O&G	Support supply chain readiness	A, E
Norman Manley Airport	Airport	Support supply chain readiness and demand creation	A, E

Pan Caribbean	Sugarcane Producer	Support feedstock collection	A, B
Petrojam	O&G	Initiate SAF production and refining capacity	A, C, E
RE3 Recovery Services	UCO Collection	Support feedstock collection	A, B, C
RYCO-JA	UCO Collection	Support feedstock collection	A, B, C
Sangster Airport	Airport	Support supply chain readiness and demand creation	A, E
Worthy Park	Sugarcane Producer	Support feedstock collection	A, B

Table 27: Stakeholder roles

Appendix B: Assumptions and results

The following tables, which are referenced in the main text of this study, summarise a number of the key inputs, assumptions, and outputs used in the modelling. They are included to provide additional transparency on the analytical approach, and to give further detail on the basis of the results presented throughout the report.

Feedstock availability

Feedstock	Availability	Feedstock availability (kt[223])		
		2030	2040	2050
UCO	Theoretical	16.4 *(16.4, 16.4)*	15.6 (15.6, 15.6)	14.4 (14.4, 14.4)
	Collectable	8.2 *(5.3, 9.2)*	8.3 *(5.1, 10.1)*	8.3 *(5.0, 10.9)*
	Aviation	3.9 *(0.9, 4.9)*	5.6 *(2.3, 7.4)*	6.6 *(3.1, 9.3)*
Animal fats	Theoretical	8.2 *(7.1, 9.2)*	9.7 *(6.8, 12.4)*	11.2 *(6.2, 15.6)*
	Collectable	6.5 *(5.0, 8.2)*	8.0 *(4.9, 11.5)*	9.5 *(4.7, 14.8)*
	Aviation	3.8 *(2.4, 5.3)*	6.3 *(3.3, 9.6)*	8.5 *(3.7, 13.6)*
Sugarcane ethanol	Theoretical	81.2 *(43.3, 117.4)*	106.5 *(47.4, 144.2)*	134.7 *(51.6, 173.5)*
	Collectable[224]	0.0 *(0.0, 14.2)*	8.1 *(0.0, 45.8)*	44.5 *(0.0, 83.2)*
	Aviation[225]	0.0 *(0.0, 0.0)*	0.0 *(0.0, 0.0)*	0.0 *(0.0, 0.0)*
Sugarcane residues	Theoretical	365.4 *(194.8, 528.1)*	478.9 *(213.4, 648.4)*	605.9 *(232.0, 780.2)*
	Collectable[226]	211.5 *(97.4, 346.1)*	311.0 *(115.7, 452.4)*	424.0 *(134.3, 570.2)*
	Aviation[227]	104.2 *(0.0, 212.8)*	174.8 *(9.0, 296.0)*	257.4 *(18.3, 390.7)*
Biogenic MSW	Theoretical	947.6 *(905.7, 977.0)*	1144.7 *(1056.1, 1206.8)*	1189.4 *(1049.5, 1287.4)*
	Collectable	947.6 *(905.7, 977.0)*	1144.7 *(1056.1, 1206.8)*	1189.4 *(1049.5, 1287.4)*
	Aviation[228]	765.2 *(733.1, 787.7)*	849.7 *(787.8, 893.3)*	834.4 *(741.6, 900.2)*

[223] Except in the case of biogas
[224] Excluding demand from non-transportation sectors
[225] Excluding demand from other transportation
[226] Excluding volumes which must remain on the field for agronomic reasons
[227] Excluding volumes used for power generation
[228] Excludes recycled volumes

TPO	Theoretical	9.0 *(9.0, 9.0)*	9.7 *(9.7, 9.7)*	10.1 *(10.1, 10.1)*
	Collectable	2.4 *(1.5, 3.3)*	6.0 *(3.1, 8.9)*	7.9 *(6.4, 9.3)*
	Aviation	1.8 *(0.2, 3.3)*	5.4 *(1.8, 8.9)*	7.2 *(5.1, 9.3)*
Biogas from manure (million m^3)	Theoretical	95.89 *(95.89, 95.89)*	95.87 *(95.87, 95.87)*	94.33 *(94.33, 94.33)*
	Collectable	19.18 *(9.59, 28.77)*	28.76 *(14.38, 43.14)*	37.73 *(18.87, 56.60)*
	Aviation	14.42 *(4.83, 24.01)*	24.01 *(9.63, 38.39)*	32.98 *(14.11, 51.84)*
Biogas from sargassum (million m^3)	Theoretical	4.24 *(4.24, 4.24)*	4.24 *(4.24, 4.24)*	4.24 *(4.24, 4.24)*
	Collectable	1.21 *(0.44, 1.97)*	1.59 (0.83, 2.35)	1.97 (1.21, 2.73)
	Aviation	1.00 *(0.23, 1.76)*	1.38 *(0.61, 2.14)*	1.76 *(1.00, 2.52)*
Industrial CO_2	Theoretical	1704.4 *(1211.0, 2016.8)*	1816.0 *(841.7, 2652.1)*	1935.0 *(585.0, 3487.5)*
	Collectable	1704.4 *(1211.0, 2016.8)*	1816.0 *(841.7, 2652.1)*	1935.0 *(585.0, 3487.5)*
	Aviation[229]	1704.4 *(1211.0, 2016.8)*	1725.2 *(757.5, 2652.1)*	1741.5 *(468.0, 3487.5)*

Table 28: Feedstock availability results

Feedstock to SAF conversion

Pathway	Fuel/Feedstock (%)	SAF/Fuel (%)[230]		
		2030	2040	2050
HEFA – FOGs	83%[231]	70%	70%	70%
AtJ – Ethanol	60%[232]	80%	82%	85%
AtJ – Residues	26%[233]			
FT – MSW	11%[234]	62%	63%	65%
Biogas	0.7 kg SAF/m^3 biogas[235]			
PtL – CO_2	7% SAF/Feedstock			

Table 29: Feedstock conversion assumptions

[229] Excludes volumes used for CCS
[230] ICF Analysis
[231] https://theicct.org/wp-content/uploads/2024/08/ID-185-%E2%80%93-Biomass-SAF_research-brief_final1.pdf
[232] https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/finance-net-zero-roadmap.pdf
[233] https://theicct.org/wp-content/uploads/2021/06/Alternative_jet_fuels_cost_EU_2020_06_v3.pdf
[234] https://theicct.org/wp-content/uploads/2024/08/ID-185-%E2%80%93-Biomass-SAF_research-brief_final1.pdf
[235] https://velocys.com/wp-content/uploads/2025/07/Syzygy-NovaSAF-1-Whitepaper_Solving_the_SAF_Trilemma.pdf

Carbon intensities

Pathway	Carbon intensity (gCO_2e/MJ)[236]		
	2030	2040	2050
HEFA – UCO	13.7	12.2	9.3
HEFA – Animal Fats	22.2	19.8	15.0
AtJ – Sugarcane Ethanol	32.0	27.0	17.0
AtJ – Sugarcane Residues	31.6	27.6	19.6
FT – MSW	39.3	35.9	25.7
Biogas	14.3	12.8	9.7
PtL – CO2	7.4	6.3	4.2

Table 30: Carbon intensity assumptions

CAPEX

Technology	CAPEX per Mt of SAF (million USD)[237]		
	2030	2040	2050
HEFA	1,054.21	1,076.41	1,109.17
AtJ	1,038.14	653.89	530.04
FT	14,607.12	9,472.46	8,286.93
Biogas	5,069.28	4,960.45	4,853.96
PtL	9,727.39	7,048.10	6,719.95

Table 31: CAPEX assumptions

[236] Based on https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Fuels/ICAO-document-06-Default-Life-Cycle-Emissions-June-2025.pdf; https://velocys.com/wp-content/uploads/2025/07/Syzygy-NovaSAF-1-Whitepaper_Solving_the_SAF_Trilemma.pdf; and ICF Analysis
[237] Based on https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/finance-net-zero-roadmap.pdf and https://velocys.com/wp-content/uploads/2025/07/Syzygy-NovaSAF-1-Whitepaper_Solving_the_SAF_Trilemma.pdf

References

Alternative Fuels Data Center (n.d.). *U.S. Federal Alternative Fuel Incentives And Laws*. Available at: https://afdc.energy.gov/laws/395

American Airlines (2024). *Sustainability Report 2024*. Available at: https://s202.q4cdn.com/986123435/files/images/esg/American-Airlines-Sustainability-Report-2024.pdf

Anselmi, M. and Dupont, R. (2025) *ICAO Environmental Report 2025*. International Civil Aviation Organization. Available at: https://www.icao.int/sites/default/files/sp-files/environmental-protection/Documents/EnvironmentReport-2010/2025/Envreport2025_50.pdf

Auditor General of Jamaica (2022). *Performance Audit Report: NSWMA*. Available at: https://auditorgeneral.gov.jm/wp-content/uploads/2022/07/Performance-Audit-Report-NSWMA-July-25-2022-FINAL.pdf

Bioenergy International (2020). *Fish Waste To Biofuel Project*. Available at: https://bioenergyinternational.com/green-fuels-research-to-head-salmo-fish-waste-to-biofuel-project

BP (2022). *Statistical Review Of World Energy – Conversion Factors*. Available at: https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2022-approximate-conversion-factors.pdf

Caribbean Cement Company (2024). *Annual Report 2024*. Available at: https://caribcement.com/wp-content/uploads/2025/05/Carib-Cement-Annual-Report-2024.pdf

Caribbean Centre for Renewable Energy and Energy Efficiency (2024). *Energy Report Card: Jamaica*. Available at: https://www.ccreee.org/wp-content/uploads/2024/09/2022-Energy-Report-Card-Jamaica.pdf

Caribbean Development Bank (n.d.). *Partnering Renewable Energy In The Caribbean*. Available at: https://www.caribank.org/sites/default/files/publication-resources/Partnering%20Renewable%20Energy.pdf

Caribbean Development Bank (n.d.). *Supporting Resilient Green Energy (SuRGE) in the Caribbean Programme*. Available at: https://www.caribank.org/our-work/programmes/supporting-resilient-green-energy-surge-caribbean-programme

CemNet (2025). Carribean Cement optimises capacity increase. Available at: https://www.cemnet.com/News/story/179539/carribean-cement-optimises-capacity-increase.html

Central Intelligence Agency (2021). *Jamaica – The World Factbook*. Available at: https://web.archive.org/web/20210111023238/https://www.cia.gov/the-world-factbook/countries/jamaica/

Chavarria-Hernandez, J., Ordonez, L., Barahona-Pérez, L., Castro-Gomez, M. and Paredes-Cervantes, S. (2016) Perspectives on the utilization of waste fat from beef cattle and fowl for biodiesel production in Mexico: Potential production of biodiesel from animal fat in Mexico. Journal of Chemical Technology & Biotechnology. Available at: https://www.researchgate.net/publication/305345394_Perspectives_on_the_utilization_of_waste_fat_from_beef_cattle_and_fowl_for_biodiesel_production_in_Mexico

Church, E. (2025). *Jamaica reaches 300,000 visitors as tourism rebounds strongly*. MaritimeBell. Available at: https://www.maritimebell.com/jamaica-reaches-300000-visitors-as-tourism-rebounds-strongly

Civil Aviation Authority of Singapore (2025). *New SAF Levy For Departing Flights*. Available at: https://www.caas.gov.sg/who-we-are/newsroom/Detail/new-SAF-levy-to-apply-from-1-apr-2026-for-flights-departing-from-1-oct-2026

Climate Studies Group Mona, the University of the West Indies (2021). *Historical and Future Climate Changes for Jamaica (Second draft)* Planning Institute of Jamaica. Available at: https://www.pioj.gov.jm/product/the-state-of-the-jamaican-climate-2019-historical-and-future-climate-changes-for-jamaica/

Climate Tracker Caribbean (2025.). *Jamaica's Renewable Energy Goals: A Closer Look at the Road Ahead.* Available at: https://climatetrackercaribbean.org/caribbean-energy-transition/jamaicas-renewable-energy-goals-a-closer-look-at-the-road-ahead/

Climate Watch (n.d.). *Global Climate Data Platform*. Available at: https://www.climatewatchdata.org

Climates to Travel (n.d.). *Climate in Jamaica*. Available at: https://www.climatestotravel.com/climate/jamaica

Cortes, G. (2024) *The Hidden Side of Paradise: Loss and Damage in Jamaica's Agricultural Belt*. International Organization for Migration. Available at: https://storyteller.iom.int/stories/hidden-side-paradise-loss-and-damage-jamaicas-agricultural-belt

Davis, G. (2021). *Transport Ministry Partners With Farmers To Produce Castor Oil For Biodiesel*. Jamaica Information Service. Available at: https://jis.gov.jm/transport-ministry-partners-with-farmers-to-produce-castor-oil-for-biodiesel/

DECARB LLC (n.d.). Biomass/Biogas to Energy Plant. Available at: https://decarbllc.com/project/biomass-biogas-to-energy-plant/

Debt Management Branch Jamaica (2024). *S&P Upgrades Jamaica Credit Rating*. Available at: https://dmb.mof.gov.jm/standard-and-poors-upgrades-jamaica-from-bb-to-bb-outlook-remains-positive/

Delta Air Lines (2024). Our *Path to Sustainability*. Available at: https://esghub.delta.com/content/esg/en/2024/path-to-sustainability.html

Delta Air Lines (2025). *Delta partners with Maeve Aerospace to advance hybrid regional aircraft*. Available at: https://news.delta.com/delta-partners-maeve-aerospace-advance-hybrid-regional-aircraft

Diaspora for Development (2020). *Diaspora Engagement Mapping Jamaica*. Available at: https://diasporafordevelopment.eu/wp-content/uploads/2020/11/CF_Jamaica.pdf

Discover Jamaica (n.d.). *Agriculture in Jamaica*. Available at: https://www.discoverjamaica.com /gleaner/discover/geography/agriculture.htm

Ecogeos (2022). *Solid waste characterization study over 3 seasons - Jamaica*. Available at: https://dbankjm.com/wp-content/uploads/2020/06/2022-06-Waste-characterization-Results-website-v2-1.pdf

Embassy of Jamaica (2007). *Geography of Jamaica*. Available at: https://www.embassyofjamaica.org/about_jamaica/geography.htm

Embassy of Jamaica (2007). Jamaican Exports and Imports. Available at: https://www.embassyofjamaica.org/about_jamaica/export_import.htm

European Commission (n.d.). *Green Taxation – in support of a more sustainable future*. Available at: https://taxation-customs.ec.europa.eu/taxation/other-taxes/green-taxation_en

European Commission (n.d.). *ReFuelEU Aviation*. Available at: https://transport.ec.europa.eu/transport-modes/air/environment/refueleu-aviation_en

European Union Aviation Safety Agency (2024). *State of the EU SAF market in 2023*. Available at: https://www.easa.europa.eu/en/domains/environment/refueleu-aviation/eu-saf-market-report

Food and Agriculture Organization (n.d.).

Forestry Department of Jamaica (2021). *Climate Change Policy Framework for Jamaica's Forest Sector*. Available at: https://www.forestry.gov.jm/resourcedocs/FINAL_15_07_21_Updated_Climate_Change_Policy_Framework___002_.pdf

Forestry Department of Jamaica (2024). *State of Jamaica's Forests Report 2024*. Available at: https://www.forestry.gov.jm/resourcedocs/State_of_Jamaica_s_Forests_Report_2024.pdf

Global Recycling (2024). Jamaica: On the Move to Energy-from-Waste. Available at: https://global-recycling.info/archives/9602

Government of Jamaica (2020). *Update of Nationally Determined Contribution of Jamaica*. Available at: https://unfccc.int/sites/default/files/NDC/2022-06/Updated%20NDC%20Jamaica%20-%20ICTU%20Guidance.pdf

Government of Jamaica (2023). *2050 Long-term Emission Reduction and Climate Resilient Strategy for Jamaica*. Available at: https://unfccc.int/sites/default/files/resource/JamaicaLTS%202050.pdf

Green Climate Fund (n.d.). *Development Bank of Jamaica Limited*. Available at: https://www.greenclimate.fund/ae/dbj

Green Climate Fund (n.d.). *Jamaica*. Available at: https://www.greenclimate.fund/countries/jamaica

Howard, A. (2023). *Why the Lessons of the Fulcrum Fiasco must not be Wasted*. The Chemical Engineer. Available at: https://www.thechemicalengineer.com/features/why-the-lessons-of-the-fulcrum-fiasco-must-not-be-wasted/

Howe, C. et al. (2024). *Pathways To Commercial Liftoff: Sustainable Aviation Fuel*. U.S. Department of Energy. Available at: https://www.alkcon.com/documents/Pathways-to-Commercial-Liftoff_Sustainable-Aviation-Fuel.pdf

Hussain, F. (2025) *F&Bio Completes Phase 1 Of Ghana SAF Site*. SAF Investor. Available at: https://www.safinvestor.com/news/148863/ghana-saf/

Iberostar Hotels & Resorts (2022). *Iberostar Hotels And Resorts Roadmap For Short-Term Decarbonization In Operations And Supply Chain.* Available at: https://waveofchange.com/wp-content/uploads/2022/10/Iberostar-Hotels-Resorts-Decarbonization-Roadmap.pdf

Imperial College London (2025). *Climate Change Impact Attribution of Hurricane Melissa*. Available at: https://www.imperial.ac.uk/grantham/research/climate-science/modelling-tropical-cyclones/hurricane-melissa/

Infinium (2024). *Infinium Receives $75m Equity Commitment From Breakthrough Energy Catalyst For Investment In Project Roadrunner*. Available at: https://www.infiniumco.com/news/infinium-receives-75m-equity-commitment-from-breakthrough-energy-catalyst-for-investment-in-project-roadrunner

Inter-American Development Bank (n.d.). *Strategic Partnerships And Donors*. Available at: https://www.iadb.org/en/how-we-can-work-together/strategic-partnerships-and-donors

International Airlines Group (2026.). *IAG Annual Report And Accounts 2025*. Available at: https://www.iairgroup.com/investors-and-shareholders/financial-reporting/annual-reports/

International Airlines Group (n.d.). *Sustainable Aviation Fuel*. Available at: https://www.iairgroup.com/sustainability/sustainable-aviation-fuel/

International Air Transport Association (2024). *Finance Net Zero CO2 Emissions Roadmap*. Available at: https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/finance-net-zero-roadmap.pdf

International Air Transport Association (2024). *Understanding SAF Sustainability Certification*. Available at: https://www.iata.org/contentassets/0bf212bfcb0548f2b6ad4c1e229f7e94/guidance-document-on-saf-sustainability-certification-v0.41_rm-indepth.pdf

International Air Transport Association Sustainability & Economics Association (2024). *Ramping Up SAF Through Standalone HEFA Facilities.* Available at: https://www.iata.org/en/iata-repository/publications/economic-reports/ramping-up-saf-through-standalone-hefa-facilities/

International Civil Aviation Organization (2022). *Long-Term Aspirational Goal (LTAG) Report*. Available at: https://www.icao.int/environmental-protection/ltag-report

International Civil Aviation Organization (2023). *ICAO Guidance On Policy Measures For SAF Development And Deployment*. Available at: https://www.icao.int/sites/default/files/environmental-protection/Documents/Guidance-on-SAF-policies-Version-3.pdf

International Civil Aviation Organization (2025). *CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels.* Available at: https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Fuels/ICAO-document-06-Default-Life-Cycle-Emissions-June-2025.pdf

International Civil Aviation Organization (2025). *CORSIA Methodology For Calculating Actual Life Cycle Emissions Values.* Available at: https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Fuels/ICAO-document-07-Methodology-for-Actual-Life-Cycle-Emissions-June-2025.pdf

International Civil Aviation Organization (2025). *CORSIA Sustainability Criteria for CORSIA Eligible Fuels*. Available at: https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Fuels/ICAO-document-05-Sustainability-Criteria-June-2025.pdf

International Civil Aviation Organization (n.d.). *CORSIA Eligible Fuels*. Available at: https://www.icao.int/CORSIA/corsia-eligible-fuels

International Civil Aviation Organization (n.d.). *SAF Conversion Processes*. Available at: https://www.icao.int/SAF/saf-conversion-processes

International Energy Agency (n.d.). Jamaica: *Electricity*. Available at: https://www.iea.org/countries/jamaica/electricity

International Energy Agency (n.d.). *Jamaica: Energy Mix*. Available at: https://www.iea.org/countries/jamaica/energy-mix

International Monetary Fund (2025). *World Economic Outlook Database (April 2025)*. Available at: https://www.imf.org/en/Publications/WEO/weo-database/2025/april/download-entire-database

International Sustainability and Carbon Certification (2024). *ISCC EU 203 Traceability and Chain of Custody*. Available at: https://www.iscc-system.org/wp-content/uploads/2024/01/ISCC_EU_203_Traceability_and_Chain-of-Custody_v4.1_January2024-1.pdf

International Trade Administration (2026). *Jamaica Country Commercial Guide*. Available at: https://www.trade.gov/country-commercial-guides/jamaica-agriculture

Jamaica Bauxite Institute (n.d.). *Bauxite And Alumina Statistics*. Available at: https://jbi.org.jm /bauxite-and-alumina-statistics/

Jamaica Bauxite Institute (n.d.). Development of The Bauxite/Alumina Sector. Available at: https://jbi.org.jm/industry/

Jamaica Constabulary Force (n.d.). *Crime Statistics*. Available at: https://jcf.gov.jm/stats-2/

Jamaica Gleaner (2023). *Jamaica records 26% jump in motor vehicle imports in 2022*. Available at: https://jamaica-gleaner.com/article/news/20230813/jamaica-records-26-jump-motor-vehicle-imports-2022

Jamaica Gleaner (2025). *Editorial: Reviving agriculture*. Available at: https://jamaica-gleaner.com/article/commentary/20250520/editorial-reviving-agriculture

Jamaica Hotel and Tourist Association (n.d.). *Projects*. Available at: https://jhta.org/projects/

Jamaica Information Service (2022). *GOJ programmes supporting the tourism sector*. Available at: https://jis.gov.jm/information/get-the-facts/goj-programmes-supporting-the-tourism-sector/

Jamaica Information Service (2025). *Fuelling Jamaica with Energy Diversification*. Available at: https://jis.gov.jm/information/get-the-facts/fuelling-jamaica-with-energy-diversification/

Jamaica Observer (2025). *US$50m sweetener*. Available at: https://www.jamaicaobserver.com/2025/05/28/us50-m-sweetener/

Jamaica Single Window for Trade (JSWIFT) (n.d.). *Welcome to JSWIFT.* Available at: https://www.jswift.gov.jm/

Jamaica Tourist Board (2024). *Jamaica's Minister Of Tourism Calls For Concerted Global Effort To Boost Sustainable Tourism*. Available at: https://www.jtbonline.org/wp-content/uploads/JAMAICAS-MINISTER-OF-TOURISM-CALLS-FOR-CONCERTED-GLOBAL-EFFORT-TO-BOOST-SUSTAINABLE-TOURISM.pdf

JAMPRO – Do Business Jamaica (2022). *National Investment Policy (November 2022)*. Available at: https://dobusinessjamaica.com/wp-content/uploads/2022/12/National-Investment-Nov.2022.pdf

JetBlue (n.d.). *Sustainability strategy*. Available at: https://www.jetblue.com/sustainability

Johnson, C., Koebrich, S. and Singer, M. (2019) *Jamaica Transportation Greenhouse Gas Reduction Plan*. National Renewable Energy Laboratory. Available at: https://docs.nrel.gov/docs/fy19osti/73380.pdf

Johnson, C., Milbrandt, A., Zhang, Y., Hardison, R. and Sharpe, A. (2020) *Jamaican Domestic Ethanol Fuel Feasibility and Benefits Analysis*. National Renewable Energy Laboratory. Available at: https://docs.nrel.gov/docs/fy20osti/76011.pdf

Kristiana, T., Baldino, C. and Searle, S. (2022) *An estimate of current collection and potential collection of used cooking oil from major Asian exporting countries*. International Council on Clean Transportation. Available at: https://theicct.org/wp-content/uploads/2022/02/UCO-from-Asia_wp_final.pdf

LanzaTech (2025). *World's first commercial ethanol-to-jet fuel plant operational*. Available at: https://ir.lanzatech.com/news-releases/news-release-details/worlds-first-commercial-ethanol-jet-fuel-plant-operational

Liu, X, Cai, H & Wang M. (n.d.). *Winter Cover Crops for Sustainable Aviation Fuel: Life Cycle Analysis and Key Issues*. U.S. Department of Energy. Available at: https://www.energy.gov/sites/default/files/2023-06/beto-09-energy-crops-saf-d1-3x5-june-2023-liu.pdf

McCloud, N. (2025). *Taxes advancing the SDGs in Jamaica*. United Nations Jamaica. Available at: https://jamaica.un.org/en/293270-taxes-advancing-sdgs-jamaica

Medley, H. (2018). *Seprod To Invest $5b In Palm Oil Business - Food Manufacturer Consolidates While Building Capacity And Foreign Markets*. Jamaica Gleaner. Available at: https://jamaica-gleaner.com/article/business/20180119/seprod-invest-5b-palm-oil-business-food-manufacturer-consolidates-while

Ministry of Agriculture Jamaica (2024). *Estimates Of Livestock Production In Jamaica*. Available at: https://www.moa.gov.jm/sites/default/files/livestock_statistics_2024.pdf

Ministry of Agriculture Jamaica (2024). *Preliminary Estimate Of Damage To Agricultural Sector By Heavy Rains Put At $621m*. Available at: https://www.moa.gov.jm/content/preliminary-estimate-damage-agricultural-sector-heavy-rains-put-621m

Ministry of Energy and Mining, Jamaica (2009). *Jamaica's Energy Policy 2009-2030*. Available at: https://www.mset.gov.jm/wp-content/uploads/2019/07/National-Energy-Policy_0.pdf

Ministry of Energy and Mining, Jamaica (2010). *National Biofuels Policy 2010-2030*. Available at: https://www.mset.gov.jm/wp-content/uploads/2019/07/Draft-Biofuels-Policy_0.pdf

Ministry of Energy, Transport, and Telecommunications, Jamaica (2023). *2022 Jamaica Integrated Resource Plan 2018 IRP Review and Update*. Available at: https://www.mset.gov.jm/wp-content/uploads/2024/11/2022-Jamaica-Integrated-Resource-Plan.pdf

Ministry of Energy, Transport, and Telecommunications, Jamaica (2025). *Jamaica energy statistics 2024*. Available at: https://www.mset.gov.jm/wp-content/uploads/2021/07/JAMAICA-ENERGY-STATISTICS-2024.pdf

Ministry of Finance and the Public Service, Jamaica (n.d.). *Debt-to-GDP falls to 62.4 per cent under revised methodology*. Available at: https://dmb.mof.gov.jm/debt-to-gdp-falls-to-62-4-per-cent-under-revised-methodology/

National Irrigation Commission Jamaica (n.d.). *Essex Valley Agriculture Development Project*. Available at: https://www.nicjamaica.com/our-projects-and-programmes/essex-valley-agriculture-development-project/

National Solid Waste Management Authority (2022). *Annual report 2021–2022*. Available at: https://www.nswma.gov.jm/wp-content/uploads/2023/06/NSWMAAnnualReport2021-22.pdf

Natural Resources Canada (n.d.). *Clean Fuels Fund*. Available at: https://natural-resources.canada.ca/energy-sources/clean-fuels/clean-fuels-fund

National Wealth Fund (n.d.). *National Wealth Fund*. Available at: https://www.nationalwealthfund.org.uk/

Nelson, J. (2024). *DBJ Enhances Public Services and Drives Economic Growth*. Jamaica Information Service. Available at: https://jis.gov.jm/dbj-enhances-public-services-and-drives-economic-growth/

Neoen (2019). *Energization of the Paradise Park Solar Farm in Jamaica and commencement of its operations*. Available at: https://neoen.com/en/news/2019/energization-of-the-paradise-park-solar-farm-in-jamaica-and-commencement-of-its-operations/

Neste (n.d.). Neste *Singapore Refinery*. Available at: https://www.neste.com/en-sg/about-neste/how-we-operate/production/singapore-refinery

Oil & Gas Journal (2018). *Jamaica's sole refinery due upgrade, expansion*. Available at: https://www.ogj.com/refining-processing/refining/optimization/article/17297340/jamaicas-sole-refinery-due-upgrade-expansion

O'Malley, J. and Baldino, C. (2024) *Availability of biomass feedstocks in the European Union to meet the 2035 ReFuelEU Aviation SAF target*. International Council on Clean Transportation. Available at: https://theicct.org/wp-content/uploads/2024/08/ID-185-%E2%80%93-Biomass-SAF_research-brief_final1.pdf

Organization of American States (2011). *Assistance for Biofuels Development and Policy Support in Jamaica*. Available at: https://www.oas.org/en/sedi/dsd/generaldocs/publications/jamaica_biofuels_report_final.pdf

Patterson, C. (2024). *Agriculture Sector Sustains $4.73b in Losses from Hurricane Beryl's Passage.* ReliefWeb. Available at: https://reliefweb.int/report/jamaica/agriculture-sector-sustains-473b-losses-hurricane-beryls-passage

Pavlenko, N., Searle, S., and Christensen, A. (2019) *The cost of supporting alternative jet fuels in the European Union*. International Council on Clean Transportation. Available at: https://theicct.org/wp-content/uploads/2021/06/Alternative_jet_fuels_cost_EU_2020_06_v3.pdf

Pelosi, D., Kazym, D., Fernandez-Pita, B., Moody, G., Yahaya, M., Fiedosiuk, A., Haddadin, J., Poon, I., O'Riordan, F., Ubani, C., Mills, K. and Hui, H. (2025) *Bio-Chemicals 2025: An evolving sustainability stream*. S&P Global. Available at: https://www.spglobal.com/content/dam/spglobal/ci/en/images/news-research/special-reports/bio-petrochemicals-2025/Bio-chemicals_2025.pdf

Petrojam Review Committee for the Government of Jamaica (2019). *Strategic Review Of Petrojam Limited*. Available at: https://opm.gov.jm/wp-content/uploads/2019/06/Petrojam-Review-Committee-Final-Report-2019.pdf

Petrojam Limited (2022). *Petrojam Annual Report 2021/2022*. Available at: https://www.petrojam.com/annual-reports-and-financials/

Petrojam Limited (2025). *Request For Expression Of Interest For Jet Fuel Delivery Services*. Available at: https://www.petrojam.com/wp-content/uploads/2025/04/Bidding-Doocument-EOI-Jet-Fuel-Supply-Agreement-2.pdf

Petrojam Limited (n.d.). *The Refining Process at Petrojam*. Available at: https://www.petrojam.com /hydroskimming-refinery-process/

Port Authority of Jamaica (n.d.). *Cargo Operations*. Available at: https://portauthorityofjamaica .azurewebsites.net/cargo-operations/

Re3 Jamaica (n.d.). *About Us*. Available at: https://www.re3jamaica.com/about-us

Rosales Calderon, O., Tao, L., Abdullah, Z., Talmadge, M., Milbrandt, A., Smolinski, S., Moriarty, K., Bhatt, A., Zhang, Y., Ravi, V., Skangos, C., Davis, R. and Payne, C. (2024) *Sustainable Aviation Fuel State-of-Industry Report: Hydroprocessed Esters and Fatty Acids Pathway*. National Renewable Energy Laboratory. Available at: https://research-hub.nrel.gov/en/publications/sustainable-aviation-fuel-state-of-industry-report-hydroprocessed/

Roundtable on Sustainable Biomaterials (n.d.). *What is the RSB Registry?* Available at: https://rsb.org/registry/

SABA (2023). *Education Deck 1: Sustainable Aviation Fuel 101.* Available at: https://flysaba.org/wp-content/uploads/2023/01/SAF-101.pdf

SeaRates (n.d.). *Jamaica maritime shipping profile*. Available at: https://www.searates.com/maritime/jamaica

Shand, J., Glakpe, E. and Ivey, C. (2025) *Policy Implications Of Implementing Residential PV Solar Energy Systems In Developing Regions*. Energy Policy. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0301421524004348

SkyNRG and ICF (2025). *2025 SAF Market Outlook*. Available at: https://skynrg.com/safmo25/

Small, S. (2022). *Gov't identifies two waste-to-energy sites*. Jamaica Gleaner. Available at: https://jamaica-gleaner.com/article/news/20221130/govt-identifies-two-waste-energy-sites

S&P Global (2025). *Sovereign Risk Indicators 2025 Estimates*. Available at: https://www.spglobal.com/ratings/sri/

S&P Global Ratings (2025). *Jamaica Long-Term Ratings Raised To 'BB' From 'BB-' On Stronger Institutions; Outlook Is Positive*. Available at: https://www.spglobal.com/ratings/en/regulatory/article/-/view/type/HTML/id/3447974

Solar Energy Industries Association (n.d.) *Tax Policy*. Available at: https://seia.org/initiatives/tax-policy/

Somwanshi, R. and Chua Wei Jun (2025) *Interactive: Global UCO markets see trade flow shifts on changing policy, supply dynamics*. S&P Global. Available at: https://www.spglobal.com/energy/en/news-research/latest-news/agriculture/022125-interactive-used-cooking-oil-market-trade-dynamics-uco-prices

Southwest Airlines (n.d.). *Sustainable Aviation Fuels (SAF)*. Available at: https://www.southwest.com/citizenship/planet/sustainable-aviation-fuels/

Statistical Institute of Jamaica (n.d.). *Main Labour Force Indicators*. Available at: https://statinja.gov.jm/LabourForce/NewLFS.aspx

Statistical Institute of Jamaica (n.d.). *Quarterly GDP*. Available at: https://statinja.gov.jm/NationalAccounting/Quarterly/NewQuarterlyGDP.aspx#

Stratas Advisors (2024). *UCO Imports: Unfair Competition with EU UCO Industry?*. Trasport & Environment. Available at: https://www.transportenvironment.org/uploads/files/TE_UCO-Study_Stratas_11062024_2024-06-17-103904_bjrt.pdf

Sundar, S. (2023). *UAE bio-energy research project to enter demonstration phase in 2024*. Zawya. Available at: https://www.zawya.com/en/projects/oil-and-gas/uae-bio-energy-research-project-to-enter-demonstration-phase-in-2024-o18f4h27

Surgenor, C. (2024). *United Airlines' Venture Arm Adds Eight New Partners To Its $200m Sustainable Flight Fund.* GreenAir News. Available at: https://www.greenairnews.com/?p=5377

Syzygy Plasmonics (2025). *Solving the SAF trilemma*. Available at: https://velocys.com/wp-content/uploads/2025/07/Syzygy-NovaSAF-1-Whitepaper_Solving_the_SAF_Trilemma.pdf

TankTerminals (2024). *Brazil's Raizen Launches Second-Generation Ethanol Plant, Mulls New Contracts*. Available at: https://tankterminals.com/news/brazils-raizen-launches-second-generation-ethanol-plant-mulls-new-contracts/

Teixeira, M. R., Nogueira, R. and Nunes, L. M. (2018) *Quantitative Assessment Of The Valorisation Of Used Cooking Oils In 23 Countries*. *Waste Management*. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0956053X18303945

Thriving Earth Exchange (n.d.). *Using sargassum seaweed as an organic waste source for agricultural and community digesters*. Available at: https://thrivingearthexchange.org/project/braco-trelawney-jamaica/

Toop, G., Alberici, S., Spoettle, M. and van Steen, H. (2013) *Trends in the UCO Market*. Ecofys. Available

Tourism Analytics (n.d.). *Cruise Visitors - Caribbean*. Available at: https://tourismanalytics.com/cruisevisitors-statistics.html

Tourism Analytics (n.d.). *Jamaica*. Available at: https://tourismanalytics.com/jamaica-statistics.html

Trading Economics (n.d.). *Jamaica*. Available at: https://tradingeconomics.com/countries

at: https://assets.publishing.service.gov.uk/media/5a74ebade5274a3cb286840c/ecofys-trends-in-the-uco-market-v1.2.pdf

Transport & Environment (2023). *Pigs do fly!*. Available at: https://www.transportenvironment.org/uploads/files/202304_Animal_fats_briefing_TE_2024-04-29-153801_lrqe.pdf

Transport & Environment (n.d.). *Used Cooking Oil: the Certified Unknown*. Available at: https://www.transportenvironment.org/articles/uco

Travel and Tour World (2025). *Jamaica launches "There's Always More to Jamaica" campaign to promote community-based tourism and authentic experiences*. Available at: https://www.travelandtourworld.com/news/article/jamaica-launches-new-theres-always-more-to-jamaica-campaign-to-promote-community-based-tourism-and-authentic-experiences/

UK Government (2023). *Net Zero Government Initiative.* Available at: https://assets.publishing.service.gov.uk/media/6569cb331104cf000dfa7352/net-zero-government-emissions-roadmap.pdf

UK Government (2023). *Sustainable aviation fuel revenue certainty mechanism: Approach to industry funding*. Available at: https://www.gov.uk/government/consultations/saf-revenue-certainty-mechanism-approach-to-industry-funding/sustainable-aviation-fuel-revenue-certainty-mechanism-approach-to-industry-funding

U.K. Government (2025). *Sustainable aviation fuel (SAF) mandate*. Available at: https://www.gov.uk/government/collections/sustainable-aviation-fuel-saf-mandate

UK Government (2025). *Contracts for difference*. Available at: https://www.gov.uk/government/collections/contracts-for-difference

United Airlines (n.d.). *Our Commitment to Environmental Sustainability.* Available at: https://www.united.com/en/us/fly/company/responsibility/our-environmental-commitment.html

United Nations (n.d.). *Expert panel on the programme of work in population*. Available at: https://estatements.un.org/estatements/31.0080/20250410100000000/jK-u-j-f/etBCbeLmUwqA_nyc_en.pdf

United Nations (2025). *Nearly a third of Jamaica's annual wealth wiped out by Hurricane Melissa.* Available at: https://news.un.org/en/story/2025/11/1166301

United Nations Department of Economic and Social Affairs (2024). *World Population Prospects 2024.* Available at: https://population.un.org/wpp/

United Nations Development Programme (2025). *Jamaica's future lies in green growth and climate resilience.* Available at: https://climatepromise.undp.org/news-and-stories/jamaica-green-growth-and-climate-resilience

United Nations Jamaica (2021). *Jamaica Employment Panel.* Available at: https://jamaica.un.org/sites/default/files/2022-01/JEP%20Discussion%207.pdfU.S. Department of Agriculture (2025). *Sugar Annual Report*. Available at: https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Sugar%20Annual_Kingston_Jamaica_JM2025-0002.pdf

U.S. Department of Energy (2022). *SAF Grand Challenge Roadmap*. Available at: https://www.energy.gov/sites/default/files/2022-09/beto-saf-gc-roadmap-report-sept-2022.pdf

U.S. Department of Energy (2024). *Point source carbon capture : Roles of Artificial Intelligence in Support of FECM RDDD&D Priorities*. Available at: https://www.energy.gov/sites/default/files/2024-04/point-source-carbon-capture.pdf

U.S. Department of Energy (2025). *CLEAN CITIES and COMMUNITIES Alternative fuel price report*. Available at: https://afdc.energy.gov/files/u/publication/alternative_fuel_price_report_april_2025.pdf

U.S. Department of Energy (n.d.) *Biodiesel Production and Blending Tax Credit*. Available at: https://afdc.energy.gov/laws/5831

U.S .Office of Energy Dominance Financing (2022). *Getting to know the Loan Programs Office*. US Department of Energy. Available at: https://www.energy.gov/edf/articles/getting-know-loan-programs-office

Waste Today (2024). *Clean fuels company verges on collapse after financial troubles, layoffs*. Available at: https://www.wastetodaymagazine.com/news/clean-fuels-company-verges-on-collapse-after-financial-troubles-layoffs-fulcrum-bionergy/

Wastefront (2025). *Wastefront Breaks Ground On UK's First Tyre-to-Fuel Facility To Fast-Track Global Sustainable Aviation Fuel Production*. Available at: https://wastefront.com/wastefront-breaks-ground-in-sunderland

Whitwell, F. (2019). Jamaican Castor Oil Industry Research and Strategy. Compete Caribbean. Available at: https://www.competecaribbean.org/wp-content/uploads/2019/09/Castor-Oil-Research-and-Strategy-Report-Final-March-2019-1.pdf

Williams, R. (2017). *PCJ Biodiesel Blend to Cut Oil Imports and Boost Agricultural Sector*. Jamaica Information Service. Available at: https://jis.gov.jm/pcj-biodiesel-blend-cut-oil-imports-boost-agricultural-sector/

World Bank (2021). *Jamaica's long-term climate change strategy recommendations*. Available at: https://documents1.worldbank.org/curated/en/394231631778039389/pdf/Jamaica-s-Long-Term-Climate-Change-Strategy-Recommendations.pdf

World Bank (2025). *Jamaica Macro Poverty Outlook*. Available at: https://thedocs.worldbank.org/en/doc/e408a7e21ba62d843bdd90dc37e61b57-0500032021/related/mpo-jam.pdf

World Bank Group (n.d.). *Agricultural land (% of land area) – Jamaica*. Available at: https://data.worldbank.org/indicator/AG.LND.AGRI.ZS?locations=JM

World Bank Group (n.d.). *Agricultural land (sq. km) – Jamaica*. Available at: https://data.worldbank.org/indicator/AG.LND.AGRI.K2?locations=JM

World Bank Group (n.d.). *Gender Data Portal*. Available at: https://genderdata.worldbank.org/en/indicator/sl-empl-zs?view=bar&geos=JAM&gender=total

World Bank Group (2026). *Jamaica – Climate Change Knowledge Portal*. Available at: https://climateknowledgeportal.worldbank.org/country/jamaica

World Bank WITS (2022). *Jamaica Imports, Tariffs*. Available at: https://wits.worldbank.org/CountryProfile/en/Country/JAM/Year/2022/TradeFlow/Import#

World Bank WITS (2023). *Jamaica Natural gas, liquefied imports by country in 2023*. Available at: https://wits.worldbank.org/trade/comtrade/en/country/JAM/year/2023/tradeflow/Imports/partner/ALL/product/271111

World Bank WITS (2023). *Jamaica Cane molasses resulting from the extraction or imports by country in 2023*. Available at: https://wits.worldbank.org/trade/comtrade/en/country/JAM/year/2023/tradeflow/Imports/partner/ALL/product/170310

World Economic Forum (2022). *Clean Skies for Tomorrow: Delivering on the Global Power-to-Liquid Ambition*. Available at: https://www3.weforum.org/docs/WEF_Clean_Skies_for_Tomorrow_Power_to_Liquid_Deep_Dive_2022.pdf

World Economic Forum (2024). *Scaling Sustainable Aviation Fuel Supply*.

WRB Enterprises (n.d.). *Jamaica 28MW Content Solar Project*. Available at: https://wrbenterprises.com/energy/jamaica-28mw-content-solar-project/

XenogyRE (2018). *Tag: Content Solar*. Available at: https://xenogyre.com/tag/content-solar/

Yasar Yetiskin
Senior Manager, Sustainable Aviation
yasar.yetiskin@icf.com

Andre J Couture
Aviation Consultant
andrej.couture@icf.com

Kelly Gibson
Senior Aviation Consultant
kelly.gibson@icf.com

Manvi Rathi
Aviation Consultant
manvi.rathi@icf.com

Dr. Susan van Dyk
SAF Expert, Research Associate
(University of British Columbia)
svandyk100@gmail.com

About ICF
ICF (NASDAQ:ICFI) is a global consulting and digital services company with over 9,000 full- and part-time employees, but we are not your typical consultants. At ICF, business analysts and policy specialists work together with digital strategists, data scientists and creatives. We combine unmatched industry expertise with cutting-edge engagement capabilities to help organizations solve their most complex challenges. Since 1969, public and private sector clients have worked with ICF to navigate change and shape the future. Learn more at icf.com.
ICF is not liable for any damages of any kind attributable to use of this report