INTERNATIONAL COOPERATION FOR SUSTAINABLE AVIATION BIOFUELS

SAF Development in Africa: Exploring the Role of Novel Pathways

Online Webinar

9 September 2025

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101122303.

Agenda

Time	Topic	Speaker
13.30 - 13.40 pm	Welcome & Introduction	Esther Hegel (RSB) - ICARUS
13.40 – 13.55 pm	Setting the Scene: SAF Development in Africa	Yitatek Yitbarek (RSB) - ICARUS
13.55 – 14.10 pm	The African Continental SAF Strategy	Francis Mwangi (ICAO)
14.10 – 14.25 pm	Fueling Africa's Flight: A Techno-Economic Assessment of SAF in Africa	Robert Malina (Hasselt University)
14.25 – 14.40 pm	The African R&D Perspective	Farai Chireshe (ICAO)
14.40 – 14.55 pm	Open Discussion & Online Survey	
14.55 – 15.00 pm	Outlook and Closing	Esther Hegel (RSB) - ICARUS

- This webinar is recorded for internal purposes.
- Slides will be shared after the webinar, pending approval by the speakers

Welcome & Introduction

Esther Hegel, RSB

ICARUS Project Partner

The ICARUS Project at a glance

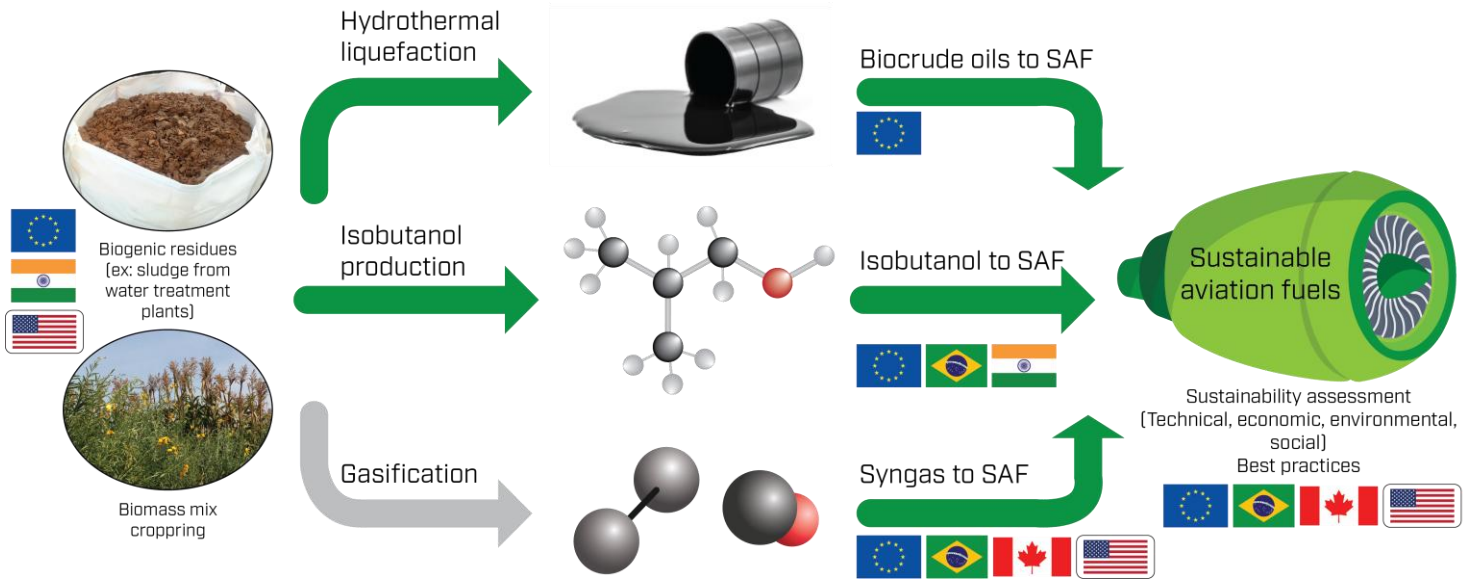
- **Duration & Framework:**
  Runs from **October 1, 2023**, to **September 30, 2026**, under the EU's **Horizon Europe** RIA scheme (Grant Agreement No. 101122303).
- **Budget**
  Total cost approximately **€3.16 million**, fully funded by the EU.
- **Consortium**
  Featuring **20 partners** spanning Europe and Mission Innovation Countries (Canada, India, Brazil), with additional input via an External Executive Advisory Board from the USA.

Partners

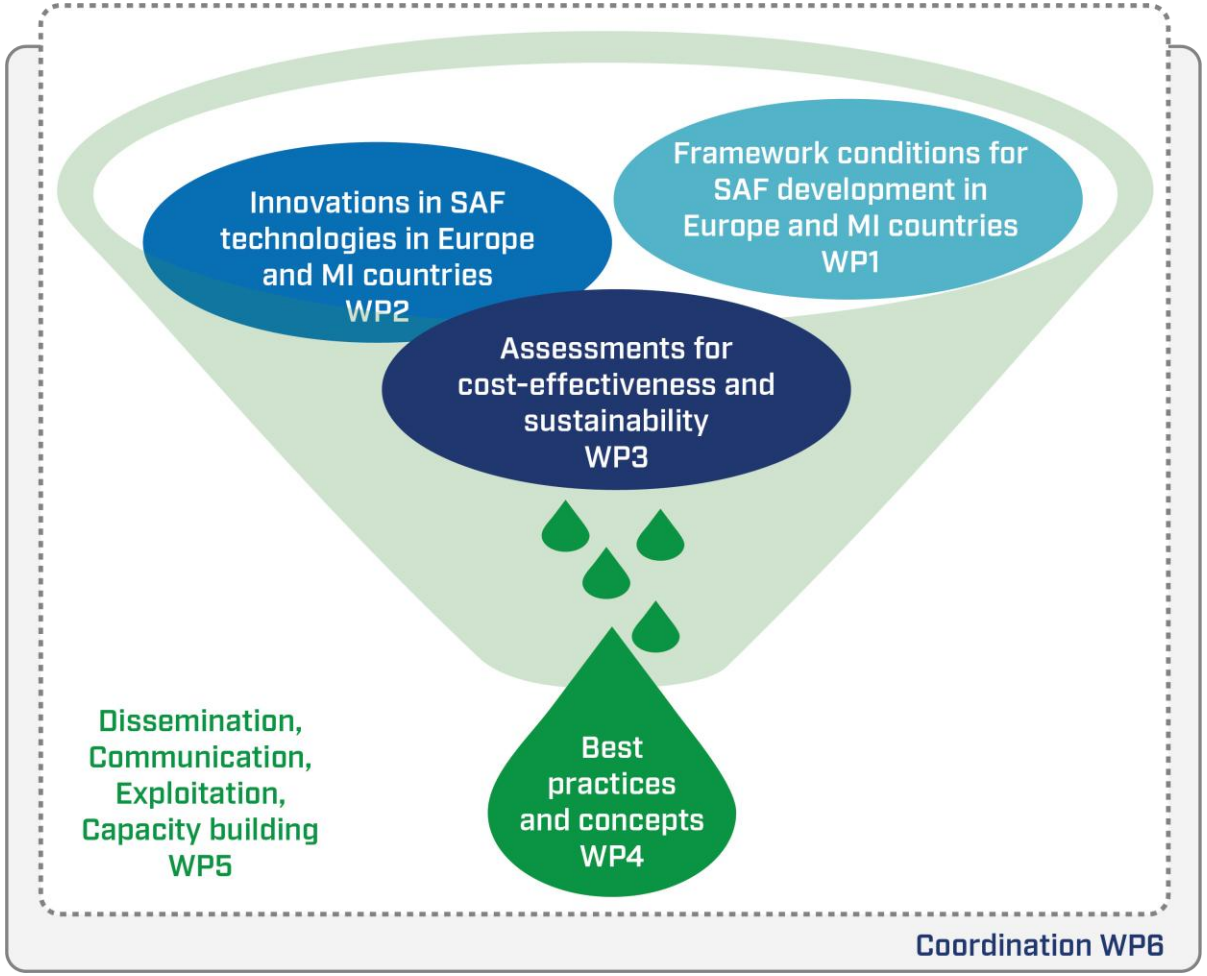
Associated Partners

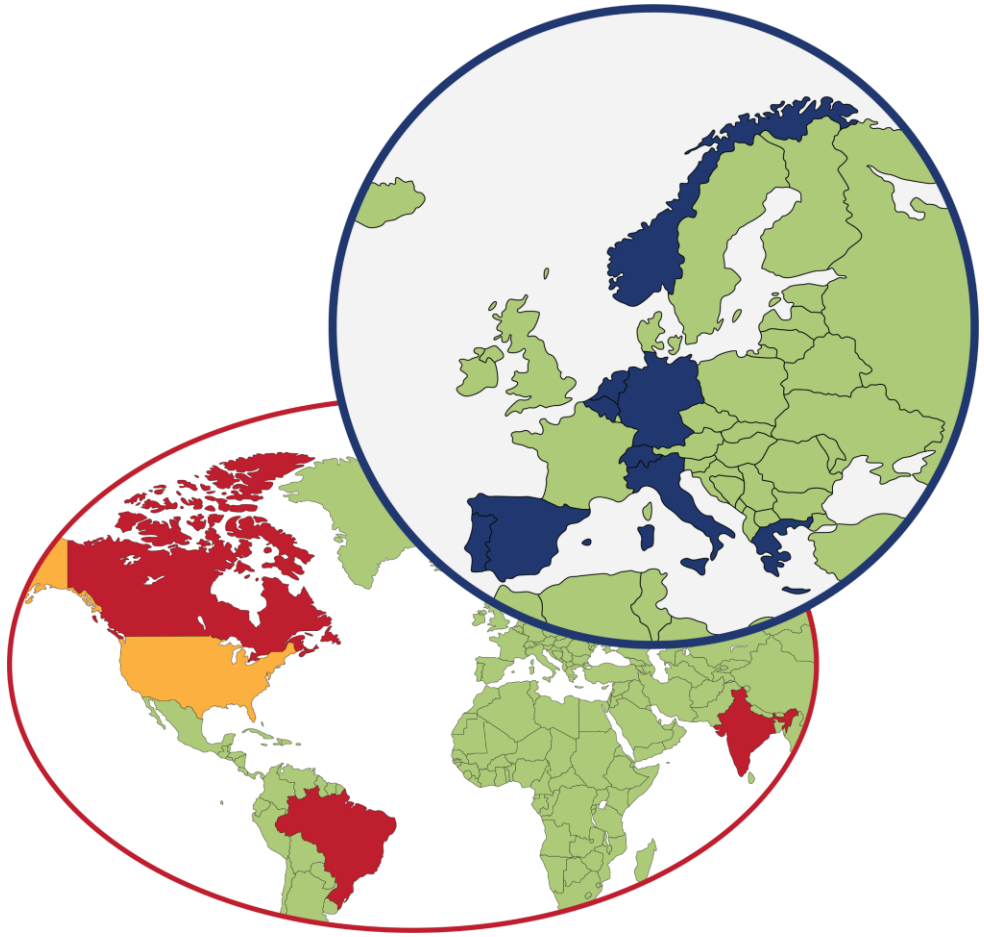
ICARUS at a glance

Aims to develop future best practices and concepts along the entire value chain for the three technological pathways selected in Icarus for accelerating the scale-up of sustainable aviation biofuels production worldwide.

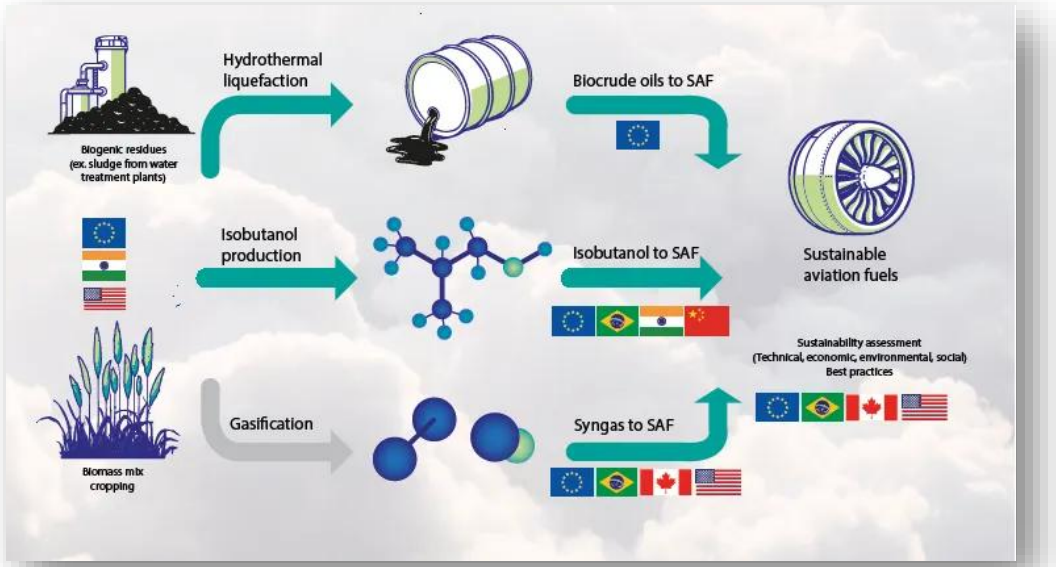


ICARUS at a glance





The ICARUS Pathways



1· Biocrude (HTL) to SAF

Convert biomass into biocrude via hydrothermal liquefaction (HTL), then upgrade to SAF through hydrotreatment

2· Isobutanol to SAF (ATJ)

Ferment lignocellulosic feedstocks into isobutanol using engineered yeasts, then convert it into jet fuel via the alcohol-to-jet (ATJ) pathway

3· Syngas to SAF (FT)

Gasify biomass to produce syngas, which is then transformed into liquid fuels through Fischer-Tropsch (FT) synthesis

Today: SAF Development in Africa

Why This Webinar Matters for ICARUS

- **Connecting Africa & Europe:**

  Brings together stakeholders to explore novel SAF pathways for African deployment.

- **High-Impact Insights**

  Expert “Lightning Pitches” share focused perspectives on policies, markets, opportunities, and barriers.

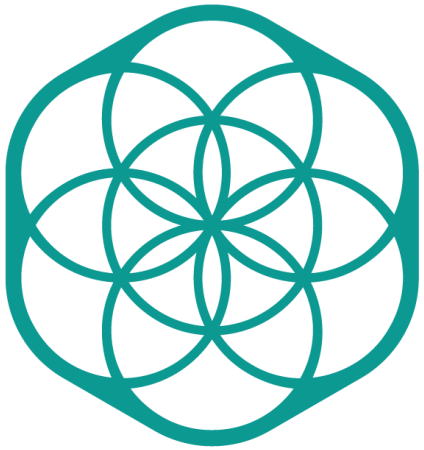
- **Shaping ICARUS Outcomes**

  Stakeholder feedback (via live poll & discussion) will feed directly into the **ICARUS public study on SAF deployment in Africa** (2026 deliverable).

Setting the Scene: SAF Deployment in Africa

Yitatek Yitbarek, RSB

Regional Manager - Africa



RSB®

www.rsb.org

SAF Development in Africa

ICARUS Webinar

9 September 2025

Presentation outline

1. Introduction to RSB
2. RSB in Africa
3. SAF Landscape in Africa
4. Key stakeholders and SAF Initiatives in Africa
5. Q&A

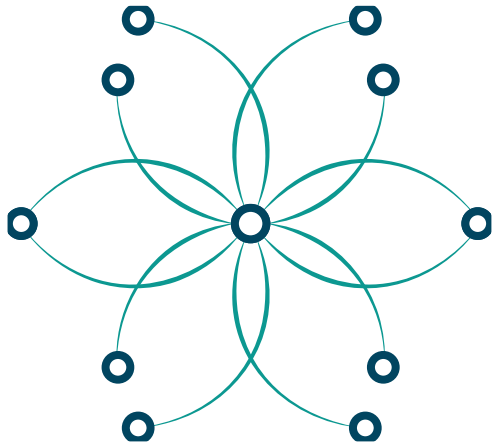
Introduction to RSB

The world we are trying to create

RSB is a collaborative network that works together to *ACCELERATE* the transformation to a sustainable circular and bio-based economy

where climate change has been mitigated, ecosystems have been restored and livelihoods have been enhanced

Our mission



To advance the just and sustainable transition to a net-positive world, in collaboration with global partners from industry, civil society, policymakers and academia.

Our activities

Certification

Providing clarity on what good looks like

Programmes

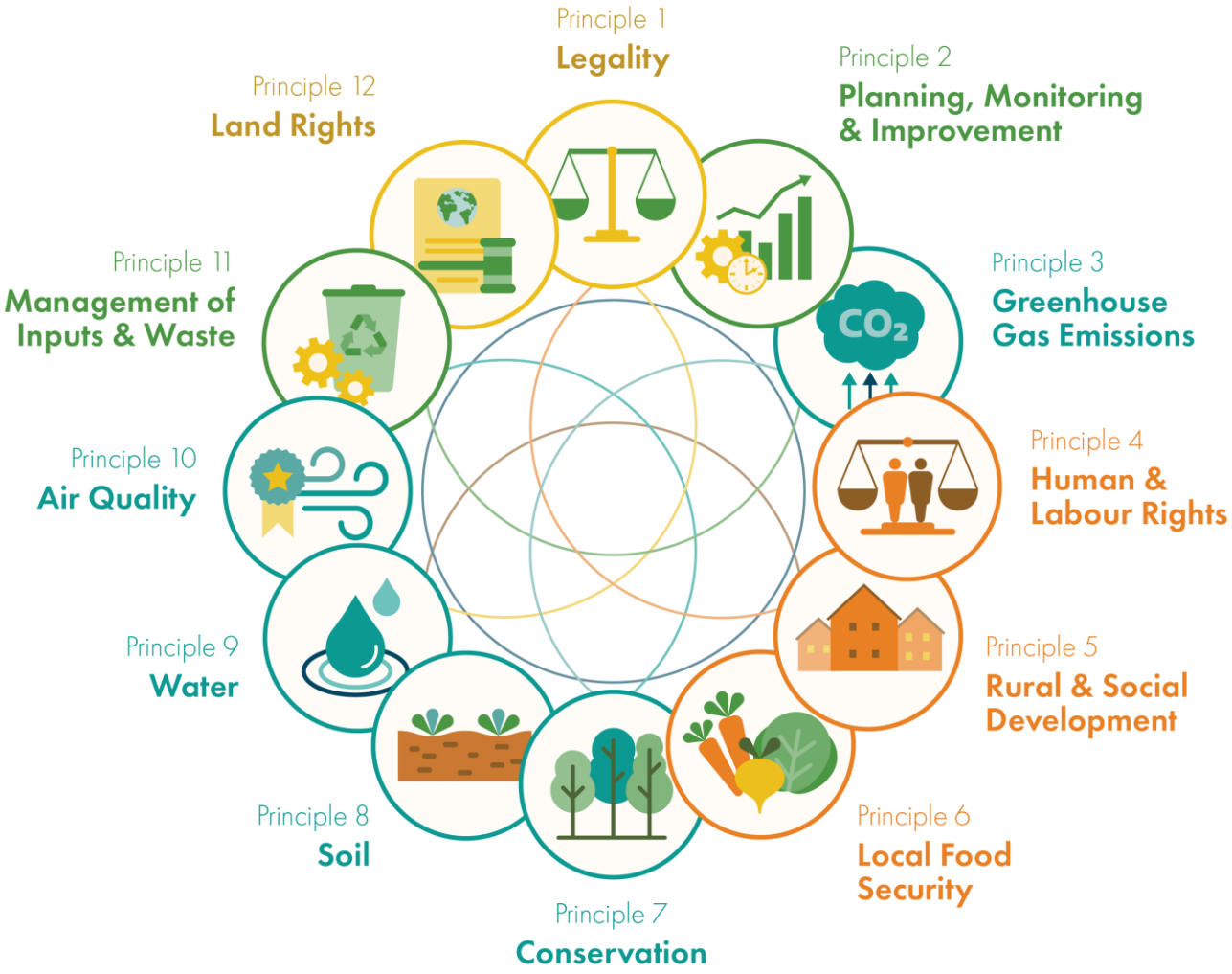
Building capability to make change happen

Community

Enabling collaboration for greater impact

Our global membership is highly diverse
A wide range of organisations across supply chains, regions and industries

Holistic approach to support creating a positive impact



RSB & SAF in Africa

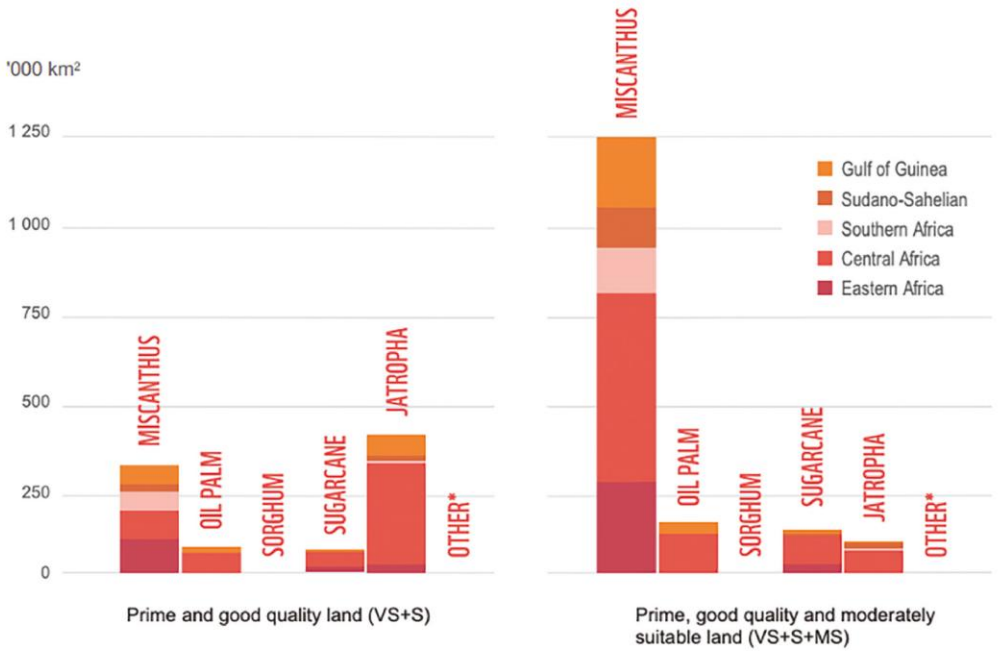
Fuelling the Sustainable Bioeconomy: Africa project outputs

Report on sustainable Aviation Fuel Potential in Sub-Saharan Africa

- International Institute for Applied Systems Analysis (IIASA) assesses pathways towards large-scale sustainable biofuel development in Sub-Saharan Africa.

- The report “Taking off: Understanding Sustainable Aviation Biofuel Feedstock Potential in Sub-Saharan Africa”, is based on a spatially detailed resource assessment for different biofuel feedstocks.

Figure 8: Geographical distribution of best-performing RSB-compliant feedstocks on REMAIN land under current conditions

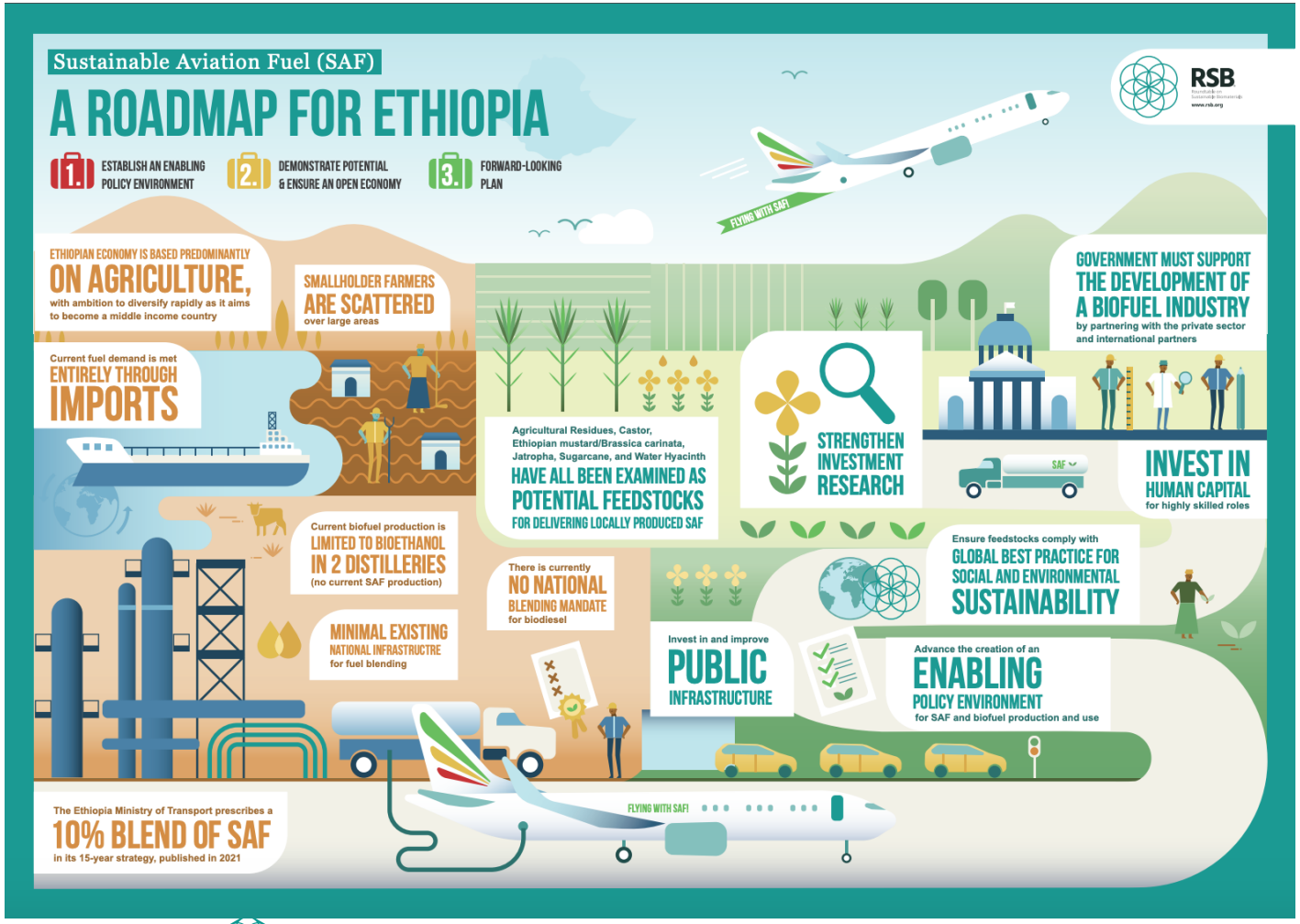


* These extents include small amounts of Solaris tobacco that meet the GHG savings criterion in southern Africa.
Source: Own calculations

Fuelling the Sustainable Bioeconomy: Africa project outputs

National SAF roadmap - Ethiopia

- To explore and advance Ethiopia's capacity to produce biofuels for use as Sustainable Aviation Fuel (SAF), RSB initiated the development of a 10-year SAF Roadmap for the country – with a report detailing a roadmap for SAF development in the country.



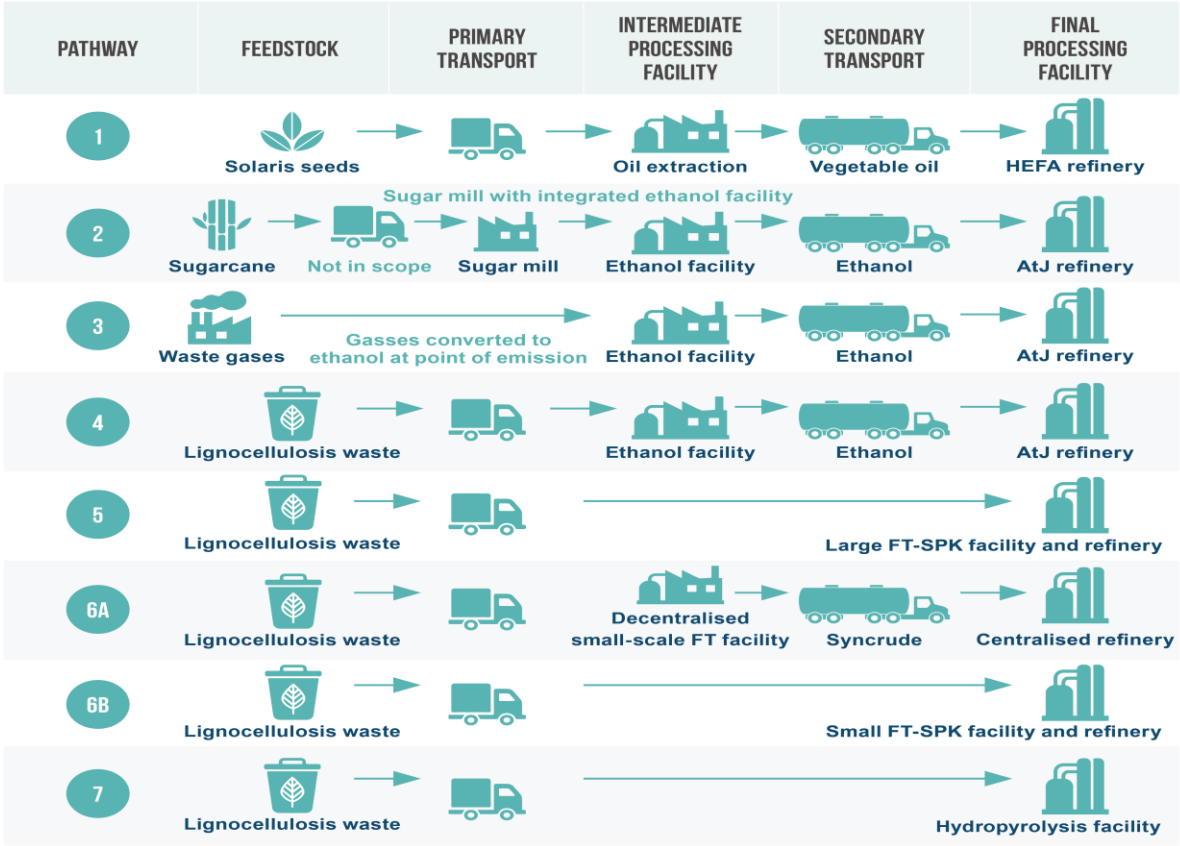
Fuelling the Sustainable Bioeconomy: Africa project outputs

Report on SAF production – South Africa

- WWF South Africa supports RSB in developing a techno-economic model of potential SAF pathways in South Africa.

- The report: "*Fuel for the future: A blueprint for the production of sustainable aviation fuel in South Africa*" finds that development of a new domestic SAF industry could be a pillar of South Africa's low-carbon economy and play an important role in a just energy transition.

Feedstock source supply chain diagrams for SAF pathways in South Africa



Fuelling the Sustainable Bioeconomy: Africa project outputs

Invasive Alien Plants as sustainable feedstock for SAF – South Africa

- More than 10% of South Africa's land mass is covered by IAPs to some degree and they use up to 6% of the country's fresh water, which can potentially increase up to 16% without eradication measures, with an increase rate of 5-10% every year in land coverage.

- RSB has developed guidance to unlock the significant potential of invasive alien biomass to feed the biofuel and bioenergy markets

Fuelling the Sustainable Bioeconomy: Africa project outputs

SAF trainings

Ethiopia

- Developed and delivered SAF and carbon offset courses for the Ethiopian Airlines Aviation University
- RSB plans to offer SAF courses on online platform for a wider reach – RSB Academy

South Africa

- Pilot of Sustainability certification approach on Invasive Alien Plants (IAPs)

SAF roadmaps

- At the initial stage of developing SAF roadmaps for selected African countries (Angola, Tanzania, and Togo).

SAF Landscape in Africa

Overview of Aviation Sector in Africa

- Africa's share of global air traffic is approximately **2.2%** as of mid-2025.
- In 2023, Air transport in Africa supported 8.1 million jobs and contributed $75 billion to the continent's GDP.
- The Single African Air Transport Market (SAATM) initiative, signed by 34 countries, aims to liberalize the market, improve connectivity, and boost competition.
- Over the next two decades, the direct contribution of the aviation sector to **Africa's GDP** is projected to grow by approximately **4.9% each year**.
- The sector face challenges :**insufficient investment**, **inadequate infrastructure**, and the **protectionism of national carriers**.

1.4 m flights[263]
3 million flight movements at airports[264]

110 m passengers[261]
221.1 million passenger movements at airports[262]

196 airlines[266]

1.2 m tonnes of cargo[267]

383 commercial airports[265]

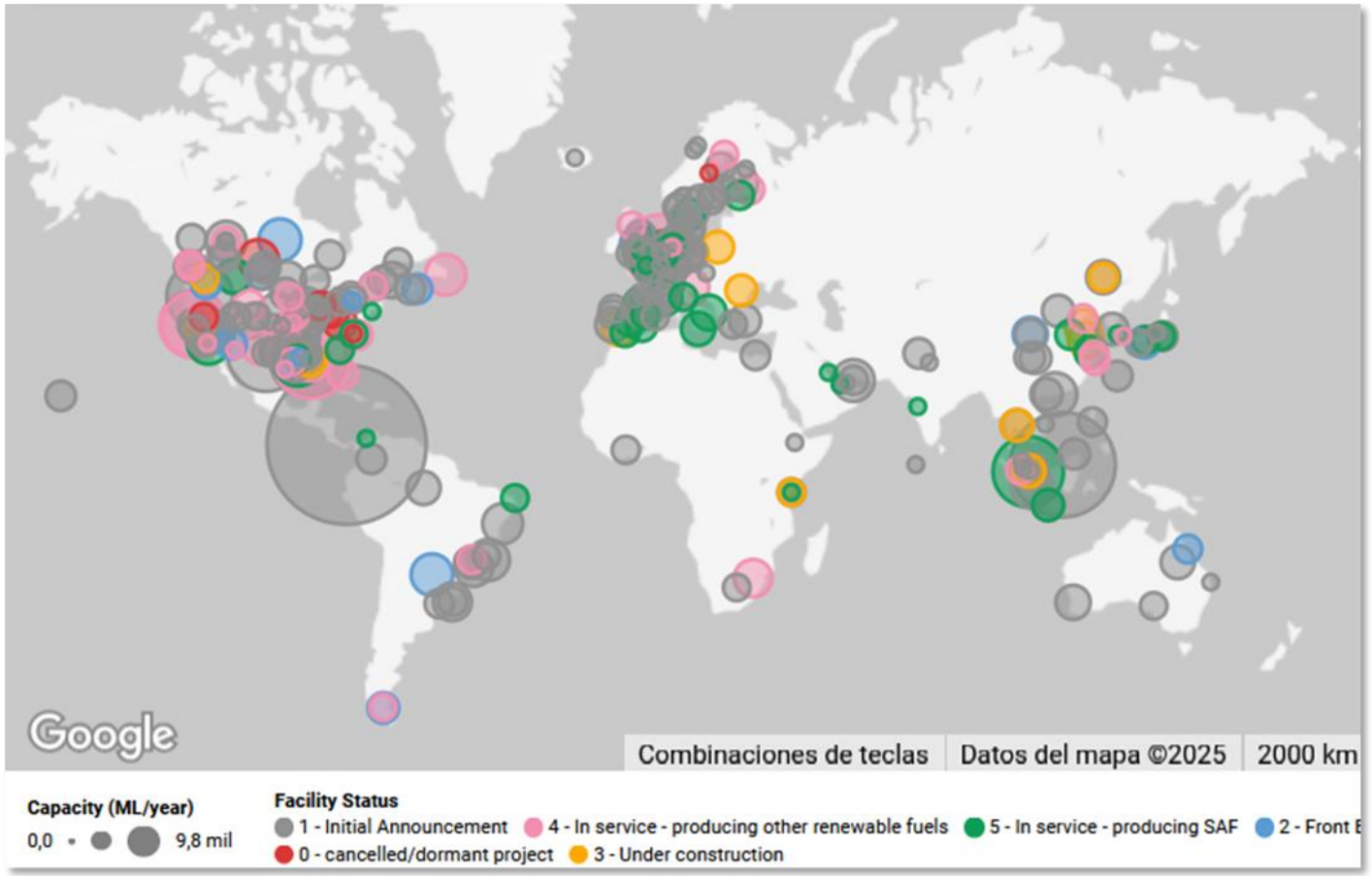
36 air navigation service providers[268]

73% average regional load factor[269]

Source: ATAG,2024

SAF in Africa

- ICAO has established a net-zero target by 2050 which African countries endorsed.
- Regional organizations such as AfCAC and AFRAA have been actively involved in the development and deployment of SAF in Africa.
- Countries likes South Africa, Egypt, Kenya, Côte d'Ivoire, Morocco, Nigeria, and Ethiopia are lining up SAF projects



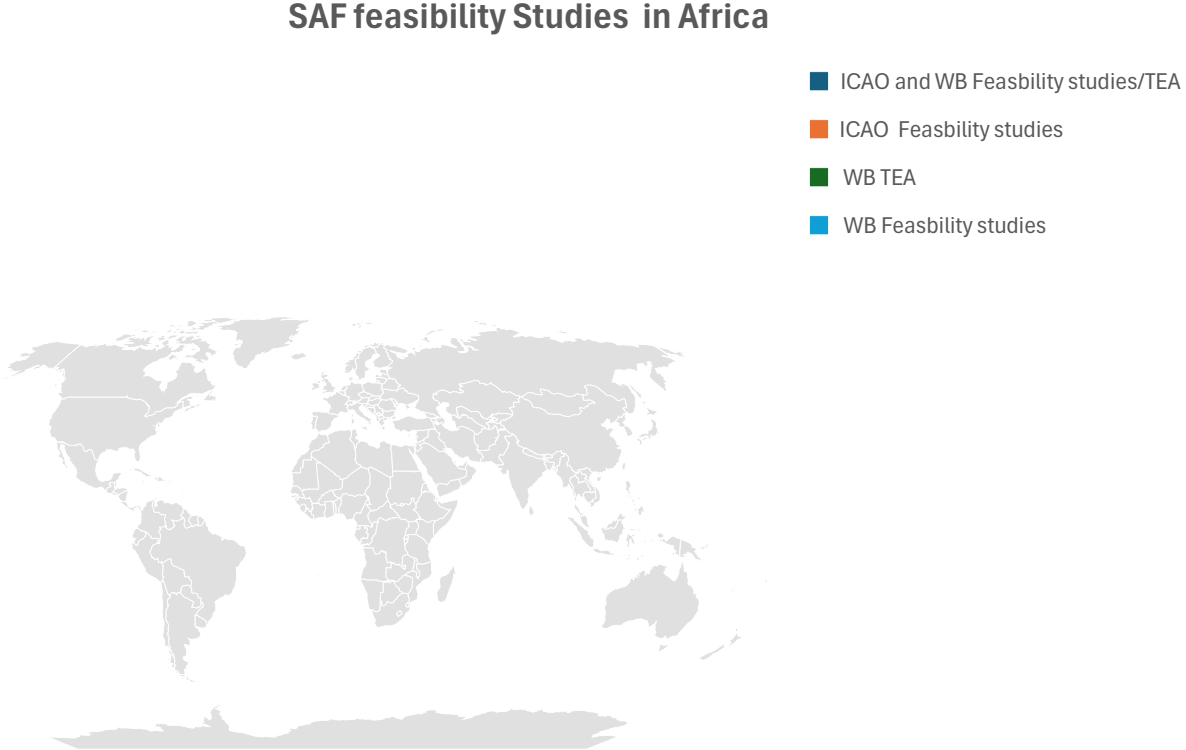
Source: ICAO Tracker of SAF Facilities

Key Stakeholders and Initiatives

SAF in Africa

Key stakeholders:

- **Government ministries and regulators**: CAAs; relevant government ministries such as Environment and energy
- **Regional Organizations**: AUC, AfCAC , COMESA, AFRAA,
- **International Organizations**: ICAO, IATA, EASA,
- **International Financial Institutions**: World Bank(IFC), African Development Bank, Asia Development Bank, EIB
- **Private sector**: national and International oil and gas companies, feedstock producers, aviation operators.



Summary

- **There are currently no SAF facilities in Africa**, but initiatives in South Africa, Kenya, Nigeria, and Egypt indicate promising potential for SAF production on the continent.
- Various feasibility studies and assessments of feedstock have been conducted in Africa. Further assessments are essential to **identify potential feedstocks** and conversion pathways.
- For Africa, SAF represents not only an international aviation climate goal but also a **means for socio-economic development** through job creation, rural development, and infrastructure investment.
- While several countries have developed SAF strategies and roadmaps, it is crucial to strengthen the **relevant policy and regulatory frameworks, along with incentives**, to promote SAF investments across the continent.
- **International collaboration** and collective efforts from key stakeholders in the aviation sector, in terms of **capacity building, financing, and technological expertise,** are crucial for promoting the development and deployment of sustainable SAF in Africa.

Thank you!

Please get in touch with me at **yitatek.yitbarek@rsb.org**

The African Continental SAF Strategy

Francis Mwangi, Vice Chair of the ICAO Kenya CEAP

PhD in Applied Economics at Hasselt University

Africa's Continental Strategy for SAF development and deployment in Africa

9 September 2025

By Francis Mwangi and Frankline Omondi

Aviation Decarbonization – Global Snapshot

ICAO Cleaner Energy Tracker Tools

ICAO ENVIRONMENT

ICAO adopted a Vision to reduce CO_2 emissions in international aviation by **5 per cent by 2030 through the use of SAF, LCAF, and other aviation cleaner energies**

This requires **23 million tonnes (Mt)** of cleaner energies use in international aviation on 2030 *(source: LTAG report data)*

This aviation cleaner energy trackers monitors progress under the ICAO Global Framework on this building blocks

(Click on each number to open the full Tracker dashboard)

Policy and Planning

48
Policies adopted or under development

Production capacity (Mt/year)

1) Announced	148.8
2) FEED study	5.1
3) Under construction	4.5
4) Producing other fuels	15.3
5) Producing SAF	9.0

172
Airports distributing SAF

Regulatory Framework

CORSIA

49 Feedstocks recognized

151 Certified batches

370 Certified Economic Operators

222 kTonnes of certified SAF

11
Approved conversion process
(11+ under evaluation)

Implementation Support

ACT SAF

77 Feasibility Studies

262 Total partners

27 References and Reports

96 Events

23
Stakeholder Action Groups

Financing

53.9
Billions liters of SAF under offtake agreements

472
Announced SAF Facilities

53.5
Billions USD in announced investments

ENVIRONMENTAL POLICIES ON AVIATION FUELS

ICAO ENVIRONMENT

The following **map** provides a summary of the policies (adopted and under development) to foster the use of Sustainable Aviation Fuels and Lower Carbon Aviation Fuels.

Visualization by: **World Map** | Charts & numbers | Table

STATE
DATE
STATUS
POLICY TITLE
POLICY TYPE
POLICY DESCRIPTION
LATEST LINK

The information presented on this dashboard is provided for informational purposes only. For comments or questions, please contact the ICAO Environment Office by email: officeenv@icao.int

25-Aug-2025
Last update

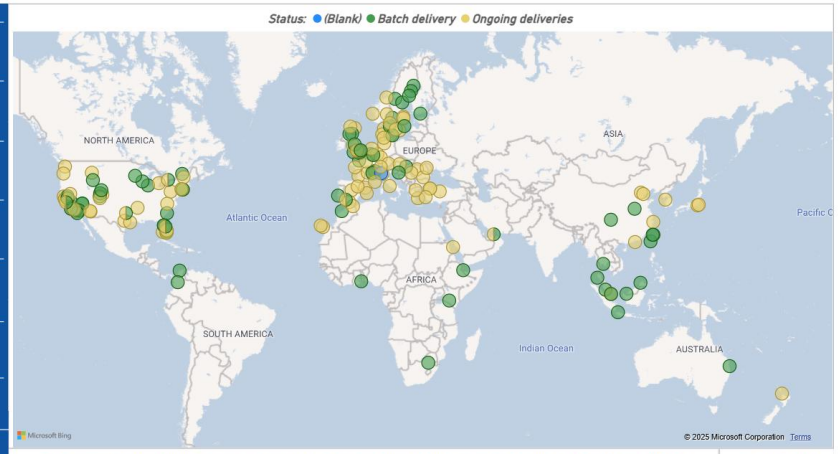
SAF Airports Map

ICAO ENVIRONMENT

A non-extensive list of airports distributing SAF (regularly or on batches)

Visualization by: **World Map** | Charts & numbers | Table

AIRPORT
STATE (Territory)
ICAO Region
DATE
STATUS
FUEL PRODUCER
PURCHASER
SOURCE



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25-Aug-2025
Last update

Africa's Aviation Energy Need

~ 10 million tonnes

Total annual aviation fuel (Jet A and Jet A-1) consumed in Africa in 2023.

Source: IATA

4%

Projected Annual traffic growth in Africa (2018-2050).

Source: ICAO Long-Term Traffic Forecast

2024

~0.1%

Contribution of SAF/LCAF to Africa's aviation fuel consumption

2030

~23

Million tonnes of SAF/LCAF required in 2030 to achieve 5% CO_2 reduction

2050

~380

Million tonnes of SAF/LCAF required in 2050 to achieve net zero

African Snapshot – What we have done so far

DIRECTORATE OF INFORMATION & COMMUNICATION

Press release N°___ /2023 Date: 22 February 2023

Venue: Addis Ababa, Ethiopia

TOWARDS A SUSTAINABLE AIR TRANSPORT DEVELOPMENT IN AFRICA

Addis Ababa, Ethiopia, 19 February 2023 – The African Union Commission (AUC) in collaboration with the African Civil Aviation Commission (AFCAC) organised a high-level roundtable session on Sustainable Development of Air Transport in Africa on the margins of the 36th African Union (AU) Assembly of Heads of State and Government in Addis Ababa, Ethiopia on 19th February 2023.

41st ICAO Assembly

Global long-term aspirational goal for international aviation (LTAG) of net-zero carbon emissions by 2050

SAATM

Increased intra African air transport

ICAO SAF Tracking Tools

Minimal SAF producing or supplying airports in Africa

World Bank Report on SAF

Production potential of about 70 to 261 million tons of SAF which translates between 11 and 20 million additional jobs

THE FOURTH ORDINARY SESSION OF THE SPECIALIZED TECHNICAL COMMITTEE ON TRANSPORT, TRANSCONTINENTAL AND INTERREGIONAL INFRASTRUCTURE, AND ENERGY (STC-TTIIE)

12 – 15 September 2023

Zanzibar-Tanzania

High-level roundtable session on Sustainable Development of Air Transport in Africa - recommended Comprehensive continental study on the development and deployment SAF/LCAF in Africa

Continental initiative to accelerate the development and deployment of SAF/LCAF to support the SAATM initiative.

4th AU STC – Approved the action Plan and called for development of a continental strategy.

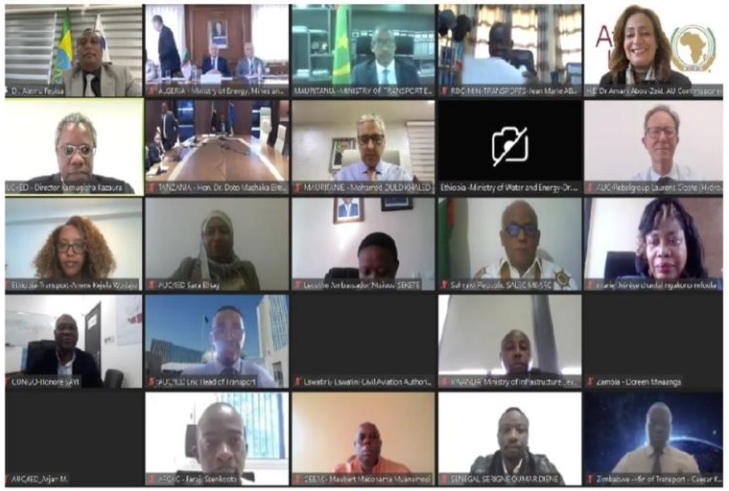
Extra-Ordinary Session of AU STC – Adopted the SAF/LCAF Strategy and called for development of Annexes.

African Strategy for SAF/LCAF – AU Policy Level Processes

African Ministers Endorse Landmark Strategies to Underpin Climate Resilience, Promote Alternative Fuels

Share:

December 05, 2024



African Union Summit Adopts Bold Strategies for Clean and Sustainable Energy and Transport Pathways

Share:

February 19, 2025

In a momentous week at the 38th African Union Summit, held from 12-16 February 2025, African leaders endorsed groundbreaking strategies aimed at advancing Africa's integration, economic transformation, and climate resilience. The Summit was instrumental for the adoption of ambitious strategies in the Infrastructure and Energy sectors that will shape the continent's sustainable future.

The Continental Strategy for Sustainable Aviation Fuels (SAF) and Low Carbon Aviation Fuels (LCAF) adopted at the Summit supports Africa's objectives to reduce carbon emissions in the aviation sector while supporting the growth of the African aviation sector.

African Strategy for SAF/LCAF

❑ **Aim:**

To promote Sustainable Development of African Aviation through SAF and LCAF.

The strategy sets out a comprehensive framework for advancing the development, production, and deployment of SAF/LCAF

Foster regional cooperation and create new economic opportunities for all civil aviation stakeholders.

❑ **Timeline:**

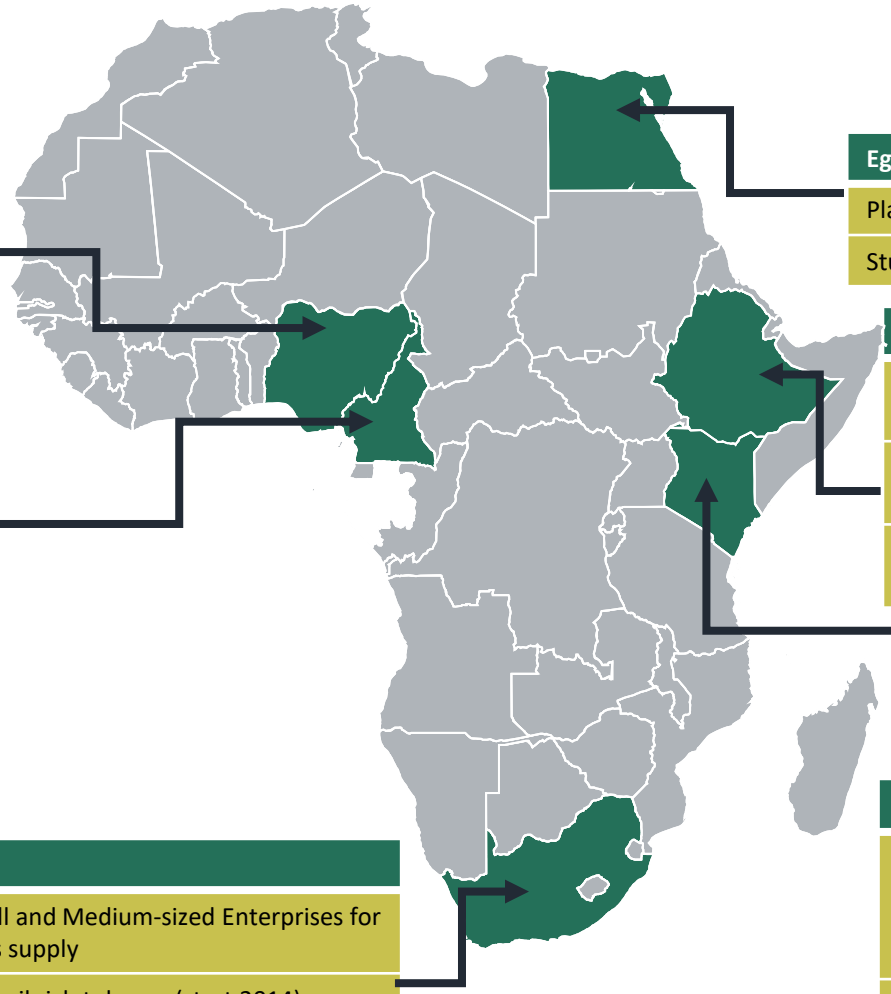
Short-term 2025 - 2030
Medium-term 2031 - 2040
Long-term 2041-2050

❑ **Key Stakeholders: All African Aviation Stakeholders**

❑ **Targets:**

2- 5% CO_2 reduction by 2030 and thereafter 75-80% by 2050 through deployment of SAF/LCAF and aviation clean energy.

Pilot Approach



Nigeria	
Feasibility study	SAF production in the context of 100 000 barrels per day refinery

Cameroon

WESAF to build first in kind hybrid renewable energy plant to produce bioethanol. 322 hectares land purchased. Aimed capacity of 2-3 mio. gallons of ethanol per year.

Status: Licensing application submitted (2021)

Journal Article[3]

Environmentally benign residues amount to 1.11 million bone dry tons per year. This has the potential to yield 0.12–0.32 billion liters of ethanol annually to displace 18–48% of the national consumption of gasoline. Alternatively, the residues could provide 0.08–0.22 billion liters of biomass to Fischer-Tropsch diesel annually to offset 17–45% of diesel fuel use.

Status: Article published 2013

South Africa	
Waste to Wing	Micro-, Small and Medium-sized Enterprises for SAF biomass supply
Solaris	Jetfuel from oil rich tobacco (start 2014)
Just Fuel Africa	Alien invasive plants, forest and agricultural residue and industrial waste for biofuel and SAF
Sasol	Fischer-Tropsch technology provider
HyShiFT	50 kt per day SAF project

Egypt	
Planned production	120 kta SAF via HEFA
Study	SAF via ethanol

Ethiopia	
RSB	Development of Sustainable Aviation Fuel in Ethiopia - A Roadmap (2021)
ICAO/ RSB	Pre-feasibility study on Brassica carinata for SAF (2023)
Ethiopia Airlines	Delivery flight used 30% blend Sustainable Aviation Fuel (SAF

Kenya	
ICAO feasibility study	UCO and MSW as promising SAF feedstocks Old Refinery Study assessment ongoing now
Kenya Airways	SAF flight 2023

Pilot Approach

Pilot Approach to Prove the Model building on work already done by ICAO and other stakeholders.

Africa Regional SAF hubs bringing together groups of countries to build an ecosystem of SAF Stakeholder value chains from feedstock to production.

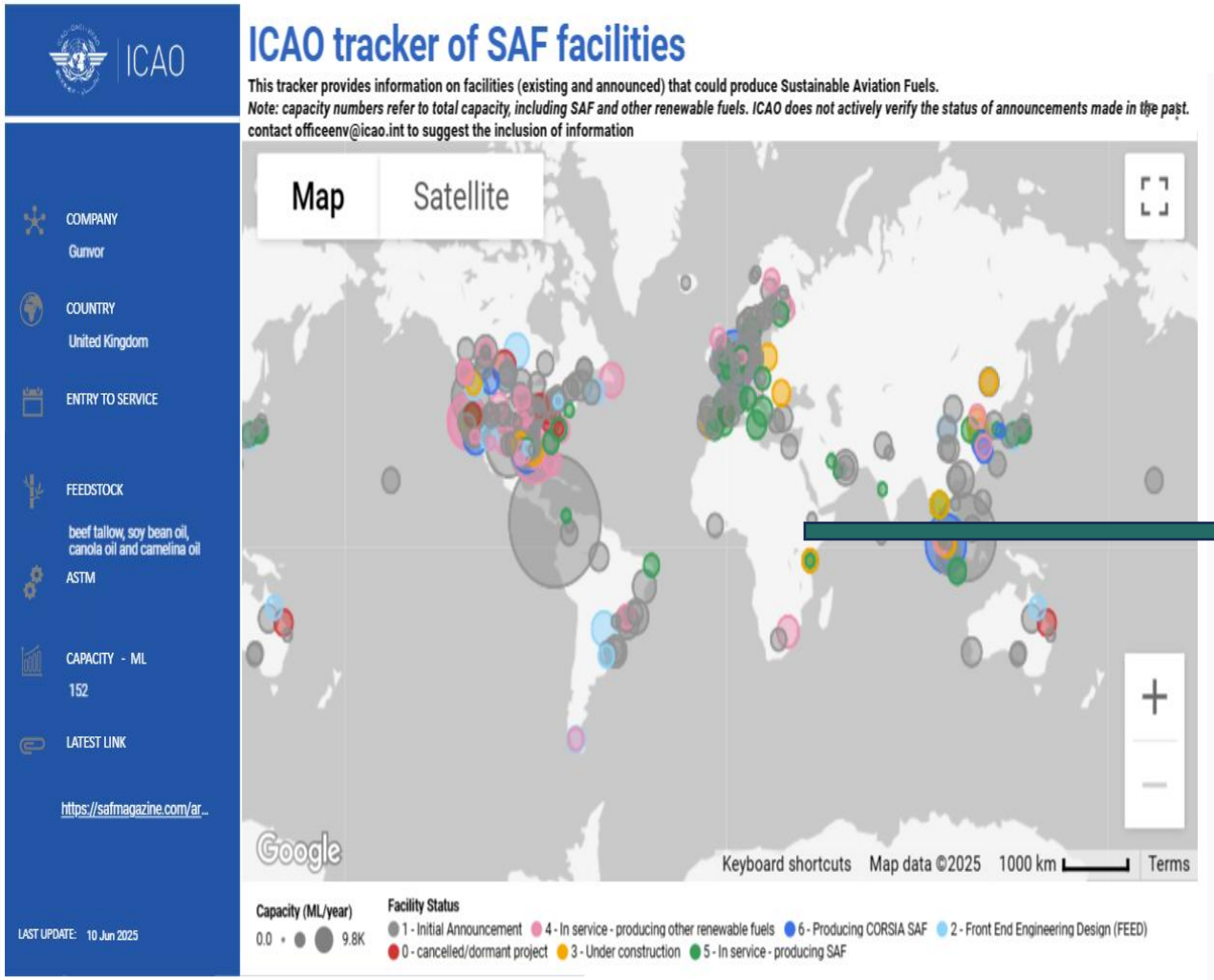
Regional SAF hubs to attract a Funding Stack comprised of Grans, Concessional Loan and Private Equity/Debt

Regional SAF hubs to quantify the impact and the expected returns:

- **Economic:** Jobs created, foreign exchange savings.
- **Environmental:** Tons of CO2 reduced annually.
- **Financial:** Projected IRR and ROI.

Key Message: This is a low-risk, high-impact starting point that can be replicated across the continent.

Forward Looking



5% CO2 reduction by 2030 using SAF/LCAF in Africa?

Call to Action

Our Shared Future

1. **Financial Commitment.** A specific financial commitment to establish a fund for the pilot projects in African States.

2. **Technical Assistance. Continued collaborative technical and expert support to prepare bankable SAF projects in African States.**

Key Message: This is the moment to move from planning to execution. We need your leadership and commitment to make this a reality.

African Aviation

Transformed

Thank You

www.afcac.org

Dakar, Senegal

Fueling Africa's Flight: A Techno-Economic Assessment of SAF in Africa

Robert Malina, Hasselt University (Belgium)

Institute Director, Professor for Environmental Economics

Fueling Africa's Flight:

A techno-economic Assessment of SAF in Africa

Robert Malina
presenting joint work with M. Abate,
G. Seber and C. E. Schlumberger

September 9, 2025

ONLINE WEBINAR, ICARUS EU PROJECT

Public Disclosure Authorized

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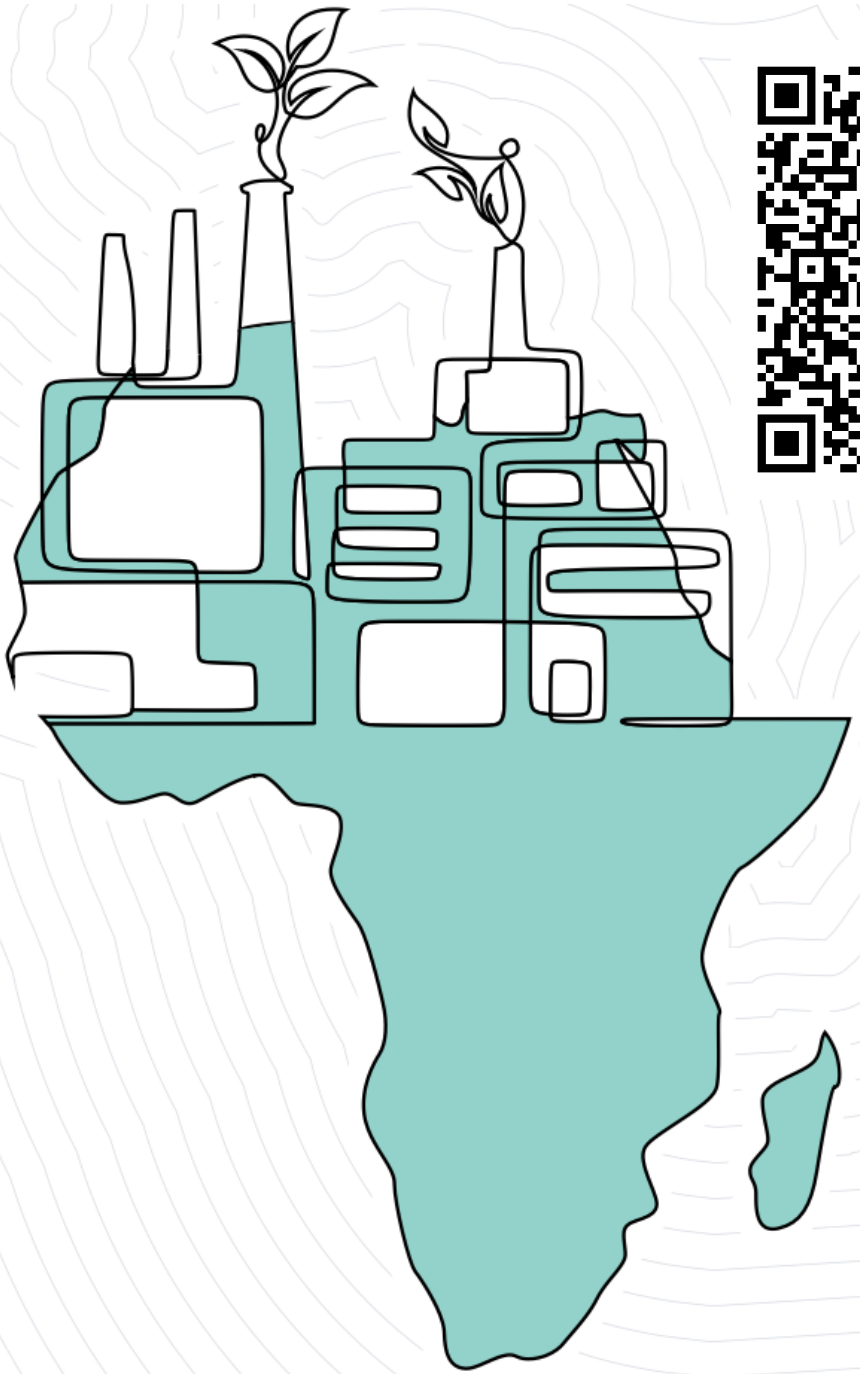
Mobility and Transport Connectivity Series

Fueling Africa's Flight:

A Techno-Economic Assessment of Sustainable Aviation Fuels in Africa

WORLD BANK GROUP



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Mobility and Transport Connectivity Series

Fueling Africa's Flight:

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WORLD BANK GROUP

The global picture

$124 billion

Investment needed to scale SAF production globally

$200-$300 million

Upfront capital needed for a single SAF facility producing 4,000 barrels per day (BPD)

The global picture

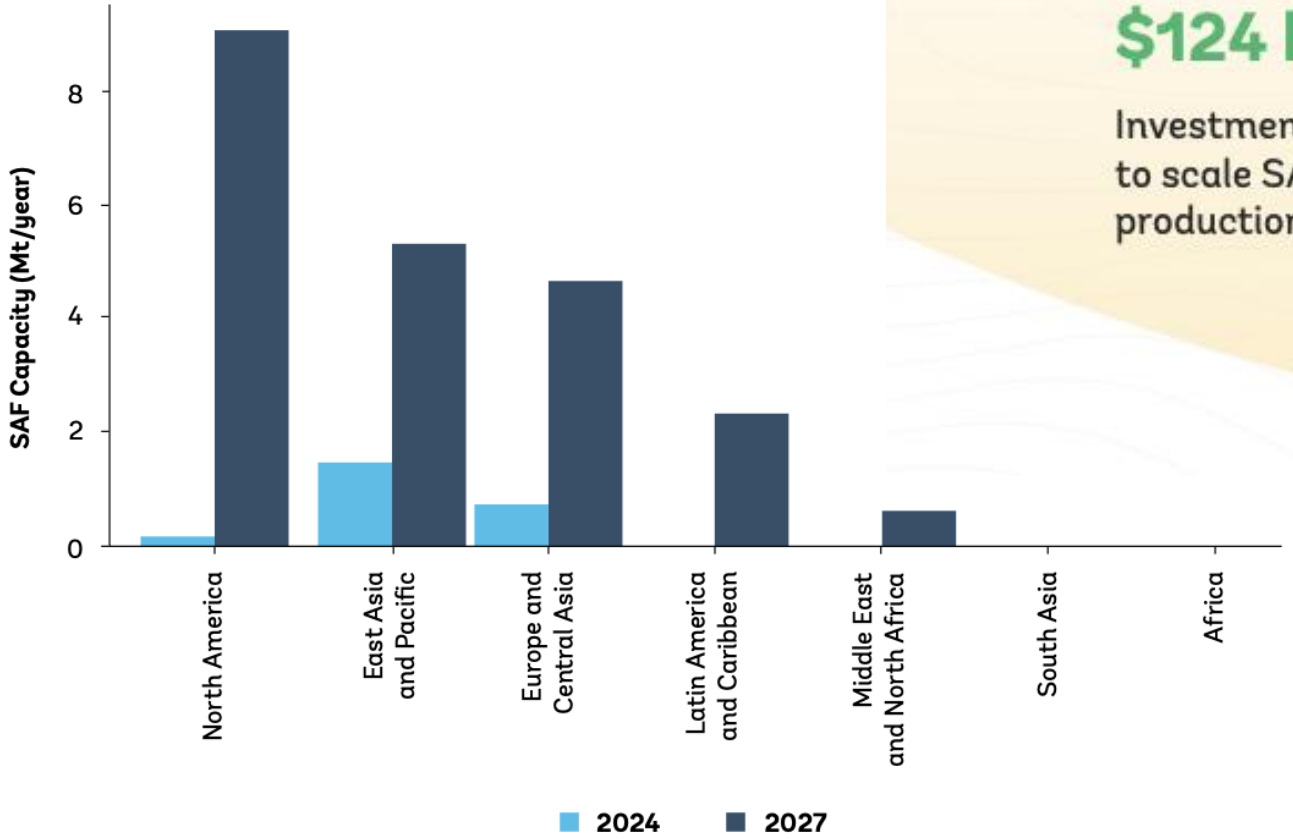
$124 billion

Investment needed to scale SAF production globally

$200-$300 million

Upfront capital needed for a single SAF facility producing 4,000 barrels per day (BPD)

A. Installed SAF capacity in 2024 and announced capacity by 2027,



Note: The figure is based on analysis of publicly available data on operational SAF facilities and announcements of planned SAF facilities in millions of tons per year. It includes only concrete announcements of facilities at specific locations. In cases where only total production was provided, SAF output was estimated using the following assumptions about the SAF product share: Hydrotreated esters and fatty acids (HEFA): 0.51; co-processing: 0.1; alcohol to jet: 0.7; Fischer-Tropsch: 0.57, power to liquid: 0.47, catalytic hydrothermolysis: 0.4. Mt = million tons.

The global picture

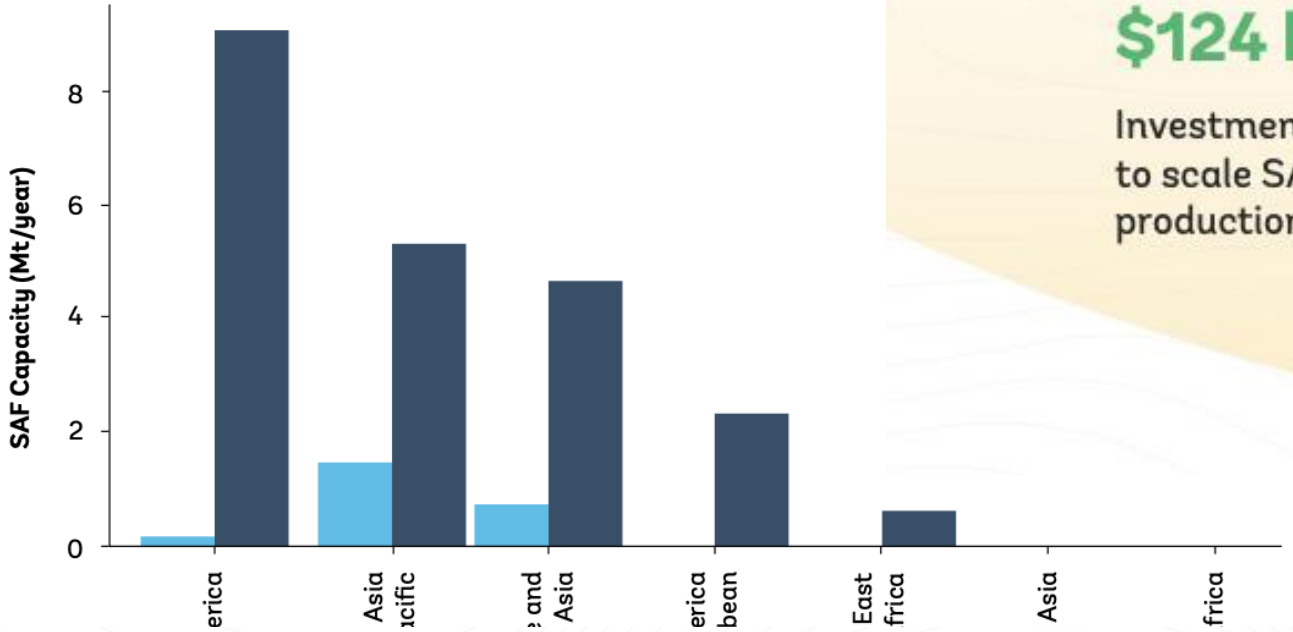
$124 billion

Investment needed to scale SAF production globally

$200-$300 million

Upfront capital needed for a single SAF facility producing 4,000 barrels per day (BPD)

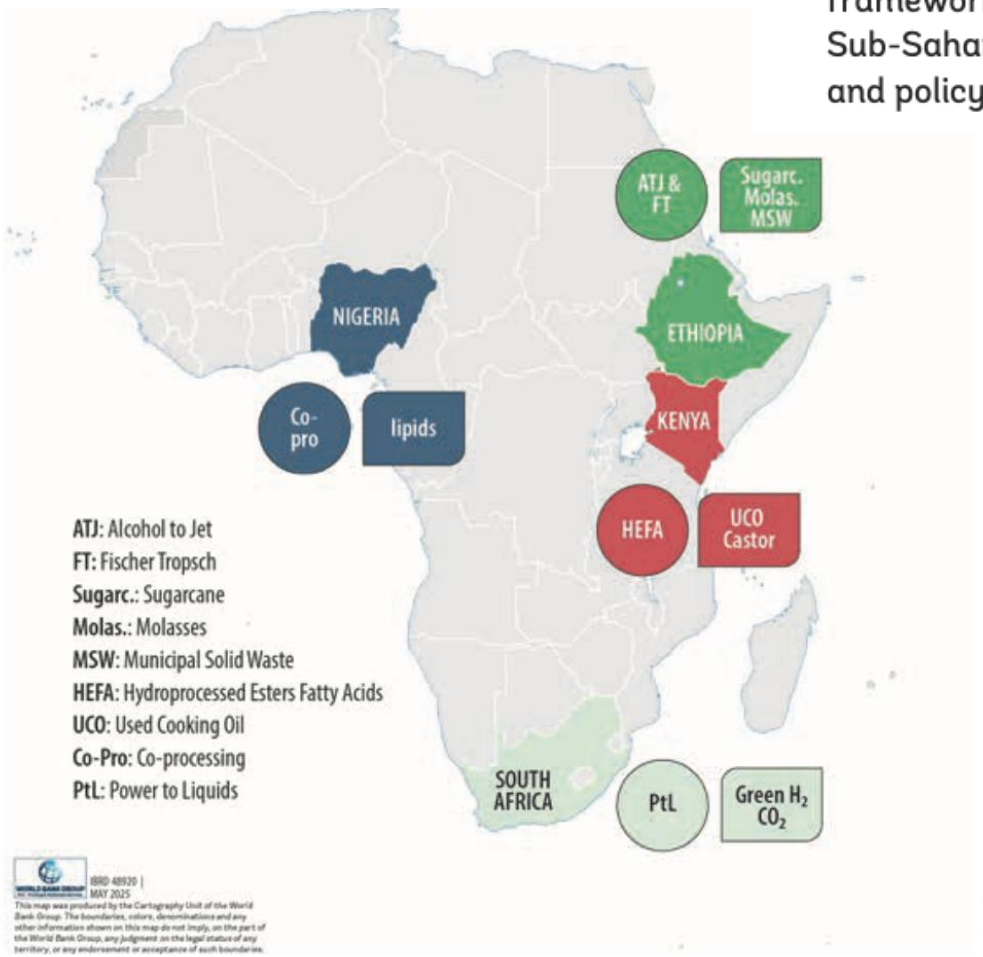
A. Installed SAF capacity in 2024 and announced capacity by 2027,

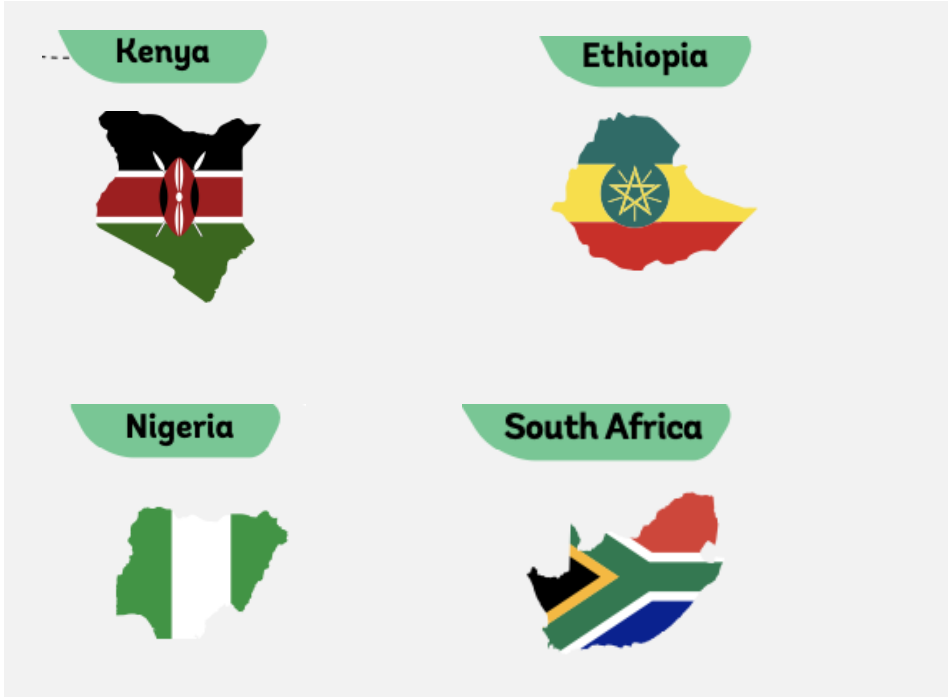


Four main challenges

1. High capital costs
2. Elevated risk premiums and green premiums
3. Feedstock scalability
4. Infrastructure and policy readiness

Kenya, Ethiopia, Nigeria, and South Africa were selected based on an SAF investment decision framework crafted by the World Bank. Together these countries represent over 60 percent of Sub-Saharan Africa's pre-Covid-19 aviation passenger demand. They also offer favorable supply and policy environments for a renewable energy transition in Africa.





Source: Original figure for this publication.

Four countries, four opportunities

SAF production potential in these countries is shaped by diverse feedstock availability, strong local and international demand, and opportunities for scalable, sustainable fuel development.

1 Kenya

The potential:

A 4,000-BPD hydrotreated esters and fatty acids (HEFA) plant using used cooking oil and castor oil could supply 15 percent of Kenya's current jet fuel needs and 10 percent of its projected 2030 demand.

Challenges

Requires significant upfront investment

Requires policy interventions such as accelerated depreciation, tax breaks, and loan guarantees

Opportunities

Strong potential for HEFA-based SAF production, supported by existing infrastructure, technical expertise, and government decarbonization efforts

2 Ethiopia

The potential:

A 2000 BPD facility producing 1445 BPD SAF meets 6% of jet fuel demand.

Challenges

Limited existing infrastructure

Requires significant investment into feedstock-processing facilities

Existing reliance on imported jet fuel

Opportunities

High demand for jet fuel driven by large airline carriers

Diverse feedstock options such as sugarcane and municipal solid waste (MSW) for SAF production

3 Nigeria

The potential:

Through cost-effective co-processing, the Dangote refinery or others could produce 3,321–5,950 BPD of SAF.

Challenges

Low feedstock scalability

Opportunities

Logistical and spatial advantages such as proximity between major airports and refineries

Significant demand for SAF due to the scale of its aviation market

4 South Africa

The potential:

A 1,000-BPD PtL facility using green hydrogen and industrial waste carbon could yield 39 million liters of SAF annually, covering about 3 percent of the country's jet fuel demand.

Challenges

High investment and processing costs

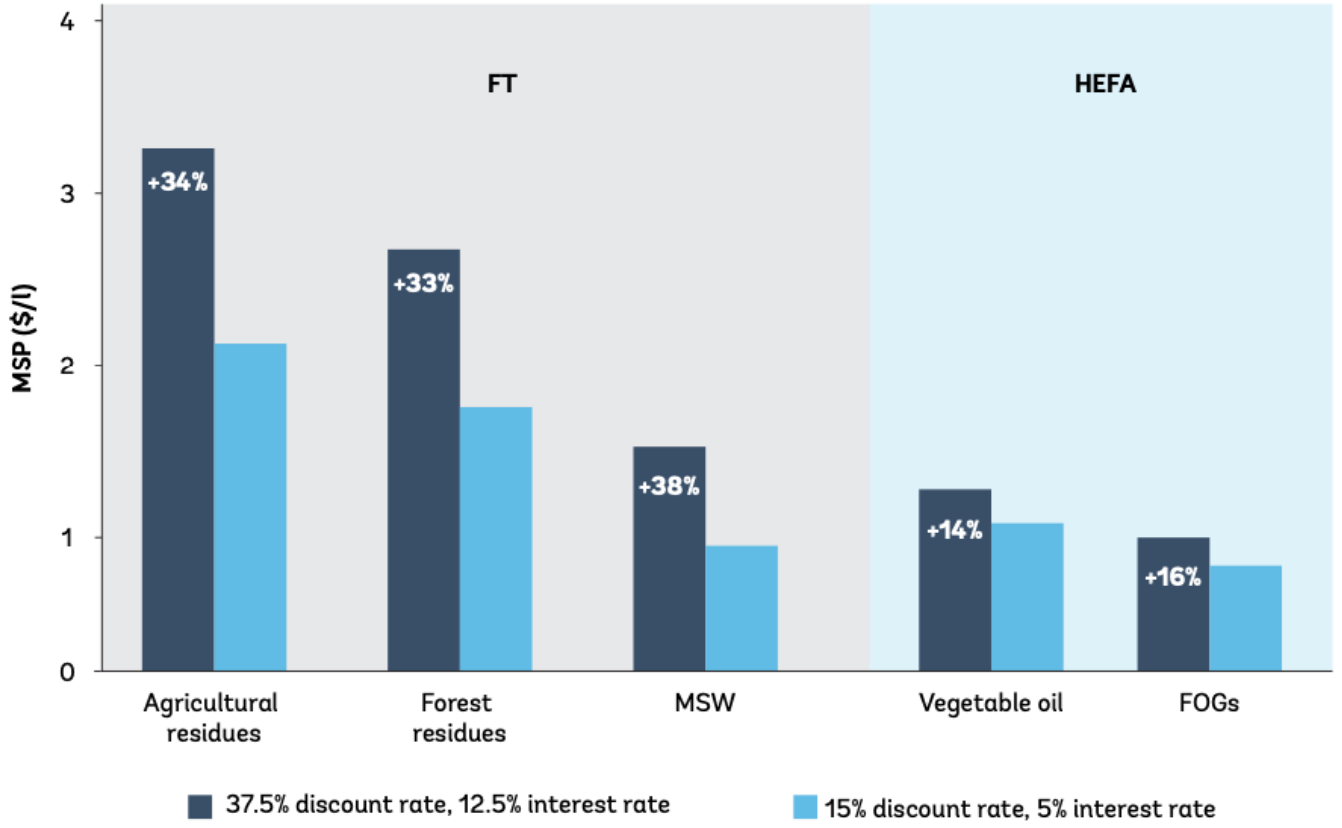
Opportunities

High potential to become an SAF hub

Existing technical foundation and expertise in the Fischer-Tropsch process for production

Unlocking Africa's potential for Sustainable fuel production

Figure 1.2. SAF minimum selling price of selected feedstocks at various discount rate/interest rate combinations



Source: Own calculations based on publicilly available DCFROR models for SAF (Hydroprocessed esters and fatty acids TEA V2.2 developed by Kristin Brandt et al. 2022, Fischer Tropsch TEA V2.2 developed by Kristin Brandt et al. 2022)
Key Assumptions: Equity/loan split: 70/30, Duration 20 years, inflation: 2%. Discount rate and loan interest assumed as mentioned above. No monetary incentives included.
FOG: Fats, Waste Oils and Greases
MSW: Municipal solid waste.

Unlocking Africa's potential for Sustainable fuel production

Figure ES.2. Risk and green premiums on SAF in Kenya,

a. Castor-HEFA SAF, Kenya

$2.6/l
K Sh 364.0/l

Baseline results for
4,000 BPD Castor HEFA
and Kenya-specific risk profile

Unlocking Africa's potential for Sustainable fuel production

Figure ES.2. Risk and green premiums on SAF in Kenya

a. Castor-HEFA SAF, Kenya

$2.6/l
K Sh 364.0/l

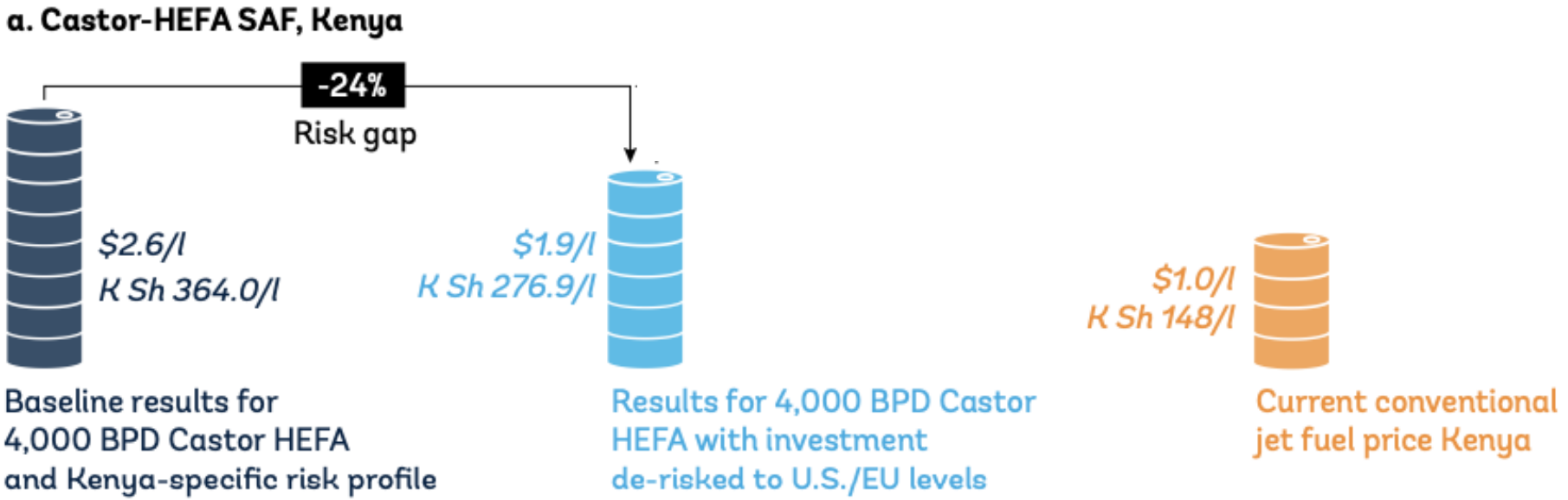
Baseline results for
4,000 BPD Castor HEFA
and Kenya-specific risk profile

$1.0/l
K Sh 148/l

Current conventional
jet fuel price Kenya

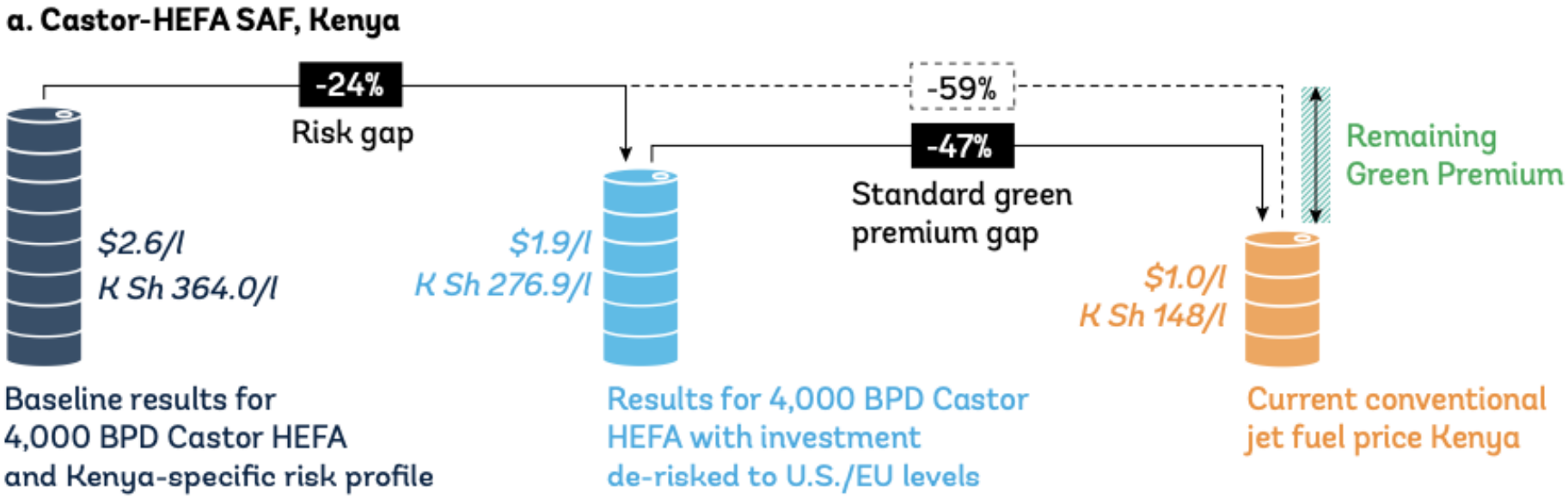
Unlocking Africa's potential for Sustainable fuel production

Figure ES.2. Risk and green premiums on SAF in Kenya



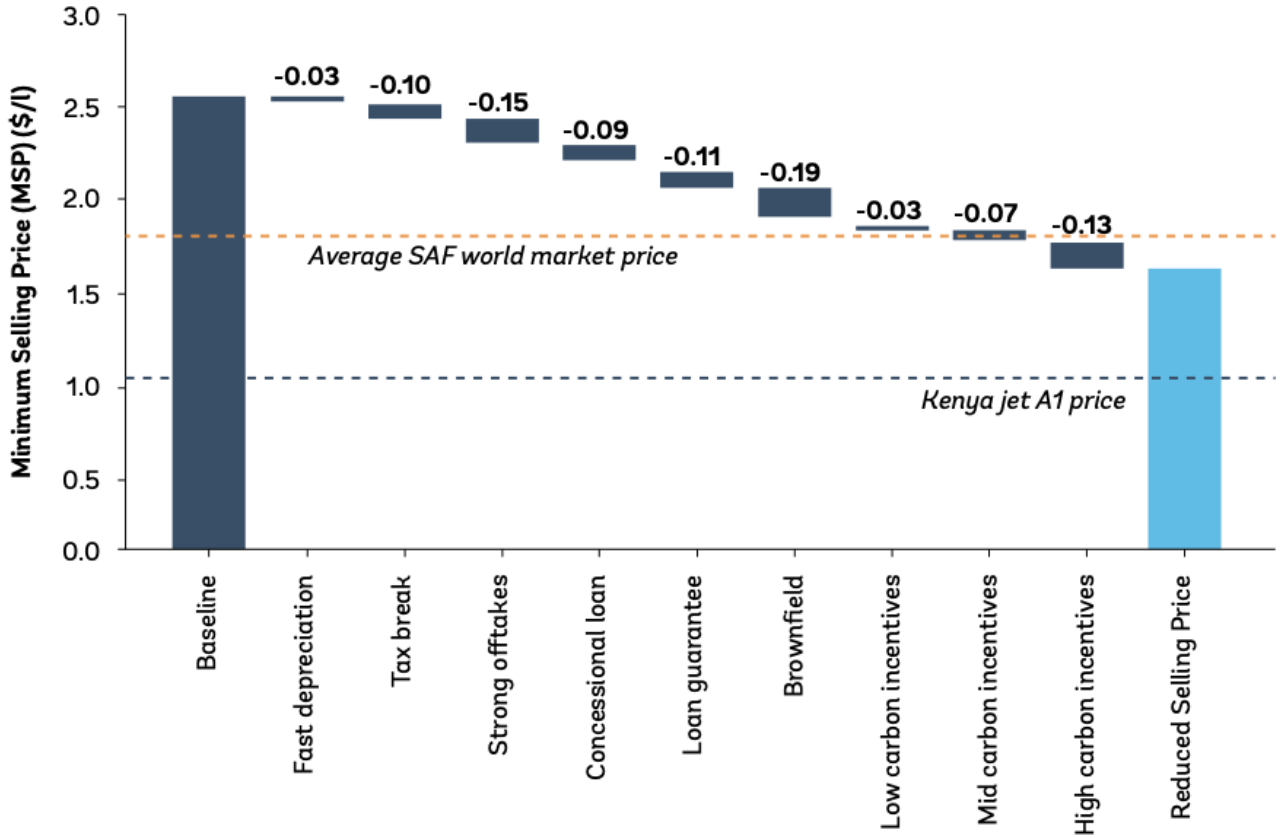
Unlocking Africa's potential for Sustainable fuel production

Figure ES.2. Risk and green premiums on SAF in Kenya



Unlocking Africa's potential for Sustainable fuel production

Figure 2.12. Impact of policy scenarios on the minimum selling price in Kenya of SAF produced using castor oil



Note: Figure is based on a 4,000-BPD fuel facility and the maximum jet product slate. The black dashed line shows the dual-purpose kerosene price in Kenya ($1.04/l) and the red dashed line shows average world market price of SAF in 2024 ($1.83/l), for comparison purposes. Global SAF prices are based on IATA (2024) data.
Source: Original figure for this publication.

Recommendations:

Rather than a one-size-fits-all approach, this report makes a case for a tailor-made approach to SAF production development in Africa.

- **Manage feedstock** by prioritizing sustainable and cost-effective sources.
- **Develop policy frameworks** by introducing financial incentives like tax breaks and grants.
- **Leverage book-and-claim mechanisms** to incentivize decarbonization efforts to international stakeholders.
- **Invest in R&D** through pilot projects and international partnerships.
- **Reduce investment risk** by leveraging support from multilateral development banks and other financial institutions.
- **Scale production** by strengthening public-private partnerships.

Thank you very much.

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The African R&D Perspective

Farai Chireshe, ICAO

Process Engineer & Technical Consultant

SUSTAINABILITY HUT

Driving Sustainable Aviation Fuels in Africa: R&D insights and strategic directions

09 SEPTEMBER 2025 | ICARUS ONLINE WEBINAR

FARAI CHIRESHE

BACKGROUND

Where are we now?

- Sustainable aviation fuel (SAF)-specific research relatively still early stage in Africa.
- Research largely academia-led, limited industrial scaling and cross country collaboration.
- Focus areas:
  - Feedstock assessments
  - Techno-economic analysis (TEA)
  - Small-scale conversion experiments.

Feedstock potential

- Starch/sugar crops: e.g., sugarcane, cassava, sorghum → ethanol, isobutanol (Alcohol-to-jet, AtJ).
- Oil crops: e.g., jatropha, camelina, waste cooking oils, algae → Biodiesel/ Hydroprocessed Esters and fatty acids (HEFA).
- Residues: e.g., crop residues, bagasse, forestry residues, municipal solid waste (MSW) → gasification Fischer-Tropsch, pyrolysis, hydrothermal liquefaction (HTL).
- Renewable electricity: solar, wind and geothermal → hydrogen + carbon capture for Power-to-liquids (PtL).

Early techno-economic studies

- Insights so far:
  - HEFA most feasible near-term followed by AtJ (feedstock & infrastructure exist)
  - Gasification-FT promising long-term, but high CAPEX
  - PtL potential in Southern, North and East Africa (solar, wind, geothermal).
- Challenges:
  - High financing costs in Africa
  - Lack of policy certainty
  - Limited life cycle analysis (LCA) studies specific to African feedstocks.

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FIRST GENERATION (1G) PATHWAYS

Oil crops

- Current status:
  - Small biodiesel initiatives in Ghana, Zambia, Liberia, Tanzania, Ethiopia, Nigeria, Senegal, Kenya, Angola, Zimbabwe, Mozambique, and South Africa
  - No upgrading to hydrotreated vegetable oil (HVO) or SAF.
- Case: Bleriot Group (Kenya)
  - Startup conducting SAF R&D from lipid-based feedstocks
  - Example of private sector innovation in Africa.

Sugar/starch-based feedstocks (AtJ)

- Ethanol
  - Produced in several African countries
  - Lower-cost route; very mature conversion process
  - Hub potential for ethanol-SAF centres in Southern, East, Central and West Africa.
- Isobutanol
  - High cost of production due to costly separation (impurities, low concentration)
  - More suitable long-term with efficient and low-cost downstream separation processes.

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AtJ case

- PetroSA Synthetic Fuels Innovation Centre (PSFIC) at the University of the Western Cape (UWC), South Africa
  - PetroSA is a natural gas to liquids facility
  - PSFIC pilots PetroSA's COD process
  - COD = Conversion of Olefins (alkenes) → Distillates
  - Priority R&D: adapting COD to bio-based olefins
  - Olefins can be derived from alcohol dehydration
    - Olefins from higher alcohols like isobutanol more suitable than those from ethanol.
- Potential: blend fossil know-how with bio-feedstock innovation.

SECOND (AND HIGHER) GENERATION PATHWAYS

Gasification and Fischer-Tropsch (FT)

- Feedstock: agricultural & forestry residues, MSW.
- Most studies and applications for electricity generation, not liquids
  - Example:2iE (Burkina Faso) + UCLouvain → gasification reactor design for manufacturing and operation in West Africa.
- Fischer–Tropsch integration:
  - Sasol (Energy and chemicals company): exploring biomass + green H_2 into FT system
    - Repurposing CTL (coal-to-liquid) experience for SAF
  - CARE-O-SENE project (South Africa + Germany): catalyst development for green kerosene.

Pyrolysis

- Several institutions carrying out pyrolysis research at bench scale (grams) across Africa
  - Stellenbosch University → kg-scale pilot (South Africa)
- Focus on producing biocrude but upgrading to jet-fuel range molecules is limited.
- Opportunities:
  - Lignocellulosic feedstock for pyrolysis oils
  - Co-processing with fossil crudes in existing refineries.

Hydrothermal Liquefaction (HTL)

- HTL produces liquid bio-oil under high pressure & temperature
  - Feedstocks include, algae, food waste, agricultural residues.
- Research examples:
  - North-West University (SA) → operates continuous plant (150 L/h water feed)
  - NM-AIST (Tanzania)
  - Edo State University (Nigeria)
  - Suez University (Egypt) → co-processing HTL oils with Vacuum gas oil (VGO) in a Fluid Catalytic Cracker (FCC) of a conventional refinery.
- Mostly gram-scale research → need scale-up & upgrading focus.

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STRATEGIC OUTLOOK

Key gaps and barriers

- **Scale**: most research still lab or kg-scale.
- **Upgrading**: limited pathways from bio-oils to jet fuels.
- **Logistics**: feedstock supply chains under-studied.
- **Regional integration**: fragmented R&D, little skills transfer.
- **Industrial uptake**: weak links between research & refineries/airlines.
- **Policy & finance**: no clear SAF policy direction, limited investment security.

R&D plus scale-up

- Regional collaboration
  - Cross-border feedstock pools
  - Development of regional hubs (West, East, Southern, North Africa).
- Catalytic upgrading
  - Ethanol → Butanol → Olefins → SAF
  - Biocrudes to jet fuel range molecules
  - Optimising yield of jet fuel range molecules.
- Scale-up
  - Move from grams → kg → tonnes → demo plants
  - Conduct comprehensive techno-economic assessments (TEA)s + Lifecycle assessments (LCA)s.
- Industrial partnerships
  - Use existing refineries for co-processing
  - Support SMEs & startups (e.g., Bleriot partnership with Kenya Airways).

Thank you!

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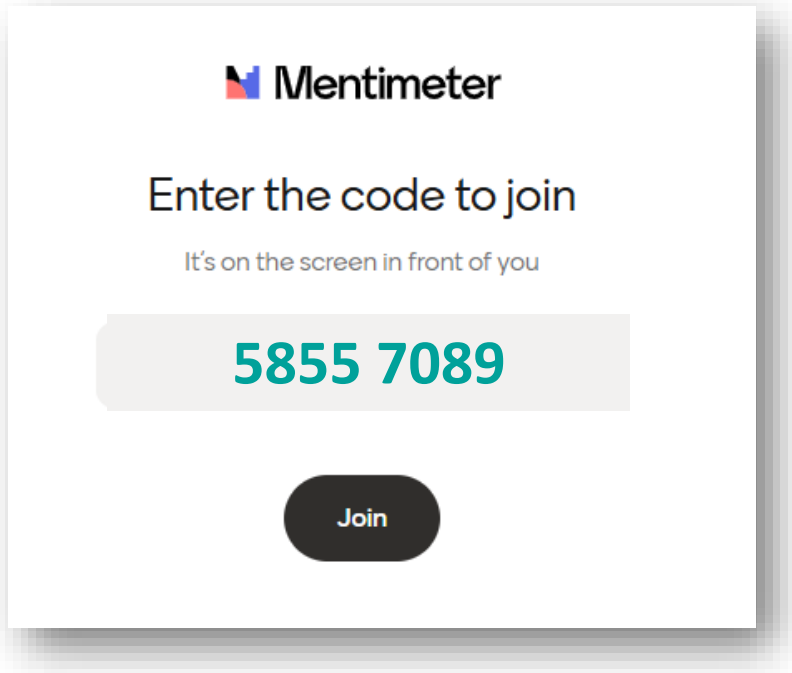
Open Discussion & Online Survey

Q&A Online Poll

1. **Take your phone/computer**

2. **Scan the QR code OR go to www.menti.com & enter the code: 5855 7089**



Open question

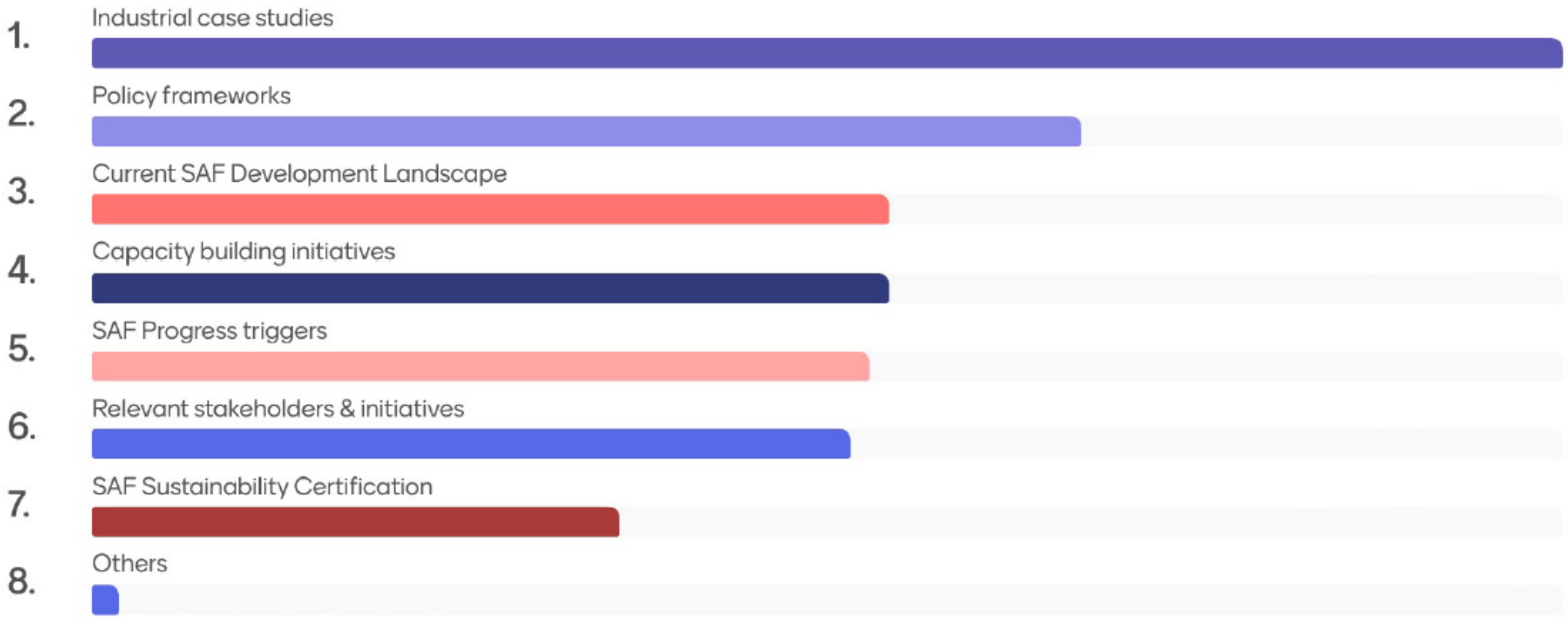
In your opinion, what are the biggest challenges to SAF development in Africa?

Open question

In your opinion, what are the biggest opportunities to SAF development in Africa?

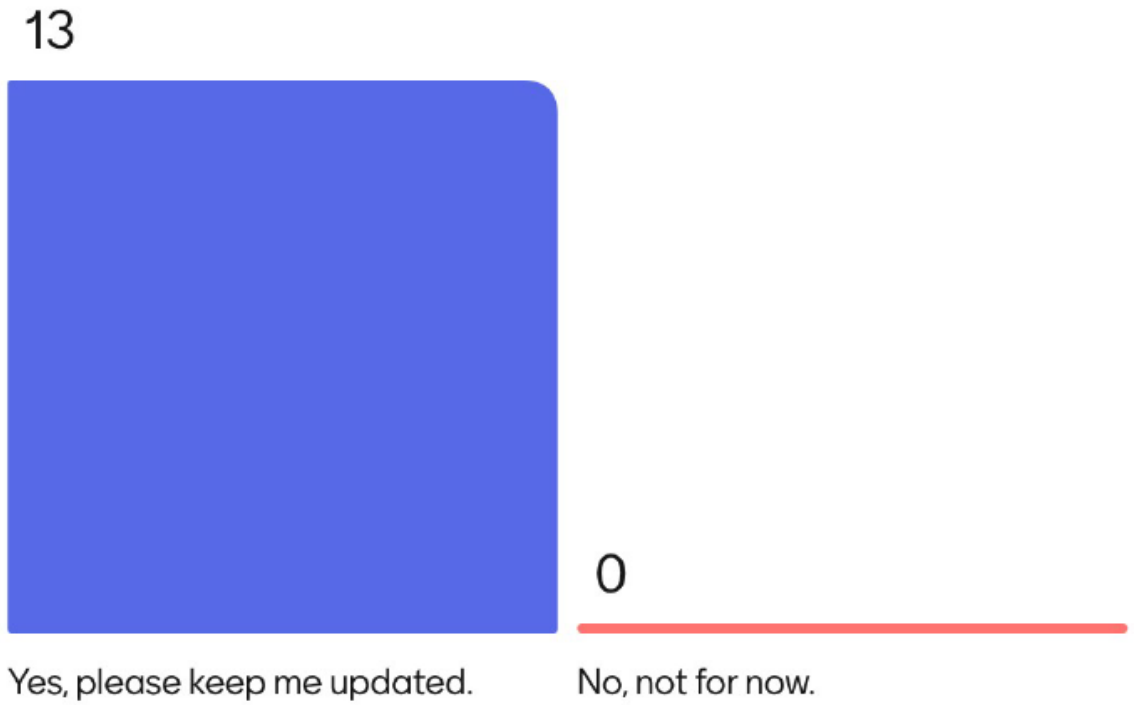
Ranking question

Which topics are most interesting for you to be discussed in the upcoming ICARUS study on “SAF development in Africa”?



Open question

Are you interested to stay up to date on the ICARUS study and upcoming webinars on “SAF Development in Africa”?



Outlook & closing

Esther Hegel, RSB

ICARUS Project Partner

Oulook & Closing

- **Save the date:** 2 October 2025 – Webinar on Sustainability Certification
- Development of **ICARUS Deliverable** on "SAF Development in Africa" in 2026 & **Webinar** on final study findings in Q3 2026
- **Stay in contact:** esther.hegel@rsb.org & yitatek.yitbarek@rsb.org

Microsoft Virtual Events Powered by Teams

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