MINISTÉRIO DE
MINAS E ENERGIA

GOVERNO FEDERAL
BRASIL
UNIÃO E RECONSTRUÇÃO

Policy and Projects for SAF in Brazil

Laís F. Thomaz
Advisor
Secretariat of Petroleum, Natural Gas and Biofuels
lais.thomaz@mme.gov.br

SAF FACTS

8 pathways approved by the ASTM

124 airports with SAF (ICAO)

53,2 Billion liters of SAF under offtake agreements (ICAO)

318 SAF Facilities Announced (ICAO)

103,4 Billion liters/year total capacity (ICAO)

SAF Legal Framework

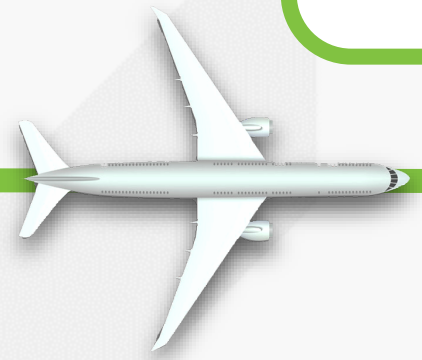
2009

Law 12.114/2009: Creates the National Fund on Climate Change, alters arts. 6th and 50th of Law #9.478, of August 6th, 1997, and makes other provisions

2013

RANP 37
QAV

RANP 20
FT; HEFA; SIP



2017

Law 13,576/2017: Provides for the National Biofuels Policy (RenovaBio) and other provisions (for other tools related to RenovaBio see BRASIL, 2021)

2018

Decree 9.578/2018: Consolidated normative acts edited by the federal Executive Branch that provide for the National Fund on Climate Change, referred to in Law #12,114, of December 9, 2009, and the National Policy on Climate Change, referred to in Law #12,187, of December 29, 2009

2019

RANP 779/2019: Amends Resolution ANP #17, dated July 26, 2006; and Resolution ANP #18, dated July 26, 2006, to update the definitions of aviation kerosene C (QAV-C) and alternative aviation kerosene and prohibit the importation of QAV-C (Repealed by RANP No. 856/2021)

RANP 778/2019
+SPK/; ATJ

SAF Legal Framework

2020

ANAC R. N. 558/2020
Amends Resolution # 496, of November 28, 2018, which regulates the monitoring, the reporting and verification of CO emission data2 for international air transport

2021

RANP 842
Green Diesel

RANP 856
+CHJ;/ HC-HEFA

Resolution CNPE #6 of 2021

Determines the carrying out of a study to propose guidelines for the National Hydrogen Program

PNH2 Programa Nacional do Hidrogênio

Resolution CNPE #7/2021

Creates the Fuel of the Future Program, creates the Fuel of the Future Technical Committees, and makes other provisions.

FUEL OF THE FUTURE

2021

Law 14.248/2021

Establishes the National Biokerosene Program to encourage research and promote the production of energy from biomass, aiming at the Brazilian aviation's sustainability

CNPE 02/2021

Establishes guidelines for research, development, and innovation in the energy sector in the country.

SAF Legal Framework

Sept. 14, 2023 - The Fuel of the Future Bill was sent to the Brazilian Congress by the Lula Administration

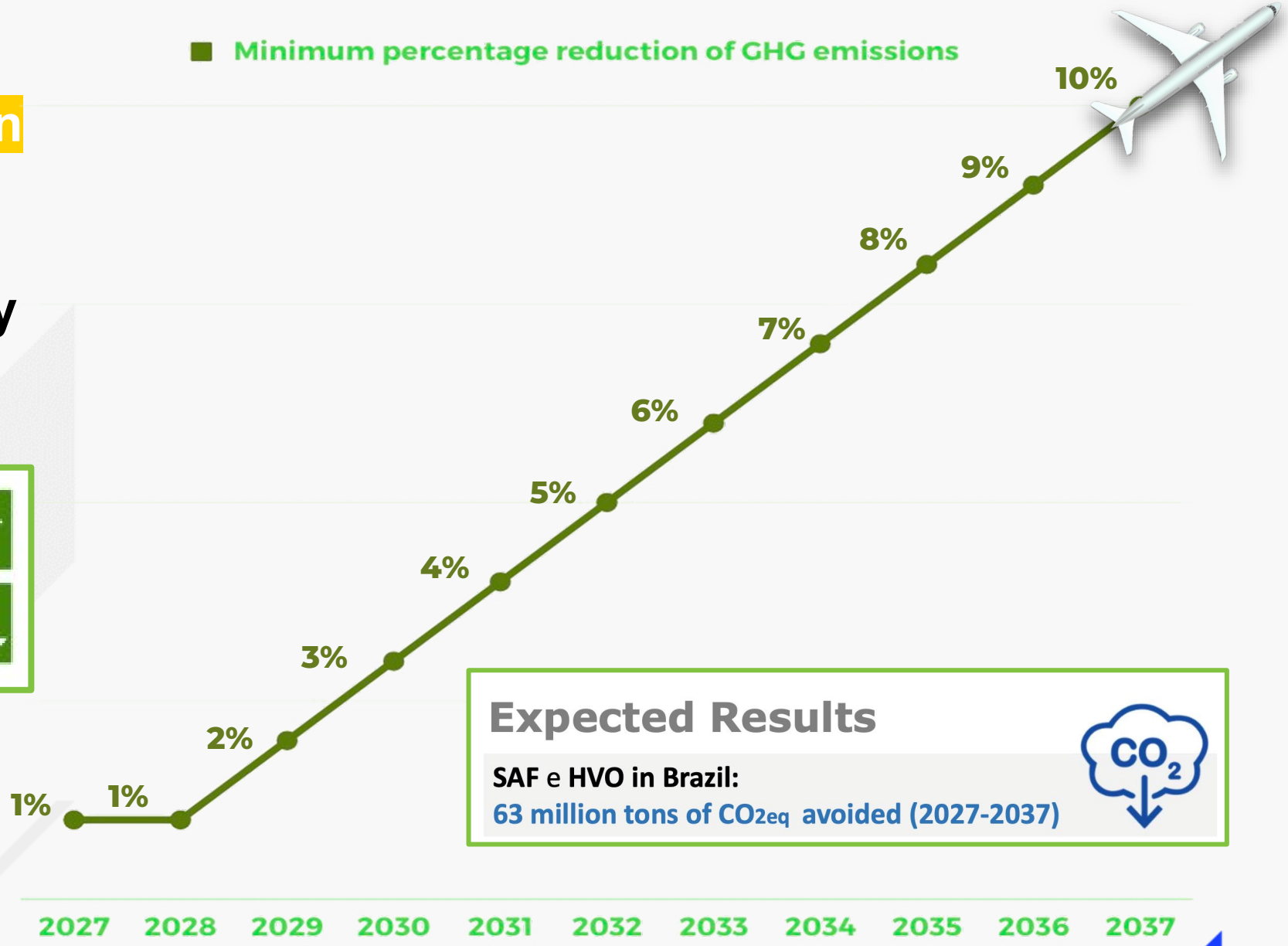
March 13, 2024 - the Bill was approved by the Lower house and it was sent to the Senate (429x19)

2023

2024

Minimum annual percentage reduction in greenhouse gas emissions (GHG) for domestic operations by air operators

FUEL OF THE FUTURE



Expected Results

SAF e HVO in Brazil:

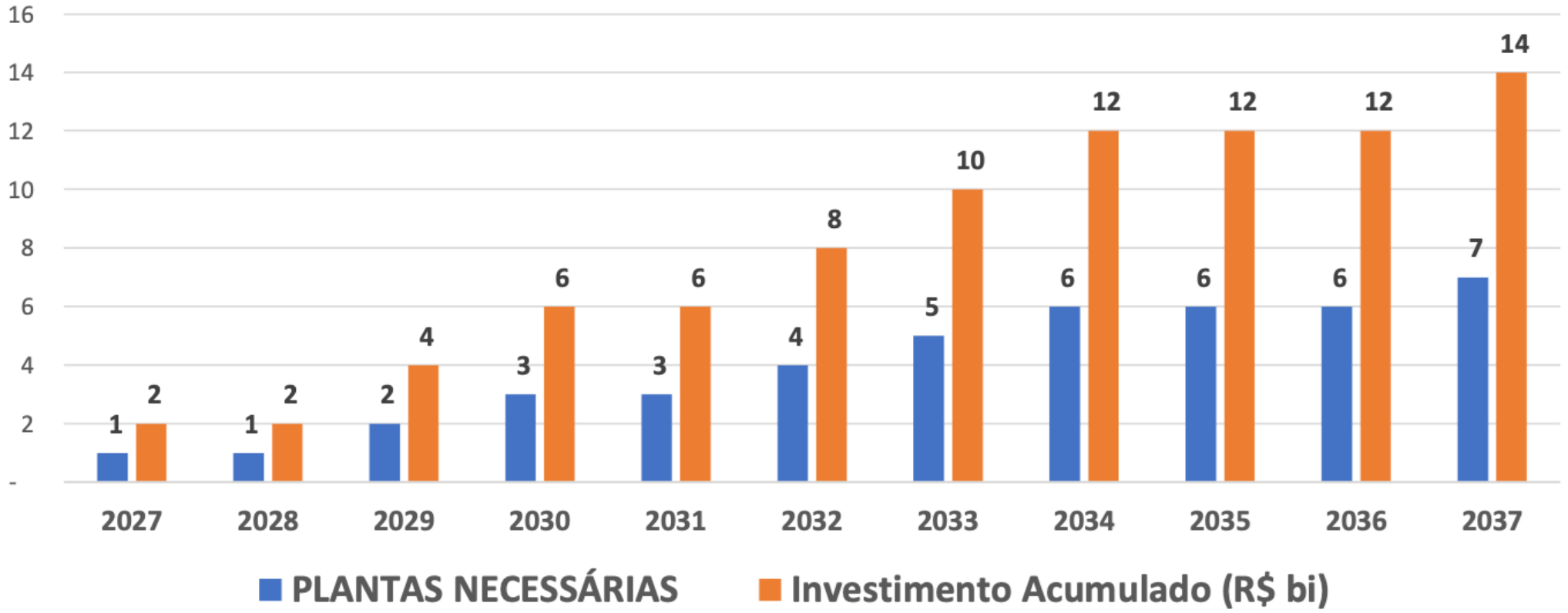
63 million tons of CO_{2eq} avoided (2027-2037)

Economic Analysis

Route	Feedstock	gCO_2/MJ	SAF volume: Mandate: 1%	SAF volume: Mandate: 10%
HEFA	Soybean Oil	67,4	4,1%	41,2%
ATJ	Ethanol	32,8	1,6%	15,8%
ATJ	Agricultue Residues	29,3	1,5%	14,9%
FT	Agricultue Residues	7,7	1,1%	10,9%
HEFA	Palm Oil	20,7	1,3%	13,1%
HEFA	Tallow	22,5	1,3%	13,4%
HEFA	UCO	13,9	1,2%	11,8%
FT	Wood Residues	8,3	1,1%	11,0%

Plants and Investiments

SAF e HVO



Dados: Investimentos PDE 2032
1 planta de BioQAV/HVO
Projetos 1 planta de 500 milhões de litros/ano
Investimentos R$ 2 bilhões

Dados: Be8
1 planta de BioQAV/HVO
Projetos 1 planta de 820-950 milhões de litros/ano
Investimentos R$ 2 bilhões

ProBioQAV subcommittee

Average 51 multi stakeholders in each hearing session

Recommendations to CNPE:

- 27 assumptions
- 5 pillars / fundamental cornerstones

Potential of feedstocks for SAF

Ethanol: 2nd biggest producer in the world

Biodiesel: One of the biggest producers in the world

3 pathways with the greatest potential for SAF production in Brazil:

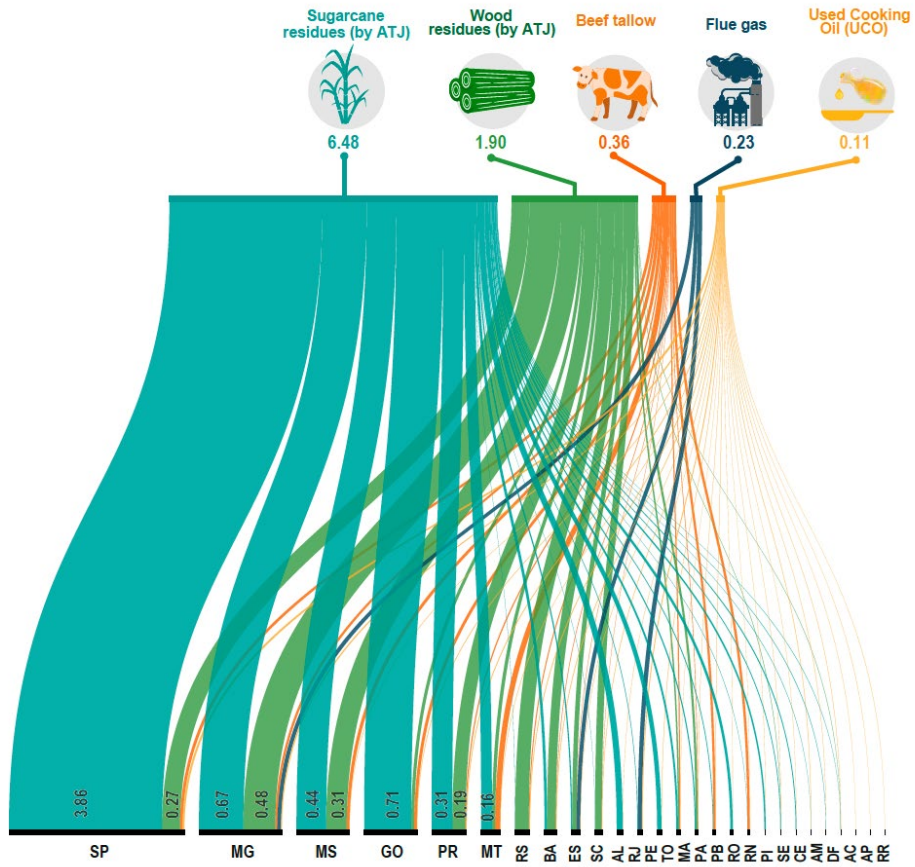
ATJ, FT and HEFA

- **Potential for SAF production from the mapped residues in Brazil is up to**
- **9 billion liters, which is around 125% of the current fossil kerosene (Jet A) consumption in Brazil.**

RSB
Roundtable on Sustainable Biomaterials
www.rsb.org

SAF PRODUCTION POTENTIAL

Potential production of SAF in Brazilian states from each feedstock (in billions of litres).



Brazilian Network of Biokerosene and Renewable Hydrocarbons for Aviation (RBQAV)

REDE BRASILEIRA DE BIOQUEROSENE
E HIDROCARBONETOS SUSTENTÁVEIS PARA AVIAÇÃO

The Plan for Science, Technology, and Innovation in Renewable and Biofuel Energy (2018-2022) of the **Ministry of Science, Technology and Innovations (MCTI)** consolidated **the creation of the RBQAV**

It is coordinated by the Office of Entrepreneurship and Innovation (SEMPI/ MCTI), with projects coordinated by the Federal University of Rio Grande do Norte (UFRN) and support from other universities involved like the UFPB, UFRJ, UFG.

Other members: MME, Embrapa Agroenergy, Ubrabio, ANP, GOL, Embraer, GIZ, Abear

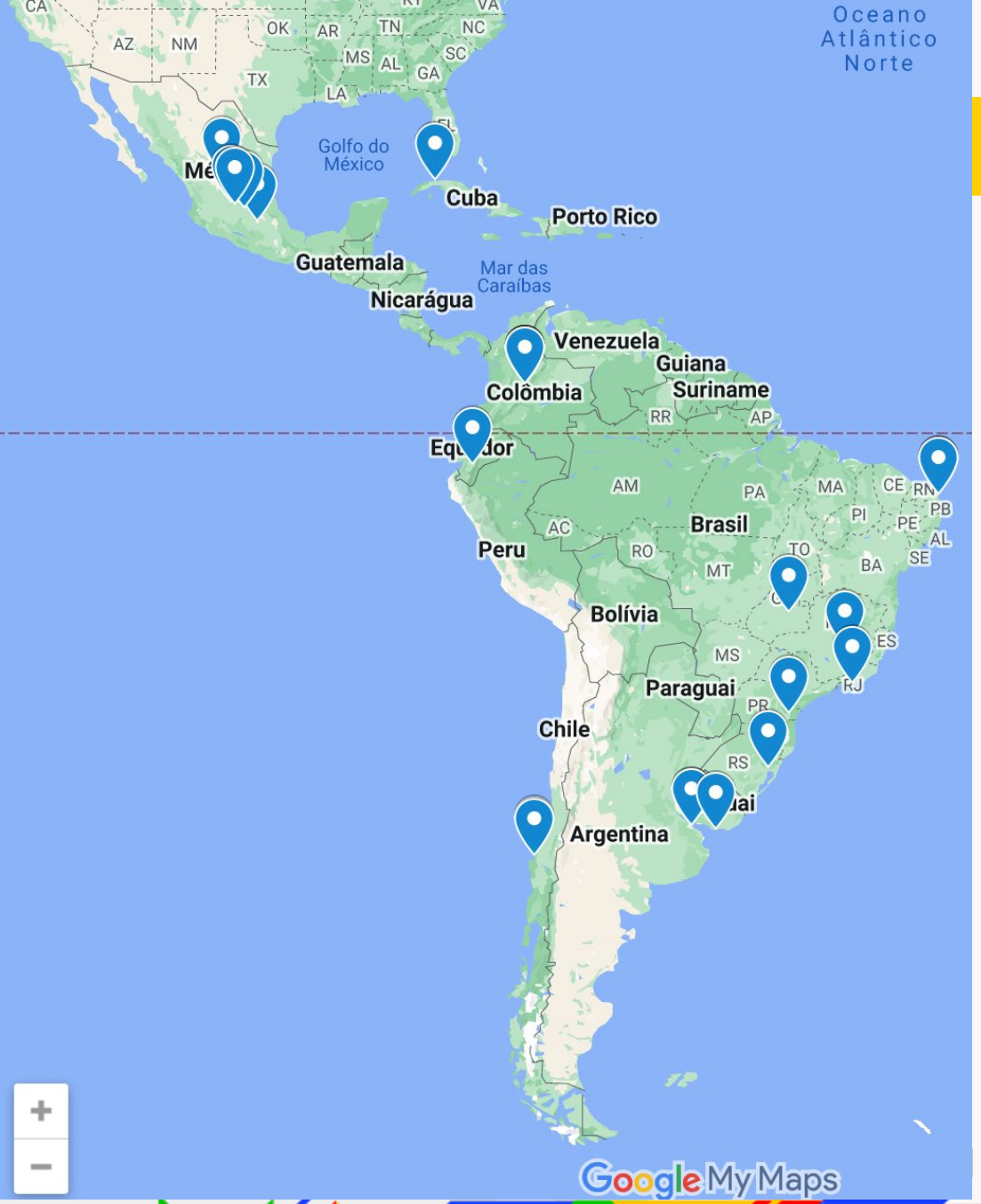
Climate Neutral Alternative Fuels

ProQR
CLIMATE NEUTRAL
ALTERNATIVE FUELS

In 2017, the Ministry of Science, Technology, Innovations and Communications (MCTIC) and the Deutsche Gesellschaft für Internationale Zusammenarbeit / the German Agency for Technical Cooperation (GIZ) - initiated the **Climate Neutral Alternative Fuels (ProQR)**

ProQR aims to create an international reference case for the application of alternative fuels without climate impacts in air transport. **Brazil** has great potential for producing energy from decentralized renewable sources, and has a large energy industry and a large and growing demand for fuels, with recognized expertise in biofuels.

Germany, in turn, has expertise in the production of environmentally friendly synthetic fuels. In this scenario, the technical cooperation signed between the two countries allows them to work together for global decarbonization, contributing to innovation worldwide in the production of next-generation fuels (PROQR, 2017).



SAF research initiatives in Brazil

H2BRASIL
Expansão do Hidrogênio Verde

Partners:

- UNIFEI – Itajubá, Minas Gerais;
- SENAI ISI – Natal, Rio Grande do Norte;
- CIBiogás – Foz do Iguaçu, Paraná;
- UFG/ RTVE – Goiânia, Goiás.

Total: **34 Million EUR**

cooperação alemã
DEUTSCHE ZUSAMMENARBEIT

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

H2BRASIL Expansão do Hidrogênio Verde

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Other Academic Initiatives for SAF in Brazil

2012	**SAF roadmap**	Fapesp, Embraer, Boeing and Unicamp
2014-2017	**Implementation of 17 biokerosene trials**	Fuel Testing Laboratory (LEC) - UFMG, ANP, partnership with Boeing
2018	**Biokerosene and Renewable Platform of Zona da Mata**	The Juiz de Fora City Hall has been coordinating multi-stakeholder actions with the participation of the Federal Government, State of Minas Gerais Government, Embrapa, Emater, Federal Universities (Minas Gerais, Juiz de Fora, Viçosa, Lavras), Ubrabio, GOL Linhas Aéreas, Curcas Diesel do Brasil, Agropecuária Serra Negra/Entaban S.A, Geoflorestas, RenewCo, United Kingdom, IZA Airport, among others with 45 other municipalities
2016-2023	**National Laboratory for Biorenewables (LNBR)**	Academic institutions: Fapesp, Fapemig, Facepe, Fapergs, Embraer, Petrobras, Klabin, Suzano, FEI, Funarbe, INT, IPT, UFPE, UFRJ, UFSM, UFU, UFV, Unicamp, Unifei BeValue - Coordinated by LNBR/CNPEM (2019 - 2023) Brazil - EC coordinated call on Advanced Lignocellulosic Biofuels and MCTI/Confap/Fapesp (Call in 2016) Brazil-EU Cooperation for Development of Advanced Lignocellulosic Biofuels – Becool
2019-2021	**Study of SAF, feedstocks by region**	Boeing, RSB, WWF, Agroicone, University of Campinas (Unicamp)

CNPq/MCTI/FNDCT

Call No. 18/2022 – Research, Development and Innovation in Support of the Fuel of the Future Program and the Brazilian Hydrogen Initiative (IBH2 MCTI)

a) Line 1 – Sustainable fuels for compression ignition engines (Examples: biodiesel, **green diesel**, biomethane, biomethanol, DME, sustainable marine fuels (bunker and Marine Diesel Oil and other sustainable alternative fuels);

b) Line 2 – **Sustainable drop-in aviation fuels (SAF)** (Examples: sustainable aviation kerosene; electrofuels, synthetic fuels and other sustainable alternative hydrocarbons);

c) Line 3 – Sustainable fuels for the Otto Cycle (Examples: ethanol, sustainable gasoline, biomethane and other sustainable fuels);

d) Line 4 – Sustainable hydrogen (production, storage and use of hydrogen, fuel cells and other applications in the transport and fuel sector)

Resources: **63 million BRL**

MCTI/FINEP/FNDCT

Economic Subsidy for Innovation – 08/2022

Support for projects to encourage the use of sustainably-obtained fuels and hydrogen applied to the transport sector / Fuels of the Future

b) Thematic Line II – Development of national production technologies focusing on the production of drop-in sustainable aviation fuels (SAF);

Resources: Up to **$20 million BRL**

The BNDES will make **$20 billion BRL** available over 4 years, at a rate of 1.9% for research, development and innovation in biofuels.

Center for Excellence in Hydrogen and Sustainable Energy Technologies (CEHTES)

The UFG received **$5.5 million USD** to establish its Center for Excellence in Hydrogen from the Government of the State of Goiás.

Due to its geographical position, favorable to the incidence of solar light and its great eolic potential, in addition to an abundance of natural resources like water and biomass, Brazil can become a power in hydrogen and clean energy.

Acting as a **regional hub** for innovation, collaboration, and for attracting national and international talents and investments, the CEHTES's mission is prospection, planning, and execution of multidisciplinary research projects in applied research that can allow both the public and entrepreneurial sectors to develop studies and technological solutions within the theme of hydrogen and renewable low-carbon energy.

CEHTES

Centro de Excelência em Hidrogênio e Tecnologias Energéticas Sustentáveis

UFG Universidade Federal de Goiás

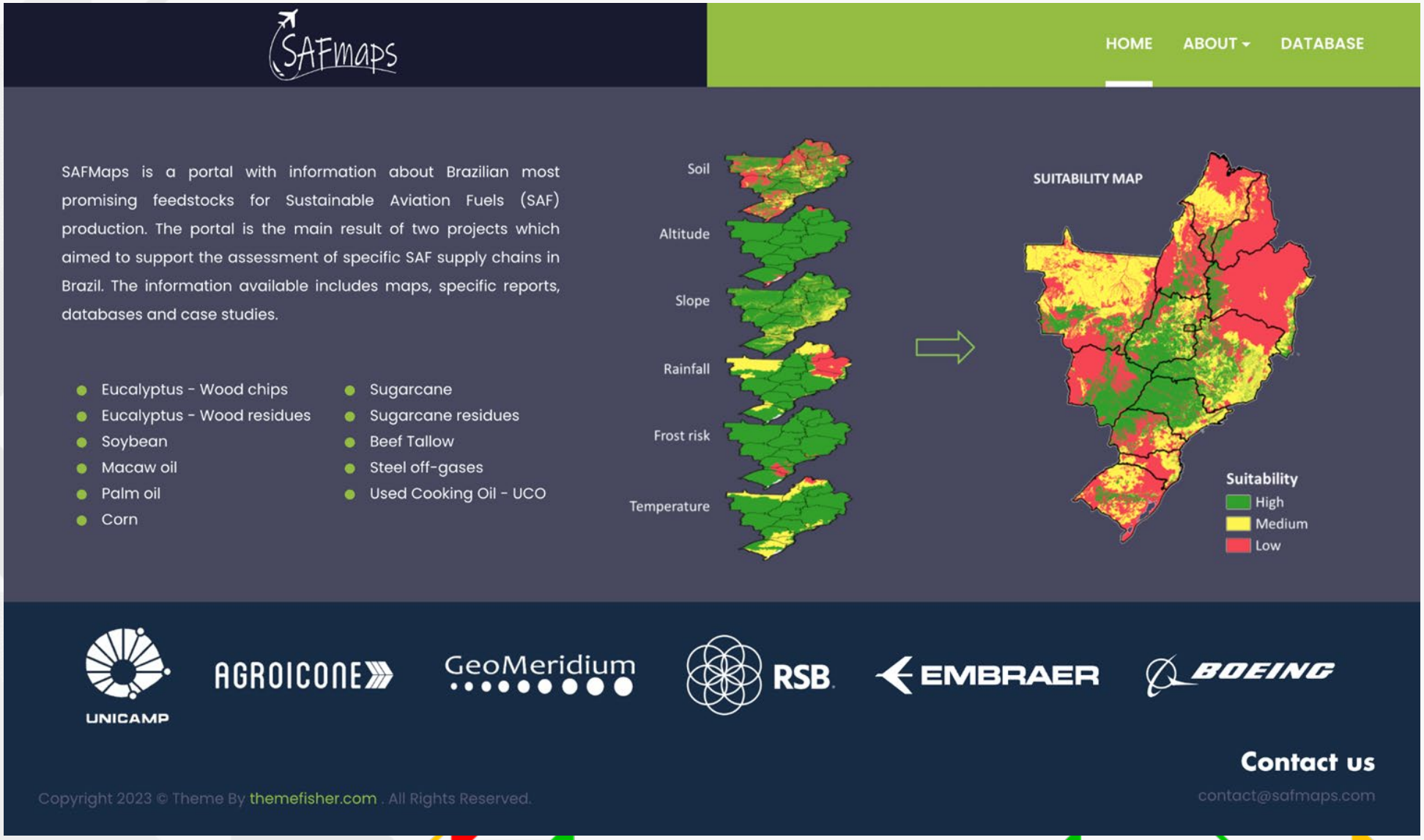
Instituto Federal Goiás

FUNAPE Fundação de Apoio à Pesquisa - UFG

FAPEG Fundação de Amparo à Pesquisa do Estado de Goiás

Governo de Goiás — O Estado que dá certo

SAF Maps


SAFmaps
HOME
ABOUT
DATABASE
SAFMaps is a portal with information about Brazilian most promising feedstocks for Sustainable Aviation Fuels (SAF) production. The portal is the main result of two projects which aimed to support the assessment of specific SAF supply chains in Brazil. The information available includes maps, specific reports, databases and case studies.
Eucalyptus - Wood chips
Eucalyptus - Wood residues
Soybean
Macaw oil
Palm oil
Corn
Sugarcane
Sugarcane residues
Beef Tallow
Steel off-gases
Used Cooking Oil - UCO
Soil
Altitude
Slope
Rainfall
Frost risk
Temperature
SUITABILITY MAP
Suitability
High
Medium
Low
UNICAMP
AGROICONE
GeoMeridium
RSB
EMBRAER
BOEING
Contact us
contact@safmaps.com
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Conexão SAF (SAF Connection)

Conexão SAF is an informal forum that aims to bring together public and private actors to identify and develop proposals and solutions that allow the Brazilian aviation sector to achieve decarbonization through the use of SAF.

This initiative seeks to promote continuous and structured debate in order to identify the technical, regulatory, production and logistical challenges for the production and consumption of SAF in Brazil, proposing alternatives and initiatives to make these fuels economically viable.

The idea is to bring together all institutions that are interested in participating in this debate on how to promote the production and consumption of SAF in Brazil.

ANAC
AGÊNCIA NACIONAL DE AVIAÇÃO CIVIL

CONEXÃO SAF
COMBUSTÍVEIS SUSTENTÁVEIS DE AVIAÇÃO

SAF INVESTMENTS ANNOUNCEMENTS IN BRAZIL

BRASIL BIOFUELS

Investment in BRL (million)

$2000

Volume (million Liters/year)

500

Start forecast: 2025

acelen

Investment in BRL (million)

$12000

Volume (million Liters/year)

1000

Start forecast: 2026

PETROBRAS

Cubatão and Itaboraí facilities

Investment in BRL (million)

$1500

Volume (million Liters/year)

≅2000

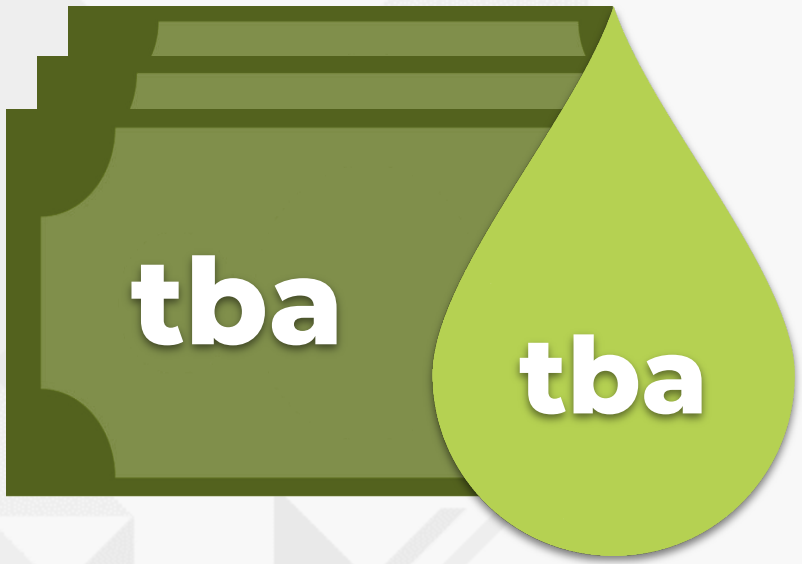
Start forecast: 2027

SAF INVESTMENTS ANNOUNCEMENTS IN BRAZIL

raízen

Investment in BRL (million)

Volume (million Liters/year)



Start forecast: 2027

geo Biogas & Tech

Investment in BRL (million)

COPERSUCAR

Volume (million Liters/year)

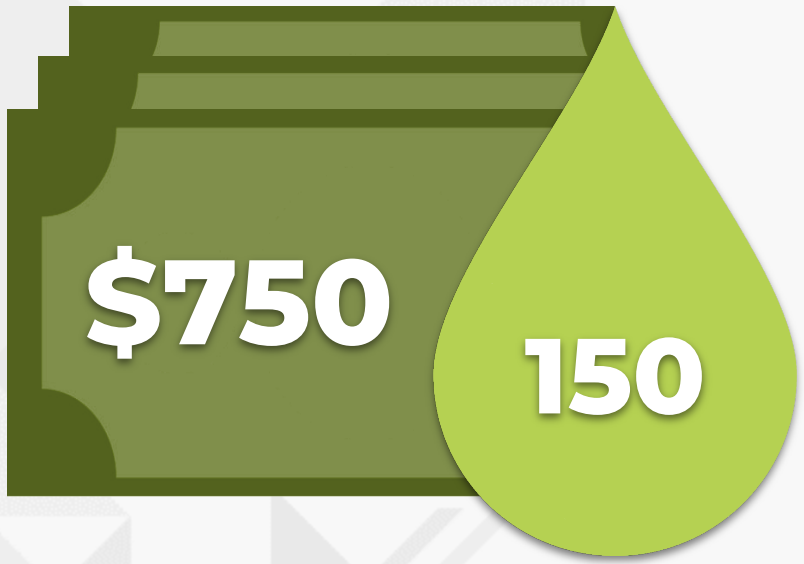
Start forecast: 2025

SAF INVESTMENTS ANNOUNCEMENTS IN BRAZIL

REFINARIA DE PETRÓLEO RIOGRANDENSE

Investment in BRL (million)

Volume (million Liters/year)

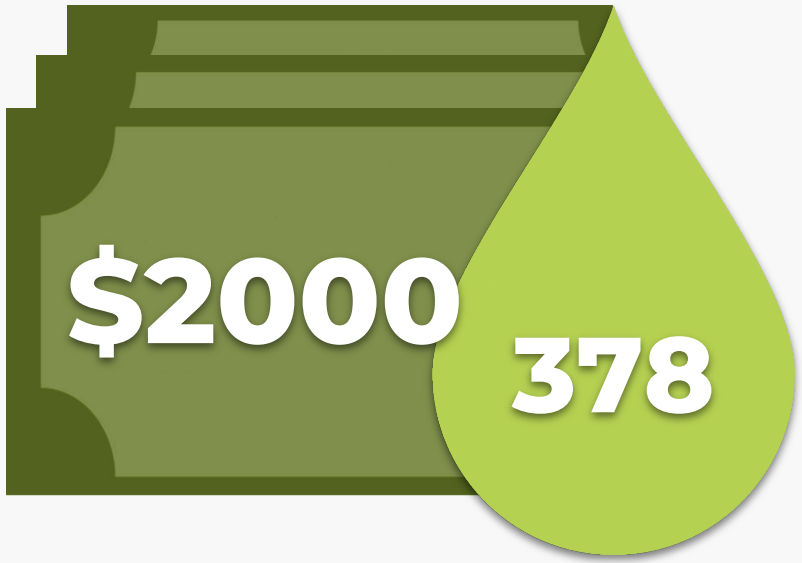


Start forecast: 2025

ENERGIS 8 BRASIL

Investment in BRL (million)

Volume (million Liters/year)



Start forecast: 2027


Thank you
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