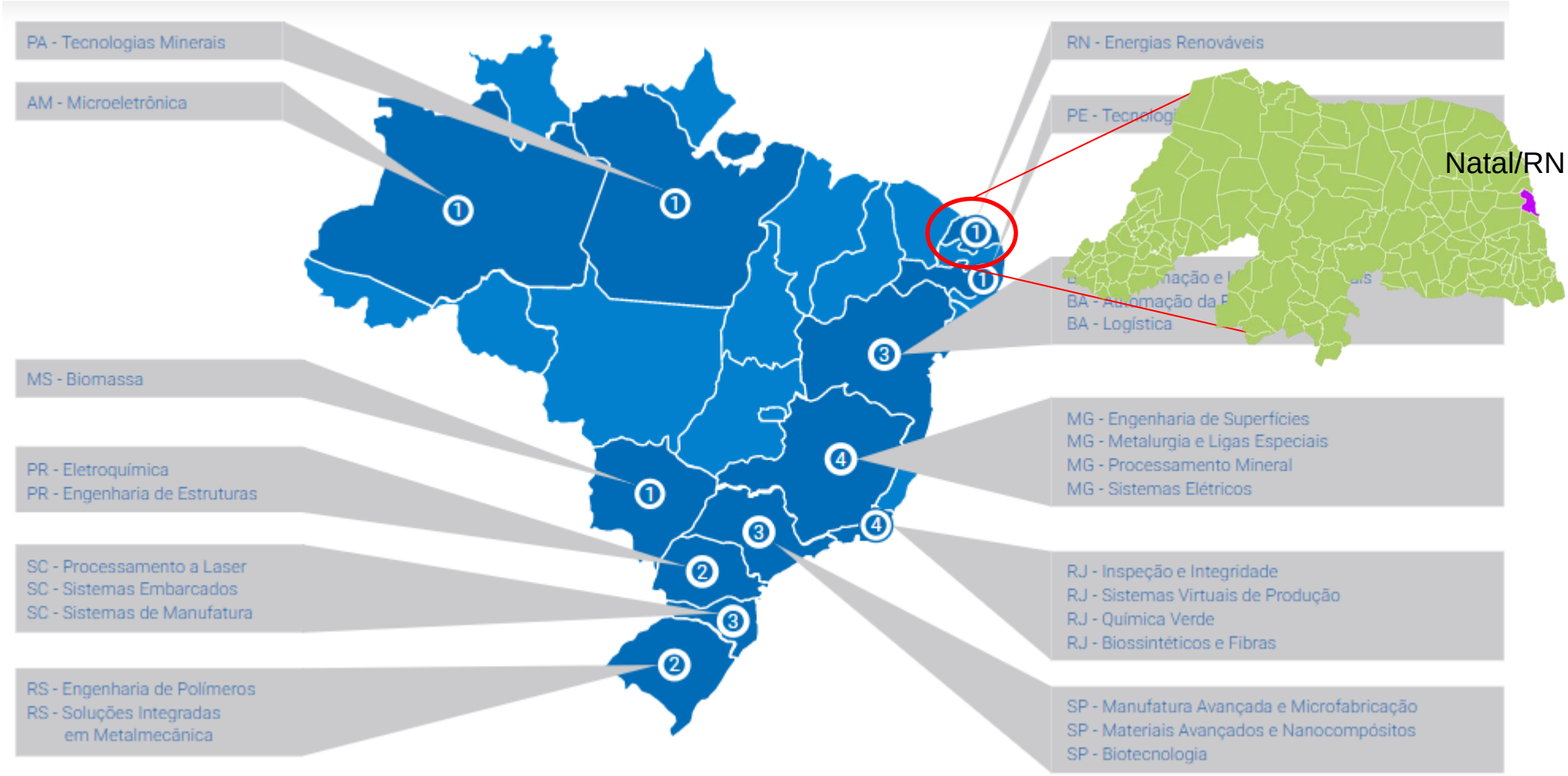



INSTITUTO SENAI DE INOVAÇÃO ENERGIAS RENOVÁVEIS

# SENAI Institute of Innovation in Renewable
# ISI-ER- Natal/RN




Fonte: http://institutos.senai.br/



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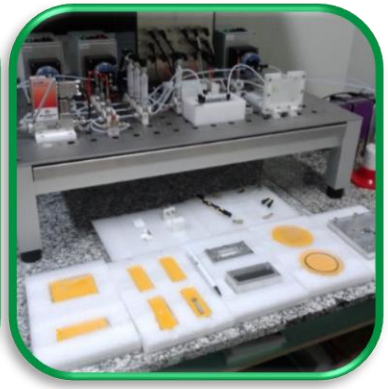
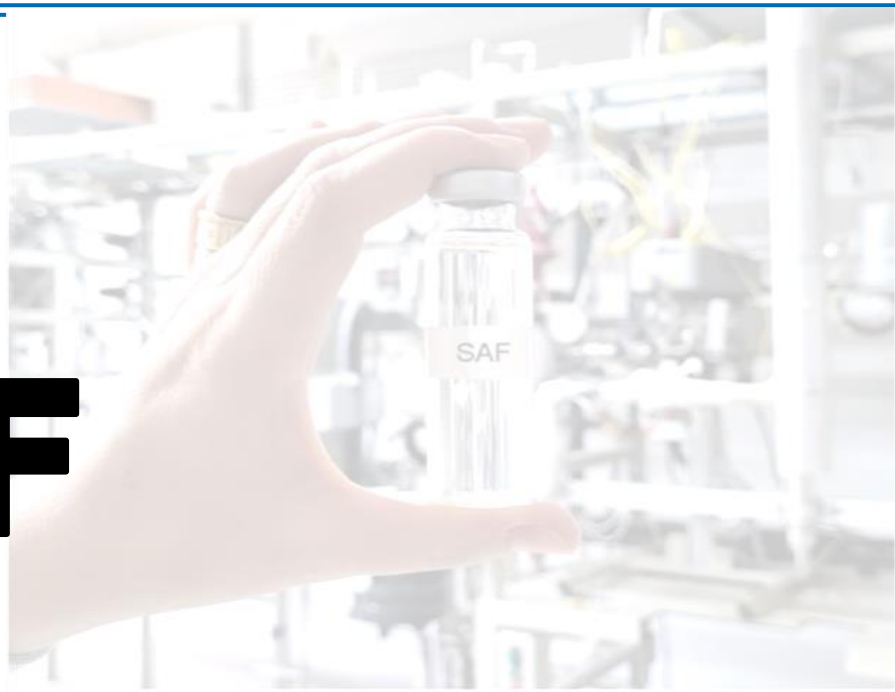


Wind Power
- onshore
- offshore

Solar Power
- photovoltaic
- thermal

**Sustainability**
- **Hydrogen**
- Greenhouse Gases
- Environment




# SAF


## PUBLIC POLICIES

With a focus on possible SAF manufacturing routes, we begin to analyze Brazilian initiatives, considering that Brazil is currently the world's second-largest producer of biofuels and that ethanol is the primary biofuel produced and consumed in Brazil, supported by a well-established supply chain initiated in the 1970s through the National Alcohol Program (Proálcool).


## Decreto nº 76.593, de 14 de Novembro de 1975

Institui o Programa Nacional do Álcool e dá outras Providências.

O PRESIDENTE DA REPÚBLICA, usando das atribuições que lhe confere o artigo 81, item III, da Constituição,

DECRETA:

https://m.folha.uol.com.br/mercado/2015/11/1706271-proalcool-faz-40-anos-em-meio-a-uma-das-mais-graves-crises-da-historia.shtml

To promote biodiesel in the Brazilian energy matrix, the Federal Government launched the National Program for Biodiesel Production and Use (PNPB) in December 2004, focusing on social inclusion and regional development.

The PNPB is an inter-ministerial program aimed at establishing the biodiesel production chain in Brazil. Its main directives include implementing a sustainable program that promotes social inclusion through income and employment generation; ensuring competitive prices, quality, and supply; producing biodiesel from different oilseed sources, thereby strengthening regional potential for raw material production.

The primary outcome of the first phase of the PNPB was the establishment of a legal and regulatory framework. In 2008, the mandatory minimum blend of 2% biodiesel with conventional diesel was implemented nationwide. As the Brazilian market matured, this percentage has been progressively increased and adjusted by the Government in response to production needs or agricultural inflation.


https://ubrabio.com.br/pnpb/

From the perspective of organizational infrastructure, the National Aviation Plan (PAN) represents a significant milestone for the Brazilian aviation sector. In addition to meeting legal requirements, it adheres to recommendations from the International Civil Aviation Organization (ICAO) regarding the necessity for countries to structure their civil aviation actions within strategic plans.

The PAN also highlights a set of actions, programs, policies, and regulations identified as critical to achieving the objectives of air transportation (National Aviation Plan, 2020). Prior to this, the National Civil Aviation Policy (PNAC) was approved through Decree No. 6.780 on February 18, 2009, establishing specific measures to ensure the efficiency of civil aviation operations and introducing "guidelines that empower the market to balance supply and demand, emphasizing tariff freedom in air transportation services." It is important to note that this legal document reflects the "political intentions of Brazilian society for the development of the Civil Aviation System" (ANAC, 2009).

Presidência da República
Secretaria-Geral
Subchefia para Assuntos Jurídicos

**LEI Nº 13.576, DE 26 DE DEZEMBRO DE 2017.**

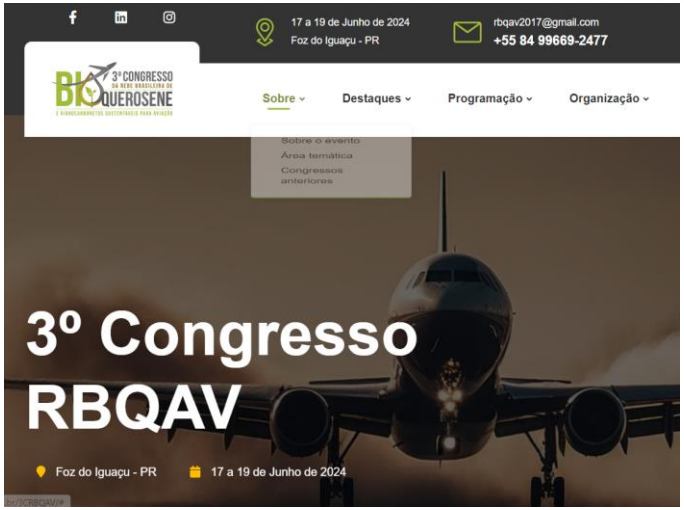
Dispõe sobre a Política Nacional de Biocombustíveis (RenovaBio) e dá outras providências.

The **RenovaBio** Program, established by Law No. 13.576/2017 and regulated by Decree No. 9.888 of June 27, 2019, sets annual mandatory targets for reducing greenhouse gas emissions from fuel sales and creates mechanisms for trading Decarbonization Credits Certification for Biofuels (CBIOs). This means that fossil fuel distributors, as defined by the National Counsel for Energy Policies (CNPE), are required to purchase CBIOs. Additionally, RenovaBio sets national targets for greenhouse gas emission reductions. Following the Decree's publication, RenovaBio established the National Biofuels Policy Committee (CRBIO), composed of representatives from various ministries. As a public policy aimed at incentivizing the biofuels sector, the expected outcome is for the RenovaBio Program to enhance Brazil's biofuels industry. Aviation bio-kerosene has been included in the Renovacalc methodology.

RenovaBio


The Ministry of Science, Technology, and Innovation (MCTI) created the Renewable Energy and Biofuels Science, Technology, and Innovation Plan (2018-2022), aiming to consolidate the Brazilian Network of Bio-kerosene and Renewable Hydrocarbons for Aviation (RBQAV). This initiative is coordinated by the Secretariat of Entrepreneurship and Innovation, with projects led by the Federal University of Rio Grande do Norte (UFRN) and supported by other universities and research institutes involved.


https://rbqav.com.br/pesquisadores



CNPE Resolution No. 7/2021, which establishes the Future Fuel Program, was published through Presidential Dispatch No. 16 on May 17, 2021. The Future Fuel Program creates a committee composed of 15 institutions empowered to propose the integration of existing policies concentrated on thematic axes. It aims to study measures for integrating various scattered programs such as Rota 2030, RenovaBio, the Biodiesel Program, the National Program for Rationalization of the Use of Petroleum Derivatives and Natural Gas (CONPET), and establish regulatory frameworks for new fuels and bioenergy with carbon capture (BECCS).

The program also mandates that the committee submit a report of its studies within 180 days. In a cautiously optimistic move, the Program also tasks the committee with studying technical conditions for large-scale production of second-generation ethanol, sustainable fuels for maritime and aviation transport. The Program constitutes a strong market signal regarding the planned decarbonization of the transportation sector.

DIÁRIO OFICIAL DA UNIÃO

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Órgão: Presidência da República

DESPACHO DO PRESIDENTE DA REPÚBLICA

MINISTÉRIO DE MINAS E ENERGIA

Exposição de Motivos

Nº 16, de 23 de abril de 2021. Resolução nº 7, de 20 de abril de 2021, do Conselho Nacional de Política Energética - CNPE. Aprovo. Em 14 de maio de 2021.

CONSELHO NACIONAL DE POLÍTICA ENERGÉTICA - CNPE

RESOLUÇÃO Nº 7, DE 20 DE ABRIL DE 2021

Institui o Programa Combustível do Futuro, cria o Comitê Técnico Combustível do Futuro e dá outras providências.

Law No. 14.248, dated November 25, 2021, establishes the National Bio-kerosene Program. This project promotes research and supports the production of biomass-based energy, aiming to sustainably fuel Brazilian aviation.

The law implements a policy to foster technological development and biofuel production, involving universities, regulatory agencies, and private enterprises. Furthermore, it seeks to integrate the national aeronautical industry into the alternative fuels market, thereby contributing to international commitments to reduce greenhouse gas emissions from the aviation sector.

The goal is to overcome challenges in the supply chain for sustainable aviation fuels in Brazil. These challenges include technical, scientific, and policy-related bottlenecks related to raw material availability, industrial processing, and integration with regionalized production chains.

The program assesses the impacts of sustainable biofuels on reducing greenhouse gas emissions in the atmosphere. Sustainable Aviation Fuels (SAFs) follow internationally approved technological routes and specifications by the American Society for Testing and Materials (ASTM) and in Brazil by the National Agency of Petroleum, Natural Gas, and Biofuels (ANP), capable of replacing fossil aviation kerosene.

DIÁRIO OFICIAL DA UNIÃO

Publicado em: 26/11/2021 | Edição: 222 | Seção: 1 | Página: 3

Órgão: Atos do Poder Legislativo

**LEI Nº 14.248, DE 25 DE NOVEMBRO DE 2021**

Estabelece o Programa Nacional do Bioquerosene para o incentivo à pesquisa e o fomento da produção de energia à base de biomassas, visando à sustentabilidade da aviação brasileira.

The National Petroleum, Natural Gas, and Biofuels Agency (ANP) revised the quality standards for fossil aviation kerosene (ANP Resolution No. 37/2009) and renewable aviation kerosene (ANP Resolutions No. 63/2014; 779/2019). On October 22, 2021, ANP approved Resolution No. 856, which specifies the requirements for JET A and JET A-1 aviation kerosene, alternative aviation kerosenes, and aviation kerosene C (JET C).

DIÁRIO OFICIAL DA UNIÃO

Publicado em: 25/10/2021 | Edição: 201 | Seção: 1 | Página: 89

Órgão: Ministério de Minas e Energia/Agência Nacional do Petróleo, Gás Natural e Biocombustíveis

RESOLUÇÃO ANP Nº 856, DE 22 DE OUTUBRO DE 2021

Estabelece as especificações do querosene de aviação JET A e JET A-1, dos querosenes de aviação alternativos e do querosene de aviação C (JET C), bem como as obrigações quanto ao controle da qualidade a serem atendidas pelos agentes econômicos que comercializam esses produtos em território nacional.

Art 4. Commercialized Aviation fuel must comply, according to type, with the respective tables and related notes in the Annex:

I- JET A and JET A-1: Table I;

II- JET C: Tables I and II;

III- JET A and JET A-1 produced from coprocessing: Tables I and III;

IV- Alternative JET SPK-FT and SPK-HEFA: Table IV;

V- Alternative JET SIP: Table V;

VI- Alternative JET SPK/A: Table VI;

VII- Alternative JET SPK-ATJ: Table VII;

VIII- Alternative JET CHJ: Table VIII; and

IX- Alternative JET SPK-HC-HEFA: Table IX.

# PNH2

# Programa Nacional do Hidrogênio

PLANO DE TRABALHO TRIENAL
2023-2025

MINISTÉRIO DE MINAS E ENERGIA
GOVERNO FEDERAL BRASIL UNIÃO E RECONSTRUÇÃO

Based on this framework, Brazil's strategy around developing the hydrogen economy finds solid foundations for effective implementation. Given the country's commitments to mitigate climate change, the available technological alternatives, and the trends in the international context, the National Hydrogen Plan (PNH2) will focus on stimulating the development of technological pathways associated with the production and use of low-carbon hydrogen.

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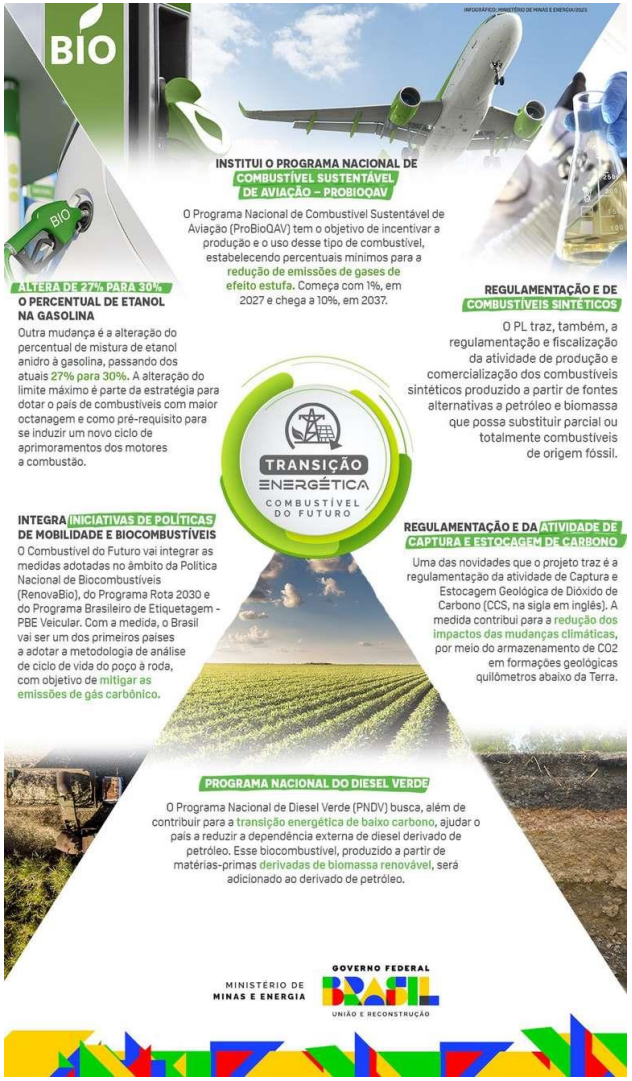
The Bill 4516/23, named as "Fuel of the Future," submitted to National Congress by the Federal Government in 2023, presents a set of measures aimed at expanding the use of sustainable and low-carbon intensity fuels in the Brazilian transportation matrix, as well as improving vehicle energy efficiency.

The text of the bill implements a decarbonization mandate for the aviation sector, going beyond traditional volumetric blending targets of biofuels with fossil fuels. This proposal aligns with successful models adopted in other countries and encourages the use of alternative means to meet emission reduction goals, including blending Sustainable Aviation Fuel (SAF) with fossil aviation kerosene. This approach provides greater flexibility, promotes innovation, efficiency, and competitiveness in the sector..

The bill establishes the National Sustainable Aviation Fuel Program (ProBioQAV), with emission reduction targets for airlines starting in 2027, achieved through the use of sustainable fuels.

Airlines will be required to reduce greenhouse gas (GHG) emissions from their domestic operations by using Sustainable Aviation Fuel (SAF), starting with a minimum of 1% between 2027 and 2028. Thereafter, this percentage will increase by 1 percentage point each year, reaching a commitment to cut emissions by 10% by 2037.



CL + Fischer-Tropsch + Upgrading + Distillation → SAF

**Chemical Looping Unit**

**Pilot Multipurpose Unit**


**Distillation Unit**

**Upgrading Unit**

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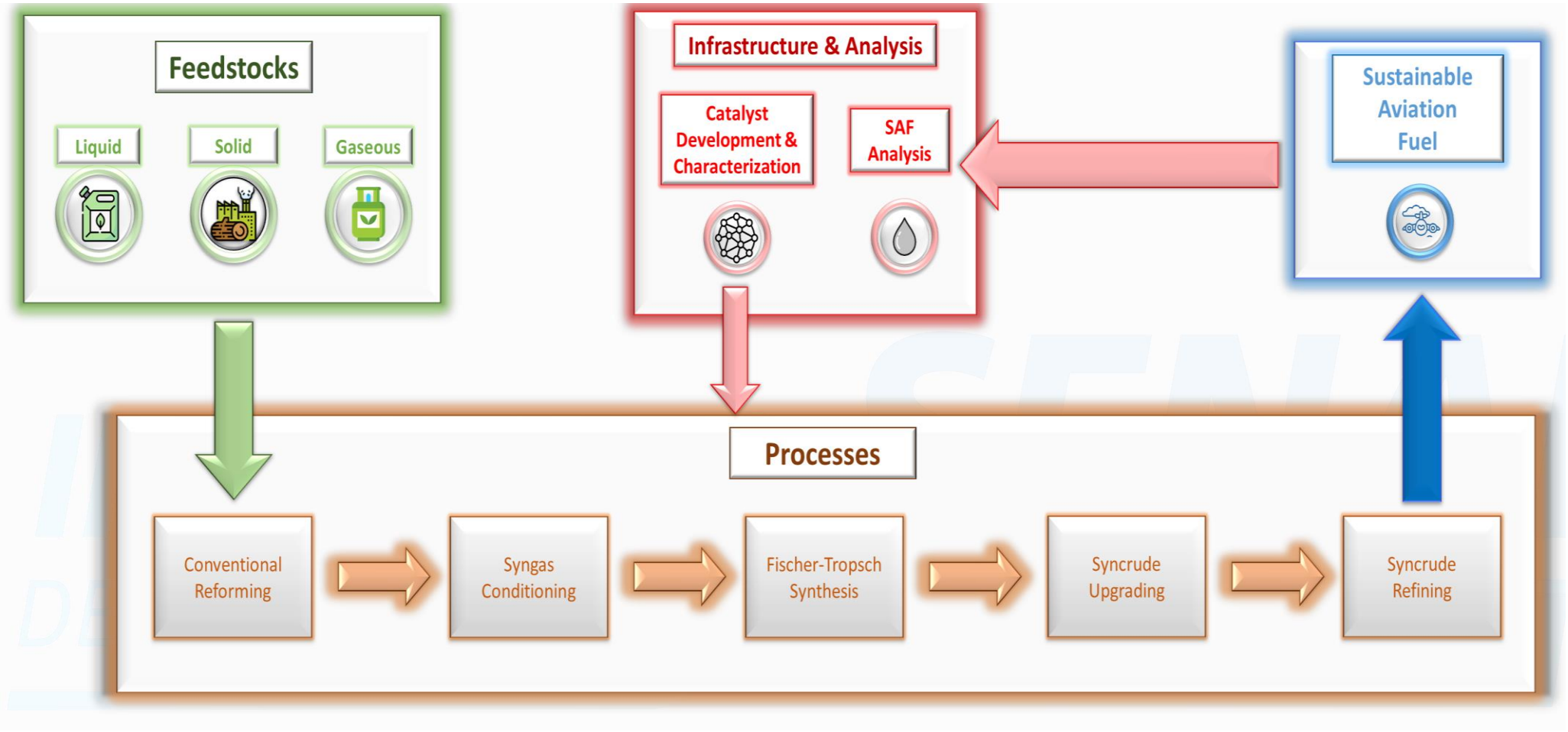


H2BRASIL
Expansão do Hidrogênio Verde
MINISTÉRIO DE MINAS E ENERGIA

# CONTACTS

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