

TECHNICAL NOTE

INVESTMENTS AND OPERATING AND MAINTENANCE COSTS IN THE BIOFUELS SECTOR: 2027 - 2036

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MINISTÉRIO DE MINAS E ENERGIA

GOVERNO DO BRASIL
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WITH THIS TECHNICAL NOTE, EPE PUBLISHES THE ASSUMPTIONS AND ESTIMATES OF INVESTMENTS (CAPEX) AND OPERATING AND MAINTENANCE COSTS (OPEX) FOR THE MAIN BIOFUELS FOR THE PERIOD 2027-2036.

THESE INCLUDE ETHANOL, BIODIESEL, BIOMETHANE, SUSTAINABLE AVIATION FUEL (SAF) AND GREEN DIESEL.

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Introduction

The purpose of this Technical Note is to present the assumptions and estimates of investments (CAPEX, capital expenditure) and operating and maintenance costs (OPEX, operational expenditure) related to biofuels for the period 2027-2036. These include ethanol (from first- and second-generation sugarcane and from corn[1]), biodiesel, biomethane, sustainable aviation fuel (SAF) and green diesel. The biofuel supply and demand figures are those of the Biofuels and Synthetic Fuels Report of the Ten-Year Energy Expansion Plan 2036 (PDE 2036) (EPE, 2026b). Monetary values are expressed in December 2025 terms, as in the PDE 2036.

1. Ethanol

National ethanol production[2] is projected to reach 53.1 billion liters in 2036, as presented in EPE (2026b). In addition to first-generation sugarcane ethanol, corn ethanol and lignocellulosic ethanol volumes will reach 21.4 billion and 0.6 billion liters, respectively, in 2036. The amount of sugarcane allocated to biofuel production is estimated at 341.3 million tons (about 47% of the total), with the remainder going to sugar production.

1.1. First-generation sugarcane ethanol

At the beginning of 2026, the nominal installed milling capacity was 826 Mtc (effective capacity of about 744 Mtc, with a capacity factor of 90% of the nominal capacity), with a nominal ethanol production capacity of 48.2 billion liters. For corn ethanol, the total processing capacity was 28.0 million tons per year and the ethanol production capacity was 13.3 billion liters[3].

In the study period (2027-2036), the reactivation[4] of two sugarcane units is expected, with an aggregate ethanol production capacity[5] of 96 million liters per year (ANP, 2026a). The expansion of ethanol production capacity in 30 existing plants[6] is also considered, totaling 1.6 billion liters per year, according to the National Agency of Petroleum, Natural Gas and Biofuels (ANP, 2026a). To assess the investments required to expand existing units (brownfield), an average investment of R$ 301.3/tc was adopted (IBGE, 2026; FGV, 2026; LNBR, 2022). Thus, investments in industrial capacity for first-generation sugarcane ethanol alone will amount to around R$ 5.9 billion.

The cost of sugarcane field formation took into account the share of each producing region (Center-South and Northeast) and their respective costs recorded in the 2025/26 harvest (PECEGE, 2026, IBGE, 2026, FGV, 2026). A ratio of 17% between planted sugarcane areas (new + renewed) and the total sugarcane area was also assumed. This resulted in an average cost of approximately R$ 40.7/tc. The investment in sugarcane field formation for ethanol was estimated at R$ 24.1 billion.

Operating costs (OPEX) were calculated with an indicator of R$ 2.41/liter, based on biomass costs (88%) and industrial costs (12%) in the Center-South region and on annual ethanol production, resulting

[1] Other cereals/grains are also used, such as sorghum, wheat and soybeans, all referred to as corn for simplicity.
[2] The mandatory blending percentage of anhydrous ethanol in gasoline C was considered to be 32% in the second half of 2026 and 30% for the rest of the period, in accordance with CNPE Resolution No. 9/2026.
[3] A capacity factor of 96% is adopted.
[4] At the time the PDE 2036 was prepared, there was one plant under reactivation, but with no stated production capacity.
[5] A 200-day harvest season is considered.
[6] Units that expand their ethanol production capacity and become flex (processing sugarcane and corn) over the ten-year horizon were accounted for under corn, both in capacity and in investments.

in a total of R$ 681.6 billion over the period (PECEGE, 2026 and EPE, 2026b). The OPEX calculation considered the sugarcane allocated to ethanol production in all units operating in each year.

1.2. Lignocellulosic ethanol

For lignocellulosic (second-generation, 2G) ethanol, five units attached to first-generation sugarcane plants were considered, with an average specific ethanol production capacity of 82,000 m³/year over the study period, which would add 410,000 m³/year in total. These projects use sugarcane bagasse as biomass. The investment estimate is based on the values of the commercial units operating in Brazil, setting a factor of R$ 15.23/liter (RAÍZEN, 2024; IBGE, 2026). Thus, investments total R$ 6.2 billion between 2027 and 2036.

The projected E2G production volume of 0.6 billion liters in 2036 is also considered (EPE, 2026b). The estimated operating cost, updated to December 2025, is R$ 2.05/liter (LNBR, 2022), resulting in an OPEX of R$ 5.8 billion.

1.3. Corn ethanol

For corn ethanol, ethanol production capacity is estimated to increase by 9.6 billion liters, considering the expansions and constructions under authorization by the ANP (twenty-eight units with a capacity of 6.2 billion liters), in addition to indicative capacity increases, either through new units or other expansions (seven projects estimated at 3.4 billion liters in total), most of them full-type plants (ANP, 2026a). Thus, the total increase, added to the installed capacity already in operation, will sustain a production of 21.4 billion liters in 2036.

The capex for building a flex plant is R$ 1.40/liter and for a full plant, R$ 2.74/liter (LNBR, 2022; IBGE, 2026; FGV, 2026). OPEX was considered only for the latter type of unit and amounts to R$ 2.14/liter (IBGE, 2026; FGV, 2026; NOVACANA, 2026). For flex units, this expense is assumed to be allocated to the sugarcane ethanol production unit.

Thus, between 2027 and 2036, the estimated investment in the construction of corn ethanol plants is around R$ 25.3 billion, and operating costs total R$ 398.2 billion.

1.4. Summary of ethanol investments

Table 1 summarizes ethanol investments from 2027 to 2036 for brownfield and greenfield units.

Table 1 - Estimates of additional production capacity, CAPEX and OPEX for ethanol

ETHANOL	*Added production capacity (million liters)*	*CAPEX (R$ billion)*	*OPEX (R$ billion)*
1G sugarcane ethanol	1,643.8	5.9	68.8
Sugarcane field formation	n/a	24.1	612.8
2G sugarcane ethanol	410.0	6.2	5.8
Corn ethanol	9,597.6	25.3	398.2
TOTAL	**11,651.4**	**61.6**	**1,085.6**

Source: EPE based on IBGE (2026), FGV (2026), LNBR (2022), NOVACANA (2026), RAÍZEN (2024)

Chart 1 presents the share and values of industrial and sugarcane field formation CAPEX for ethanol between 2027 and 2036.

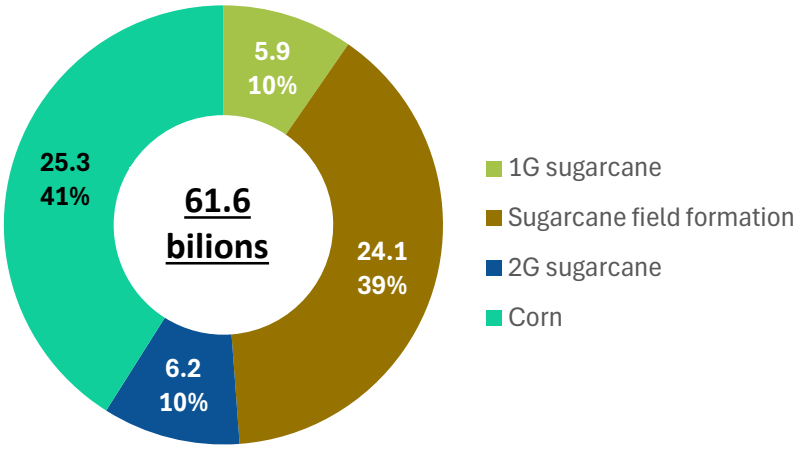


Chart 1 - Ethanol CAPEX between 2027 and 2036 (R$ billion and %)
Source: EPE based on IBGE (2026), FGV (2026), LNBR (2022), NOVACANA (2026) and RAÍZEN (2024)

If investments related to sugar production were included, the value for 1G sugarcane would reach R$ 11.4 billion for the industrial part and R$ 48.8 billion for sugarcane field formation, while operating costs would reach R$ 1.4 trillion by the end of the period.

2. Biodiesel

Biodiesel consumption is determined by the mandatory percentage to be added to the projected demand for type B diesel, which reaches 84.4 billion liters in 2036 (EPE, 2026b). Furthermore, the use of biodiesel in waterborne transport is becoming increasingly common, serving as an alternative for the decarbonization of this transport segment.

The mandatory biodiesel content in B diesel has been 15% since August 1st, 2025, according to CNPE Resolution No. 8/2025 (CNPE, 2025). Under the Future Fuel Law, the CNPE (National Energy Policy Council) may change the biodiesel blending percentage between 13% and 25% at any time, for justified reasons of public interest (BRASIL, 2024). The PDE 2036 projections consider a 15% blend throughout the study horizon, in accordance with CNPE Resolution No. 8/2025.

Regarding waterborne use, some companies already have pilot projects that add up to 30% biodiesel to marine diesel oil, while others already operate their vessels with pure biodiesel (B100). In addition, Petrobras already markets VLS B24, a product containing 24% biodiesel blended with fossil fuel (EPE, 2026a). In addition, potential biodiesel consumption for B100 power generation is estimated. Hence, the voluntary biodiesel consumption for these applications could reach up to 2.0 billion liters in 2036 (EPE, 2026b).

In 2026, CNPE issued complementary rules requiring producers holding the Social Biofuel Seal to supply at least 80% of the mandatory biodiesel blend and determining that biodiesel sold in Brazil be produced exclusively by units authorized by the ANP (CNPE Resolution No. 5/2026; CNPE, 2026). At the same time, ANP began revising its regulations (especially ANP Resolution No. 910/2022; ANP, 2022) to expand voluntary uses of biodiesel at contents above the mandatory blend, in line with the Future Fuel Law.

In the current study cycle, 2027-2036, investments were calculated based on ANP data on the expansion and construction of new biodiesel units (ANP, 2026a). According to the information available

in July 2026, the three expansion requests total 527 million liters and the construction of nine new units adds up to 1.43 billion liters.

On this total (1.96 billion liters), an average CAPEX of R$ 0.71/liter/year was applied to new units and R$ 0.55/liter/year to expansions (BIODIESELBR, 2025; IBGE, 2026; FGV, 2026), representing investments of R$ 1.3 billion (2027-2036).

With a utilization factor (UF) of 92%, due to planned shutdowns and adverse events, the effective biodiesel production capacity is about 18.9 billion liters by the end of the period[7] (EPE, 2026b).

Considering that soybeans will remain the main feedstock for biodiesel production, with an average share of about 70% in the historical series, the projected investment in soybean processing capacity is based on the implementation of 10 new units by 2036, each with a capacity of 4,000 t/day, equivalent to a total of 14.6 million tons per year, at an estimated cost of R$ 8.6 billion (ABIOVE, 2026).

For the analysis of the additional grain crushing required, the complementary demand for soybean oil for the production of diesel-cycle biofuels was considered, which includes: the mandatory percentage of ester biodiesel, its additional waterborne use, green diesel, co-processed diesel and SAF (HEFA route[8]) (EPE, 2026b), in addition to the soybean crushing capacity of 76.4 million tons per year in December 2025 (ABIOVE, 2026). The investments needed to process other types of oilseeds were not considered, although public policies for greater feedstock diversification are underway, valuing regional biomasses[9].

The OPEX for biodiesel production was estimated based on the average sales prices of volumes traded between producers and distributors in 2025 (ANP, 2026b) and on information from industry experts (UBRABIO, 2019; FGV, 2026), resulting in a factor of R$ 0.95/liter. Operating costs between 2027 and 2036 are estimated at R$ 121 billion. Biodiesel production units have an intermittent profile throughout the year and, since January 2022, the sector has had a commercialization system based on free negotiation between producers and distributors (CNPE, 2020). Therefore, this cost indicator is expected to have a wide range.

[7] This would represent an idle capacity of 22% when biodiesel for waterborne use is also considered.

[8] Synthesized paraffinic kerosene from hydroprocessed esters and fatty acids.

[9] Fatty materials (a mixture that arrives at the plants without specific characterization) and beef tallow account for 15% and 7%, respectively, of the feedstocks used in biodiesel production (still significantly below soybean oil).

Box | Sensitivity analysis for biodiesel

This item seeks to verify the need for additional investments in installed capacity for biodiesel production and vegetable oil extraction, considering the Future Fuel Law, which proposes a gradual increase in the biodiesel blending percentage in B diesel, compared with the estimate for the PDE 2036 reference scenario (B15).

Seeking possible alternatives for the national supply of diesel-cycle fuels, the PDE 2036 (EPE, 2026b) conducts two sensitivity analyses: one in which the biodiesel percentage in B diesel reaches a 20% blend (B20) in 2031, remaining at that level until 2036 (T3), and another increasing by 1% per year until reaching 25% (B25) in 2036 (T4). This results in a biofuel demand of 16.9 billion liters and 21.1 billion liters, respectively, at the end of the study horizon.

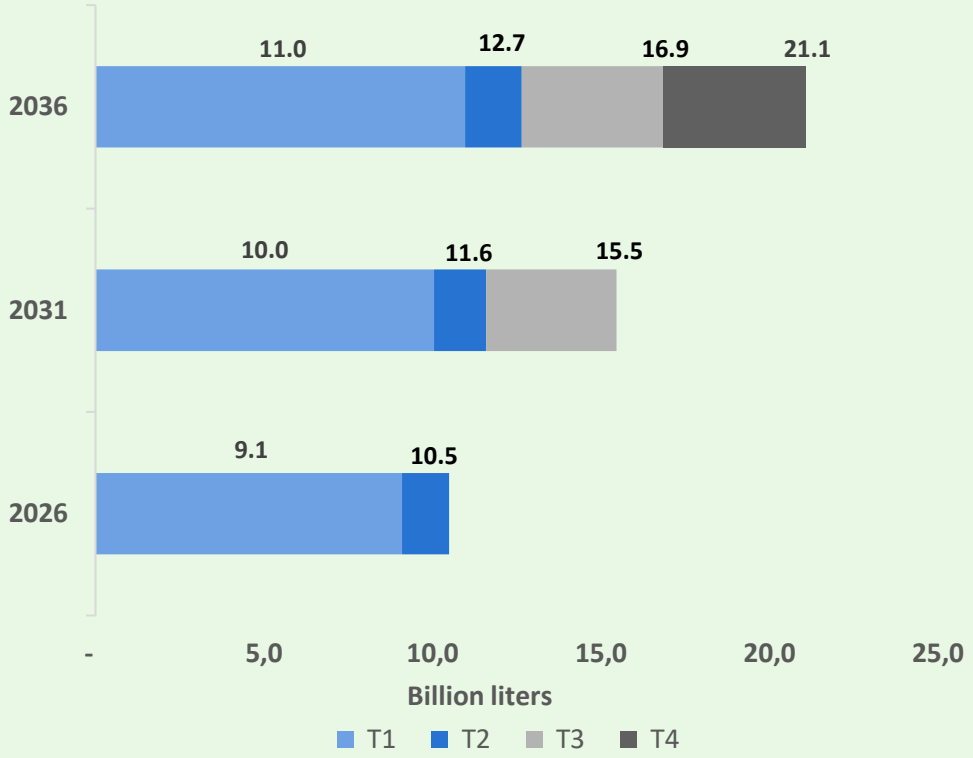


Chart 2 - Trajectories for biodiesel demand

Note: Trajectories T1: blending percentage remains at 13% throughout the period; T2: blending percentage remains at 15% throughout the period; T3: blending percentage starting at 15% and increasing by 1% per year until reaching 20% in 2031, remaining at that level until 2036; T4: blending percentage starting at 15% and increasing by 1% per year until reaching 25% in 2036.

Source: EPE

In addition to the higher blending percentage, biodiesel demand for waterborne transport (domestic and international navigation) and B100 power generation could reach 2.0 billion liters in 2036, which would lead to a total demand of 19 billion liters and 23.0 billion liters, respectively, in each scenario in that same year.

In turn, effective production capacity could reach 18.9 billion liters in 2036, according to the requests for expansion and construction authorization submitted to the ANP as of July 2026. Thus, under the given infrastructure and projected demand conditions, the country would have capacity to meet the mandatory demand and the demand for navigation and B100 power generation in scenario T3 (B20), and would present a nominal production capacity deficit of 4.5 billion liters in the B25 sensitivity, as well as an additional need of between 19 and 29 million tons of soybean crushing capacity, compared with the reference scenario.

The B25 scenario would require additional investments in biodiesel production capacity of R$ 3.2 billion. In the B20 scenario, the investment in production capacity would be the same as in the B15 scenario (R$ 1.3 billion). Regarding processing capacity, the B20 and B25 scenarios would require additional investments of R$ 11.2 billion and R$ 17.2 billion, respectively, distributed between 2029 and 2036.

3. Biomethane

Between July 2025 and July 2026, the implementation of the biomethane regulatory framework advanced, with the publication of Decree No. 12,614/2025 (BRASIL, 2025), which regulated the National Program for the Decarbonization of Natural Gas Producers and Importers and Incentive to Biomethane (PNGB), and of ANP Resolutions No. 995 (ANP, 2026c) and No. 996 (ANP, 2026d), which established, respectively, the allocation of the annual mandatory targets and the procedures for certifying and issuing Biomethane Guarantee of Origin Certificates (CGOB). Over the period, regulatory advances associated with the program were also observed, including measures aimed at expanding the supply of Federal Government gas, the integrated planning of natural gas and biomethane infrastructure and the integration of low-carbon solutions such as biogas and biomethane, which may contribute positively to the development of this market[10].

Therefore, the convergence of the Future Fuel and Gas for Employment programs is evident, with biomethane becoming a fundamental element in expanding the supply of gas in the grid while reducing its carbon footprint. The use of biomethane as fuel in the transport sector, especially in heavy vehicles, has synergies with the objectives of RenovaBio. With 8 certified producers as of July 2026, biomethane was the biofuel with the highest energy-environmental efficiency rating (EPE, 2026b).

Biomethane production has increased significantly in recent years. The number of biomethane plants authorized by the ANP to operate increased by 75%, from 12 units in July 2025 to 21 in June 2026. Considering the requests for construction and expansion of biomethane plants registered with the ANP (2026a), projects have accelerated in recent years. In 2025, 36 new projects were registered, while one plant was seeking expansion. In July 2026, 48 projects were under authorization, of which 46 were new plants and two were expansions of existing units, showing the dynamism of the market and the prospects for expanding the biomethane supply in the coming years. This reflects the growing interest of the sugar-energy and municipal solid waste (MSW) sectors[11], as well as the regulatory incentives recently introduced to develop the biomethane production chain. Of this total, 28 units are expected between 2027 and 2036, 3 of which come from the sugar-energy sector, two located in the Northeast region and the other in the Southeast region.

Based on the information in the applications for inclusion in the REIDI program, specific investment factors were obtained for each plant: R$ 3,323.9 per Nm^3/day (R$ 9.11 per Nm^3/year) for plants under construction, which was applied to projects without information, and R$ 3,657.5 per Nm^3/day (R$ 10 per Nm^3/year) for the plant under expansion. The 28 projects add up to a production capacity of 910,400 Nm^3/day, or 332.3 million Nm^3/year, and a CAPEX of R$ 3.0 billion (ANP, 2026a; BNDES, 2020a; MME, 2022). OPEX over the entire horizon is estimated at R$ 1.1 billion.

[10] In addition, the Gas for Employment Program (MME, 2023), promoted by the Federal Government to make better use of the natural gas produced in Brazil, may also have a positive impact on biomethane.

[11] In recent years, a growing number of municipal plans for urban solid waste and sanitation have been structured, and the National Solid Waste Plan was launched (MMA, 2022). This document already highlights the potential for linking waste and biomethane production.

However, the capacity currently identified is insufficient to meet the volumetric demand in a scenario in which the maximum emission reduction target under the Future Fuel Law is met. Considering the PDE 2036 natural gas demand projections and assuming an emission reduction target of 10% in 2036, the volume of biomethane needed to back compliance with the regulatory obligations, either through its direct use in the natural gas market in the energy sector or through the issuance and retirement of CGOBs, is estimated at 8.5 million Nm³/day. Considering the capacity factors adopted in this study, this volume would require a nominal installed capacity of 11.53 million Nm³/day in 2036.

Thus, applying the same investment factors used above and considering the share of each substrate among the biomethane plants registered with the ANP in July 2026, the implementation of the additional capacity of 8.44 million Nm³/day, or 3.1 billion Nm³/year, required to deliver this biomethane supply would demand investments of around R$ 28.1 billion.

Operating and maintenance costs were calculated based on data provided by BNDES (2020a; 2020b) for the profile of a biogas production plant of 33 million Nm³/year and 18.2 million Nm³/year of biomethane. Considering sector production sufficient to meet the maximum regulatory demand in biomethane volume, the accumulated expenditure (OPEX) between 2027 and 2036 is around R$ 2.5 billion for biomethane, considering the maximum target, based on a factor of R$ 0.153/Nm³.

4. Sustainable aviation fuel and green diesel

Considering that sustainable aviation fuel (SAF) and green diesel are co-produced in the plants identified in this study, the investments in these fuels were not separated and are presented in aggregate form in item 4.1.

4.1. Sustainable aviation fuel

The Future Fuel Law also seeks to promote the expansion of domestic SAF production through the National Sustainable Aviation Fuel Program (ProBioQAV), regulated by Decree No. 13,094/2026 (BRASIL, 2026a), which sets gradual emission reduction targets up to 2037.

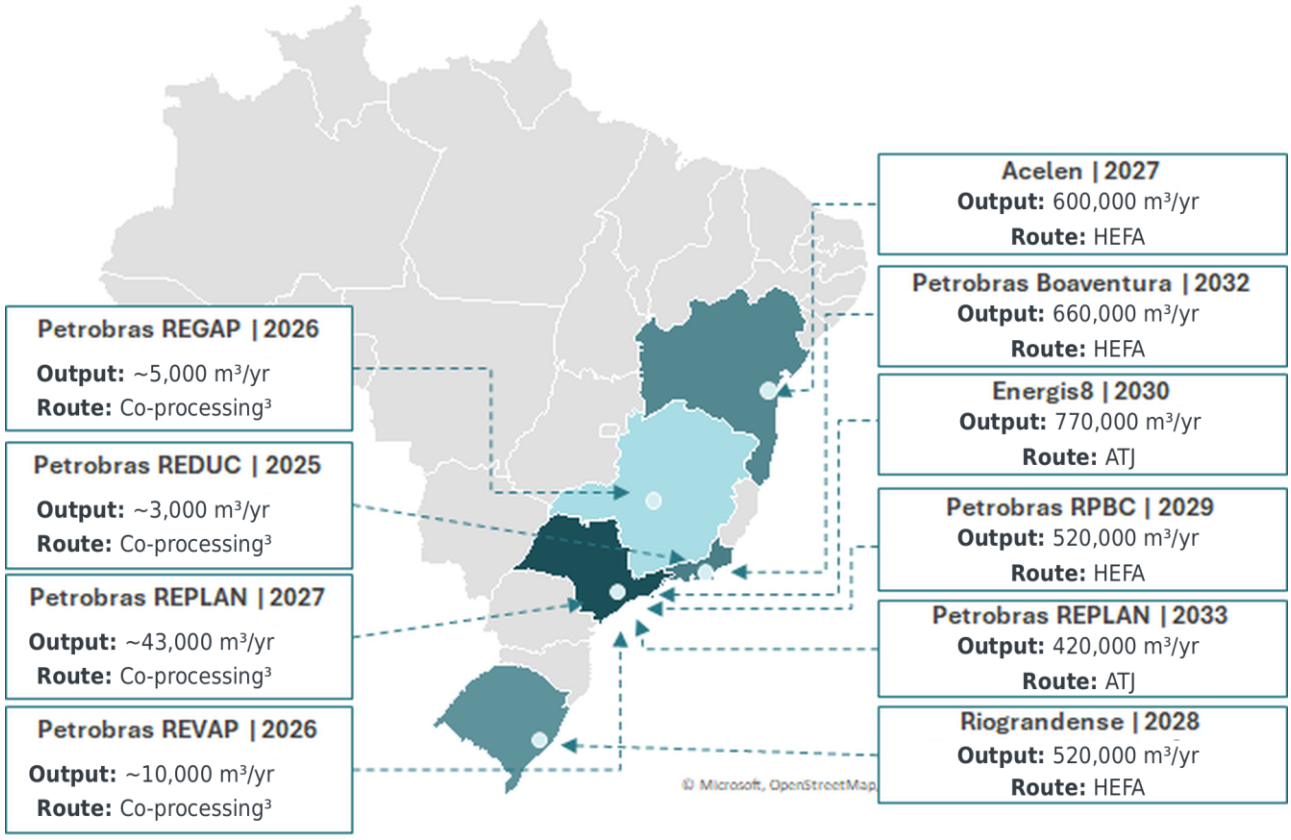
Internationally, the International Civil Aviation Organization (ICAO) has set the goals of carbon-neutral growth from 2020 and net zero by 2050; in parallel, CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation) was established, a mechanism that also encourages the reduction and offsetting of CO2 emissions from international flights.

SAF production in Brazil is concentrated mainly on the HEFA and Alcohol-to-Jet (ATJ) routes, see Figure 1. On the HEFA route, the highlights are the Petrobras projects in Cubatão (SP) and Itaboraí (RJ) (PETROBRAS, 2026b), the conversion of the Riograndense Oil Refinery (RS) into a biorefinery and the Acelen project in Bahia, with the first commercial operations expected from 2027 and potential use of feedstocks such as soybean oil, beef tallow, technical corn oil and used cooking oil (UCO). On the ATJ route, projects have been announced by Petrobras (REPLAN) and Energis8, with start-up expected mostly after 2030.

In its most recent Business Plan (2026-2030), Petrobras reported that co-processed jet fuel will be produced at REVAP, REDUC, REGAP and REPLAN, with a maximum renewable content of 1% at the first three and 5% at the last[12] (PETROBRAS, 2026b).

The total production capacity of these projects is 5.5 billion liters/year, with 75% for SAF and 25% for green diesel in all plants, except at Replan and Energis8, where the SAF share reaches 90%. Estimated investments will be around R$ 39.0 billion, aggregating the HEFA and ATJ routes, as it is not possible to separate the estimated CAPEX of the announced projects by route. Based on the operating assumptions adopted for these projects, the domestic SAF supply is estimated to reach 3.6 billion liters from 2034 onwards.

Due to insufficient information, the operating costs of producting these biofuels could not be estimated.



Notes: 1 - Projects announced by companies up to June 2026 were considered; 2 - The nominal capacity of the projects was weighted by a utilization factor and an operating mode that maximizes SAF production; 3 - For projects using the co-processing route, only the renewable share of the fuel was considered.

Figure 1 - Sustainable aviation fuel (SAF) projects
Source: EPE adapted from Acelen (2026) and Petrobras (2026a; 2026b).

Consistent with this positive outlook, the 2024 BNDES/FINEP public call revealed the significant market interest in SAF production in Brazil, attracting projects across a wide range of scales, from pilot plants to large commercial facilities.

[12] Petrobras also plans to market co-processed diesel, totaling a production capacity of 60,000 m³/year (renewable share), from the REPLAN, REDUC, REVAP and REGAP units.

4.2. Green diesel

Green diesel, a drop-in renewable fuel, can be produced from different feedstocks (such as soybean, palm and macauba oils) and routes. The Future Fuel Law also includes a specific program to stimulate its supply, the National Green Diesel Program (PNDV), which may set a minimum mandatory share of up to 3%[13] to be added to fossil diesel, as determined by the CNPE.

The announced projects identified in subitem 4.1 have an estimated co-production of 850 million liters of green diesel in 2036. Until the PNDV is regulated, this production may be exported, which is the trajectory considered in the PDE 2036.

5. Innovations and future perspectives

Among the solutions that may be implemented under the Future Fuel Law, RenovaBio and other decarbonization initiatives, bio-CCS or BECCS (Bioenergy with Carbon Capture and Storage) stands out, a technology for the capture and geological storage of CO_2 from biomass. Because it enables negative emissions, BECCS is considered a relevant strategy for mitigating climate change and for strengthening Brazil's position in low-carbon value chains[14]. In Brazil, its technical attractiveness is favored by the availability of concentrated streams of biogenic CO_2, such as those from ethanol fermentation.

In this context, low-CO2-emission hydrogen[15] produced from biomass (biohydrogen) is also gaining relevance, as it can reduce the carbon intensity of bioenergy products by replacing fossil hydrogen in hydrogenation processes, such as in the production of SAF and green diesel via the HEFA route.

Synthetic fuels are also emerging as a promising alternative for hard-to-abate sectors, benefiting from Brazil's wide availability of biomass and renewable generation potential. E-methanol and e-ammonia are expected to become part of the national fuel mix by the end of the ten-year horizon, while the use of biogenic CO_2 in the production of these fuels expands the opportunities for integration between biofuels and this new segment.

Further information on technological maturity, infrastructure, costs, regulation and target markets can be found in the report Biogenic CO_2 in Bioenergy (EPE, 2025b) and in the Technical Note H_2 from Biomass (EPE, 2025a).

[13] Voluntary addition above 3% is also allowed, provided it is reported to the ANP.

[14] Decree No. 13,095/2026 set out the guidelines for the authorization, performance and termination of CCS activities by the ANP and established the mandatory biennial planning of CCS infrastructure (BRASIL, 2026b).

[15] Decree No. 13,096/2026 regulated Law No. 14,948 of August 2, 2024, which establishes the legal framework for low-carbon hydrogen, provides for the National Low-Carbon Hydrogen Policy, establishes incentives for the low-carbon hydrogen industry and creates the Special Incentive Regime for Low-Carbon Hydrogen Production (Rehidro), and Law No. 14,990 of September 27, 2024, which establishes the Low-Carbon Hydrogen Development Program (PHBC) (BRASIL, 2026c).

6. Consolidation of CAPEX and OPEX estimates

The Future Fuel Law, together with ANP and CNPE resolutions, is already impacting biofuel production in Brazil, encouraging domestic production and the increased use of biofuels to support the country's decarbonization. As a result, investments in the sector are expected to increase further in the coming years.

Thus, based on the study cycle for the 2036 horizon (EPE, 2026b), investments (CAPEX) and operating costs (OPEX) for ethanol, biodiesel, biomethane, SAF, green diesel and vegetable oil co-processing are estimated at approximately R$ 142 billion and R$ 1,209 billion, respectively.

Table 2 - CAPEX and OPEX estimates for biofuels between 2027 and 2036

	CAPEX (R$ billion)	OPEX (R$ billion)
Ethanol	61.6	1,085.6
Biodiesel[1]	9.9	121.0
Biomethane[2]	31.1	2.5
SAF / Green Diesel	39.0	n/e
TOTAL	**141.6**	**1,209.1**

Notes: 1 - CAPEX includes soybean crushing, and OPEX includes only biodiesel production; 2 - Projects under construction in the sugar-energy, agro-silvo-pastoral and commercial sectors and MSW landfill projects are considered, as well as indicative projects (see item 3).
Source: EPE

It should be noted that the OPEX values correspond to the sum, over the ten-year horizon, of the current operating and maintenance costs of the production units. Most of this refers to the purchase of feedstock, such as sugarcane, corn and soybean oil. Therefore, these values do not represent additional investments and should not be added to CAPEX.

Chart 3 presents the share and values of industrial CAPEX for biofuels, including sugarcane field formation for ethanol production, between 2027 and 2036.

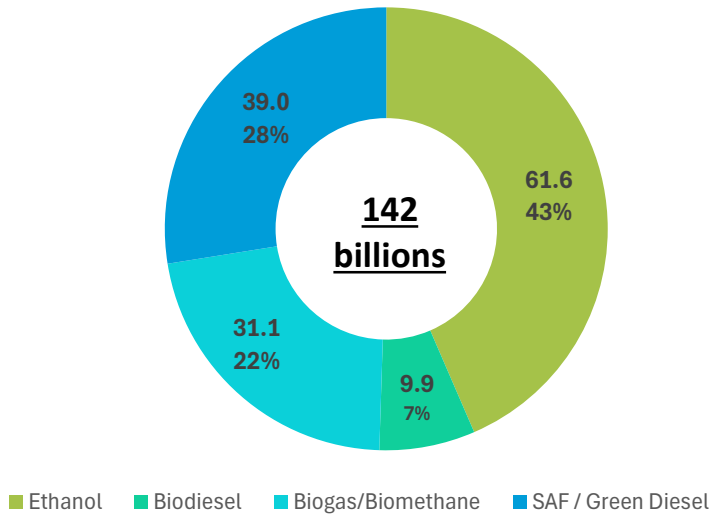


Chart 3 - Biofuels CAPEX between 2027 and 2036 (R$ billion and %)
Source: EPE

Considering the investments related to sugar production (1G sugarcane), total biofuel CAPEX reaches R$ 172 billion. OPEX Accumulated over the period amounts to R$ 1,905 billion.

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