WORLD BIOGAS ASSOCIATION

Market Report

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In association with:

ABiogás CIBIOGAS ENERGIAS RENOVÁVEIS

Introduction

Brazil is an important global player in renewable energy, leveraging vast natural resources and innovative policies to lead in bioenergy production, particularly bioelectricity, biofuels (such as bioethanol and biodiesel) and more recently, biogas and biomethane.

Shortly after being elected in 2023, President Lula da Silva pledged to develop pathways and partnerships aimed at protecting the environment and transforming Brazil into a 'Green Superpower'.

The utilisation of biogas aligns with Brazil's renewed commitments under the Paris Agreement to reduce GHG emissions by 59-67% by 2035 compared to 2005 levels and its G20/COP30 initiative to develop a Global Bioeconomy.

While fossil fuels still supply around half of Brazil's energy, the demand for low-carbon alternatives is increasing. With abundant feedstock availability, biogas[1] is central to the realisation of Brazil's renewable energy strategy aimed at reducing emissions in many of its vital value chains, including but not limited to heavy transport, heavy industry, such as steel and glass production, and the food and agroindustry. It is set to contribute to energy diversification and security, helps manage organic waste and improves soil health and quality.[2]

Brazil is well-equipped to further integrate biogas and biomethane into its energy mix. It possesses a developed energy sector, including an extensive electricity network, expanding natural gas infrastructure, and a comprehensive logistics network.

The environmental benefits, such as significant greenhouse gas emission reductions and sustainable waste management, along with socio-economic advantages like enhanced food security, energy security, job creation and rural development, further strengthen the case.

Supported by progressive government policies, incentives for renewable energy, and ongoing technological advancements, these factors create an ideal environment for establishing a reliable and sustainable biogas industry in Brazil.

Current Scenario

The latest available data shows that the Brazilian biogas market has an installed capacity of **8,876 GWh, predominantly used to generate electricity and biomethane**.[3] Biomethane production for grid injection or use as vehicle fuel is growing exponentially. There are **1,365** biogas plants of different sizes in the country, which grew by a significant 32% in 2023 compared to 2022. Production capacity has reached **4,15 billion cubic meters of biogas** annually.[4]

The market has experienced a compound annual growth rate of 21% over the past five years. Despite this growth, biogas still accounts for less than 5% of its long-term potential and 38% of its short-term potential, indicating significant room for expansion.[5,6]

Production is concentrated in the states of **Paraná, Minas Gerais, São Paulo, Santa Catarina and Goiás**, which are known for their high agroindustrial outputs from sectors such as the animal protein and sugar cane value chains. However, biogas production is expanding nationwide as the environmental and market benefits become increasingly compelling.

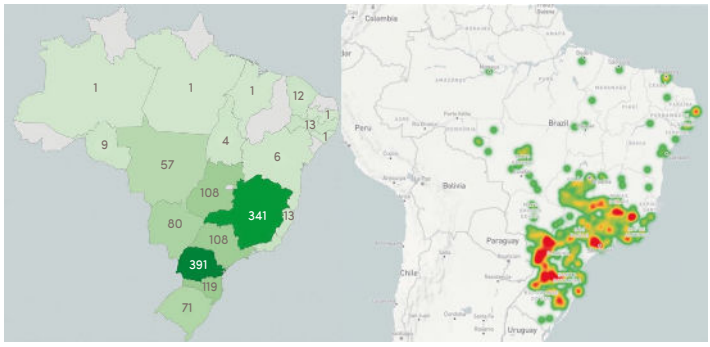

Figure 1: Biogas production across states and number of plants. Source: CIBiogás, 2024.

Thermal Energy and Electricity

Biogas is primarily used to generate electricity from landfills, wastewater treatment plants (WWTPs) and farms in Brazil. Some projects feed this electricity into the grid under Brazil's distributed energy rules, attracting revenues or reducing input costs. Others operate off-grid, using the electricity on-site (in island mode) to reduce input costs and reliance on the main power network.

Biogas is also used as a substitute for wood in industrial boilers and to generate heat, particularly in agricultural industries that are distant from the natural gas network.

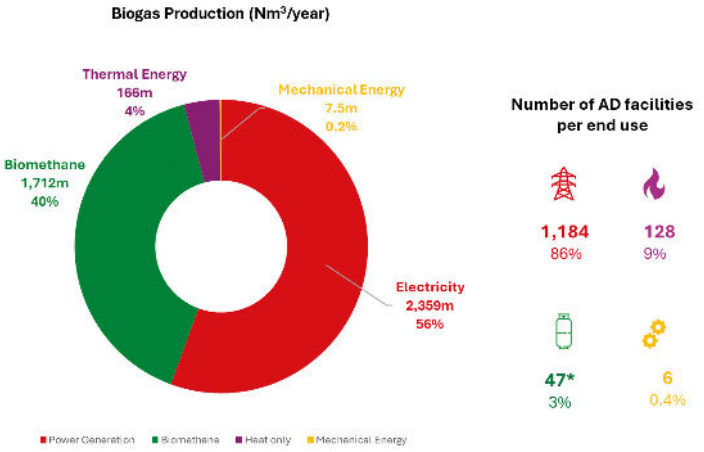

Figure 2: Total AD plants and biogas production capacity per end use in 2023. (*Biomethane: 23 non-commercial, 21 awaiting authorisation, 6 authorised by the sector regulator, ANP). Source: CIBiogás, 2024.

Biomethane

Currently, Brazil has 23 biomethane plants either operating in island mode (on site) or as R&D projects and 11 large-scale biomethane plants authorised by the sector regulator, the National Agency for Petroleum, Natural Gas and Biofuels (ANP), to proceed with operations and biomethane trade. However, that number is expected to more than double by the end of 2025.

According to the latest industry survey from the Brazilian Biogas Association (ABiogás), a further 30 biomethane plants are under development and expected to be commissioned before the end of the year. The survey also forecasts that 133 new plants are planned to be completed by 2032.[7,8]

In addition, 33 biomethane plants are awaiting authorisation to become operational between 2025 and 2032.

As a result, Brazil could potentially have 97 biomethane plants operational by the end of 2025 and 200 by 2032. This indicates an average of 13 new biomethane plants each year, resulting in a total growth rate of 106%. The most significant growth is expected to occur from 2025 to 2026, with an increase of 33%.[9]

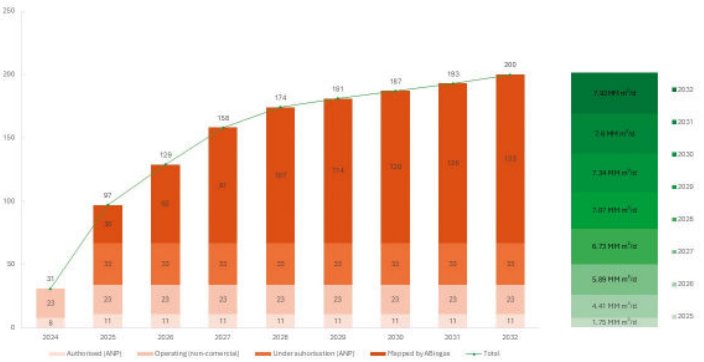

Figure 3: Estimated growth of biomethane up to 2032. Source: ABiogás, 2025

Biomethane production is projected to reach 2.1 million cubic meters per day (Nm^3/day) by 2027, the equivalent of 95% of Brazil's current residential and commercial natural gas demand, or 12% of its imports. According to the Ministry of Mines and Energy's (MME) Monthly Natural Gas Industry Monitoring Bulletin, Brazil imports approximately 16.9 million Nm^3/day of natural gas.[10,11]

Although this percentage may seem modest, biomethane plays a crucial role in diversifying the energy matrix and promoting domestic renewable energy sources, in support of Brazil's international commitments and ambitions to reduce the carbon footprint of its food chain and to become a global supplier of novel fuels such as green hydrogen and SAF.

Biogas Production Technologies in Brazil

Brazil employs a range of technologies for biogas and biomethane production, including:

- **Continuous stirred-tank reactor (CSTR):** This type of reactor is used for some industrial wastewater treatment and food waste recycling, which contains higher solid rates, such as municipal solid waste or vinasse and filter cake coprocessing.
- **Covered lagoons:** Common in small to large-scale livestock farms, food processing plants and sugar cane mills, providing a cost-effective solution for managing manure and wastewater management.
- **Upflow anaerobic sludge blanket (UASB):** Commonly used to treat sewage and beverages industrial wastewater.
- **Wells and a blower/flare (or vacuum) system:** Biogas is extracted from landfills using this system to direct the collected gas to a central point, where it can be processed and treated depending upon the ultimate use for the gas – power, heat or transport fuel.
- **Upgrading technologies:** Where biogas is upgraded to biomethane, a study conducted in 2024 by the IEA Task 37 Energy from Biogas group found that a variety of different technologies were in use, including membrane, PSA, chemical scrubber, water scrubber, organic scrubber and combined/other.[12]

Brazilian Biogas Potential

Brazil is the largest economy and most populated country in Latin America. It has significant potential for biogas production, bolstered by its extensive landmass, robust agro-industrial sector and vast urban population, which contribute to the generation of organic waste and sewage.

According to McKinsey & Company, Brazil's biomethane market value could reach US$15 billion by 2040, leveraging organic waste and by-products from five main industries: sugarcane, cattle ranching, dairy farming, pork raising, as well as urban waste and sewage.[13]

With planned strategic development, Brazil's biogas sector has an opportunity to capitalise on low-hanging fruit readily available feedstock that require minimal additional investment to be harnessed efficiently. According to an assessment by Instituto 17, the short-term biogas potential in Brazil is estimated at 10.8 billion Nm^3/year.[14] Compared to the current scenario of 4.15 billion Nm^3/year, the headroom for growth is 160%, indicating that 6.65 billion Nm^3/year could be unlocked in the near term.

ABiogás has undertaken a comprehensive assessment of the long-term potential for biogas and biomethane production in Brazil. Overall, it concluded that the country can **produce up to 84.6 billion Nm^3/year** of biogas and **43.8 billion Nm^3/year** of biomethane, derived from the waste of key sectors: sugar-bioenergy (48.9%), animal protein (29.8%), agriculture (15.3%), and sanitation (6%).[15]

However, biomethane can have a profound and immediate impact in the short term. From utilising readily available waste, Brazil is projected to produce 34.9 million Nm^3/day within the next five years, or **12.7 billion Nm^3/year by 2030**, which is equivalent to 36% of the RepowerEU target of 35 bcm by 2030.[16]

While reaching the long-term potential will depend on infrastructure expansion and integration - including gas grid networks, power grids and gas stations - alongside policy incentives and technological advancements, direct gains can be achieved by optimising existing resources.

States with the most significant biogas potential include:

- São Paulo: 25 bcm annually
- Minas Gerais: 9 bcm annually
- Goiás: around 8 bcm annually
- Mato Grosso: around 7 bcm annually
- Mato Grosso do Sul: up to 6 bcm annually

São Paulo has three to four times more biogas potential than other states, reflecting its central position in the country's sugar cane industry. As the leading producer of sugar and ethanol, the state boasts numerous mills situated near transportation and distribution pipelines, enhancing the efficency of biogas production.

Minas Gerais, Goiás, Mato Grosso and Mato Grosso do Sul also have significant biogas potential, driven by their extensive farming industries and agro-industrial waste feedstocks. These projections suggest that with appropriate investments and policies, the country could increase its current output by tenfold and emerge as a global leader in biogas energy.

On the demand side, biogas potential is also growing. Several major gas distribution companies in Brazil, including Bahiagás (BA), Comgás (SP), Compagás (PR), Gasmig (MG), MSGás (MS), Necta (SP) and SCGás (SC), have issued procurement tenders in recent years to gauge available volumes of biomethane and interest from producers.[17]

This demand-side interest has been accelerated by Brazil's 2024 blending mandate (see Drivers section for more details), which requires producers and importers of natural gas to blend a minimum of 1% biomethane into their supply. In response, Petrobras, one of the major players, plan to buy 700 Nm^3/day starting in 2026. As part of this effort, Petrobras will also buy certificates of origin (CGOB) from companies that replace fossil gas with biomethane.

Feedstock Potential

Agriculture

Brazil has a significant advantage in biogas production thanks to its robust agricultural and livestock production. The Brazilian agricultural sector generates a substantial amount of organic waste that can be harnessed to produce biogas and biofertiliser. Manure, crop residues and agroindustrial waste are abundant sources of raw material for biogas production.

Brazil is considered to be one of the six primary breadbaskets of the world, alongside the United States, China, India, Ukraine and Russia. According to a survey by the BTG Pactual bank, Brazil is currently the world's largest exporter of soybeans (56% of total exports), corn (31%),

coffee (27%), sugar (44%), orange juice (76%), beef (24%) and chicken meat (33%). Brazil also ranks second in sales of ethanol and cotton.

Furthermore, Brazil is the world's leading producer and processor of sugar cane. According to the 2024 Brazilian Energy Balance Report, sugar cane production reached 712.7 million tons in 2023, marking an approximate 20% increase from the previous year. Sugar production grew by 26.1% (45.8 million tons), while ethanol production rose by 11.3%, totalling 31.2 million m^3.[18]

The organic waste left over from these processes is transformed into biogas through anaerobic digestion.

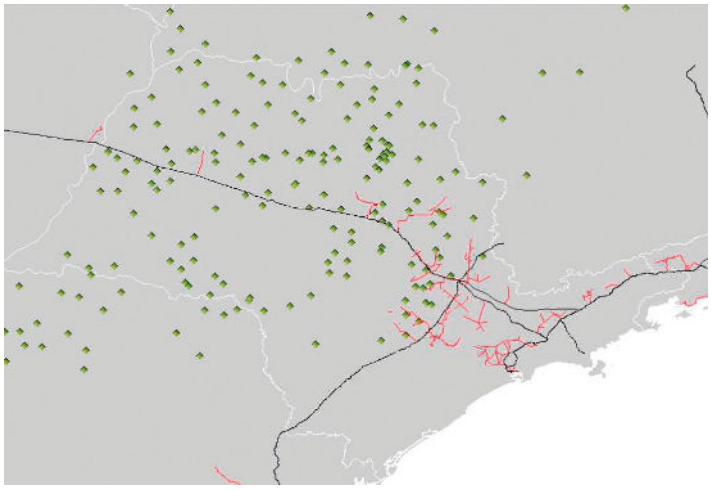

Figure 4: Distribution of ethanol and sugar mills in relation to gas pipelines in São Paulo.
Source: EPE & CIBiogás, 2023.

Other feedstocks include livestock manure and agroindustrial wastewater. According to the Brazilian Animal Protein Association (ABPA), poultry meat production is expected to reach between 15 and 15.35 million tonnes in 2025, reflecting a slight increase of 2.3% compared to 2024. Pork and egg production could reach 5.25 million tonnes and 57.5 billion units, respectively.[19]

Energy crops are not used to produce biogas. For instance, sugarcane (energy crop) is used to produce ethanol and bioelectricity from burnt bagasse, while the industrial process residues, such as vinasse and filter cake are used to produce biogas and biomethane.

Household organics

Brazil, the world's sixth-most populous country, produces some 20 million tonnes of food waste a year.[20]

The average annual amount of food loss and waste in Brazil remains unknown, with estimates varying from 23 million tonnes (Canatella 2021) to 82.1 million tonnes (Dal' Magro and Talamini 2019). The UN Food Waste Index 2024 places the amount at approximately 20 million tonnes with 'medium confidence'.[21]

A household food waste baseline is currently being developed. The National Solid Waste Plan sets goals to increase recycling rates throughout Brazil to 48% by 2040, aiming for half of the waste generated to be recovered through recycling, composting, anaerobic digestion and energy recovery – including energy resources such as biogas and biomethane. These measures include plans to close the nearly 2,600 dumpsites and uncontrolled landfills still in operation across Brazil.

Sewage

The latest available data indicates that only 56% of the population has access to sewage collection systems, leaving over 90 million Brazilians without basic sanitation infrastructure. The government aims to achieve universal (90%) access to sanitation services by 2033.

Household digesters and clean cooking

Brazil has undertaken a study to assess the advantages of small-scale biogas for rural communities, across seven states in the semi-arid region. Led by the non-governmental organisation Diaconia, the *Biodigestor Sertanejo* project installed over 850 digesters, to universal acclaim from the users.

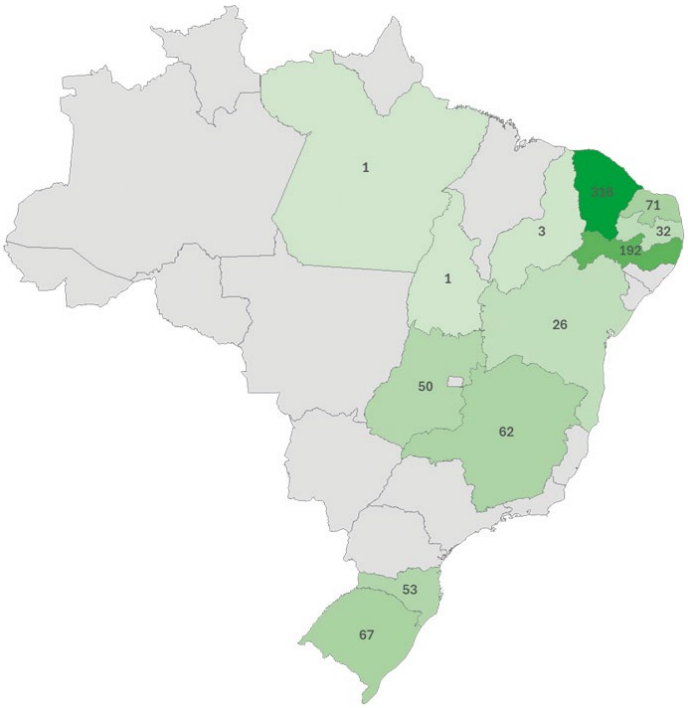

Figure 5: Geographical distribution of household biodigesters in Brazil.
Source: Instituto 17, 2022

The study found that the generation of clean energy reduced reliance on wood-burning stoves, which are still widely used in Brazil's interior, not only protecting the Caatinga biome from deforestation but also improving the health of families by avoiding exposure to harmful smoke. The generation of biogas also led to a reduced reliance on LPG.

Beyond energy production, the biodigester technology was found to support better water access, soil conservation and sustainable farming practices. The biofertiliser generated as part of the biogas process was found to boost food production and reduce input costs, further improving livelihoods.

Where challenges emerged, these primarily related to maintenance (replacing parts) and lack of feedstock. The study recommends the deployment of small-scale digesters to small farms with livestock.

If implemented, it could have a profound impact on Brazil's levelling up and climate agendas. With the right investment and support, Biodigestor Sertanejo has the potential to revolutionise rural energy access and environmental sustainability across Brazil.[22]

- **Potential number of digesters:** 50,000 to 200,000[23]
- **Potential total investment:** R$ 150 to 850 million (USD 25-142 million).
- **Potential biogas production:** 10 million m^3/year – equivalent to approximately 304,000 LPG cylinders.
- **Potential reduction in GHG emissions:** 10 to 100k tCO_2eq per year.

Drivers

Emissions Reduction Target

Biofuels, especially biogas and biomethane, play a crucial role in Brazil's strategy to achieve its Enhanced Nationally Determined Contribution (NDC) targets for reducing greenhouse gas (GHG) emissions. In its updated NDC submitted to the UNFCCC, Brazil has committed to reducing GHG emissions by 59-67% by 2035 compared to 2005 levels.[24]

The target aligns to the goals of the Paris Agreement to keep global warming below 2C, ideally 1.5C. In order to implement the NDC, Brazil will be updating its national climate plan, which will include national mitigation and adaptation strategies. These will be broken down into 16 sectoral adaptation plans and seven sectoral mitigation plans.

These are expected to be delivered ahead of COP 30 in November/ December (2025), which Brazil hosts.

Key takeaways from Brazil's Enhanced NDC relevant to the biogas industry include:

- In the **agricultural sector**, Brazil will continue to demonstrate that it is possible to sustainably expand agricultural production while guaranteeing food security and energy security through the sustainable production of biofuels.
- In the **energy sector**, Brazil will seek to: expand electricity generation with an increased share of technology and clean sources; gradually replace the use of fossil fuels with electrification solutions and advanced biofuels - including Sustainable Aviation Fuels (SAF) -, as well as expanding biofuel production associated with carbon capture and storage (BEECS) to meet the demand for negative greenhouse gas emissions.
- In the **transportation sector**, Brazil will seek to mitigate greenhouse gas emissions in line with the energy sector by replacing fossil fuels with electricity and biofuels.
- In the **cities and urban mobility sector**, the trends observed for urban mobility follow the logic of electrification and increased use of biofuels. In buildings, Brazil will seek progress in terms of energy efficiency and the evaluation of alternatives to the use of liquefied petroleum gas (LPG) and natural gas for cooking, such as biomethane.
- In the **waste sector**, the greatest opportunity for mitigation will be in the reduction of methane emissions, combined with its capture and energy use.
- In the **industrial sector**, Brazil will seek to reduce emissions intensity by progressively replacing fossil fuels with biofuels and electrification, while gradually adopting new technological routes for industrial processes with lower emissions and developing carbon capture technologies in certain industrial segments.
- The adaptation policies will build on existing important instruments for mitigating emissions by promoting the efficient use of energy and increasing the use of electricity and fuels from renewable sources.

Government policies

Since the early 2000s, the Brazilian government has implemented a series of state policies to stimulate the renewable energy and biofuels markets. These policies have included auctions and long-term contracts with the national grid operator, tax differentiation between fossil fuels and renewables, mandatory mixing of anhydrous ethanol in gasoline and biodiesel in fossil diesel, and the inclusion of flex-fuel vehicles, enabling the use of E100. The latest actions that boost biogas and biomethane production are the **National Biofuels Policy** (**RenovaBio**, instituted by Law 13576/2017) and the **Fuel of the Future Program** (instituted by Law 14993/2024).

Fuel of the Future is a national policy launched in 2024 aimed at decarbonising the transport sector. It includes the National Programme for Decarbonising Natural Gas Producers and Importers and promotes biomethane production and consumption through blending mandates, starting with a 1% share and potentially increasing to 10%.

The policy encourages methane-powered vehicles, conversions from diesel engines and supports infrastructure projects connecting biomethane plants to natural gas networks if they are economically viable.[25] This will stimulate demand, increase biomethane production and create a self-regulated market. It is a key driver for promoting the uptake of biomethane and achieving renewable targets.

RenovaBio was implemented in 2017 to stimulate biofuel production, including biomethane, by issuing decarbonisation credits (CBIOs) – representing one tonne of CO_2 emissions avoided through biofuel use. RenovaBio allows biofuel producers to sell CBIOs[30], including producers of biomethane used in the transport sector.

These credits are traded on the stock market and must be purchased by fossil fuel distributors to help reduce greenhouse gas (GHG) emissions in the transport sector. Distributors must meet their annual CBIO quotas based on total fossil fuel sales.

Low-Carbon Hydrogen Development Program positions Brazil to lead the green hydrogen market. Accompanied by tax incentives (PHBC) from 2028 to 2032, this law promotes a cleaner, more diversified energy matrix. Biogas and biomethane are identified as having a strategic role, being one of the most viable routes for low-carbon hydrogen production.

Brazilian Emissions Trading System (SBCE), was enacted in late 2024 to **establish the regulatory framework for a national carbon market**. Brazil has adopted a regulated market model for carbon pricing, aligning with global trends. Large GHG emitters that produce over 10,000 tons of CO_2 equivalent (tCO_2eq) per year are required to monitor and report their emissions according to an approved monitoring plan. Those emitting more than 25,000 tCO_2eq per year must compensate for their emissions in addition to the monitoring and reporting obligations. This involves submitting a reconciliation report that demonstrates either the acquisition of carbon credits, investments in renewable energy or energy efficiency, or the implementation of new technologies to directly reduce emissions.[26]

Waste management initiatives

The **National Solid Waste Plan** targets an increase in recycling rates throughout Brazil of 14% by 2024, with a view to reaching 48% by 2040. Law 12,305/2010 prioritises waste management practices in the following order: non-generation, reduction, reuse, recycling, treatment of solid waste, and environmentally appropriate final disposal of waste. It requires municipalities, states and the federal district to develop solid waste management plans, which are essential for accessing federal funds related to urban development and environmental management.[27] These measures include plans to cap and close the nearly 2,600 dumpsites and uncontrolled landfills in operation in Brazil.

The **New Sanitation Legal Framework** (Marco Regulatório do Saneamento, established by Law 14026/2020) sets a goal of universalising sanitation services by 2033. This means ensuring that 99% of the population has access to clean water and 90% to sewage treatment and collection. An estimated annual investment of R$ 46.3 billion (USD 8bn) will be required to reach this target.[28]

Financial incentives

The Brazilian biogas market is driven by demand. There are no incentives such as feed-in tariffs or government subsidies in place. However, some funding and tax reduction mechanisms can benefit new projects and attract international investments.

The **National Bank for Economic and Social Development (BNDES)** provides access to funding such as: the Climate Fund, which aims to decarbonise industrial sectors; FINEM and FINAME, funds dedicated to supporting the acquisition of new imported machinery and equipment with no national equivalent; and the Green Fund, recently created under the Energy Transition Acceleration Programme (Paten).[29]

REIDI is a special incentive scheme for energy infrastructure development that allows the suspension of taxes - PIS/PASEP and Cofins contributions - on the sale or import of goods (machinery, apparatus, instruments, equipment and construction materials) and services intended for new biomethane projects.[30]

ICMS (Imposto sobre Circulação de Mercadorias e Serviços) is a state-level tax in Brazil, meaning each state sets its own rates and regulations. It applies to the sale of goods, transportation services and communication services within Brazil.

To encourage the adoption of renewable energy, some states offer ICMS reductions or exemptions for biogas and biomethane. This reduction lowers the tax burden on companies involved in producing, selling or using these fuels, making them more financially attractive compared to fossil fuels.

Presumed Credit is a mechanism that allows companies to reduce their ICMS tax liability by a predetermined percentage (up to 12%) of the value of specific purchases without the need for a detailed accounting of the actual taxes paid on those purchases.

Global funding: The International Finance Corporation (IFC), a member of the World Bank Group, provides finance to support the agribusiness sector's decarbonisation efforts through biomethane production.[31]

International Co-operation

Brazil is a pivotal country in global affairs due to its economic size, natural resources, geopolitical influence, and leadership in climate and energy policies. The country maintains strong ties with both Western nations and emerging economies. It is a founding member of the United Nations (UN), a leader in G20, BRICS, and Mercosur, shaping international trade and development policies. It is also engaged in further multi-lateral and bilateral regional agreements, with a particular focus on rainforest protection and sustainable development.

Within that framework, Brazil is a global leader in climate action. Aside from being a signatory to the Paris Agreement, Brazil takes an active role in other global partnerships, including the Global Biofuels Alliance and Global Methane Pledge.

Global Biofuels Alliance (GBA) Brazil as one of the three main biofuels producers in the world, alongside the US and India, and is a founding member of GBA. The consortium of 19 countries and 12 international organisations, including WBA, seeks to accelerate the sustainable production of biofuels, including biogas and biomethane.

According to data from the International Energy Agency, global production of sustainable biofuels needs to triple by 2030 for the world to achieve net-zero emissions by 2050. In 2022, liquid biofuels provided more than 4% of the total energy for transport, but their use still has significant potential for growth. The use of biofuels in aviation and shipping, to reduce emissions in the respective sectors, will further increase global consumption and the need to expand the number of suppliers.[32]

Global Methane Pledge (GMP) As one of the 159 countries to sign the GMP Brazil is actively implementing several strategies to meet its commitment to reduce methane emissions by 30% by 2030. Key initiatives include:

- The **National Zero Methane Program**, which promotes the production and use of biogas and biomethane, particularly in agriculture and livestock sectors. Financial support is provided through public banks, offering specific financing and credit lines to stimulate the establishment of new biomethane production centres and the development of green corridors for heavy vehicle fuel supply.[33]
- The **ABC+ Plan** aims to expand sustainable agricultural technologies across 72 million hectares by 2030. A significant focus is on manure management, targeting the treatment of 27% of animal manure (approximately 208 million cubic meters) to reduce agricultural methane emissions. Financial incentives are provided to support producers in adopting these practices.[34]
- The **Global Environment Facility (GEF)** has ongoing projects in collaboration with the Government of Brazil and UNIDO to inculcate biogas into the agricultural and energy value chains, leveraging $7.8 million in funding.[35]
- **Bioeconomy initiative**. In 2024, under Brazil's G20 presidency, the G20 Initiative on Bioeconomy (GIB) established 10 High-Level Principles on Bioeconomy, marking the first time the bioeconomy has been the subject of a multilaterally agreed document.[36] These principles serve as a framework for international cooperation, guiding countries in implementing bioeconomic strategies that align with global sustainability goals.

Challenges to Growth

National

The absence of specific policies and regulatory frameworks designed explicitly for biogas production, distribution and use, creates uncertainty for investors. Although biogas is included in the country's National Energy Plan, more coordinated actions are needed to develop long-term public policies that support biogas. Efforts to promote biogas often emphasize technical and regulatory aspects, but the integration of the entire value chain (from production to end use) remains disjointed and poses a challenge.

Lack of capital financing and incentives. Biogas projects in Brazil have limited access to affordable financing options, partly as a consequence of a lack of dedicated policies. Additionally, government incentives and subsidies that are available for other renewable energies are less prominent for biogas. While some pathways do exist (see Drivers), accessing financing can be complex due to bureaucratic processes, high interest rates and limited investor awareness. Many projects rely on partnerships with private investors or agricultural cooperatives to secure funding.

Lack of a level playing field in the market. Fossil fuels like natural gas and diesel receive a lot of government subsidies. This creates an unfair advantage in the market, making it harder for renewable energy to compete and grow.

Brazil's spending on fossil fuel subsidies in 2023 was around 4.5 times larger than its spending on renewable subsidies, according to a study published by the Institute of Socioeconomic Studies (Inesc).

The country spent R$99.8bn ($17.49bn) in subsidies for both fossil fuels and renewables in 2023, a 3.6% increase from 2022, the study said. Of the total, R$81.74bn were related to fossil fuels while R$18.06bn went to renewable sources, nearly 27% hike from 2022.[37]

Limited gas infrastructure. Brazil has a relatively small and underdeveloped natural gas pipeline network compared to other countries, especially in rural areas where most biogas and biomethane production potential exists (from agriculture, agro-industries and livestock waste). Without pipelines, transporting biomethane to industrial and urban consumers is costly, often requiring compressed (CNG) or liquefied (LNG) transport, which increases expenses.

Even where pipelines exist, connecting biomethane plants to the grid is expensive due to technical requirements and lack of standardised regulations. Many small and medium producers cannot afford the high infrastructure investment needed to inject biomethane into the grid.

The lack of infrastructure limits the availability of biomethane, making it harder for industries, transport companies and consumers to switch from fossil fuels. Without a reliable supply, demand remains low, discouraging further investments in the sector.

Illegal dumpsites and unregulated landfills remain a persistent challenge. Despite laws like the National Solid Waste Policy (PNRS) – Law 12,305/2010 – enforcement is weak, and many municipalities lack the resources to build proper waste treatment facilities. As a result, tonnes of mixed waste continue to be improperly disposed of, exacerbating environmental pollution, methane emissions, and public health risks.

Urban Areas

AD plants in Brazil struggle to find a landbank for digestate. Their impact could be maximised by integrating digestate into local farming, landscaping and soil restoration projects. With the right policies and incentives, digestate could become a key part of sustainable urban waste management.

Lack of strict oversight and infrastructure for proper waste management prevents the full implementation of mandatory waste segregation and valorisation initiatives. A lack of integration between the waste and energy sectors neglects the benefits of the biogas technologies and, as a consequence, supports cheaper, more established disposal options such as landfills.

Rural Areas

High transportation costs for gas and digestate. Rural areas in Brazil often lack natural gas infrastructure, making it difficult to integrate biomethane into existing distribution networks. Unlike urban centres where gas pipelines enable efficient supply, rural producers must rely on costly alternatives such as trucked biomethane or local consumption, limiting market reach and scalability.

Digestate, the byproduct of anaerobic digestion, rich in nutrients, can be used as fertiliser, but its high water content makes transportation expensive over long distances. Farmers may struggle to find nearby users, reducing its economic value.

Lack of long-term financing mechanisms. Most financing mechanisms in Brazil favour large-scale energy projects and do not cater to small and medium-sized rural producers. Banks and investors often view biogas projects as risky due to long payback periods and fluctuating energy prices, making it difficult for farmers to secure affordable loans or investment.

High upfront costs. Installing anaerobic digesters, purification systems and biogas upgrading technology requires significant capital investment, often beyond the financial capacity of small and medium-sized farmers. The lack of subsidies, grants or accessible credit lines further discourages adoption.

Competition. Many agricultural byproducts, such as crop residues and manure, already have competing uses. Some residues are used directly in livestock diets, providing an immediate economic return for farmers, or composting. This competition makes it harder for biogas projects to secure consistent and affordable feedstock, limiting their viability.

Potential solutions

National

Harmonised policies. The biogas industry requires clear and consistent policies that align across various government agencies. Improved coordination between national and state policies regarding waste management, sewage treatment, renewable energy, transport, and agricultural waste would enhance efforts in methane reduction and waste management.

The adoption of key components of the WBA's **#MakingBiogasHappen** programme – the Global Biogas Regulatory Framework and the Anaerobic Digestion Certification Scheme International – will assist Brazil in developing a country specific action plan to accelerate uptake and overcome barriers to scaling up the Brazilian biogas market.

Simultaneously, ADCS International will **establish clear performance metrics and standards** for biogas producers. This will create a performance benchmark, based on the best available techniques and technologies, instilling confidence to investors and financial institutions regarding anticipated return on investment (ROI).

Infrastructure upgrades. Brazil needs to invest in expanding and modernising its gas infrastructure, establish financial incentives for pipeline connections, and promote decentralised biomethane distribution models such as local microgrids or virtual pipelines (truck-based transport). A combination of financial support, regulatory certainty, and market incentives would enhance the attractiveness of gas infrastructure projects in Brazil, unlocking investments in biogas, biomethane and natural gas distribution networks.

Encourage the adoption of Low-Carbon Fuels. There is an urgent need to create "blue (or sustainable) corridors" with refuelling stations along major highways to support low-carbon fuels like biomethane (bioCNG and bioLNG) for medium- and long-distance transport. These fuels will first complement diesel and eventually replace it in heavy transport.

The São Paulo↔Rio de Janeiro corridor currently has 10 refueling stations offering CNG and bioCNG, providing a cleaner option for long-haul trucks. The Paranaguá↔Londrina corridor features 11 stations, and the state of Paraná plans to expand its network in the coming years.

Enhanced digestate market. By combining regulatory support, financial incentives, education, and infrastructure investment, Brazil can transform digestate into a valuable product, reducing reliance on chemical fertilisers and bolstering the circular bioeconomy.

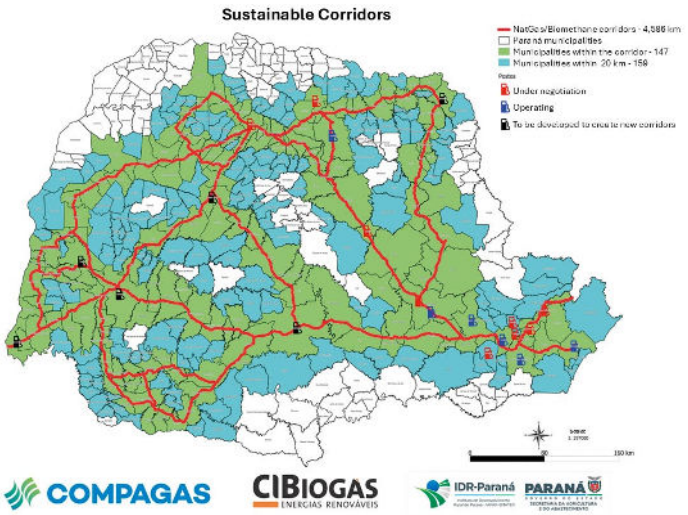

Figure 6: Paraná State sustainable corridors map.[38] Source: SEAB, 2025.

Clear performance metrics and standards are essential for biogas projects to offer investors and financial institutions evidence of expected Return on Investment (ROI).

Targeting hard to decarbonise sectors. Brazil is actively working to reduce methane emissions as a signatory of the Global Methane Pledge, specifically focusing on its oil and gas sector as a major global producer. If properly aligned, Brazil's methane regulations could enhance the adoption of biogas and biomethane, creating a win-win scenario for emissions reduction and renewable energy expansion.[39]

Stricter methane regulations for fossil fuel producers could encourage industries to switch to biomethane as a cleaner alternative to reduce emissions and comply with regulations. This could lead to the introduction of new incentives, if methane reduction policies include rewards for methane capture and utilisation. Oil and gas companies may invest in biogas projects to offset emissions and adhere to regulations.

Urban Areas

Municipal mandate for solid waste segregation. Cities should require households, markets and businesses to separate organic waste at the source, sending it to recycle in biogas plants rather than landfills. The policy should establish clear targets to gradually reduce organic waste in landfills, aiming for complete elimination over time.

Introduce mandatory gas capture and energy use for landfill gas. This policy should include incentives, such as tax and carbon credits as well as grants to encourage investment in LFG-to-energy technologies, that support the conversion of methane into electricity or pipeline-quality gas. Additionally, strict monitoring and reporting requirements must be established to ensure compliance.

Mandatory sewage collection and treatment, biogas utilisation, energy and nutrient recovery. This policy aims to promote the sustainable collection and treatment of sewage through anaerobic digestion (AD), reduce environmental impact, generate renewable energy, and support the circular economy.

Rural Areas

Establish priority use criteria for local animal and agricultural waste feedstock to be treated in biogas plants to meet sustainability criteria for feedstocks, environmental goals related to air and water quality, and enhance rural resilience, energy and food security. Explore incentives for biogas cooperatives and community-based biogas plants to ensure everyone can cost-effectively realise the full benefits.

Training for community-based and on-farm biogas plants is essential to ensure high uptake and effective operation. Local operators must receive comprehensive instruction on technical skills, safety protocols and maintenance procedures for these plants. Hands-on operational training and post-installation services are crucial for ensuring the successful adoption and long-term sustainability of community-based and on-farm biogas plants. The World Biogas Association (WBA), through its Making Biogas Happen program, actively supports local capacity-building efforts.

Promote and support build-operate-transfer (BOT) contracts that enable private companies to design, finance, build and operate biogas plants on a farmer's land or within a cooperative for a fixed period (e.g., 5–15 years). This approach allows farmers to avoid high upfront capital costs and instead pay gradually through operational revenues. At the end of the contract, ownership of the plant (in working order) is transferred to the farmer or cooperative.

The model based on BOT contracts is commonly used by governments. It describes a public private partnership (PPP) model in which a private entity builds, operates, and subsequently transfers a project back to the government at the end of a specified period. This model is frequently utilised for infrastructure projects such as highways, power plants and water treatment facilities.

References

[1] Implementation of bioenergy in Brazil – 2024 update, IEA Bioenergy. https://shorturl.at/nR8od

[2] Biogas: Pathways to 2030, World Biogas Association. https://shorturl.at/gUdhK

[3] Calorific value of biogas: 6.1 kWh/Nm^3. Electric efficiency of 35%.

[4] Panorama do Biogas 2023, CIBIOGÁS, 2024. www.youtube.com/watch?v=G4Hm-oZ9eHE

[5] Brazilian Biogas Potential. ABiogás, 2019. https://shorturl.at/BcHaf

[6] Biogás no Brasil: Potencial Oferta a Curto Prazo. Brazil Energy Program (BEP). Instituto 17. https://i17.eco.br/wp-content/uploads/2022/11/RT02-2021.pdf

[7] Panorama do Biogas 2023, CIBIOGÁS, 2024. www.youtube.com/watch?v=G4Hm-oZ9eHE

[8] Mapping biomethane plants by 2032, ABiogás 2025. https://shorturl.at/tPE4Q

[9] Mapping biomethane plants by 2032, ABiogás 2025. https://shorturl.at/tPE4Q

[10] Painel dinâmico de biometano, ANP. https://shorturl.at/jb03d

[11] Natural Gas Industry Bulletin - September 2024, MME. – 75 m m^3/day is the average of the last 5 years total supply. https://t.ly/-DOHn

[12] State of the biogas industry in 12 member countries of IEA Bioenergy Task 37. IEA Bioenergy. https://shorturl.at/o5wv0

[13] The green hidden gem – Brazil's opportunity to become a sustainability powerhouse McKinsey & Company. https://shorturl.at/Gz5i2

[14] Biogás no Brasil: Potencial Oferta a Curto Prazo. Brazil Energy Program (BEP). Instituto 17. https://i17.eco.br/wp-content/uploads/2022/11/RT02-2021.pdf

[15] Brazilian Biogas Potential. 2019. ABiogás. https://shorturl.at/BcHaf

[16] RepowerEU is a plan European Union has put in place to fast forward the clean transition and reduce dependence of imported fossil fuels. https://shorturl.at/gGdSb

[17] Petrobras publishes first Call for Proposals to purchase biomethane. Petrobras. https://t.ly/EC_tL

[18] 2024 Brazilian Energy Balance. EPE. https://shorturl.at/V4EYx

[19] ABPA makes projections for the production and export of poultry, pork and eggs in 2024 and initial expectations for 2025. ABPA. https://shorturl.at/B9kMk

[20] An inside look at Brazil's push to end food waste. UNEP, 2024. www.unep.org/news-and-stories/story/inside-look-brazils-push-end-food-waste

[21] Food Waste Index Report 2024. Think Eat Save: Tracking Progress to Halve Global Food Waste. UNEP, 2024. https://wedocs.unep.org/handle/20.500.11822/45230

[22] Biodigestor Sertanejo: Tecnologia social para o fortalecimento dos ODS. Instituto 17, 2022. https://i17.eco.br/wp-content/uploads/2022/11/RT05-2022.pdf

[23] Based on estimates of 1-5% of Brazil's rural communities having access to this technology.

[24] BRAZIL'S NDC: National determination to contribute and transform, Brazilian Government. https://shorturl.at/ksWMi

[25] Brazil advances with a new regulatory framework for biofuels. World Biogas Association, 2025. https://shorturl.at/vqBD1

[26] Law 15042/2024 https://shorturl.at/YHVgC

[27] Law 12305/2012 – Brazilian National Policy on Solid Waste. https://t.ly/UR7my

[28] Potencial de produção de biogás a partir do tratamento do esgoto. Instituto 17, 2021. https://i17.eco.br/wp-content/uploads/2022/11/NT01-2021.pdf

[29] Law 15103/2025. https://t.ly/4SJai

[30] Portaria Normativa no. 19/GM/MME 2021. https://t.ly/ZXS3z

[31] IFC Boosts Decarbonization of Agriculture in Brazil with $165 Million Financing for São Martinho. IFC. https://rb.gy/qrbk6v

[32] Press release n. 380. Launch of the Global Biofuels Alliance. https://shorturl.at/fSwRn

[33] The National Zero Methane Program. Brazil, 2022. https://www.gov.br

[34] Brazil Launches Transformative Agricultural Methane Project. CCAC, 2023. www.ccacoalition.org

[35] Brazil and the GEF - A Transformative Partnership. GEF, 2023. https://shorturl.at/nXwjU

[36] G20 approves declaration setting out 10 principles on bioeconomy. Agência Brasil, 2024. https://g20.gov.br

[37] Brazil fossil fuel subsidies outpace renewables: Study Argus Media https://shorturl.at/EZwNE

[38] Governo assina protocolos para uso de biogas e biometano no transporte rodoviario, Parana State Government. https://shorturl.at/6ObMs

[39] Highlights from 2023 Global Methane Pledge Ministerial. Global Methane Hub (GMH). https://shorturl.at/gcRAs

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