

RURAL RESIDUES AND FUEL CONSUMPTION

How much of current fuel consumption can be competitively replaced?

Elaboração:



This Fact Sheet presents an assessment of the technical and economic potential for substituting part of diesel and gasoline consumption with biomethane produced from agricultural and livestock residues

As a major food producer, Brazil generates billions of tonnes of residues every year. Studies show that, depending on the crop, between 30% and 50% of rural residues can be recovered for other uses while maintaining soil cover, thereby preventing erosion and nutrient losses. Similarly, a large share of residues from extensive livestock systems can be utilized, as around 40% of manure is concentrated in the vicinity of salt troughs. These residues can be used to produce biomethane, a gaseous fuel compatible with natural gas.

The development of solutions that enable the use of natural gas and biomethane in passenger and freight transport, as well as in agricultural machinery, creates significant potential for substituting petroleum-derived fuels in these applications. It should be noted that a substantial share of the diesel and gasoline supplied in Brazil is imported, and the use of agricultural and livestock residues for biomethane production is one of the solutions to reduce expenditure on fuel imports.

The technical potential for the energy use of residues has been analyzed by EPE for several years. **The SIenergia plataforma consolidates** historical data on the potential of different substrates and conversion technologies.

The maps below show the technical potential of agricultural and livestock residues and their geographic concentration. A color intensity scale is used, with lower intensity represented in white.

Technical potential for biomethane production (base year: 2022)

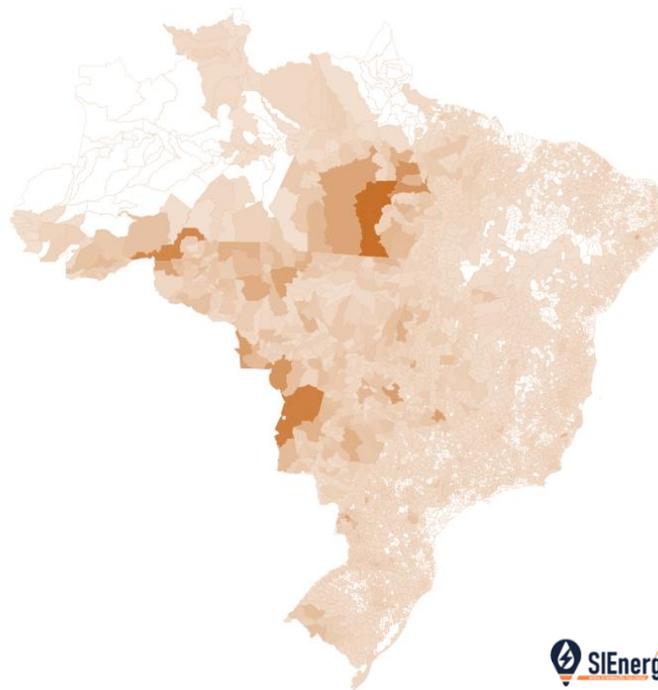
Agricultural Residue

Total: 55 billion liters of diesel oil equivalent



Livestock Residue

Total: 24 billion liters of diesel oil equivalent



Note: The analysis considers cotton, rice, banana, sugarcane, beans, cassava, corn, soybeans, wheat, beef and dairy cattle herds, swine, and poultry.

WHAT SHARE OF THE TECHNICAL POTENTIAL IS ECONOMICALLY VIABLE? SIENERGIA PROVIDES THE ANSWER



Despite the high technical potential for biomethane production from residues, it is known that part of this potential is not economically viable for exploitation. EPE, through a Technical Cooperation Agreement with Itaipu Parquetec, developed a **simulator to assess economic viability**, which is available for installation on EPE's [GitHub repository](#).



The tool enables the assessment of economic viability for the following technological pathways and applications:

- Anaerobic digestion of agricultural and livestock residues for biofuel production ([here](#));
- Anaerobic digestion of agricultural and livestock residues for electricity generation;
- **Densification of agricultural residues for combustion in boilers for electricity generation and/or industrial uses – the focus of this fact sheet.**

Assessment of Economic Potential Using SIenergia

To carry out the assessments, the tool uses direct costs, operational and financial indicators, revenues, and the low-voltage market consumption capacity within the electricity distributor's concession area. More information about the tool can be found at the User's Manual and at Documentation.

In this assessment, the tool's default parameters were used, except, due to computational constraints, for the number of hubs tested per "cluster," which was reduced to 10. Regarding revenues from biomethane sales, the default value (R\$ 2.90/m³) is consistent with the realization cost used in the formation of the average diesel price (EPE, 2025) over the period from 6 April 2025 to 12 April 2025 (see source). This revenue assumption can be considered conservative, given that biofuels benefit from favorable taxation, which could provide biomethane producers with a competitive advantage for final consumers.

Economic potential for biomethane fuel production (2022 data)

Agricultural Residues

Total: 29 billion liters of diesel oil equivalent



Livestock Residues

Total: 2 billion liters of diesel oil equivalent



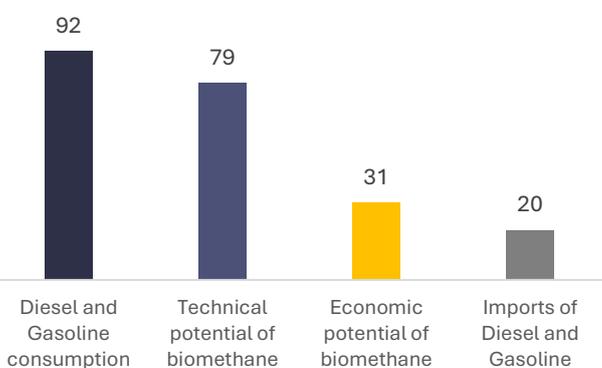
- Municipalities with economically viable biomass utilization
- Municipalities without economically viable biomass utilization

Note: The map results represent a preliminary analysis based on the parameters used in the simulation. Economic viability may vary according to the specific characteristics of each project.

WHAT DO THE RESULTS SHOW?

Under the assumed premises, the results show that around one-third of total diesel and gasoline consumption in Brazil—equivalent to 150% of current imports—has the potential to be economically replaced by biomethane, at a revenue of R\$ 2.90/m³, using agricultural and livestock residues.

Diesel oil equivalent volume (billion liters) – 2022



- The results are based on residues sourced from more than 3,000 municipalities, which supply biomass to plants located in 369 host municipalities
- On the one hand, this simulation can be considered conservative, as it assumes a potential biomethane remuneration lower than that of diesel at refineries. On the other hand, there are recognized barriers to this utilization, such as the need to adapt vehicle fleets.
- The tool also supports project assessments under the framework of the Fuel of the Future Law (Law No. 14,993/2024), including projects applying to both the PNIIGB and the CGOB.
- EPE intends to continue developing studies based on SIenergia with the aim of fostering discussion on this topic.



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