

HIGHLIGHTS

STRUCTURAL INITIATIVES AND CHALLENGES TO BOOST LOW-CARBON MOBILITY IN BRAZIL BY 2040

Study prepared by LCA Consultores

Instituto
MBCBrasil
MOBILIDADE DE BAIXO CARBONO



The LCA study addresses the evolution of the road transport fleet and the paths to decarbonization by 2040. Given the projected demand, **what should be done in terms of infrastructure and public policy to ensure biofuel and energy availability** (distribution, delivery, and availability). Sustainable biofuels and energy sources were evaluated in different scenarios, advantages, challenges, and structural proposals were recommended to public authorities.

1. EVOLUTION OF THE ROAD FLEET AND DECARBONIZATION

LIGHT-DUTY VEHICLES

FLEXFUEL

✓ **62%**

They will be dominant until 2040; share drops from 79% to 62%.

ELECTRIFIED

↑ **44x**

They will grow 44 times by 2040 (vs. 2025).

HYBRIDS

↑ **72%**

They will account for 72% of electrified vehicles by 2040.

HEAVY-DUTY VEHICLES

BUSES

Diesel

Reducing 11% by 2040; will still account for 70% of the fleet.

Gas / Biomethane

Reaching 10% of the fleet by 2040.

Electric

Increasing 67-fold by 2040 (vs. 2025); will account for 20% of the fleet.

TRUCKS

Diesel

Still predominant by 2040 (85%); Difficulty in replacing old fleet.

Electric

Accounting for 7% of the fleet by 2040 (for specific applications, as last miles).

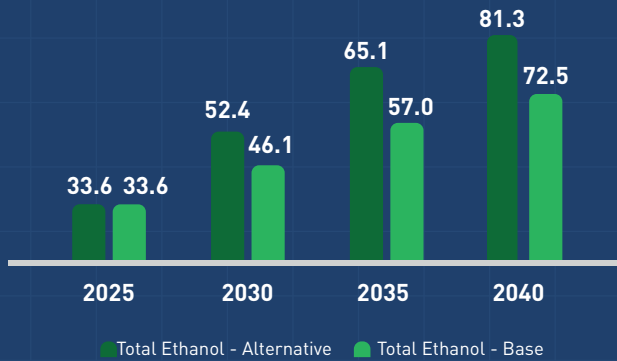
Gas

Increasing 31-fold by 2040 (vs. 2025); will account for 8% of the fleet.

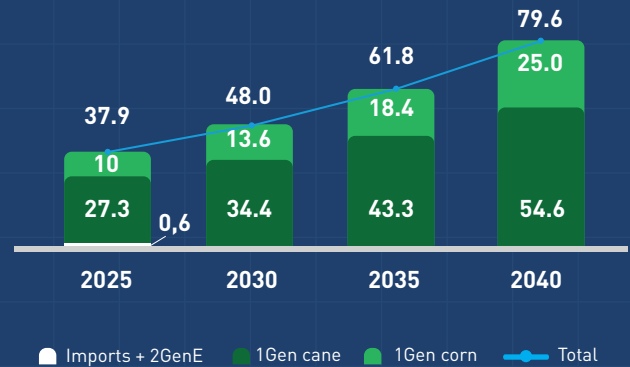


2. SUSTAINABLE ENERGIES: DEMAND AND SUPPLY

Ethanol demand
(billions of liters)



Estimated total ethanol supply
(billions of liters)



ETANOL

LIGHT-DUTY FLEET

↑ **56%**

Usage could increase from 42% to 56% by 2040.

NEW USAGES (SAF/Maritime)

↑ **87%**

Additional demand of 60% to 87% by 2040. Total demand will grow 2.2 to 2.4 times (vs. 2025)

PRODUCTION

↑ **110%**

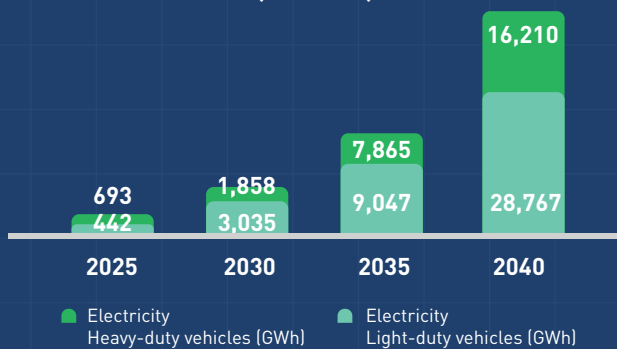
Growth potential of up to 110% by 2040.

CORN ETHANOL

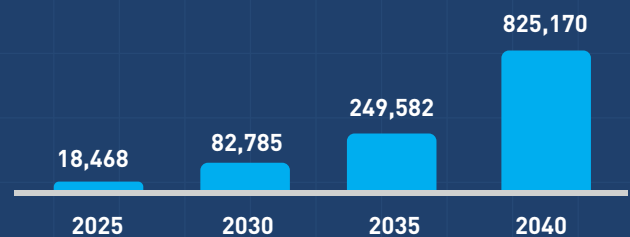
✓ **33%**

It will account for one-third of ethanol production by 2040.

Electricity
(in GWh)



Estimated number of charging stations
(units)



ELECTRICITY

CHARGING INFRASTRUCTURE

↑ **45x**

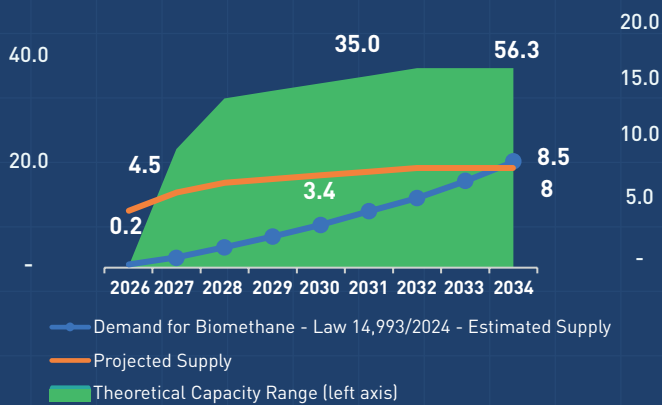
Current deficit of 1,600 stations; demand will grow 45-fold by 2040. Investments of R\$25 billion required.

ENERGY DEMAND

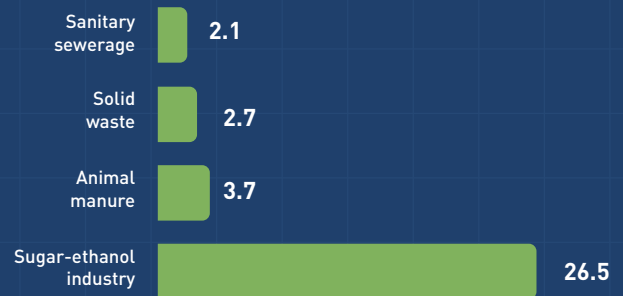
✓ **45 TWh**

45 TWh by 2040 (light- and heavy-duty vehicles only); demand accounts for only 7% of renewable electricity in 2024.

Potential industrial demand for biomethane as established by Law No. 14,993 / 2024 (in million m³/day)



Potential biomethane production in Brazil by 2030 (MM m³/day)



BIOMETHANE

HEAVY-DUTY TRANSPORTATION/ INDUSTRY

↑ **22x**

A key player
in decarbonization.
Demand will grow
22-fold in 15 years.

PRODUCTION / POTENTIAL

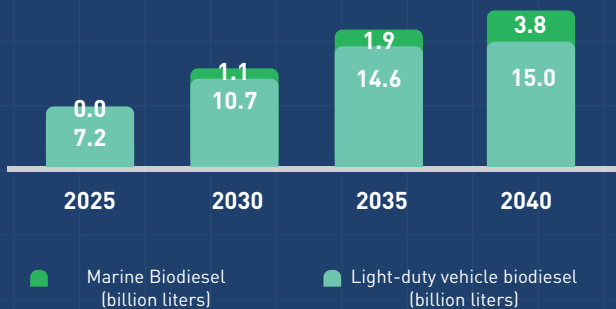
↑ **120mi M³**

35 million m³/day (2030) and
120 million m³/day (2040).

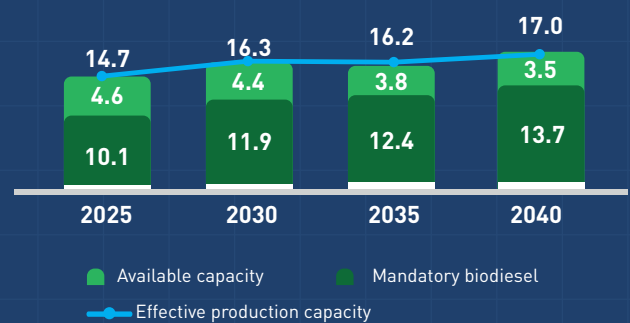


Competitive versus diesel/LNG;
will require expanding
the market and network

Biodiesel demand (in billion liters)



Estimated capacity for biodiesel production (billion liters)



BIODIESEL AND HVO

DEMAND FOR BIODIESEL

↑ **18.8 bi**
Liters
(alternative scenario)

It will increase 2.1 times
(base) to 2.6 times (alternative
scenario) by 2040, reaching
18.8 billion liters
(20%-25% blends).

PRODUCTION CAPACITY

✓ **17 bi**
Liters

17 billion liters
by 2040.

HVO

✓ **2 bi**
Liters

High technical acceptance,
but usage restricted by cost.
Annual demand
of 2 billion liters by 2040
(addition of 3%).



B25 Challenges

A 25% blend (B25) is
challenging; it requires
a review of standards,
and inspections.

3. PUBLIC POLICIES: RECOMMENDATIONS



BIOMETHANE



Grid Connection

Share connection costs; invest in priority and wide-reaching infrastructure. Differentiate access/transport tariffs.



Innovation

R&D&I strategy in biomethane and by-products. Strengthen the supply chain. Expand financing (FINEP, BNDES).



Fleet Renewal

Programa Renovar / Renewal Program - (Climate Fund, tax credits) for renewal, retirement of older models. Support proportional to decarbonization potential.



Green/Blue Corridors

Create highway corridors (exemption of IPVA-tax and toll for gas/biomethane vehicles). Develop gas refueling infrastructure and urban corridors for public transport. Priority for unloading at ports.



ETHANOL



Gasoline Prices

Establish (update) criteria for Petrobras' pricing policy (formula-based prices, price bands, periodicity).



Agricultural Machinery

Postpone MAR-2 (Program for the Control of Air Pollution by Motor Vehicles); encourage biofuels. Plano Safra / Harvest Plan: favorable conditions for ethanol/biomethane.



R&D

Financing for demo plants of Technical-Scientific Centers; support for the expansion of bioenergy in degraded areas.



Alternative Uses

Establish a common Mercosur standard for SAF; implement a local Tax Credit Program for SAF. Promote ethanol use in international navigation.



ELECTRICITY



Long-Distance Infrastructure

Support investments in fast-charging along strategic routes. Include stations in green/blue corridors. Infrastructure, service stations, electricity distribution, and grid modernization.



Energy Storage

Establish regulatory standards for off-grid hybrid solutions. Provide tax credits for charging systems (increasing with local production).



Local Battery Supply Chain

Promote innovation, mineral extraction/refining, and battery production in Brazil. Encourage local content in electric vehicles assembled in the country.



Electric Grid

Anticipate grid reinforcements for connections at strategic locations; define layout, load, and voltage of stations.



BIODIESEL



Monitoring and R&D

Strengthen the role of the National Agency of Petroleum, Natural Gas and Biofuels (ANP) in quality control. Promote R&D to prevent or resolve technical issues with fuel blends.



Refueling Hubs

Support expansion of B100 hubs in production regions and routes.



Fleet Renewal

Special financing lines (Climate Fund, EcoInvest) and tax credits for renewal, with retirement of older models. Support proportional to decarbonization potential (RenovaBio).



Access the full study

Scan the QR Code and check it out right now!



Technical Sheet

Initiatives and Challenges to Boost Low-Carbon Mobility in Brazil by 2040

Prepared by LCA Consultores



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Technical Staff

Fernando Camargo
Director-partner

Bráulio Borges
Director

João Queiroz
Economist

Matheus Marcelino
Economist

Thaís Monello
Economist

www.lcaconsultores.com.br

At the request of

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