

From Waste to Wheels: International Study Identifies Biomethane as Key Solution for Transport Decarbonization

Commissioned by Instituto MBCBrasil, the study highlights global deployment opportunities and positions Brazil as a leader in renewable fuel technology

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-- Biomethane has emerged as one of the most immediate, mature, and cost-effective solutions for decarbonizing road transport, particularly in heavy-duty and long-haul freight. This is a core finding [“From Waste to Wheels](#) - Turning organic waste into renewable fuel for transport”, a new international literature review commissioned by [Instituto MBCBrasil](#) and authored by leading researchers from the University of São Paulo (USP), Federal University of Itajubá (UNIFEI), Agronomic Institute of Campinas (IAC), and Mauá Institute of Technology.



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Covering mature and emerging markets across the Americas, Europe, Asia, and Africa, the study demonstrates that biomethane — produced through anaerobic digestion of organic residues such as vinasse, manure, municipal waste, and sewage — combines greenhouse gas (GHG) reductions with energy security and circular economy benefits.

A Global Industrial Movement

Biomethane is produced in roughly 40 countries and used in transport in nearly 30 markets. Globally, sustainable biogas and biomethane potential reaches 1 trillion m³ per year — equivalent to 25% of total global natural gas demand.

Demonstrating its strategic importance, the European Union aims for 35 billion m³ (bcm) of annual biomethane production by 2030 under REPowerEU. Meanwhile, the U.S. operates 470 renewable natural gas (RNG) projects, and India counts 7.7 million gas-powered vehicles.

"We gathered evidence from dozens of international and Brazilian sources to demonstrate how biomethane drives transport decarbonization on a global scale," says Professor Gláucia Mendes Souza (USP), leader of IEA Bioenergy Task 39 and co-author. "The fuel is a mature, viable

solution. Beyond producing fuel, Brazil can lead the supply of technology, equipment, and engineering solutions to other markets seeking to decarbonize."

The Brazilian Opportunity: Energy & Tech Exports

Brazil holds one of the world's largest supplies of agro-industrial feedstocks. In the sugarcane sector alone, biomethane potential is estimated at 41.4 billion m³ annually (equivalent to 41 billion liters of diesel), of which less than 2% is currently utilized.

This creates a twofold opportunity: supplying domestic clean energy and exporting accumulated know-how. Brazilian industry has developed advanced vertical biodigesters, gas purification systems, and bio-LNG transport logistics, positioning the country as a strategic equipment and engineering exporter for Latin America, Asia, and Africa.

Climate Impact and Economics

Replacing diesel with biomethane in heavy-duty transport cuts well-to-wheel CO₂-equivalent emissions by 45% to 75%. When accounting for avoided fugitive methane from waste, net emissions can reach as low as -246% compared to diesel.

Financially, biomethane is already cost-competitive. Total Cost of Ownership (TCO) simulations for heavy-duty freight fleets in Brazil show:

- LNG (Liquefied Natural Gas): US\$ 1.59 / km
- CNG / Biomethane: US\$ 1.73 / km
- Diesel: US\$ 1.87 / km

In mature markets, 20% to 60% of a plant's revenue comes from non-fuel sources, including waste treatment (US\$ 1–6/GJ), biofertilizer sales (US\$ 0.5–4/GJ), and carbon credits (US\$ 1–8/GJ) — transforming biomethane facilities into multi-product biorefineries.

Operational Milestones and Regulation

Commercial facilities using vinasse and sugarcane residues are already operating in Brazil at sites including [Cocal](#), Raízen, São Martinho, and Adecoagro. Landfill projects, such as the Paulínia facility (up to 225,000 Nm³/day), and urban bus fleet conversions in Goiânia further demonstrate commercial scalability.

The study coincides with the enactment of Brazil's Fuel of the Future Law (Law No. 14,993/2024), which created the Biomethane Certificate of Origin (CDOB) to support mandatory emission reduction targets for natural gas, starting at 0.5% in 2026 and reaching 10%.

"Biomethane is a global reality ready for deployment at scale," states José Eduardo Luzzi, Chairman of the Board of Instituto MBCBrasil. "This study reinforces Brazil's position not only as a supplier of clean energy, but as an exporter of technology and innovation for the energy transition."

About Instituto MBCBrasil

Instituto MBCBrasil is a multisectoral organization dedicated to accelerating transport decarbonization through evidence-based public policies and technology neutrality, integrating biofuels, electrification, and renewable energy sources. For more information, visit the Instituto MBCBrasil Website or follow on LinkedIn and YouTube.

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