

# The Untapped Potential of Biogas in Natural Gas Vehicle Adoption: A Cleaner and Circular Path Forward

NEWARK, DE, UNITED STATES, April 21, 2025 /EINPresswire.com/ --

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The [automotive natural gas vehicle market](#) is estimated to reach USD 15.64 billion in 2025. It is anticipated to grow at a CAGR of 7.1% during the assessment period 2025 to 2035 and reach a value of USD 31.06 billion by 2035.



Automotive Natural Gas Vehicle

The global CNG vehicles market has gained steady momentum over the past decade, largely fueled by rising concerns about air pollution, fluctuating crude oil prices, and the push for clean fuel transportation. Natural Gas Vehicles (NGVs), especially those running on Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG), have emerged as promising alternatives to diesel and petrol vehicles, particularly for fleet operators and public transit systems. However, discussions around NGVs remain predominantly centered on fossil-based natural gas, leaving out a critical and renewable alternative—biogas.

Biogas, often called bio-CNG or renewable natural gas (RNG) when purified, presents a transformative opportunity for NGVs. It enables not only low-carbon mobility but also contributes to waste management, rural economic development, and energy independence. Despite these clear advantages, its adoption remains limited due to low awareness and systemic inertia. As nations pursue decarbonization goals and circular economy models, biogas could play a pivotal role in shaping the future of alternative fuels in transportation.

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To understand the value of biogas in the NGV market, it's crucial to distinguish it from conventional CNG. While CNG is a non-renewable fossil fuel extracted from natural gas reserves,

biogas is generated through the anaerobic digestion of organic materials such as agricultural waste, food scraps, and sewage sludge. When this raw biogas is cleaned and upgraded—by removing impurities like carbon dioxide and hydrogen sulfide—it becomes biomethane, which is chemically almost identical to CNG and can be injected into existing natural gas pipelines or compressed as bio-CNG for vehicle use.

This makes biogas not only compatible with existing NGV technologies but also a carbon-neutral or even carbon-negative fuel, depending on how it's sourced and processed. Using waste that would otherwise emit methane directly into the atmosphere, biogas systems reduce greenhouse gas emissions at both ends of the value chain. The outcome is a cleaner, renewable fuel that fits seamlessly into the current NGV infrastructure without the need for technological overhauls.

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Biogas represents a rare convergence of environmental responsibility and economic viability, especially in the context of a circular economy. In India, for instance, the government-backed SATAT (Sustainable Alternative Towards Affordable Transportation) initiative has supported the establishment of hundreds of small-scale biogas plants across rural regions. These plants convert cattle dung and crop residue into bio-CNG, which is then used to fuel local transport fleets—creating local jobs, reducing urban-rural fuel dependency, and minimizing agricultural waste burning.

Sweden, often cited as a model for green transportation, powers nearly 60% of its public buses with biogas derived from municipal solid waste and sewage. In the U.S., California's Low Carbon Fuel Standard has spurred major investments in RNG production from landfills and dairy farms, with logistics companies like UPS and Waste Management integrating renewable natural gas in vehicles to meet sustainability targets. According to the U.S. Environmental Protection Agency (EPA), RNG used in transportation can reduce lifecycle GHG emissions by up to 300% compared to diesel, factoring in avoided methane emissions.

These examples underscore the fuel's potential to close resource loops and generate clean energy while solving local waste disposal problems. They also illustrate how biogas can shift the narrative from fossil-dependent NGVs to self-sustaining, community-powered clean mobility solutions.

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Despite promising pilot projects and government support, biogas remains a niche segment within the broader NGV market. Part of the challenge lies in fragmented infrastructure and a lack of awareness among fleet operators and policymakers. The European Union's Renewable Energy

Directive II mandates increased use of advanced biofuels, including biogas, in the transport sector. Similarly, India’s SATAT aims to produce 15 million tonnes of bio-CNG annually by 2025. Yet, these ambitions are often thwarted by regulatory red tape, low private sector investment, and technical know-how gaps at the grassroots level.

Moreover, biogas suffers from a perception problem—it is frequently viewed as a waste management solution rather than a premium, high-performance automotive fuel. This restricts market traction and delays integration into national energy and transportation planning. Bridging this gap requires concerted efforts in public-private collaboration, targeted subsidies, and inclusion of bio-CNG in mainstream clean energy dialogues.

One of the key advantages of biogas is its plug-and-play compatibility with existing CNG technologies. Vehicles that run on fossil-based CNG require no engine modification to use bio-CNG. Similarly, existing refueling stations can distribute upgraded biomethane through the same pipelines and compressors, minimizing infrastructure costs. Companies such as Scania and Iveco already produce dual-fuel heavy vehicles capable of running on both fossil CNG and biogas.

Furthermore, decentralized biogas production can be aligned with regional transport networks. For instance, bio-CNG generated in a rural area can fuel local farm-to-market trucks or regional bus services, minimizing distribution losses and enhancing energy sovereignty. Such models not only reduce emissions but also provide a scalable template for renewable transportation in developing economies with agricultural abundance.

Some of the major manufacturers of CNG vehicles are:

- Hyundai Motor Company
- Honda Motor Co. Ltd.
- Suzuki Motor Corporation
- General Motors Company
- Ford Motor Company
- Volkswagen Group
- Fiat Chrysler Automobiles
- Mitsubishi Motors Corporation
- Mercedes-Benz Group
- Nissan Motor Company Ltd.

The automotive natural gas vehicle market is segmented into compressed natural gas (CNG) and liquefied natural gas (LNG).

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In terms of vehicle type, the market is segmented into passenger vehicles and commercial vehicles.

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