India Compressed Biogas Market Assessment, By Raw Material [Agricultural Residue, Municipal Solid Waste, Sugarcane Press Mud, Distillery Spent Wash, Cattle Dung, Others], By End-user [Own Retail Outlets, SATAT Scheme, CBG-CGD Synchronisation Scheme, Others], By Region, Opportunities and Forecast, FY2018-FY2032F

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Report description:

India compressed biogas market was valued at USD 15.64 million in FY2024, expected to reach USD 40.14 million in FY2032, with a CAGR of 12.50% for the forecast period between FY2025 and FY2032. India is witnessing a significant shortfall of 25,488 mmscm due to its current gas production of 29,769 mmscm against its consumption of 55,256 mmscm. This shortfall, accounting for about 46.12% of total consumption, is met largely through imports. Compressed biogas (CBG) appears to be a viable solution to meet the country's clean energy and sustainability targets efficiently.

India's vast economy and rapid population growth have created increased demand for energy, reflecting a dire need for alternate and sustainable sources of energy in India. Since, CBG is produced from raw materials such as animal manure, municipal solid waste, and agricultural wastes, it provides a domestic renewable resource solution which can be utilized to meet the energy gap. As per the estimates of Indian Oil Corporation Limited (IOCL), India's CBG holds a strong potential of around 62 million metric tonnes (MMT), along with the generation of 370 MMT bio-manure, highlighting the enormous potential for substituting dependence on imported gas and augmenting energy security.

The applications of CBG extend beyond addressing the energy deficit. In industries, it provides a much cleaner source of energy, supporting cleaner modes of production and use in transportation as a substitute of CNG. Moreover, the government of India has undertaken various initiatives and programs to drive the compressed biogas market in India. For instance, recently launched in 2022, the National Bioenergy Programme aims to accelerate the sustainable transition through the large funding available for CBG projects, thus showcasing a critical commitment towards harnessing domestic renewable resources.

Furthermore, with improving technology, decreasing costs, and supportive policies by the government, India compressed biogas market is bound to prosper. Higher integration with other renewable energy sources and infrastructure enhances its impact.

Moreover, CBG showcases a crucial contribution to the attainment of climate objectives and targets of India's energy security sector, positioning it as a cornerstone of India's renewable energy scenario.

The Emerging Potential of Compressed Biogas

The compressed biogas market in India presents huge potential for waste management improvement as local clean energy production increases. It is reducing the imported compressed natural gas (CNG), which is currently fulfilling 47% of the gas requirements in the country. As the market evolves, the push towards setting up 5,000 CBG projects under the Sustainable Alternative Towards Affordable Transportation (SATAT) scheme ensures a leaning step towards more sustainable energy solutions. Although the sector has witnessed slow progress in the beginning, the sector's expansion is on the horizon. The market offers opportunities due to a limited number of engineering, procurement, and construction (EPC) developers and technology providers, thereby opening huge scope for innovative new entrants in market looking to solve specific challenges. Explicit areas that require development and urgent attention involve regional-level feedstock mapping, which could be enhanced with AI-driven localized estimations to optimize plant planning. Additionally, the mixed feedstock technology development could enhance the plants' efficiency by keeping them capable of handling different kinds of feedstock, thereby addressing issues related to sourcing and shortages. Furthermore, capturing and utilizing the generated CBG as a green energy source, thereby creates new opportunities for high-end applications such as cooking, transportation, etc. Addressing these needs can drive the sector forward, ensuring a more sustainable and efficient energy landscape for India.

Government Initiatives Acting as a Catalyst

The Indian government has taken significant strides towards the promotion of clean energy, especially compressed biogas. Government schemes such as Sustainable Alternative Towards Affordable Transportation (SATAT), launched in 2018 by the Ministry of Petroleum and Natural Gas (MoPNG), promote CBG as a green fuel using agricultural and organic waste, with a target of 5,000 plants by the end of 2024. Additionally, in March 2024, 53 CBG projects have been commissioned under the SATAT initiative. With visible support, SATAT encourages entrepreneurs to undertake initiatives and invest in the CBG infrastructure throughout the country. Besides SATAT, various other schemes have been rolled out to strengthen the investment pipeline in biogas such as GOBARdhan, the New National Biogas Organic Manure Programme, Biogas Power Generation Off-Grid, and Thermal Energy Application Programme.

Furthermore, the 2023-2024 Union budget reiterated the commitment through an allocation of USD 1.20 billion (INR 10,000 crore) for 500 new waste to wealth plants, including 129 dedicated to CBG. Currently, a total of 198 green power plants, out of which there are 12 CBG plants and 186 biogas plants have been set up. It showcase the building momentum in the sector. All these initiatives are directed toward signifying the strategic focus of the government in the growth and development of the compressed biogas market to support India's renewable energy landscape.

Boosting CBG Supply through CGD Synchronization

The CBG-CGD Synchronisation Scheme enhances the integration between the compressed biogas production and City Gas Distribution (CGD) networks intending to provide a more efficient and sustainable energy ecosystem. The scheme brings demand centers closer to biogas production facilities, which provides advancements in the development of a gas-based economy. This alignment is particularly timely given the increasing demand for biogas, driven by a significant shortfall in domestic gas supply for PNG (Domestic) and CNG (Transport) segments, which currently stands at approximately 7 MMSCMD. Furthermore, the scheme mandates the blending of Biogas/CBG with CGD networks, with the required blend percentage set at 1%, 3%, 4%, and 5% of totaling CNG/PNG consumption for FY2025-FY2026, FY2026-FY2027, FY2027-FY2028, and FY2028-FY2029, respectively. This strategic approach addresses the supply shortfall and supports the growth of compressed biogas market and fosters a transition toward greener energy solutions in India.

Regional Variations in India's CBG Sector

The regional dynamics of India's compressed biogas market reveal a promising landscape shaped by varying biomass resources. According to the Sardar Swaran Singh National Institute of Bio-Energy, the annual availability of biomass was estimated at 750 million metric tons, including a surplus of 230 MMT. Thereby, the country's compressed biogas market benefits significantly from its abundant biomass resources.

Uttar Pradesh, with its considerable availability of biomass resources and proactive policy for bioenergy, stands out as the leader in this sector. With an outlay of USD 89.40 million (INR 750 crore) for CBG projects from 2022 to 2027 and various other

incentives, UP is positioned to lead the market. The western region of the state produces a significant amount of pressmud, a by-product from sugar belt, supporting most of the existing and planned CBG plants. The region alone supports 1,000 of the 5,000 CBG plants planned under SATAT by using 20% of its surplus feedstock. Moreover, Punjab and Madhya Pradesh offer high potential for CBG production, particularly from agricultural waste. While Maharashtra leads in CBG production from municipal solid waste (MSW) and sewage waste, it is one of the leading states in CBG production from sugarcane and distillery waste. Furthermore, the state of Tamil Nadu ranks next to Maharashtra in the production of MSW-based CBG, reflecting regional strengths in different biomass sources. The regional analysis showcases the diverse and considerable opportunities existing for expanding the CBG market in the country's different states.

Future Market Scenario (FY2025 - FY2032F)

- In the future, the CBG market in India will more likely be focused on the enrichment and marketing of Fermented Organic Manure (FOM). With increasing awareness and technological support, effective enrichment strategies will transform FOM into a valuable product for farmers, addressing current challenges and broadening its market acceptance.
- The development and adoption of cost-effective, efficient feedstock pretreatment systems will drive growth in the CBG sector. As investors will have more clarity on the pros and cons of available variants of pretreatment methods, the selection of optimal techniques will lead to enhancements in feedstock utilization, hence supporting sustainable and scalable biogas production.
- Efforts to develop and expand markets for CBG and its by-products, such as organic manure, will be crucial. Increasing awareness and adoption among farmers and dealers will support the sector's long-term growth in the forecast period.

Key Players Landscape and Outlook

The key players operating in India compressed biogas market undertake various strategies to sustain in the sector. For instance, in February 2024, Reliance Industries stated the company's plans to expand its footprint by setting up over 50 CBG plants within two years with an investment of over USD 595.63 million (INR 5,000 crore). With massive investments in infrastructure, the company seeks to leverage CBG's eco-friendly attributes and its similarity to compressed natural gas (CNG) to meet the growing demand for sustainable fuel sources.

Additionally, other market players are leveraging government incentives and subsidies for renewable energy projects. To produce CBG effectively and efficiently, companies collaborate with farmers and waste management organizations to ensure a continuous supply of feedstock material in the form of biomass. Technological advancements in biogas production and upgrading processes are being prioritized to enhance efficiency and reduce costs. Overall, these strategies reflect a concerted effort to capitalize on the green energy trend, reduce carbon footprints, and address the country's energy needs sustainably.

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*Companies mentioned above DO NOT hold any order as per market share and can be changed as per information available during research work.

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