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**Biofuels: Catalysts for India's  
 Energy Transition and Global Leadership**

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**MISSION LiFE  
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India's decarbonization journey is now accelerated, riding at the back of firming Indian Carbon Market (ICM) mandates and the need to align with rapidly evolving international regulations. One such decarbonization lever, the fuel of the future, is compressed biogas (CBG). With the ability to lighten India's natural gas import bills, CBG sits squarely to meet India's net zero/decarbonization goals. Alongside, CBG promises to double farm incomes, reduce farm waste related pollution, and ensure energy security. Rapid developments are now being seen in the CBG sector since the announcement of Sustainable Alternative Towards Affordable Transportation (SATAT) scheme by the Government of India in 2018. The next big development comes with the phasing in of proposed CBG Blending Obligations (CBO), set to be implemented from FY '26. The Ministry of Petroleum and Natural Gas (MoPNG) proposed mandatory blending of CBG in compressed natural gas-T (CNG-T) and piped natural gas-Domestic (PNG-D) in city gas distribution (CGD) networks in Feb 2024 (hereafter referred to as CBG Blending Obligations, CBO)<sup>22</sup>. CBOs are set at 1%<sup>23</sup> for FY '26, scaling up to 5% by FY '29, providing the much needed thrust to CBG demand. Multiple factors will facilitate meeting the set CBOs. Eco-system support in the form of direct pipeline injection for large quantum of CBG, advancing the introduction of open access in gas transmission, easing out biomass aggregation issues, integrating renewable gas certificates with Indian carbon markets, are only some of the measures, seeking attention from policy makers.

Like with any new technology, policy and regulation certainty lead from the front in maturing markets and incentivizing private sector investments. Several policy reforms (both by central and state governments) are already in the making, but the call to action for a robust and clearly defined policy and regulatory ecosystem is now stronger than before. This article presents five key considerations.

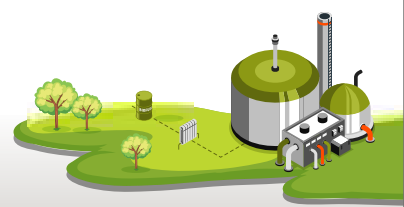
### **1. Need For Focused Technology Research & Development Spends**

The CBG technology development is still in its nascent stage in India and needs focused research and development (R&D) efforts. Two key policy inclusions can improve the momentum for the sector. First, technology options for feedstock pre-processing need dedicated research and fiscal incentives. Currently, capex incentives are in place for biomass aggregation, under the Biomass Aggregation Machinery (BAM) scheme, extending financial assistance for biomass aggregation to CBG developers. However, technology options and financing schemes are lacking in feedstock pre-processing and handling, which plays a key role in plant stabilization, availability and in improving gas yields. Second, given the nascent stage of CBG sector in India, the digester technology is still under experimentation, and requires focused R&D efforts, grants and proofing. Setting up state and central government grants through CBG R&D Centers of Excellence (CoE) will provide the necessary fillip to CBG technology providers.

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22. MoPNG Office Memorandum dated 27th Feb, 2024.

23. CBO: %prescribed for gas consumed in CNG-T and PNG-D networks.



## 2. Revised Gas Off-Take Price Methodology to Improve Project Returns

The current methodology for CBG off-take price is linked to the retail selling price (RSP) of CNG. OGMCs have set a floor price Rs. 46/kg (excluding taxes) till 31st March 2029<sup>24</sup> with actual off-take price indexed to a CNG RSP pricing slab. Off-take prices under the CBG-CGD synchronization scheme are also linked to average CNG RSP, with a control period of six months (to be revised every April and November of the financial year). There are two amendments in the current pricing methodology that would improve CBG project economics. First, a longer control period for gas off-take prices than currently, would go a long way in providing long term revenue guarantees for CBG developers. Examples can be drawn from the CERC Tariff Regulations 2024, that define an off-take price for biogas based power projects (where tariffs are determined under section 62 of the Electricity Act), for 25 years. A long-term view on off-take prices provides relief to developers. Second, by aligning with tariff regulations 2024, off-take prices for fuel dependent power projects get a single part tariff with two components (fixed cost and fuel cost component). Such pricing structures provide project returns to developers, basis return on equity, depreciation, operations and maintenance costs, and other project cost variables. These changes will go a long way in improving CBG project returns and spur developer confidence.

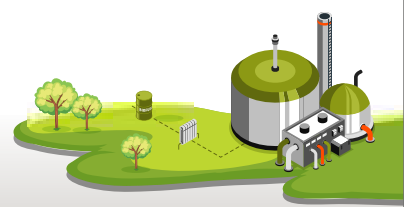
## 3. Renewable Gas Certificates (RGC): The Promise of Additional Revenue for CBG Developers Needs Integration with Indian Carbon Markets

MoPNG, in stakeholder consultation on CBOs, has prescribed that CBG shall be promoted as a green gas and guarantees of its origin shall be monetized through trading of green certificates. Renewable Gas Certificates (RGCs) are proposed to be market tradeable instrument which will enable mandated entities to meet CBOs. Under RGCs, green attribute from bio-methane shall be unbundled and will be attached to a green certificate. RGCs are set to play a pivotal role in elevating CBG economics. RGCs will help CBO obligated entities to meet blending obligations by purchasing RGCs, most usefully so, for mandated entities located in areas where CBG delivery is economically unviable (on account of grid connectivity unavailability and/or difficulties in cascade-based deliveries). For success of the RGC market, there are four imperatives that assume importance.

First, there is an urgent need to define ownership of the green attribute of bio-methane. Current SATAT, contracts are silent on the same. In view of improving project returns, it is recommended that developers retain and monetize the green attributes.

Second, it is essential that the RGC price is de-linked from the CBG off-take price and is available to the CBG producer in addition to the gas price. Important lessons can be learnt from the Renewable Energy Certificate (REC) markets which supported Renewable Energy Purchase Obligations (RPO) compliance for discoms (obligated entities). Under REC markets, renewable electricity offtake prices were set lower (~ Rs. 2.5/unit, linked to average pooled purchase cost of discoms) and REC floor prices were pegged at Rs. 1.5/unit of green electricity. This resulted in lower than attractive project returns for RE projects registered under the REC route, truncating the success of REC markets. A similar structure should not be adopted for CBG, in order to protect investor confidence.

24. IOCL Office Memorandum dated 20th May, 2022.



Third, RGCs should be introduced with a defined floor price, supporting and protecting both the demand side and supply side economics parallelly. On one hand, the RGC floor price should not dampen demand from mandated entities to buy these certificates, but at the same time, it should prove to be a remunerative revenue stream for the CBG developer. Thus, the RGC mechanism calls for careful economic designing.

Fourth and finally, given that the CBG sector has been identified under voluntary markets in the Indian Carbon Markets regulations, clarity is needed on the convergence of RGCs with carbon credits.

#### 4. Off-Take Mandates, Treatment and Price Support for Digestate

To support the marketing and sale of CBG by-products namely Fermented Organic Manure (FOM), Liquified Fermented Organic Manure (LFOM) and Phosphate Rich Organic Manure (PROM), Department of Fertilizers (DoF) announced the Market Development Assistance scheme in Sep 2023<sup>25</sup>. Currently, CBG producers have the option of marketing FOM/LFOM to fertilizer marketing companies, either in bulk form and/or packed form. MDA has been pegged at Rs. 1,500/MT of digestate sale. However, certain considerations demand notice to ease issues related to FOM, LFOM disposal. First, there is a need to re-assess the off-take price under MDA, to better project economics. An upward revision to Rs. 3000/MT would boost project revenues, compared to the current levels. Second, a phased mandatory offtake by national and state fertilizer companies and co-operatives will provide adequate relief. Blending mandates can be introduced at a modest 2% in chemical fertilizers, with blending trajectory moving to 20% by 2030. Digestate blended fertilizers can enhance the depleted carbon content of soil and provide a fillip for agricultural crop yield.

#### 5. Focused State Specific Targets and Incentives

Apart from schemes and incentives announced by the Government of India (GoI), state policies are being progressively announced with dedicated targets and incentives. Policies such as UP Bio-Energy Policy 2022, and the recently announced Integrated Clean Energy Policy (ICEP) by Andhra Pradesh provide for additional capex and opex incentives in form of fixed capital subsidies, SGST re-imburements, power tariff rebates, land on preferential lease, electricity duty exemption amongst others. Such dedicated state specific incentives which are available in addition to central assistance programs, are fundamental to attracting investments in biomass rich states and further national CBG production targets.

The compressed biogas (CBG) sector in India holds the next big promise to further India's decarbonization targets. A concerted effort from policymakers and industry stakeholders will serve as a foundation for scaling up the sector, which is sitting at the brink of expansion.



25. Department of Fertilizer Office Memorandum dated 20th Sep, 2023.

