



# Biogas

## Past, present, and future



# Introduction

Professional bioenergy association

Underwent 7 years of partnership with German Biogas Association (BIG-P)

Indian Biogas Association

Estd. 2011

Headquarters: Gurgaon, Haryana

**Supports, and Represents the stakeholders:**

- Operators,
- Manufacturers,
- Planners,
- Representatives from public bodies,
- Science and research, and
- All other environmental enthusiasts.

[www.biogas-india.com](http://www.biogas-india.com)

# Esteemed members



...more

# Buckets

Technical



Financial



Social



The core remains – communication, coordination and solution

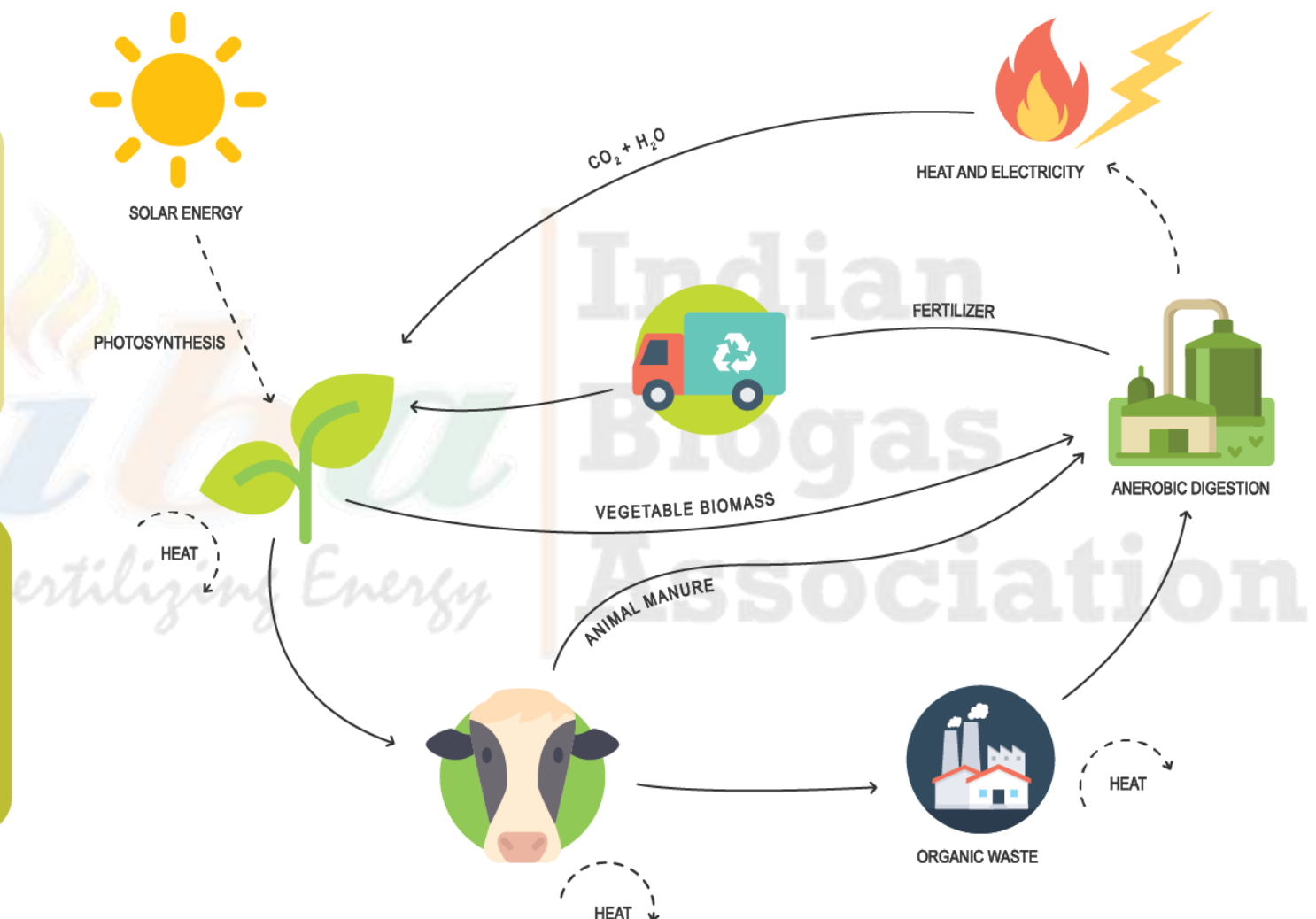
# Biogas as an all-rounder

**Waste Treatment Benefits**

- Natural waste treatment process
- Requires less land than aerobic composting
- Reduces disposed waste volume to landfill

**Energy Benefits**

- Net energy-producing process
- Generates high quality renewable fuel
- Numerous end-use applications



**Environmental Benefits**

- Significantly reduces greenhouse gas emissions
- Eliminates odours
- Produces nutrient-rich organic fertilizer
- Maximizes recycling

**Social Benefits**

- Inclusive economical growth
- Employment opportunities
- Empowerment of women

# Biogas Plants- Types

House-hold based  
(1-25 m<sup>3</sup>)



Community based Biogas  
Plant (25-1000 m<sup>3</sup>)



Large Scale Biogas  
Plant (>2500m<sup>3</sup>)



Commonly used technology :

- Fixed Dome- Janta Model, Deenabandhu Model
- Floating Dome-KVIC, FRP based,

Commonly used technology :

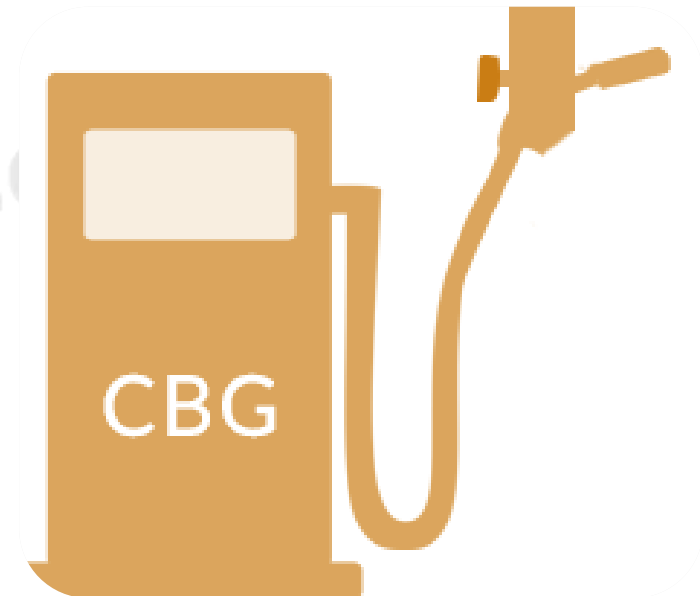
- KVIC, Nisarguna ( BARC), decentralized containerized solution

Commonly used technology :

- UASB, CSTR, Plug- Flow Type, Garage Type(Dry Fermentation)

# Specs of Biomethane

	Range	Method of test
CH <sub>4</sub> , percent, <i>Min</i>	90	IS 15130 (Part 3)
Moisture, mg/m <sup>3</sup> , <i>Max</i>	5	IS 15641 (Part 2)
H <sub>2</sub> S, mg/m <sup>3</sup> , <i>Max</i>	20	ISO 6326-3
CO <sub>2</sub> +N <sub>2</sub> +O <sub>2</sub> , percent, 10 IS 15130 (Part 3) <i>Max (v/v)</i>	10	IS 15130 (Part 3)
CO <sub>2</sub> , percent, <i>Max (v/v)</i> 4 IS 15130 (Part 3) (when intended for filling in cylinders)	4	IS 15130 (Part 3)
O <sub>2</sub> , percent, <i>Max (v/v)</i>	0.5	IS 15130 (Part 3)





# Feedstocks

## Source

## Approx. CBG Potential

Cattle Dung & Chicken Litter

18 MMT

Forest Residue

8 MMT

Agriculture Residue

12 MMT

Press Mud, Spent Wash & Baggasse

8 MMT

Municipal Solid Waste

2 MMT

Prospective energy crops in Barren, Waste & Single Crop Land

12 MMT

Total approx. CBG Potential: 60 MMT



# Recent developments in CBG industry



## Revision of CBG procurement price from 01.06.2022

- CBG price indexed to CBG Under SATAT initiative - Rs. 54/kg plus GST (minimum)
- Under CBG-CGD Synchronisation Scheme - Rs. 1082/MMBtu



## Market Linkage for FOM

- Department of Fertilizers (DoF) notification to fertilizer companies for mandatory offtake of FOM with chemical fertilizers as a “Basket approach”.
- DOF's has moved an EFC Note to provide Market Development Assistance to Bio & Organic Fertilizers including FOM



## MNRE's Umbrella Scheme “National Bioenergy Programme”

- CFA scheme revived for WTE and Biogas Projects



## Expediting setting of CBG projects

- OGMCs reviewing the LOI issuance process and providing handholding to entrepreneurs
- No separate PESO approval needed if approval is sought for dispensing CNG



## Relaxed recognition of CPCB

- CBG plants producing FOM (solid and liq.) kept under White (relaxed) category

Fertilizing Energy  
Biogas Association

# Status of SATAT Initiative

CBG Plants Commissioned: 46

CBG supply initiated through Retail Outlets: >61

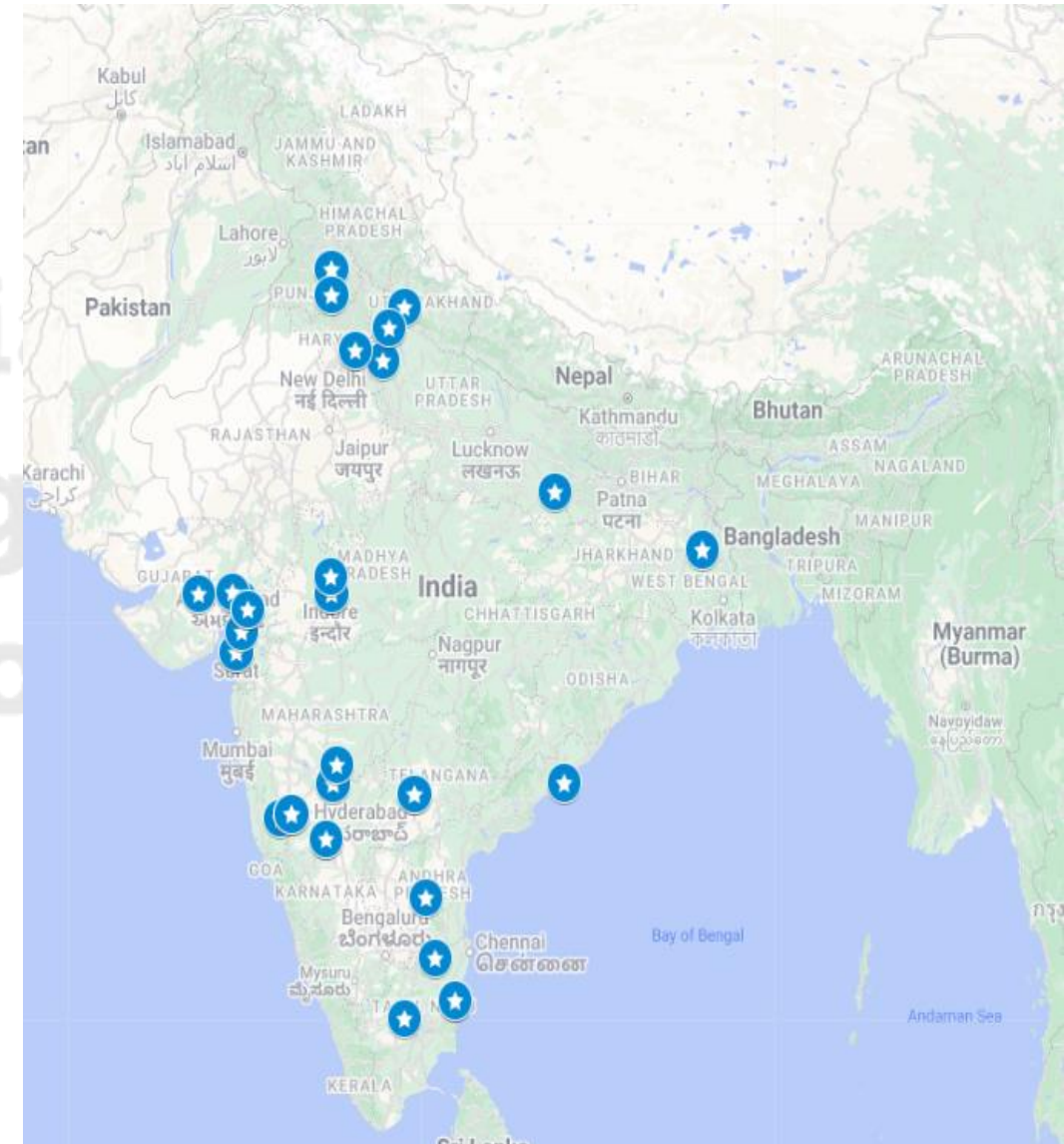
GA's supplying CBG under synchronization scheme: >12

CBG Sale : ~16,000 tons

LOI's issued: ~4100



## CBG Plants under SATAT



# LOI awarded



LOIs issued - 4090

Exp. CBG production >7.6 MMTPA

# New pricing mechanism

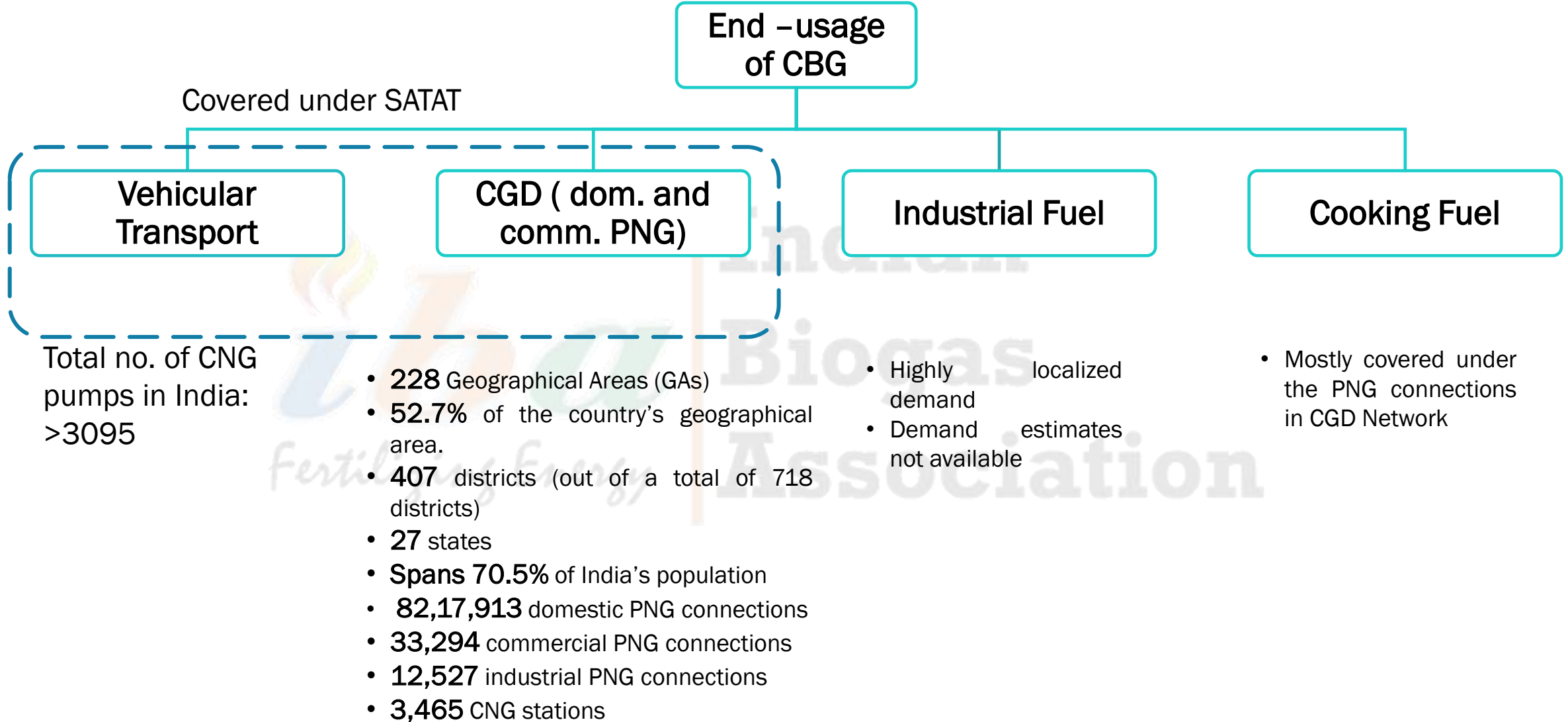
New procurement price of CBG delivered at OMC Retail Outlet situated at any distance (up to 75 km one way):-

S No	Lower Retail Selling Price of CBG in Slab	Higher Retail Selling Price of CBG in Slab	Procurement price of CBG	Procurement price of CBG
	including tax	including tax	Without GST	With GST
	Rs./kg	Rs./kg	Rs./kg	Rs./kg
1	Retail Selling Price of CBG up to 70		54.00	56.70
2	70.01	75.00	55.25	58.01
3	75.01	80.00	59.06	62.01
4	80.01	85.00	62.86	66.01
5	85.01	90.00	66.67	70.01
6	90.01	95.00	70.48	74.01
7	95.01	100.00	74.29	78.01

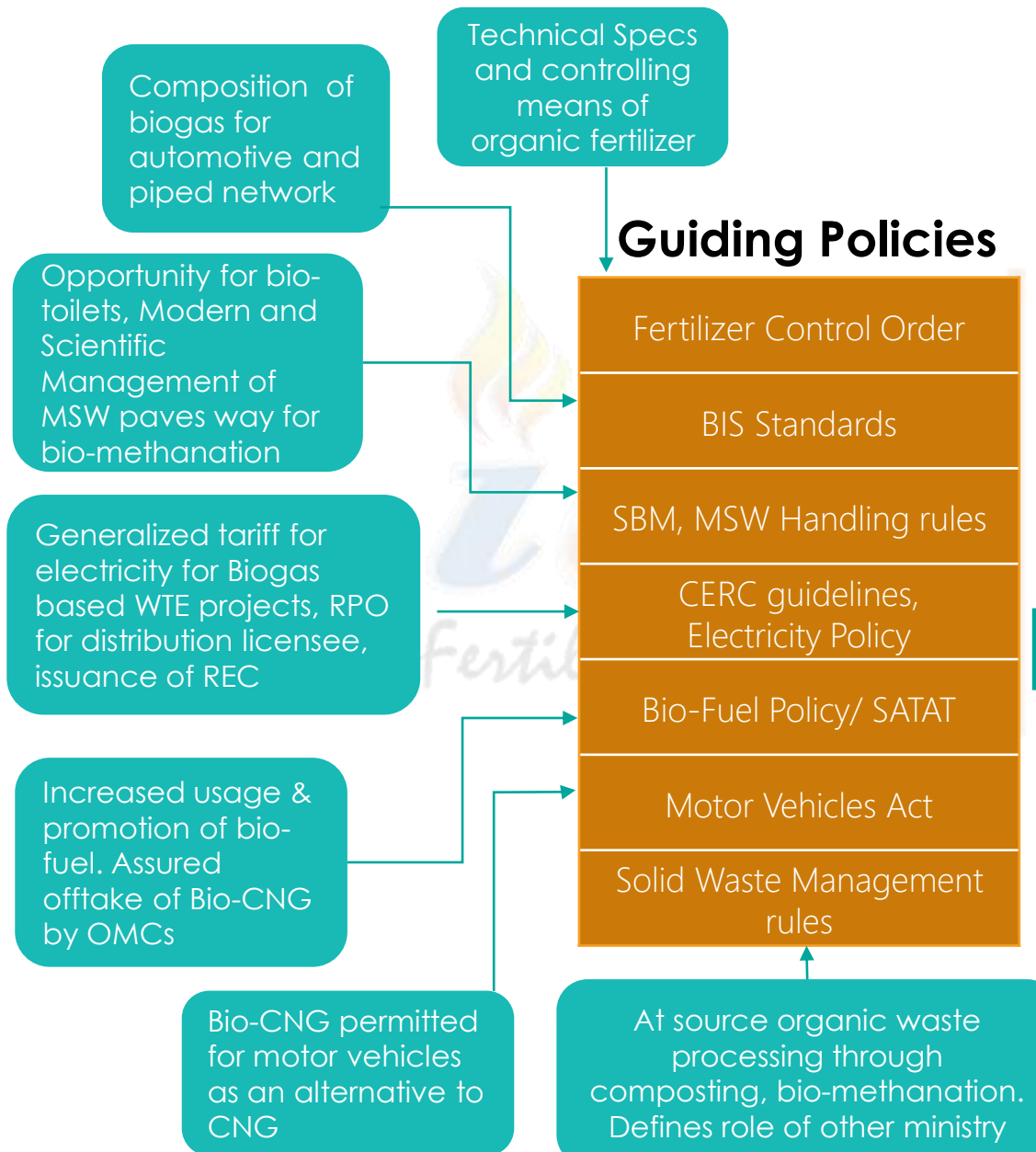
- The minimum procurement price of CBG will not be lower than Rs. 46/kg + applicable taxes for the period up to 31.3.2029.
- The Retail Selling Price of CBG in a market shall be at par with RSP of CNG (as provided by the authorized CGD entity).
- Additional transportation cost for transportation of CBG beyond 75 km (one-way distance) from CBG Plant shall be paid separately, at mutually discussed & agreed rates.
- For further increase in slabs beyond Rs. 100/kg, procurement price will be extrapolated as per the above.



# Offtake opportunities CBG



# Inter-Ministerial Participation



MNRE-Central Coordinating Ministry

Involved Ministry	Usage of Biogas and by products			
	Thermal	Electric	Transport	Organic Manure
MoAFW/ MoCF				✓
MoCA	✓		✓	?
MoUD	✓	✓	✓	✓
MoP		✓	✓	
MoPNG	✓	✓	✓	
MoRTH		✓	✓	?
MoEF	✓	✓	✓	✓

Other Supporting Ministries and bodies  
 MoRD, MoCI (PESO), MSME(KVIC), MoF (IREDA, NCEF, NABARD)

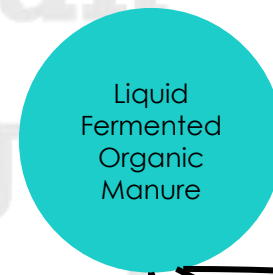
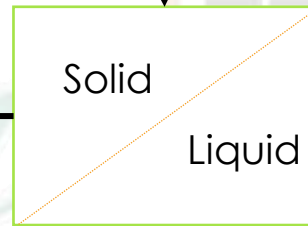
\* Large scale biogas plant

# Bio Manure Processing Technologies



CBG Plant

Digestate/  
Slurry Out



Separation Techniques (Screw Press, Screen Press, Centrifuge, Sieves, Band filter)

Process

Products

Composting

Drying

Pelletising

Vacuum Evaporation

Membrane Filtration

Precipitation

Water  
Waste water Treatment

Compost

Nutrient Solution,  
Granulates, PROM,  
Ammonium Sulphate

Digestate pellets

Nutrient Solution,  
Water,  
Ammonium Sulphate

Nutrient Solution,  
Water

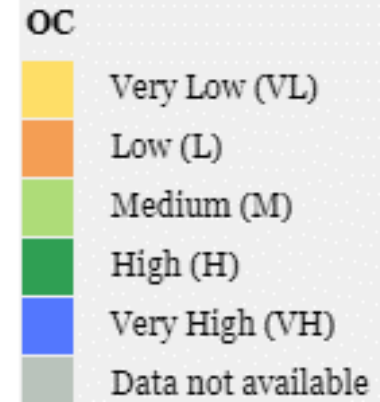
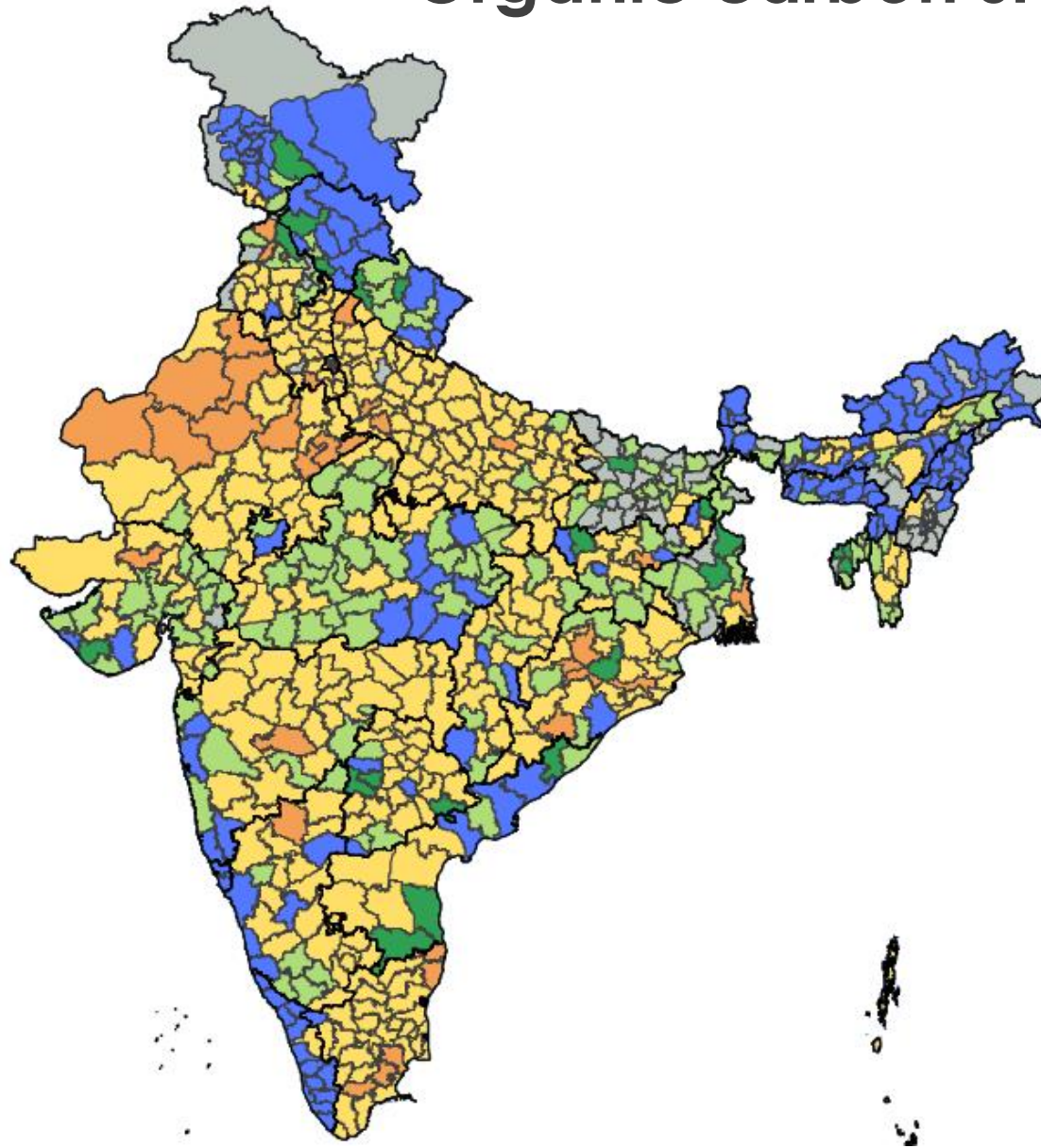
Magnesium  
Ammonium Phosphate,  
Calcium Phosphate,  
P-reduced digestate

Degree of prevalence in Indian Scenario





# Organic carbon status



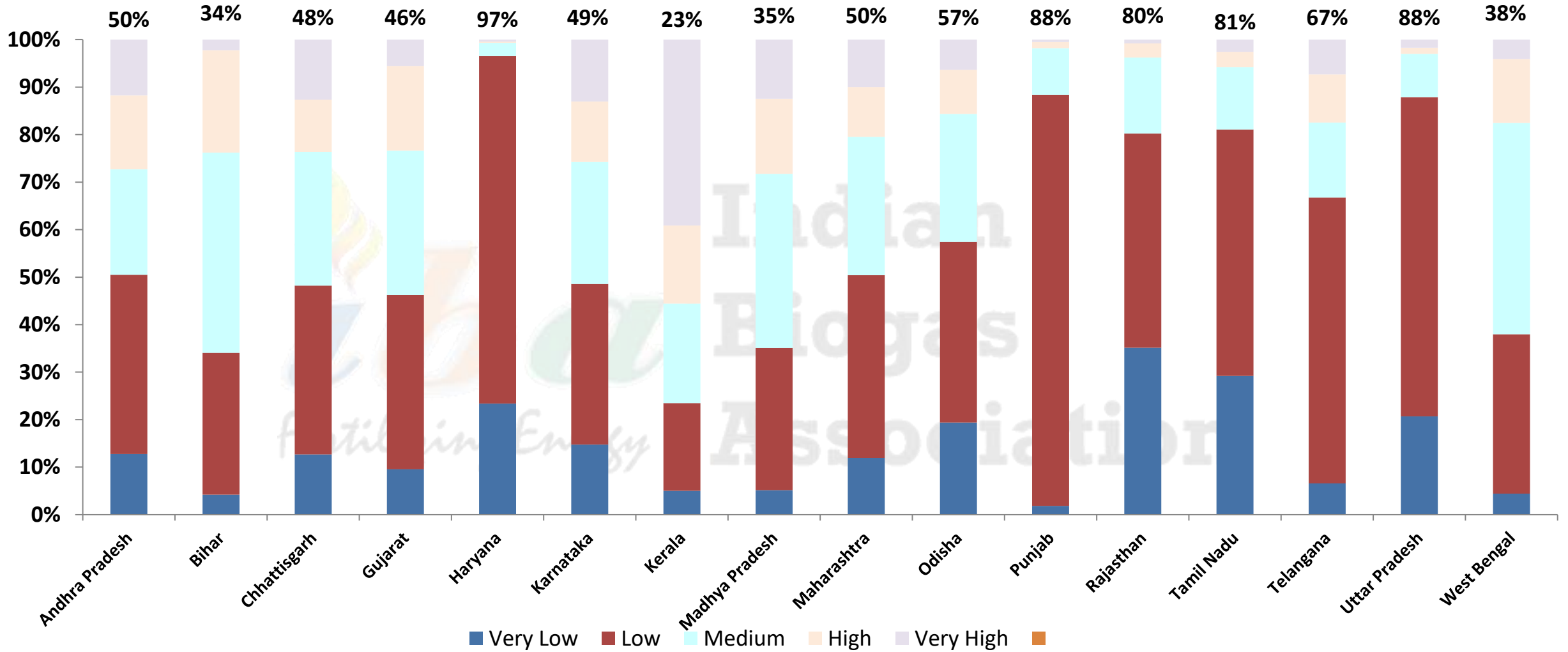
Low < 0.5%

Medium 0.5-0.75%

High >0.75%

Source : <https://soilhealth7.gov.in/>

# Organic carbon in soil



Percentages displayed are cases with very low and low organic carbon

<https://soilhealth.dac.gov.in>

# • Solid and liquid fermented organic manure •

Increase in crop yield

Replacement of chemical nitrogen and phosphorous

Restore natural soil fertility

Protection against drought and soil bourn diseases



**Bharat Biogas**

<p><b>Bharat Gold</b></p>  <p>BHARAT GOLD is a Microbial, Essential Nutritional Elements &amp; High Protein Enriched Organic Manure. Due to dual type of composting process (i.e. anaerobic and aerobic) which generates high temperature, this leads to destruction of all weed seeds, harmful fungus bacteria and other microbes.</p> <p><b>Product Advantage</b></p> <ul style="list-style-type: none"><li>- Balances soil Nutrition for Plants.</li><li>- Rich source of Organic Carbon for soil.</li><li>- Rich source of primary, secondary and trace elements</li><li>- User friendly due to powder form, apply through broadcasting</li><li>- Reduces addition of harmful chemical fertilizers</li><li>- Improves soil fertility by increasing N, P and K ratio</li><li>- Improves Organic matter, Minerals &amp; Microbes in soil.</li></ul> <p><b>Dose &amp; Method of Application</b></p> <ul style="list-style-type: none"><li>- 4-5 Bags (25kg) per acre can be applied in soil during land preparation /sowing by broadcasting method.</li></ul>	<p><b>Bharat Cs</b></p>  <p><b>Product Advantage:</b></p> <ul style="list-style-type: none"><li>- Consortium of Microbes. Safe and Environment friendly.</li><li>- Beneficial for Nitrogen, Phosphorous, Potassium and Zinc to the crops.</li><li>- It improves the soil pH and water holding capacity.</li><li>- Increases the yield by 15% to 25% and chemical fertilizers can be reduced by 30%.</li><li>- N.P.K.ZN- Bacterial Conjunction</li></ul> <p><b>Dose &amp; Method of Application:</b></p> <ul style="list-style-type: none"><li>- 1 Litre /acre can be applied in soil.</li><li>- Can be repeated as per need.</li></ul>
--	--



**Glow Green**



**Green Earth**

FOM is being exported to Kenya by Bharat Biogas, Anand

# “Organic” economy

Total fertilizer import value 2022-23 (projected) – Rs. 2.15 lakh crore

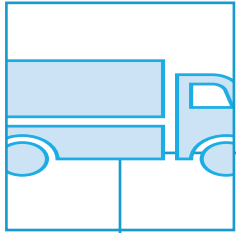
Manure generated from 5000 CBG Plants: 50 MMTPA

## Direct Replacement

- Urea (N) : 1.74 MMTPA
- SSP (P): 0.2 MMTPA
- MOP (K): 3.2 MMTPA

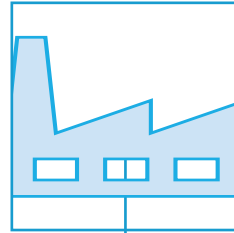
Value generated: Rs. 7000 crore through direct replacement of Chemical fertilizers

# Identified Enablers across value chain



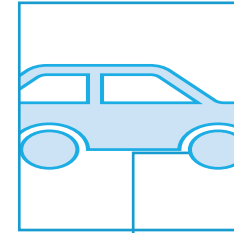
## Upstream

- Effective Crop residue management
- Streamlining aggregation chain for feedstocks
  - Importance of LTAs
  - Emphasis on D2D segregation and intact collection of MSW
- Subsidised Farm implements
- Nurturing org. like CHC, FPO
- Cluster Allocation



## Midstream

- Development of Standards
- Capacity building
  - skilled resources for industry
  - awareness amongst FI officials
- Govt. support
  - involvement of Centre and SNAs
  - single window clearance
  - subsidy and fiscal incentives
- Categorization (CPCB) under relaxed white category



## Downstream

- SATAT (assurance of offtake by the OMCs, offtake price indexed to CNG)
- Inclusion of FOM in FCO
- Policy measures for strengthening the sale of FOM (PGS, NMSA, PKVY etc.)
- PESO clearance for CNG applicable for CBG sales
- Enablers fostering sale of by-products like CO2 and H2S

# Enablers – Potential Revenue Streams

## CBG

- Sustainable Alternative towards Affordable Transportation (SATAT)
- CBG-CGD synchronization and involvement of CGD entities
- As per NDC, 50 % replacement of fossil fuel by 2030

## Organic Manure

- Introduction of FCO
- Value added products like PROM, vermi-compost, precipitated phosphorus, bio-char, etc.
- Conducive Organic policies like NPOP, PMKVY, PGS certification, etc.

## Carbon Offset

- Established Voluntary carbon market, like Verra, GCC, GS, etc.
- Energy Conservation (Amendment) Bill, 2022: Boost to compliance market
- 45% carbon emission intensity by 2030 as per NDC

## Demand of other by-products

- CO2 demand in industries: Chemicals, Pharma, Petrochemicals, F&B, Healthcare
- Demand of H2S in industries: iron smelting, breweries, chemical, etc.



# Recommendations

## A. Ease in Project Financing

S. No	Concerned Aspect	Desired Intervention
1.	Non-availability of Loans from Banks/ FIs.	<ul style="list-style-type: none"><li>• Needful list of coordinating banks/ FI (Affiliated Lending Institutions with contact details) can be clearly mentioned on IREDA/ MNRE/MoPNG website.</li></ul>
2.	Creation of 'Biogas-Fertilizer Fund'	<ul style="list-style-type: none"><li>• Generation Based Incentive (GBI)/Capex Subsidy to sanctioned plants <i>(CFA scheme lapsed and erstwhile budget allocation was way too less)</i></li><li>• Creation of a Credit Guarantee Trust for offsetting higher Collateral Requirement of lending FIs. <i>(Prevalent CGTMSE scheme covers just INR 2 crores)</i></li></ul>
3.	Priority Lending for CBG industry	<ul style="list-style-type: none"><li>• RBI to issue guidelines for Priority Lending ("<i>specific quota</i>") by Banks/ FIs for lending loans to bio-CNG/ CBG/ RNG plants/ projects.</li></ul>
4.	Disseminating awareness amongst FI	<ul style="list-style-type: none"><li>• Proper Capacity Building program to train the Financial Institution Officials (across hierarchy) to dispel the notion of undue inherent risk associated with bio-CNG industry. <i>(MoPNG/ MNRE to cater through its State Agencies)</i></li></ul>



# Recommendations

## B. Regulatory Requirement

S. No	Concerned Aspect	Desired Intervention
1	Unorganized Organic Manure Market	<ul style="list-style-type: none"><li>• A nutrient-based (N, P, K, and C) pricing approach for organic manure. ✓ <i>Extension of Market Development Assistance ( MDA of INR 1500/ton) for Fermented organic Manure, as was available for city compost under SBM</i></li><li>• Promotion and marketing of organic manure across all CBG projects through Fertilizer Marketing Companies ( IFFCO, KRIBCO, NFL, etc.)</li><li>• Appropriate BIS standard/ Eco-Mark for defining a Quality protocol leading to better market acceptance of org. manure.</li></ul>
2.	introducing Biomethane injection quota in Natural gas grid/ CGD	<ul style="list-style-type: none"><li>• Roadmap from MoPNG introducing mandatory blending quota of co-mingled CBG in the total gas supply to the CGD sector (PNG-H and CNG-T) in phased manner (i.e. short term, mid term, and long term).</li><li>• Introduction of CBG at SATAT defined price into the Gas Pool (domestic, spot RLNG) for pricing the gas procured by CGD players (Pvt. Player included)</li></ul>

# Recommendations

## B. Regulatory Requirement ( cont..)

S. No	Concerned Aspect	Desired Intervention
3.	Creation of RPO/REC alike ecosystem for CBG.	<ul style="list-style-type: none"><li>• Formulation of Renewable Fuel Obligation (RFO)/Renewable Fuel Certificate (RFC) ecosystem with a regulatory body (PNGRB) monitoring and implementing same.</li><li>• obligate fossil fuel suppliers /CGD entities to procure a defined quota of CBG (in its overall fuel supply mix) or, purchasing a Renewable Fuel Certificate (RFC) from CBG producers in case the assigned quota is not met.</li></ul>
4.	Single window clearance for projects.	<ul style="list-style-type: none"><li>• <b><i>Identification of respective departments/bodies. Integration of other department approval process through MNRE/ SNA portal.</i></b></li><li>• <b><i>Integrated File tracking mechanism for corresponding clearance departments.</i></b></li></ul>
5	Systematic communication between stakeholders and Govt. (all levels)	<ul style="list-style-type: none"><li>• Creation of cross-functional biogas/ bio-CNG/ CBG/ RNG Task Force and scheduling periodic meeting with the Task force.</li></ul>

# Recommendations

## B. Regulatory Requirement ( cont..)

S. No	Concerned Aspect	Desired Intervention
6.	Robust supply chain management	<ul style="list-style-type: none"><li>• Earmarking the Command Area- Identify, form, and allocate a cluster of villages for the Biomass-based projects to avoid the scarcity of biomass in that cluster.</li><li>• Strengthening of Custom Hiring Centers (CHC), Village Level Entrepreneur (VLE), FPO, etc. as an intermediary for getting into raw material supply contracts</li><li>• Govt. backed cooperatives/ agencies/ depts. such as NAFED, APMC, FCI, KVK, and other relevant bodies should be identified and integrated into the upstream supply chain network system for leveraging upon their wide network</li></ul>
7.	Need for overall standards in biogas/ bio-CNG for industry.	<b><i>Formulation of standards for: Terms and Definitions, Safety, Operation, Technical Specs, Emission, etc. in line with global standards (customized as per need) shall create a level playing field.</i></b>

# Recommendations

## C. Fiscal Support

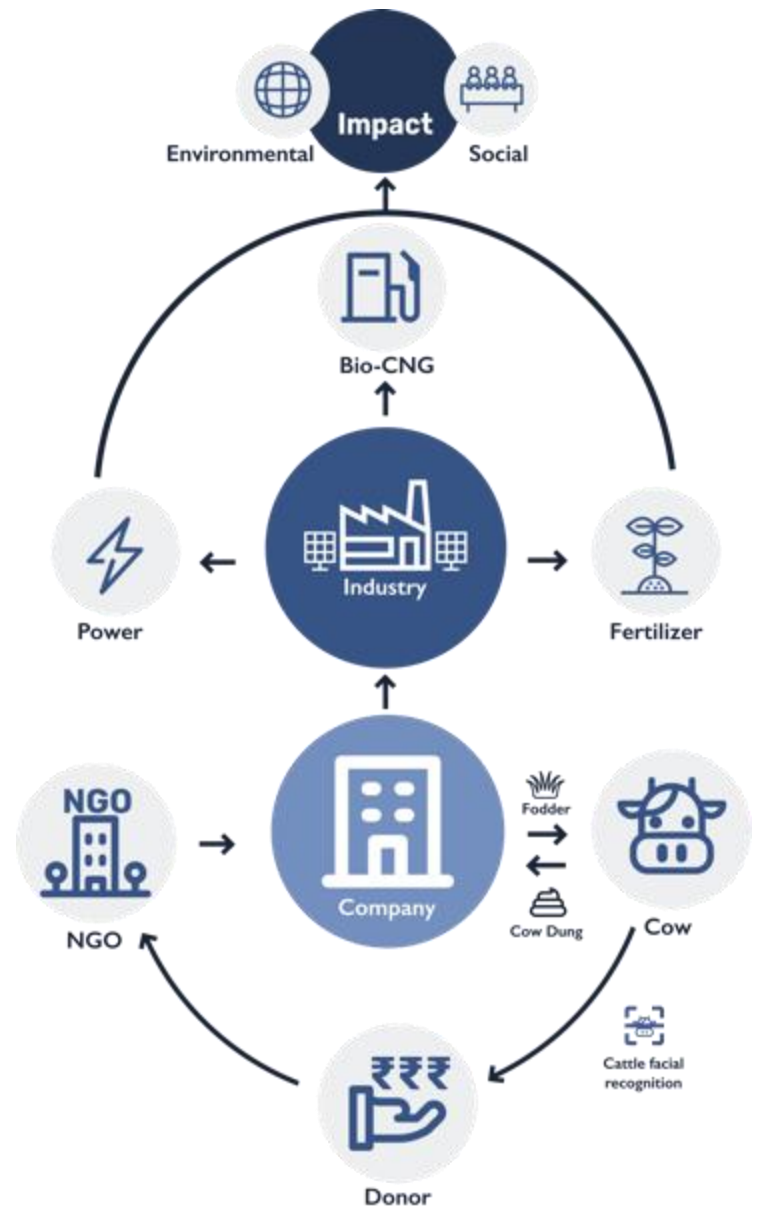
S. No	Concerned Aspect	Desired Intervention
1	Tax Holidays	<ul style="list-style-type: none"><li>• corporate tax exemption for at least 5 continuous years (<i>ambiguity in 80 JJA scheme for its applicability under new taxation schemes 115BAA and BAB</i>)</li></ul>
2.	Inverted GST structure	<ul style="list-style-type: none"><li>• Increased Project Cost due to Inverted Tax Structure ( Input tax &gt; Output tax)<ul style="list-style-type: none"><li>✓ 12 % GST biogas/CBG project equipment (<i>only for items defined in Sec. 84 and 85, other items at even higher rates</i>)</li><li>✓ 5% GST on biogas/ CBG plant outputs</li><li>✓ Service Contracts in higher bracket of 18%</li></ul></li></ul>

# Recommendations

## C. Fiscal Support (cont..)

S. No	Concerned Aspect	Desired Intervention
3.	Subsidy Coverage	<ul style="list-style-type: none"><li>• Continuation of the CFA scheme quintessential till the market pull happens</li><li>• Graduating towards Generation Based Incentive (GBI) from the ongoing Capex based subsidy ( will ensure adequate capacity utilization in long run)</li></ul>
4.	Establishing Fair Remunerative price (FRP) for bio-CNG	<ul style="list-style-type: none"><li>• Guideline needs to be issued by MNRE w.r.t. appropriate Market price for bio-CNG factoring economic viability of CBG plants for different feedstock and other crucial factors (cues to be taken from CERC tariff guideline)</li><li>• (based on different types of biomass/ biomass wastes IBA recommends a viability gap of ~Rs. 18-20/- per kg of Bio-CNG*</li></ul>

# GAU Ecosystem



# GAU Vision<sup>®</sup> – a software product

Recognition of cow face in the picture



Uniquely identifying the cow



Images from our Internal Research Paper



Images from real GAU Vision App

Onboarding and learning can be done in bulk. The technology works at hyper scale with tens of millions of cows.









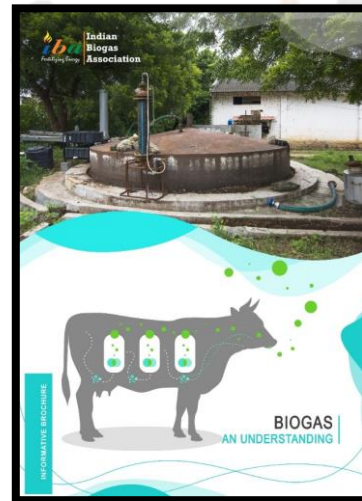
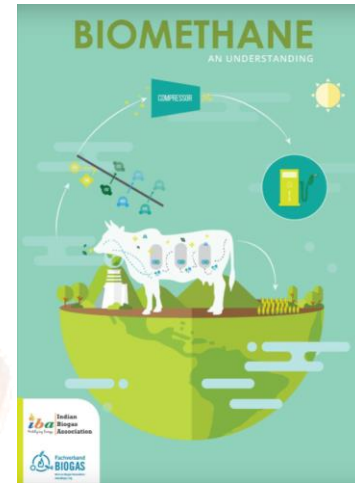
**Indian  
Biogas  
Association**

# Services – a glimpse

Magazines



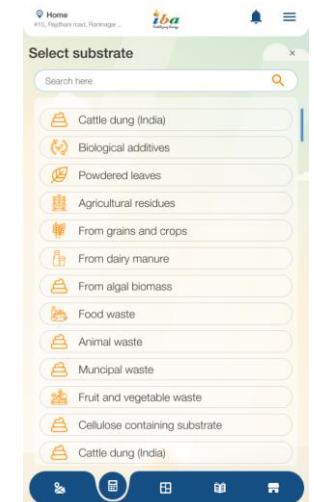
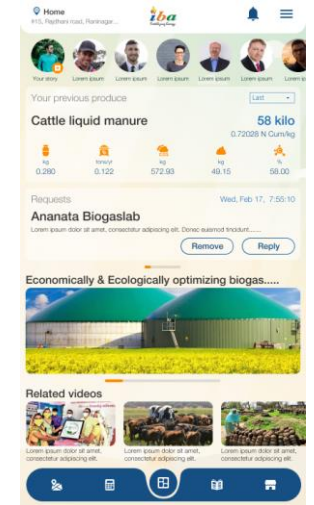
Biogas/Biomethane Brochure



Biolab Portal



Biogas App



# Services

## Basic Modes

- Newsletter, Flyers
- Magazines, Informative Brochures
- Social Networking
- What'sApp group
- Helpline
- Pavilion, Seminars, Awards and workshops
- Regional working groups
- Members' Feedback management
- General Assembly
- Online Training Courses
- Biogas Lab, Feasibility Studies

## Advanced

- Consultancy in waste management
- On-Demand Training
- Plant installation and O&M Training Program (Biomitra)
- Plant Certification
- Buyer Seller Platform (Biogas App)
- Due diligence of biogas projects

# Services – a glimpse (cont'd)

## Key Features:

- Located at IIT-BHU, Varanasi
- Comprehensive testing facility
- State of the Art laboratory
- Cross Disciplinary
- Regional Labs to be set-up

## Working Domains:

- Laboratory Analytics
- Yield Optimization
- Study of Substrates
- Feedstock Analysis



## Tests:

- Dry Matter (DM)
- Organic Dry Matter(oDM)
- Biomethane Potential
- Total Alkanity (TAC)
- Total Volatile Fatty Acids
- FOS/TAC
- $\text{NH}_4\text{-N}_{\text{tot}}$
- $\text{H}_2\text{S}_{\text{tot}}$
- BOD
- COD
- Acid Spectrum (C2-C6)
- Phosphorus ( $\text{P}_2\text{O}_5$ )
- Potassium( $\text{K}_2\text{O}$ )
- Total Organic Carbon (TOC)

Biogas Lab



# Services – a glimpse (cont'd)

## ✓ Site Assessment:

- Analysis of different available feedstock in project vicinity
- Land identification and its suitability
- Utility mapping of frozen site
- Overall demand mapping and assessing off-take feasibility
- Socio-economical analysis
- Identification and earmarking the relevant stakeholders

## ✓ Financial Feasibility

- Capex , Opex Estimates
- Free Cash Flow Analysis
- Financial Appraisal-Profitability, Liquidity, Leverage, Project Returns
- Sensitivity Analysis



## ✓ Technical Recommendations

- Comparison with contemporary technologies
- Specific Technology recommendation across the process steps
- Mapping with probable equipment suppliers

## ✓ Risk Analysis and Overall Recommendations:

- Setting up the overall project schedule (micro/macro level planning)
- Listing project specific permissions and clearance requirement
- Recommendation for optimal business model
- Scenario Analysis, overall risk assessment and mitigation plan–feedstock, offtake, social, technical, regulatory

# Feasibility Assessment



## Contact us:

**Address:** 216, Tower B3, Spaze-i-Tech Park,  
Sector 49, Sohna Road, Gurguram, Haryana  
122018

**Helpline:** 0124-4988622

**Website:** [www.biogas-india.com](http://www.biogas-india.com)

**Email:** [g.kedia@biogas-india.com](mailto:g.kedia@biogas-india.com)  
[info@biogas-india.com](mailto:info@biogas-india.com)