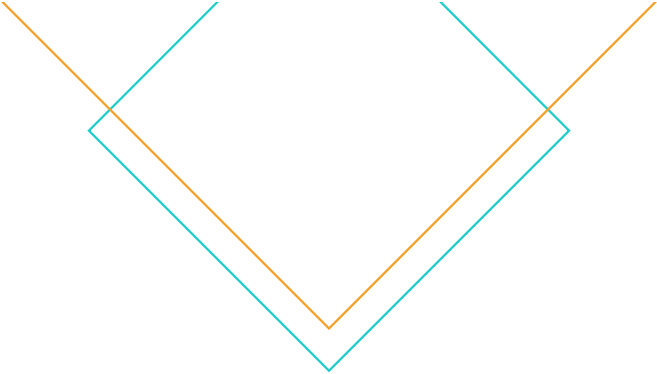




IGCC Webinar, 26 May 2020

Biogas/Biomethane Scenario in India

Gaurav Kumar Kedia
President



www.biogas-india.com

History of Biogas In India

1859-First digestion plant was built at leper colony in Bombay, India

1897-Biogas used for lighting at Matunga leper asylum, Bombay.

1946-The first biogas plant designed IARI, Delhi.

1952-Development of the floating dome model, Grama Laxmi- III by Jashbai Patel.

2008- Incorporation of BDTC at IIT-Delhi

1981- Development of National Project on Biogas Development

1977-Development of Janata Model Biogas Plant

1962-KVIC's entry into the field of biogas technology

2009- Bio-CNG production/ utilization-Demonstration of Integrated Technology Package on Biogas-Fertilization Plants (BGFP)

2013 - Bio-CNG production/ utilization forms part of 'Programme on Energy from Urban, Industrial and Agricultural Wastes/ Residues'

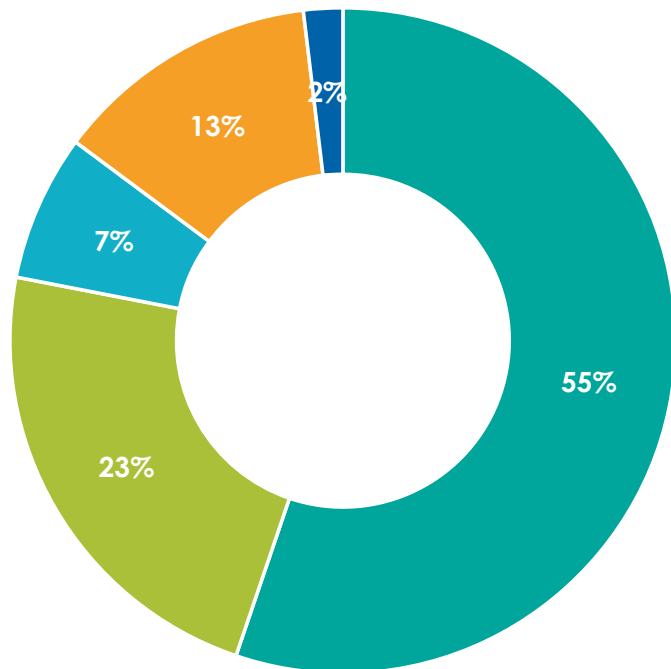
2013/2016- BIS Standard for Biogas Composition/further modification

2017 - Sustainable Alternative Towards Affordable Transportation (SATAT) launched for Bio-CNG/ CBG purchase and dispensation as auto fuel

Mix of installed Electrical Capacity in India

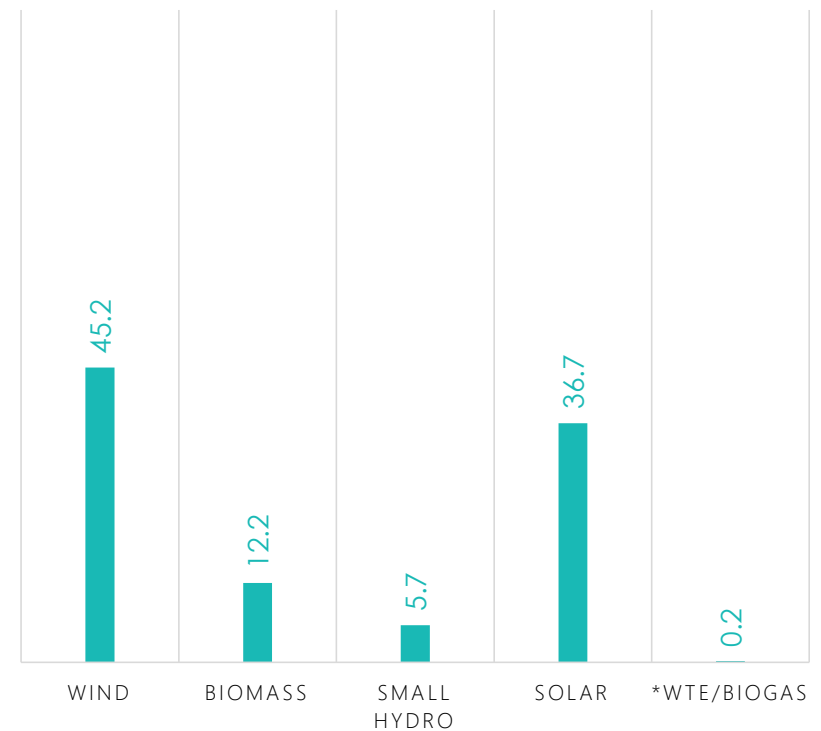
Overall Energy Mix

■ Coal ■ Renewable ■ Gas ■ Hydro ■ Nuclear



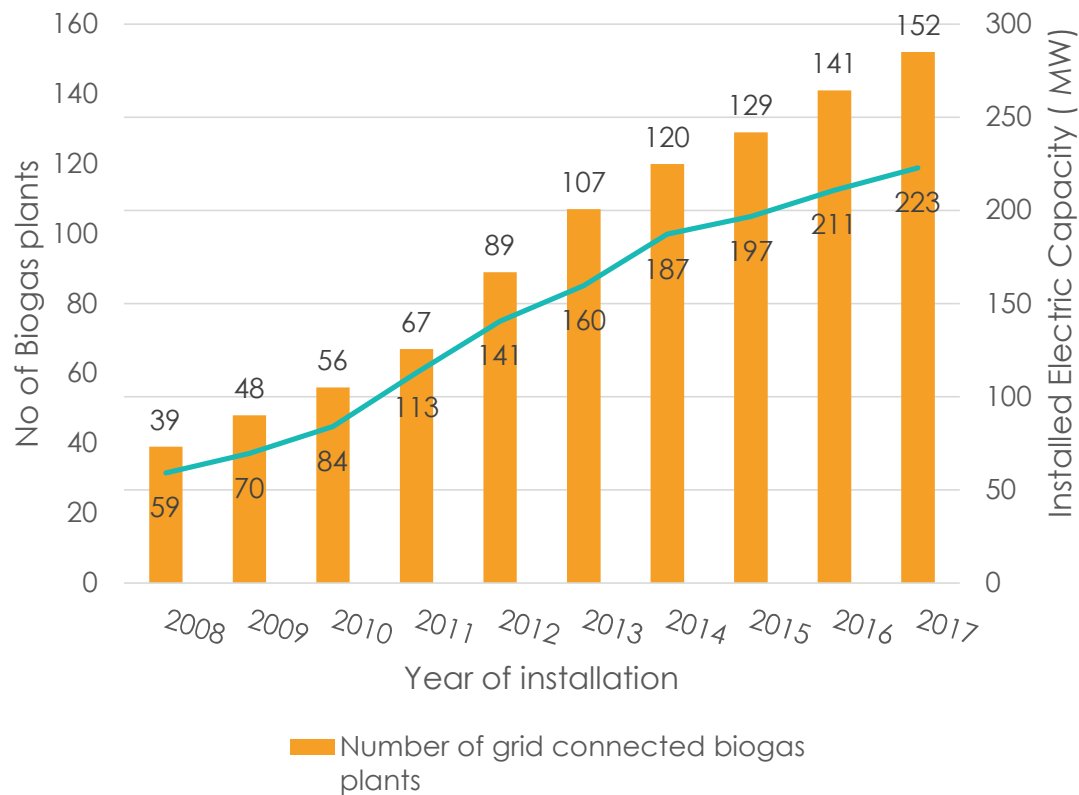
Total Installed Capacity: 358 GW

Share of Renewable Energy

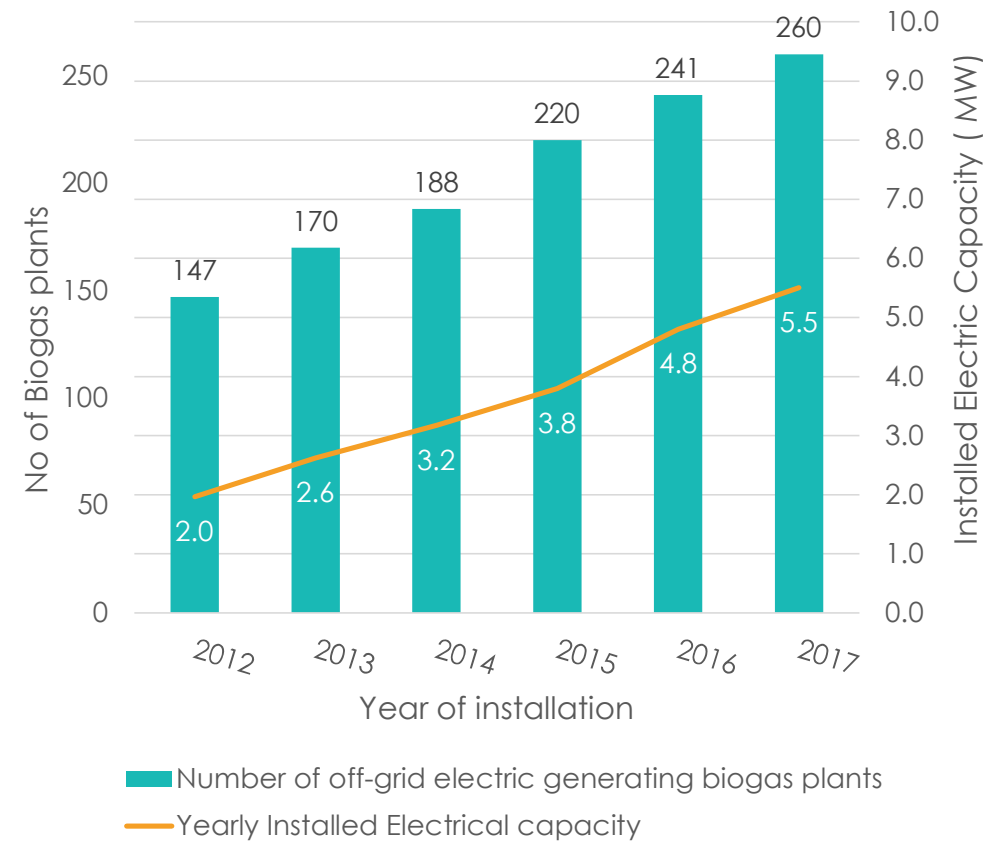


Status of Off-Grid / Grid Connected Biogas Plants in India

Grid connected Biogas plants (>250 KW)



Off-grid Biogas plants (< 250 KW)



Source: MNRE Annual Report (2008-2017)

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*Beginning period taken as 2012 due to inconsistent data in earlier years

Bio-waste to Biogas In India

- Cow Dung, poultry litter, horse dung, etc.
- Agricultural residues as rice/wheat straw, banana stem, maize stalks
- Sugar mill's press mud, Distilleries spent wash, Sago plant effluent
- Municipal Solid Waste, slaughter house waste, vegetable market waste, kitchen waste



Technologies



Domestic
biogas
digesters
(small scale)



(Covered)
Lagoon
digesters



Garage or
Batch



CSTR and
Plug-flow



Biomethane
(biogas
upgrading)

Low-tech solutions

High-tech solutions

Biogas Plants across segments

	Definition	Installed Base	Future Potential
Small Biogas plant	These consist of biogas plants of the size between 1 to 10 cubic meter capacities	A cumulative total of 4.8 million family type biogas plants have been set up in the country	Estimated potential of 12 million family plants
Medium Biogas plant	Power generation capacity between 3 KW to 250 KW	There are about 300 small and medium biogas plants (5-25 KW)	Currently insignificant to be sized
Large Biogas plant	Equivalent power generation capacity above 250 KW	Few large scale installations, (50-60 No.) most on demonstration basis:	The estimated potential from urban municipal wastes is projected at c. 5000 MW equivalent by 2023
Industrial & Municipal waste Biogas plant	Plants based on feedstock derived from Industrial and Municipal waste	~ 40 power projects installed so far	The estimated potential of generation of power from industrial solid and liquid wastes is expected to increase to 2000 MW

Overall challenges in Indian Biogas Industry

	Challenges	Mitigation Strategies
MARKET	• Social Stigma (NIMBY syndrome) • Market for organic manure missing • Nascent Market with limited players	• Promoting Awareness, Reaching last mile with NGOs • Work on amendment to FCO, Dept. of Fertilizer • Awareness building, collaboration with Academic Institutes
OPERATIONS	• Feedstock security/Repeated break in Supply Chain • Non-Segregated waste supply • Availability of Skilled Manpower	• Resource Mapping, emphasis on pre-feasibility • Pan-India adaptation of SWM rules • Capacity Building, Tailor made courses
FINANCE	• Insecurity over business viability • Lack of credibility of customers • Access to loans from FI • Higher capital cost/ payback period	• Securing off-take, roping in OMCs • Due diligence, Certification of players • Priority Sector lending, Innovative Financial Models • Market development, Fostering Industry-Institute Partnership
REGULATIONS	• Inclination towards power based projects • Lack of concrete Standardization • Non Synchronous Centre and State Policies • Lengthier subsidy sanction method of MNRE	• Balance of centralized and decentralized tech. • Expedite development of Indian Standards • Building regional working groups to work on State and local body related policies • Performance based Incentives shall induce faster clearances

Policy Support for Biogas sector

Scale of Biogas plant

1-25 m³

Region	1 m ³ (Subsidy in INR)	2-6 m ³ (Subsidy in INR)
NE States	17000	22000
General	7500	12000
Toilet linked Biogas Plants	1600 (Additional subsidy)	
Turn-Key Fee (5 year warranty)	2500 per plant (1-10 m ³) 4500 per plant (15-25 m ³)	

National Biogas and Manure Management Program (NBMMP)

3-250 kW

Capacity	Subsidy (max up to 40% of total cost)
3-20 kW _{el}	40,000/kW**
20-100 kW _{el}	35,000/kW**
100-250 kW _{el}	30,000/kW**

Biogas Power(Off- grid) Programme (BPP)

For BPP, Thermal Subsidy is 50 % of above rates

***>250 kW

Waste/ Process/ Technology	Subsidy
*Bio-CNG from MSW	4 crore/ MWeq (max 10 crore per project)
Power generation based on biogas produced from Urban/ Agro Waste or, production of bio-CNG (under waste to energy)	3 crore/MWeq (max 10 crore/ project)
Only Biogas generation from Urban, Industrial and Agricultural waste/ residue	1 crore/ MWeq (max. 10 crore/ project)
bio-CNG generation from biogas produced from Urban waste/ Agro waste/ Ind. Waste or mix of these	4 crore/MWeq (max. 10 crore/ project)

Programme on Energy from Urban, Industrial and Agricultural Wastes/Residues

*Presently the subsidy amount is 4 cr/ MW_{el}. Prospectively its on cards to increase it to 5 cr/ MW_{el}

**Rates defined are for SC/SCT and NER states; for general states specific cost is 5000/ kW lesser across all scale

*** For only cattle dung based projects, limit of > 250 KW holds good

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Potential Business Cases (I)

Industries	Prominent Wastes Generated	Treatment Option	Application
Sugar Mills	Sugar bagasse	Combustion and Gasification/ Cogeneration	Heat and Power
	Pressmud	Biomethanation	Biogas production & digestate
	Sugar molasses	Fermentation	Ethanol synthesis
	Fermentative Yeast biomass	Biomethanation	Biogas production & digestate
Slaughter houses	Organs, Tissues, Blood, Hides, Animal excreta and Carcass etc	Biomethanation	Biogas production & digestate
Paper mills	Pulp	Biomethanation/Cogeneration	Biogas production & digestate
	Paper shavings	Combustion	Heat and Power
	Wood wastes and Paper boards	Combustion and gasification	Heat and Power

Potential Business Cases (II)

Industries	Prominent Wastes Generated	Treatment Option	Application
Dairy Plants	Whey and Milk cream	Biomethanation	Biogas production & digestate
Sago factories	Starch materials and peels	Biomethanation	Biogas production & digestate
Tanneries	Hides and skins	Acid treatments and biomethanation	Biogas production & digestate
Animal Husbandries	Animal excreta and body fluids	Biomethanation	Biogas production & digestate
Fruits and vegetable processing units	Pulp wastes	Biomethanation	Biogas production & digestate
Distilleries	Spent Wash	Biomethanation	Biogas production & digestate

Case Study (I)

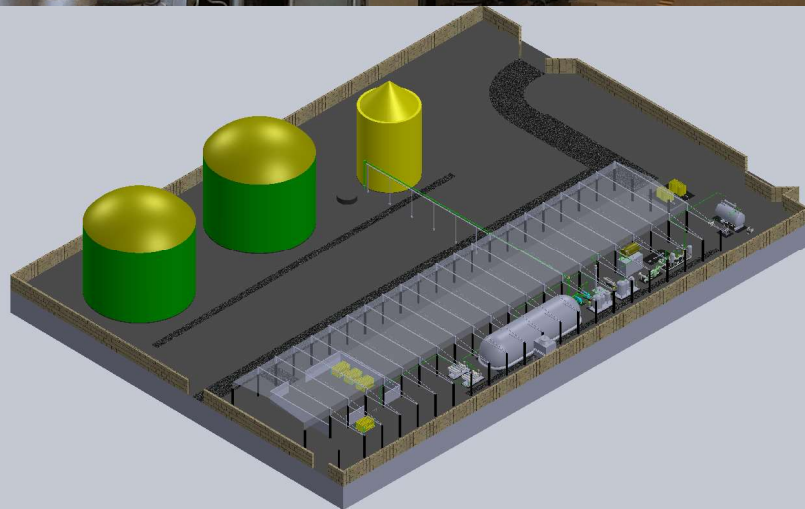
Project details:

1 MW high-rate bio-methanation plant based on cattle manure



- **Location:** Haebowal Dairy Complex, Ludhiana, Punjab, India
- **Project: Site Type :** Dairy Complex
- **Waste Collection:** Collected manually from local Gaushalas
- **Digester Type:** Intermittently stirred tank reactors based on biogas-induced mixing arrangement
- **Gas Storage:** 1000 CUM (bell and shell type made of neoprene coated nylon fabric
- **Owner:** PEDA, Punjab
- **Digester Volume:** 2X5000 CUM
- **Feedstock:** Cattle Manure 200 MT/day
- **Year of commissioning:** Sept, 2004
- **End Use:** Power generation

Case Study (I) - glimpses



Case Study (II)

Project details:

14000 m³ Biogas plant from dung, vegetable waste, and press mud



- **Location:** Umreth, Vadodara, Gujarat
- **Site Type:** Rural Locality
- **Waste Collection:** Dung collection from dairy, discarded potato pulp and press mud from local industries.
- **Technology:** CSTR based biogas plant, up-gradation facility (MPSA) and CNG filling station
- **Owner:** Bharat Biogas Energy Limited
- **Digester Volume:** 2X 6000 m³
- **Feedstock:** Dung, press mud, and potato pulp
- **Year of commissioning:** Nov, 2015
- **End Use-** Bio-CNG for industrial use. Fertilizer processed, conditioned and sold to the market with defined nutrients

Case Study (III)

Project details:

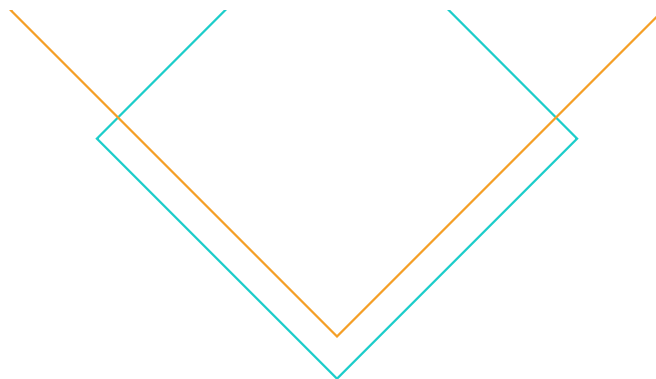
3000 Kg/ Day
bio-CNG based
on sewerage
waste water



- **Location:** Delawas, Jaipur, India
- **Site Type:** STP
- **Waste Collection:** Sewerage waste water from 25Km surrounding
- **Technology:** Activated Sludge Process with anaerobic Digester and centrifuge unit
- **Digester Volume:** 2X 3500 m³
- **Owner:** Jaipur Municipal Corporation
- **Feedstock:** 125 MLD sewerage water
- **Year of commissioning:** July 2011
- **End Use:** 3,000 kg/day from 8,400 m³/day of Bio-CNG. Captive Power generation from remaining.

• Case Study (III) - glimpses •





Indian Biogas Association



www.biogas-india.com

Introduction

- Headquarters: Gurgaon
- First nationwide and professional biogas association, established in 2011
- Supports and represents the stakeholders:
 - Operators,
 - Manufacturers,
 - Planners,
 - Representatives from public bodies,
 - Science and research, and
 - All other environmental enthusiasts.
- In Partnership with German Biogas Association (BIG-P)

Vision and Mission

Vision

"Our vision is to propagate biogas in a sustainable way, and in the process, improve the life of our countrymen by bridging the energy deficit in greener way, while also reducing pollution and waste of our cities."

Mission

"Our mission is to increase awareness of biogas, promote research and development activities in the sector, and improve the business scenario of the biogas industry by advocating for conducive policies."

IBA Team



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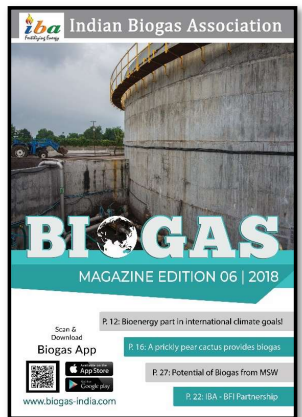
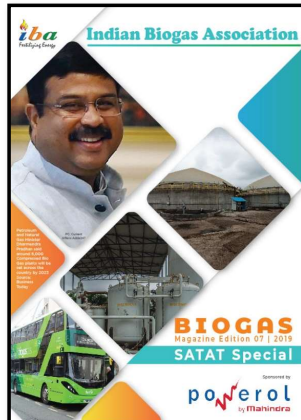
Members of IBA

SOME OF OUR KEY MEMBERS

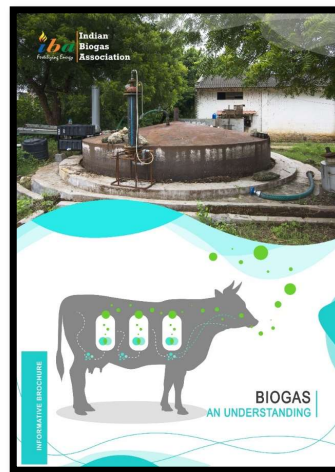


New launches of IBA (2017-2018)

Magazines

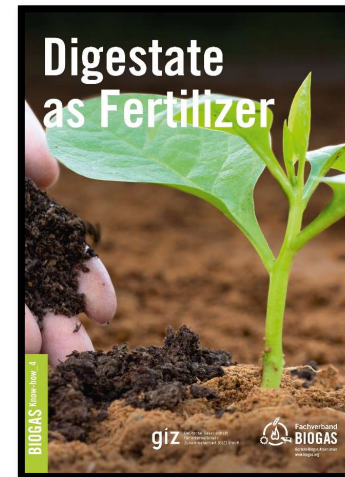


Biogas Brochure



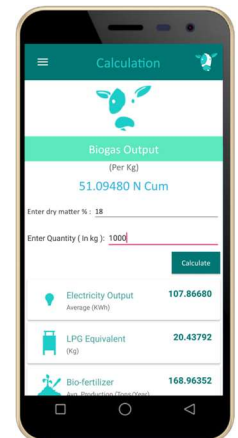
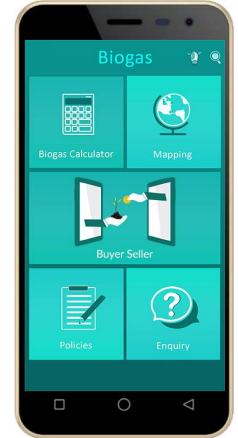
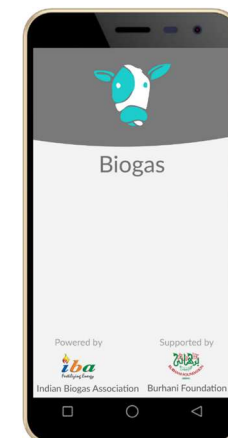
Published by IBA

Digestate Brochure



Published by GBA

Mobile App



Biogas Lab

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



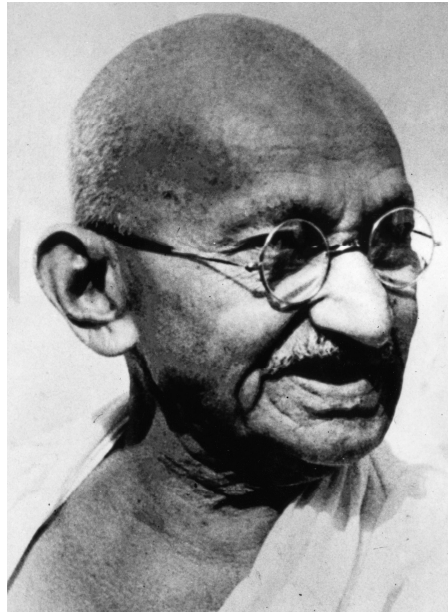
Tests:

- Dry Matter (DM)
- Organic Dry Matter (oDM)
- Biomethane Potential
- Total Alkalinity (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 (P_2O_5)
- Potassium (K_2O)
- Total Organic Carbon (TOC)

Conclusion

- Long history of Biogas in India
- Share of biogas/ WtE in Energy mix is extremely low
- Govt. support available across scale of biogas plant
- Growth rate of different scale of biogas plant is picking up
- Immense opportunities lies in
 - utilizing diverse range of available substrates
 - organic fertilizer production
- Wider spectrum of shareholders

Thanks



Commonsense is the realised sense of proportion - Mahatma Gandhi

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