

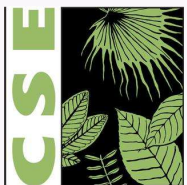
Compressed Biogas (CBG)

A National Blueprint for Upscaling Policy and Practice

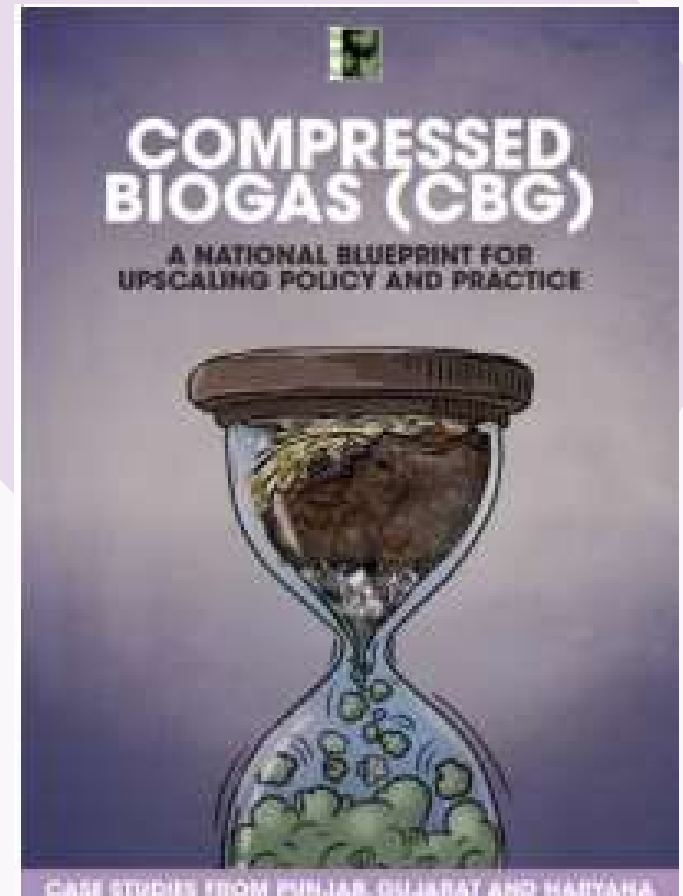
Webinar on

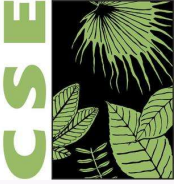
A BLUEPRINT FOR BIOGAS: SCALING CBG FROM FIELD TO POLICY

24th July, 2026



<https://www.cseindia.org/compressed-biogas-cbg-a-national-blueprint-for-upscaling-policy-and-practice-13084>





CONTEXT

India's gas import bill -and CBG's dual promise

50%

of India's natural gas is imported

71,000 MSCM

total consumption, 2024-25

US \$14,908 mn

spent on gas imports in 2024-25

CBG - compressed biogas - is emerging as a **domestic alternative to imported natural gas**. Produced from **agricultural residue, cattle dung, municipal solid waste and industrial organic waste**, it yields **two products**: clean-burning **CBG for transport, industry and households**, and fermented organic manure (**FOM/LFOM**) that can **substitute chemical fertilizer** - creating a genuinely circular economy from waste.



Sink for waste

MSW, agri-residue, animal dung, industrial waste



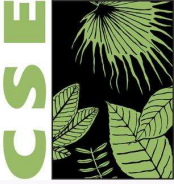
Clean transport fuel

Substitute for CNG / diesel with similar properties



Farm-ready manure

FOM/LFOM cuts dependence on chemical fertiliser



CONTEXT

SATAT: an ambitious target, a slow build-out

Launched Oct 2018 by MoPNG -target of 5,000 CBG plants producing 15 MT of CBG by 2023-24

Registered plants (total)

1,550

Yet to start construction

1,050

Under construction

312

Commissioned / operational

188

12%

of registered plants are actually operational -as of January 2026



CONTEXT

A national footprint, concentrated in a few states

Registered CBG/bio-CNG plants by status, GOBARdhan portal, as of Jan 20, 2026

State	Registered	Under construction	Operational
Uttar Pradesh	293	78	37
Gujarat	148	31	25
Haryana	76	17	20
Maharashtra	254	40	20
Karnataka	116	25	19
Punjab	84	13	10

Uttar Pradesh

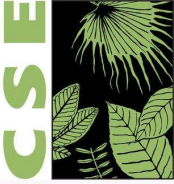
Good CBG production potential and model state in CBG sector, is home to most number of plants.

Punjab & Haryana

Agriculture-dominant states battling stubble burning -CBG can absorb paddy straw at scale.

Gujarat

A front-runner with functional plants and models -including MSW and APMC-based CBG -that can be replicated elsewhere.



01

GOOD PRACTICES

Case Studies from the Field

Operational plants surveyed across states

APMC Surat (Aksar Biotech), Gujarat

A model that can be replicated in other APMC mandis across the country



Feedstock: vegetable market waste + cow dung

The model

Located inside the APMC mandi itself, the plant **sources vegetable waste directly on-site** -a genuinely integrated waste-to-energy setup. It currently **produces 1.8-2 tonne of CBG a day**.

Off-take & digestates

CBG is trucked **up to 60 km to Gujarat Gas at Rs 60/kg**; margins run 4-5% via cascade vs 15-20% on pipeline. Of the digestate, **95% is LFOM (sold at Rs 1.5/litre) and 5% FOM (Rs 2.5/kg)** -farmers using 150 litres/acre have seen yields rise up to 1.25x over urea.

3.2 TPD

rated CBG capacity

Monthly economics

Rs.40-42 L

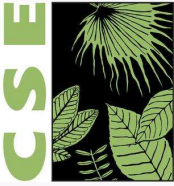
revenue (Rs.30-32L gas +
Rs.8-10L FOM/LFOM)

Rs.8-9 L

operating expenses (labour,
transport)

Rs.24.2 L

net profit / month (per CSE
analysis)



MSW-BASED CBG • CASE STUDY 2 & 3

Blueplanet, Greater Noida, Uttar Pradesh

Delhi-NCR's only MSW-based CBG plant

Operations

60% source segregation; waste collection ~Rs 1,500/tonne, collected via 12 dedicated vehicles.

Gas Offtake

The plant runs its own CBG dispensing station on-site.

Rs.24.7 L

net annual profit (revenue
Rs.1.07 cr – expenses
Rs.81.9 L)

Biofics, Surat, Gujarat

An example of a made-in-India initiative

Indigenous technology

80-90% of machinery -including the auto-segregation system -is **self-manufactured**. Holds multiple **patents on its own technology**.

Operations

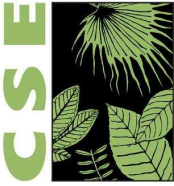
60-70% segregation achieved at source; waste collection costs ~Rs 1,500/tonne

Gas offtake

CBG is supplied to GAIL and Gujarat Gas.

5 TPD

CBG capacity, MSW
feedstock



Sampurn Agro Industry, Fazilka, Punjab

Building farmer trust in organic manure through demo farms



Feedstock: paddy straw + animal dung

Not yet CBG -but instructive on FOM

Sampurn Agro is a biogas-to-power plant (1.2 MW), included for its FOM/LFOM practices as it **plans a shift to CBG**. It runs at 20 TPD of its 50 TPD capacity, on a 13-acre site with 6-7 acres for feedstock storage.

ICAR-backed demo farms

FOM (9-11 t/day) and LFOM (5,000 L/day) are certified by ICAR and Punjab Agricultural University. Field trials by PAU Ludhiana and CIPHET Abohar recorded ~20% higher yield with FOM versus chemical fertiliser alone.

50 TPD

processing capacity
(biogas-to-power,
planning shift to CBG)

Farmer impact

Rs.3/kg

FOM selling price

-66%

reduction in chemical
fertiliser use reported by
farmers

Rs.1,500/ac

input cost, down from
Rs.4,000-5,000/acre

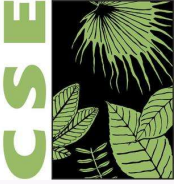


02

COST ECONOMICS

The Economics of the CBG Business

CSE modelled a representative 5-TPD plant across four feedstocks -paddy straw, animal dung, press mud and MSW



COST ECONOMICS

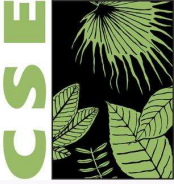
Capital cost & feedstock requirement

Benchmarked for a 5-TPD plant · Rs 80/kg is the current average CBG realisation

Feedstock	Feedstock / t of CBG	Annual qty required (t)	Feedstock price (Rs./t)	Capital cost (Rs. cr)
Paddy straw	10 t	16,500	1,000-1,500	30-35
Animal dung	50 t	82,500	350-1,000	25-30
MSW	25 t	41,250	Nil	25-30
Press mud	25 t	41,250	1,500-2,000	25-30

Capital cost is ~Rs 6-7 crore/tonne for paddy-straw plants (extra pre-treatment for silica/lignin) versus ~Rs 5 crore/tonne for dung, MSW or press mud.

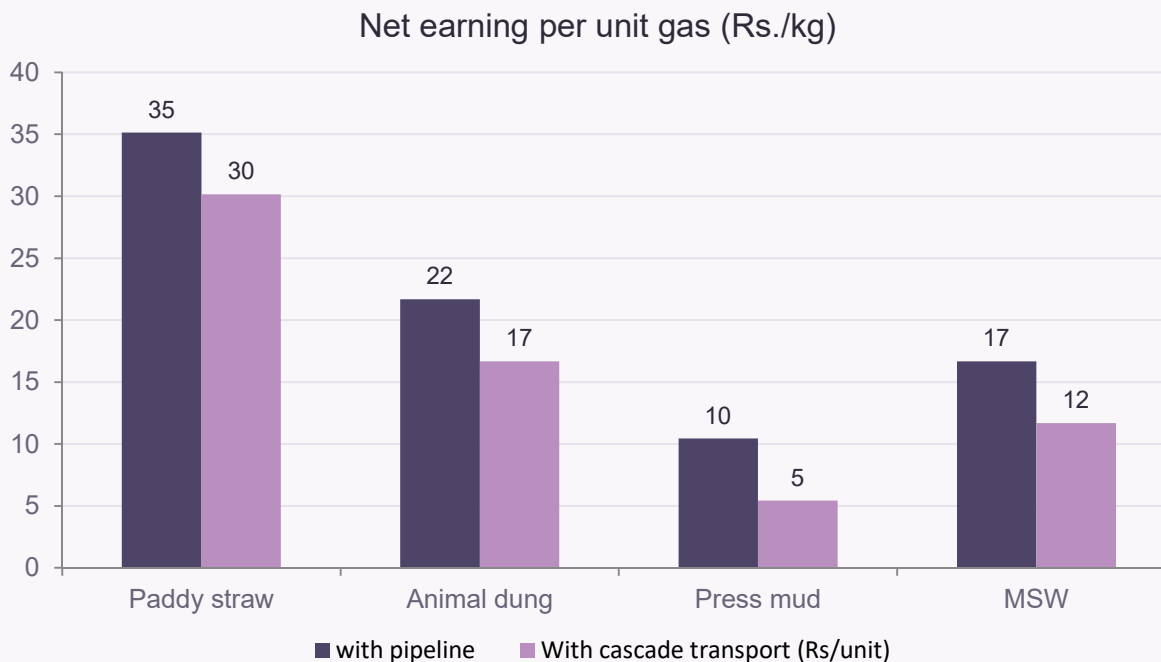
Annual operational cost includes manpower, feedstock, electricity and interest on loans



COST ECONOMICS

Transportation is a margin killer

Net earnings per kg of CBG sold -pipeline off-take vs cascade transport, at 100% capacity



Margin lost to cascade transport

Paddy straw	14%
Animal dung	23%
MSW	30%
Press mud	48%

Rs 5/kg cascade cost (<50 km) vs a Rs 1.5/kg DPI subsidy for pipeline distances beyond 50 km. Pipeline access lifts net earnings by 14-48%, depending on feedstock.

COST ECONOMICS

FOM/LFOM revenue

MDA support of Rs.1,500/tonne on FOM/LFOM sale, under GOBARdhan-registered plants

Net earnings per unit of CBG at 100% capacity (Rs./kg)

Feedstock	With MDA & free sale	No MDA & free sale
Paddy straw	38	30
Animal dung	54	16
Press mud	24	5
MSW	30	12

- At 100% capacity, plants are profitable across all feedstock.
- The impact of MDA is most critical at 50 per cent utilization, where different feedstock shift from losses to positive net earnings.
- At 25 per cent utilization, none of the feedstock remain viable even with MDA support except cow dung with MDA.

03

ISSUES & CHALLENGES

What the State Profiles Reveal

Consolidated findings from the CSE survey of operational plants across Punjab, Gujarat, Haryana and Uttar Pradesh

ISSUES & CHALLENGES

Feedstock supply & security

The most cited constraint across all states



Seasonal availability & storage infra

Paddy straw available for only 30-40 days during harvest; other feedstocks like pressmud face similar continuity gaps.



MSW collection cost burden

MSW-based plants bear collection costs up to Rs 4/kg with no municipal tipping-fee support.



Volatile raw-material pricing

Paddy straw price swings from Rs 1.7-2.5/kg; press-mud renewal terms favour sugar mills over plants.



Quality of feedstock & standardization of equipment

Plant often receive contaminated feedstock- cow dung, pressmud
Lack of technical guidelines for plant design, machinery

ISSUES & CHALLENGES

Off-take, infrastructure & regulation

Getting gas to market -and projects through approval -remains slow



Limited pipeline infrastructure

Cascade transport adds Rs 8-10/kg and gives 15-40% less net earnings than pipeline off-take.



Lack of skilled manpower

Manpower who can handle advanced biogas technologies.



Slow regulatory approvals

Multi-department clearances sometimes take 8-10 months; no or inefficient single-window system in most states.



Land acquisition costs

A major upfront burden, particularly for private developers without institutional land access.

ISSUES & CHALLENGES

FOM/LFOM management & market access

The by-product that decides plant-level financial viability



Low farmer awareness

Despite the potential to replace 25-50% of chemical fertiliser, sensitisation remain limited.



Persisting chemical-fertiliser habit

Many farmers continue blending ~30% chemical fertiliser alongside FOM/LFOM out of habit and trust deficit.



No structured market linkages

Enriched LFOM prices range wildly, from Rs 3/kg to Rs 140/kg, with no state-level demand mechanism.



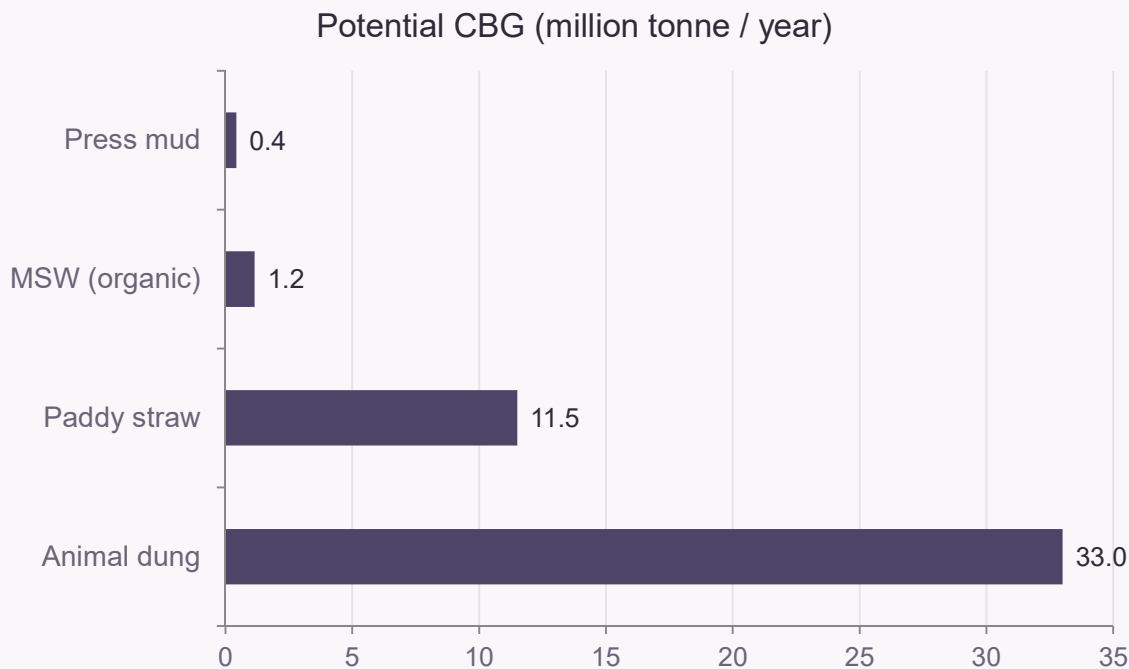
Regulatory bottleneck on sales

Only ~100 of 188 operational plants were authorised to sell FOM/LFOM directly in bulk under the MDA scheme.

THE BLUEPRINT

India's untapped CBG production potential

Estimated CBG potential from major feedstocks, based on full utilisation (70-80% realistically tappable)



~46 MT/yr

total national CBG potential -versus
188 operational plants realising a
fraction of it today

Revised national target (CSE)

1,000 waste-based operational
plants by 2030, at >75% average
capacity utilisation -realistic, quality-
first, vs. the original 5,000-by-2023
goal.

THE BLUEPRINT

Seven pillars for scaling the sector

Securing feedstock, strengthening state policy, market integration, building capacity institutional support, and indigenous technology



1

Introduce Structured feedstock & supply-chain management

- **Long-term supply agreements** with price-escalation clauses;
- SOPs for collection, transport and storage;
- Biomass banks/storage hubs on a user-charge basis;
- Strengthened source segregation for MSW.

2

Need of market integration for gas and FOM/LFOM

- Expand CGD networks with CBG blending targets;
- Introduce Organic Fertiliser Off-take Obligation requiring fertiliser companies to procure bio-manure;
- Include forestry department, Horticulture department as well as NHAI as points of application;
- Establish state Soil Health Missions.

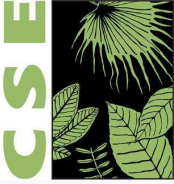
3

Strengthen state-level policy & regulation

- VAT exemption on CBG-blended CNG to complement Central excise relief;
- Allocating land parcels for dedicated land banks;
- State-specific blending targets aligned to the national 5% mandate.

THE BLUEPRINT

Seven pillars for scaling the sector



4

Capacity building & stakeholder awareness

- Skilling programmes for plant operators via the Union Ministry of Skill Development;
- KVK/NGO/SHG-led farmer training on FOM/LFOM dosage and benefits;
- Technical training for industry and entrepreneurs.

5

Strengthen state nodal agencies

- Empower state nodal agencies for coordinated, fast-tracked clearances -replacing today's fragmented, multi-department approval process.

6-7

Resource centres & indigenous technology

- An MoPNG-backed state resource centre for monitoring, troubleshooting and grievance redress;
- Promote R&D for cost-effective, feedstock-specific indigenous technology;
- CBG Technology Handbook with a detailed guidance on plant configurations, machinery standards and benchmark costs.