

SUSTAINABLE STUBBLE FUND

INVESTMENT THESIS

Tapping the biomass abundance in rural India through community-focused Compressed Biogas (CBG) plants and Fermented Organic Manure (FOM) with an incentive-backed biomass supply chain to tackle air pollution caused by stubble and waste burning, combat land degradation, enhance waste segregation, and facilitate India's transition to cleaner energy alternatives, thereby unlocking the benefits of a circular rural economy.

PROBLEM

Environmental issues, caused by rapid development and climate change have put India's population of 1.4 billion at risk. Rural India acts as an agent and a victim of these challenges in many ways:

Stubble (crop residues like wheat husk, rice straw) burning in rural areas due to the **absence of a viable means of disposal**, is estimated to release **~150 mn tonnes of CO₂** yearly, apart from other GHG gases like Sulphur oxides, Black Carbon.

Particulate Matter from stubble burning is more than **17 times** the emissions from all other polluting sources in Delhi. The **AQI in Delhi breaches the 500 mark** during peak stubble burning.

Despite comprising largely of **biodegradable waste, village waste (0.5 mnt/day) is not segregated** & is dumped into landfill

~30% of India's land is degraded, a situation exacerbated by the burning of **>35 mn tonnes of crop residues** annually, burning 1 tonne leads to a loss of 5.5 kg nitrogen, 2.3 kg of phosphorous.

India is dependent on **fossil fuels** for **~70% of its total energy**, which imposes huge environmental costs.

OPPORTUNITY

Compressed Biogas (CBG or bio CNG) holds the potential to create a circular rural economy while solving these problems and transforming rural communities into **agents of positive action**:

IMPACT OPPORTUNITY

Stubble, Cow Dung, and Solid Waste are input in CBG plants, enabling **proper waste management and clean air**.

Crop residues and cow dung can generate 80k tons of CBG per day, can reduce **~50% diesel use** in the transportation sector.

Bio-manure from CBG plants is estimated at **370mn tons per year**, and can replenish **~20mn hectares** of land.

FINANCIAL OPPORTUNITY

Substitutability of CBG for CNG creates **high derived demand** for it as CNG cars comprise 11 of every 100 cars sold in India today.

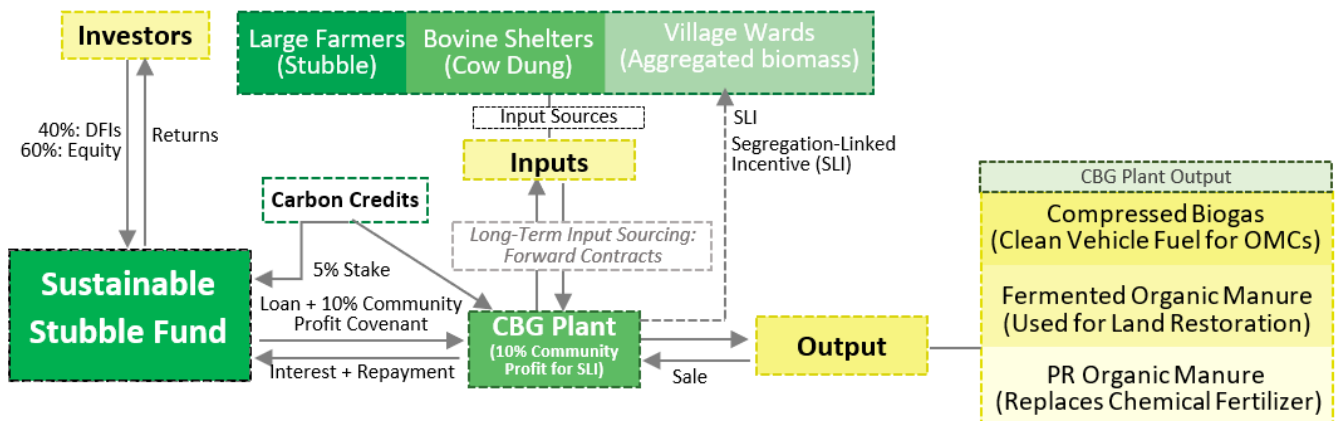
Govt is providing **subsidies to establish ~5000 CBG plants** in India (currently 40) to enable the clean energy transition.

Oil cos. guarantee a fair price for CBG, creating a **~USD 182mn opportunity** for farmers from **selling stubble to CBG plants**.

Addressable Market: \$1.47bn, CAGR:6.3%

SUSTAINABLE STUBBLE FUND: OUR SOLUTION

SSF shall promote CBG plants in rural India by addressing 2 major issues: **1. Funding for the development of such plants at the village-level, 2. Waste segregation & viable stubble disposal**



1. CBG DEVELOPMENT SPV

Aim: It would channel funds into **6-yr loans** (with govt. subsidy) to prospective CBG Plants in rural areas to solve the first impediment mentioned above, along with a **10% profit in the CBG plant to be earmarked by the fund for Segregation-linked Incentives**

Disbursement and collection of loans shall take place through MFIs.

Funding: The SPV shall be funded using equity and grants from DFIs.

Carbon Credits: To be distributed among the fund, CBG plant.

Forward Contracts: Long-term needs shall be fulfilled using Forward Contracts, facilitated by on-ground intermediaries, with Large Farmers, Bovine Shelters, and Village Wards (aggregating solid waste from households, stubble from small farmers who cannot supply it)

*A ward is a sub-unit (population > 5000) of the municipal corporation

2. SEGREGATION LINKED INCENTIVE (SLI)

SLI aims to create an **incentive for village wards*** to improve the **segregation and aggregation of solid waste, stubble, and cow dung**. Groups of wards shall be contracted to supply inputs on a **fixed rotation schedule** (15 days) to optimize logistics.

Segregation Efficiency & Community Profit: The **efficiency of waste supplied in each rotation** (which depends on the extent of segregation) shall be observed (by CBG plant) based on the quantum of output in each rotation given that the qty of input is constant. The most efficient groups shall be **awarded the 10% Community profit**, thereby creating incentives as **~90% of rural waste is not segregated** and small farmers do not find it viable to supply stubble individually. Hence, SLI shall motivate wards to aggregate and segregate waste.

SUSTAINABLE STUBBLE FUND

UNIT ECONOMICS

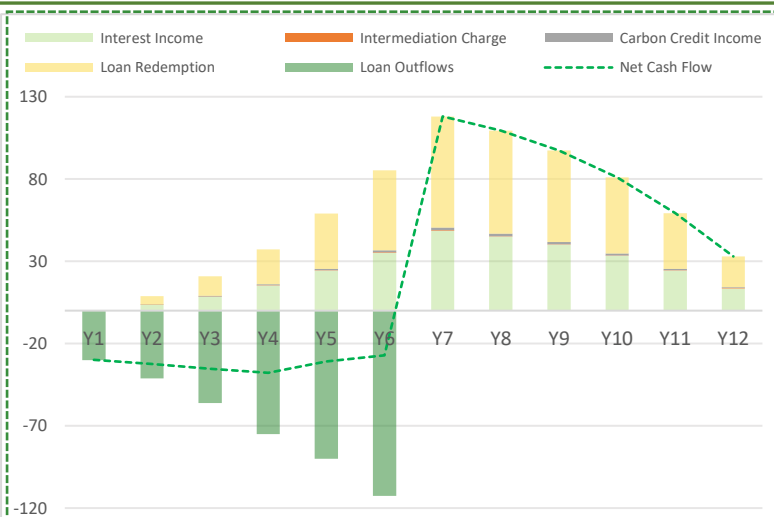
Revenue from sale of Bio-CNG	₹ 4,743,200
Weighted Revenue from FOM/PROM (Manure)	₹ 1,706,250
Revenue from sale of Carbon Credits	₹ 931,000
Total Revenue	₹ 7,380,450
Cost of Stubble (₹1000/tonne)	₹ 350,000
Waste Collection Cost from Wards (₹400/tonne)	₹ 140,000
Subsidised Electricity Cost (₹3.35/unit)	₹ 112,560
Labour Cost (2 helpers and 1 technician)	₹ 336,000
Storage, Compression & Distribution Cost	₹ 240,000
Other Inputs including Phosphatic Rocks	₹ 81,375
Repairs and Maintenance Cost	₹ 420,000
Intermediation Charge (5% of volume trade)	₹ 24,500
Total Cost	₹ 1,704,435
Interest Cost (Assuming First Instalment)	₹ 1,440,000
First Principal Instalment	₹ 2,000,000
Ward Development (10% Equity)	₹ 223,601
PAT/EAT for Owners (in USD)	\$ 25,155

Assumptions: 1. CBG Price: ₹ 77/kg, 2. Operating Capacity: 80%, 350 days, 3. \$1 = ₹ 80

FUND DETAILS

Fund Type	CBG Loan Fund SPV
Fund Size	\$ 200 million; leverage 40:60 (DFI Grant: Equity); Loan Ticket size ~\$150,000 (Post Subsidy)
Tenor	6 y for loan disbursement and collection + 5 y for only collection + 1 y non-recovery contingency
Min. Investment	\$ 1 million buy-in, 2 equal rounds (Year 0 & 3)
Geography	India
Target IRR	14-15% (Fund Level); 18-19% (Equity Investors)
Target Investors	HNIs, Institutional Investors, ESG & Pension funds
SLI Covenant	All CBG plants availing of the fund's concessionary finance shall be required to earmark 10% of annual profits for the implementation of SLI.
Eligible Borrower	Farmer Cooperatives, Wards, Entrepreneurs
Income Streams (For Investors)	
Loan Interest	10 y Indian Govt. Treasury Bond Rate (~7%) + Industry Risk Premium (~2.5%) + Plant-specific Risk Premium (size, input sourcing, collateral)
Carbon Credits	5% of Carbon Credits sold (registered under VCS)
Fees (Managers)	0.2% Loan Origination; 0.5% on Carbon Credit Sales
Financial Covenants	Maintain >70% productive capacity; CBG land lease be ≥ 5 years, Fixed Charge Coverage Ratio > 2

FUND CASH FLOWS (million USD)



Assumptions:

1. Avg Loan Size: INR 12 mn
2. Avg Input Capacity: 2 tons/day
3. Govt Subsidy: 20% of CBG Plant
4. Establishment Gestation: 8 months
5. Weighted Avg Tax Rate: 18%
6. Delinquency Rate: 5%
7. Carbon Credit Price: \$ 5 (conservative)
8. DFI Guarantee Fund created using CSR contributions from Oil Companies.
9. Redemption through 6 equal instalments

Sources: Indian Oil Corporation | SATAT Scheme | Clean India Mission | Renewable Energy Ministry

RISKS AND MITIGANTS

HIGH MATERIALITY	
Segregation/Input Quality Risk	Segregation-linked incentives, better prices for high-quality inputs like stubble, and carbon credits
Input Supply Risk	Forward contracts ensure long-term supply and the Stubble & Waste Exchange covers any contingency
Default Risk	CBG Plant to be the collateral; non-repayment to increase community stake in multiples of 5%
Impact Risk	SLI to ensure supply chain impact; covenant to ensure >70% capacity operation of the CBG Plant
Investment Risk	Diverse revenue streams (Loan, Carbon Credits) and the presence of DFIs in the fund
Output/ Demand Risk	Guaranteed purchase of CBG by CNG stations within 25 kms of the plant by oil cos to ensure sale
Regulatory Risk	Presence of pro-CBG govt. policies and subsidies like SATAT, GobarDhan ensure favorable conditions
LOW MATERIALITY	

IMPACT ACROSS THE VALUE CHAIN

Measure	Benefit	Beneficiary
Annual Fertilizer Savings (tons)	700 mn (~2.7% of fertilizer use)	Farmers
Direct Employment Generated	72900	Rural Communities
Annual Supplemental income for Wards (10% equity)	\$ 19 mn (~160 wards' annual budget)	Country
Vehicular Emissions Saved (m ³)	469.57 mn	
GHG reduction from Stubble Burning (tCO ₂)	12.5 mn (~20% of Delhi's CO ₂)	
Land Restored (km ²)	789 (~50% of Delhi's area)	
Methane Reduction from Cow Dung & Waste (tons)	3 mn (~3% of total from landfill)	
Imports and Fertilizer subsidy (Barrels of Oil Equivalent)	2.7 mn (~50% of 1-day oil imports)	

SDGs ADDRESSED AND KPIS

SDG	KPIs	SDG	KPIs
7 AFFORDABLE AND CLEAN ENERGY	Biogas Plant Capacity utilization; Sale of new CBG tractors	6 CLEAN WATER AND SANITATION	Instances of stubble burning/open waste dumping/burning
8 DECENT WORK AND ECONOMIC GROWTH	Additional income generated from CBG Plant and Restored Land	13 CLIMATE ACTION	PM concentration in air surrounding fields, CO ₂ emissions reduced
11 SUSTAINABLE CITIES AND COMMUNITIES	Improvement in the Clean India survey annual ranking for the municipality	15 LIFE ON LAND	Degraded land restored, Super Normal Net Sown Area under cultivation
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	Creation of closed loops: Ward ownership as a % of overall plant owners	17 PARTNERSHIPS FOR THE GOALS	Ward Contract Renewal Rate; Price differences b/w waste & stubble
1 NO POVERTY	New jobs created by CBG plants and on large farms for stubble collection	3 GOOD HEALTH AND WELL-BEING	Community Health Centre Respiratory Disease Burden for AQI

PILOT

The fund shall be launched in 20 districts across 2 states adjoining the national capital New Delhi

GUARANTEE FUND

\$ 10 mn guarantee fund; 40% - One-time ward fee (₹ 1000), 60% OMC CSR mandatory contribution

EXTENSIONS

Market: Urban Municipal Waste
Product: LNG, ATF, Green Hydrogen
Input Pricing: Bidding-based

PARTNERS

Indian: Biogas Association, MFIs, Oil Companies, Biogas Training Centre; **Global:** GCF