



# **SUSTAINABLE STUBBLE FUND**

Kellogg-Morgan Stanley Sustainable Investing Challenge 2023

**THE AQI IN DELHI IS 200 ON A  
GOOD DAY**

**ANYTHING ABOVE 25 IS DEEMED  
UNSAFE BY THE WHO**



Source: AQICN

**0/500 DAYS WITH  
<25 PM 2.5 AQI  
THE TIME TO ACT  
IS NOW**



INDIAN AGRICULTURE IS BOOMING,  
AND SO IS THE AMOUNT OF CROP RESIDUES,  
BUT..

**“If I can clear my farm using a one-rupee  
matchbox, why will I spend thousands?”**

- A FARMER FROM MADHYA PRADESH



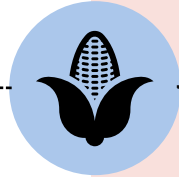


# RURAL INDIA HAS A BIOMASS PROBLEM

## PROBLEM

### STUBBLE BURNING

Magnitude of the issue: 23 million tonnes  
Stubble Burning: The practice of removing agricultural waste from the field by setting straw stubble on fire  
Source: BBC

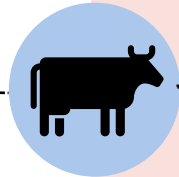


## NEGATIVE IMPACT

- 149 mn tCO<sub>2</sub>, 9 mn tCO, 1.28mn tPM emissions annually
- INR 76 million spend on respiratory illness in rural Punjab
- ~48% stubble burning contribution to Delhi's Air Pollution

### COW DUNG UNDERUTILIZATION

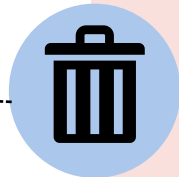
Magnitude of the issue: 56.2 million tonnes  
Source: Incubees



- Utilized as a cooking fuel with low calorific value
- Linked to the Black Fungus epidemic in India
- Risk of Arsenic Poisoning

### BIODEGRADABLE WASTE DISPOSAL

Magnitude of the issue: 75% of rural waste  
Source: Clean India Mission



- Ends up in landfills/is burnt despite high organic content
- Microbial Flora around organic waste spreads diseases
- High Methane emissions, 25x CO<sub>2</sub> potency in trapping heat



# THE PROBLEM CALLS FOR **URGENT ACTION**



# PROMOTING CIRCULARITY: COMPRESSED BIOGAS

“Compressed biogas (CBG) is a circular technology where the by-product of agriculture becomes an input for a fuel, and its by-product nourishes back the soil”

## POTENTIAL VS REALITY

- **POTENTIAL:** 80,000 tons of CBG per day, can replace 50% of the diesel use in transport
- **REALITY:** Only 0.5% of the compressed biogas potential is utilised

## VS OTHER RENEWABLE SOURCES

Unlike other renewable energy sources, compressed biogas can:

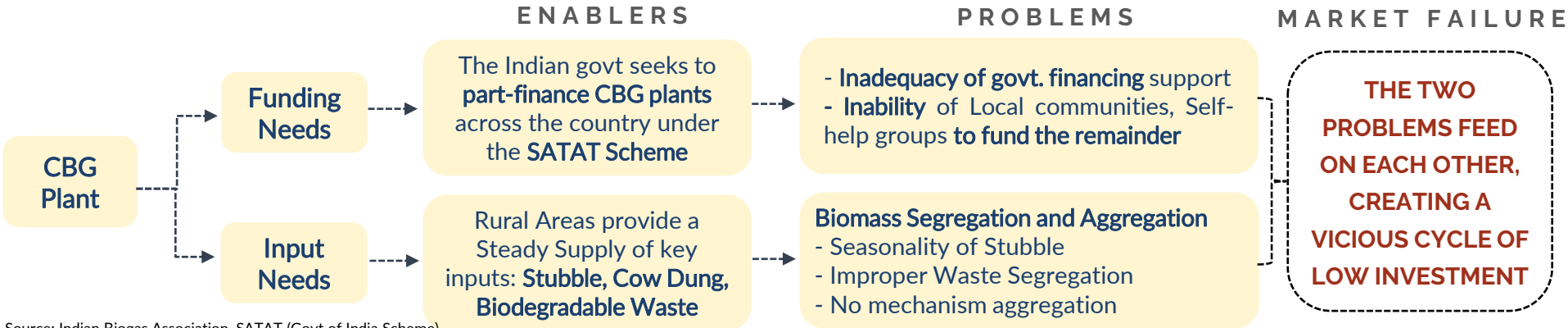
- Be produced **round-the-clock**, and
- **Employs more people** than the solar and wind energy industry

## UTILITY

- The gas, upgraded to 95% methane, is compressed in cylinders and **filled in vehicles at compressed natural gas stations**, replacing CNG, which is derived from crude oil.
- The **leftover slurry** in CBG Plant can be used as **manure**.

Source: IIT Guwahati Study

## WHY IS THE INDIAN CBG INDUSTRY UNDERDEVELOPED DESPITE ITS HUGE POTENTIAL?



Source: Indian Biogas Association, SATAT (Govt of India Scheme)

# SUSTAINABLE STUBBLE FUND: OUR SOLUTION

FROM BIOMASS PROBLEM TO BIOMASS POTENTIAL

PROBLEMS

SOLUTION

NATURE OF INTERVENTION

FUNDING INSUFFICIENCY

**Loan Fund**  
(to support beyond government support)

Loan + 10% community profit covenant

**CBG Plant**

Output



**Compressed Biogas (CBG)**  
**Fermented Organic Manure**  
**Carbon Credits**

**Sustainable Stubble Fund**

Fixed price+ 10% SLI  
Long-term input sourcing contracts

**LACK OF SEGREGATION OF BIOMASS**  
**LACK OF AGGREGATION OF BIOMASS OVER SMALLER UNITS**

**Segregation-linked Incentive**  
(to promote biomass aggregation and segregation)

**Ward-1**   **Ward-2**   **Ward-3**

Biomass Aggregation by village wards

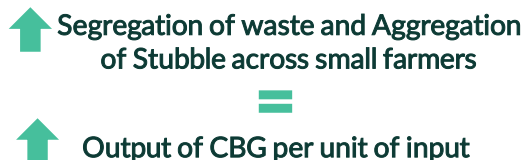


- 1. Rotation-based supply** of inputs by groups of wards
- 2. CBG generated per unit of input** measured in each rotation (stubble has the highest efficiency), indicating the composition and segregation extent of collected waste
- 3. 10% community profit disbursed**, in proportion to the efficiency of waste, at the end of each rotation schedule by the CBG Plant

# SUSTAINABLE STUBBLE FUND: STRUCTURE

## SEGREGATION-LINKED INCENTIVE (SLI) BENEFITS

### HOW DOES IT BENEFIT THE CBG PLANT?



### HOW DOES IT BENEFIT VILLAGE WARDS?

1. Induces compliance under the Clean India Mission
2. Generates revenue for the cash-strapped local authorities

### HOW DOES IT BENEFIT THE FUND?



## LOAN TERMS AND COVENANTS

Loan Amount	~\$150,000 6-year loans
Eligibility	SATAT Scheme approved CBG projects proposed by Farmer Cooperatives, Wards, Self-Help Groups
Interest Rate	10 y bond rate (~7%) + Industry-risk premium (~2.5%) + Plant-specific factors (size, input sourcing)
Intermediary	Loans to be disbursed via Microfinance Agencies
Financial Covenants	Productive Capacity > 70%, CBG Land Lease >= 5 years, FCCR >2

## CBG PLANT REVENUE REALIZATION AVENUES

OUTPUT	POTENTIAL BUYERS	SUPPORTING FACTORS
Compressed Biogas	Oil Companies (for vehicles) Households (for cooking)	Indian Oil Companies guarantee purchase of CBG at competitive prices
Fermented Organic Manure	Farmers Fertilizer Companies	Degraded Land; Addition of Phosphatic Rocks to make PROM
Carbon Credits	Large Corporates in the Voluntary Carbon Markets	Shortage of genuine carbon credits in the voluntary markets

CHALLENGE

OPPORTUNITY

SOLUTION

IMPACT

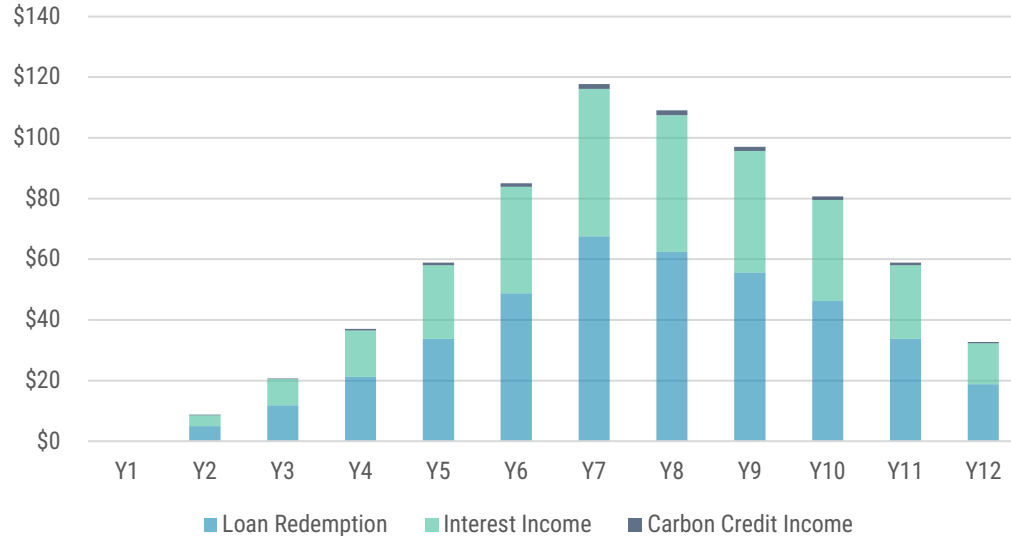
RISK

APPENDIX



# SSF: FINANCIAL STRUCTURE

## FUND REVENUES (IN MILLION \$)



Payback Period (Fund): **7.6 years**

## ASSUMPTIONS: FUND

- Conservative Carbon Pricing at \$5
- Delinquency rate at 5%, declining to 3%
- Loan Guarantee Fund of \$30 Million
- Weighted Average Tax Rate at 19%
- ₹/\$ Exchange Rate assumed to be 80
- Carbon Credit Realization at 90%

## FUND HIGHLIGHTS

**TARGET RETURN: 14% NET IRR**



**Structure:** \$200 million LP; 12 Y lifetime closed-end fund; \$1 million investor buy-in  
Funds to be raised in 2 equal rounds during Y-0 & 3



**Development Finance Leverage:** 3:2

DFIs: Borrowed Funds

Large Investors: Equity

**Indian DFIs:** Canara, IDBI, IFCI, NABARD

High Net-worth Individuals  
Pension Funds

**Global DFIs:** JP Morgan's DFI, IFC, ADB

Institutional Investors  
ESG Funds



**Development Finance Guarantee:** Mandatory CSR spend by Indian oil companies to be channeled into the guarantee pool for DFI loans.



**Fund Income:**

1. Loan Interest
2. 5% Share in Carbon Credits



**Management Income:**

1. 0.2% Loan Origination Fee
2. 0.5% Share in Carbon Credits

# IRR SENSITIVITY

## TO CARBON CREDIT PRICES AND EXPECTED CREDIT GENERATION

Expected Credit Generation per CBG Plant	CARBON CREDIT PRICES		
	\$5	\$10	\$25
1600	17.98%	18.30%	19.27%
2000	18.06%	18.46%	19.67%
2450	18.15%	18.65%	20.12%
2800	18.22%	18.78%	20.47%
3200	18.30%	18.95%	20.88%

## TO LOAN DISBURSEMENT TARGETS AND DEFAULT RATES

Loan Disbursement Targets	DEFAULT RATES		
	Base	7.50%	10%
80%	14.92%	13.81%	12.57%
90%	16.52%	15.66%	14.53%
100%	18.15%	17.30%	16.35%

### SCENARIO: NO GOVT. SUPPORT\*

**IRR IN THIS SCENARIO: 13.5%, PAYBACK: 9.1 YEARS**

\*Revised Loan repayment in 8 installments

#### ASSUMPTIONS: BASE CASE

- Production Capacity: 220 kgs daily
- Operating Days in an year: 350
- Competitive CBG Price: INR 77/kg
- Operating Capacity: 80%
- Loan repayment in 6 installments @12%
- Carbon Credits Priced at USD 5/Offset

CHALLENGE

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SOLUTION

# CBG PLANT UNIT ECONOMICS

10

PARTICULARS	BASE CASE	PESSIMISTIC
Loan Ticket Size	₹ 1,20,00,000	₹ 1,50,00,000
Revenue from sale of Bio-CNG	₹ 47,43,200	₹ 35,57,400
Weighted Revenue from FOM/PROM (Manure)	₹ 17,06,250	₹ 14,50,312
Revenue from sale of Carbon Credits	₹ 9,31,000	₹ 7,44,800
<b>Total Revenue</b>	<b>₹ 73,80,450</b>	<b>₹ 57,52,512</b>
Cost of Stubble (₹1000/tonne)	₹ 3,50,000	₹ 4,90,000
Waste Collection Cost from Wards (₹400/tonne)	₹ 1,40,000	₹ 1,96,000
Subsidised Electricity Cost (₹3.35/unit)	₹ 1,12,560	₹ 2,01,600
Labour Cost (2 helpers and 1 technician)	₹ 3,36,000	₹ 3,36,000
Storage, Compression & Distribution Cost	₹ 2,40,000	₹ 2,40,000
Other Inputs including Phosphatic Rocks	₹ 81,375	₹ 81,375
Repairs and Maintenance Cost	₹ 4,20,000	₹ 4,20,000
SWE Intermediation Charge (5% of input volume traded)	₹ -	₹ 34,300
<b>Total Cost</b>	<b>₹ 16,79,935</b>	<b>₹ 19,99,275</b>
<b>Interest Cost (Assuming First Installment)</b>	<b>₹ 14,40,000</b>	<b>₹ 18,00,000</b>
First Principal Installment	₹ 20,00,000	₹ 18,75,000
Ward Development (10% Equity)	₹ 58,058	₹ -
<b>PAT/EAT for Owners (in USD)</b>	<b>\$ 27,530</b>	<b>\$ 977</b>

#### ASSUMPTIONS: PESSIMISTIC CASE

- Removal of Govt. Subsidy
- CBG offtake at 75%, 20% wastages
- Monetizable carbon at 80% capacity
- Stubble Cost: INR 1400/ton
- Loan repayment in 8 installments @12%
- Electricity Cost: INR 6/unit

IMPACT

RISK

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# SCALABILITY AND REPLICABILITY

## PILOT

Total Addressable Market (Biogas plants) in India: USD 1.47 billion, growing at 6.3% p.a.

The fund will be launched in **20 districts** across **Haryana** and **Punjab**, with ~70% of total stubble burning in India



A phased nationwide rollout in 3 states every 6 months with MFI and other partners' associations and **>30 Approved EOIs** per state as a preliminary demand check

## LOAN DISBURSAL AND MONITORING: THROUGH MFIS

### Roles & Responsibilities of Microfinance Institutes:

**Loan Related:** Disbursement and Collection

**SLI Related:** Ensuring the enforcement of SLI-based input sourcing

### Microfinance Partners:

Sahayog Group, Ujjivan Finance, Bandhan Bank, Fusion Finance

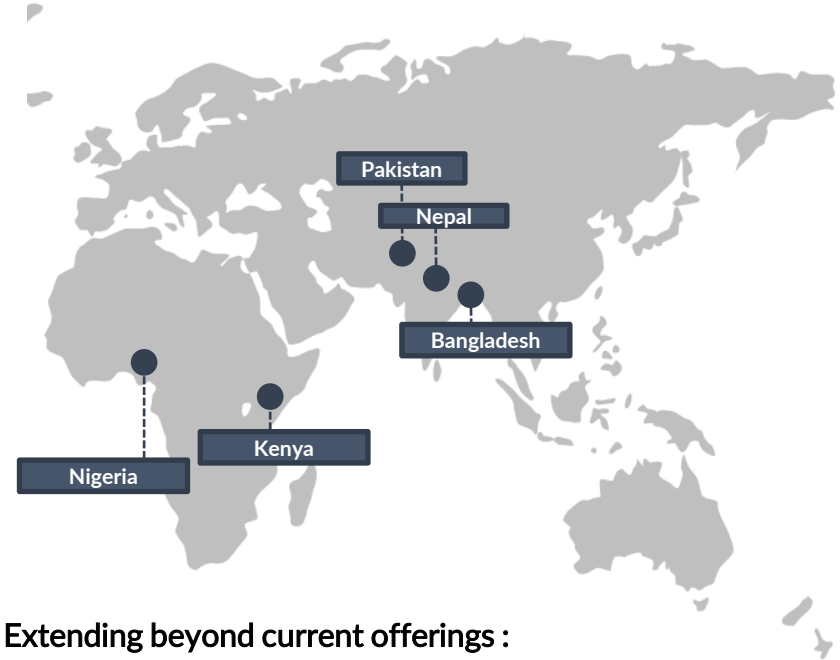
### Microfinance Partners Income:

0.5% (of the loan) processing commission + 0.5% Intermediation Commission

Source: Fortune Business Insights

## PROSPECTIVE EXTENSIONS

### Geographical Extension:



### Extending beyond current offerings :

1. **Market:** Urban Municipal Waste, City Gas Distribution Pipelines
2. **Product:** Liquefied Natural Gas, Aviation Turbine Fuel etc.
3. **Input Pricing:** Ward Auctions ensuring price competitiveness

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# OUR IMPACT THROUGH SDG CONTRIBUTIONS

AND THE CORRESPONDING KPIs

HIGH  
IMPACT

## SDGs

## KEY PERFORMANCE INDICATORS

## KEY PERFORMANCE INDICATORS

## SDGs

7 AFFORDABLE AND CLEAN ENERGY



- Avg. CBG Plant Capacity utilization (>90%)
- New CBG tractor registrations in 60+ districts

- PM2.5, PM10 concentration in air surrounding fields; CH4, CO<sub>2</sub> emissions reduced in villages

13 CLIMATE ACTION



11 SUSTAINABLE CITIES AND COMMUNITIES



- Ward Input Contract Renewal Rate (>80%)
- CBG sold by OMCs as a fraction of CNG(~5%)
- Creation of closed loops: Ward ownership as a % of overall plant owners

- Primary & Community Health Centres' Respiratory Disease Burden to track AQI

3 GOOD HEALTH AND WELL-BEING



6 CLEAN WATER AND SANITATION



- Instances of stubble burning/open waste dumping/burning captured via satellite

- Degraded land restored (FOM Usage in villages)
- Net Sown Area - Cultivation on Degraded Land

15 LIFE ON LAND



MODERATE  
IMPACT

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# IMPACT ACROSS THE VALUE CHAIN

## RURAL CIRCULARITY BENEFITS

Benefit	Equivalent to	Beneficiary	Source of Impact
<b>700 million tons</b> Annual Fertilizer Savings	= ~2.7% of Total Fertilizer Use in India		Fermented Organic Manure
<b>72900</b> Jobs Created	= ~1.3x An Indian Oil Majors' Employees		Input Aggregation; CBG Plant
<b>USD 19 million</b> Annual Income for Wards	= ~160 Wards' Annual Budget		Segregation Linked Incentives
<b>469 million g/m<sup>3</sup></b> Vehicular Emissions Avoided	= ~5 Days CNG consumption in India		Adoption of CBG
<b>12.5 million tCO<sub>2</sub></b> GHG Reduction	= ~20% of Delhi's CO <sub>2</sub> Emissions		Prevention of Stubble Burning
<b>789 km<sup>2</sup></b> Land Restored	= ~50% of Delhi's Area		Fermented Organic Manure
<b>3 million tons</b> Methane Reduction	= ~3% ~of Total from Landfills		Better disposal of waste & cow dung
<b>2.7 mn barrels of oil</b> Savings on Oil Imports & Fertilizer Subsidy	= ~50% of 1-day oil imports in India		CBG substituting oil and CNG

CHALLENGE

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# RISKS AND MITIGANTS

RISK	FACTORS	MITIGANTS
Segregation/Input Quality Risk	Wards isolating biodegradable waste	<ul style="list-style-type: none"> <li>Implementation of Segregation-linked incentive (SLI)</li> <li>Regular monitoring at plant and Oil/Gas retail outlet</li> </ul>
Input Supply Risk	Input sellers' sustained commitment	<ul style="list-style-type: none"> <li>Emphasis on long-term Input Forward contracts</li> <li>Endeavoring Stubble &amp; Waste Exchange (SWE)</li> </ul>
Default Risk	CBG Plant's low ROC & Moral Hazard	<ul style="list-style-type: none"> <li>\$30 Million Quasi-First Loss OMC Guarantee Pool</li> <li>Default-led Owner's equity provision in multiples of 4%</li> </ul>
Impact Risk	On-ground GHG reduction & Waste Handling	<ul style="list-style-type: none"> <li>Covenants: &gt;70% plant capacity; &gt;90% carbon targets</li> <li>Ongoing visits by Impact-focused local MFI partners</li> </ul>
Investment Risk	Investor Incentivization & Confidence	<ul style="list-style-type: none"> <li>Multiple fund revenue streams (Loan, Carbon Credits)</li> <li>DFI-presence promoting risk sharing (Equity IRR 18%)</li> </ul>
Demand Risk	Consistent CBG sales at competitive prices	<ul style="list-style-type: none"> <li>Minimum 15-year offtake contract with retail outlets</li> <li>OMC-assisted sale to large industrial customers</li> </ul>
Regulatory Risk	Ease of Doing Business and Policy support	<ul style="list-style-type: none"> <li>Pro-CBG govt. policies (SATAT, GobarDhan, SBA)</li> <li>Enabling environment (due-diligence, cheap finance)</li> </ul>



# OUR TEAM

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**Aarohi Sharma** is a final year M.A. Economics candidate at the Delhi School of Economics, University of Delhi. With a keen eye for sustainability, she is driven towards the application of finance to solve the environment's deepest threats. In terms of past experiences, she has previously been associated with DE Shaw and Nestle, offering a diverse set of experiences.



**Parv Maheshwari** is a final year M.A. Economics candidate at the Delhi School of Economics, University of Delhi. He is passionate about modern macroeconomics and working with economic fundamentals. He shall be joining JP Morgan Chase as a Credit Risk analyst after graduation.



**THANK YOU**

Kellogg-Morgan Stanley Sustainable Investing Challenge 2023



# SPECIAL THANKS TO

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Orrick

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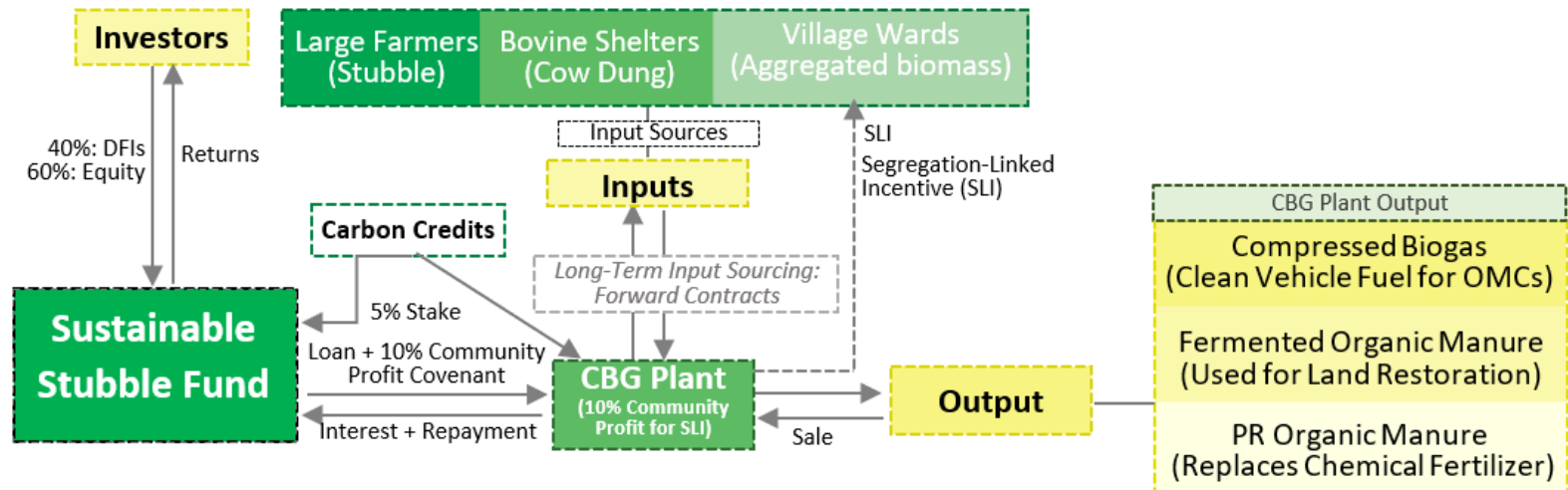
**Devin Rapson**

Social Impact at Kellogg

**Sophia Sun**

Social Impact at Kellogg

# DETAILED FUND STRUCTURE



## CBG INPUT EFFICIENCY

Input	CBG Production (ton)	Feedstock Requirement
Stubble	1	10 ton
Cow Dung	1	50 ton
Household Biodegradable Waste	1	20 ton
Press Mud	1	25 ton
Bagasse	1	10 ton
Chicken Litter	1	25 ton
Forest Residue	1	15 ton

Source: Indian Oil Corporation Limited

## CBG VS OTHER FUELS

	CBG	CNG	PETROL	DIESEL
Calorific Value	50000 kJ/kg	50000 kJ/kg	45800 kJ/kg	45500 kJ/kg
Selling Price	INR 80/kg	INR 80/kg	INR 96.76/L	INR 89.6/L
CO <sub>2</sub> Neutrality	✓	✗	✗	✗
Origin	Fermented Waste	Fossil Fuels	Fossil Fuels	Fossil Fuels
	↓	1 KG CNG/CBG = 1.4 L Petrol		
	Impact Potential			

# FARMERS: PRE vs POST STUBBLE SALE

## Farmer's Stubble Sale Feasibility (2 Hectare Paddy Farm)

Avg. Paddy yield in India (tonnes per hectare)	6.47
Paddy Stubble to Grain multiple	1.5
Stubble generated on the paddy farm (tonnes)	19.41
Paddy stubble price (INR/tonne as CBG Plant input)	1,500
Revenue generated from stubble sale (INR)	29,115
Stubble removal cost (INR)	6,800
Supplementary Farm Income (INR)	22,315
Indirect Savings during next crop cycle (INR for inputs)	37,226
Total Savings per cycle (INR)	59,541
Total Savings as a fraction of farmer's paddy income (MSP-2023)	22.51%

## WHY ARE FARMERS RESORTING TO STUBBLE BURNING?

- Mechanisation in farms, cutting residue at an awkward length, rendered unfit for bovine consumption
- Market Failure and Adverse Incentives by the Govt. on farm inputs, most importantly on fertilizers and irrigation, drastically reducing the cost of cultivation
- Shorter Length of Cropping Cycle and an increase in the average number of crops per farm

## FERTILIZER SUBSIDY (UNIT LEVEL)

- 90-95% subsidy on Urea
- 70% subsidy on DAP
- Centre Farm Bill, ~1.2% of GDP

## POSITIVE GOVERNMENT ACTION ON STUBBLE

- 22% reduction in farm input subsidies this year
- 2 Lakh Happy Seeders distributed for free stubble removal by the Govt.
- INR 5,000/hectare direct cash transfer for not burning stubble



# FAQs (I) – CBG & SATAT

S. NO.	QUESTIONS	CLARIFICATIONS
1.	What is Compressed Bio Gas or CBG ?	<p>CBG or Compressed Bio Gas consists of mainly methane (more than 90%) and other gasses like carbon dioxide (less than 4%), etc. CBG is produced by anaerobic digestion of biomass and waste sources like agricultural residue, cattle dung, sugarcane press mud, municipal solid waste, sewage treatment plant waste, etc. This Biogas can be purified to remove hydrogen sulphide (H<sub>2</sub>S), carbon dioxide (CO<sub>2</sub>), water vapor and when this purified biogas (methane content more than 90%) is compressed to maximum 250 bar and filled up in cascades (group of high pressure cylindrical vessels) it is called Compressed Bio Gas or CBG</p>
2.	Is CBG same as CNG or is there any difference. Can CBG be filled in the vehicle which are currently running on CNG. In other words, can a vehicle running on CNG be straightway filled with CBG without any modification in the vehicle ?	<ul style="list-style-type: none"> <li>• CBG has properties almost similar to CNG and hence a vehicle running on CNG can straightway be filled with CBG without any modification in the vehicle.</li> <li>• Ministry of Road Transport and Highways, Government of India, vide Gazette Notification no. 395 dated 16.6.2015 has permitted usage of CBG for motor vehicles as an alternate of CNG.</li> <li>• BIS has issued IS 16087 2016 standards on CBG which is similar to BIS specifications IS 15958:2012 for CNG.</li> </ul>
3.	What is Government scheme SSF intends to leverage?	<ul style="list-style-type: none"> <li>• SATAT' (Sustainable Alternative Towards Affordable Transportation) scheme on Compressed Bio Gas (CBG) was launched by Hon'ble Minister, Petroleum &amp; Natural Gas on 1.10.2018.</li> <li>• The scheme envisages to target production of 15 MMT (million tons) of CBG from 5000 Plants to support ~8000 CNG pumps across the country. Under SATAT scheme, entrepreneurs shall set up CBG plants, produce &amp; supply CBG to OMCs for sale as automotive &amp; industrial fuels.</li> <li>• Entrepreneurs/Groups under the scheme shall be eligible for upfront subsidies on capital cost, covering ~20-25% of the outlay. Further, subsidies upto Rs. 4 crore may be availed against a 4.8 ton CBG plant.</li> </ul>
4.	What are the qualification criteria. How will I be evaluated through the Expression of Interest on SATAT scheme.	<p>Evaluation of the EOIs shall be carried out of a total of 100 marks as described in the EOI document. The prospective applicant has to score minimum of 35 marks to qualify. After submission of the documents through the e-tender portal, a committee of a particular OMC/GMC evaluates the EOI and awards Letter of Intent (LOI) to the successful applicant who had scored 35 marks or more on evaluation criteria.</p>
5.	In addition, the Buyer shall also have the right to install quality assurance equipment and/or test the samples of CBG independently Please explain the clause ?	<p>OMC/GMC shall be installing gas analyzers at its Retail Outlet to ascertain the quality of gas supplied and dispensed. The quality of gas should be as per IS 16087 2016 specifications.</p>

# FAQs (II) – SATAT & CBG UPTAKE

S. NO.	QUESTIONS	CLARIFICATIONS
6.	What are the terms by which we can supply CBG to Oil & Gas Companies ?	As per the EOI, OMC/GMC has offered a procurement price of CBG of Rs. 46/kg + applicable taxes from 1.10.2018 to 31.3.2024. There will be periodic revision in procurement price with effect from 1.4.2024 until 2029. Additionally, OMC/GMC shall also execute a Commercial Agreement of 15 years with the CBG Plant owner, to be extended on mutual consent, for a retail outlet within 25kms.
7.	What is the expected price 2024 onwards?	The revised procurement price of CBG 2024 onwards, offered by OMC/GMC partners, shall not be less than Rs. 80/kg + applicable taxes (5% GST) in line with CNG prices as at 31st March, 2023 (Rs. 79.56). The expectation rests on procurement price setting precedence in 2018. (CBG Price of Rs. 46 - 15% premium against Rs. 40 CNG Price in New Delhi (on 1st April, 2018)
8.	What are the terms of the offtake of CBG? In SATAT, is there a provision for 100% offtake of CBG from the day one i.e. from the first day of commissioning; by oil PSUs? Offtake of CBG in-case demand is not commensurate with the production?	Oil and Gas Companies shall try to off-take and market the entire amount of CBG produced by the CBG Plant. The CBG market, particularly in unseeded market, is expected to grow gradually and therefore, the supply of CBG from a particular CBG plant is also expected to increase gradually. Accordingly, the mutually agreed CBG supply plan shall be finalised and accordingly the production of CBG from a particular CBG plant shall be synchronised. In the event Buyer is not able to off-take CBG as per Supply Plan for a period of three (3) months, the Buyer shall endeavor to facilitate in sale of CBG at other retail outlet(s) of the Buyer or industrial bulk customers of the Buyer. Such sale to industrial bulk customers of Buyer will be as per mutual agreement by both parties.
9.	OMC/GMC has started to sell CBG at various locations. How is the customer experience? What does global studies say on efficiency of CBG ?	OMC/GMC has initiated marketing of CBG from various retail outlets and Industrial customers. The feedback received from customers using CBG for their vehicles are encouraging. Improvement in mileage and ease of driving are the two common factors for which customers have expressed their satisfaction during recent survey. As per a study in Camden, UK on CBG and CNG vehicles, it was observed that the CGB vehicle displayed a 6% efficiency improvement in fuel consumption when compared with the CNG vehicle.
10.	Can Retail Outlet(s) outside the radius of twenty-five (25) kilometers from the CBG Plant be selected for sale of CBG ?	Retail Outlet(s) outside the radius of 25 kilometers from the CBG Plant can be selected for sale of CBG without any additional liability and financial implication to Oil & Gas Company. The additional cost incurred on transportation of CBG beyond 25 Kms shall be fully accountable to the CBG Plant owner.

# DETAILED FUND FINANCIALS (I)

23

	Y1	Y2	Y3	Y4	Y5	Y6
<b>Investor Infusion (70:30 - Y1:Y4)</b>	₹ 11,40,00,00,000.00	₹ -	₹ -	₹ 4,80,00,00,000.00	₹ -	₹ -
<b>Loan Outflows Post-Subsidy (Net of Origination fee)</b>	₹ -2,39,52,00,000.00	₹ -3,29,34,00,000.00	₹ -4,49,10,00,000.00	₹ -5,98,80,00,000.00	₹ -7,18,56,00,000.00	₹ -8,98,20,00,000.00
<b>Revenue Streams</b>						
Interest Income	₹ -	₹ 28,80,00,000.00	₹ 68,40,00,000.00	₹ 1,22,40,00,000.00	₹ 1,94,40,00,000.00	₹ 2,80,80,00,000.00
Carbon Credit Income	₹ -	₹ 98,00,000.00	₹ 2,32,75,000.00	₹ 4,16,50,000.00	₹ 6,61,50,000.00	₹ 9,55,50,000.00
Loan Redemption	₹ -	₹ 40,00,00,000.00	₹ 95,00,00,000.00	₹ 1,70,00,00,000.00	₹ 2,70,00,00,000.00	₹ 3,90,00,00,000.00
<b>Gross Revenues</b>	₹ -	₹ 69,78,00,000.00	₹ 1,65,72,75,000.00	₹ 2,96,56,50,000.00	₹ 4,71,01,50,000.00	₹ 6,80,35,50,000.00
<b>Fund Expenses</b>						
MFI Processing Commission (0.5% of loan amount)	₹ -1,19,76,000.00	₹ -1,64,67,000.00	₹ -2,24,55,000.00	₹ -2,99,40,000.00	₹ -3,59,28,000.00	₹ -4,49,10,000.00
MFI SLI+ Intermediation Commission (0.5% of collections)	₹ -	₹ -34,40,000.00	₹ -81,70,000.00	₹ -1,46,20,000.00	₹ -2,32,20,000.00	₹ -3,35,40,000.00
Management Fees (0.5% of credits sold)	₹ -	₹ -9,80,000.00	₹ -23,27,500.00	₹ -41,65,000.00	₹ -66,15,000.00	₹ -95,55,000.00
Operating Expenses	₹ -70,00,000.00	₹ -80,50,000.00	₹ -92,57,500.00	₹ -1,06,46,125.00	₹ -1,22,43,043.75	₹ -1,40,79,500.31
Legal and Administrative Expenses	₹ -25,00,000.00	₹ -25,00,000.00	₹ -25,00,000.00	₹ -25,00,000.00	₹ -25,00,000.00	₹ -25,00,000.00
Total Carbon Certification Fees ( <i>Explanatory Note below</i> )	₹ -5,20,000.00	₹ -9,03,261.00	₹ -7,04,757.60	₹ -8,70,277.88	₹ -10,76,739.50	₹ -13,15,117.88
Miscellaneous Expenses	₹ -6,00,000.00	₹ -6,00,000.00	₹ -6,00,000.00	₹ -6,00,000.00	₹ -6,00,000.00	₹ -6,00,000.00
<b>Total Fund Expenses</b>	₹ -2,25,96,000.00	₹ -3,29,40,261.00	₹ -4,60,14,757.60	₹ -6,33,41,402.88	₹ -8,21,82,783.25	₹ -10,64,99,618.19
<b>Loan Defaults</b>						
Bad Debts on Receivables (5% to 3% : Staggered Decline)	₹ -	₹ 3,44,00,000.00	₹ 8,17,00,000.00	₹ 14,62,00,000.00	₹ 23,22,00,000.00	₹ 26,83,20,000.00
Additional Guarantee (\$6 million for 5 years)	₹ 48,00,00,000.00	₹ 48,00,00,000.00	₹ 48,00,00,000.00	₹ 48,00,00,000.00	₹ 48,00,00,000.00	₹ -
Default Guarantee Fund (Accumulated)	₹ 48,00,00,000.00	₹ 96,00,00,000.00	₹ 1,40,56,00,000.00	₹ 1,80,39,00,000.00	₹ 2,13,77,00,000.00	₹ 1,90,55,00,000.00
<b>Net Provision</b>	₹ -	₹ 92,56,00,000.00	₹ 1,32,39,00,000.00	₹ 1,65,77,00,000.00	₹ 1,90,55,00,000.00	₹ 1,63,71,80,000.00
<b>Net Cash Flows (Fund Level)</b>	₹ -2,41,77,96,000.00	₹ -2,62,85,40,261.00	₹ -2,87,97,39,757.60	₹ -3,08,56,91,402.88	₹ -2,55,76,32,783.25	₹ -2,28,49,49,618.19

CHALLENGE

OPPORTUNITY

SOLUTION

IMPACT

RISK

APPENDIX

# DETAILED FUND FINANCIALS (II)

	Y7	Y8	Y9	Y10	Y11	Y12
<b>Investor Infusion (70:30 - Y1:Y4)</b>	₹ -	₹ -	₹ -	₹ -	₹ -	₹ -
<b>Loan Outflows Post-Subsidy (Net of Origination fee)</b>	₹ -	₹ -	₹ -	₹ -	₹ -	₹ -
<b>Revenue Streams</b>						
Interest Income	₹ 3,88,80,00,000.00	₹ 3,60,00,00,000.00	₹ 3,20,40,00,000.00	₹ 2,66,40,00,000.00	₹ 1,94,40,00,000.00	₹ 1,08,00,00,000.00
Carbon Credit Income	₹ 13,23,00,000.00	₹ 12,25,00,000.00	₹ 10,90,25,000.00	₹ 9,06,50,000.00	₹ 6,61,50,000.00	₹ 3,67,50,000.00
Loan Redemption	₹ 5,40,00,00,000.00	₹ 5,00,00,00,000.00	₹ 4,45,00,00,000.00	₹ 3,70,00,00,000.00	₹ 2,70,00,00,000.00	₹ 1,50,00,00,000.00
<b>Gross Revenues</b>	₹ 9,42,03,00,000.00	₹ 8,72,25,00,000.00	₹ 7,76,30,25,000.00	₹ 6,45,46,50,000.00	₹ 4,71,01,50,000.00	₹ 2,61,67,50,000.00
<b>Fund Expenses</b>						
MFI Processing Commission (0.5% of loan amount)	₹ -	₹ -	₹ -	₹ -	₹ -	₹ -
MFI SLI+ Intermediation Commission (0.5% of collections)	₹ -4,64,40,000.00	₹ -4,30,00,000.00	₹ -3,82,70,000.00	₹ -3,18,20,000.00	₹ -2,32,20,000.00	₹ -1,29,00,000.00
Management Fees (0.5% of credits sold)	₹ -1,32,30,000.00	₹ -1,22,50,000.00	₹ -1,09,02,500.00	₹ -90,65,000.00	₹ -66,15,000.00	₹ -36,75,000.00
Operating Expenses	₹ -1,07,28,006.75	₹ -76,24,771.98	₹ -48,62,893.02	₹ -46,68,377.30	₹ -44,81,642.21	₹ -43,02,376.52
Legal and Administrative Expenses	₹ -20,00,000.00	₹ -20,00,000.00	₹ -20,00,000.00	₹ -20,00,000.00	₹ -20,00,000.00	₹ -20,00,000.00
Total Carbon Certification Fees (Explanatory Note below)	₹ -14,50,413.00	₹ -14,52,751.93	₹ -14,34,634.65	₹ -13,88,754.50	₹ -12,32,675.00	₹ -10,05,446.50
Miscellaneous Expenses	₹ -6,00,000.00	₹ -6,00,000.00	₹ -6,00,000.00	₹ -6,00,000.00	₹ -6,00,000.00	₹ -6,00,000.00
<b>Total Fund Expenses</b>	₹ -7,44,48,419.75	₹ -6,69,27,523.90	₹ -5,80,70,027.67	₹ -4,95,42,131.80	₹ -3,81,49,317.21	₹ -2,44,82,823.02
<b>Loan Defaults</b>						
Bad Debts on Receivables (5% to 3% : Staggered Decline)	₹ 37,15,20,000.00	₹ 34,40,00,000.00	₹ 22,96,20,000.00	₹ 19,09,20,000.00	₹ 13,93,20,000.00	₹ 7,74,00,000.00
Additional Guarantee (\$6 million for 5 years)	₹ -	₹ -	₹ -	₹ -	₹ -	₹ -
Default Guarantee Fund (Accumulated)	₹ 1,63,71,80,000.00	₹ 1,26,56,60,000.00	₹ 92,16,60,000.00	₹ 69,20,40,000.00	₹ 50,11,20,000.00	₹ 36,18,00,000.00
<b>Net Provision</b>	₹ 1,26,56,60,000.00	₹ 92,16,60,000.00	₹ 69,20,40,000.00	₹ 50,11,20,000.00	₹ 36,18,00,000.00	₹ 28,44,00,000.00
<b>Net Cash Flows (Fund Level)</b>	₹ 9,34,58,51,580.25	₹ 8,65,55,72,476.10	₹ 7,70,49,54,972.33	₹ 6,40,51,07,868.20	₹ 4,67,20,00,682.79	₹ 2,59,22,67,176.98

# CARBON CERTIFICATION FEE

Certification Fee Particulars	Y1	Y2	Y3	Y4	Y5	Y6
Account Opening Fee	₹ -1,00,000.00	₹ -	₹ -	₹ -	₹ -	₹ -
Registration Fee	₹ -2,20,000.00	₹ -1,50,000.00	₹ -1,50,000.00	₹ -1,50,000.00	₹ -1,50,000.00	₹ -1,50,000.00
VCU Issuance Levy	₹ -	₹ -60,000.00	₹ -1,42,500.00	₹ -2,55,000.00	₹ -4,05,000.00	₹ -5,85,000.00
Conversion of GHG Credits	₹ -	₹ -12,880.50	₹ -26,524.80	₹ -40,984.88	₹ -56,383.50	₹ -72,304.88
Methodology Compensation Fees	₹ -	₹ -20,000.00	₹ -20,000.00	₹ -20,000.00	₹ -20,000.00	₹ -20,000.00
Expert Application Annual Fees	₹ -	₹ -50,000.00	₹ -50,000.00	₹ -50,000.00	₹ -50,000.00	₹ -50,000.00
Validation Body Annual Fees	₹ -	₹ -60,000.00	₹ -60,000.00	₹ -60,000.00	₹ -60,000.00	₹ -60,000.00
<b>Total Certification Fees</b>	<b>₹ -2,00,000.00</b>	<b>₹ -5,50,380.50</b>	<b>₹ -2,55,732.80</b>	<b>₹ -2,94,293.00</b>	<b>₹ -3,35,356.00</b>	<b>₹ -3,77,813.00</b>

Certification Fee Particulars	Y7	Y8	Y9	Y10	Y11	Y12
Account Opening Fee	₹ -	₹ -	₹ -	₹ -	₹ -	₹ -
Registration Fee	₹ -	₹ -	₹ -	₹ -	₹ -	₹ -
VCU Issuance Levy	₹ -8,10,000.00	₹ -7,50,000.00	₹ -6,67,500.00	₹ -5,55,000.00	₹ -4,05,000.00	₹ -2,25,000.00
Conversion of GHG Credits	₹ -88,749.00	₹ -1,05,750.53	₹ -1,23,309.45	₹ -1,41,478.50	₹ -1,60,275.00	₹ -1,47,394.50
Methodology Compensation Fees	₹ -20,000.00	₹ -20,000.00	₹ -20,000.00	₹ -20,000.00	₹ -20,000.00	₹ -20,000.00
Expert Application Annual Fees	₹ -50,000.00	₹ -50,000.00	₹ -50,000.00	₹ -50,000.00	₹ -50,000.00	₹ -50,000.00
Validation Body Annual Fees	₹ -60,000.00	₹ -60,000.00	₹ -60,000.00	₹ -60,000.00	₹ -60,000.00	₹ -60,000.00
<b>Total Certification Fees</b>	<b>₹ -4,21,664.00</b>	<b>₹ -4,67,001.40</b>	<b>₹ -5,13,825.20</b>	<b>₹ -5,62,276.00</b>	<b>₹ -5,37,400.00</b>	<b>₹ -5,03,052.00</b>

## GUARANTEE FUND: QUASI-FIRST LOSS



Mandatory 2% CSR spend by oil manufacturing companies to be channelled into the Sustainable Stubble Guarantee Fund



Guarantee Fund to be brought to use for fund investors and DFIs in the event of default by CBG plants and non-recovery thereof



### Guarantee Fund Contributions

Primary OMCs	CSR (Latest CSR targets)	Identification Strategy: Direct Impact
IOCL	₹ 4,60,00,00,000.00	
HPCL	₹ 1,55,00,00,000.00	
BPCL	₹ 1,62,00,00,000.00	
ONGC	₹ 5,53,00,00,000.00	
GAIL	₹ 1,47,00,00,000.00	
Overall Contribution	₹ 14,77,00,00,000.00	
Absolute Annual Contribution	₹ 32,00,00,000.00	
Annual Guarantee (%)	2.17%	

Tertiary Contributors	CSR (Latest CSR targets)	Identification Strategy: Energy sector with rural-focused CSR projects
Reliance Industries Ltd.	₹ 11,40,00,00,000.00	
Vedanta Ltd.	₹ 3,31,00,00,000.00	
Tata Power Company Ltd.	₹ 3,45,00,000.00	
NTPC Ltd.	₹ 4,18,00,00,000.00	
Power Grid Corporation of India	₹ 2,47,00,00,000.00	
Overall Contribution	₹ 21,39,45,00,000.00	
Absolute Annual Contribution	₹ 16,00,00,000.00	

# LOAN UTILISATION AND UPTAKE

Loan Utilization (\$1.5 million)	
Biogas Plant (Digester)	25%
Scrubbing Unit	13%
Compressor Cost	21%
CNG Cylinder and Pipeline	6%
Storage Tank	3%
Installation Expenses	6%
Slurry Processing Unit	27%

	Y1	Y2	Y3	Y4	Y5	Y6
Loans disbursed (in millions)	2400	3300	4500	6000	7200	9000
CBG Plants Loaned	200	275	375	500	600	750



# SLI INPUT SOURCING FEASIBILITY ASSESSMENT

CBG Plant Sourcing Feasibility Estimate (Derived solely on household biodegradable waste)	
Avg No. of wards accessible to CBG Plant (10km radius)	15
Avg no. of individuals in a ward	5000
Household waste generated per person per day (kgs)	0.57
Waste collectible per person per day (kgs)	0.31
Collection efficiency of the ward (%)	50%
Total collectible waste per ward (tonnes per day)	0.775
Total accessible collectible waste (tonnes per day)	11.625
CBG Plant input requirement (tonnes per day)	2
Daily input requirement as a fraction of collectible waste (%)	17.2%

Ward SLI Revenue Generation Potential	
Total collectible waste per ward (tonnes per day)	0.775
Expected waste uptake from CBG Plant (%)	50%
Expected annual waste collection from the ward (tonnes)	135.625
Ward's annual revenue potential (INR)	54,250

# CBG PLANT SUCCESS STORY

## IN FOCUS: SANGRUR CBG PLANT

### THE STORY BEHIND THE SANGRUR CBG PLANT

- Sangrur, a hotbed of intensive wheat-rice agriculture in Punjab used to top the charts regarding farm fire incidents
- But in June, the district became home to an innovation aimed at producing Bio-CNG or compressed biogas (CBG)
- The plant has been set up by Verbio, a German company and would consume 100,000 tonnes of paddy straw, procured from 6-8 satellite locations within a 10 km radius of the plant.

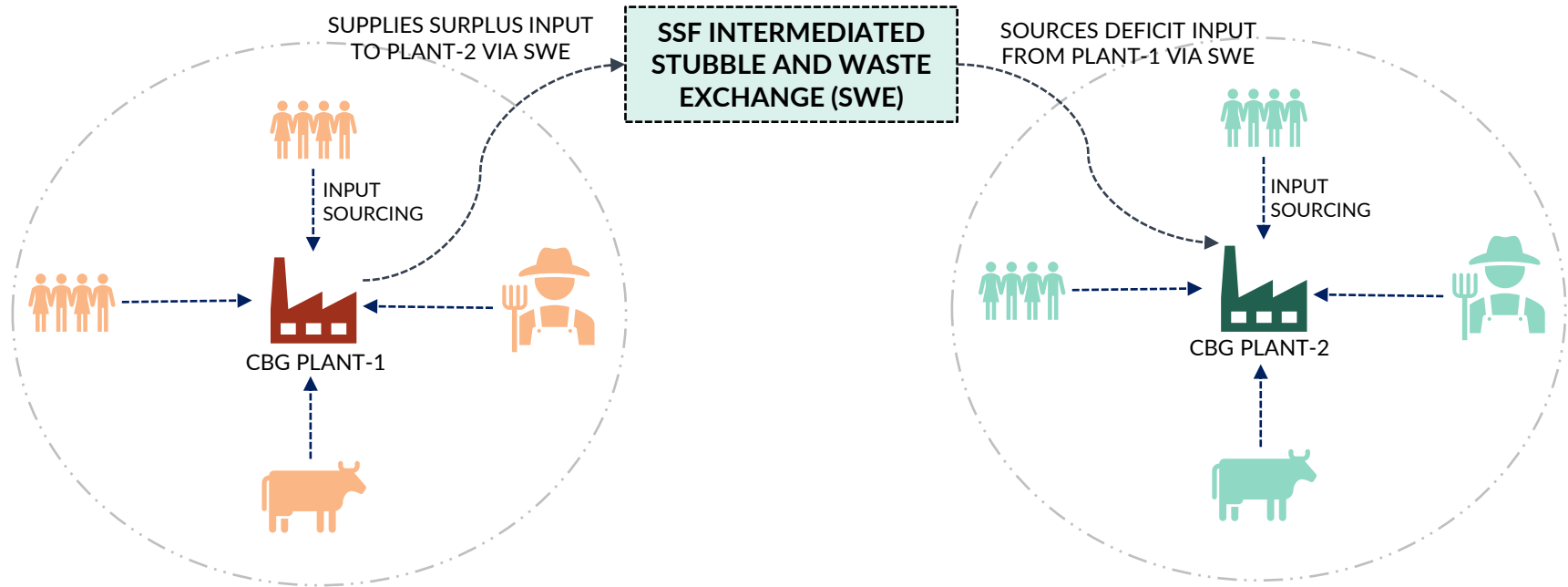
### POSITIVE IMPACT OF THE PLANT

- There shall be daily production of about 600-650 tonnes of FOM (Fermented Organic Manure) in the Sangrur, which can be used for organic farming.
- It shall prevent stubble burning of 40,000 acres of fields, translating into an annual reduction of 150,000 tonnes of CO<sub>2</sub>, ensuring that the citizens of Sangrur breathe in cleaner air and contribute towards India's COP26 Climate Change targets.



# MARKETPLACE FOR STUBBLE AND WASTE: **FUTURE EXTENSION**

AIM: TO CREATE A LOCAL MARKET FOR STUBBLE AND WASTE



CBG PLANT-1 SOURCES INPUT FROM NEARBY SOURCES

CBG PLANT-2 IS WITHIN A FEASIBLE DISTANCE TO PLANT-1 AND SOURCES INPUT FROM NEARBY SOURCES