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:

**Problem**
- **Stubble (crop residues like wheat husk, rice straw) burning in rural areas due to the absence of a viable means of disposal,** 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.
- 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%

**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

**Sustainable Stubble Fund: Our Solution**

**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)

**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**: Creation of funds 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

**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

- **Low Materiality**
  - 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

**IMPACT ACROSS THE VALUE CHAIN**

- **Measure**: Annual Fertilizer Savings (tons)
  - **Benefit**: 700 mn ($7 mn)
  - **Beneficiary**: Farmers

- **Measure**: Direct Employment Generated
  - **Benefit**: 7,2900
  - **Beneficiary**: Rural Communities

- **Measure**: Annual Supplemental income for Wards (10% equity)
  - **Benefit**: ₹ 19 mn ($1 mn)
  - **Beneficiary**: Wards (160 wards’ annual budget)

- **Measure**: GHG reduction from Stubble Burning (tCO₂)
  - **Benefit**: 12.5 mn ($1.25 mn)
  - **Beneficiary**: Country

- **Measure**: Land Restored (km²)
  - **Benefit**: 789 ($789 mn)
  - **Beneficiary**: Country

- **Measure**: Methane Reduction from Cow Dung & Waste (tons)
  - **Benefit**: 3 mn ($3 mn)
  - **Beneficiary**: Country

- **Measure**: Imports and Fertilizer subsidy (Barrels of Oil Equivalent)
  - **Benefit**: 2.7 mn ($2.7 mn)
  - **Beneficiary**: Country

**SDGs ADDRESSED AND KPIs**

- **SDG**: Biogas Plant Capacity utilization; Sale of new CBG tractors
  - **KPIs**: Additional income generated from CBG Plant and Restored Land

- **SDG**: Improvement in the Clean India survey annual ranking for the municipality
  - **KPIs**: Creation of jobs, Ward ownership as a % of overall plant owners

- **SDG**: Instances of stubble burning/open waste dumping/burning
  - **KPIs**: Degraded land restored, Super Normal Net Sown Area under cultivation

- **SDG**: Community Health Centre Respiratory Disease Burden for AQI
  - **KPIs**: PM concentration in air surrounding fields, CO₂ emissions reduced

**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

**MARKET**

- **Product**: Urban Municipal Waste
  - **Input Pricing**: Bidding-based

**EXTENSIONS**

- **Market**: Biogas Association, MFIs, Oil Companies, Biogas Training Centre, Global: GCF

**PARTNERS**

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