

CLEAN INDIA STRUCTURED NOTES

A PROPOSAL TO RADICALLY CHANGE THE WAY WASTE IS MANAGED IN INDIA USING A GOVERNMENT BACKED FINANCIAL INSTRUMENT THAT YIELDS HIGH RISK ADJUSTED RETURNS TO THE INVESTORS

THE CHALLENGE

Problem of Waste Management

A severe problem of waste management is looming over the city of Bengaluru as 2 out of 7 legal landfills have reached their saturation point; other landfills are facing protest from locals due to serious health risks posed by them. This problem can be attributed to:

- **Lack of Funding** - Requirement of large capital for appropriate processing technology and dearth of financial support hamper sustainable solutions.
- **Open Illegal Dumps** - 90% of municipal solid waste (MSW) is either disposed of illegally or burnt in open. The short term gain realized from such unhealthy practices manifests itself in the form of costly damages to health and environment in the long run.
- **Unlined Landfills** - Land degradation and groundwater contamination occur due to seepage of leachate. Their close proximity to the population centres causes health problems for residents.

Dismal Plight of Rag Pickers

Despite providing an **annual savings of 14%** to the municipal budget, the rag picking sector in India remains largely **unrecognized**.

- **Abysmal Working conditions** - Unhygienic working conditions coupled with heavy rains in the city lead to several occupational hazards and loss of earnings (20% - 40%) for the rag pickers.
- **Informal Sector** - Being an unorganized sector, the incomes of rag pickers are meagre and highly fluctuating, not to mention the dearth of social welfare government schemes for them. Moreover, the presence of black market in recyclables makes them more vulnerable to exploitation from middlemen.

THE OPPORTUNITY

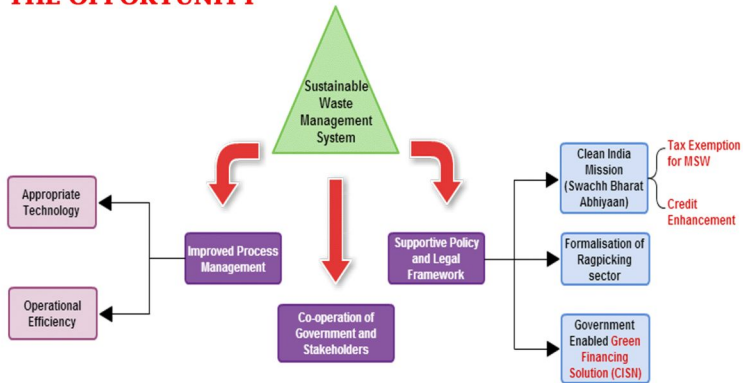


Fig.1: Sustainable Waste Management - Transforming Liabilities into Assets

An optimal solution to these problems lies in balancing technology with the human capital (rag pickers) to create value out of waste.

- **Value Generation** - (a) Improved condition of rag pickers and better life expectancies (b) Reliable waste collection (c) Sale of recyclables (d) Generation of electricity and compost (e) Savings for municipality from reduced transportation and disposal costs
- **Socio-economic upliftment of rag pickers** - Opportunity to move from traditional practices of repression and neglect to those of support and integration with the formal SWM system
- **Participation of Stakeholders** - The Government and Investors can work together under **Clean India Mission (Swachh Bharat Abhiyan)** to form policies that provide financial incentives to rag pickers and other stakeholders for the optimization of waste management system.
- **Carbon Footprint** - A biogas plant handling 350 metric tons/day of organic waste, will annually (a) save greenhouse gas emissions equivalent to 0.47 million tonnes of CO₂ (b) produce 3.85 million kg of Bio-LNG which can be used as fuel for transportation trucks (c) generate 0.7 million kg of organic compost and 100,000 MWh of electricity, reducing consumption of 0.032 million tonnes of coal and 0.13 million barrels of oil.

INVESTMENT THESIS

Proposal

Bengaluru's growing population, economy and consumption require a multidimensional approach to solid waste management problem. Hence, this proposal intends to collaborate with the local government body to reduce the amount of untreated waste going into landfills and change the way waste is handled at all levels i.e. transportation - segregation - treatment - value generation.

Segregation of Waste	<ul style="list-style-type: none"> • Higher Tipping Fees for Unsegregated Waste to promote Segregation at source • Installed Mechanical Segregation Units to achieve ~100% segregation
Municipal Solid Waste Treatment	<ul style="list-style-type: none"> • Develop 5 Waste Treatment Plants; Estimated Life of 20 Years • Optimal Locations <ul style="list-style-type: none"> Maximize city coverage Minimize logistics costs • Organic (60%) → Anaerobic Digester → Biogas <ul style="list-style-type: none"> Generator → Electricity Liquefaction → Bio-LNG Residue → Compost • Recyclables (25%) → Waste Recycling Industries • Inert (Sand/Earth/Stones; 15%) → Sanitary Landfill • Landfills meet EPA Standards (Environmental Protection Agency); Appropriate Lining System, Leachate Treatment and Capping Systems
Rag Pickers	<ul style="list-style-type: none"> • Employment of up to 1000 Rag Pickers per site • Fixed Monthly Income + Incentives on tonnage separation basis • Protective clothes, equipments, work related training process and medical supervision • Covered segregation units to prevent wetting of waste
Self-sufficiency	<ul style="list-style-type: none"> • Installed Solar Panels on sheds to meet operational electricity requirements • Production of Bio-LNG (Liquified Natural Gas) from Biogas; used as fuel for garbage trucks

Cash Flow Analysis

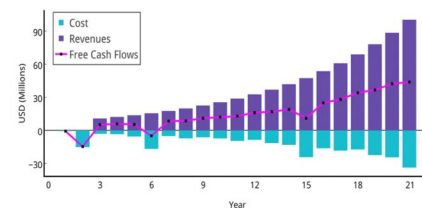


Fig.2: Cost and Revenue Projections

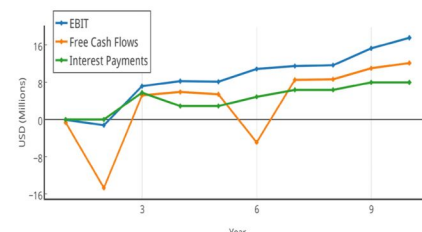


Fig.3: EBIT and Interest Payments

✓ Projected **IRR of 30%** over the next **10 years**

✓ Negative free cash flows in **Year-1, 2, 6** due to high capital expenditure

✓ Construction of *digester* in **Year-2** followed by expansion in **Year-6 and Year-15**

✓ Investment in landfill expansion after every **1500 tonnes** of inerts dumped

✓ **Major costs:** (in decreasing order) Wages to Rag Pickers, Anaerobic Digester, Landfill Development, Transportation Costs

✓ **Sources of Revenue:** Electricity, Recyclables, Compost, Tipping Fees, Carbon Credits

Business Risks

Risk	Description
Government Disapproval	Non-cooperative municipality creating disruption in consistent feedstock supply
Society Protests (NIMBY)	Locals raising objections in setting up landfills
Land Acquisition	Project abandonment due to acquisition by competitors or other stakeholders
Fire Breakout	Mishandling of combustible substances in waste management plant
Technological Limitation	Lack of adequate technology for handling Indian garbage mix

FINANCIAL INSTRUMENT

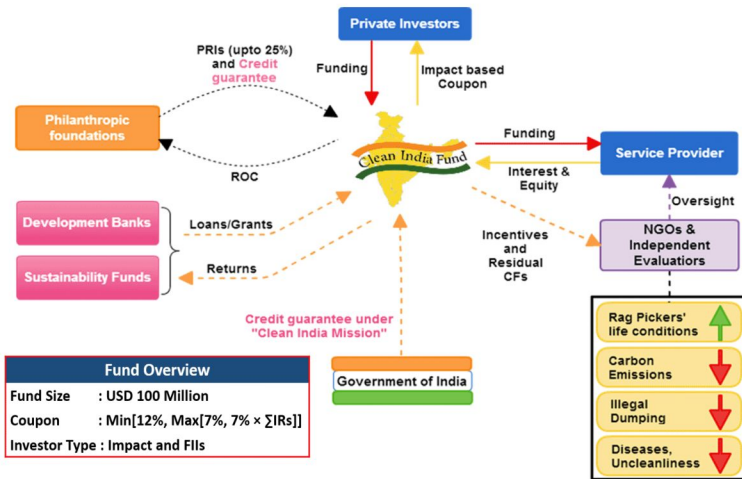


Fig.4: Financing and Operating Mechanism

Overview

Clean India Structured Notes (CISNs) are Government backed structured notes (first of its kind in India) which would enable **Impact and Foreign Institutional Investors (FIIs)** to earn a higher risk adjusted return with a **guaranteed floor coupon**. The note not only yields **impact linked structured coupons** but also enables **principal protection** for the end investor. These structured notes have been designed to minimize the impact of credit risk under the provision of **credit enhancement** through **Clean India Mission**. The credit risk is further minimized by implementing a novel **FX reset cash-flow hedging mechanism**. These structured notes have an **option (convertible debt)** embedded in them which enables investors to convert debt into equity starting from the sixth year of issuance. This provides the investor an opportunity to participate in upside of the firms profitability to a much larger extent.

Summary Terms, Pricing and Currency Risk Mitigation

- The pilot programme in Bengaluru is targeting to raise an initial capital funding of **USD 100 million** with the help of CISNs.
- CISN has a legal **maturity of 10 Years subject to early termination**. The Notes are issued with **par values of USD 1 million**. These notes are issued with **credit enhancement** by the **Government of India** under Clean India Mission.
- A **guaranteed coupon of 7% p.a.**, offered by CISN, will be funded by the **Government of India** for the first 2 years of issuance. During this period, capital raised will be deployed to create the required setup.
- Third year onwards**, CISN provides **annual structured coupon** payoffs calculated as **Min[12%, Max[7%, 7% x ΣImpact Ratios]]** to the end investor **subject to termination** (maturity or option exercise). A **floor coupon** of 7% p.a. offers an attractive premium to investors over other **Emerging Markets Hard Currency Bonds** (current yield of 5.70% p.a.).
- Impact Ratios (IRs)** are derived from the **improvement in living conditions of rag pickers, reduction in carbon foot print, reduction in illegal dumping and improvement in societal health and cleanliness**. In order to assess these metrics correctly, it is proposed to set up an **Independent Evaluator** unit. This will also help in **eliminating** the associated **Agency problem**.
- CISN has a **convertible debt option (annual Bermudan callability feature)** wherein an investor can convert debt to equity starting from the **fourth year** of issuance. This enables the fund to raise higher capital due to the additional premium earned from the embedded optionality.
- CISN is priced at **106.50%** of par taking into account the **embedded optionality** and the **risky coupons**.

- As revenues are generated in **functional currency (INR)**, it is proposed to enter into a **FX Reset Cross Currency Swap** with an Investment Bank to **hedge** the foreign currency risk (**USD appreciation risk**). This also helps in reducing the **credit risk** associated with an **uncollateralized issue** of this kind. The swap has been priced efficiently considering the **high volatility** of returns in waste management. The **note issuance and hedging mechanism** (as shown below) has the following risk return characteristics:
 - FX reset cross currency swap (FXR-CSS)** would be a **cost effective** solution to convert USD assets to INR assets (and vice versa) and at the same time take out much of the credit exposure on both sides.
 - Credit exposure** rises each interval and then drops to zero once the **FX reset** occurs and since the intervals are short, the credit exposures always stay at a much **lower level** than a Vanilla Cross Currency Swap.
 - It **increases the credit worthiness** of these notes by decreasing the default risk.

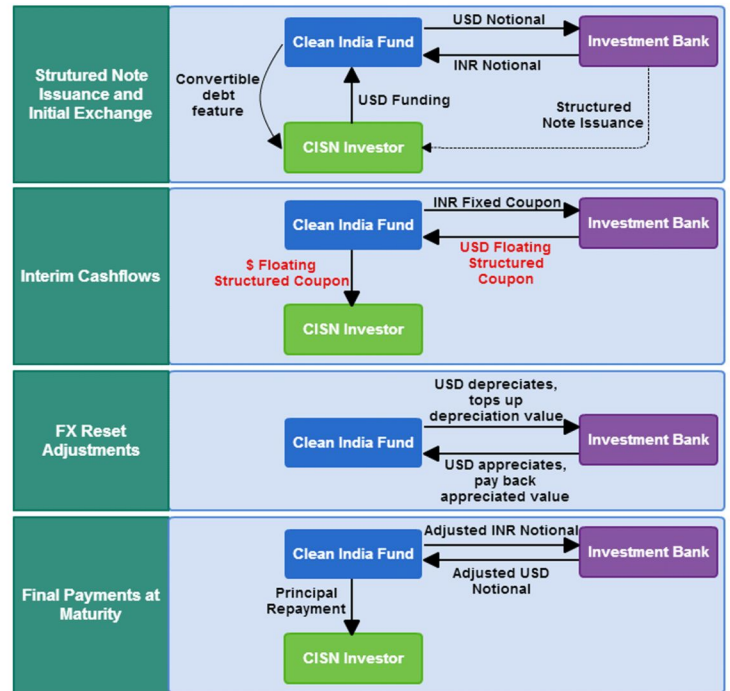


Fig.5: Note Issuance and Hedging Mechanism

IMPACT ON STAKEHOLDERS

Stakeholder	Parameter	Impact	Description
Rag Pickers (20% are children)	Economic Value	↑	Increased minimum wage from \$1/day to \$4.5/day through formal employment
	Social Recognition	↑	Improved social status of Dalit rag pickers (lowest rung of Hindu society)
	Health	↑	Safe and hygienic working conditions by providing proper infrastructure
	Child Labour	↓	Combating child exploitation by providing legal rights
Society	Carbon Footprint	↓	Reduced burning of waste in open by using appropriate disposal techniques
	Water Contamination	↓	Decreased greenhouse emissions due to minimal dependence on coal/oil
Government	Corrupt Practices	↓	Curtailed in leachate seepage using latest landfill technology
	Savings	↑	Reduced presence of garbage nexus by virtue of Government approved venture

PROSPECTS AND SCALABILITY

The SWM sector in India is very lucrative with an estimated market of **\$6.83bn** in 2015 (CAGR of 9.93%). Going forward, the proposal can be scaled to different cities in India and diversified to **Industrial wastes** (CAGR of 11.40%), **E wastes** (CAGR of 10.03%) and **Medical wastes** (CAGR of 8.41%). These would require sophisticated technology and funding base, which can be achieved by collaborating with the waste management arm of **United Nations - Global Partnership on Waste Management**.

References

Unep.org, "Global Partnership On Waste Management (GPWM) - United Nations Environment Programme; Seas.columbia.edu, "Measuring the Sustainable Return on Investment(SROI) of Waste to Energy"; Bbmp.gov.in, "Bruhat Bengaluru Mahanagara Palike"; Foresternetwork.com, "Landfill Economics: Getting Down to Business"; C40.org, "Organic Waste is Composted and Sold as Bio-Rich Fertilizer - Reducing Emissions, Generating Jobs and Cleaning up the City; Solid Waste Management - Subhash Anand