BUILDING BRICKS

Securitized-Carbon and Kiln Loan Fund

To address the resource inefficiency and air pollution caused by the Brick Kilns in India, the second-largest producer of bricks globally, by plugging the funding gap and incentivizing brick kiln owners to adopt cleaner technology while diversifying cash flows and managing risk for investors through a unique Emission-based securitization approach.

INVESTMENT HYPOTHESIS

OPPORTUNITY

Brick masonry is the most popular method for wall construction in India, with around 87% share (0.65 billion m^2/year) of the total wall construction being done using bricks. India is the world's second-largest producer of bricks, producing **250-300 billion bricks annually**. Brick demand is projected to grow **3-4x** in the next 20 years. However, the industry remains underserved despite being the backbone of all construction activities and faces the following critical challenges:

- Kiln owners, predominantly rural, have **little or no access to formalized credit**; thereby creating an untapped segment
- Highly **energy inefficient** and **reliant on coal** (35 mt per year); there exists scope for **energy savings** of 2 mtoe by 2031 & 4 mtoe by 2041, sufficient for lighting up to 47 million homes
- Kilns emit toxic fumes containing **PM 2.5**, **CO**, **SO_2**, worsening AQI to **'Hazardous'** levels in cities; they **emit 66-84 million tons of CO_2** yearly and **9%** of the **total black** carbon in India
- Kilns employ one of the **nation's largest workforce after agriculture**, exposing them to toxic pollutants on a daily basis
- **Lack of technical know-how** and inaccessibility of funds hinder the adoption of better product-tech combinations
- Large amounts of soil extraction for the preparation of **burnt clay bricks** (87% share), **leading to land degradation**

Rising Demand
Shortage of Funds
Efficient Technology
+
Emission & Resource Efficiency (Clay+Energy)
Worker well-being
=
Returns with Impact

Financial Opportunity | Impact Opportunity

SOLUTION: BUILDING BRICKS FUND

The fund seeks to address **financial & environmental concerns** of Brick Kilns in India through the creation of a **holding company**, with **two wings** focusing on the **core lending business** and the establishment of a **risk transfer mechanism** for the fund by **securitizing carbon credits**:

Lending Corporation

Aim: To provide Capex loans suited to the needs of Brick Kilns seeking to upgrade to kilns with lower specific manufacturing energy (MJ/m^3) vis-à-vis the fund baseline (defined below).

Investors put their money into one of the following two divisions based on the **degrees of altruism**:

1. **Loan + Worker Insurance Fund**
   Includes health insurance transfers for kiln workers, which additionally ensures workers' safety through a joint commitment and an equal contribution by the Fund and the kiln owners to an external insurance company.
2. **Only Loan Fund**

The fund offers kiln establishment & upgradation loans, to be repaid over a 10-year period from Year 2. In addition, the fund provides access to kiln producers for technological assistance and repairs & maintenance.

In return, the firms commit to provide carbon credits to the fund over the duration of the loan, which are further sold to the securitization SPV at a discount.

At the start of each year, the expected number of carbon credits to be generated by the kilns that newly entered the fund shall be ascertained.

Emission-Based Securities

Aim: To mitigate payment risk through the generation of a novel revenue stream by securitizing carbon credits. Kilns to be incentivized to generate more carbon credits.

1. The SPV buys expected carbon credits each year from the lending corporation (separation of powers) for the newly joining kilns at a discount based on the lower bound of the expected present value of carbon credits (80% of total).
2. The SPV combines and securitizes them into **Carbon Credit Bonds* (CCB)** – a 10-year high risk security, sold to buyers each year.

The cash flows on these bonds are tied to receipts from Carbon credits generated by the corresponding kilns at the end of the year from the open market. Hence, the security mimics a variable coupon bond.

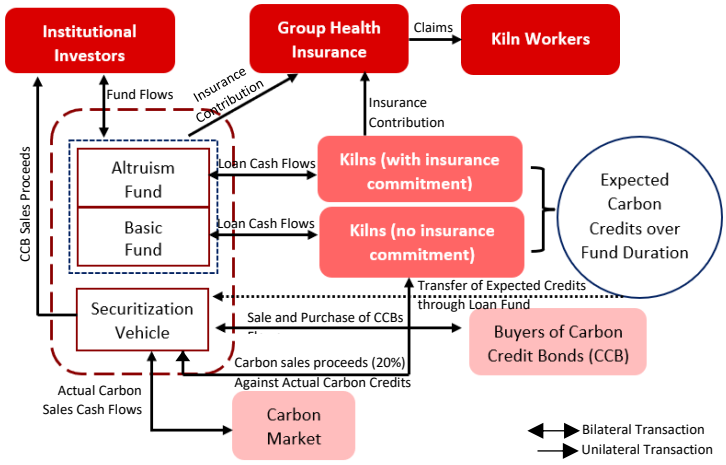
Cash flows from the **actual sale of carbon credits** each year shall be distributed as follows:

- Kiln owners – 20%
- CCB Investors – 75%
- Management – 5%

The UN valued carbon at $ 75 a ton to attain GHG targets. This claim further evidences the lucrativeness of CCB.

*Pre-sale credit rating shall be sought by the SPV for CCBs

FUND STRUCTURE



PRODUCT-TECHNOLOGY COMBINATIONS

Kiln	Brick	Energy Used	tCO_2/m^3	PM (g/m^3)
Clamp	Solid	3200 MJ/m^3	-	-
FCBT	Solid	2100 MJ/m^3	0.19	1888
ZigZag	Solid	1800 MJ/m^3	0.15	368
ZigZag	Perforated	1600 MJ/m^3	0.14	331
Tunnel	Hollow	1300 MJ/m^3	0.12	178

Fund Baseline Energy Consumption: 2100 MJ/m^3

Energy and Emissions depend on: Type of Kiln + Type of Brick

Sources: Greentech Knowledge Solutions Pvt. Ltd. | Bureau of Energy Efficiency | National Bricks mission | Central Pollution Control board | Sustainable Energy foundation

IMPACT ASSESSMENT

Scale of Impact

100 Million GJ	Energy savings possible by 2030
10 Million tco_2	GHG emissions cut by 2030
400 tonnes	Soil extraction savings by 2030

SDGs Addressed

BUILDING BRICKS FUND

KILN CASH FLOWS

Unit Economics (per brick) (Annual)		ZigZag Kiln	Tunnel Kiln
Avg. Selling Price	Revenue	₹ 3.15	₹ 4.20
Raw Material	Variable Cost	₹ -0.35	₹ -0.40
Cost of Operations	Variable Cost	₹ -0.65	₹ -1.00
Fuel and Overheads	Variable Cost	₹ -0.88	₹ -1.15
Brick Wasting Losses	Variable Cost	₹ -0.15	₹ -0.10
Contribution (per brick)		**₹ 1.13**	**₹ 1.15**

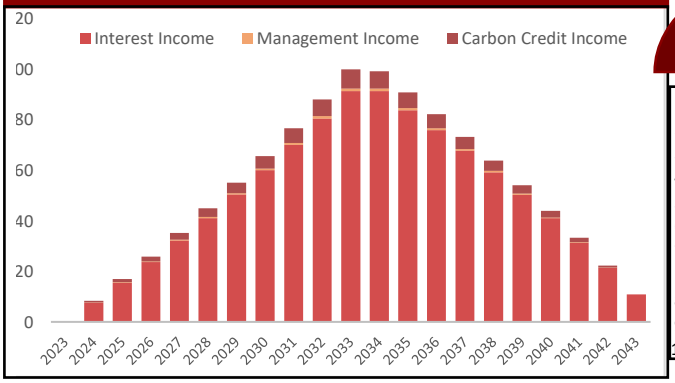
P&L Statement of the Kiln	(Loan: 5 mn)	(Loan: 70 mn)
Production Capacity (overall)	6,000,000	20,000,000
Productive Capacity	80%	80%
No. of Bricks Fired	4,800,000	16,000,000
Carbon Credits Sale (20% of total)	₹ 45,360	₹ 234,000
Income from Sale of Bricks	₹ 5,400,000	₹ 18,400,000
EBIT	**₹ 5,445,360**	**₹ 18,634,000**
Interest (11% - ZigZag; 13% - Tunnel)	₹ -550,000	₹ -9,100,000
Loan Repayment	₹ -500,000	₹ -7,000,000
Health Insurance Contribution	₹ -200,000	₹ -300,000
PAT/EAT	₹ 4,195,360	₹ 2,234,000
PAT/EAT (in USD)	**$ 55,938.13**	**$ 29,786.67**

FUND DETAILS

Fund Type	Loan Fund + Emission Securitization Vehicle
Fund Size	$ 500 million equity (2:3 split Altruism: Basic Fund)
Tenor	10 y for loan disbursement and collection + 10 y for only collection + 2 y non-recovery contingency
Min. Investment	$ 100,000
Geography	India
Target IRR	13-14% (Basic Fund); 12-13% (Altruism Fund)
Target Investors	HNIs, Institutional Investors, ESG & Pension funds
Income Streams (For Investors)	
↳ **Loan Interest**	10 y Indian Govt. Treasury Bond Rate (~6%) + Industry Risk Premium (~3%) + Kiln-specific Risk Premium (technology, collateral)
↳ **CCBs**	Sale of expected credits to the SPV at a discount
Fees (Fund Managers)	5% Management Fee (on sale of Carbon) + 2% Origination Fee (on kiln loans issued)
Financial Covenants (kiln)	Maintain >60% productive capacity; Kiln land lease should be ≥ 10 years, Debt Coverage Ratio > 0.9
Impact Covenants (kiln)	Kilns to maintain specific energy consumption below the fund baseline (2100 MJ/m^3)

FUND CASH FLOWS

INCOME PROJECTION (million $)

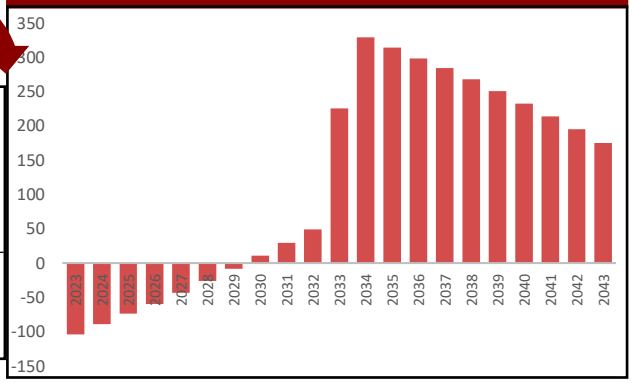


Net CF = Income + Net Loan Repayment

KEY ASSUMPTIONS

1. Delinquency rate: 5%
2. Insurance adoption rate: 50%
3. Carbon Price: $2 (Conservative)
4. ₹/$ Exchange Rate: 75
5. Kiln Operating Capacity: 80%
6. Tax computations excluded
7. Loan uptake aligned with high-income countries
8. CCBs discount rate: 30%
9. Fund Starts Operations: 2023
10. Repayment begins in year-2

NET CASH FLOW (million $)



IMPACT ACROSS THE VALUE CHAIN

Consider a hypothetical residential building with 10 floors, 6 flats per floor, and an area of 100 m^2 per floor constructed using **Hollow bricks** of the **Tunnel Kiln**. The estimated incremental benefits over the baseline FCBTK solid burnt clay are:

Parameter	Savings (60 flats)	Beneficiary
Manufacturing Energy Savings (MJ)	2,583,000	Manufacturer
Electricity Consumption Reduction (kWh/year)	74,760	End-User
Reduction in weight of walls (ton)	2,220	Contractor
Construction Cost Reduction	1.5%	
Energy Savings (tonnes of coal equivalent)	1,760	Country
Reduction in GHG (tCO_2)	3,300	
Clay usage reduction	40-70%	

RISKS AND MITIGATION

Default Risk	Non-payment of dues by a kiln after the grace period (6 mos) gives equity to the fund in multiples of 3%
Impact Risk	Monitoring impact disclosures; incentivizing compliance via a 20% share in carbon credits sales
Technology Risk	Upgrading contracts based on new technologies; partnering with of Habla ZigZag, Wienerberger India
Demand Risk	Diversifying kilns' consumer base by creating channels to enter the untapped rural brick market
Investment Risk	Diversifying cash flows through CCBs; re-investing principal repayment proceeds to generate leverage
Regulatory & Policy Risk	Financial: Transferring losses (loan fund) to the SPV Environmental: Keeping fund baselines consistently superior to the existing national regulations

SCALABILITY AND PILOT

Addressable Market: $4.95 billion, growing at 5% p.a.

Pilot: The fund will be launched in **50 districts** across the states of **U.P.** and **Bihar**, with ~30% of total brick kilns in India, followed by a phased nationwide rollout in 4 states every 6 months.

EXTENSIONS

The fund can be extended into:

1. Alternate Walling Systems
2. Recycled waste raw material
3. Non-clay input mixes

UNDERWRITING

Prospective Underwriters:

Indian: Axis, ICICI Securities

Global: Morgan Stanley, HSBC