United Nations Development Programme
India
Annual Work Plan - 2009

Project Title	Energy Efficiency Improvements in the Indian Brick Industry
UNDAF Outcome(s)1:	Communities are aware of their vulnerabilities, and adequately prepared to manage (and reduce) disaster and environmental related risks.
Expected CP Outcome(s):	Energy efficiency improvements in Indian Brick Industry demonstrated.
Expected Output(s):	Energy efficiency improvements in Indian Brick Industry.
Implementing Partner:	Ministry of Environment & Forests (MoEF)
Responsible Parties:	The Energy and Resources Institute (TERI)

Brief description

The Indian brick industry is the second largest in the world producing approximately 140 billion bricks annually. The brick industry also contributes significantly to greenhouse gas emissions (GHGs) from the country. The industry is also a source of local air pollution and topsoil erosion.

This project aims to reduce energy consumption in production and promote use of resource efficient bricks, which will have several co benefits including reduced GHG emissions. Identified five major brick producing clusters will be developed as demonstrative models by (i) public sector awareness on resource-efficient products, (ii) access to finance for brick kiln entrepreneurs, (iii) knowledge on technology and marketing, (iv) availability of resource efficient technology models through Local Resource Centres, and (v) capacities of brick kiln entrepreneurs.

During the year 2009, the project will initiate dialogue with brick kiln entrepreneurs, industry associations and other relevant stakeholders. A national level meeting will be organized for sensitizing various end users Public Works Department (PWD), Military Engineering Services (MES) and builders/ architects/ developers, etc) on production and utilization of resource efficient brick products in the construction sector. Technologies suitable for the selected clusters will be identified and discussions initiated with technology providers and financial institutions. It will develop framework for the detailed project reports (DPR).

Programme Period:	2008-2012	2009 AWP budget:	USD 117,020
Key Result Area: Mainstreaming Energy & Environment		Total resources required	USD 696,448
Atlas Award ID:	00047625	Total allocated resources:	
Start date:	April 2009	• Regular	
End Date	December 2009	• Other:	
		• GEF	USD 117,020
PAC Meeting Date	7 November 2008	• Others	
Management Arrangements:	National Implementation	Unfunded budget:	_____
		In-kind Contributions	_____
		Co-financing	USD 1,999,000

Agreed by: Ministry of Environment & Forests 15/6/2009

(R. R. RASHMI)
Joint Secretary
Ministry of Env. & Forests
Govt. of India, New Delhi

Agreed by: 15.6.2009 United Nations Development Programme

Pieter Bult
UNDP Deputy Country Director

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1. Project Overview:

1.1 Situation Analysis:

The construction sector contributes about 10% towards India's GDP and is growing at the rate of 9% per annum. Building materials are the greatest single contributors to pollution in the construction sector. The Indian brick industry is the second largest producer of bricks in the world after China, producing about 140 billion bricks per year. Brick production in India takes place in small units, using manual labour and traditional firing technologies. Large demand for bricks in urban centres has resulted in mushrooming of brick kiln clusters at the outskirts of major towns and cities.

At the current rate of production, the brick industry consumes about 350 million tonne of fertile topsoil every year, approximately equal to 34,000 hectares of prime agricultural land[2]. By using perforated, hollow clay bricks we can save upto 30% of clay per brick. The sector consumes 24 million tonnes of coal along with huge quantity of biomass fuels. These brick clusters are major source of local air pollution (SPM, SO_2, fugitive emissions, etc) affecting local population, agriculture and vegetation. The total CO_2 emission from the brick industry is estimated at 41.6 million tonne accounting for 4.5% of total GHG emissions from India.

1.2 Rationale of Project:

Use of obsolete technologies and use of solid bricks with traditional practices are seen as major threats to Indian brick industry. Under the business as usual scenario, Indian brick industry will continue to operate with traditional technologies and practices. The following have been identified as the major problems in Indian brick industry:

- Limited information on resource efficient technologies;
- Lack of resource efficient model brick kiln units at cluster levels;
- Non-availability of trained manpower;
- Limited access to finance;
- Unexplored market for alternate building products;
- Old specifications & codes for building materials and
- Non-availability of institutional mechanism.

The project preparatory phase clearly indicated several opportunities in Indian brick industry to improve resource efficiencies and promote production of resource efficient bricks such as perforated bricks, hollow blocks and fly ash bricks. This would require significant changes and up-gradation in existing setup of brick making processes for which ready-made solutions are not available.

1.3 Project Strategy:

The goal of the project is to reduce energy consumption[3] by creating appropriate infrastructure for sustained adoption of new and improved technologies for production and use of resource efficient bricks in India., The objective is to make India's five[4] major brick producing clusters more energy efficient. A co-benefit of the interventions will also be reduction in air pollution and GHG emissions from brick production

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[2] A standard size of a solid fired clay brick commonly used in India is 9 inch x 4.5 inch x 3 inch. Thus one solid brick requires 150 cubic inches or 0.0024 cubic meters of topsoil.

[3] Reduction in energy consumption is estimated to be 15–20%

[4] The parameters chosen for short-listing of these clusters are: Major brick production centres located close to high growth centres, Higher demands for bricks due to vibrant construction activities, Availability of forward looking entrepreneurs willing to adopt technology modernization, Covering different geographical locations

Following outcomes are envisaged through various activities proposed under the project:

(i) Enhancing public sector awareness on resource-efficient products.
(ii) Access to finance for brick kiln entrepreneurs
(iii) Improved knowledge on technology, including marketing
(iv) Availability of resource efficient technology models in 5 clusters through Local Resource Centres
(v) Improved capacity of brick kiln entrepreneurs

During the year 2009, the project will initiate dialogue with brick kiln entrepreneurs, industry associations and other relevant stakeholders by carrying out one to one meetings as well as cluster level meetings. The project will organize a national level meeting for sensitizing various end users Public Works Department (PWD), Military Engineering Services (MES) and builders/ architects/ developers, etc) on production and utilization of resource efficient brick products in the construction sector. The project will shortlist technologies suitable for the identified clusters and initiate discussions with technology providers and financial institutions. It will develop framework for the detailed project reports (DPR). The project management unit will be established. The project website will be launched.

2. ANNUAL WORK PLAN AND BUDGET SHEET (1ST YEAR) YEAR: APRIL 2009 TO DECEMBER 2009

CP Output: National efforts supported to leverage environmental finance to address climate change, biodiversity, land degradation and chemical management issues

EXPECTED CP OUTPUTS And indicators including annual targets	PLANNED ACTIVITIES List of activities including M&E to be undertaken during the year towards stated CP outputs	TIMEFRAME				RESPONSIBLE PARTY	PLANNED BUDGET		
		Q1	Q2	Q3	Q4		Source of Funds	Budget Description	Amount (USD)
Output 1: To make India's five major brick producing clusters energy efficient **Indicator** • No. of builders/architects using resource efficient brick products as a result of sensitisation done by project Baseline: 0 Target: 10	Activity Result 1: Enhancing Public Sector Awareness on Resource efficient products. • National Level Meeting for key stakeholders such as PWD, MES and builders • Two cluster meetings with concerned stakeholders					TERI	UNDP GEF	71300 Local consultants 71600 Travel	5295 700
Indicator • Database of local banks and financial institutions developed on financial information for brick kiln entrepreneurs Baseline: No database available Target: Database developed	Activity Result 2: Facilitating project finance access to brick kiln entrepreneurs. • Identification of interested national and regional financial institutions and banks • Preparation of template frameworks and DPRs on financing of resource efficient brick kiln technology					TERI	UNDP GEF	71300 Local consultants 71600 Travel 72000 Service contracts 74500 Public consultations and Hearings 74500 Misc	4000 1250 2000 1000 1000

Indicator • Technology Assessment and market feasibility completed and shared with various stakeholders Baseline: Lack of an assessment and feasibility study on improved brick technologies Target : Study completed & results shared with stakeholders	Activity Result 3: Developing of knowledge on technology and marketing • Undertaking research on available technologies and markets • Results shared with the concerned stakeholders through workshops, meetings, etc.					TERI	UNDP GEF	71300 Local consultants 71600 Travel 72000 Service contracts 74500 Public consultations and Hearings 74500 Misc	4000 1200 4000 1200 700
Indicator • No. of clusters in which technologies for production of resource efficient bricks identified Baseline: 0 Target: 5	Activity Result: Availability of efficient technology models in 5 clusters for demonstration projects. • Preparation of database on potential brick kiln enterprises • Identification and short-listing of technologies to be sourced for five clusters					TERI	UNDP GEF	71200 Intl consultants 71300 Local consultants 71600 Travel 72000 Service contracts 74500 Public consultations and Hearings	3000 3000 1000 40000 600
Indicator • No. of Local Resource Centres established for training programmes on resource efficient bricks Baseline: 0 Target: 5	Activity Result: Enhancing capacity of brick kiln enterprises • Preparatory work for establishing LRCs (local resource centres) for training programs • Interaction with entrepreneurs and experts for assessing the needs of the clusters and developing training modules • Organizing exposure visit for prospective entrepreneurs					TERI	UNDP GEF	71300 Local consultants 71600 Travel 74500 Public consultations and Hearings	10575 500 1000

Indicator • Project implementation strategy finalised Baseline: Nil Target: Strategy finalised	Activity Result: Monitoring, Learning and Evaluation • Project inception workshop • Developing promotional and information material • Developing project website					MoEF, TERI	UNDP GEF	71200 Intl consultants 71300 Local consultants 71600 Travel	4000 5000 2000
Output 2. Project Management	Activity Result: Project Management Unit					MoEF, TERI	UNDP GEF	71300 Local consultants 71600 Travel 72200 Equipment and furniture 72500 Office supplies	10000 2000 6000 2000
TOTAL								Total	**117,020**

I. FUNDS REQUIRED FROM UNDP-GEF (APRIL 2009 TO DECEMBER 2009): USD 117,020

3. MANAGEMENT ARRANGEMENTS

3.1 Implementation Arrangements – Institutional Mechanisms & Monitoring:

3.1.1 The Implementing Partner:

The project will be nationally implemented by the Ministry of Environment and Forests (MoEF), GoI and will assume the overall responsibility for the achievement of the project results. MoEF will sign the budgeted Annual Work Plan (AWP) with UNDP on an annual basis, as per UNDP rules and regulations. MoEF will designate a senior official as the National Project Director (NPD) for the project. The NPD will be responsible for overall management, including achievement of planned results, and for the use of UNDP funds, in each activity under this project.

3.1.2 Responsible Party:

The Energy and Resources Institute (TERI) will have overall responsibility for the implementation of project activities. TERI will coordinate and facilitate the project activities in all the five identified brick kiln clusters. TERI will coordinate and facilitate the project activities in all the five identified brick kiln clusters. TERI would help in providing guidance and directions for project implementation.

3.1.3 Project Steering Committee:

A Project Steering Committee (PSC) would be constituted at the apex level to review the progress and provide direction and guidelines for implementation of the project. The PSC will comprise of members from different institutions - Ministries, financial institutions, industry associations, bilateral agencies, TERI and others and would help in providing guidance and directions for project implementation. The PSC will carry out the following functions:

- Ensure that the project goals and objectives are achieved in a defined timeframe;
- Review the project progress and suggest implementation strategies periodically;
- Review the project expenditures against activities and outcomes; and
- Approve Annual and Quarterly Work Plans.

The PSC will be the group responsible for making, by consensus, management decisions for the project and holding periodic reviews. In order to ensure UNDP's ultimate accountability, final decision-making rests with UNDP in accordance with its applicable regulations, rules, policies and procedures. Project reviews by the PSC will be carried out on a quarterly basis during the running of a project, or as necessary when raised by the Project Manager.

3.1.4 Programme Management Board (PMB):

PMB for the Energy & Environment Outcome (Outcome 1.1 in CPD/CPAP) will be set up and co-chaired by MoEF and UNDP. Department of Economic Affairs, Ministry of Finance will be an invitee in the PMB. The PMB will oversee the delivery and achievement of results for all the initiatives under the Energy & Environment Programme Outcome and provide strategic directions for future programmes in this outcome area. The PMB will also appraise the new programme initiatives prior to sign off with the Implementing Partners (IPs). The PMB will comprise ministries relevant to the Programme Outcome and relevant stakeholders identified in consultation with UNDP and IPs. It will meet twice a year, in the 2nd and 4th quarter, to take stock of the physical and financial progress.

3.1.5 National Project Director:

On behalf of the MoEF, the NPD will coordinate project and ensure its proper implementation. In this, S/he will be supported by the project staff as follows:

3.1.5.1 Project Manager:

TERI will designate a full-time Project Manager with the concurrence of MoEF for the day-to-day management and decision making of the project and will be accountable to the NPD and PSC. S/he will prepare the detailed activity and monitoring plan based on the Annual Work Plan (AWP) and Budget and submit it to the PSC for approval. The Project Manager will ensure that the project produces the results specified in the project document, to the required standards of quality and within the specified constraints of time and cost. The Project Manager will prepare and submit to UNDP the following reports/documents:

Annual and Quarterly Work Plans, Quarterly and Annual Progress Reports (substantive and financial), Issue Log, Risk Log, Quality Log, Lessons Learnt Log, Communications and Monitoring Plan using standard reporting format to be provided by UNDP.

3.1.5.2 Project Management Unit and Support Teams:

At the Responsible Party level (TERI), a Project Management Unit (PMU) under the Project Manager (PM) will be formed and the PMU will coordinate each activity of the project at national, state and cluster level. Experts will be called to provide their inputs during formal interactions in meetings and workshops. Regular meetings will be held to review and coordinate the project activities and PMU will host these meetings. PMU will also be responsible for documentation (MOUs, minutes of meeting and agreement etc of the project). These documents will be circulated to Steering committee members. In addition, the PMU would help in smooth and timely flow of funds from co-financiers of the project to ensure that there are no times and cost over-run.

3.1.5.2.1 Support teams:

The support teams, recruited under the project, assist the Project Manager in day-to-day management of the project.

Finance Management Unit

The team would consist of an accountant, a part time auditor, and local consultant. The tasks for the team would be to:

1. Address issues relating to financial barriers identified in the project proposal.
2. Interact with Financial Institutions for financial options for energy conservation.
3. Maintain accounting of project expenses as per UNDP guidelines.
4. Purchase and procure in accordance with TERI purchase procedures.
5. Co-ordinate with external auditor for annual audit.

The recruitment and staffing process will give due attention to considerations of gender equality and promoting diversity at workplace. Along with the Project Manager, the PMU will be based at the TERI.

Local Resource Centres (LRCs)

LRCs will play a key role in setting up of demonstration projects. They will be equipped with necessary instrumentation to carry out monitoring as well as training. LRCs will develop DPRs and assist in seeking loan from banks. LRCs will carry out, training programs, awareness generation activities and market promotion. LRCs would serve as "resource centres" for carrying forward dissemination activities. This would include providing technical support and troubleshooting for new units.

3.1.6 Project Assurance:

Project Assurance will be the responsibility of UNDP. The Project Assurance role will support the PSC by carrying out objective and independent project oversight and monitoring functions. During the implementation of the project, this role ensures (through periodic monitoring, assessment and evaluations) that appropriate project management milestones are managed and completed.

NPD, in collaboration with the Project Manager, will convene an annual review meeting involving the Implementing Partner and Responsible Parties to review the progress in the previous year and discuss the work plan for the coming year. An independent external review may be conducted through resource persons/groups to feed into this process. Project Assurance and Project Manager will meet quarterly (or whenever guidance/decision is required by an implementing agency).

3.2 Funds Flow Arrangements and Financial Management:

The Ministry of Environment of Forest will enter into an agreement with TERI for carrying out the project activities. At the written request of MoEF, UNDP will release the funds directly to TERI as per the signed AWP. MoEF will account for the funds released to TERI on a quarterly basis through the standard Fund Authorization and Certificate of Expenditures (FACE) Report duly signed by MoEF. No funds shall be released by UNDP without prior submission of a duly filled and signed FACE report. The Project Manager will be responsible for compilation and collation of these Financial Reports. Unspent funds from the approved AWPs will be reviewed in the early part of the last quarter of the calendar year and funds reallocated accordingly. The detailed UNDP financial guidelines will be provided on signature of the project.

0.5% of the total project budget will be allocated for communication, advocacy and accountability purposes undertaken by UNDP.

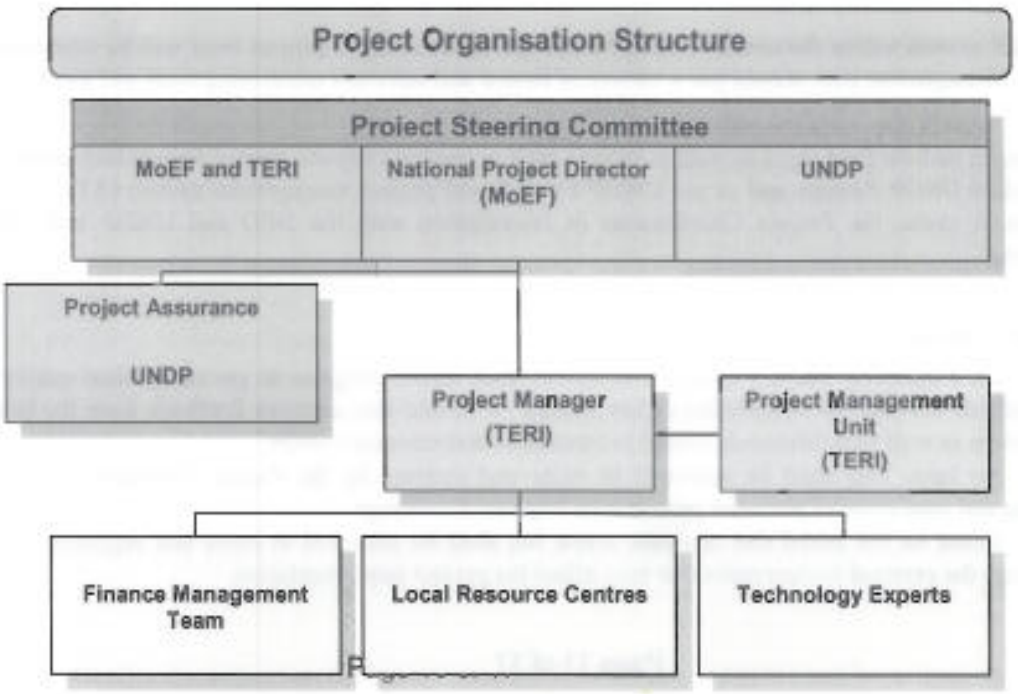
The MoEF may enter into an agreement with UNDP for the provision of support services by UNDP in the form of procurement of goods and services. Cost recovery for project implementation support services by UNDP will be charged as per UNDP rules and regulations as subject to provision of services by UNDP.

A separate bank account will be maintained by TERI to track and report the utilisation on UNDP funds. This will be operated in the name of the project and any interest accrued on the project funds during the project cycle will be ploughed back into the project in consultation with MoEF, NPC, state governments and UNDP and project budgets will stand revised to this extent. If there is no scope for ploughing back accordingly the project budget will stand reduced by the corresponding amount and/or the interest will be refunded to UNDP.

3.3 Audit:

Audit: The project shall be subject to audit in accordance with UNDP procedures and as per the annual audit plan drawn up in consultation with MoEF. The projectt shall be informed of the audit requirements by January of the following year. The audit covering annual calendar year expenditure will focus on the following parameters – (a) financial accounting, documenting and reporting; (b) monitoring, valuation and reporting; (c) use and control of non-extendable reporting; (d) UNDP Country Office support. In line with the UN Audit Board requirements for submitting the final audit reports by 30 April, the auditors will carry out field visits during February/March. Detailed instructions on audit will be circulated by UNDP separately and on signature.

4. PROJECT ORGANISATION STRUCTURE



5. Monitoring Framework And Evaluation

Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures. The details of Monitoring and Evaluation Plan have been enumerated in the attached GEF-approved proposal. This plan will be presented and finalised at the Project's Inception Workshop following a collective fine-tuning of indicators, means of verification, and the full definition of project staff M & E responsibilities.

The project will be monitored through the following:

The Project Management Team will use a variety of formal and informal monitoring tools and mechanisms. This would include field visits as well as reports such as progress reports, annual reports and annual reviews in standard UNDP formats and as per UNDP's web-based project management system (ATLAS). Within the annual cycle, the Project Manager in consultation with the NPD and UNDP will ensure the following:

In accordance with the UNDP Programming guidelines, the project will be monitored through the following:

Annual Basis:

Annual Review Report: An Annual Review Report shall be prepared by the Project Manager and shared with the Project Board and the Outcome Board. As minimum requirement, the Annual Review Report shall consist of the Atlas standard format for the QPR covering the whole year with updated information for each above element of the QPR as well as a summary of results achieved against pre-defined annual targets at the output level.

Annual Project Review: Based on the above report, an annual project review shall be conducted during the fourth quarter of the year or soon after, to assess the performance of the project and appraise the Annual Work Plan (AWP) for the following year. In the last year, this review will be a final assessment. This review is driven by the Project Board and may involve other stakeholders as required. It shall focus on the extent to which progress is being made towards outputs, and that these remain aligned to appropriate outcomes.

Project Evaluation: A mid-term project evaluation will be carried out in July 2010 to assess the progress of the project in meeting its objectives as outlined in the document. In July 2012, an outcome evaluation will be conducted to review the overall impact of the project.

Monitoring system and tools

An M&E system within the overall results framework outlined in the project brief will be established. The Project Management Unit should use a variety of formal and informal monitoring tools and mechanisms.

This would include field visits as well as reports such as progress reports, annual reports and annual reviews in standard UNDP formats and as per UNDP's web-based project management system (ATLAS). Within the annual cycle, the Project Coordinators in consultation with the NPD and UNDP will ensure the following:

Quarterly basis

- On a quarterly basis, a quality assessment shall record progress as per established quality criteria and methods towards the completion of key results. It should also captures feedback from the beneficiary perspective as well as information related to timeliness and resources usage.
- An Issue Log shall be activated in Atlas and updated by the Project Coordinators to facilitate tracking and resolution of potential problems or requests for change.
- Based on the initial risk analysis, a risk log shall be activated in Atlas and regularly updated by reviewing the external environment that may affect the project implementation.

- Based on the above information recorded in Atlas, a Project Progress Reports (PPR) shall be submitted by the Project Coordinators to the SC through Project Assurance, using the standard UNDP report format.
- A project Lesson-learned log will be activated and regularly updated to ensure on-going learning and adaptation within the Implementing Partner, and to facilitate the preparation of the Lessons-learned Report at the end of the project.
- A Monitoring Schedule Plan shall be activated in Atlas and updated to track key management actions/events

In addition to normal Government monitoring described above, UNDP will have the monitoring and reporting obligation for the programme. In this connection, additional M&E missions will be undertaken by UNDP when this is judged to be required, as for example when there is a need for an intermediate assessment of progress or impact before a decision is made as to the continuation of any given activity. This will be done in collaboration with the MoEF as well as with the other relevant stakeholders.

MoEF will be responsible for regularly monitoring progress in project implementation. In this, it will be supported by the NPD and the Project Team, as above. Progress will be measured against the targets set out in the work plan and project logical framework. Project Team will be required to report relevant progress to the NPD and UNDP on a quarterly basis. Regular monitoring of the project will occur through these reporting mechanisms as well as through site visits, as required.

Annual review meetings with the participation of IP, project team, stakeholders and UNDP, will be held to review progress, identify problems, and agree on solutions to maintain timely provision of inputs/achievement of results. The PSC will review annual work plans as well as provide strategic advice on the most effective ways and means of implementation.

Field visits: A representative from the UNDP office will visit each project state periodically. Field visits serve the purpose of results validation, especially when undertaken in the first half of the year. If undertaken in the latter part of the year, the field visit should provide latest information on progress for annual reporting preparation. Field visits should be documented through brief and action-oriented reports, submitted within the week of return to the office.

In addition, a mid-term and a terminal evaluation of the project will be commissioned based on approval of the PSC and as per GEF requirements. It will be conducted by external agencies/experts.

US $56,000 has been set-aside for Monitoring and Evaluation, which GEF will contribute for the duration of the project.

A detailed Communication and Advocacy Plan will be prepared by TERI and approved by the PSC that describes which activities and outputs will be monitored, reviewed and evaluated, how and by whom. The Plan will articulate the types of communication and associated scheduling required during the project, as well as methods of communicating project results to stakeholders shall be activated in Atlas and updated to track key management actions/events.

6. Quality Management for Project Activity Results

OUTPUT 1: To make India's five major brick producing clusters more energy efficient		
Activity Result 1 **(Atlas Activity ID)**	*Short title to be used for Atlas Activity ID* Enhancing public sector awareness on resource efficient products	Start Date: Jul 2009 End Date: Dec 2009
Purpose	*What is the purpose of the activity?* Public sector awareness on resource efficient products enhanced	
Description	*Planned actions to produce the activity result.* • National Level Meeting for key stakeholders such as PWD, MES and builders	

	• Two cluster meetings with concerned stakeholders

Quality Criteria *How/with what indicators the quality of the activity result will be measured?*	Quality Method *Means of verification. What method will be used to determine if quality criteria has been met?*	Date of Assessment *When will the assessment of quality be performed?*
10 builders/ architects and 3 government organizations sensitized on use of resource efficient brick products	• Database of relevant government organizations, builders and architects • Minutes of cluster meetings	On quarterly basis

Activity Result 2 **(Atlas Activity ID)**	*Short title to be used for Atlas Activity ID* Facilitating finance access to brick kiln entrepreneurs	Start Date: Jul 2009 End Date: Dec 2009
Purpose	*What is the purpose of the activity?* Brick kiln entrepreneurs would have access to project finance for adoption of technology for production of energy efficient bricks	
Description	*Planned actions to produce the activity result.* • Identification of interested national and regional financial institutions and banks • Preparation of framework for DPRs	

Quality Criteria *How/with what indicators the quality of the activity result will be measured?*	Quality Method *Means of verification. What method will be used to determine if quality criteria has been met?*	Date of Assessment *When will the assessment of quality be performed?*
• Short-listed financial institutions and banks • Framework for DPRs prepared.	List of interested financial institutions and banks	On quarterly basis

Activity Result 3 **(Atlas Activity ID)**	*Short title to be used for Atlas Activity ID* Developing knowledge on technology and marketing	Start Date: Jul 2009 End Date: Dec 2009
Purpose	*What is the purpose of the activity?* Improved knowledge on technology marketing of energy efficient bricks	
Description	*Planned actions to produce the activity result.* • Undertaking research on available technologies and markets • Results shared and views taken with the stakeholders	

Quality Criteria *How/with what indicators the quality of the activity result will be measured?*	Quality Method *Means of verification. What method will be used to determine if quality criteria has been met?*	Date of Assessment *When will the assessment of quality be performed?*
Research on market and technologies carried out and shared with the experts	Enquiries of entrepreneurs and end-users pertaining to technology, products and investments	On quarterly basis

Activity Result 4 **(Atlas Activity ID)**	*Short title to be used for Atlas Activity ID* Availability of resource efficient technologies	Start Date: Apr 2009 End Date: Sep 2009
Purpose	*What is the purpose of the activity?* Availability of resource efficient technology models in 5 clusters through Local Resource Centres	
Description	*Planned actions to produce the activity result.* • Preparation of database on potential brick kiln enterprises • Identification and short-listing of technologies to be sourced for the five clusters	

Quality Criteria *How/with what indicators the quality of the activity result will be measured?*	Quality Method *Means of verification. What method will be used to determine if quality criteria has been met?*	Date of Assessment *When will the assessment of quality be performed?*
Technologies for the identified clusters short-listed	Document having details of resource efficient technologies	On quarterly basis

Activity Result 5 **(Atlas Activity ID)**	*Short title to be used for Atlas Activity ID* Improved capacity of entrepreneurs	Start Date: Apr 2009 End Date: Dec 2009

Purpose	*What is the purpose of the activity?* Improved capacity of brick kiln entrepreneurs		
Description	*Planned actions to produce the activity result.* • Preparatory work for establishing LRCs (local resource centres) for training programs • Interaction with entrepreneurs and experts for assessing the needs of the clusters and developing training modules • Organizing exposure visit for prospective entrepreneurs		
Quality Criteria *How/with what indicators the quality of the activity result will be measured?*		**Quality Method** *Means of verification. What method will be used to determine if quality criteria has been met?*	**Date of Assessment** *When will the assessment of quality be performed?*
Exposure visit of brick kiln entrepreneurs		Feedback received from the entrepreneurs on resource efficient technologies and products	On quarterly basis

7. EXIT STRATEGY:

Refer to attached GEF approved MSP project document at Annexure 4.

8. LEGAL CONTEXT:

This document together with the CPAP signed by the Government and UNDP, which is incorporated by reference, constitute together the instrument envisaged in the Supplemental Provisions to the Project Document, attached hereto (Annex 1).

Consistent with the above Supplemental Provisions, the responsibility for the safety and security of the implementing partner and its personnel and property, and of UNDP's property in the implementing partner's custody, rests with the implementing partner.

The implementing partner shall:

a) Put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;

b) Assume all risks and liabilities related to the implementing partner's security, and the full implementation of the security plan.

UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.

The implementing partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.

Annex 1

Total Project Budget and Work Plan

GEF Outcome/Atlas Activity	Responsible Party/ Implementing Agency	Fund ID	Donor Name	Atlas Budgetary Account	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)
Outcome 1: **Public sector awareness**	UNDP	62000	GEF	71200	International Consultant	0	0	0	0	0
				71300	Local Consultant	5295	9835	9835	3535	28500
				71600	Travel	700	1800	1800	700	5000
				74500	Public Consultations and Hearings	0	824	824	0	1648
				Total Outcome 1		**5,995**	**12,459**	**12,459**	**4,235**	**35,148**
Outcome 2: **Access to Finance**	UNDP	62000	GEF	71200	International Consultant	0	0	0	0	0
				71300	Local Consultant	6050	8650	8650	10650	34000
				71600	Travel	2250	2250	2250	2250	9000
				72000	Service Contract	4550	4550	4550	4550	18200
				74500	Public Consultations and Hearings	3000	3000	3000	3000	12000
				74500	Misc	1000	1000	1000	1000	4000
				Total Outcome 2		**16,850**	**19,450**	**19,450**	**21,450**	**77,200**
Outcome 3: **Improved knowledge on technology, including marketing**	UNDP	62000	GEF	71200	International Consultant	0	0	0	0	0
				71300	Local Consultant	5900	7100	7000	8000	28000
				71600	Travel	1200	3400	4200	1200	10000
				72000	Service Contract	9200	20000	16000	12000	57200
				74500	Public Consultations and Hearings	2400	3400	1500	3200	10500
				74500	Misc	700	700	700	700	2800

				Total Outcome 3		**19,400**	**34,600**	**29,400**	**52,100**	**108,500**
Outcome 4: **Availability of resource efficient technology**	UNDP	62000	GEF	71200	International Consultant	3000	6000	6000	3000	18000
				71300	Local Consultant	6500	10000	12000	6500	35000
				71600	Travel	1500	1500	0	2000	5000
				72000	Service Contract	57250	85250	57250	29250	229000
				74500	Public Consultations and Hearings	600	2500	2500	3000	8600
				Total Outcome 4		**68,850**	**105,250**	**77,750**	**43,750**	**295,600**
Outcome 5: **Improved capacity of entrepreneurs**	UNDP	62000	GEF	71200	International Consultant	0	0	0	0	0
				71300	Local Consultant	10575	7775	9175	8975	36500
				71600	Travel	1250	1250	1250	1250	5000
				74500	Public Consultations and Hearings	2125	2125	2125	2125	8500
				Total Outcome 5		**13,950**	**11,150**	**12,550**	**12,350**	**50,000**
Outcome 6: **Monitoring, learning and evaluation**	UNDP	62000	GEF	71200	International Consultant	4000	6000	8000	7300	25300
				71300	Local Consultant	9150	10250	9250	2050	30700
				71600	Travel	2250	2250	2250	2250	9000
				Total Outcome 6		**15,400**	**18,500**	**19,500**	**11,600**	**65,000**
PROJECT MANAGEMENT UNIT	UNDP	62000	GEF	71300	Local Consultant	10000	10000	10000	10000	40000
				71600	Travel	3000	3000	3000	3000	12000
				72200	Equipment & furniture	1875	1875	1875	1875	7500
				72500	Office supplies	1375	1375	1375	1375	5500
				Total PMU		**16,250**	**16,250**	**16,250**	**16,250**	**65,000**
Project Total						**156,695**	**217,659**	**187,359**	**134,735**	**696,448**

Annexure 2

Risk Log

II.	ID	Type	Date Identified; Author	Description	Current Risk Level [5] L	C	R	Comments	Status	Status Change Date	Owner
1		**Technical**		Adoption of technology by brick clusters	Low	High	Moderate	Awareness creation and initiate technology demonstration with more acceptable location.	No change		TERI
2		**Commercial**		Adaptation of new product by Architects and builders specially around mega cities	Low	High	Moderate	Awareness creation through Local resource centres and demonstration of technology	No change		TERI
3		**Financial**		Small scale industry and financial institutions/ banks support and provide timely co-financing to the initiative in various clusters	Low	High	Moderate	Close coordination will be ensured with the small scale industry clusters and the financial institutions/ banks and to ensure timely disbursement of funds and participation.	No change		TERI

[5] L = likelihood; C = Consequence; R = Risk Level

REQUEST FOR CEO ENDORSEMENT/APPROVAL

PROJECT TYPE: Medium-sized Project
THE GEF TRUST FUND

Submission Date: July 2007
Re-submission Date: 3 March 2008
Re-submission Date: 17 March 2008

PART I: PROJECT INFORMATION

GEFSEC PROJECT ID: 2844
GEF AGENCY PROJECT ID: 3465
COUNTRY(IES): PROJECT TITLE: Energy Efficiency Improvements in Indian Brick Industry
GEF AGENCY(IES): UNDP
OTHER EXECUTING PARTNER(S): Ministry of Environment and Forests (MoEF) through The Energy Research Institute (TERI)
GEF FOCAL AREA(S): Climate Change
GEF-4 STRATEGIC PROGRAM(S): SP2
NAME OF PARENT PROGRAM/UMBRELLA PROJECT: N/A

Expected Calendar	
Milestones	**Dates**
Work Program (for FSP)	(actual)
GEF Agency Approval	April 2008
Implementation Start	May 2008
Mid-term Review (if planned)	May 2010
Implementation Completion	April 2012

A. PROJECT FRAMEWORK (Expand table as necessary)

Project Objective: Make India's five major brick producing clusters more energy efficient								
Project Components	*Indicate whether Investment, TA, or STA***	**Expected Outcomes**	*Expected Outputs*	*GEF Financing**		**Co-financing***		**Total ($)**
				($)	***%***	***($)***	***%***	
1. Enhancing Public Sector Awareness	TA	Public sector awareness on resource-efficient products enhanced	1. National level workshops on resource efficient bricks arranged 2 Energy efficient bricks in public construction contracts included	35,148	5.05	199,900	10	235,048
2. Facilitating project finance access to brick kiln entrepreneurs	TA	Brick kiln entrepreneurs accessed project finance	1. National and regional Financial Institution Identified 2. Resource efficient brick production project profiles developed 3. Detailed Project report (DPR) prepared for 12 demonstration projects 4. Finance arranged for demonstration project	77,200	11.08	199,900	10	277,100
3. Developing of knowledge on technology and marketing	TA	Improved knowledge on technology marketing	1. Arranged market research and develop strategies for market development	108,500	15.58	199,900	10	308,400

			2. End users sensitizing and educated					
4. Availing efficient technology models in 5 clusters for demonstration project	TA	Availability of resource efficient technology models in 5 clusters through Local Resource Centres	1. Brick kiln units identified 2. Facilitate sourcing of plants and machinery for individual demonstration units. 3. Facilitate commissioning of demonstration projects 4. Monitoring and evaluation of projects	295,600	42.44	899,550	45	1,195,150
5 Enhancing capacity of brick kiln enterprises	TA	Improved capacity of brick kiln entrepreneurs	1. Training module for energy efficiency improvements developed 2. Organised Training programs 3. Study tours within country arranged 4. Awareness seminars conducted 5. Promotional materials and website developed	50.000	7.18	99,950	5	149,950
6.Monitoring , Learning and evaluation				65,000	9.33	199,900	10	264,900
4. Project management				65,000	9.33	199,900	10	264,900
Total Project Costs				696,448		1,999,000		2,695,448

* List the $ by project components. The percentage is the share of GEF and Co-financing respectively to the total amount for the component.
** TA = Technical Assistance; STA = Scientific & technical analysis.

B. FINANCING PLAN SUMMARY FOR THE PROJECT ($)

	*Project Preparation**	*Project*	*Agency Fee*	*Total at CEO Endorsement*	*For the record: Total at PIF*
GEF	25,000	696,448	71,145	793,592	
Co-financing	-	1,999,000		1,999,000	
Total	25,000	2,695,448	71,145	2,792,593	

***** Please include the previously approved PDFs and PPG, if any. Indicate the amount already approved as footnote here and if the GEF funding is from GEF-3. Provide the status of implementation and use of fund for the project preparation grant in Annex D.

C. SOURCES OF CONFIRMED CO-FINANCING, including co-financing for project preparation for both the PDFs and PPG. (expand the table line items as necessary)

Name of co-financier (source)	*Classification*	*Type*	*Amount ($)*	*%**

TERI	Executing Agency	In Kind	145,000	7.25
Brick Kiln Units	Beneficiaries	In Cash	1,854,000	92.75
Total Co-financing			1,999,000	100%

* Percentage of each co-financier's contribution at CEO endorsement to total co-financing.

D. GEF RESOURCES REQUESTED BY FOCAL AREA(S), AGENCY(IES) OR COUNTRY(IES)

GEF Agency	*Focal Area*	*Country Name/ Global*	*(in $)*			
			Project Preparation	*Project*	*Agency Fee*	*Total*
(select)	(select)					
(select)	(select)					
(select)	(select)					
(select)	(select)					
(select)	(select)					
(select)	(select)					
Total GEF Resources						

***** No need to provide information for this table if it is a single focal area, single country and single GEF Agency project.

E. PROJECT MANAGEMENT BUDGET/COST

Cost Items	Total Estimated person weeks	GEF ***($)***	Other sources ($)	Project total ($)
Local consultants*	***156***	**40,000**	35,000	75,000
International consultants*	-	-	-	-
Office facilities, equipment, vehicles and communications**		13,000	12,000	25,000
*Travel***		12,000	11,000	23,000
			2,000	2,000
Total	**156**	**65,000**	**60,000**	**125,000**

* Provide detailed information regarding the consultants in Annex C.

** Provide detailed information and justification for these line items.

F. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	Estimated person weeks	GEF($)	Other sources ($)	Project total ($)
Local consultants*	422	232,700	85,000	317,700
International consultants*	14	43,300	0	43,300
Total	**436**	**276,000**	**85,000**	**361,600**

* Provide detailed information regarding the consultants in Annex C.

G. DESCRIBE THE BUDGETED M&E PLAN: Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures and will be provided by the project team and UNDP country office with support from UNDP/GEF.

Annual work plan (AWP) will be prepared with the approval of the Project Steering Committee (PSC). These targets will serve as baseline for monitoring and evaluation. Internal monitoring on day-to-day basis will be done by the Project Facilitation Cell (PFC). Monthly reports will be submitted to the PSC. Slippage in physical and financial targets, if any,

will be analyzed and reported to the PSC for remedial action. Review meetings at the PSC and PFC levels would serve as appropriate forums for evaluating the physical and financial progress and provide directions for periodical correction, if any. Quarterly reports will be submitted to UNDP/GEF in the prescribed format. Project implementation review as per GEF requirement will be done once in a year. Management audit by independent auditors shall be carried out annually.

A mid-term evaluation will be initiated after 2years from the start of the project. Consultants for the evaluation will be appointed with the approval of PSC. Based on the findings and recommendations emerging from the evaluation, necessary corrections, if any, will be incorporated. A final and terminal evaluation of the project will be undertaken upon its completion by an independent team constituted in consultation with MoEF and UNDP. Lessons learned will be properly documented which will serve as guidelines for future projects of replication. The evaluation report would be circulated amongst the stakeholders.

PART II: PROJECT JUSTIFICATION

A. DESCRIBE THE PROJECT RATIONALE AND THE EXPECTED MEASURABLE GLOBAL ENVIRONMENTAL BENEFITS:

The Indian brick industry is the second largest producer of bricks in the world after China. The brick production in India is estimated at 140 billion bricks, consuming 24 million tonnes of coal along with huge quantity of biomass fuels. The total CO_2 emissions are estimated to be 41.6 million tonnes and it accounts for about 4.5% of total GHG emissions from India. Large demand for bricks in urban centres has resulted in mushrooming of brick kiln clusters at the outskirts of major towns and cities. These brick clusters are important source of local air pollution (SPM, SO_2, fugitive emissions, etc) affecting local population, agriculture and vegetation. Apart from air pollution, brick industry also consumes good quality top soil for brick making. The industry is estimated to consume 350 million tonnes of top soil every year.

Currently the brick production process is very traditional and bricks are mainly produced through manual processes with little knowledge on raw material (mainly clay) and its selection. Brick production in India takes place in small units, using manual labour, sun drying and traditional firing technologies. Upgradation of equipment/ systems for producing resource–efficient bricks would require better and improved understanding and knowledge on various aspects of raw materials and its preparation. Introduction of machinery would require better understanding on the drying processes. Significant knowledge and skills at various levels of the industry (workers, operators and entrepreneurs) are required for improving yield and reducing breakage in brick making. Technology upgradation in the sector would open up new sets of opportunities of employment in the brick sector which would lead to improved livelihoods for the workers. Promotion of technology upgradation in the small scale brick sector would lead to modernization of the industry. It would promote usage of machinery such as brick extruders for production of resource–efficient bricks in the industry.

UNDP-GEF's intervention aims to address the above barriers and assist India's five major brick producing clusters through activities such as enhancing public sector awareness on resource-efficient products; access to finance for brick kiln entrepreneurs; improved knowledge on technology and marketing; availability of resource efficient technology models in five clusters through local resource centres; and improve capacity of brick kiln entrepreneurs. The project supports to reduce energy consumption, and restrict GHG emissions by creating appropriate infrastructure for sustained adoption of new and improved technologies for production and use of resource efficient bricks in India.

B. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH NATIONAL PRIORITIES/PLANS:

The brick sector is one of the most polluting industries in India and the Government of India has enforced air emission standards for brick kilns. These regulations were notified by the MoEF (Ministry of Environment and Forests) during 1996 aiming at controlling air pollution from brick kilns. The notification also banned the use of moving chimney type Bull's Trench Kilns (BTKs), switch over to fixed chimney system and adoption of pollution control system (gravity settling chamber) in brick industries.

One of the positive impact of the enforcements was the Indian brick industry started looking forward to local technological solutions to meet these needs. These efforts had led to the development of three prominent fixed chimney

designs (Central Building Research Institute, Punjab State Council for Science and Technology and Alighar Muslim University) in the country. The regulations also brought in certain awareness on pollution control and energy conservation among the brick industries.

Another environment related regulation on the use of fly ash in brick making was notified by MoEF during 1999. This regulation aims at conserving the top soil through increased use of fly ash from coal based thermal power stations in brick making. The implementation and monitoring of the regulations are being carried out through Central Pollution Control Board (CPCB), state level pollution control boards and district level offices. Fly ash is a partial replacement for top soil used in brick making. Use of fly ash in brick making is not applicable to brick kiln units that are located beyond a radius of 100 kilometers from coal–based thermal power stations. However, preservation of top soil is vital for agricultural–based economies like India. Production of resource-efficient bricks and large scale adoption in construction would ensure reduction in overall consumption of top soil by individual brick kiln units. Production and use of resource–efficient bricks (hollow blocks and perforated bricks) on a large scale would help in reducing the rate of consumption of top soil (up to 30%).

C. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH GEF STRATEGIES AND STRATEGIC PROGRAMS:

The project proposes to address various barriers relevant for Indian brick sector that inhibit technology upgrade and transformation. The project is in line with the overall objective of Operational Program 5 (OP5) which is "Removal of Barriers to Energy Efficiency and Energy Conservation" in the climate change focal area. OP5 promotes energy efficiency by removing barriers to large-scale application, implementation and dissemination of cost-effective, energy efficient technologies and practices that will result in the reduction of greenhouse gas emissions. This makes the project in conformity with Climate Change (CC) Strategic Objective (SO-2) and Strategic Programme (SP-1) - to promote energy-efficient technologies and practices in industrial sector.

D. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES:

Followed by the enforcements regulations of the Government of India the brick industry started looking forward to local technological solutions to meet the growing needs. These efforts had led to the development of three prominent fixed chimney designs (Central Building Research Institute, Punjab State Council for Science and Technology and Alighar Muslim University) in the country. The regulations also brought in certain awareness on pollution control and energy conservation among the brick industries.

Apart from air emission standards applicable for Indian brick industry, there are few other programs which are generally cluster-centric or regional centric supported by bilateral agencies focusing on various issues related to the brick sector. One such programme is supported by the Swiss agency for Development and Cooperation (SDC) and executed through NGOs, focuses on capacity building of brick firemen community in India.

E. **DESCRIBE THE INCREMENTAL REASONING OF THE PROJECT:**

This project aims to install 12 demonstration projects in five clusters in the country. In the process, the project will support savings of approximately 47128 tons of CO2 emissions over the project lifetime (4 years). Considering the operational lifetime of the project to be 15 years, the project activity will save 187,840 tons of CO2. These savings would not been realized without this project.

F. INDICATE RISKS, INCLUDING CLIMATE CHANGE RISKS, THAT MIGHT PREVENT THE PROJECT OBJECTIVE(S) FROM BEING ACHIEVED AND OUTLINE RISK MANAGEMENT MEASURES:

Acceptance of new technology by brick manufacturers and its propagation would determine the success of this project. In absence of any policy guideline, the acceptances of new technology by the small scale industry supporting the entire initiative in various clusters include implementation risk. Adaptation of new product by Architects and builders add up to the market risks.

The brick sector has been identified as one of the most polluting industries in India and the Government of India has enforced air emission standards for brick kilns. These regulations were notified by the MoEF (Ministry of Environment

and Forests) during 1996 aiming at controlling air pollution from brick kilns. In recent years, Government is focusing on energy efficiency and energy conservation measures in all possible sectors. Government agencies now promoting new resource efficient product in construction sector supporting to modernization of Indian brick industry. Bank lending policies are conducive to brick industry. All these initiatives will support modernizing the brick industry and to create an acceptance amongst the target groups a dedicated and focused strategy for awareness creation shall be developed for implementation during the project period.

Considering the project location climatic risks don't have significant impacts.

G. EXPLAIN HOW COST-EFFECTIVENESS IS REFLECTED IN THE PROJECT DESIGN:

The project costs financed by the GEF are estimated to be USD 793,592 for a period of 4 years. The share of GEF finance works out to be 28% of total project costs which includes co-financing by brick kiln entrepreneurs (equity investment up to 66%) and executive agency 5%. The share of GEF will be utilized to remove barriers in the adoption of the technology. The activities to be covered would be awareness and education, capacity building, monitoring and evaluation and supporting 12 demonstration projects in 5 clusters.

Major (global) benefits of the project would be in terms of reduction in GHG emissions. The total direct lifetime reduction in CO2 emissions as a result of this project is estimated at 187,239 tones, which gives a rate of project cost of US$ 14.87 per accumulative ton of CO2 and GEF financing rate for this project comes out to US$ 4.22 per ton of CO2 reduction. The figures are shown in tables below. This compares favorably with other similar projects financed by GEF.

Project Cost per ton of CO2 reduction			
Narration	Lifetime direct reduction in CO2	Project cost	Project Cost / ton of CO2 reduction (US$)
	(tons)	(US$)	
12 demonstration units are installed with operational life time of 15 years	187,840	2,792,593	14.87

GEF Finance per ton of CO2 reduction			
Narration	Lifetime direct reduction in CO2	GEF Finance	GEF Finance / ton of CO2 reduction (US$)
	(tons)	(US$)	
12 demonstration units are installed with operational life time of 15 years	187,840	793,592	4.22

PART III: INSTITUTIONAL COORDINATION AND SUPPORT

A. PROJECT IMPLEMENTATION ARRANGEMENT:

In this project, UNDP will be the Implementing Agency (IA) and the Ministry of Environment & Forests (MoEF) will be the Executing Agency (EA). The Executing Agency (MoEF) will establish a Project Facilitation Cell (PFC) at the Energy and Resources Institute (TERI). PFC will consist of a Project Coordinator (PC) and an assistant. and it will have overall responsibility for the implementation of project activities. Local Resource Centres (LRCs) will be established in the 5 (five) clusters identified for project implementation. It is proposed that these LRCs will be located in the local industry associations/ offices of SISI/ office of TERI. LRCs would hire services of resource persons on

technology and marketing. LRCs are responsible for field level implementation and would interact extensively with various stakeholders at field level. TERI will coordinate and facilitate the project activities in all the five identified brick kiln clusters.

A Project Steering Committee (PSC) comprising of members from different institutions (Ministries, financial institutions, industry associations, bilateral agencies, TERI and others would help in providing guidance and directions for project implementation. A pool of 'technology experts' would help the Local Resource Centres (LRCs) and the Project Facilitation Cell (PFC) in developing cluster level technology packages and setting up of demonstration units.

The steering committee will provide inputs to the Project Facilitation Cell (PFC) and in turn PFC will coordinate each activity of the project at national, state and cluster level. Experts will be called to provide their inputs during formal interactions in meetings and workshops. Regular meetings will be held to review and coordinate the project activities and PFC will host these meetings at Delhi. PFC will also be responsible for documentation (MOUs, minutes of meeting and agreement etc of the project). These documents will be circulated to Steering committee members.

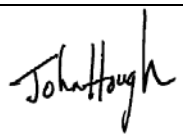
LRCs will play a key role in setting up of demonstration projects. They will be equipped with necessary instrumentation to carry out monitoring as well as training. LRCs will develop DPRs and assist in seeking loan from banks. LRCs will carry out, training programs, awareness generation activities and market promotion. LRCs would serve as "resource centres" for carrying forward dissemination activities. This would include providing technical support and trouble-shooting for new units.

Each LRC would be responsible for local coordination between individual brick kiln units, local industry associations, technology suppliers, technical experts, financial institutions, end-users and other relevant stakeholders. The LRC would provide feedback and report to the PFC.

PART IV: EXPLAIN THE ALIGNMENT OF PROJECT DESIGN WITH THE ORIGINAL PIF:

The alignment of this project design complies with the original PIF (PDF B).

PART V: AGENCY(IES) CERTIFICATION

<table>
<tr><td colspan="2">This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for CEO Endorsement.</td></tr>
<tr><td> 
John Hough
Deputy Executive Coordinator, a.i.
UNDP/GEF</td><td>Project Contact Person
Martin Krause, Regional Technical Advisor</td></tr>
<tr><td>Date: 17 March 2008</td><td>Tel. and Email: +66 2 288 2719
martin.krause@undp.org</td></tr>
</table>

ANNEX A: PROJECT RESULTS FRAMEWORK

Project Strategy	Objectively verifiable indicators				
Goal	To reduce energy consumption, and restrict GHG emissions by creating appropriate infrastructure for sustained adoption of new and improved technologies for production and use of resource efficient bricks in India				
	Indicator (quantified and time-bound)	**Baseline**	**Target**	**Sources of verification**	**Risks and Assumptions**
Objective To make India's five major brick producing clusters more energy efficient	Reduction of 187,840 tons of CO_2 in five major brick making clusters in India over 15 years Savings in energy consumption by the demonstration units.	Production of resource-efficient bricks will not increase resulting in continuation of high CO_2 generation and high energy consumption in the sector (42 million tonnes of CO_2 per annum)	Year 1: reduction of 10,099 tCO_2 Year 5: reduction of 59,920 tCO_2 Year 10: reduction of 123,880 tCO_2 Year 15: reduction of 187,840 tCO_2	Project reports and files	Government agencies promoting new resource efficient product in construction sector
Outcome 1: Enhancing public sector awareness on resource-efficient products	Usage of resource-efficient bricks by new public department building contracts increased by 20% by end of project.	No increase in usage of EE bricks in public buildings.	Year 2: increase by 3% Year 3: increase by 10% Year 4: increase by 20%	Contract documents of the public departments with inclusion of resource–efficient bricks specifications	Government policies conducive to modernization of Indian brick industry
Outcome 2: Access to finance for brick kiln entrepreneurs	# of loans from local banks/ financial institutions for technology upgradation tripled by end of project.	# of loans will not increase	Year 3: # of loans doubled compared to baseline year 2008. Year 4: # of loans tripled compared to baseline year 2008	Bank records and Industry association records	Bank lending policies are conducive to brick industry
Outcome 3: Improved knowledge on technology, including marketing	Resource-efficient bricks sold in the market and used for construction.	Market share of resource-efficient bricks remains low	Market share of resource-efficient bricks doubled by end of project	Market surveys and relevant reports and enquiries of entrepreneurs and end-users.	Small scale industry supporting the entire initiative in various clusters
Outcome 4: Availability of resource-efficient technology models in 5 clusters through Local Resource Centres	12 EE brick kilns units established in 5 clusters by end of project	No EE brick kiln units established	Year 1: All 12 Units established by end of year 1.	Records of demonstration units on production and sale of resource-efficient bricks.	Adaptation of new product by Architects and builders specially around mega cities
Outcome 5: Improved capacity of brick kiln entrepreneurs	At least 5 Brick kiln entrepreneurs in each cluster invest in technology upgradation by end of project	No such investment will take place	Year 2: 1 entrepreneur in each cluster invests Year 4: 5 entrepreneurs in each cluster invests	Market surveys reports	Government policies conducive to modernization of Indian brick industry

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF)

India: EE Improvements in the Indian Brick Industry

UNDP response to GEFSEC Review Sheet from August 9, 2007

GEF SEC COMMENTS	UNDP RESPONSE
Description of Component 1, however, is rather vague and needs to be strengthened significantly. Modifying specifications and codes for building material is too general and too broad. Further elaboration and more specifics are needed here. Unless specific policy and regulatory barriers have been identified and objectives and outcomes/outputs well defined, this project component and related activities (i.e., conducting three national meetings) will not prove useful or meaningful.	Component 1 has been revised and is now focusing on awareness in the public sector, including using energy-efficient bricks in public construction contracts and policy advocacy.
The project logframe looks weak, especially with respect to SMART indicators. Both indicators and targets need to well specified for each of the components, with baselines clearly defined. They also need to match the activities planned for the project under each component	The logframe, including the indictors, has been completely revised.
Please provide the basis for the calculation of CO2 emissions reduction.	Basis for the CO2 calculation is provided now on in the section on incremental reasoning.
Project management budget on p. 22 (Table b) is inconsistent with that of the Budget Table on p. 27.	The 2 tables have been synchronized
There are also discrepancies for the consultants budget between p. 23 (Table c) and the Budget Table on p. 26-27. For example, costs for international consultants in Table c are $152,025, but the sum of all international consultants from the Budget Table comes to $157,250. Please check and correct.	The figures have been checked and corrected.
Given the scope of the project, it seems questionable that each project component has a budget for international consultants; their potential value added may not justify the (high) cost, since local expertise seems more appropriate for activities such as marketing and facilitating access to finance. For technical expertise, more emphasis should be given to South-South technical exchange, as brickmaking technologies in developed countries are generally not applicable for the Indian situation. Please refer to comments under Core Commitments and Linkages.	The budget has been adjusted and allocations for international consultants have been reduced substantially.
Letter of co-financing commitment from TERI is needed.	The cofinancing letter from TERI is attached in the annex on page 38.
Results of the SDC program in promoting VSBK technology need to elaborated, including how they will be incorporated into this project, where applicable.	This has been done in section 5. a).
We understand that there has been a UNDP-supported program	This must be a misunderstanding.

GEF SEC COMMENTS	UNDP RESPONSE
on brickmaking in India. Please also discuss the results of that program and how this new proposal will build upon the existing experiences.	There has not been a UNDP supported program on brickmaking in India.
UNDP has been implementing a number of GEF-supported brickmaking projects in the region, including China, Vietnam, and Bangladesh. It is important to incorporate the results and lessons learned from the ongoing and completed projects into this project, including technology development, exchange of information, and sharing of technology and know-how. Please discuss in specific terms how this proposal will address this and reflect it in the project design.	This has been done in section 5. a)
Furthermore, beyond the proposed replication in general terms, please discuss how India/UNDP expects to scale up resource-efficient brickmaking in India in a meaningful way that will have an impact and how a possible GEF-supported program would achieve that.	Section on replication has been revised.
To facilitate review and reading of the proposal, please add a Table of Content (listing attachments) and a list of acronyms.	This has been added.
Please clarifying implementation arrangements. Our understanding (from previous discussion) is that TERI is local executing agency, but the cover page is left blank on this, and in the Budget Table, MoEF is listed as the Implementing Partner. Please clarify and make necessary changes in the proposal.	MoEF will be the executing agency and TERI the local implementing partner. The cover page is now mentioning this.

ANNEX C: CONSULTANTS TO BE HIRED FOR THE PROJECT

Position Titles	*$/ person week*	*Estimated person weeks*	*Tasks to be performed*
For Project Management			
Local			
Project Co-coordinator	576	104	Overall Direction of the Project
Project support staff	288	52	Supporting Project co-ordinator
International			
For Technical Assistance			
Local			
Consultant (Energy Efficiency)	750	208	Technical Support in Project Implementation
Consultant (Industry Expert)	750	104	Supporting installation of demonstration projects
Consultant (Environment / Pollution Control)	750	52	Guiding Environment and Pollution Control norms in setting demonstration projects
Consultant (Monitoring Evaluation)	750	32	Monitoring and Evaluation of the Project
Consultant (Report preparation)	750	26	Preparing the final report
International			
Expert (Monitoring & Evaluation)	3000	14	Project Evaluation

ANNEX D: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS

A. EXPLAIN IF THE PPG OBJECTIVE HAS BEEN ACHIEVED THROUGH THE PPG ACTIVITIES UNDERTAKEN.

PPG activities have been undertaken and all objectives have been achieved. The budget amount has been fully utilized.

B. DESCRIBE IF ANY FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION.

C. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES AND THEIR IMPLEMTATION STATUS IN THE TABLE BELOW:

Project Preparation Activities Approved	*Implementation Status*	*GEF Amount ($)*				*Co-financing ($)*
		Amount Approved	*Amount Spent To-date*	*Amount Committed*	*Uncommitted Amount**	
Local consultants	Completed	8,000	Fully utilised	10,990		
Training	Completed	12,000	Fully utilised	10,638		
Travel	Completed		Fully utilised	2,708		
Miscellaneous (Workshop & Report Preparation)	Completed	5000	Fully utilised	664		3,000
Total		**25,000**		**25,000**		**3,000**

* Uncommitted amount should be returned to the GEF Trust Fund. Please indicate expected date of refund transaction to Trust

MEDIUM-SIZED PROJECT PROPOSAL
REQUEST FOR FUNDING UNDER THE GEF Trust Fund

GEFSEC PROJECT ID: 2844
IA/EXA PROJECT ID: 3465
COUNTRY: India
PROJECT TITLE: Energy Efficiency Improvements in the Indian Brick Industry
GEF IA/EXA: UNDP
OTHER PROJECT EXECUTING AGENCY(IES): MOEF THROUGH The Energy and Resources Institute (TERI)
DURATION**:** 4 years
GEF FOCAL AREA: Climate Change
GEF STRATEGIC OBJECTIVES: Energy Efficiency in Industry: To promote the deployment and diffusion of energy-efficient technologies and practices in industrial production and manufacturing processes
GEF OPERATIONAL PROGRAM: OP-5
IA/EXA FEE: USD 72,145
CONTRIBUTION TO KEY INDICATORS IDENTIFIED IN THE FOCAL AREA STRATEGIES: GHG emission reductions of up to 187,840 tons of CO_{2e}

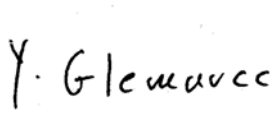
FINANCING PLAN ($)		
	PPG	Project*
GEF Total	25,000	696,448
Co-financing	(provide details in Section b: Co-financing)	
GEF IA/ExA		
Government		
Others		1,999,000
Co-financing Total		1,999,000
Total	25,000	2,695,448
Financing for Associated Activities If Any: $4,327,000		

* If project is multi-focal, indicate agreed split between focal area allocations

MILESTONES	DATES
PIF APPROVAL	
PPG APPROVAL	
MSP EFFECTIVENESS	Apr 2008
MSP START	May 2008
MSP CLOSING	Apr. 2012
TE/PC REPORT*	Apr. 2012

*Terminal Evaluation/Project Completion Report

Approved on behalf of the *UNDP*. This proposal has been prepared in accordance with GEF policies and procedures and meets the standards of the Review Criteria for GEF Medium-sized Projects.



Yannick Glemarec
UNDP-GEF Executive Coordinator
Date: 5 July 2007

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List of Acronyms

AIBTMF	All India Bricks and Tiles Manufactures' Federation
APR	Annual Project Report
AWP	Annual Work Plan
BIS	Bureau of Indian Standards
BOP	Best Operating Practices
BTK	Bull's Trench Kilns
CO_2	Carbon dioxide
CPCB	Central Pollution Control Board
CPWD	Central Public Works Department
DPR	Detailed Project Report
ExA	Executing Agency
FALG	Fly Ash Lime Gypsum brick
FI	Financial Institution
GCV	Gross Calorific Value
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Green House Gases
IA	Implementing Agency
INP	Int Nirmata Parishad
IR	Inception Report
LRC	Local resource centre
M&E	Monitoring & Evaluation
MES	Military Engineering Services
MJ	Mega Joule
MoEF	Ministry of Environment & Forests
MoSSI	Ministry of Small Scale Industries
MoU	Memorandum of Understanding
MoUD	Ministry of urban Development
MSP	Medium Size Project
NCR	National Capital Region
NSIC	National Small Industries Corporation Ltd
OP	Operation Program
PC	Project Coordinator
PDF	Project Development Facility
PFC	Project Facilitation Cell
PIR	Project Implementation Review
PWD	Public Works Department
R&D	Research & Development
RCU	Regional Coordinating Unit
SC	Steering Committee
SDC	Swiss Development and Cooperation
SIDBI	Small Industries Development Bank of India
SISI	Small Industries Services Institute
SME	Small and Medium Enterprises
SPM	Suspended Particulate Matter
SSI	Small Scale Industries
TERI	The Energy and Resources Institute
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
UP	Uttar Pradesh
USD	US Dollar
VSBK	Vertical Shaft Brick Kiln

PART I - PROJECT

1. PROJECT SUMMARY

PROJECT RATIONALE, OBJECTIVES, OUTCOMES/OUTPUTS, AND ACTIVITIES

The construction sector is an important part of the Indian economy with a contribution of 10% in GDP and registering an annual growth of 9%. The Indian brick industry is the second largest producer of bricks in the world after China. The brick production in India is estimated at 140 billion bricks, consuming 24 million tonnes of coal along with huge quantity of biomass fuels. The total CO_2 emissions are estimated at 41.6 million tonne accounting for 4.5% of total GHG emissions from India. Brick production in India takes place in small units, using manual labour and traditional firing technologies. Large demand for bricks in urban centres has resulted in mushrooming of brick kiln clusters at the outskirts of major towns and cities. These brick clusters are important source of local air pollution (SPM, SO_2, fugitive emissions, etc) affecting local population, agriculture and vegetation. Apart from air pollution, brick industry also consumes good quality top soil for brick making. The industry is estimated to consume 350 million tonne of top soil every year. The outcome of stakeholder workshop conducted under the PDF-A phase clearly indicated several opportunities exist in Indian brick industry to improve resource efficiencies and promote production of resource efficient bricks such as perforated bricks, hollow blocks and fly ash bricks.

The goal of the project is to reduce energy consumption, and restrict GHG emissions by creating appropriate infrastructure for sustained adoption of new and improved technologies for production and use of resource efficient bricks in India. The objective is to make India's five major brick producing clusters more energy efficient. Outcomes are:

(i) Enhancing public sector awareness on resource-efficient products.
(ii) Access to finance for brick kiln entrepreneurs
(iii) Improved knowledge on technology, including marketing
(iv) Availability of resource efficient technology models in 5 clusters through Local Resource Centres
(v) Improved capacity of brick kiln entrepreneurs

a) KEY INDICATORS, ASSUMPTIONS, AND RISKS

Key Indicators:

- Increase of market share of resource-efficient bricks
- Reduced CO_2 emissions in five major brick making clusters in India
- Savings in energy consumption by new units
- Availability of technology providers in the market

Key Assumptions:

- Government policies conducive to modernization of Indian brick industry
- Increasing expectation for adaptation of new product
- Government agencies promoting new resource efficient product in construction sector
- Adaptation of new product by Architects and builders specially around mega cities

2. COUNTRY OWNERSHIP

A. COUNTRY ELIGIBILITY

India is a non-Annex-A country and a party to the United Nations Framework Convention on Climate Change (UNFCCC). India signed the UNFCCC treaty on 10th June 1992. India was the 38th country to ratify the convention on 1st November 1993. India is eligible to receive support from the Global Environment Facility (GEF).

B. COUNTRY DRIVEN-NESS

Government regulations and other developmental efforts by different agencies have so far had limited impacts on the Indian brick industry both on the production technology and types of bricks produced. The brick sector is one of the most polluting industries in India and the Government of India has enforced air emission standards for brick kilns. These regulations were notified by the MoEF (Ministry of Environment and Forests) during 1996 aiming at controlling air pollution from brick kilns. The notification also banned the use of moving chimney type Bull's Trench Kilns (BTKs), switch over to fixed chimney system and adoption of pollution control system (gravity settling chamber) in brick industries. One of the positive impact of the enforcements was the Indian brick industry started looking forward to local technological solutions to meet these needs. These efforts had led to the development of three prominent fixed chimney designs (Central Building Research Institute, Punjab State Council for Science and Technology and Alighar Muslim University) in the country. The regulations also brought in certain awareness on pollution control and energy conservation among the brick industries.

Another environment related regulation on the use of fly ash in brick making was notified by MoEF during 1999. This regulation aims at conserving the top soil through increased use of fly ash from coal based thermal power stations in brick making. The implementation and monitoring of the regulations are being carried out through Central Pollution Control Board (CPCB), state level pollution control boards and district level offices. Fly ash is a partial replacement for top soil used in brick making. Use of fly ash in brick making is not applicable to brick kiln units that are located beyond a radius of 100 kilometers from coal–based thermal power stations. However, preservation of top soil is vital for agricultural–based economies like India. Production of resource-efficient bricks and large scale adoption in construction would ensure reduction in overall consumption of top soil by individual brick kiln units. Production and use of resource–efficient bricks (hollow blocks and perforated bricks) on a large scale would help in reducing the rate of consumption of top soil (up to 30%).

Apart from air emission standards applicable for Indian brick industry, there are few other programs which are generally cluster-centric or regional centric supported by bilateral agencies focusing on various issues related to the brick sector. One such programme is supported by the Swiss agency for Development and Cooperation (SDC) and executed through NGOs, focuses on capacity building of brick firemen community in India.

With the construction sector in India growing at about 9%, the demand for various resources required for brick making will also increase substantially under business as usual scenario. Coupled with escalating costs of energy and depleting resources, it is paramount for the brick industry to adopt resource-efficient processes and products to alter the present conditions.

Promotion of technology upgradation in the small scale brick sector would lead to modernization of the industry. It would promote usage of machinery such as brick extruders for production of resource–efficient bricks in the industry. Currently the brick production process is very traditional and artisanal and bricks are mainly produced through manual processes. Brick making is a traditional industry with little knowledge on raw material (mainly clay) and its selection. Sun drying of bricks is done in Indian brick industries and introduction of machinery would require better understanding on the drying processes. Upgradation of equipment/ systems for producing resource–efficient bricks would require better and improved understanding and knowledge on various aspects of raw materials and its preparation. Significant knowledge and skills at various levels of the industry (workers, operators and

entrepreneurs) are required for improving yield and reducing breakage in brick making. Technology upgradation in the sector would open up new sets of opportunities of employment in the brick sector which would lead to improved livelihoods for the workers.

3. PROGRAM AND POLICY CONFORMITY

a) PROGRAM DESIGNATION AND CONFORMITY

The project proposes to address various barriers relevant for Indian brick sector that inhibit technology upgrade and transformation. The project is in line with the overall objective of Operational Program 5 (OP5) which is "Removal of Barriers to Energy Efficiency and Energy Conservation" in the climate change focal area. OP5 promotes energy efficiency by removing barriers to large-scale application, implementation and dissemination of cost-effective, energy efficient technologies and practices that will result in the reduction of greenhouse gas emissions.

The objective of the proposed medium size project is to make India's five major brick producing clusters more energy efficient by promoting production and use of resource-efficient bricks, and improving overall efficiency in brick making. This conforms with the strategic objective "Promoting industrial energy efficiency" of OP5.

b) PROJECT DESIGN (INCLUDING LOGFRAME AND INCREMENTAL REASONING)

Problem Statement

Indian brick industry consists of large number of small brick kiln units scattered across various clusters in different parts of India. Since the brick kiln units are not recognized as an industrial setup, they face several issues like non-availability of resources (e.g. good quality coal, soil, etc) and meeting the existing regulations.

One of the regulations of the government stipulates use of flyash in brick making. This would require significant changes and upgrade in existing setup of brick making processes for which ready-made solutions are not available. Use of obsolete technologies and use of solid bricks with traditional practices are seen as major threats to Indian brick industry.

Limited availability of information on technologies, no proven & operating modern brick kiln units at cluster levels, non-availability of trained manpower, limited access to finance, unexplored market for other building products and old specifications & codes for building materials and non-availability of organized program & institutional mechanism have been identified as problems in Indian brick industry. Under the business as usual scenario Indian brick industry will continue to operate with traditional technologies and practices. With its poor efficiency levels, the brick industry will be consuming about 24 million tonnes of coal every year, producing about 42 million tonnes of CO_2 every year (4.5% of total emissions from India), which is a global threat.

Barriers

The barriers responsible for stagnation of the Indian brick sector are inhibiting a technology upgrade. Major barriers identified in the Indian brick sector are as follows:

(i) Policy barrier

The exiting codes and specifications for building materials are based on traditional brick making and do not meet modern practices and technologies. With the availability of new building materials, these codes and specifications need to be reviewed and modified for large scale production and end-use.

(ii) Financial barrier

There is lack of awareness and knowledge among brick kiln entrepreneurs to prepare project reports/ documents for seeking loan from financial institutions/ banks. The credit worthiness of brick kiln entrepreneurs by banks is also not very favourable. At present, there is no tailor-made financial instrument available to brick kiln entrepreneurs for investing on technology upgradation. Higher transaction costs are envisaged by individual brick kiln entrepreneurs for developing markets for resource-efficient bricks. These financial barriers are responsible for brick kiln entrepreneurs not to invest on technology upgradation and its related activities.

(iii) Business skills related barrier

Majority of the brick kiln entrepreneurs use traditional method of green brick production, brick firing and marketing. They also lack capacities and modern practices on marketing, business opportunities and kiln management. There is also lack of trained manpower to cope with new technology changes.

(iv) Technology barrier

The availability of technology know-how for resource-efficient bricks is limited as very few technology providers are available in the country. With the brick kiln operations in India are generally carried out in small scale, the access to know-how by individual brick kiln entrepreneurs is limited.

(v) Awareness barrier

Present level of awareness of entrepreneurs and end-users on modern technologies (machineries) and building products is low. The benefits on production of resource-efficient bricks such as energy savings, reduction in top soil consumption and air pollution are also not well known to the brick kiln entrepreneurs. The end-users such as builders, architects, etc also lack information on benefits (insulation properties, saving in mortar during construction, etc) of using resource-efficient bricks in building construction.

Intervention Strategy

Goal: To reduce energy consumption, and restrict GHG emissions by creating appropriate infrastructure for sustained adoption of new and improved technologies for production and use of resource efficient bricks in India

Objective: The objective of the project is to make India's five major brick producing clusters more energy efficient.

Outcomes

Following outcomes are envisaged through various activities proposed under the project:

(i) Enhancing public sector awareness on resource-efficient products.
(ii) Access to finance for brick kiln entrepreneurs
(iii) Improved knowledge on technology, including marketing
(iv) Availability of resource efficient technology models in 5 clusters through Local Resource Centres
(v) Improved capacity of brick kiln entrepreneurs.

Component 1: Enhancing public sector awareness on resource-efficient products

Presently, the awareness level of specifications and codes amongst relevant public agencies at State and Central Government such as Central Public Works Department (CPWD), state public works departments, Military Engineering Services (MES), etc is very low. For example, most of them are not aware that the energy efficient burnt clay hollow brick (for walls and partition), meets the building code. In fact this brick type not only fully complies with the specifications, it also contributes to improved structural stability and better looks. Furthermore, lack of awareness about specifications and codes among government agencies has led to non-inclusion of resource efficient and energy efficient products in their bill of materials to be used in public construction contracts.

(i) Public construction contracts
Inclusion of energy-efficient bricks in public construction contracts will be a focus under this component. This will improve confidence level of builders and end-users resulting in a wider of use of these products. It will have direct impact on the market and stimulate production of resource efficient bricks.

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(ii) Policy advocacy
PFC would make a special effort to obtain the support of state and local governments in the promotion of resource efficient bricks. Various state and central Government agencies (e.g. CPWD, PWD, MES, BIS, etc.) will be invited to workshops at the national level conducted by LRCs, which would help in enhancing their knowledge and understanding on resource efficient bricks. It is planned to conduct at least three "National level meetings" to which all stakeholders, including policy makers, will be invited.

Component 2: Access to finance for brick kiln entrepreneurs

One of the important activities during project implementation would be to establish access to funds from various financial institutions for demonstration units and assist financial institutions in developing tailor-made financial packages for the brick industry. Letter of cooperation from financial institutions interested in technology upgradation in Indian brick industry is given in **annexure 5**. The activity would address the barrier being faced by the brick manufacturers in accessing loans from financial institutions.

(i) Identification of national and regional financial institutions (FIs)
The project has interacted with various financial institutions and banks e.g. Small Industries Development Bank of India (SIDBI) to share knowledge on the Indian brick sector and the proposed interventions under the UNDP-GEF project, which would help in transformation of the Indian brick sector. The response from SIDBI is positive.

In the initial phase of the project, PFC and LRCs will interact extensively with various financial institutions and local banks, which would help in enhancing understanding of FIs on the brick sector and the project objectives. The interactions will assist the project in identifying the interested national and regional financial institutions for providing finance to brick making units.

(ii) DPR preparation for 12 demonstration projects
Individual brick kiln entrepreneurs lack the capacity to prepare detailed project reports for project implementation and for approaching banks for loans. The LRCs would prepare detailed project reports (DPRs) for the new projects (12 no.) with the guidance of PFC. It would also prepare user-friendly guidelines and model DPRs which would help other brick kiln units to prepare DPRs on their own.

During the PDF-A phase, based on interaction with brick kiln entrepreneurs, brief project profiles for each cluster were prepared and presented in the stakeholder's workshop. The brief project profiles for each cluster (NCR, Ludhiana, Varanasi, Pune and Bangalore) after incorporating feedback during stakeholder consultation workshop are enclosed in **annexure 4.** The estimated investments, which will be met through bank loans and promoter's (brick kiln entrepreneur) investments are given below:

(iii) Development of resource efficient brick production project profiles
The experience gained during the planning and implementation of the demonstration will be collated and detailed project profiles relevant for a particular cluster/ region will be prepared.

Figure 1: Demonstration Units

Cluster	*Investment per demonstration unit (USD)*	*Number of demonstration units*	*Total investments per cluster (USD)*
Ghaziabad/ Gurgaon	311,000	2	622,000
Ludhiana	246,000	2	492,000
Varanasi	246,000	2	492,000
Pune	892,000	3	677,000
Bangalore	633,000	3	898,000
Total	**2,328,000**	**12**	**3,181,000**

(iv) Arranging finance for the demonstration projects
The project will be setting up 12 (twelve) resource efficient brick kiln units in 5 (five) different clusters. PFC and LRCs would prepare DPRs for approaching the banks. It would also facilitate interaction between individual entrepreneurs and banks for provision of loans based on DPRs and fulfilment of bank's criteria in providing loans. These activities would also help in developing suitable financial package for brick industry.

Component 3: Improved knowledge on technology, including marketing

While other components have mainly focused on strengthening the supply of resource-efficient bricks, Component 3 focuses on creating markets for such products.

(i) Market research and strategies for market development
A marketing professional will help each LRC in studying market and demands for the resource efficient bricks in the cluster. The marketing professionals will interact with demonstration units, LRC and end-users and would develop the strategies for market development. He will also provide assistance to the demonstration units in marketing of the resource efficient bricks. LRC would also facilitate testing of resource efficient bricks (e.g. compressive strengths of bricks). These results will be used to provide comprehensive product details to the end-users so that they can make an informed choice.

(ii) Sensitizing and educating end-users
LRCs and PFC would sensitise and educate end-users such as builders, architects, masons and house builders regarding the advantages of resource efficient bricks. Posters will be exhibited and brochures will be distributed during various interactive meets (training programs and awareness programs). LRC would also distribute these promotional materials to various end-users during one-to-one meetings and also through post & email. The posters and brochures will also be distributed to various government and non-governmental agencies for display and distribution specifically during national and international exhibitions on building materials and construction.

Component 4: Availability of resource efficient technology models in 5 clusters through Local Resource Centres

The project has short-listed five brick making clusters in India. The parameters chosen for short-listing of these clusters are:

- Major brick production centres located close to high growth centres
- Higher demands for bricks due to vibrant construction activities
- Availability of forward looking entrepreneurs willing to adopt technology modernization.
- Covering different geographical locations

The base case scenario of these clusters is given below:

Ludhiana (Punjab)

Ludhiana cluster is located in the state of Punjab. It produces mainly solid bricks, using manual moulding and firing process. There are about 1400 fixed chimney Bull' Trench Kilns (BTKs) operating in Ludhiana cluster in a radius of 75 km. The general brick production season is between December to June (about 7 months). Sun dried green bricks are fired in BTKs. The total estimated brick production from the cluster is 11,700 million bricks per year with the estimated coal consumption of 1.7 million tonne per year. Production of other brick products such as perforated bricks, hollow blocks or fly ash bricks is almost negligible. Air pollution and top soil loss are important environmental issues in the cluster.

National Capital Region (NCR)

The National Capital Region (NCR) consists of Delhi and surrounding districts of Haryana, Uttar Pradesh and Rajasthan. This region has one of the highest per capita consumption of bricks in the country. Production of clay fired bricks is banned in Delhi. Large concentration of BTKs exists in the states surrounding Delhi i.e. Haryana and Uttar Pradesh. Brick making is seasonal (December to June). Hand moulded solid bricks are produced in these clusters. There are about 400 brick kilns operating in brick kiln clusters surrounding Delhi, with an estimated brick production of about 4400 million bricks, consuming about 0.67 million tonne of coal per year. A few fly ash lime gypsum (FALG) brick units are located in Delhi; there are also a few brick kiln units producing perforated bricks. However, the production and use of fly ash and perforated bricks is very small.

Varanasi (Uttar Pradesh)

Varanasi brick cluster is located in east Uttar Pradesh. It produces high quality solid bricks through manual process. The estimated number of brick kilns in Varanasi cluster is about 350, producing about 1800 million bricks per year and consuming about 0.27 million tonne of coal per year. The sun dried green bricks are fired in BTKs. There are no initiatives for production of resource efficient bricks in this cluster.

Pune (Maharashtra)

The construction sector is fast growing around Pune. The demand for bricks is very high, but the quality of soil available is poor. Pune brick cluster produces mainly solid bricks and manual process is adopted for solid clay brick production. The sun dried green bricks are fired mainly in clamp type kilns. The total estimated brick production around Pune is about 1800 million per year with an estimated coal consumption of 0.27 million tonne.

Bangalore (Karnataka)

The brick industry surrounding Bangalore Karnataka) is fast growing due to huge expansion taking place in the area. A number of brick clusters – Malur, Kolar and Anaekkal brick clusters supply mainly solid bricks to the construction industry. Large number of units use sheds for drying and storing of bricks. Majority of the kilns in Malur and Kolar brick clusters are downdraught kilns of intermittent type. These two clusters mainly use biomass fuels (eucalyptus twigs) for kiln firing,

Anaekkal brick cluster has mainly BTKs and mainly use coal as fuel. Few Hoffmann kilns are also operating in this region. Extruders (machineries) are used for brick production in few units. The total number of brick kiln units in different clusters surrounding Bangalore is close to 1000. The estimated brick production from the cluster is about 3000 million bricks, consuming about 0.47 million tonne of coal.

The project would set up 12 (twelve) demonstration projects in 5 (five) different brick kiln clusters (**figure 2 and 3)** regions, and thereby allowing new/ existing entrepreneurs to take up production of resource–efficient products.

The clusters identified for setting up demonstration units and the types of interventions proposed are given below:

Figure 2: Brick kiln clusters

S No	*Cluster*	*State/ Region*	*Number of demonstration units*	*Proposed interventions*
1	Ghaziabad/ Gurgaon	NCR	2	Perforated bricks
2	Ludhiana	Punjab	2	Perforated bricks/ Flyash-Clay bricks
3	Varanasi	East Uttar Pradesh	2	Perforated bricks/ Hollow blocks
4	Pune	Maharashtra	3	Perforated bricks/ Hollow blocks
5	Bangalore	Karnataka	3	Perforated bricks/ Hollow blocks

(i) Identification of brick kiln units and signing MoUs

The project, during the PDF-A phase interacted with individual brick kiln entrepreneurs in all the five clusters. Letters from individual brick kiln entrepreneurs interested in adoption of technologies for production of resource efficient bricks are given in **annexure 2.** The project also interacted with brick industry association at national level national (All India Bricks and Tiles Manufacturers' Federation – AIBTMF) as well as at regional levels (e.g. Int Nirmata Parishad – INP, Varanasi). The letters of cooperation from brick industry associations at national and regional level are given in **annexure 3**. During implementation, the project will shortlist the brick kiln units based on a well defined 'selection criteria' for up-gradation of technology. The next step would be finalisation of MoUs with each of the brick kiln units. The project will work closely with the local industry associations during this phase, so as to ensure the involvement of the entire brick industry in the cluster in the demonstration projects.

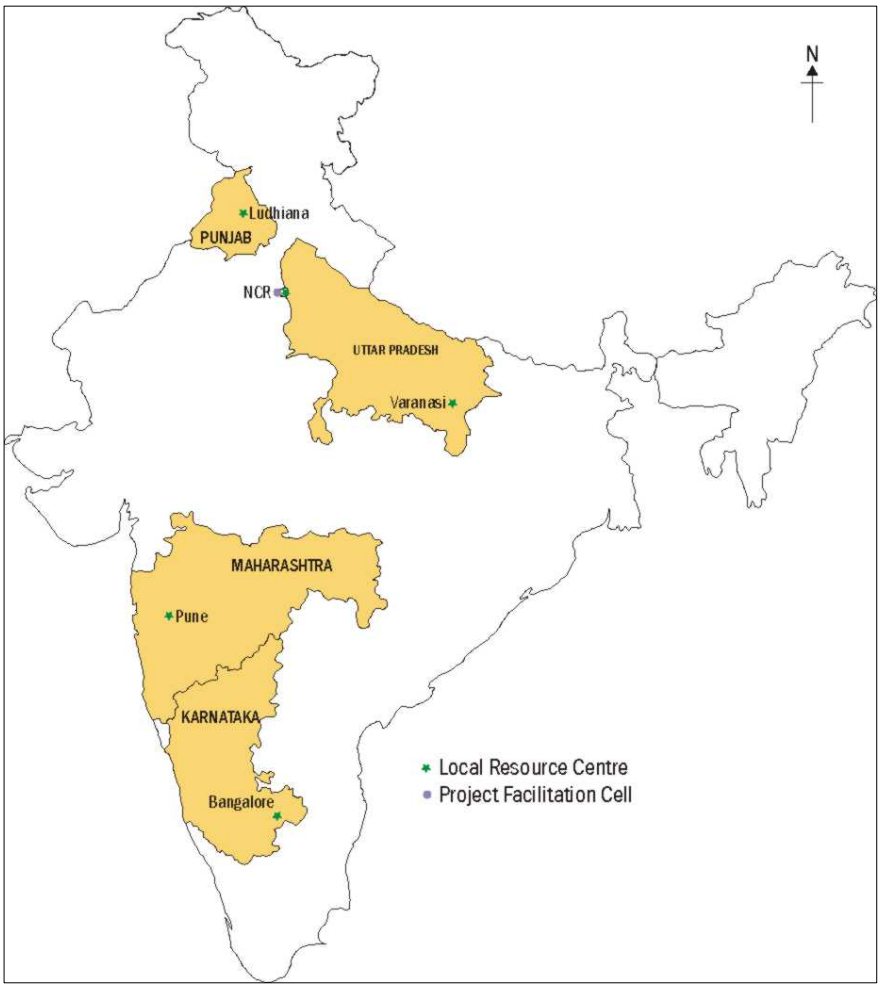

Figure 3: Brick kiln clusters of project implementation

(ii) Technology sourcing

During the PDF-A phase, interactions with a number of technology suppliers involved in supplying machineries to brick industry have been initiated. These interactions had helped in developing project profiles by matching available equipment specifications with the needs of the industry, such as, production capacity, investments capacity of the entrepreneurs, quality and reliability of the machinery. During implementation phase, the project would extensively interact with technology/ machinery suppliers and prepare a list of potential technology suppliers to be made available to the project developers. The project through the PFC & LRCs will facilitate sourcing of plant and machinery for individual demonstration units.

(iii) Facilitating commissioning of demonstration projects

The Project Facilitation Cell (PFC) would facilitate the implementation of the project through the local resource centres (LRCs) identified in the short-listed clusters (given in following table). It would also coordinate with local offices of SISI/ NSIC for synergizing various activities planned under project implementation. During the PDF-A stage, detailed discussions were organised with the Ministry of Small Scale industries (MoSSI) and the concerned officials of the ministry have assured cooperation in the proposed project through the involvement of SISI/ NSIC branches in the selected clusters. LRC would facilitate adoption of technologies for production of resource efficient bricks by individual brick kiln units in the short-listed clusters. This would require effective coordination between all the

stakeholders such as entrepreneur, technology supplier, financial institutions, local brick industry associations etc.

During the commissioning of demonstration projects in the cluster, LRC would assist in the commissioning on a regular basis. It would also interact with the technology supplier and the technical experts in troubleshooting operations wherever required and ensure smooth functioning of the resource efficient brick kiln unit.

(iv) Monitoring and evaluation of projects
PFC will prepare a comprehensive monitoring and evaluation framework for the monitoring of individual brick kiln units. It would help the LRC in carrying out the evaluation by experts in the field. For each brick kiln unit, a baseline report and a post-commissioning report will be prepared. These reports would cover performance evaluation of energy consumption, environmental emissions and resource efficiency (e.g. reduction in soil consumption level) along with other operational parameters (production, breakage, production costs and sale of bricks). LRC would also help individual brick kiln units in preparation of suitable formats to document various operating parameters and carrying out energy & environmental monitoring of the plants of the plants, which would help in the evaluation process.

Component 5: Improved capacity of brick kiln entrepreneurs

Component 5 will focus on 'capacity development in the private sector', addressing the needs of local brick industry and institutions such as brick kiln associations.

(i) Development of training module for energy efficiency improvements
The LRCs and PFC would assess the specific needs of the brick sector and develop suitable training modules for conducting training programs in different clusters. The training program would cover 'Best Operating Practices' (BOP) on brick firing, green brick making and financial management. Suitable modifications in the training modules will be incorporated based on the feedback received from the participants.

(ii) Organization of training programs
It is proposed to conduct 2 training programs per year per cluster. The total programs planned are 40 and estimated number of beneficiaries are 2000 brick kiln units. The LRC along with technical experts will be organising these training programs jointly with local brick manufacturers associations. These training programs would help in adopting BOP in individual brick kiln units and are expected to result in energy savings of 5–10%. LRC would obtain feedback from each training programs that would help PFC in continuously upgrading the contents and the overall quality of the training programmes.

(iii) Exposure visits/ Study tours within India
The project would undertake exposure visit/ study tour for members of PFC and LRCs and short-listed group of entrepreneurs for in-depth understanding on the technological options available.

(iv) Conducting awareness seminars
LRC would conduct a total of 5 (five) regional level awareness seminars during the execution of the project. These awareness seminars would bring together the brick kiln entrepreneurs (around 500), construction sector experts and the technology suppliers to a common platform to share their experiences and requirements. Awareness seminars will be accompanied by organisation of technical exhibition to exhibit resource-efficient brick making processes and machineries as well as resource efficient brick products. This is expected to help in developing business for the technology supplier as well as avenues for the demonstration units in finding market for their bricks.

(v) Development of promotional materials and web site

PFC would develop promotional materials such as website, brochures and posters to promote resource efficient bricks. PFC would develop a website with inputs from LRCs. The website would provide information on alternate products available in different regions, list of brick kiln units who produce alternate bricks, quality of these products (e.g. compressive strength of perforated bricks, hollow blocks and fly ash bricks) and technology suppliers. The website will also provide linkages with other relevant websites. PFC will maintain the website and update information regularly. The project will prepare brochure which will be distributed to all relevant stakeholders. The brochure would provide information pertaining to resource efficient technologies, resource efficient bricks, their physical parameters (dimensions and compressive strengths), usage and availability in the market.

LogFrame Matrix

Project Strategy	Objectively verifiable indicators				
Goal	To reduce energy consumption, and restrict GHG emissions by creating appropriate infrastructure for sustained adoption of new and improved technologies for production and use of resource efficient bricks in India				
	Indicator (quantified and time-bound)	**Baseline**	**Target**	**Sources of verification**	**Risks and Assumptions**
Objective To make India's five major brick producing clusters more energy efficient	Reduction of 187,840 tons of CO_2 in five major brick making clusters in India over 15 years Savings in energy consumption by the demonstration units.	Production of resource-efficient bricks will not increase resulting in continuation of high CO_2 generation and high energy consumption in the sector (42 million tonnes of CO_2 per annum)	Year 1: reduction of 10,099 tCO_2 Year 5: reduction of 59,920 tCO_2 Year 10: reduction of 123,880 tCO_2 Year 15: reduction of 187,840 tCO_2	Project reports and files	Government agencies promoting new resource efficient product in construction sector
Outcome 1: Enhancing public sector awareness on resource-efficient products	Usage of resource-efficient bricks by new public department building contracts increased by 20% by end of project.	No increase in usage of EE bricks in public buildings.	Year 2: increase by 3% Year 3: increase by 10% Year 4: increase by 20%	Contract documents of the public departments with inclusion of resource–efficient bricks specifications	Government policies conducive to modernization of Indian brick industry
Outcome 2: Access to finance for brick kiln entrepreneurs	# of loans from local banks/ financial institutions for technology upgradation tripled by end of project.	# of loans will not increase	Year 3: # of loans doubled compared to baseline year 2008. Year 4: # of loans tripled compared to baseline year 2008	Bank records and Industry association records	Bank lending policies are conducive to brick industry
Outcome 3: Improved knowledge on technology, including marketing	Resource-efficient bricks sold in the market and used for construction.	Market share of resource-efficient bricks remains low	Market share of resource-efficient bricks doubled by end of project	Market surveys and relevant reports and enquiries of entrepreneurs and end-users.	Small scale industry supporting the entire initiative in various clusters
Outcome 4: Availability of resource-efficient technology	12 EE brick kilns units established in 5 clusters by end of project	No EE brick kiln units established	Year 1: All 12 Units established by end of year 1.	Records of demonstration units on production and sale of resource-efficient bricks.	Adaptation of new product by Architects and builders specially around mega cities

models in 5 clusters through Local Resource Centres					
Outcome 5: Improved capacity of brick kiln entrepreneurs	At least 5 Brick kiln entrepreneurs in each cluster invest in technology upgradation by end of project	No such investment will take place	Year 2: 1 entrepreneur in each cluster invests Year 4: 5 entrepreneurs in each cluster invests	Market surveys reports	Government policies conducive to modernization of Indian brick industry

Incremental Reasoning

The project costs financed by the GEF are estimated to be USD 696,448 for a period of 4 years. The share of GEF finance works out to be 10.1% of total project costs which includes co-financing by brick kiln entrepreneurs (equity investment up to 30-40%) and financial institutions/ banks (loans up to 60-70%). The incremental reasoning of the project in terms of global and domestic benefits with baseline and alternative scenario are given below:

Environmental benefits
The brick kilns to be set up in 5 prominent brick making clusters would start producing resource-efficient bricks that would help in reducing CO_2 emissions of up to 187,840 tons during their life time. The accrued reduction of CO_2 emissions are based on following assumptions.

- About 30% reductions in weight of bricks result from switching over from production of solid bricks to resource–efficient bricks
- Weigh reduction results in reduced energy requirements for production of resource–efficient bricks (about 20%)
- An average gross calorific value (GCV) of 5500 kcal/kg assumed for coal used in these brick kilns
- Net CO_2 reductions is the difference between CO_2 reductions from production of resource–efficient bricks and the CO_2 emissions from additional energy in the form of electricity consumed in machinery for production of resource-efficient bricks, which otherwise is being done manually.
- The share of resource-efficient bricks is about 25% for Varanasi and Delhi clusters, about 40% for Punjab cluster and 100% for Pune and Bangalore clusters.
- The envisaged production of resource efficient bricks will increase to 75%, 85%, 95% and 95% respectively as a percentage of total production for year-1, year-2, year-3 and year-4.
- An average lifespan of 15 years assumed for CO_2 reductions from individual brick kiln units.

CO_2 reductions from individual brick kiln units and the calculations are given in annexure 6.

Apart from reductions in GHG emissions, there are other associated benefits for the end-users who will use resource-efficient bricks for construction:

- Reduction in mortar usage since resource-efficient bricks does not have uneven surfaces unlike hand-moulded bricks.
- Savings in construction time, as the modern brick kiln units can produce user-friendly bricks such as interlocking bricks.
- Savings in energy consumption in building during cooling and heating as resource-efficient bricks will have better insulating properties.

Socio-economic benefits
Indian brick industry uses hand moulding practices for brick making, which is highly labour intensive. The production of resource-efficient bricks such as perforated bricks and hollow blocks would require mechanisation which in turn reduce drudgery for moulders.

Institutional benefits
The Local Resource Centres (LRCs) proposed to be established in five brick clusters will continue to provide support to local brick kiln units in the cluster/ region in technology upgradation efforts and capacity building (training in best operating practices, kiln management, etc).

Policy benefits

Various interactions with policy makers during the project implementation phase would help in sensitizing policy makers on different options like perforated bricks, hollow blocks and fly ash bricks available for construction. This would help in enhancing adoption of resource-efficient products on a large scale and may result in suitable changes/ modifications in the existing code related to use of resource-efficient brick products.

Output/ Activities	*Baseline*	*Alternative*	*Increment*
Global benefits	Hand-moulded solid bricks consuming high energy and resources Limited production of resource efficient brick products. High emissions of GHG during production of conventional solid bricks.	Enhanced adoption of technologies for production of resource efficient bricks would improve the overall performance (energy and resource efficiency) of brick sector Reductions in CO_2 emissions are achieved through technology upgradation and best operating practices	Availability of technology packages through LRCs at cluster level
Domestic benefits	Present technologies favour production of only solid bricks, which are resource intensive. Under developed market for resource efficient bricks	Technologies demonstrated for production of resource efficient bricks would help in improving resource use efficiency Market developed for resource efficient brick products	LRCs each cluster facilitating technology and finance package for early adaptation Sensitization of end-users

Output/ Activities	*Baseline*	*Alternative*	*Increment*
Outcome 1 : **Enhancing public sector awareness on resource-efficient products**			
	Production of resource-efficient bricks are limited in India, their benefits are not well known at central/ state government levels and these products are not extensively used in various public construction activities.	Participation of officials from central/ state level agencies in various awareness and training programs would help in understanding the benefits of production and use of resource-efficient bricks.	Awareness programs, meetings and workshops for policy makers
Outcome 2 : Access to finance established			
Domestic benefits	There is information gap between brick kiln units and financial institutions on technology upgradation needs and availability of finance in India, which is generally not addressed	The project would put efforts to change the existing situation, and help the demonstration units to avail loan from banks for technology upgradation. Individual brick kiln entrepreneur would become aware of the procedures for availing loan and take up	Close interaction between entrepreneurs and banks Preparation of Detailed Project Reports (DPRs) to meet requirements of banks.

Output/ Activities	*Baseline*	*Alternative*	*Increment*
		technology upgradation in their units.	
Outcome 3 : Improved knowledge on kiln management and marketing by brick kiln entrepreneurs			
	Low level of knowledge on brick kiln management	Enhancing the knowledge level of brick kiln owners on various aspects of kiln management	Training programs for brick kiln owners
Domestic benefits	There is poor market for resource efficient brick products along with limited capacity of brick producers to market new resource efficient bricks	Project support would sensitize various end-users and establish market for new products. Provide variety of products for construction for building industry	Sensitization of various end-users and project support to individual entrepreneurs to establish market for resource efficient bricks.
Outcome 4 : Technologies demonstrated in five clusters through Local Resource Centres (LRCs)			
Domestic benefits	Very little technical capacity is available at cluster/ regional level to address technology issues/ modernization relevant for Indian brick industry There is no structured program aimed to enhance resource efficiencies in brick industry.	LRCs would help brick industry in technology adoption, capacity building and market development.	Local technical capacity enhanced with the presence of LRCs at cluster level.
	Limited capacity of brick kiln units for identify technology options and adoption without external technical support Poor or non-existing record keeping and monitoring of various resources (e.g. fuel) and pollution.	Successful demonstration of technologies and development of technology packages would build help in large scale adoption in cluster/ region. Performance evaluation would help brick kiln units in establishing the benefits in their units	Development of confidence among entrepreneurs to undertake modernization
Outcome 5 : Improved capacity of brick kiln entrepreneurs			
Domestic benefits	Present technical capacity of brick kiln units is limited. Structured programs for upgrading the skills of workers and supervisors is absent. No institution carries out such programmes in India	Development of training modules and organising training programs would help a large number of brick kiln units to improve their performance in various aspects.	Local Resource centre will act as Knowledge hub and conduct regular training programme on modernization of brick industry Availability of trained manpower in different brick clusters

CO_2 reductions in demonstration units

Parameter	Unit	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7	Unit-8	Unit-9	Unit-10	Unit-11	Unit-12
Yearly brick production	lakh /yr	90	90	70	70	70	70	105	105	105	105	105	105
Production of resource-efficient bricks	lakh /yr	36	36	18	18	18	18	105	105	105	105	105	105
Specific energy consumption of solid bricks	MJ/kg brick	1.15	1.15	1.20	1.20	1.20	1.20	1.15	1.15	1.15	1.15	1.15	1.15
CO_2 reduction with reduction in fuel consumption	kg CO_2 per kg brick	0.071	0.071	0.074	0.074	0.074	0.074	0.071	0.071	0.071	0.071	0.071	0.071
CO_2 factor for electricity consumption	kg CO_2 per kg brick	-0.0131	-0.0131	-0.0209	-0.0209	-0.0209	-0.0209	-0.0126	-0.0126	-0.0126	-0.0126	-0.0126	-0.0126
Overall CO_2 reduction	kg CO_2 / kg brick	0.058	0.058	0.053	0.053	0.05	0.053	0.06	0.06	0.059	0.059	0.059	0.059
CO_2 reduction/ Demo Unit/Yr	kg CO_2 / kg brick	626	626	288	288	288	288	1844	1844	1844	1844	1844	1844

	Year 1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Year-9	Year-10	Year-11	Year-12	Year-13	Year-14	Year-15	Cumulative
Unit-1	470	532	595	595	595	595	595	595	595	595	595	595	595	595	595	8739
Unit-2	470	532	595	595	595	595	595	595	595	595	595	595	595	595	595	8739
Unit-3	216	244	273	273	273	273	273	273	273	273	273	273	273	273	273	4011
Unit-4	216	244	273	273	273	273	273	273	273	273	273	273	273	273	273	4011
Unit-5	216	244	273	273	273	273	273	273	273	273	273	273	273	273	273	4011
Unit-6	216	244	273	273	273	273	273	273	273	273	273	273	273	273	273	4011
Unit-7	1383	1567	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	25719
Unit-8	1383	1567	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	25719
Unit-9	1383	1567	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	25719
Unit-10	1383	1567	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	25719
Unit-11	1383	1567	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	25719
Unit-12	1383	1567	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752	25719
	10099	**11445**	**12792**	**12792**	**12792**	**12792**	**12792**	**12792**	**12792**	**12792**	**12792**	**12792**	**12792**	**12792**	**12792**	**187840**

c) SUSTAINABILITY (INCLUDING FINANCIAL SUSTAINABILITY)

The project through its Local Resource Centres (LRCs) would facilitate commissioning, operation and fine-tuning of demonstration units. It would help in training the manpower on better operating practices in brick kilns. It would also provide support in developing market for resource-efficient products through various contact programs. While resource-efficient products would fetch better pricing compared with conventional solid bricks, the demonstration units would also reduce operating costs through energy savings due to production of resource-efficient bricks and adoption of best operating practices along with reduction in volume of soil consumed for brick making. These demonstration projects would serve as models in the clusters of interventions for motivating other brick kiln units to adopt technology upgradation.

It is proposed to anchor the LRCs with brick industry associations, local government nodal offices or R&D institutions. This would ensure the information and data on technologies demonstrated are anchored with these centres who would provide services to other brick kiln units to adopt changes. The LRCs would serve as nodal agencies for providing services to local brick industries – preparation of detailed project reports (DPRs), providing access to banks, conducting regular training programs for brick industries. All these services will be done on chargeable basis which would help in sustainability of LRCs.

d) REPLICABILITY

The demonstration projects in five clusters will serve as models for large number of similar brick kiln units operating in the clusters. Validation of the demonstration units with their techno-economic feasibilities would further enhances replication. LRCs in each cluster would play catalytic role during demonstration phase as well as there after. During the project phase, technology package and financial package relevant will be established for each of the clusters identified. The LRCs will help in establishing demonstration projects, conduct awareness seminars/ training programs in the identified clusters. Large pool of trained manpower will be available which further improves the replication process. LRCs are anchored with cluster level institutions that would provide support to local brick kiln units and promote replication beyond project duration.

Enhanced awareness of various stakeholders including policy makers would help in creating a stable and demanding market for resource-efficient bricks. This would enable large number of brick kiln units to adopt technology upgradation and produce resource-efficient bricks. Availability of finance/ loan by local banks would further encourage more number of brick kiln units to invest on technology upgradation. The LRCs would facilitate changes at cluster level.

e) STAKEHOLDER INVOLVEMENT

Various stakeholders involved in project development activities include brick kiln entrepreneurs, brick industry associations, technology/ machinery suppliers, financial institutions, builders, architects, etc. A stakeholder workshop was organized to incorporate feedback from various stakeholders (**Annexure 1**). The envisaged roles of the stakeholders during the project phase and beyond are given below:

Brick kiln entrepreneurs
Brick kiln entrepreneurs are the most important stakeholders in the project. Demonstration units will be set up with 12 brick kiln units identified in 5 different brick clusters in India. These brick kiln

entrepreneurs would provide their facilities (infrastructure such as kiln and manpower) during project implementation. They would also invest about 30% of the total investments required for technology upgradation. They would also take loans from banks for balance share of investments required on technology upgradation. They would also provide access to their units for carrying out monitoring and evaluation of technologies implemented in their units. Brick kiln entrepreneurs and the firemen from other kilns in these clusters will participate in training programs which would help in building their skills and capacities.

Brick industry associations
The brick industry associations will provide support to LRCs during project implementation in organizing various training programs and awareness seminars. Few LRCs will be anchored with industry associations which will further strengthen the process.

Technology suppliers
The project will interact extensively with various technology suppliers identified during PDF-A phase which would in finalizing the specifications required for various machineries. The project would also involve brick kiln entrepreneurs of the demonstration projects and respective brick industry associations during this process.

Financial institutions and banks
The project will facilitate the demonstration projects access to loans for investing on technology upgradation. This will set up a trend for other units in the cluster for approaching banks to invest in their units.

End-users
The end-users include both government and private sectors. They incorporate builders, architects, public work departments of government and individual users. The proposed project would conduct a number of awareness seminars and interaction meets that would help in sensitizing various end-users that would help in developing and enhancing the market for resource-efficient bricks.

Policy makers
Interaction with policy makers especially those involved in developing specifications and codes for building materials will be enhanced through various awareness and training programs. Envisaged changes in these codes will further brighten the prospects for resource-efficient bricks.

f) MONITORING AND EVALUATION

Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures and will be provided by the project team and the UNDP Country Office (UNDP-CO) with support from UNDP/GEF. The Logical Framework Matrix provides *performance* and *impact* indicators for project implementation along with their corresponding *means of verification*. These will form the basis on which the project's Monitoring and Evaluation system will be built.

The following sections outline the principle components of the Monitoring and Evaluation Plan and indicative cost estimates related to M&E activities. The project's Monitoring and Evaluation Plan will be presented and finalized at the Project's Inception Report following a collective fine-tuning of indicators, means of verification, and the full definition of project staff M&E responsibilities.

INCEPTION

Description of major consultancies

Consultancy	Description	Estimated Cost (GEF contribution)
Project Management	A part time project manager and a part time assistant will be contracted to manage the project, which includes: leading and guiding the project team, contracting and supervising all technical consultancies, administrative and financial management, liaison with UNDP office and government. Combined, 3 person years (2 for the project manager, and 1 for the assistant) are allocated for the 4 year project.	$25,000
Public sector awareness	A local and an international consultant will be contracted for approx. 18 weeks (11 weeks for the national and 7 weeks for the international consultant) over the 4 year period. These consultants would support the project team with regard to: obtaining support of state and local governments in the promotion of resource efficient bricks; conducting 3 number of "National level meetings" in which various stakeholders including policy makers will be invited.	$28,500
Access to finance	Two local and one international consultant will be contracted for approx. 26 weeks (19 weeks for the national and 7 weeks for the international consultant) over the 4 year period. These consultants would support the project team with regard to: Arranging finance for the demonstration projects; development of resource efficient brick production project profiles; DPR preparation for 12 demonstration projects and identification of national and regional financial institutions (FIs).	$34,000
Improved knowledge on technology, including marketing	A local and an international consultant will be contracted for approx. 18 weeks (12 weeks for the national and 6 weeks for the international consultant) over the 4 year period. These consultants would support the project team with regard to: Market research and strategies for market development; sensitizing and educating end-users; policy advocacy including three National level meetings.	$28,000
Availability of resource efficient technology	Two local and one international consultant will be contracted for approx. 37 weeks (26 weeks for the national and 11 weeks for the international consultant) over the 4 year period. These consultants would support the project team with regard to: Identification of brick kiln units and signing MoUs; Technology sourcing; Facilitating commissioning of demonstration projects; Monitoring and evaluation of projects.	$53,000
Improved Capacity of entrepreneurs	A local and an international consultant will be contracted for approx. 22 weeks (13 weeks for the national and 9 weeks for the international consultant) over the 4 year period. These consultants would support the project team with regard to: Development of training module for energy efficiency improvements; Organization of training programs; Exposure visits/ Study tours within India; Conducting awareness seminars; Development of promotional materials and web site.	$36,500
Monitoring, Learning, & Evaluation	Approx. four local and international consultants will be contracted for 56 weeks (25 weeks for national and 12 weeks for international consultants) over the 4 year period. These consultants would support the project team with regard to: conducting the final evaluation (2 consultants one national and one international); exposure visits to project sites; an annual experience sharing workshop featuring all stake holders; video documentation; presentations on project achievements in various forums and other tasks as relevant to this component.	$56,000

Total Budget and Work Plan

Award ID:	00041170
Award Title:	PIMS 3465 India Energy Efficiency Improvements in the Indian Brick Industry
Business Unit:	IND10
Project Title:	PIMS 3465 India Energy Efficiency Improvements in the Indian Brick Industry
Implementing Partner (Executing Agency)	MoEF through TERI

GEF Outcome/Atlas Activity	Responsible Party/ Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	See Budget Note:
OUTCOME 1: Public sector awareness	**UNDP**	**62000**	**GEF**	71200	International Consultants	0	0	0	0	0	
				71300	Local Consultants	5,295	9,835	9,835	3,535	28,500	
				71600	Travel	700	1,800	1,800	700	5,000	
				74500	Public Consultations and Hearings	0	824	824	0	1,648	
					Total Outcome 1	**5,995**	**12,459**	**12,459**	**4,235**	**35,148**	
OUTCOME 2: Access to finance	**UNDP**	**62000**	**GEF**	71200	International Consultants	0	0	0	0	0	
				71300	Local Consultants	6,050	8,650	8,650	10,650	34,000	
				71600	Travel	2,250	2,250	2,250	2,250	9,000	
				72000	Service Contract	4,550	4,550	4,550	4,550	18,200	
				74500	Public Consultations and Hearings	3,000	3,000	3,000	3,000	12,000	
				74500	Misc	1,000	1,000	1,000	1,000	4,000	
					Total Outcome 2	**16,850**	**19,450**	**19,450**	**21,450**	**77,200**	
OUTCOME 3: Improved knowledge on technology, including marketing	**UNDP**	**62000**	**GEF**	71200	International Consultants	0	0	0	0	0	
				71300	Local Consultants	5,900	7,100	7,000	8,000	28,000	
				71600	Travel	1,200	3,400	4,200	1,200	10,000	
				72000	Service Contract	9,200	20,000	16,000	12,000	57,200	
				74500	Public Consultations and Hearings	2,400	3,400	1,500	3,200	10,500	
				74500	Misc	700	700	700	700	2,800	
					Total Outcome 3	**19,400**	**34,600**	**29,400**	**25,100**	**108,500**	

OUTCOME 4: Availability of resource efficient technology	**UNDP**	**62000**	**GEF**	71200	International Consultants	3,000	6,000	6,000	3,000	18,000	
				71300	Local Consultants	6,500	10,000	12,000	6,500	35,000	
				71600	Travel	1,500	1,500	0	2,000	5,000	
				72000	Service Contract	57,250	85,250	57,250	29,250	229,000	
				74500	Public Consultations and Hearings	600	2,500	2,500	3,000	8,600	
					Total Outcome 4	**68,850**	**105,250**	**77,750**	**43,750**	**295,600**	
OUTCOME 5: Improved capacity of entrepreneurs	**UNDP**	**62000**	**GEF**	71200	International Consultants	0	0	0	0	0	
				71300	Local Consultants	10,575	7,775	9,175	8,975	36,500	
				71600	Travel	1,250	1,250	1,250	1,250	5,000	
				74500	Public Consultations and Hearings	2,125	2,125	2,125	2,125	8,500	
					Total Outcome 5	**13,950**	**11,150**	**12,550**	**12,350**	**50,000**	
OUTCOME 6: MONITORING, LEARNING, EVALUATION	**PMU**	**62000**	**GEF**	71200	International Consultants	4,000	6,000	8,000	7,300	25,300	
				71300	Local Consultants	9,150	10,250	9,250	2,050	30,700	
				71600	Travel	2,250	2,250	2,250	2,250	9,000	
					Total Outcome 6	**15,400**	**18,500**	**19,500**	**11,600**	**65,000**	
PROJECT MANAGEMENT UNIT	**PMU**	**62000**	**GEF**	71300	Local Consultants	10,000	10,000	10,000	10,000	40,000	
				71600	Travel	3,000	3,000	3,000	3,000	12,000	
				72200	Equipment & Furniture	1,875	1,875	1,875	1,875	7,500	
				72500	Office Supplies	1,375	1,375	1,375	1,375	5,500	
					Total Management	**16,250**	**16,250**	**16,250**	**16,250**	**65,000**	
					PROJECT TOTAL	**156,695**	**217,659**	**187,359**	**134,735**	**696,448**	

Summary of Funds: [3]

GEF	In cash	**156,695**	**217,659**	**187,359**	**134,735**	**696,448**
TERI	In kind	29,000	43,500	43,500	29,000	**145,000**
Brick kiln units	Equity Contribution	370,800	556,200	556,200	370,800	**1,854,000**
TOTAL		**556,495**	**817,359**	**787,059**	**534,535**	**2,695,448**

[3] Summary table should include all financing of all kinds: GEF financing, cofinancing, cash, in-kind, etc. etc

5. INSTITUTIONAL COORDINATION AND SUPPORT

a) CORE COMMITMENTS AND LINKAGES

Various partners are committed to this project including brick kiln entrepreneurs, brick industry associations, technology/ machinery suppliers, financial institutions, builders, architects, etc.

Apart from this, SDC (Swiss Agency for Development and Cooperation), is working on the development of SMEs in India, including brick sector. TERI is working along with SDC for skill upgradation of workers, mainly firemen working in bull's trench kilns (BTKs). Capacity building of firemen in BTKs is one of the important components under the SDC supported programme. Apart from focusing on improved firing practices, the capacity building programme also creates awareness on production and usage of resource efficient products. The programme focuses on eastern Uttar Pradesh, whereas Varanasi is one of the chosen clusters under this MSP. It is also pertinent to mention that the majority of the brick firemen (estimated to be 150,000) in India hail from eastern Uttar Pradesh and work in BTKs in different parts of the country.

UNDP supported projects in the brick sector are on-going in neighboring countries like Vietnam and Bangladesh. The project in Vietnam focuses on VSBK (vertical shaft brick kiln) technology adoption and the project in Bangladesh focuses on introduction of improved firing technologies such as Hoffmann kilns. The proposed MSP in India focuses on technologies for production of resource–efficient bricks that can be fired in any type of kilns. The capacities of kilns considered for intervention varies between 30,000 to 50,000 bricks per day and BTK with fixed chimney type brick kilns are commonly used for this purpose. Once this project is up and running a direct linkage with other UNDP supported projects in neighboring countries will be established. Knowledge gained in other projects on production of resource-efficient bricks will be of immense value and exchange visits will be organized. There are ample opportunities to learn more about production of resource-efficient bricks and the adopted firing practices. Knowledge sharing in this area will be an added value for the project. The India project envisages meaningful south-south cooperation in this direction.

A change or transformation in the proposed brick clusters in India would have direct impact for replication in other brick clusters in India.

b) CONSULTATION, COORDINATION AND COLLABORATION BETWEEN IAS, AND IAS AND EXAS, IF APPROPRIATE.

N/A

c) PROJECT IMPLEMENTATION ARRANGEMENT

UNDP will be the Implementing Agency (IA). Ministry of Environment & Forests (MoEF) will be the Executing Agency (EA) for the project. A Project Facilitation Cell (PFC) will be established at the Energy and Resources Institute (TERI) and will have overall responsibility for the implementation of project activities. The activity schedule for various project components is given in annexure 5. TERI will coordinate and facilitate the project activities in all the five identified brick kiln clusters. A Steering Committee (SC) comprising of members from different institutions (Ministries, financial institutions, industry associations, bilateral agencies, TERI and others would help in providing guidance and directions for project implementation. A pool of 'technology experts' would help the Local Resource Centres (LRCs) and the Project Facilitation Cell (PFC) in developing cluster level technology packages and setting up of demonstration units.

The steering committee will provide inputs to the Project Facilitation Cell (PFC) and in turn PFC will coordinate each activity of the project at national, state and cluster level. Experts will be called to provide their inputs during formal interactions in meetings and workshops. Regular meetings will be held to review and coordinate the project activities and PFC will host these meetings at Delhi. PFC will also be responsible for documentation (MOUs, minutes of meeting and agreement etc of the project). These documents will be circulated to Steering committee members. Figure 4 generally represents the implementation structure however this may need modification in consultation with IA and EA as soon as project commences

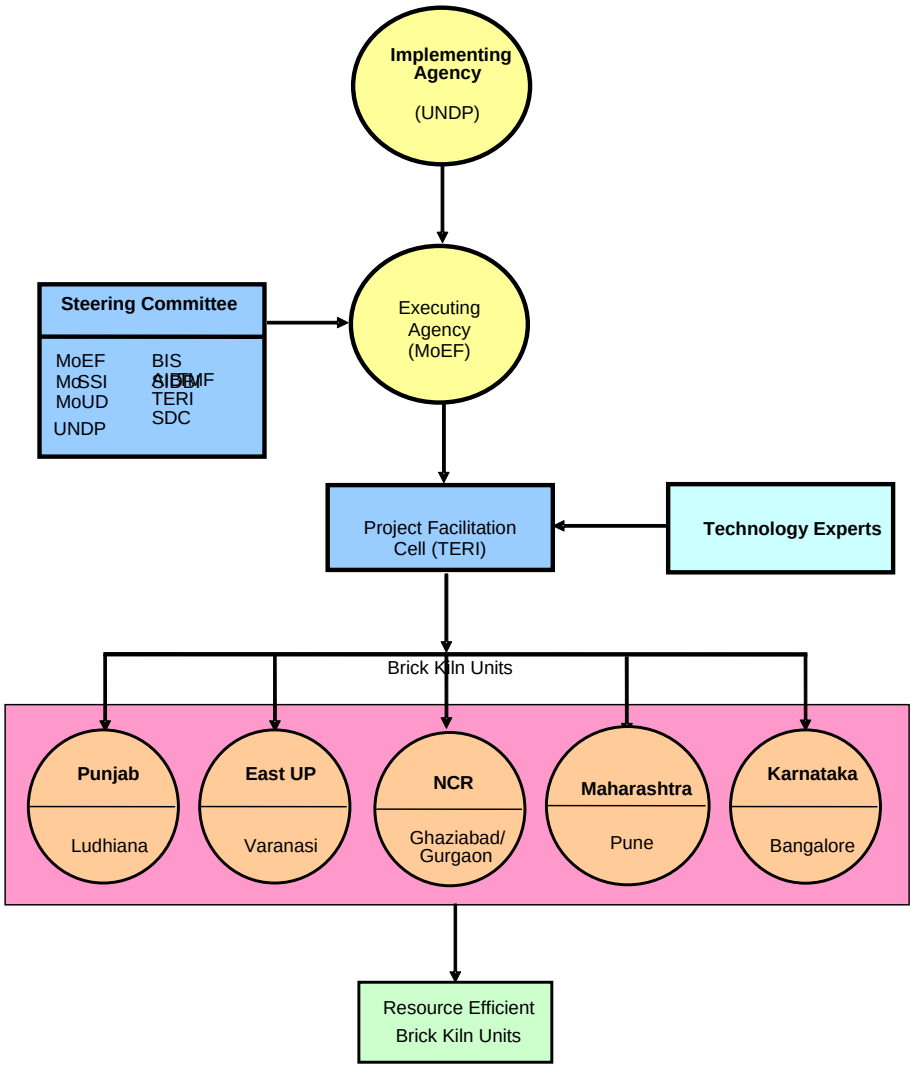

FIGURE 4. PROPOSED IMPLEMENTATION

Role of Project Facilitation Cell (PFC)

The EA will establish a Project Facilitation Cell (PFC) which will facilitate various activity components in the project. PFC will consist of a Project Coordinator (PC) and an assistant.

Role of Local Resource Centres (LRCs)

LRCs will play a key role in setting up of demonstration projects. They will be equipped with necessary instrumentation to carry out monitoring as well as training. LRCs will develop DPRs and assist in seeking loan from banks. LRCs will carry out, training programs, awareness generation activities and market promotion. LRCs would serve as "resource centres" for carrying forward dissemination activities. This would include providing technical support and trouble-shooting for new units.

Anchoring Local Resource Centres (LRCs) at cluster level and Project management

The Local Resource Centres (LRCs) will be established in the 5 (five) clusters identified for project implementation. It is proposed that these LRCs will be located in the local industry associations/ offices of SISI/ office of TERI. LRCs would hire services of resource persons on technology and marketing. LRCs are responsible for field level implementation and would interact extensively with various stakeholders at field level. The proposed Local Resource Centres (LRCs) are given below:

Cluster/ Region	*Proposed Local Resource Centre*
Ghaziabad/Gurgaon	TERI / AIBTMF
Ludhiana	PSCST / SISI- Ludhiana
Varanasi	Int Nirmata Parishad (INP) - Varanasi
Pune	Brick industry association / SISI - Mumbai
Bangalore	TERI / Karnataka Tile Manufacturers' Federation

Each LRC would be responsible for local coordination between individual brick kiln units, local industry associations, technology suppliers, technical experts, financial institutions, end-users and other relevant stakeholders. The LRC would provide feedback and report to the PFC. It is expected that LRCs will become knowledge hub for the brick industry in the individual cluster.

6. REQUIRED ATTACHMENTS

a) Report on the Use of Project Preparation Grant

PDF/PPG STATUS REPORT

GEFSEC PROJECT ID: 2844
UNDP PROJECT ID: PIMS 3465
COUNTRY: India
PROJECT TITLE: Energy Efficiency Improvements in the Indian Brick Industry
OTHER PROJECT EXECUTING AGENCY (IES): Ministry of Environment and Forests (MoEF)
GEF FOCAL AREA: Climate Change
GEF OPERATIONAL PROGRAM: OP-5 (Removal of barriers to energy efficiency and energy conservation)
STARTING DATE: July 2005
ESTIMATED DATE OF OPERATIONAL CLOSURE: MARCH 2007
ESTIMATED DATE OF FINANCIAL CLOSURE: JUNE 2007

Report submitted by:

Name	Title	Date
Monali Ranade	UNDP Environment Focal Point	15 March 2007

PART I - PREPARATORY ASSISTANCE ACHIEVEMENTS

A- SUMMARY OF ACTUAL ACHIEVEMENTS OF PREPARATORY PHASE (OUTPUTS AND OUTCOMES), AND EXPLANATION OF ANY DEVIATIONS FROM EXPECTED OUTCOMES

- Five major brick producing clusters have been identified for demonstration of technologies for production of resource efficient bricks
- Organized stakeholder workshop with participation by various stakeholders such as brick kiln entrepreneurs, brick industry associations, technology suppliers, financial institutions & banks and policy makers) to incorporate their feedback in the project brief
- Interactions with technology suppliers initiated that helped in developing detailed project profiles for identified brick kiln clusters (Delhi, Bangalore, Pune, Punjab and Varanasi).
- Intensive interaction had resulted in letter of cooperation from individual brick kiln entrepreneurs from the identified clusters for adopting technology changes in their units.
- Letter of cooperation from brick industry associations at national and cluster levels were also obtained
- SIDBI (Small Industries Development Bank of India) and Corporation Bank has given letter of cooperation for providing support in the form of loan to individual brick kiln units.
- Project brief on "Energy Efficiency Improvements in the Indian Brick Industry" has been endorsed by Ministry of Environment and Forest (MoEF), Government of India during September 2006.
-

Table 1: Completion status of Project Activities

Approved			Actuals			
Proposed Activities at Approval	GEF Financing	Co-financing	Status of activities	GEF financing committed	Co-financing committed	Uncommitted GEF funds
Preparation of PDF-A document	US $ 25,000	US $ 3,000	Completed	US$ 25,000	US$ 3000	

B – RECORD OF STAKEHOLDER INVOLVEMENT IN PROJECT PREPARATION

- **Brick industry association**
  Detailed discussions with industry association at National and regional level has helped in identification of five major brick kiln clusters and individual brick kiln entrepreneurs.

- **Brick kiln entrepreneurs**
  Letter of cooperation received from individual brick kiln entrepreneurs in five clusters interested in adoption of technologies that will help in production of resource efficient bricks.

- **Financial institutions**
  There is very limited access to brick kiln entrepreneurs to avail loan facility from different financial institutions for their business. Detailed discussions were carried out with lead banks/ financial institutions and this has helped in obtaining letter of cooperation from different banks. The senior bank officials participated in stakeholder's workshop and expressed their interest in the project.

- **Technology suppliers**
  Discussions were carried out with machinery suppliers on suitability of their machinery for different clusters and based on their inputs the detailed project profile of different clusters were prepared

PART II - PREPARATORY ASSISTANCE financial delivery

TABLE 2 – PDF/PPG INPUT BUDGET – APPROVALS AND COMMITMENTS

*Input Description**	*Approved*			*Committed*		
	Staff weeks	*GEF financing*	*Co-finance*	*Staff weeks*	*GEF financing*	*Co-finance*
Personnel						
Local consultants		8,000			10,990	
International consultants		-				
Training		12,000			10,638	
Office Equipment						
Travel					2,708	
Miscellaneous (Workshop + Report Preparation)		5,000	3,000		836.5	3000
Total	24	25,000	3,000	24	25,000	3,000

Additional information as relevant :

- Indicate PDF/PPG delivery rate (funds disbursed at time of operational closure as percentage of total GEF allocation) – 100%
- Indicate whether it is expected that there will be unspent PDF/PPG funds at the time if financial closure – No
- Provide justification for major deviations of actual disbursement from what was planned – No major deviations

TABLE 3: ACTUAL PDF/PPG CO-FINANCING

Co-financing Sources for Preparatory Assistance				
Name of Co-financier (source)	Classification	Type	Amount	
			Expected ($)	Actual ($)
TERI	NGO	In kind	3000	3000
Total co-financing			3000	3000

Additional information as relevant:

- Provide explanation for major deviations from what was planned - None

Country Endorsement Letter (RAF endorsement letter if BD or CC project)

The letters dated 18 September 2006 and 13 November 2006 confirm re-endorsement of this project and acceptance into the 2007 pipeline.

To: **Ms. Monique Barbut**
CEO, Global Environment Facility

भारत सरकार
पर्यावरण एवं वन मंत्रालय
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT & FORESTS

F. No. 4(1)/16/2006 – IC &SD.I
Dated: 18th September 2006

Re: Endorsement Letter for 'Energy Efficiency Improvements in the Brick Industry'

On behalf of the Government of India, and in my capacity as GEF Operational Focal Point, I hereby re-endorse the project titled 'Energy Efficiency Improvements in the Brick Industry' to be proposed through the United Nations Development Program (UNDP) to the Global Environment Facility (GEF) for funding under GEF 4.

The Government of India confirms that the project addresses national climate change priorities, and we hereby agree to allocate USD 0.697 million of the GEF climate change funds available to India through the GEF Resource Allocation Framework to this project.

Yours sincerely,

(SUDHIR MITAL)
Joint Secretary
and, GEF Operational Focal Point India
Ministry of Environment and Forests
Government of India

Cc: **Mr. Rajeev P Singh,** Director, DEA, North Block, New Delhi
Dr. Maxine Olson, Resident Representative, UNDP Co, 55 Lodhi Estates, New Delhi
Mr. Marcel Alers, Climate Change Manager, UNDP/GEF, New York

Confirmed letters of commitments from co-financiers (with English translations)

Web www.teriin.org

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N Vasudevan
Fellow

March 15, 2007

Ms Seeta Giri,
Team Leader,
Sustainable Environment and Energy Division,
UNDP
55, Lodhi Road,
New Delhi – 110 003

Sub: **MSP on "Energy efficiency improvements in the Indian brick industry"**

Dear Ms Giri,

This has reference to the MSP prepared by TERI on the "Energy efficiency improvements in the Indian brick Industry". We would like to clarify the following on the MSP submitted by us.

(1) Co-financing by TERI in kind
TERI would provide office facilities such as provision of workplace, computer and other office equipment in its New Delhi and Bangalore offices (in two of the identified clusters) during the project implementation period (four years). This is approximately US$ 145,000 for four years (US$ 36,250 per year).

(2) Equity contribution from brick kiln units
During the PDF-A preparation phase, the project interacted extensively with both individual brick kiln entrepreneurs & industry associations in all the five identified brick kiln clusters as well as with technology/ machinery suppliers to assess the investment requirements for adopting technologies suitable for respective cluster. Based on these inputs, detailed project reports were prepared for all five clusters separately (refer annexure 4 of the MSP submitted to UNDP). The estimated project costs involve land, site development, plant & machinery, margin money on working capital, contingencies, etc. Bank provides about 70% of total project costs (excluding land costs) and the rest 30% is borne by the brick kiln entrepreneurs (which also includes land costs).

The project has identified prospective and forward looking entrepreneurs for taking up this initiative. Project will be providing support for preparation of project reports and other related documents to approach banks for funding. The Project, through the proposed five LRCs (Local Resource Centres) would provide technical support in project implementation. It is also proposed in the MSP to provide support that would help in enhancing the market for the resource efficient bricks. These soft supports, which do not exist at present have encouraged the forward looking entrepreneurs to provide the letter of cooperation to take up the projects in their units. The total equity contribution from the brick kiln entrepreneurs in the project will be US$ 1,854,000.

The project will help all twelve brick kiln entrepreneurs in preparing various documents required by the banks that would help them in getting loans from banks. The total equity from banks amounts to US$ 4,327,000.

With regards,

Yours sincerely,

N Vasudevan

Agency Notification on Major Amendment and provide details of the amendment, if applicable.

N/A

PART III - RESPONSE TO PROJECT REVIEWS

a) Convention Secretariat comments and IA/ExA response
b) STAP expert review and IA/ExA response (if requested)

c) GEF Secretariat and other Agencies' comments and IA/ExA response

Annexure 1

Summary of stakeholder consultation workshop

The stakeholder consultation workshop was held on March 21, 2006 as two sessions. The forenoon session focused on project activities and the afternoon session focused on project profile requirements at cluster level and role of local resource centres. The Workshop was attended by representatives of various Stake-holders groups.

a. Individual brick manufacturers from the 5 selected clusters and representatives of the brick manufacturers associations
b. Senior officials from the two relevant government ministries i.e. Ministry of Environmental & Forests (MoEF) and Ministry of Small Scale Industries (MoSSI)
c. Officials from financial institutions e.g. Housing and Urban Development Corporation Ltd. (HUDCO), SIDBI and Corporation bank
d. Technology and service providers
e .Potential donor organizations e.g. Swiss Agency for Development & Cooperation (SDC)
f. End-users of building materials e.g. architects and builders

A. Project activities (Forenoon session)

Dr Sameer Maithel, TERI welcomed the guests and the participants for the workshop. He elucidated the objective of the workshop and role and importance of each stake holder with focus on government support and co-financing.

Mr. S K Joshi (IAS), Jt. Secretary, MoEF stressed on the importance of brick sector in Indian economy – high growth rates, high energy consumption and high pollution, which need to be addressed by the industry. He also suggested TERI to come out with a definite timeframe for the project activities

Mr. Pravir Kumar (IAS), Jt Secretary, MoSSI told that the industry must avail various benefits provided by the government schemes which help in cluster development (subsidies under Credit Link Capital Subsidy Scheme (CLCSS)) and international opportunities (carbon trading) while attempting technology modernization.

Ms Monali Ranade, UNDP conveyed the UNDP's support for the project.

Important points discussed during the workshop

(1) Address issues of fly ash utilisation
One of the important suggestions made that the project should address the issue of use of fly ash in brick production in the proposed project. Lack of awareness and

risk averse mindset of the brick entrepreneurs along with some technical problems seems to be the main barriers which need to be addressed

(2) Industry status for the brick sector
Brick sector must adopt methods and clean technologies which would lead to improvements in quality and fulfillment of need of good quality construction material market. While the brick sector must strive for these improvements, government must provide industrial status, accessibility to easy term loan etc for the brick sector.

(3) Development of sustained market for new products
The project must focus on enabling environment which would help in enhancing the market for new resource efficient brick products. Proactive role of governments (e.g. preference for use of the new products in government projects) would build confidence among end-users and enhance market for new resource efficient brick products. Government can also consider some fiscal incentives, tax benefits (e.g. lowering of sales tax) for promotion of these products.

(4) Demonstration of techno-economic viability of new technology
The demonstration of technology along with economical viable alternative brick product will ensure long term sustainability. Brick kiln owners are generally followers, demonstrations would help in proving technical and economic viability of new efforts.

(5) Training needs
It was felt by stake holders that the component of training and capacity building will be crucial for the success of the project and it will contribute to the overall development of the brick sector . Therefore, the project must focus on training of various stakeholders in the industry, which would help in improving the overall performance of the brick sector. Technology modernization would also focus on providing training to the new set of people to handle machineries and extruded bricks.

(6) Access to finance
The role of co financing in the project cannot over emphasized. The past record on financing brick sector is not very encouraging. However, with new forward-looking entrepreneurs and recent development in brick sector, financial institutions are willing to support. Mr. Ramesh Dharmaji GM, SIDBI shown his willing ness to consider loan assistance to viable projects.

(7) Other issues
- ‘Promotion’ in place of ‘regulation’ would help in greater adoption of technologies for production of new brick products. Setting up of ‘Technology Promotion Boards’ would help in technology replications.
- Explore possibilities of insurance coverage
- Promotion of light weight bricks in RCC structures is more relevant as bricks will be used as a filler material and not as load bearing material.

- Certain focus on R&D must also be undertaken which would be beneficial for the brick sector

Conclusions
Mr. Pravir Kumar, Jt Secretary (MoSSI) summed up the discussion. The industry and the project must work towards a common goal leading to improvements in energy efficiency, reduction in pollution and financial viability of the industry. Demonstration projects would help in seeding the efforts in different regions. Government can play a big role through promotion of the new brick products for use in various construction activities undertaken by the government which would enhance confidence among end-users.

Establishment of 'testing facilities' for brick industries in different regions would help in promoting the new brick products. The project must follow 'institutional approach/ framework' in which the brick industry associations must play a lead role. Availability of 'think tank' would help in discussing various issues related to brick industry and may eventually lead to a national level program for modernization of the brick sector. MoSSI would provide required support for the program.

Mr S K Joshi, Jt Secretary (MoEF) reiterated the need for new and relevant technologies and products in the Indian brick sector to meet the growing demands. 'Brick and tile resource centers' must be established for ready access to information (e.g. catalogues) and technology. The market must also grow to provide significant share for the new brick products. Individual brick kiln owners should undertake 'resource audit' of their units in assessing the status and requirements. The project must frame appropriate 'selection criteria' for identification of entrepreneurs in seeding the technologies. The project must also attempt and dovetail various government schemes and grants for the betterment of the brick sector and help develop a national program.

Dr Sameer Maithel (TERI) concluded that based on the inputs provided during the workshop, TERI will finalise the project document with in one month. It would also develop a brief document on brick sector which would contain technology mapping and technology providers and submit to MoEF which would be the first step towards formulation of a national program on brick sector.

B. Discussions on project profiles and role of local resource centres (Afternoon session)

The afternoon session was devoted to project viability specially on technology, products, finance and market development for north and south India covering all the five clusters. Brick kiln entrepreneurs and end-users such as architect and structural engineer provided suggestions and inputs on the proposed project initiatives. The stakeholders also provided inputs on the role of local resource centres proposed for various clusters of project implementation.

1.0 Technology configuration

The project presented the project profiles prepared in consultation with brick kiln entrepreneurs in various clusters to obtain inputs on acceptance of the project profile, changes to be incorporated and replication potential and issues to be addressed (e.g. fly ash). The executing agency will demonstrate projects, which have least chances for failure. The groups discussed about the type of project, issues to be addressed, production capacity and other technical parameters. Salient points emerged out of discussion are as under:

Out of 5 regions chosen for demonstration, the project will have brown-field projects (modification of existing facilities) in NCR, Ludhiana and Varanasi. The demonstration projects at Pune and Bangalore will be of green-field type

About 25% of total production from these units will be of alternate bricks (e.g. perforated bricks).

The project will also test clay for share of usage of fly ash in brick making.

Project must consider use of 'rollers' for handling coarse particles

Use of 14" mould in extruder would help in production of about 20,000 perforated bricks per day.

Incorporation of machineries will increase the cost of production and would require assistance from the project for market acceptance for the new products

Certain investments such as 'dumpers' may be outsourced' (on contract basis)

Project must be open for use of artificial drying systems (e.g. tunnel dryer, chamber dryer)

2.0 Local resource centres

Important features of the LRC must include the following:

2.1 Test facilities

LRCs must have test facilities which would help in overall quality control of the brick industry. The lab must include test facilities for coal, soil and strength of fired bricks. Int Nirmata Parishad (INP)-Varanasi which has significant experiences with testing laboratory which was established with TERI's assistance also reiterated the need for such test facilities at regional levels.

2.2 Access to technical literature

Technical literatures on brick kilns are generally not available. It was proposed that LRC would compile such technical literature, both old and new, on brick industry which can be referred.

2.3 Availability of monitoring instruments

Availability of portable instruments for monitoring of energy and environmental parameters would help the industry in monitoring their performance.

2.4 Training and awareness requirements

Regular training programs and awareness workshops must be conducted to improve the understanding of brick kiln entrepreneurs on energy conservation, environmental improvements and technology upgradation possibilities in their units. Local government nodal agencies such as SISI may provide help in the training programs.

2.5 Information dissemination
Regular newsletter/ magazine which updates on various cluster interventions and availability of resource efficient bricks would help in out reach.

Agenda for the Stakeholder Consultation Workshop –
Energy efficiency improvements in the Indian brick industry

Venue: TERI, Darbari Seth Block, India Habitat Centre, Lodi Road New Delhi

Location: Seminar Hall (Ground Floor)

Date : March 21, 2006 (Tuesday)

Agenda:

10:30 AM – 11:00 AM	Registration and Tea	
11:00 AM – 11:10 AM	Welcome Address	Dr Sameer Maithel, Director, TERI
11:10 AM – 11:20 AM	Special Address	Mr. Ramesh Dharmaji, GM, SIDBI
11:20 AM – 11:30AM	Special Address	Mr. Pravir Kumar, IAS Jt Secretary, MoSSI
11:30AM – 11:40 AM	Inaugural address	Mr S K Joshi, IAS Jt Secretary, MoEF
11:40 AM – 11:45 AM	Country Program	UNDP
11:45 AM – 12:10 PM	Presentation on the project proposal	Mr N Vasudevan, Fellow, TERI
12:10 PM – 01:20 PM	Interaction with stakeholders	Chaired by: Mr S.K. Joshi, IAS, Jt Secretary, MoEF
01:20 PM – 01:30 PM	Summing up	Dr Sameer Maithel, Director, TERI
01: 30 PM – 02:30 PM	Lunch	
02: 30 PM – 04:30 PM	Stakeholder discussions *Steered by:* Mr Rakesh Johri, Fellow, TERI & Mr Anand Damle, CMD, DCS(P) Ltd. Pune	Participants Brick kiln entrepreneurs End-users *(Builders and Architects)* Machinery suppliers Project partners

Participants

UNDP

S.No	Name	Designation	Address
1	Ms. Monali Ranade	Consultant	55, Lodhi Estate, New Delhi
2	Mr. Anil Misra	Consultant	55, Lodhi Estate, New Delhi

SDC

S.No.	Name	Designation	Address
1	Dr. Veena Joshi	Focus - in - charge, Rural Energy and Housing	Swiss Agency for Development and Cooperation, Embassy of Switzerland, Chandragupta Marg, Chanakyapuri, New Delhi - 110 021

Ministries, Government departments and undertakings

S.No	Name	Designation	Address
1	Mr. S.K. Joshi, IAS	Joint Secretary	Ministry of Environment and Forest, Paryavaran Bhawan, CGO Complex, New Delhi – 110 003
2	Mr. Pravir Kumar, IAS	Joint Secretary	Ministry of Small Scale Industry, Udyog Bhawan, Rafi Marg, New Delhi – 110 011
5	Mr. T. Venugopal	Director	Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, New Delhi
6	Mr. D P Singh	Director	Development Commisiioner (Small Scale Industries)'A' Wing, Nirman Bhawan,Maulana Azad Road, New Delhi
8	Mr. Satish Sabharwal	Senior Economist	Bureau of Energy Efficiency, Hall No. IV, 2nd floor, NBCC Tower 15, Bhikaji Gama Place,New Delhi – 110 066
9	Mr. V.K. Mathur	Deputy General Manager	Ash Utilisation division,NTPC Limited, R&D building, Sector – 24, Noida (UP) – 201 301
10	Mr. N.K. singh	Deputy Director	Office of the Development Commisiioner,7th Floor, 'A'Wing, Nirman Bhawan, New Delhi – 110 011
11	Mr. Surinder Gera	Deputy Chief	HUDCO, India Habitat Centre, Lodhi Road, New Delhi – 110 003
13	Mr. Jitender Singh	AAO (BT)	HUDCO, India Habitat Centre, Lodhi Road, New Delhi – 110 003
14	Mr. B Senthil Kumar	Project Engineer	Bureau of Energy Efficiency, Hall No. IV, 2nd Floor,, NBCC Tower 15, Bhikaji Gama Place, New Delhi – 110 066

Financial institutions

S.No	Name	Designation	Address
1	Mr. Ramesh Dharmaji	General Manager	SIDBI, Videocon Tower, Ground Floor, E-1, Rani Jhansi Road, Jhandewalan Extension, New Delhi – 110 055
2	Mr. S. Ramachandran	Chief Manager	Corporation bank, Chandigarh

Machinery manufacturers/ suppliers

S.No	Name	Address
1	Mr. K.K. Vijayan	Vijayprakash Industrials, NH -17, Near Sarada Mandiram, P.O. Kolathara, Calicut- 673 655
2	Mr. Deepak Dawar	Hydraform (India) Pvt. Ltd., 318, Kirti Shikhar, 11 Janak Palace, Janakpuri, Distt. Centre, New Delhi - 110 058
3	Mr. Sandeep Dave	Neptune, 297, G.I.D.C., Industrial estate, Phase - II, Dediasan, Mehsana - 384 004 (Gujarat)

Architects

S.No	Name	Address
1	Mr. R.K. Ramesh	Corporation Offfice Road, Calicut - 673 032
2	Mr. Hari Om Gupta	New Delhi
3	Mr. Kirti Arora	New Delhi

Brick kiln associations

S.No	Name	Designation	Address
1	Mr. R.S. Chandel	President	AIBTMF, India Habitat Centre, New Delhi - 110 003
2	Mr. K.K. Pandey	President	Int Nirmata Parishad, Varanasi
3	Mr. V.S. Shanmugam	President	Karnataka Tile Manufacturing federation

Brick Kiln Entrepreneurs		
S.No.	**Name**	**Address**
1	Mr. Jitendra Pareek	D-15 &16, Site- B, UPSIDC, Surajpur Industrial area, Greater Noida - 203 207 (UP)
2	Mr. O.P. Badlani	F-2 (1), Ananta Colony, Nadesar, Varanasi - 221 002
3	Mr. Babu Appat	Vijayprakash Industrials, NH -17, Near Sarada Mandiram, P.O. Kolathara, Calicut- 673 655
4	Mr. Brij Mohan Gupta	B-38 (Ist Floor), Friends Colony West, New Delhi - 65
5	Mr. R K Tewatia	SC-21,Shastri Nagar, Ghaziabad - 202 001
6	Mr. Sanjay Dadoo	A-506, Priyadarshni Apartments, I.P. Extension, Delhi - 110 092
8	Mr. Prasanna Kumar	Bangalore (Karnataka)
9	Mr. Sahil Sood/J Sood	Ludhiana (Punjab)
10	Mr. Gurcharan Singh	Patiala (Punjab)
11	Mr. Indrapal Rana	Patiala (Punjab)
13	Mr. Vimal Jindal	Jhajjar (Haryana)
14	Mr. S. P. Jindal	Jhajjar (Haryana)
15	Mr. Narinde Sandhu	Gurdaspur (Punjab)
16	Mr. Rajinder Singh	Jhajjar (Haryana) & Kolkata
17	Mr. Surinder Singh	Jhajjar (Haryana)

Others

S.No.	Name	Designation	Address
1	Mr. Krunal Negandhi	HOD (Environment)	Lavasa Corporation Limited, Hincon House, Lal Bahadur Shastri Marg, Vikhroli (West), Mumbai - 400 083
2	Mr. Lalit Singhania	Editor	Paryavaran Urja Times
3	Mr. Abhinav Ganju	Editor	Paryavaran Urja Times

Project partners

S.No.	Name	Designation	Address
1	Mr. Anand Damle	Chairman and Managing Director	Damle Clay Structurals (P) Ltd., Anant Plot No. 98, Lane 5 Natraj society, Karvenagar Pune - 411 052
2	Mr. M.S. Jaggi	Additional Director	PSCST, MGSIPA Complex, Near Sacred Heart School, Sector -26, Chandigarh - 160 019
3	Mr. Anil Kumar	Chief Operating Officer	BTECON, New Delhi, S-9, A, 3rd floor, School Block, Shakarpur, Delhi - 92
4	Mr. Abhay Srivastava	Research Asstt.	BTECON, New Delhi, S-9, A, 3rd floor, School Block, Shakarpur, Delhi - 92
5	Mr. P P S Gusain		BTECON, New Delhi, S-9, A, 3rd floor, School Block, Shakarpur, Delhi - 92

Annexure 4(1)
Project profile - Delhi brick cluster

1.0 Specifications for Perforated Bricks
Major quality requirements as per IS : 2222 – 1991 titled "Specification for Burnt Clay Perforated Building Bricks (Fourth Revision)" are given below.

1.1 General Quality
Bricks shall be made from suitable clay and shall be thoroughly burnt at the maturing temperature of the clay. They shall be free from cracks, flaws and nodules of free lime. They shall have rectangular faces with sharp straight edges at right angles. They shall be of uniform colour and texture.

1.2 Dimensions and Tolerances

Dimensions	'Modular' bricks	'Non-Modular' bricks
Length (mm)	190 (± 7)	230 (± 10)
Width (mm)	90 (± 4)	110 (± 7)
Height (mm)	90 (± 4)	70 (± 4)

1.3 Perforations
The area of perforation shall be between 30 per cent and 45 per cent of the total area of the corresponding face of the bricks. The perforations shall be uniformly distributed over the surface. In case of rectangular perforations, the larger dimension shall be parallel to the longer side of the brick. and the shorter dimension shall be less than 20 mm. In case of circular perforations, their diameter shall not exceed 25 mm. The area of each perforation shall not exceed 500 mm^2.

1.4 Physical requirements:

a) Compressive strength:
Bricks when tested in accordance with the procedure laid down in IS : 3495 (Parts – 1 to 4) – 1991 shall have a minimum average compressive strength of 7 N/mm^2 on net area.

b) Water absorption:
Water absorption of bricks when tested in accordance with the procedure laid down in IS : 3495 (Parts – 1 to 4) –1991, after immersion in cold water for 24 hours, shall not be more than 20 per cent by weight.

c) Efflorescence:
The rating of efflorescence for bricks when tested in accordance with the procedure laid down in IS : 3495 (Part – 1 to 4) – 1991 shall not be more than 'slight'.

d) Warpage :
The average warpage of bricks when tested in accordance with the procedure laid down in IS : 3495 (Part – 1 to 4) – 1991 shall not exceed 3 per cent.

2.0 Plant capacity :

Basis:
30-week seasonal operation (during November to June) for Hand- moulded as well as Extruded bricks fired in FCBTK; 6 shaping days / week ; 7 firing days / week; 5 % handling and other loss in green bricks and 5 % in fired bricks.

Particulars	Quantity
Raw bricks produced / year (Extruded)	18.00 lakh
Raw bricks produced / year (Hand-moulded)	51.75 lakh
Saleable bricks produced / year (Extruded)	16.25 lakh
Saleable bricks produced / year (Hand-moulded)	46.75 lakh

3.0 Plant & machinery cost
20 M long Belt Conveyor (2 x 2HP motor); Double Shaft Clay Mixer (Open type 10' long size, 10 HP motor); Differential Speed Rollers (600 x 500 mm size, 30 HP motor); De-airing Pugmill (14" dia barrel,30 HP); Vacuum Pump (5 HP motor); Manually operated Cutting Table (10 Bricks at a time); Wheel Barrows (5 nos.); Electric Motors; 100 KVA Diesel generating set; Taxes / Duties / Transport Expenses; Machinery Foundations; Electrification; Erection Expenses; Tools & Tackle, Spares; Process Know-how

4.0 Brief description of manufacturing process to be adopted
Plastic clay (or 'sticky' clay) and lean clay (silt) form the major components of the raw-mix. They are mixed together in such a proportion that the resultant raw-mix attains 'moderate' plasticity. Materials like fly ash, grog (burnt powdery material from kiln), etc. are used as 'additives' to open-up the raw-mix and improve its burnability. Clay (both plastic and lean) is procured during 6 to 8 months of a year only and alternate layers of plastic and lean clays are put one above the other inside the Weathering Tank. The raw-mix is then kept soaked in water for at least 7 days of 'weathering'. Weathering improves homogeneity and plasticity of the mix by continuous action of water, sunlight and wind.

Shaping:
The weathered raw-mix is then temporarily stocked on the RCC Platform built inside the Weathering Tank and fed manually through the Hopper at a steady rate. The mix falls onto the Belt Conveyor fitted below the Hopper and is carried to Double Shaft Clay Mixer, where it mixed properly with water. The mix falls onto the Belt Conveyor fitted below the Clay Mixer and is carried to single set of Differential Speed Rollers, where it gets crushed below 2 mm.

The raw-mix then falls on to the De-airing Pugmill system and finally gets extruded horizontally through the die in the form of a continuous clay column. In De-airing Pugmill system, the raw-mix gets re-mixed and de-aired (i.e. excess moisture and

entrapped air is sucked out with the help of the Vacuum Pump). If perforated / slitted bricks are desired, the De-airing Pugmill die is fitted with 'pins' from inside, which cause continuous conduits of the desired cross section in the clay column. The clay column is then cut into individual bricks by using Hand operated Cutting Table. After cutting 10 bricks in one stroke, the bricks are kept on a m.s. pallet. 5 pallets are loaded on the Wheel Barrow at a time and taken to the Drying Shed for setting on the drying floor.

Drying:
Freshly extruded bricks are manually unloaded from each pallet one by one and set on edges on the drying floor in 3-4 layers, leaving a gap of about 1" between adjacent bricks. Extreme care is exercised during this operation so that the edges and surfaces of freshly extruded bricks are not damaged. Bricks dry in this position for about 4 to 5 days till they achieve 'leather hard' condition (i.e. their moisture content is reduced from 25 per cent to about 18 per cent). They are then stacked flat outside the Drying Shed one above the other as close as possible in 10 to 12 courses till they reach 'bone–dry' condition (i.e. till their moisture content is reduced to about 6 per cent). This final drying in the open takes about 3 to 4 days.

Firing:
Dried bricks are manually removed from the stacks and transported to the floor of the Fixed Chimney Bull's Trench Kiln (FCBTK). FCBTK is a continuous kiln working on natural draught created by its fixed chimney. 'B' or 'C' grade steam coal is used as fuel in the kiln. About 5 per cent breakages / rejects are expected.

Dried bricks are set manually in the FCBTK with trace holes, fuel shafts, flues, etc. kept in accordance with standard practice. The fuel is fed through feed holes provided in the kiln-top. The firing temperature ranges between 1000^0 and 1050^0 C. Fully fired and cooled bricks are manually unloaded, carried to the Open Brick Yard and graded. They are then loaded in trucks and dispatched.

5.0 Estimated project cost:

Sr.No.	Particulars	**Amount (Rs. in lakhs)**
A	Land (5 acres) *already existing*	30.00
B	Site development (leveling, fencing, gate, internal roads, bore- well, storm water drains, etc.)	04.00
C	Civil work - Weathering tank, loading platform with hopper, machinery shed, drying shed, water storage tank, office with toilet, labour hutments, etc.	19.50
D	Erected plant & machinery, Fixed chimney Bull's trench kiln with accessories	43.50
E	Miscellaneous fixed assets (office furniture & fixtures, etc.)	01.00

Sr.No.	Particulars	Amount (Rs. in lakhs)
F	Preliminary & Pre-operative Expenses (loan application processing fees, other legal expenses, raw material testing and travelling expenses, interest on term loan during construction period, mortgage expenses, personnel training and start-up expenses, etc.)	04.50
g	Contingencies (2 % of cost of site development, civil work, P & M and miscellaneous assets)	01.10
H	Margin money on working capital	07.00
	Total	**110.60**
	Additional investment to existing **Infrastructure**	**80.60**

6.0 Means of finance:

Sr. No.	Particulars	Amount (Rs. In Lakhs)
1	Term loan from Bank (Average 70 % of cost of site development, civil work, erected P&M and contingencies)	47.67
2	Promoter's capital (Project cost - Term loan)	32.93
	Total	**80.60**

7.0 Cost of production at 100% capacity utilisation :

Sr. No.	Particulars	Amount (Rs. / 1,000 bricks)
1.	Raw material (Clay)	175
2.	Consumables	10
3.	Steam coal 135 kg / 1000 bricks @ Rs. 4,500/- MT	608
4.	Diesel and Lube oil	350
5.	Direct labour for green brick production.	200
6.	Stacking charges inside shed	15
7.	Stacking charges outside shed for sun drying	40
8.	Transportation charges for green bricks to kiln	50
10.	Stacking charges in side kiln	10
11	Firing charges	20
11	Ash filling charges	7
12.	Unloading charges	45
13.	Electricity charges for lighting and pumping	15

Sr. No.	Particulars	Amount (Rs. / 1,000 bricks)
14.	Administrative overheads (salaries of Supervisor, Mechanic, Operators, Accountant, Watchman etc.)	60
16.	Repairs & maintenance (@ 1 % of site development + civil work and 2 % of erected plant and machinery cost)	54
17.	Taxes, duties and other miscellaneous expenses	10
16.	Interest - @ 12 % on term loan @ 12 % on working capital loan	 92 14
17.	Depreciation (by straight line method)	85
	Total	**1860**

8.0 Financial indicators at 100 % capacity utilisation :

Sr. No.	Particulars	
1.	Annual Turnover (assuming ex-kiln selling price of Rs. 1700/- per 1000 nos .for hand- moulded bricks and Rs.2200/- per 1000 nos. for extruded bricks)	Rs. 115.20 lakhs
2.	Break-Even Point (BEP) - Including depreciation - Excluding depreciation	 54% 39%
3.	Return on Investment (earnings before term loan interest, depreciation and tax divided by project cost)	27%

Annexure 4(2)
Project profile - Ludhiana brick cluster

1.0 Specifications for perforated bricks
Major quality requirements as per IS : 2222 – 1991 titled "Specification for Burnt Clay Perforated Building Bricks (Fourth Revision)" are given below.

1.1 General quality
Bricks shall be made from suitable clay and shall be thoroughly burnt at the maturing temperature of the clay. They shall be free from cracks, flaws and nodules of free lime. They shall have rectangular faces with sharp straight edges at right angles. They shall be of uniform colour and texture.

1.2 Dimensions and tolerances

Dimensions	'Modular' bricks	'Non-Modular' bricks
Length (mm)	190 (± 7)	230 (± 10)
Width (mm)	90 (± 4)	110 (± 7)
Height (mm)	90 (± 4)	70 (± 4)

1.3 Perforations
The area of perforation shall be between 30 per cent and 45 per cent of the total area of the corresponding face of the bricks. The perforations shall be uniformly distributed over the surface. In case of rectangular perforations, the larger dimension shall be parallel to the longer side of the brick. and the shorter dimension shall be less than 20 mm. In case of circular perforations, their diameter shall not exceed 25 mm. The area of each perforation shall not exceed 500 mm^2.

1.4 Physical requirements
a) Compressive strength
Bricks when tested in accordance with the procedure laid down in IS : 3495 (Parts – 1 to 4) – 1991 shall have a minimum average compressive strength of 7 N/mm^2 on net area.

b) Water absorption
Water absorption of bricks when tested in accordance with the procedure laid down in IS : 3495 (Parts – 1 to 4) –1991, after immersion in cold water for 24 hours, shall not be more than 20 per cent by weight.

c) Efflorescence
The rating of efflorescence for bricks when tested in accordance with the procedure laid down in IS : 3495 (Part – 1 to 4) – 1991 shall not be more than 'slight'.

d) Warpage
The average warpage of bricks when tested in accordance with the procedure laid down in IS : 3495 (Part – 1 to 4) – 1991 shall not exceed 3 per cent.

2.0 Plant capacity

Basis
30-week seasonal operation (during November to June) for Hand- moulded as well as Extruded bricks fired in FCBTK; 6 shaping days / week ; 7 firing days / week; 5 % handling and other loss in green bricks and 5 % in fired bricks

Particulars	*Quantity*
Raw bricks produced / year (Extruded)	36.00 lakh
Raw bricks produced / year (Hand-moulded)	54.00 lakh
Saleable bricks produced / year (Extruded)	32.50 lakh
Saleable bricks produced / year (Hand-moulded)	48.74 lakh

3.0 Cost of plant & machinery

30 M long Belt Conveyor (3 x 3HP motor); Double Shaft Clay Mixer (3' X 1.5' size, 20 HP motor); Differential Speed Rollers (600 x 500 mm size, 30 HP motor); De-airing Pugmill (14" dia barrel,40 HP); Vacuum Pump (5 HP motor); Semi-Automatic Cutting Table (10 Bricks at a time); Wheel Barrows (5 nos.); Electric Motors; 125 KVA Diesel generating set; Taxes / Duties / Transport Expenses; Machinery Foundations; Electrification; Erection Expenses; Tools & Tackle, Spares; Process Know-how

4.0 Brief description of manufacturing process to be adopted

Plastic clay (or 'sticky' clay) and lean clay (silt) form the major components of the raw-mix. They are mixed together in such a proportion that the resultant raw-mix attains 'moderate' plasticity. Materials like fly ash, grog (burnt powdery material from kiln), etc. are used as 'additives' to open-up the raw-mix and improve its burnability. Clay (both plastic and lean) is procured during 6 to 8 months of a year only and alternate layers of plastic and lean clays are put one above the other inside the Weathering Tank. The raw-mix is then kept soaked in water for at least 7 days of 'weathering'. Weathering improves homogeneity and plasticity of the mix by continuous action of water, sunlight and wind.

(I) Shaping

The weathered raw-mix is then temporarily stocked on the RCC Platform built inside the Weathering Tank and fed manually through the Hopper at a steady rate. The mix falls onto the Belt Conveyor fitted below the Hopper and is carried to Double Shaft Clay Mixer, where it mixed properly with water. The mix falls onto the Belt Conveyor fitted below the Clay Mixer and is carried to single set of Differential Speed Rollers, where it gets crushed below 2 mm.

The raw-mix then falls on to the De-airing Pugmill system and finally gets extruded horizontally through the die in the form of a continuous clay column. In De-airing Pugmill system, the raw-mix gets re-mixed and de-aired (i.e. excess moisture and entrapped air is sucked out with the help of the Vacuum Pump). If perforated / slitted bricks are desired, the De-airing Pugmill die is fitted with ‘pins’ from inside, which cause continuous conduits of the desired cross section in the clay column. The clay

column is then cut into individual bricks by using Semi-automatic Cutting Table. After cutting 10 bricks in one stroke, the bricks are kept on a m.s. pallet. 5 pallets are loaded on the Wheel Barrow at a time and taken to the Drying Shed for setting on the drying floor.

(ii)Drying

Freshly extruded bricks are manually unloaded from each pallet one by one and set on edges on the drying floor in 3-4 layers, leaving a gap of about 1" between adjacent bricks. Extreme care is exercised during this operation so that the edges and surfaces of freshly extruded bricks are not damaged. Bricks dry in this position for about 4 to 5 days till they achieve 'leather hard' condition (i.e. their moisture content is reduced from 25 per cent to about 18 per cent). They are then stacked flat outside the Drying Shed one above the other as close as possible in 10 to 12 courses till they reach 'bone–dry' condition (i.e. till their moisture content is reduced to about 6 per cent). This final drying in the open takes about 3 to 4 days.

(iii) Firing

Dried bricks are manually removed from the stacks and transported to the floor of the Fixed Chimney Bull's Trench Kiln (FCBTK). FCBTK is a continuous kiln working on natural draught created by its fixed chimney. 'B' or 'C' grade steam coal is used as fuel in the kiln. About 5 per cent breakages / rejects are expected. Dried bricks are set manually in the FCBTK with trace holes, fuel shafts, flues, etc. kept in accordance with standard practice. The fuel is fed through feed holes provided in the kiln-top. The firing temperature ranges between 1000^0 and 1050^0 C. Fully fired and cooled bricks are manually unloaded, carried to the Open Brick Yard and graded. They are then loaded in trucks and dispatched.

5.0 Estimated project cost

S No	***Particulars***	*Amount (Rs lakh)*
a	Land (5 acres) - *already existing*	30.00
b	Site development (leveling, fencing, gate, internal roads, bore- well, storm water drains, etc.)	04.00
c	Civil work (Weathering tank, loading platform with hopper, machinery shed, drying shed, water storage tank, office with toilet, labour hutments, etc.)	33.00
d	Erected Plant & Machinery, viz. fixed chimney Bull's trench kiln with accessories	57.00
e	Miscellaneous fixed assets (office furniture & fixtures, etc.)	1.00
f	Preliminary & Pre-operative Expenses (feasibility study and loan application processing fees, land N.A. and other legal expenses, raw material testing and travel expenses, interest on term loan during construction period, mortgage expenses, personnel training and start-up expenses, etc.)	5.50

S No	***Particulars***	*Amount (Rs lakh)*
g	Contingencies (2 % of cost of site development, civil work, P & M and misc. assets)	1.50
h	Margin money on working capital	08.00
	Total	**140.10**
	Additional investment to existing **infrastructure**	**110.00**

6.0 Means of finance

S No.	*Particulars*	*Amount (Rs. lakh)*
1	Term loan from Bank (Average 70 % of cost of site development, civil work, erected P&M and contingencies)	66.85
2	Promoter's capital (Project cost - Term loan)	43.15
	Total	**110.00**

7.0 Cost of production at 100% capacity utilisation

S No	*Particulars*	*(Rs/ 1000 bricks)*
1.	Raw material (Clay)	170
2	Fly ash 10% of brick weight @ 666/- per tonne	188
2.	Consumables	10
3.	Steam coal 115 kg / 1000 bricks @ Rs. 6,000/-per MT	690
4.	Diesel and Lube oil	210
5.	Direct labour for green brick production.	125
6.	Stacking charges inside shed	15
7.	Stacking charges outside shed for sun drying	40
8.	Transportation charges for green bricks to kiln	50
10.	Stacking charges in side kiln	10
11	Firing charges	20
11	Ash filling charges	7
12.	Unloading charges	45
13.	Electricity charges for lighting and pumping	15
14.	Administrative overheads (salaries of Supervisor, Mechanic, Operators, Accountant, Watchman etc.)	60
16.	Repairs & maintenance (@ 1 % of site development + civil work and 2 % of erected plant and machinery cost)	41
17.	Taxes, duties and other miscellaneous expenses	10
16.	Interest - @ 12 % on term loan @ 12 % on working capital loan	100 12
17.	Depreciation (by straight line method)	70
	Total	**1888**

8.0 Financial indicators at 100 % capacity utilisation :

S No	*Particulars*	
1.	Annual turnover (assuming ex-kiln selling price of Rs. 1800/- per 1000 nos .for hand- moulded bricks and Rs.2000/- per 1000 nos. for extruded bricks)	Rs. 152.73 lakh
2.	Break-even point (BEP) - Including depreciation - Excluding depreciation	 57% 39%
3.	Return on Investment (earnings before term loan interest, depreciation and tax divided by project cost)	32%

Annexure 4 (3)

Project profile - Varanasi brick cluster

1.0 Specifications for Perforated Bricks
Major quality requirements as per IS : 2222 – 1991 titled "Specification for Burnt Clay Perforated Building Bricks (Fourth Revision)" are given below.

1.1 General Quality
Bricks shall be made from suitable clay and shall be thoroughly burnt at the maturing temperature of the clay. They shall be free from cracks, flaws and nodules of free lime. They shall have rectangular faces with sharp straight edges at right angles. They shall be of uniform colour and texture.

1.2 Dimensions and Tolerances

Dimensions	'Modular' bricks	'Non-Modular' bricks
Length (mm)	190 (± 7)	230 (± 10)
Width (mm)	90 (± 4)	110 (± 7)
Height (mm)	90 (± 4)	70 (± 4)

1.3 Perforations
The area of perforation shall be between 30 per cent and 45 per cent of the total area of the corresponding face of the bricks. The perforations shall be uniformly distributed over the surface. In case of rectangular perforations, the larger dimension shall be parallel to the longer side of the brick. and the shorter dimension shall be less than 20 mm. In case of circular perforations, their diameter shall not exceed 25 mm. The area of each perforation shall not exceed 500 mm^2.

1.4 Physical requirements:

a) Compressive strength:
Bricks when tested in accordance with the procedure laid down in IS : 3495 (Parts – 1 to 4) – 1991 shall have a minimum average compressive strength of 7 N/mm^2 on net area.

b) Water absorption:
Water absorption of bricks when tested in accordance with the procedure laid down in IS : 3495 (Parts – 1 to 4) –1991, after immersion in cold water for 24 hours, shall not be more than 20 per cent by weight.

c) Efflorescence:
The rating of efflorescence for bricks when tested in accordance with the procedure laid down in IS : 3495 (Part – 1 to 4) – 1991 shall not be more than 'slight'.

d) Warpage :
The average warpage of bricks when tested in accordance with the procedure laid down in IS : 3495 (Part – 1 to 4) – 1991 shall not exceed 3 per cent.

2.0 Plant capacity :

Basis:
30-week seasonal operation (during November to June) for Hand- moulded as well as Extruded bricks fired in FCBTK; 6 shaping days / week ; 7 firing days / week; 5 % handling and other loss in green bricks and 5 % in fired bricks.

Particulars	Quantity
Raw bricks produced / year (Extruded)	18.00 lakh
Raw bricks produced / year (Hand-moulded)	51.75 lakh
Saleable bricks produced / year (Extruded)	16.25 lakh
Saleable bricks produced / year (Hand-moulded)	46.75 lakh

3.0 Plant & machinery costs
20 M long Belt Conveyor (2 x 2HP motor); Double Shaft Clay Mixer (Open type 10' long size, 10 HP motor); Differential Speed Rollers (600 x 500 mm size, 30 HP motor); De-airing Pugmill (14" dia barrel,30 HP); Vacuum Pump (5 HP motor); Manually operated Cutting Table (10 Bricks at a time); Wheel Barrows (5 nos.); Electric Motors; 100 KVA Diesel generating set; Taxes / Duties / Transport Expenses; Machinery Foundations; Electrification; Erection Expenses; Tools & Tackle, Spares; Process Know-how

4.0 Brief description of manufacturing process to be adopted
Plastic clay (or 'sticky' clay) and lean clay (silt) form the major components of the raw-mix. They are mixed together in such a proportion that the resultant raw-mix attains 'moderate' plasticity. Materials like fly ash, grog (burnt powdery material from kiln), etc. are used as 'additives' to open-up the raw-mix and improve its burnability. Clay (both plastic and lean) is procured during 6 to 8 months of a year only and alternate layers of plastic and lean clays are put one above the other inside the Weathering Tank. The raw-mix is then kept soaked in water for at least 7 days of 'weathering'. Weathering improves homogeneity and plasticity of the mix by continuous action of water, sunlight and wind.

Shaping:
The weathered raw-mix is then temporarily stocked on the RCC Platform built inside the Weathering Tank and fed manually through the Hopper at a steady rate. The mix falls onto the Belt Conveyor fitted below the Hopper and is carried to Double Shaft Clay Mixer, where it mixed properly with water. The mix falls onto the Belt Conveyor fitted below the Clay Mixer and is carried to single set of Differential Speed Rollers, where it gets crushed below 2 mm.

The raw-mix then falls on to the De-airing Pugmill system and finally gets extruded horizontally through the die in the form of a continuous clay column. In De-airing Pugmill system, the raw-mix gets re-mixed and de-aired (i.e. excess moisture and entrapped air is sucked out with the help of the Vacuum Pump). If perforated / slitted bricks are desired, the De-airing Pugmill die is fitted with 'pins' from inside, which cause continuous conduits of the desired cross section in the clay column. The clay column is then cut into individual bricks by using Hand operated Cutting Table. After cutting 10 bricks in one stroke, the bricks are kept on a m.s. pallet. 5 pallets are loaded on the Wheel Barrow at a time and taken to the Drying Shed for setting on the drying floor.

Drying:

Freshly extruded bricks are manually unloaded from each pallet one by one and set on edges on the drying floor in 3-4 layers, leaving a gap of about 1" between adjacent bricks. Extreme care is exercised during this operation so that the edges and surfaces of freshly extruded bricks are not damaged. Bricks dry in this position for about 4 to 5 days till they achieve 'leather hard' condition (i.e. their moisture content is reduced from 25 per cent to about 18 per cent). They are then stacked flat outside the Drying Shed one above the other as close as possible in 10 to 12 courses till they reach 'bone–dry' condition (i.e. till their moisture content is reduced to about 6 per cent). This final drying in the open takes about 3 to 4 days.

Firing:

Dried bricks are manually removed from the stacks and transported to the floor of the Fixed Chimney Bull's Trench Kiln (FCBTK). FCBTK is a continuous kiln working on natural draught created by its fixed chimney. 'B' or 'C' grade steam coal is used as fuel in the kiln. About 5 per cent breakages / rejects are expected.

Dried bricks are set manually in the FCBTK with trace holes, fuel shafts, flues, etc. kept in accordance with standard practice. The fuel is fed through feed holes provided in the kiln-top. The firing temperature ranges between 1000^0 and 1050^0 C. Fully fired and cooled bricks are manually unloaded, carried to the Open Brick Yard and graded. They are then loaded in trucks and dispatched.

5.0 Estimated project cost:

Sr.No.	Particulars	**Amount (Rs. in lakhs)**
a	Land (5 acres) - *already existing*	30.00
b	Site development (leveling, fencing, gate, internal roads, bore- well, storm water drains, etc.)	04.00
c	Civil work - Weathering tank, loading platform with hopper, machinery shed, drying shed, water storage tank, office with toilet, labour hutments, etc.	19.50
d	Erected Plant & Machinery, viz. fixed chimney Bull's trench kiln with accessories, feed water pump (5HP) with piping & fittings	43.50

Sr.No.	Particulars	Amount (Rs. in lakhs)
e	Miscellaneous Fixed Assets (office furniture & fixtures, etc.)	1.00
f	Preliminary & Pre-operative Expenses (feasibility study and loan application processing fees, land N.A. and other legal expenses, raw material testing and travelling expenses, interest on term loan during construction period, mortgage expenses, personnel training and start-up expenses, etc.)	4.50
g	Contingencies (2 % of cost of site development, civil work, P & M and misc. assets)	1.00
h	Margin money on working capital	7.00
	Total	**110.50**
	Additional investment to existing **infrastructure**	**80.50**

6.0 Means of finance

Sr. No.	Particulars	Amount (Rs. In Lakhs)
1	Term loan from Bank (Average 70 % of cost of site development, civil work, erected P&M and contingencies)	47.95
2	Promoter's capital (Project cost - Term loan)	32.55
	Total	**80.50**

7.0 Cost of production at 100% capacity utilisatio

Sr. No.	Particulars	Amount (Rs. / 1,000 bricks)
1.	Raw material (Clay)	175
2.	Consumables	10
3.	Steam coal 135 kg / 1000 bricks @ Rs. 4,500/- MT	608
4.	Diesel and Lube oil	350
5.	Direct labour for green brick production.	200
6.	Stacking charges inside shed	15
7.	Stacking charges outside shed for sun drying	40
8.	Transportation charges for green bricks to kiln	50
10.	Stacking charges in side kiln	10
11	Firing charges	20
11	Ash filling charges	7
12.	Unloading charges	45
13.	Electricity charges for lighting and pumping	15
14.	Administrative overheads (salaries of Supervisor,	

Sr. No.	Particulars	Amount (Rs. / 1,000 bricks)
	Mechanic, Operators, Accountant, Watchman etc.)	60
16.	Repairs & maintenance (@ 1 % of site development + civil work and 2 % of erected plant and machinery cost)	54
17.	Taxes, duties and other miscellaneous expenses	10
16.	Interest - @ 12 % on term loan @ 12 % on working capital loan	 92 14
17.	Depreciation (by straight line method)	85
	Total	**1860**

8.0 Financial indicators at 100 % capacity utilisation :

Sr. No.	Particulars	
1.	Annual Turnover (assuming ex-kiln selling price of Rs. 1700/- per 1000 nos .for hand- moulded bricks and Rs.2200/- per 1000 nos. for extruded bricks)	Rs. 115.20 lakhs
2.	Break-Even Point (BEP) - Including depreciation - Excluding depreciation	 54% 39%
3.	Return on Investment (earnings before term loan interest, depreciation and tax divided by project cost)	27%

Annexure 4 (4)

Project profile - Pune brick cluster

1.0 Specifications for Perforated Bricks :

Major quality requirements as per IS : 2222 – 1991 titled "Specification for Burnt Clay Perforated Building Bricks (Fourth Revision)" are given below.

1.1 General Quality:

Bricks shall be made from suitable clay and shall be thoroughly burnt at the maturing temperature of the clay. They shall be free from cracks, flaws and nodules of free lime. They shall have rectangular faces with sharp straight edges at right angles. They shall be of uniform colour and texture.

1.2 Dimensions and Tolerances

Dimensions	'Modular' bricks	'Non-Modular' bricks
Length (mm)	190 (± 7)	230 (± 10)
Width (mm)	90 (± 4)	110 (± 7)
Height (mm)	90 (± 4)	70 (± 4)

1.3 Perforations :

The area of perforation shall be between 30 per cent and 45 per cent of the total area of the corresponding face of the bricks. The perforations shall be uniformly distributed over the surface. In case of rectangular perforations, the larger dimension shall be parallel to the longer side of the brick. and the shorter dimension shall be less than 20 mm. In case of circular perforations, their diameter shall not exceed 25 mm. The area of each perforation shall not exceed 500 mm^2.

1.4 Physical requirements:

a) Compressive strength:

Bricks when tested in accordance with the procedure laid down in IS : 3495 (Parts – 1 to 4) – 1991 shall have a minimum average compressive strength of 7 N/mm^2 on net area.

b) Water absorption:

Water absorption of bricks when tested in accordance with the procedure laid down in IS : 3495 (Parts – 1 to 4) –1991, after immersion in cold water for 24 hours, shall not be more than 20 per cent by weight.

c) Efflorescence:

The rating of efflorescence for bricks when tested in accordance with the procedure laid down in IS : 3495 (Part – 1 to 4) – 1991 shall not be more than 'slight'.

d) Warpage :

The average warpage of bricks when tested in accordance with the procedure laid down in IS : 3495 (Part – 1 to 4) – 1991 shall not exceed 3 per cent.

2.0 Plant capacity

Basis : 35 week seasonal operation (November to June); 6 moulding days / week; 7 firing days / week; 3 % production loss during forming and 2 % during firing.

Sr. No.	Description	
1	Plant capacity per day / per shift (perforated 'non-modular' bricks)	50,000 nos.
2	No. of forming days per year	210
3	No. of 'green' bricks formed per year	1,05,00,000
4.	No. of firing days per year	245
5	Saleable bricks produced per year	99,81,000

3.0 Plant and machinery costs

Sr. No.	Details of Plant & Machinery	HP	Amount (Rs.)
1	JCB Excavator	--	18,00,000
2	Box feeder (16' x 4' x 4' size)	7.5	6,70,000
3	Pan Mill	30	10,58,000
4	Differential Speed Crushing Roller (800 x 500 mm size)	40	4,00,000
5	Clay Mixer (4' x 2' size)	30	4,88,000
6	Differential Speed Roller (1000 x 600 mm size)	60	5,75,000
7	De-airing Pug mill (20" size)	75	12,00,000
8	Vacuum Pump (heavy duty type)	7.5	2,00,000
9	Automatic Cutting Table	4	2,10,000
10	Belt conveyors between machines to machine (50 m @ Rs. 6,300/- per m)	15	3,15,000
11	Wooden Pallets	3×10^5	15,00,000
12	Steel Fabricated Racks	240	12,00,000
13	Chain conveyor	1	10,00,000
13	Feed Water Pump	05	20,000
14	Electric Motors with Starters		10,00,000
15	Electrification Charges		5,00,000
16	Dumper (Second-hand 2 nos.)	--	16,00,000
17	Truck LP (Second-hand 2 nos.)	--	24,00,000
18	Diesel Generating Set (300 KVA)		16,00,000
19	Fixed Chimney Bull's Trench Kiln		15,00,000
20	Tools & Tackle, Spares		4,00,000
21	Transportation Charges		1,50,000
22	Erection Expenses		6,00,000
23	Know-how Fee and Supervision Charges during Erection		5,00,000
24	Commissioning and Start-up Expenses		3,00,000
25	Taxes / duties for all above iterms		8,00,000
	Total		**21,986,000**

4.0 Civil works

Land required: 6 to 8 acres

S No.	Description	Rate (Rs. / m^2)	Amount (Rs)
1	Machinery Shed (60 x 15 x 4.5 m)	2000/-	18,00,000
2	Drying Shed (5,050 m^2)	600/-	30,30,000
3	Overground RCC Water storage tank (100,000 L)	3/- per L	3,00,000
4	Office Block (100 m^2)	2000/-	2,00,000
5	Machinery Foundation		4,00,000
6	Piping and Fitting Charges (1000 m)		1,50,000
7	Generator Room		50,000
8	Kiln shed (90 x 30 x 5m)	1000/-	27,00,000
9	Labour Quarters		1,00,000
10	Workshop, Laboratory, etc. (50 m^2)	2000/-	1,00,000
11	Security Cabin		50,000
	Total		**88,80,000**

5.0 Direct labour requirements

S No.	Job Description	Nos.
1	Clay Yard management	2
2	JCB Excavator Operation	2
3	Box Feeder Attendant	1
4	Clay Mixer Attendant	1
5	De-Airing Pugmill Attendant	1
6	Feeding Pallets to Cutting Table	1
7	Lifting Pallets from Cutting Table	2
8	Shifting bricks on wooden pallets	6
9	Loading / unloading Wooden pallets from chain conveyor	14
10	Carrying / stacking loaded pallets from chain conveyor to steel Racks	18
11	Unloading Dried bricks from pallets and stacking in side shed	18
12	Loading empty pallets in Chain conveyor	4
13	Stacking Bricks Outside Drying Shed	10
13	Transporting Bricks to Kiln	20
14	Stacking Bricks Inside Kiln	6
15	Kiln Firing	6
16	Coal crushing and Handling	4
17	Covering / Cleaning Ash Over Kiln Top	3
18	Unloading Bricks from Kiln	20

6.0 Details of manufacturing process to be adopted for fired clay perforated bricks

Plastic clay (or 'sticky' clay) and lean clay (or 'sandy' clay) form the major components of the raw-mix. They are mixed together in such a proportion that the resultant raw-mix attains 'moderate' plasticity. Materials like flyash, grog (burnt powdery material from kiln), burnt foundry sand, rice husk, etc. are used as 'additives' to open-up the raw-mix and improve its burnability. All these materials are normally procured within 10 kilometres of plant site. Clay (both plastic and lean) is procured during 6 to 8 months of a year only and alternate layers of plastic and lean clays are put one above the other in the open clay stock yard. The raw-mix is then kept soaked in water for at least 8 days of 'weathering'. Weathering improves homogeneity and plasticity of the mix by continuous action of water, sunlight and wind.

Shaping

The weathered raw-mix is then excavated by using JCB Excavator and fed to the Box feeder. The mix falls on the Box feeder is automatically fed through its metallic link conveyor in a steady rate. The mix falls onto the Belt Conveyor fitted below the Box feeeder and is carried to Perforated Bottom Pan mil,, where it gets mixed and ground in its solid / perforated pans and is pushed through its perforations to the bottom collecting plate. The mix falls on the collecting plate is fed automatically to the belt conveyor fitted below and is carried to the Differential speed Crushing Rollers, where it gets ground less than 5 mm size. The raw mix then falls to the belt conveyor fitted below the Differential speed Crushing Rollers and is carried to Double shaft Clay Mixer, where it gets throughly mixed. Additional water is sprayed here on the mix if required. The raw mix then falls to the belt conveyor fitted below the Clay Mixer and is carried to Differential speed Smooth Rollers, where it gets finely ground less than 2 mm size.

The mix falls onto the Belt Conveyor fitted below the Differential speed Smooth Rollers and is carried to the upper deck of the De-airing Pugmill system, where it gets re-mixed in its mixing chamber and de-aired (i.e. excess moisture and entrapped air is sucked out with the help of the Vacuum Pump) in its vacuum chamber. If perforated / slitted bricks are desired, the De-airing Pugmill die is fitted with ‘pins’ from inside, which cause continuous conduits of the desired cross section in the clay column. The capacity of the 20" De-airing Pugmill system is upto 50,000 bricks per 8 hours shift.

The clay column is then cut into individual bricks by the Automatic Cutting Table. After cutting 20 bricks in one stroke, the bricks are kept on a m.s. pallet. 4 bricks are manually removed from the m.s. pallet and stacked on wooden pallets.These wooden pallets are loaded manually to the Endless Chain conveyor. In Drying shed, these pallets are unloaded from the chain conveyor and stacked on the fabricated Racks for drying.

Drying

Freshly extruded bricks along with wooden pallets are manually unloaded from Chain conveyor and stacked on the Racks for Drying. Bricks dry in this position for

about 15 to 20 days till they reach 'bone–dry' condition (i.e. till their moisture content is reduced to about 6 per cent). They are then stacked flat inside / outside the Drying Shed one above the other in 10 to 12 courses for final drying.

Firing

Dried bricks are manually removed from the stacks and transported to the floor of the Fixed Chimney Bull's Trench Kiln.

Fixed Chimney Bull's Trench Kiln

Fixed Chimney Bull's Trench Kiln is a continuous kiln working on natural draught created by its fixed chimney. 'B' or 'C' grade steam coal is used as fuel in the kiln. About 2 per cent breakages / rejects are expected.

Dried bricks are set manually in the Fixed Chimney Bull's Trench Kiln with trace holes, fuel shafts, flues, etc. kept in accordance with standard practice. The fuel is fed through feed holes provided in the kiln-top. The firing temperature ranges between 900^0 and 1000^0 C. Fully fired and cooled bricks are manually unloaded and carried to the Open Brick Yard or are directly loaded in trucks and despatched.

7.0 Estimated project cost :

S No.	Particulars	Amount **(Rs lakh)**
1	Land (8 acres)	16.00
2	Site development (Levelling, fencing, gate, internal roads, bore well, storm water drains, etc.)	4.00
3	Civil work (Office with toilet, machineryshed, kiln shed and drying sheds, water storage tank, etc.)	88.80
4	Erected Plant & machinery	219.86
5	Miscellaneous Fixed Assets (Office furniture & fixtures, etc.)	1.00
6	Preliminary & Pre-operative Expenses (Feasibility study and loan application processing fees, land N.A. and other legal expenses, raw material testing and traveling expenses, interest on term loan during construction period, mortgage expenses, personnel training and start-up expenses, etc.)	17.50
7	Contingencies (about 3% of Site Development, Civil Work, P & M and Miscellaneous Assets Cost)	9.40
8	Margin Money on Working Capital	45.00
	Total	**401.56**

8.0 Means of finance:

S No.	Particulars	Amount (Rs lakh)
1	Term loan from Bank (Average 70 % of cost of Land, Site Development, Civil Work, Erected P&M and Contingencies)	237.30
2	Promoter's capital (Project Cost - Term Loan)	164.26
	Total	**401.56**

9.0 Cost of production at 100% capacity utilisation :

S No.	Particulars	Amount (Rs/ 1,000 bricks)
1	Raw material & additives	150
2	Consumables	20
3	Fuel (Steam coal 130 kg /1,000 nos.@ Rs. 4,000/- per MT)	520
4	Direct labour (65 nos. for making , 40 nos. piece-rate labour and 19 nos. for kiln stacking & firing)	240
5	Diesel cost	230
6	Administrative overheads	150
7	Repairs & maintenance (1 % of site development + civil work and 2 % of erected plant and machinery cost)	54
8	Interest @ 12 % on term loan @ 12 % on working capital loan (55.0 lakhs)	 285 66
9	Depreciation (by straight line method)	262
	Total	**1977**

10 Financial indicators at 100 % capacity utilization

S No.	Indicator	
1	Annual Turnover (assuming ex-works selling price of Rs.3,000/- per 1,000 nos.)	299.43 lakh
2	Break-Even Point (BEP) Including Depreciation Excluding Depreciation	 39% 24%
3	Return on Investment (earnings before term loan interest, depreciation and tax divided by project cost)	40%

Annexure 4 (5)

Project profile - Bangalore brick cluster

1.0 Specifications for Perforated Bricks

Major quality requirements as per IS : 2222 – 1991 titled "Specification for Burnt Clay Perforated Building Bricks (Fourth Revision)" are given below.

1.1 General Quality

Bricks shall be made from suitable clay and shall be thoroughly burnt at the maturing temperature of the clay. They shall be free from cracks, flaws and nodules of free lime. They shall have rectangular faces with sharp straight edges at right angles. They shall be of uniform colour and texture.

1.2 Dimensions and Tolerances

Dimensions	'Modular' bricks	'Non-Modular' bricks
Length (mm)	190 (± 7)	230 (± 10)
Width (mm)	90 (± 4)	110 (± 7)
Height (mm)	90 (± 4)	70 (± 4)

1.3 Perforations

The area of perforation shall be between 30 per cent and 45 per cent of the total area of the corresponding face of the bricks. The perforations shall be uniformly distributed over the surface. In case of rectangular perforations, the larger dimension shall be parallel to the longer side of the brick. and the shorter dimension shall be less than 20 mm. In case of circular perforations, their diameter shall not exceed 25 mm. The area of each perforation shall not exceed 500 mm^2.

1.4 Physical requirements:

a) Compressive strength :

Bricks when tested in accordance with the procedure laid down in IS : 3495

(Parts – 1 to 4) – 1991 shall have a minimum average compressive strength of 7 N/mm^2 on net area.

b) Water absorption:

Water absorption of bricks when tested in accordance with the procedure laid down in IS : 3495 (Parts – 1 to 4) –1991, after immersion in cold water for 24 hours, shall not be more than 20 per cent by weight.

c) Efflorescence:

The rating of efflorescence for bricks when tested in accordance with the procedure laid down in IS : 3495 (Part – 1 to 4) – 1991 shall not be more than 'slight'.

d) Warpage :

The average warpage of bricks when tested in accordance with the procedure laid down in IS : 3495 (Part – 1 to 4) – 1991 shall not exceed 3 per cent.

2.0 Plant capacity:

Basis: 35 week seasonal operation (November to June); 6 moulding days / week; 7 firing days / week; 3 % production loss during forming and 2 % during firing.

Sr. No.	Description	
1	Plant capacity per day / per shift (perforated 'non-modular' bricks)	50,000 nos.
2	No. of forming days per year	210
3	No. of 'green' bricks formed per year	1,05,00,000
4.	No. of firing days per year	245
5	Saleable bricks produced per year	99,81,000

3.0 Plant and Machinery costs

Sr. No.	Details of Plant & Machinery	HP	Amount (Rs)
1	Bucket Excavator	15	8,10,000
2	Box feeder (16' x 4' x 4' size)	7.5	6,70,000
3	Clay Mixer (4' x 2' size)	30	4,88,000
4	Pan Mill	30	10,58,000
5	Differential Speed Roller (1000 x 600 mm size)	60	5,75,000
6	De-airing Pug mill (20" size)	75	12,00,000
7	Vacuum Pump (heavy duty type)	7.5	2,00,000
8	Automatic Cutting Table	4	2,10,000
9	Belt conveyor for clay yard (100 m @ Rs. 6,300/- per m)	20	6,30,000
10	Belt conveyors between machines to machine (40 m @ Rs. 6,300/- per m)	12	2,52,000
11	Mild steel pallets (80 nos.)	--	40,000
12	Wheel Barrows (10 nos.)		60,000
13	Feedwater Pump	05	20,000
14	Electric motors with starters		10,00,000
15	Electrification Charges		5,00,000
16	Dumper (2 nos.)	--	16,00,000
17	Truck LP (2 nos.)	--	20,00,000
18	Diesel Generating Set (300 KVA)		16,00,000
19	Fixed Chimney Bull's Trench Kiln		15,00,000
20	Tools & Tackle, Spares		4,00,000
21	Transportation Charges		1,50,000
22	Erection Expenses		6,00,000
23	Know-how Fee and Supervision Charges during Erection		5,00,000
24	Commissioning and Start-up Expenses		3,00,000
25	Taxes / duties for all above iterms		8,00,000
	Total		**1,71,63,000**

4.0 Civil works

Land requirements : 6 to 8 acres

S No.	Description	Rate (Rs. / m^2)	Amount (Rs)
1	Machinery Shed (60 x 15 x 4.5 m)	500/-	4,50,000
2	Drying Shed (10,000 m^2)	300/-	30,00,000
3	Overground RCC Water storage tank (100,000 L)	3/- per L	3,00,000
4	Office Block (60 m^2)	3500/-	2,10,000
5	Kiln shed (90 x 30 x 5m)	500/-	13,50,000
5	Labour Quarters		1,00,000
6	Workshop, Laboratory, etc. (50 m^2)	2000/-	1,00,000
7	Security Cabin		50,000
	Total		**55,60,000**

5.0 Direct labour requirements

S No.	Job Description	Nos.
1	Clay Yard management	2
2	Bucket Excavator Operation	2
3	Box Feeder Attendant	1
4	Clay Mixer Attendant	1
5	De-Airing Pugmill Attendant	1
6	Feeding Pallets to Cutting Table	1
7	Lifting Pallets from Cutting Table	2
8	Carrying Wheel Barrows to Drying Shed	8
9	Unloading Pallets from Wheel Barrows / Loading Empty Pallets on to Wheel Barrows	4
10	Unloading Bricks from Pallets	8
11	Stacking Bricks Inside Drying Shed	8
12	Stacking Bricks Outside Drying Shed	20
13	Transporting Bricks to Kiln	20
14	Stacking Bricks Inside Kiln	6
15	Kiln Firing	6
16	Fuel Preparation and Handling	2
17	Covering / Cleaning Ash Over Kiln Top	3
18	Unloading Bricks from Kiln	20

6.0 Details of manufacturing process to be adopted for fired clay perforated bricks

Plastic clay (or 'sticky' clay) and lean clay (or 'sandy' clay) form the major components of the raw-mix. They are mixed together in such a proportion that the resultant raw-mix attains 'moderate' plasticity. Materials like flyash, grog (burnt powdery material from kiln), burnt foundry sand, rice husk, etc. are used as 'additives' to open-up the raw-mix and improve its burnability. All these materials

are normally procured within 10 kilometres of plant site. Clay (both plastic and lean) is procured during 6 to 8 months of a year only and alternate layers of plastic and lean clays are put one above the other in the open clay stock yard. The raw-mix is then kept soaked in water for at least 8 days of 'weathering'. Weathering improves homogeneity and plasticity of the mix by continuous action of water, sunlight and wind.

Shaping

The weathered raw-mix is then excavated by using Bucket chain Excavator / JCB and fed automatically through its Hopper at a steady rate. The mix falls onto the Belt Conveyor fitted below the Hopper and is carried to Box feeder where it automatically fed through its metallic link conveyor in a steady rate. The mix falls onto the Belt Conveyor fitted below the Box feeeder and is carried to Double shaft open type Clay Mixer, where it gets throughly mixed. Additional water is sprayed here on the mix if required. The raw mix then falls to the belt conveyor fitted below the Clay Mixer and is carried to Perforated Bottom Pan mil,, where it gets mixed and ground in its solid / perforated pans and is pushed through its perforations to the bottom collecting plate. The mix falls on the collecting plate is fed automatically to the belt conveyor fitted below and is carried to the Differential speed Smooth Rollers, where it gets finely ground less than 2 mm size.

The mix falls onto the Belt Conveyor fitted below the Differential speed Smooth Rollers and is carried to the upper deck of the De-airing Pugmill system, where it gets re-mixed in its mixing chamber and de-aired (i.e. excess moisture and entrapped air is sucked out with the help of the Vacuum Pump) in its vacuum chamber. If perforated / slitted bricks are desired, the De-airing Pugmill die is fitted with ‘pins’ from inside, which cause continuous conduits of the desired cross section in the clay column. The capacity of the 20" De-airing Pugmill system is upto 50,000 bricks per 8 hours shift.

The clay column is then cut into individual bricks by the Automatic Cutting Table. After cutting 20 bricks in one stroke, the bricks are kept on a m.s. pallet. 5 pallets are loaded on the Wheel Barrow at a time and taken to the Drying Shed for setting on the drying floor.

Drying

Freshly extruded bricks are manually unloaded from each pallet one by one and set on edges on the drying floor in 3-4 layers, leaving a gap of about 10 mm between adjacent bricks. Extreme care is exercised during this operation so that the edges and surfaces of freshly extruded bricks are not damaged. Bricks dry in this position for about 6 to 7 days till they achieve ‘leather hard’ condition (i.e. their moisture content is reduced from 20 per cent to about 15 per cent). They are then stacked flat inside the Drying Shed one above the other in 10 to 12 courses till they reach ‘bone–dry’ condition (i.e. till their moisture content is reduced to about 6 per cent). This final drying in the open takes about 4 to 5 days.

Firing
Dried bricks are manually removed from the stacks and transported to the floor of the Fixed Chimney Bull's Trench Kiln.

Fixed Chimney Bull's Trench Kiln
Fixed Chimney Bull's Trench Kiln is a continuous kiln working on natural draught created by its fixed chimney. 'B' or 'C' grade steam coal is used as fuel in the kiln. About 2 per cent breakages / rejects are expected.

Dried bricks are set manually in the Fixed Chimney Bull's Trench Kiln with trace holes, fuel shafts, flues, etc. kept in accordance with standard practice. The fuel is fed through feed holes provided in the kiln-top. The firing temperature ranges between 900^0 and 1000^0 C. Fully fired and cooled bricks are manually unloaded and carried to the Open Brick Yard or are directly loaded in trucks and despatched.

7.0 Estimated project costs

S No.	Particulars	Amount **(Rs lakh)**
1	Land (8 acres)	16.00
2	Site development (Levelling, fencing, gate, internal roads, borewell, storm water drains,etc.)	5.00
3	Civil work (Office with toilet, machinery , kiln shed and drying sheds, water storage tank, etc.)	55.60
4	Erected Plant & machinery	171.63
5	Miscellaneous Fixed Assets (Office furniture & fixtures, KSEB deposit and power drawing / service connection charges, etc.)	5.00
6	Preliminary & Pre-operative Expenses (Feasibility study and loan application processing fees, land N.A. and other legal expenses, raw material testing and travelling expenses, interest on term loan during construction period, mortgage expenses, personnel training and start-up expenses, etc.)	15.00
7	Contingencies (about 2 % of Site Development, Civil Work, P & M and Miscellaneous Assets Cost)	4.50
8	Margin Money on Working Capital	12.00
	Total	**284.73**

8.0 Means of finance

S No.	**Particulars**	Amount **(Rs lakh)**
1	Term loan from Bank (Average 70 % of cost of Land, Site Development, Civil Work, Erected P&M and Contingencies)	180.41
2	Promoter's capital (Project Cost - Term Loan)	104.32
	Total	**284.73**

9.0 Cost of production at 100% capacity utilisation

S No.	Particulars	Amount (Rs/ 1,000 bricks)
1	Raw material & additives	200
2	Consumables	20
3	Fuel (Steam coal 110 kg /1,000 nos.@ Rs. 4,500/- per MT)	540
4	Direct labour (25 nos.for making, 68 nos. piece-rate labour and 17 nos. for kiln stacking & firing)	250
5	Diesel cost	200
6	Administrative overheads	150
7	Repairs & maintenance (1 % of site development + civil work and 2 % of erected plant and machinery cost)	41
8	Interest @ 12 % on term loan (180.41 lakhs) @ 12 % on working capital loan (36.0 lakhs)	 217 43
9	Depreciation (by straight line method)	197
	Total	**1,858**

10 Financial indicators at 100 % capacity utilization

S No.	Indicator	
1	Annual Turnover (assuming ex-works selling price of Rs. 2,500 per 1,000 no)	249.52 lakhs
2	Break-Even Point (BEP) Including deprecoation Excluding Depreciation	 49% 33%
3	Return on Investment (earnings before term loan interest, depreciation and tax divided by project cost)	38%