

KNOWLEDGE PARTNERSHIP PROGRAMME



Inception Report: Extension Phase

South - South Technology Transfer: Low Carbon Building Technology

**Development Alternatives- Technology and Action for Rural Advancement
(TARA)**

Submitted to



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South-South Technology Transfer – Low Carbon Building Technology

Extension Inception Report

June 2015

Contents

- 1. Introduction2
- 2. Approach and Methodology3
- 3. Plan7

SOUTH – SOUTH TECHNOLOGY TRANSFER – LOW CARBON BUILDING TECHNOLOGY

EXTENSION INCEPTION REPORT

1. Introduction

1.1. Background

The republic of Malawi is a land locked country situated in southern Africa. With a population about 15 million and an average annual per capita income of USD 330, it is among the poorest countries in the world. The economy is predominantly agricultural and is dependent on substantial international assistance.

Currently just 15% of the population is urban, but this growing at an annual rate of 4.2%. It has been estimated that with a current rate of urbanisation, a minimum of 21,000 housing units are required over the next 10 years to meet the urban housing demand. The main and only building material in Malawi is “burnt clay bricks”. Use of alternate materials is sparse, limited to subsidised construction activities. Thus Malawi will require around 1.7 billion units of burnt clay bricks annually. If the rural housing demand is also considered then the annual brick consumption will be much more.

Currently, brick production in Malawi is highly decentralised and unrecognised. The entire Malawi brick industry uses open clamps for firing. Due to poor quality of green bricks, clamps are not stacked high enough. There is no control over firing process in the clamps. Fuel used in firing bricks in Malawi is fuel wood. It is estimated around 850,000 tonnes of fuelwood will be required to produce around 1.7 billion of bricks if alternative technologies are not adopted. At this rate the fuelwood consumption, the entire country will be deforested within 25 – 30 years only from brick Industry. No waste materials are used

in green brick making for use as body fuel. Besides fuelwood, fuel in the form of leafy biomass is also used to provide additional energy. However, the quantity and quality is not suitable to provide additional heat to uniformly fire the upper layers of the clamp.

The high rate of urbanisation puts tremendous pressure on the entire building material sector. With constraints in supply of material both the quality of material (brick) and the application (house) has degraded to an alarming extent resulting in poor quality and increasing construction cost. The current state of housing has put an immense pressure on the low cost housing sector. Most often it has reached beyond the means of common beneficiaries. To construct with traditional bricks, is approximately 70% more than similar construction with good quality bricks. Thus use of quality bricks can drastically bring down the cost of construction of a low cost housing.

Thus, the two major concerns in the Malawi brick sector are increased deforestation due to use of fuel wood and poor brick quality resulting in poor construction quality. With



Figure 1: Map of Malawi

constraints in supply of material, both the quality of material (brick) and the application (house) has degraded to an alarming extent resulting in poor quality and increasing construction costs. This coupled with the increasing deforestation in the country, has prompted the Government of Malawi to sit up and take notice of the situation and explore alternatives. During the course of the assessment, several meetings and workshops were conducted in Lilongwe, Malawi. The Department of Energy Affairs, Department of Environment Affairs, and National Construction Industry Council etc. have expressed a keen interest in promotion of such building materials from India.

1.2. Scope of Work

Over the 13 months of engagement under Knowledge Partnership Programme (KPP), Development Alternatives Group through TARA has established and transferred VSBK technology and demonstrated the successful commissioning of this technology in MALAWI. However to spread the message to the African countries, the technology needs to be supported while it restarts in the month of May 2015 after rainy season. A green building centre has been set up where other building materials technologies have been set up. These benefits about these technologies will be disseminated to aid their adoption.

1.3. Project

TARA undertook the assignment of transferring and demonstrating the VSBK technology. Following assignment has been taken place

- Transfer and adoption of innovative technology i.e. VSBK
- Created awareness among local stakeholders to promote and adopt this technology
- Anchoring the technology in local context for sustainable development

The technology was transferred to a local agency (CCODE) and the local skill to build to undertake daily operation has been completed; while engagement required for a longer period of time to face all the challenges and to make perfect the technology for further dissemination with Malawi.

The technology demonstration had a great impact on local prospective entrepreneur to adopt this technology in Malawi in future. This proposed assignment of further support to the transferred technology technically will ensure local stakeholder are encouraged and inclined towards adopting this technology.

The objectives for the proposed assignment are:

- Providing technical and capacity building support to the transferred technology
- Disseminating the technology widely both in Malawi and the neighbouring countries

This will assist in widespread impact in the lives of the local Malawi home owners and entrepreneurs. As the consultancy arm of the Development Alternatives Group, TARA will be the lead organization for the present assignment while Development Alternatives will be providing research and strategic support.

2. Approach and Methodology

New approaches to operational practices require a paradigm shift from the conventional practices and the engrained mentality amongst entrepreneurs resisting to process innovations and new technology. This transformation requires extensive awareness; widespread demonstrations; intensive training and long term technology support for entrepreneurs and operators to adopt improved technology options. The technology transfer

programme already included both the hardware and software skills e.g. equipment, tools and accessories, the entire production system know-how, material testing, analysis and quality control capability. The local anchoring of technology needed to create ownership and address to development potential was also been initiated under the previous phase. The follow on phase will look at consolidating the activities undertaken in the previous phase. This assignment, undertakes a comprehensive demonstration initiative and project attractive business opportunities and enhanced environmental benefits to diverse stakeholders in the building materials and construction sector.

2.1. Approach

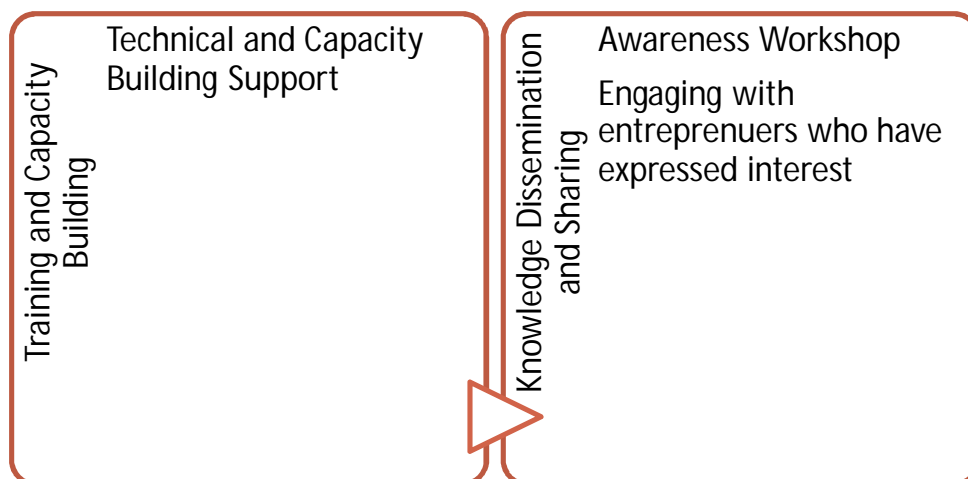
This proposed follow up aims to consolidate the activities undertaken over the last one year and create a ripple effect through dissemination of the technology to a larger stakeholder group. Successful technology transfer has generated immense amount of interest among the stakeholders. This will ensure that the local anchoring of the technology is strengthened through continued support and more people are inclined towards adopting it. A two phased approach will be adopted for this.

- Demonstration of this technology commercially and troubleshooting of problems
- Technical and capacity building of the local personnel through training and active participation in daily activity of the kiln functioning.

After establishing the economic viability of VSBK, a commercial route will be adopted for rapid dissemination and multiplication.

2.2. Methodology

A two-step methodology will be followed for the proposed assignment.



A. Technical and Capacity Building Support

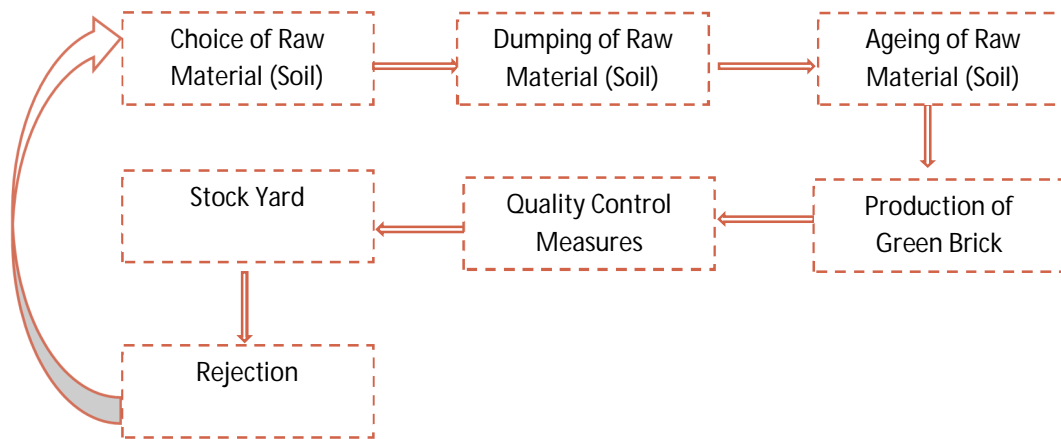
This phase will provide the existing kiln with technical and process engineering support to ensure smooth functioning. Through supervision and quality control monitoring of the process of green brick making and firing capacities will be strengthened at a multitude of levels to ensure smooth functioning of the units. A capacity building programme will be undertaken to create a cadre of skilled personnel who can service and maintain the technology. This includes equipment manufacturers, machine operators, firemen and firing supervisors.

Key activities include:

- Technical support and quality control for green brick making to create a bank of green bricks
- Technical support and quality control for firing the kiln to ensure continuous operation
- Monitoring and trouble shooting of kiln operations
- Skill development through on site supervision and capacity building
- Identification and engagement with training organizations and resource agencies like TEVETA (Technical, Entrepreneurial and Vocational Education and Training Authority of Malawi) in order to institutionalize the process and enable sustainability even after the end of the programme

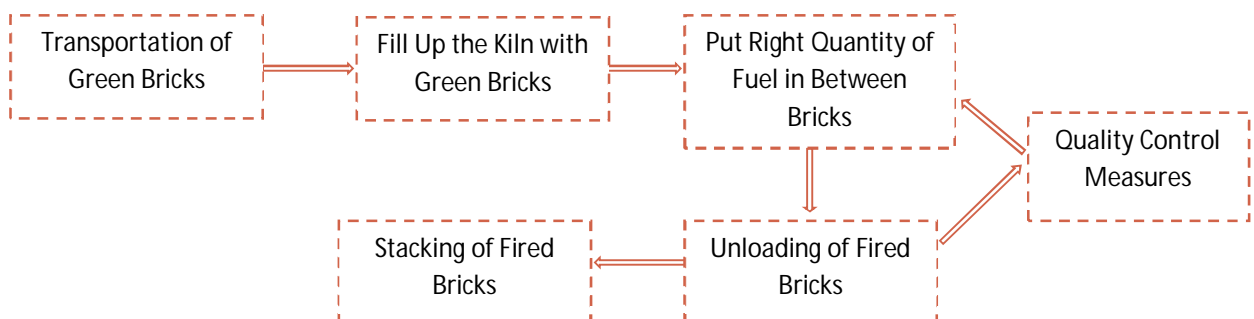
- **Technical Support & Quality for Green Brick**

Green brick making process is one of the most critical aspects of this technology. The steps of green brick making are charted below:



- **Technical Support and Quality Control for Fired Bricks**

Another important activity of this project is the monitoring and quality control of fired brick production system. It includes transportation of green bricks from bottom to the top of loading platform, filling up the kiln in certain pattern, putting fuel in between bricks at right quantity, monitoring of temperature, unloading of bricks from bottom of the kiln and stacking of fired bricks at stack yard.



- **Monitoring & Trouble Shooting of the Kiln Operation**

This measures needs to be carried out while the kiln is in operation. Fire master and on site engineer must be familiar with the actions to be taken if the kiln is in trouble. Some of the common activities of a fire master are:

- Takes care about good quality of G Brick while loading the kiln
- Monitors firing temperature of the kiln.
- Loads right quantity of fuel along with bricks to fire
- Checks the quality of the fired bricks
- Initiate action on any alarming symptoms if the desired quality is not achieved

B. Dissemination & Knowledge Sharing

Another key aspect is the knowledge dissemination on the benefits of this technology to a larger stakeholder group in Malawi. Entrepreneurs from across the country will be invited to the workshop to introduce the technology and encourage more entrepreneurs to adopt the technology.

The technology transfer project to Malawi will also be utilised as an opportunity to further strengthen the regional capacities in Africa to multiple impacts. This is of significant importance since successful demonstrations of technologies in Malawi will increasingly bring up requests from neighbouring countries. Expressions of interest from various private entrepreneurs from Malawi, Uganda, Kenya, Zambia and Djibouti have already been received. The project initiative also plans to tap in DFID Malawi and GIZ for the long term support & sustainability for better anchoring of the technology transfer and scale up.

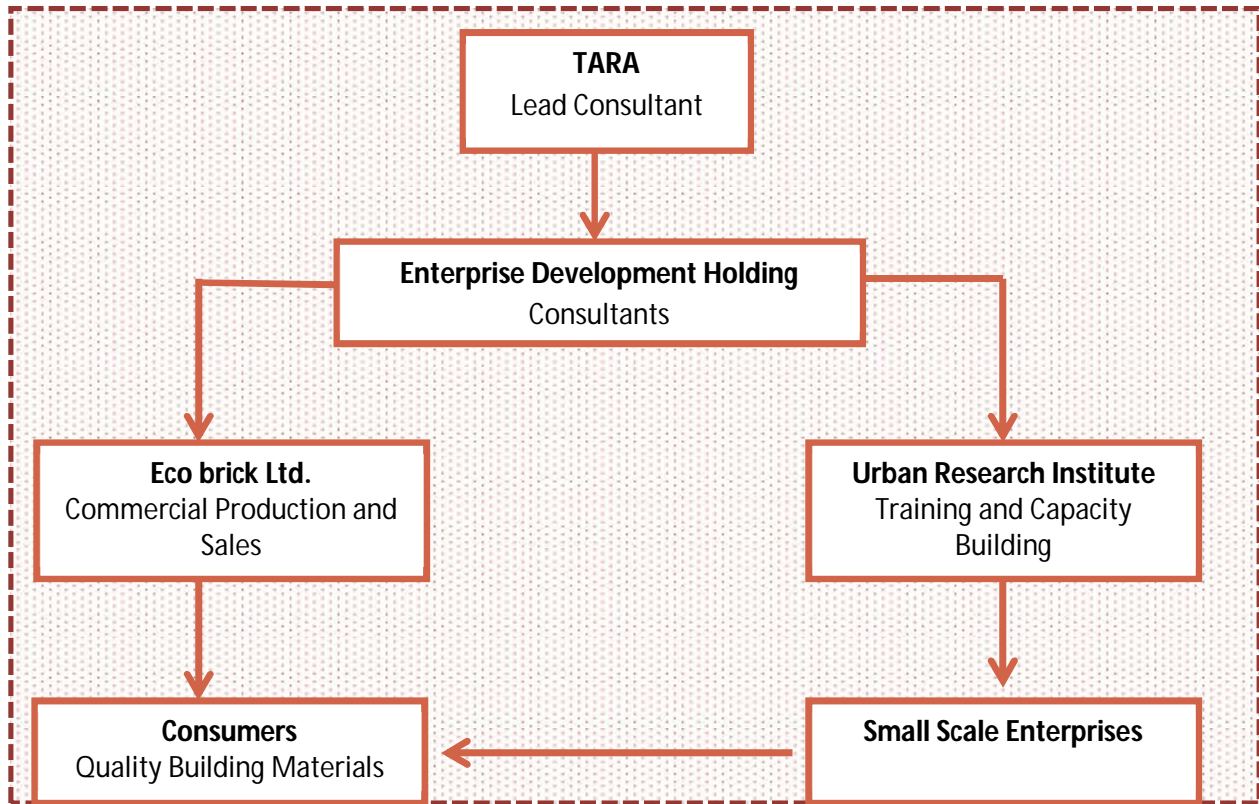
Key activities include:

- Engaging with entrepreneurs who have expressed interest to consolidate demand
- Awareness workshop with exposure visit to the kiln for prospective entrepreneurs

Thus, a holistic approach has been applied that considers the technological, environmental, economic, social and institutional aspects towards a successful technology transfer programme.

2.3. Stakeholders and Partners

The project funded by IPE Global/DFID would be managed by TARA with support from Development Alternatives; the local management in Malawi will be undertaken by Enterprise Development Holding (EDH), with Eco bricks Ltd. and Urban Research Institute looking at products and technology respectively. The direct beneficiaries will be Small & Medium Enterprises and Consumers likes home owners and developers. The project will help create this system described above. The Government of Malawi and Financial Institutes are important stakeholders. Engagement with them will be continued in this phase. However in order to create a favourable environment it is essential to build the capacities of these stakeholders with a longer term engagement beyond the project duration.



3. Plan

3.1. Outputs/ Deliverables and Timeline

Deliverables	Timeline
Inception Report	June 2015
Technical Support <ul style="list-style-type: none"> Quality of green bricks and control of firing of bricks Trouble-shooting Identification of training centre 	September 2015 Continuous process October 2015
Knowledge Dissemination and Sharing <ul style="list-style-type: none"> Engagement with interested entrepreneurs Awareness Workshop 	Continuous process October 2015

3.2. Action Plan

Activity	June	July	Aug	Sept	Oct	Nov
Technical and Capacity Building Support						
Technical Support and Quality Control for Green Brick Making <ul style="list-style-type: none"> Choice of raw materials Production of green bricks Quality control of green bricks 						
Technical Support and Quality Control for Firing the Kiln <ul style="list-style-type: none"> Loading of green brick in operational kiln Quality control measures on fired bricks 						
Monitoring and Trouble Shooting of Kiln Operations <ul style="list-style-type: none"> Quality audit monitoring Variance report on quality & performance of the kiln 						
Skill Development and Capacity Building <ul style="list-style-type: none"> Ongoing process 						
Identification and engagement with training organizations and resource agencies ¹						
Dissemination & Knowledge Sharing						
Engaging with expression of interests to consolidate demand: Potential Entrepreneurs, large developers (based on inquiries)						
Awareness workshop with exposure visit to the kiln for prospective entrepreneurs						
Project Reporting						
Inception Report						
Awareness Workshop Report						
Final Report						

¹Identification and engagement with training organizations and resource agencies like TEVETA (Technical, Entrepreneurial and Vocational Education and Training Authority of Malawi) in order to institutionalise the process and enable sustainability even after the end of the programme

3.3 Output, Outcome and Impact

	Output	Outcome	Impact
Technology transfer (successful pilot, X bricks produced, suitable adaptations identified/made, demonstration value etc)	VSBK technology has been transferred to Lilongwe, Malawi. Around 1 million bricks has been produced and sold. Housing Companies and individuals are using the bricks.	VSBK technology has a positive impact in Malawi	<ul style="list-style-type: none"> • Carbon emissions reduced • Fire wood saved
Capacity building (jobs, skills, training, manuals, local ability to operate, maintain and troubleshoot; including any specific outcomes for women and youth)	Around 130 people got employed in and around the vicinity of the kiln	Enhancement in incomes of people	<ul style="list-style-type: none"> • Employment generated
Policy incentives (influence on policy guidance/reform to incentivise the use of VSBK)	Malawi Government expresses willingness to make policy changes for promotion of cleaner brick production technologies.	VSBK technology has a positive impact in Malawi	Not to be defined during this project phase
Positioning for scale up (in Malawi) – partners identified, expressions of interest received, buy-in from GoM, plans of GIZ etc	Interest of support received from donor agencies in supporting VSBK initiatives.	VSBK technology has a positive impact in Malawi	Not to be defined during this project phase
Positioning for scale out (in region) – interest received, information disseminated, connections made to partners that can drive scale up	Enquires received from neighboring countries for VSBK technology.	VSBK being ready for dissemination in other countries	Not to be defined during this project phase
Positioning for Market response – market analysis, profitability, market interest – expressions of interest etc.	Various cost comparison datas and business plans	Positive response for VSBK in the market	Better and durable construction quality