CLEANER TECHNOLOGIES AND PRACTICES
FOR
IMPROVEMENT OF THE BRICK SECTOR IN BANGLADESH

Feasibility report

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Development Alternatives

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It would not have been possible for Development Alternatives to organize an awareness visit for Bangladesh entrepreneurs and Government officials and conduct a feasibility study of the brick industry in Bangladesh especially in and around Dhaka, Chittagong and Faridpur without the active involvement and assistance of a number of individuals and organizations.

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Acronyms

AQMP	Air Quality Monitoring Project
BBMOA	Bangladesh Brick Manufacturers and Owners Association
BUET	Bangladesh University of Engineering and Technology
CASE	Clean Air and Sustainable Environment
CDM	Clean Development Mechanism
DA	Development Alternatives
DoE	Department of Environment
FCBTK	Fixed Chimney Bulls Trench Kiln
GEF	Global Environment Facility
GoB	Government of Bangladesh
HHK	Hybrid Hoffmann Kiln
IDCOL	Infrastructure Development Company Limited
MCBTK	Movable Chimney Bulls Trench Kiln
MOEF	Ministry of Environment and Forests
PA	Practical Action (formerly ITDG)
PPRC	Power and Participation Research Centre
TK	Bangladesh Taka
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USD	United States Dollars
VSBK	Vertical Shaft Brick Kiln

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Executive summary

This report is the result of an awareness visit to India by brick entrepreneurs' and Government of Bangladesh officials in November-December 2007 and a subsequent feasibility study conducted by Development Alternatives in December 2007. The study was locally assisted by BBMOA and Practical Action and covered the brick making areas of Dhaka, Chittagong and Faridpur. The objective was primarily to create a belief amongst various stakeholders in Bangladesh about the available options of improvements in the brick industry and then explore the various options and means of cleaning up the brick sector through improvement in existing processes and introduction of new processes and technologies. The report proposes a long term programme and not a short term project on improved technologies and processes that can be most efficiently and effectively introduced and transferred throughout the brick making communities of Bangladesh.

Background

Government of Bangladesh in association with World Bank is facilitating the implementation of a project (Clean Air & Sustainable Environment - CASE) that would sustain its efforts to control air pollution from key sources. Under the environment component, the Department of Environment, Government of Bangladesh would be promoting cleaner technologies and practices in the brick sector, which is recognized to contribute substantively to the urban air pollution problem in the cities (Dhaka and Chittagong) and in the vicinity of the brick kilns themselves.

In June 2007 a workshop was held at World Bank, Dhaka with participation from all stakeholders of the Bangladesh brick industry. Based on initial interactions with the Department of Environment, the brick sector association in Bangladesh and other stakeholders it has been decided to effectively implement cleaner technologies and practices with technical support from India.

Bangladesh brick sector scenario

Brick production is one of the significant energy consuming activities in aggregate starved Bangladesh. Fired bricks forms one of the most significant industries in the construction sector in terms of walling materials and also aggregates. Trends show that the demand of bricks is rising steadily at more than 5% annually. The total brick production in Bangladesh is estimated to be over 8.66 billion with an estimated sale value of US 450 million, almost 1% of Bangladesh's GDP. Majority of the fuel used in firing of bricks is coal and wood. Out of this coal is consumed to about 2.2 million tonnes and wood 1.9 million tonnes. Since all the coal used in brick firing is procured from India, the countries import bill stands at a staggering 140 million USD. The total GHG emission arising out of this fuel is around 8.75 million tonnes and is one of the largest polluters of air in and around the major cities of Bangladesh.

Thus the booming brick sector has created a high potential to introduce improved technologies and processes and also non clay based alternate building materials. Private entrepreneurs are currently motivated to adopt new technologies and improvement of existing processes thereby complying with Government ru

Feedback from awareness visit to India

The brick entrepreneurs from Bangladesh were particularly convinced about the need for introducing energy efficient and environment friendly technology in Bangladesh context. These could be on three fronts:

1. Introduction of modifications in existing FCK and Zig Zag kilns for enhanced efficiency.
2. Introduction of processes and selective mechanization which would reduce emission, particularly the concept of "internal fuel use".
3. Pilot demonstration of new technologies e.g. Vertical Shaft Brick Kiln. Opinions were expressed about their suitability in rural areas since they are of low capacity and would not suit the high per day productivity demands. It was also felt to see the results under actual similar working conditions as Bangladesh. Thus the need to demonstrate in Bangladesh conditions.

All types of logistic and pilot kiln support were expressed by BBMOA. It was also felt that the pilot initiatives should be under the aegis of brick association to ensure no failures and faster dissemination of successes.

The assessment methodology adopted by the GoB delegation was based on a large number of factors, such as kiln design, operating practices, raw material, fuel, production of green bricks and its properties, ambient condition etc. Although the energy savings in VSBK technology was convincing, however it needs to be verified depending on the coal quality availability in Bangladesh. Emission of pollutants from VSBK was likely to be lower due to the efficiency of fuel and less coal consumption but needs to verified using similar coal quality found in Bangladesh. Depending upon the situation in Bangladesh the various advantages of VSBK needs to be demonstrated. Demonstration should be equally emphasized in all the divisions with emphasis in and around Dhaka, since the whole country should benefit from such technology transfer programmes and not only the capital city.

Feasibility study findings and results

Following upon the feedback received from entrepreneurs and Government officials a holistic assessment regarding technical, environment, energy, economic, social and institutional aspects confirmed the need for substantial improvements. The entry points are proposed to be environment advantages and economic benefits. The assessment showed potentials for introduction of new environment friendly technologies e.g. VSBK for energy benefits and improvements in environmental emissions. There is also scope for improvements in the existing technologies e.g. FCK. Key findings and potentials are summarized as follows:

Technical/Environmental/Energy

Considerable problems are being faced by brick entrepreneurs due to shortage of skilled workers. Thus introduction of selective mechanization especially in the green brick making is being proposed to provide new skills, improved product quality and partially increased use of soil substitutes in brick production. The effec

long term depending upon the number of enterprises adopting the same during the programme phase.

In terms of environmental and energy performance, the use of wood and dense clustering of FCK is a matter of concern resulting in uncontrolled deforestation and appreciable levels of particulate pollution. Appreciable improvements can be made towards lowering energy consumption and reducing the emission of harmful pollutants through the introduction of VSBK technology. VSBK technology provides high potential for energy savings (existing 1.74 MJ/kg of bricks to 0.80 MJ/kg of bricks) and a reduction of emission (40%-50%). This is proposed to be done through introduction of internal fuel bricks and selective mechanization. The interventions will not only be introduction of a new firing technology but changes in the entire brick production system.

The Government of Bangladesh is highly interested since environment issues especially air pollution have become a great concern. Introducing the VSBK technology is feasible because crucial pre-conditions are fulfilled (good clay, availability of coal, brick quality awareness.)

Economic

The investment opportunities for new brick kilns are high considering the extremely strong financial sector for Bangladesh. Although the private sector is interested in investing in the brick sector, viable projects need to be demonstrated first. Thus the necessary prerequisites for convincing early adopters are successful pilot kilns operating under prevalent conditions in Bangladesh.

Social

Working conditions in existing brick kilns in Bangladesh are similar to most of the surrounding South-East Asian countries. Issues as seasonal work, migrant workers, child labour, availability of safe working conditions and improved skills are issues that need to be addressed. To solve these problems, the introduction of new technologies will have a significant potential to improve working conditions and job security through training and skill development.

Institutional

In the Bangladesh brick sector fast changes are currently taking place with active interest of the Government. The private sector is generally strengthening whereas the public sector has great potential for improvement. However, the regulatory framework needs to be strengthened and supplemented by new policies for improvement of the brick sector and newer emission standards and rules and regulations. All these measures should also be reinforced by a favourable atmosphere through easier taxes and regulations and financial incentives provided for enterprises delivering improv