

# Securing the Environment: Potentiality of Green Brick in Bangladesh

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## Abstract

*This paper presents the buzzing issue of green brick technology with the promises to protect the environment against the multidimensional damage done by traditional brick system. Bangladesh now facing a flourish in real estate sector that stimulates the brick industry too, but the very traditional brick making system destroys the diminishing forest of this country intensifying the emission of carbon in the air polluting environment and endangering the life and livestock of the country. After presenting such facts regarding traditional brick system, the paper also examines the potentiality of green brick technology with details. Automated process, govt. support and extreme high demand with income through selling carbon credit are some promises of this green brick. The pollution of environment and ways to reduce this through this environment friendly brick making industry is the key concern of this research.*

**Keywords:** Green Brick Technology, Traditional Brick Making Industry, Carbon Emission, Securing Environment

## Introduction

Any kind of pollution which is causing damage to environment is equally bad for whole humanity. Today, various kinds of serious health problems (like cancer) are increasing fast across the world and the main reason behind this is increasing pollution of our environment.

According to the Air Quality Management Project (AQMP), Bangladesh is rated as having one of the worst air quality in the world, causing an estimated 15,000 premature deaths a year in capital Dhaka alone. Brick kilns around Dhaka are the main reason of this worst air quality. The brick kilns emit toxic fumes containing carbon monoxides and oxides of sulphur (SO<sub>x</sub>) are harmful to eye, lungs and throat. These air pollutants inhibit the mental and physical growth of children and affect crops and plants in the areas nearby to brick fields. Bangladesh can lessen significant amount of carbon emission and conserve its

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forests and environment through adopting energy efficient clean technology in brick kilns.

However, there is hardly any research work on securing environment with special focus on green brick's role in Bangladesh. This article aims to present the fact how this endangered environment of Bangladesh can be saved by the mass use of green brick technology. This article is divided into four parts: the first part contains the research methodology used in this work; in second part a discussion on traditional brick making industry in Bangladesh is provided. In the next part, there is discussion presented on the potentiality of the green brick technology. The final part consists of conclusion of this research followed by findings.

### **Objectives**

The objective of this paper is to present a) the overview of traditional brick system & b) potentiality of green brick.

### **Methodology**

The study is based on both primary and secondary data. The facts have been presented after the discussion with colleagues and advisors. The primary data were collected through informal conversation with employee working in green brick technology. The cost of setting a green brick kiln and justification of that cost had been the issue of conversation. The secondary data were collected from newspapers and some renowned national and international organizations and the published materials.

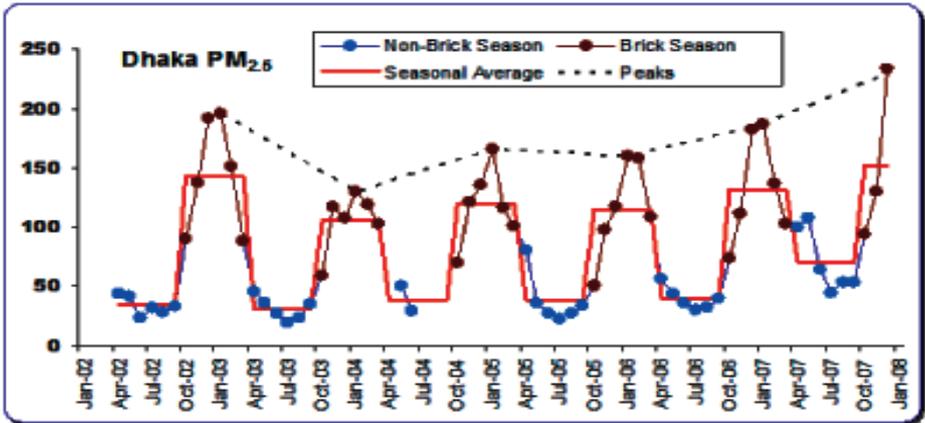
### **An overview of traditional brick making industry in Bangladesh**

Bangladesh is the 8th largest populous country with 160 million people. Each year 3, 00,000 to 4, 00,000 rural people migrate in Dhaka. The existing people as well as new migrants need housing facility. At present in our country the annually required shelter varies from 3 lakh to 5.5 lakh units. Bangladesh will need to construct approximately four million new houses annually to accommodate the growing population (Rahim, 2011, p. 2). Rapid urbanization in the country has created a booming construction industry and spurred the production of 8.6 billion bricks each year, with demand for the bricks rising at an annual rate of about 5.28 percent (UNDP; 2011).

Bangladesh has about 6,000 authorized brickfields and numerous illegal ones. (Bayron, 2009). The illegal brickfields do not have proper resources to run and proper license to keep the fields into track. The brickfields are typically small independent units and operate 24 hours during the dry season. They are located near towns or major construction sites; i.e., Gabtali, Savar, Ashuliya, Keraniganj, Narshingdi, Gazipur and Manikganj. In Dhaka, there are around

4,500 brick kilns in operation, producing about 9.0 billion bricks per year. The largest brick making zone is on the north of Dhaka city, where more than 1,000 brickfields are situated (Khan, 2009). The existing technology for firing kiln are fixed chimney kiln (FCK) and bull's trench kiln (BTK); though last one is banned in Bangladesh contributes 16% of production. The main raw materials used in brick kilns to dry bricks are firewood and coal. In case of unavailability of coal brick fields (about 33%) use firewood illegally to dry bricks. As a result a large number of trees like Keora, chaila, sundari, mehguni, bain etc. are being felled indiscriminately. If Bangladesh maintains its current economic growth rate, continued use of this outdated brick-firing technology would raise the level of greenhouse gas emissions to 8.7 million tons by 2014 by using coal in the purpose. Furthermore, using of firewood in kilns also results in significant deforestation and this wood still account for about 25 percent of the fuel used in Bangladesh's brick making kilns every year. The department of environment said that the 4,000 brick kilns burn nearly 20 lakh tons of coal and another 20 lakh tons of wood every year to meet the demand for 400 to 1200 tons of fuel (Roy, 2004). Inquiry suggested that many brick manufacturers set up their kilns near forests with the intention to plain the forests illegally. Another investigation reveals that workers of the brick field not only cut many trees but also built dikes to stop water from entering its premises during high tide which results in sudden flood in the adjacent areas. Beside this, people working in the brickfield because of deadly air and poor water quality have to accept a sub-human life. On an average the workers receive 80 taka every day for over 12 hours of extremely hard or hazardous work (Akter, 2010).

In Bangladesh there are three major sources of air pollution; i.e. (a) vehicular emission, (b) small industries like brick kilns and other biomass inclinators and (c) re-suspended road dust (Ferdausi, Vaideeswaran & Akbar, 2008). In manufacturing seasons of brick, October to March, pollution goes to peak in Dhaka and around the city depending on the monsoonal rains. The Figure 4 shows air pollution of Dhaka throughout the year because of brick manufacturing. Most brick fields have set up 25-foot tin chimneys in place of 120-foot ones, defying government rules. In the brick kilns smokes are wafting out of the chimneys polluting the environment of the area. According to the Brick Kiln Control (amended) Act (2001), there must be no establishment of brick kilns within a three-kilometer radius of human inhabitation as well as fruit garden. But lack of proper monitoring, brickfields have sprung up like mushrooms and the situation has created a serious threat to environment and biodiversity while the people in the neighboring areas face health hazards and fertility of farms is going down (The Daily Star, 2011). The brick kilns emit toxic fumes containing suspended particulate matters rich in carbon particles and high concentration of carbon monoxides and oxides of sulphur (SO<sub>x</sub>) that are harmful to eye, lungs and throat (SOS arsenic-net. (n.d.)).



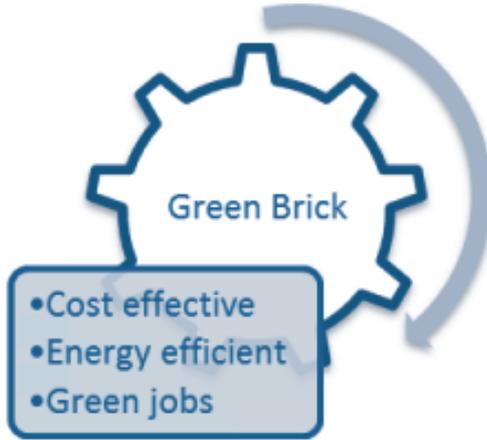
Source: Impact analysis of brick kilns on the air quality in Dhaka, Bangladesh; Dr. Guttikunda; 2009, May

**Figure 1: Air pollution of Dhaka caused by brick manufacture**

### Potentiality of Green Brick

As an effort to reduce greenhouse gases, Bangladesh has adopted smokeless brick-making technology introduced by the UN Development Program as part of its project "Improving Kiln Efficiency in the Brick Making Industry". The UNDP, which started its pilot project in 2006, will contribute \$25 million in the next five years for 15 new projects in the country. The innovative technology that is being used to replace the existing 150-year-old system will simply make the brick making industry so efficient that when this is replicated across Bangladesh we will have huge benefits for both the people and the global environment (anonymous, 2010). The cleaner alternative coming on-stream is called green bricks. Under the project, 31 energy efficient brick kilns will be set up in different parts of the country (UNDP, 2009). The new technology can be used in making green brick would be two types: Vertical Shaft Brick Kiln (VSBK) and another is Hybrid Hoffman Kiln (HHK). VSBK is low scale brick making technology; successfully demonstrated in Vietnam, Nepal and India and its success and acceptance will be much higher in divisional cities and small towns. On the other hand, HHK is high tech based and continue to proliferate in metro cities of Dhaka and Chittagong which is developed in China (Anonymous, n.d).

Among the two alternatives UNDP choose hybrid technology for Bangladesh. Under the 'green brick project' UNDP expects to set up at least 16 HHK by 2015 in the country because of its 'triple benefit' including energy efficiency, cost effectiveness and creating employment opportunity for local people. UNDP also expects to establish a training center to train up green brick kiln labors.



**Figure 2: Triple benefit of Green Brick**

### **Cost and productivity of Green Brick**

Green brick has already started working in different areas of our country; i.e., Savar, Dhaka, Ashulia, Mymensingh, Khulna and Norshindi. Production of such bricks suggested that they need only 40% of human intervention than that of the traditional one and as the production continues throughout the year it keeps all people active without any streamlining. In its preparation, coal and clay are mixed automatically and then poured into a machine. In every piece of brick about 2-3 percent coal is mixed. Bricks are prepared automatically and taken to a silo, and smoke of the kiln for drying the raw bricks (Byron, 2009). It is the production process used in Diamond Auto Green Brick, Saughat, Narayanganj. Another green brick kiln in Dhamrai use approximately seven to 7.5 tons of coal per 100,000 bricks (Wasserman, 2009). The technology of installing green brick kiln is expensive than the traditional one. It will take Tk 7 crore to Tk 10 crore to set up an energy efficient brick kiln that will be able to produce around two crore bricks annually - some 40,000-50,000 bricks per day; whereas Tk 1 crore is required for a traditional brickfield. The strength of the bricks produced in this way is more than double than that of the traditional bricks and lead less than 5% rejects as compared to 25% for the traditional method. The price of green bricks is also competitive. According to the owner of the Diamond Auto Brick Field, per piece green brick is of Tk 6 and the traditional one is of Tk 5.50-5.80.

	<b>Green brick</b>	<b>Traditional brick</b>
<b>Set up cost of Brickfield</b>	7-10 crore (Tk.)	1 crore (Tk.)
<b>Price (per piece)</b>	Tk. 6	Tk. 5.50- Tk. 5.80
<b>Production (annual)</b>	2 crore	2 crore
<b>Coal required for 100,000 bricks</b>	7.8-8 ton	23 ton

**Figure 3: A Comparison between Traditional Brick and Green Brick (in daily production of 40,000 pieces)**

The initial high cost of setting a green brick kiln will be justified in the following way:

#### **Automated Process**

The production process is fully automated. After the production for drying the bricks a few number of people are needed; i.e., for monthly production of 40,000 bricks, it takes 40 to 50 labors at the highest.

#### **Assistance from Govt. and Private Banks**

To encourage the owners, govt. loans are provided with a payback period of 5 long years which is really convenient in practice.

#### **Extremely High Demand**

The initial high cost gets absolutely justified with the high production and sales as demand for such bricks and with the flourish of real estate business in Bangladesh, the per day demand of such brick is only increasing, and green brick is always the priority as it saves the environment protecting forests.

#### **Earning through Carbon Credit**

For the clause of emitting less carbon in the air, 2 crore of taka are to be received annually from the developed countries.

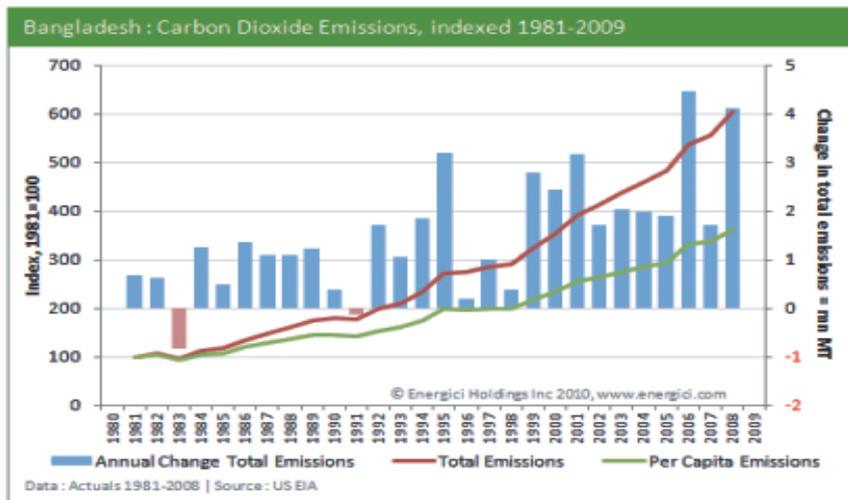
#### **Quick & Secured Recovery of Investment**

According to Auto Green Brick Field in Ashulia, with the scheduled production and quick selling the cost of setting up the green brick kiln is recovered within just one year.

## **Carbon Credit Market and Green Brick**

Bangladesh's brick industry has grown approximately 5.3 percent during the last decade- it represents one of the largest sources of greenhouse gas emissions in the country. In the Figure 4 we find that in 2008, total carbon dioxide emissions in Bangladesh reached 50.39 million Metric Tons (mn MT); within which estimated at 6 million tons of carbon dioxide due to the use of outmoded technologies and substandard fuels such as wood, sulphur coal and the burning of tires. The figure also suggest that on a per capita basis meanwhile, Bangladesh is ranked at 172 worldwide, with per capita emissions increasing on 2007 by 0.02 metric tons to 0.33 metric tons. From another source (The Daily Ittefaq, 2009), at present, 6000 traditional brickfields are emitting 8.75 million tons carbon annually. According to the UNDP, Bangladesh uses about 23 tons of coal to produce 100,000 bricks, compared with China, which uses 7.8 to 8 tons of coal to produce the same amount (UPI, 2010). The annual greenhouse gas emissions by the traditional brickfield is equivalent to emissions of more than 230,000 passenger vehicles or carbon sequestered by more than 250,000 acres of pine or fir forests. By following the vulnerable situation, UNDP is providing the energy efficient brick making technology Hybrid Hoffman Kiln (HHK) to make clean bricks (The News Today, 2011) and reduce carbon emission. A single kiln that runs on HHK technology will produce 15 million bricks and cut carbon emission by 5,000 tons a year. A double unit kiln will produce 30 million bricks and cut carbon dioxide (CO<sub>2</sub>) emission by 10,000 tons every year (Byron, 2009). The secret to the Hybrid Hoffman Kiln's success is its ability to completely burn most of the fuel that is mixed into the bricks during firing, and thereby drastically reduce energy use. It also dries the bricks by directing hot air into the tunnel from the annular kiln, which blocks greenhouse gas emission (UNDP, 2011).

However, Bangladesh can earn substantial revenue through selling carbon as carbon credit like China and India in the international market by using modern technology in brickfields surrounding Dhaka city. According to the Collins English Dictionary carbon credit is a certificate showing that a government or company has paid to have a certain amount of carbon dioxide removed from the environment. Emission trading is another term related to carbon trading is a market based approach which is used to control pollution by receiving economic incentives for achieving reductions in the emissions of pollutants (i.e., carbon etc.).



Source: Bangladesh: Energy Profile

**Figure 4: Carbon dioxide Emission from 1981-2009**

A country's leading non-banking financial institution, Industrial and Infrastructure Development Finance Company (IIDFC) has already entered into two agreements named "emission reduction purchase agreements (ERPA)" with the World Bank and the Danish Energy Agency (DEA) to help in reducing carbon emissions from brickfields. As per agreements, the World Bank and Denmark will buy 189,000 and 60,000 emission reductions respectively (Khan, 2009). As per the guidelines of the Kyoto protocol, Bangladesh will get 15.20 dollars from the global Community Development Carbon Fund for reducing each ton of carbon emissions (The Daily Ittefaq, 2009). From this point of view if Bangladesh can reduce the amount of emissions at least 50% of 8.75 (4.17%) million tons through technology transfer, the country will get huge revenue amounted \$70 million a year from global carbon trading fund.

### Findings

UNDP suggested green bricks are beneficial both for humanity and environment. Lower loss of fire woods, less burning of coals, low demand for clay, low intervention of human bodies etc. are the different encouraging sides of green brick. The analysis suggested that, any green brick kiln producing 50,000 bricks daily need maximum 60 labors. Bangladesh can achieve Tk. 200,000 for five years' production of grin brick for reducing carbon emission. By dropping the use of coal it can also reduce dependency on other countries

for importing coal from them. As green brick ensures whole year productivity rather than seasonal productivity it can easily cope with increasing demands of bricks in Bangladesh.

### **Conclusion**

Because of seasonal productivity, outdated technology, low productivity of labor, non-existent capitalization and informal management system the brick making industry in Bangladesh is described as "footloose" industry. But the UNDP hosted new green brick concept can give Bangladesh a spirit of vow from the brick industries. Even though the traditional brick kilns pollute the environment heavily; most of the brick makers or entrepreneurs prefer it for its low capital requirement and high returns as well as easy installation. As a single unit traditional brick kiln needs only Tk. 10 million, investments while HHK costs at least Tk. 100 million people will not be easily motivated to develop such a new brick kiln. They are mostly unable to afford them and will result in an increase in price of brick.

Government need to push people by creating awareness against traditional kilns and make the technology simply available to the brick manufacturers. Electronic and print media should come forward to encourage people for using such kinds of bricks. More marketing is required to familiarize people with green bricks. To encourage entrepreneurs, banks need to provide long-term loan. But the problem is in receiving loan from banks, an entrepreneur has to complete a large number of formalities including verification of certificates and licenses. To avoid such unfairness policy makers should make process this easy and should modernize the policies and regulations with demand of time.

Bangladesh bank has also extended a refinance scheme of Tk. 200 crore in 2009 to establish and spread the technology. Different banks have already started providing loan for green brick kiln establishment with payback period of 5 years.

If a green brick kiln produces only 40,000 bricks daily it can easily reimburse bank's loan within a year. From 31st December, 2012 all the traditional brick fields will lose their validity for working which will also reinforce traditional brick makers to collapse their production and start with green brick system.

### **References:**

Akter, B. (2010, November 25). Brick field: a deadly workplace. Retrieved from <http://www.demotix.com/news/518117/brick-field-deadly-workplace>

Bayron, R.K. (2009, December 13). Brick kilns going green. *The Daily Star*. Retrieved from <http://www.thedailystar.net/newDesign/news-details.php?nid=117503>

Energici.com. (n.d.). Bangladesh: Energy Profile. Retrieved from <http://www.energici.com/energy-profiles/by-country/asia-a-l/bangladesh>

Ferdausi, S.A., Vaideeswaran, S., & Akbar, S. (2008, November). Greening brick making industries in Bangladesh. *South Asia Social, Environment & Water Resources Management Unit, the World Bank*.

Guttikunda, S. (2009, May). Impact Analysis of Brick Kilns on the Air Quality in Dhaka, Bangladesh. *SIM working paper series 21-2009, p.2*. Retrieved from <http://www.indiaenvironmentportal.org.in/files/Dhaka-AQ-Brick%20Kilns.pdf>

Khan, S. (2009, December 20). An important tool in global carbon trading. *The Financial Express*. Retrieved from <http://www.thefinancialexpress-bd.com/more.php?news%20id=87227>

Introduction of vertical shaft brick kiln in Bangladesh. Retrieved from [www.sdc-climateandenvironment.net/en/.../document.php?](http://www.sdc-climateandenvironment.net/en/.../document.php?)

MSN green. (2010, April 4). Bangladesh adopts green brick kiln technology. Retrieved from <http://green.in.msn.com/cleantechnologies/article.aspx?cp-documentid=3673171>

Rahim. (2011, November). Real Estate Business in Bangladesh: Opportunities and Challenges. *Vol.1. (issue V), pp. 2*. 2011, June 20. Eco-friendly brick technique helps build a cleaner Bangladesh. Retrieved from <http://www.beta.undp.org/undp/en/home/presscenter/articles/2011/06/20/eco-friendly-brick-technique-helps-build-a-cleaner-bangladesh.html>

Roy, P. (2004, March 7). Spewing out eco time bomb Raising chimney heights of brick kilns fails to stop grave air pollution. *The Daily Star*. Retrieved from <http://www.sos-arsenic.net/english/environment/toxic-fumes.html>

SOS arsenic-net. (n.d.). Toxic fumes from brick kiln a threat to health. Retrieved from <http://www.sos-arsenic.net/english/environment/toxic-fumes.html>

The Daily Ittefaq. (2009, August 30). Deal to reduce carbon omission from brickfield. Retrieved from <http://www.carbonoffsetsdaily.com/news-channels/asia/deal-to-reduce-carbon-omission-from-brickfield-11219.htm>

The Daily Star. (2011, April 20). Brick kilns burn firewood, destroying CHT forest. Retrieved from <http://www.thedailystar.net/newDesign/news-details.php?nid=182300>

The News Today. (2011, June 25). Green brick kilns can help reduce carbon emission. Retrieved from [http://www.newstoday.com.bd/index.php?option=details&news\\_id=31371 & date=2011-06-25](http://www.newstoday.com.bd/index.php?option=details&news_id=31371 & date=2011-06-25)

UNDP. (2009, February 9). Environment-friendly 'green bricks' introduced. Retrieved from <http://www.undp.org.bd/info/events.php?d=7&newsid=392&t=In%20News>

UNDP. (2011, June 20). Eco-friendly brick technique helps build a cleaner Bangladesh. Retrieved from <http://www.beta.undp.org/undp/en/home/presscenter/articles/2011/06/20/eco-friendly-brick-technique-helps-build-a-cleaner-bangladesh.html>

UPI. (2010, August 6). Bangladesh adopts green brick making. Retrieved from [http://www.upi.com/Business\\_News/Energy-Resources/2010/04/06/Bangladesh-adopts-green-brick-making/UPI-69981270565548/](http://www.upi.com/Business_News/Energy-Resources/2010/04/06/Bangladesh-adopts-green-brick-making/UPI-69981270565548/)

Wasserman, R. (2009, July 24). A green brick revolution in Bangladesh. Retrieved from <http://www.asiacalling.org/ur/news/bangladesh/613-a-green-brick-revolution-in-bangladesh>