

SECTOR ASSESSMENT (SUMMARY): BRICK¹

Sector Road Map

1. Sector Performance, Problems, and Opportunities

1. The brick sector in Bangladesh contributes about 1% of gross domestic product and generates employment for about 750,000 people. The brick sector has grown rapidly in the last decade, led by continuous economic expansion since the 1990s and the subsequent construction boom.² Because of the lack of stone aggregates and other alternative building materials, the clay in Bangladesh's Ganges River delta provides abundant raw materials for bricks, which have underpinned the country's civil construction in building, road pavement, irrigation, bridges, and other essential infrastructure, and as aggregate in concrete mix.³

2. In 2011, available market data indicate that there are 4,880 brickfields in Bangladesh, 92% of which are polluting fixed chimney kilns. The brick sector grew at an average rate of about 5.6% per year during 1995–2005, and is estimated to be currently growing at 7%–8% per annum. The available data also indicate that the brick sector in Bangladesh burns about 203 tons of coals and emits about 576 tons of CO₂ per 1 million bricks manufactured.⁴ With about 17 billion bricks produced annually, the industry's annual CO₂ emissions are estimated to be 9.8 million tons (footnote 1). In the capital city of Dhaka, the north Dhaka cluster of brickfields contributes about 40% of the fine particulate pollution in the city during the operating season (November to April).

3. There are generally six types of brick kilns in Bangladesh: (i) bull's trench kilns (BTKs), (ii) fixed chimney kilns (FCKs), (iii) improved zigzag kilns, (iv) vertical shaft brick kiln (VSBKs), (v) Hoffman kilns, and (vi) tunnel kilns. Prior to 2004, most of the kilns in Bangladesh were BTKs, a relatively primitive design developed over 150 years ago. BTKs are highly polluting and energy inefficient. After the promulgation of the brick burning rules in 2002, most BTKs were converted to FCKs, which are more energy efficient while fine particulate emissions remain the same. The brick sector satisfactorily complied with the government's directive in 2002 to construct chimneys at the designated 120–130 feet (36.6–39.6 meters) height.

4. Due to the still-developing economy, businesses often choose cheap, though inefficient, operational techniques to reduce costs. This has led to the emergence of a large number of inefficient and polluting FCKs. There is a small number of VSBKs in operation. However, most brickfields failed to import the correct VSBK design and the technology has not resulted to any increase in VSBKs in Bangladesh. Currently, there are only nine HHKs in operation, six under construction, and six in the pipeline. There are fewer than five tunnel kilns in Bangladesh, with one major tunnel kiln being constructed in the city of Jessor. The country's inability to develop an energy efficient, clean, and modern brick sector is a sign of market failure, and is a result of general lacks of (i) awareness of available modern technologies, (ii) technological and operational capacity, and (iii) targeted finance.

¹ This summary is based on the existing study on the brick-making industry in Bangladesh and ADB's first-hand experience. World Bank. 2011. *Introducing Energy-Efficient Clean Technologies in the Brick Sector of Bangladesh*. Washington, DC. (available on request).

² Annual growth rate of the construction sector has ranged from 8.1% to 8.9% from early 1990s to 2010.

³ Bricks constitute 44% of total construction materials in Bangladesh.

⁴ Calculated from: World Bank. 2011. *Introducing Energy Efficient Clean Technologies in the Brick Sector of Bangladesh*. Washington, DC: (June, Table 2.1, page 17).

5. The underdevelopment of the brick sector in Bangladesh is partly attributed to the shortage of designated local and donor funding support to promote the construction of more energy efficient brick kilns. Various direct surveys indicate that brickfield owners regard the lack of targeted financing as the main obstacle to development of the brick sector.⁵ However, the financial system in Bangladesh is experiencing tightening of liquidity because of a rapid credit expansion of heavy government borrowing and the December 2010 stock market correction. As a result, the funding cost in Bangladesh's banking system is high—interbank borrowing rates are about 12%, and lending rates for industrial projects are about 16% and even higher for loans from nonbanking financial institutions. The interest rate spread of commercial banks is about 4%.

2. Government's Sector Strategy

6. There is a lack of a government policy to support a long-term brick sector development strategy. As a result, the legal and regulatory framework does not adequately address the relevant energy efficiency guidelines and other underlying development constraints. Most brickfields are informal, small to medium-sized businesses⁶ that operate with outmoded technologies, are severely polluting, and have poor labor standards.

7. The existing legislation is based on the Brick Burning Act (1989) and various amendments and circulars thereafter. Though in place, these frameworks have not been effective to encourage brickfield owners to switch to the most efficient technologies and reduce pollution. The most concrete step taken by the government is the 2010 government notification that banned the operation of FCKs by September 2013 (table).⁷

Relevant Brick Sector Regulations

Year	Regulation	Responsible Agency	Details	Remarks
1989	The Brick Burning (Regulation) Act of 1989	Department of Environment (DOE), Ministry of Environment and Forests (MOEF)	Bangladesh's first brick-making law banned the use of firewood for brick manufacturing and introduced licensing for brick kilns.	Use of firewood has largely been discontinued but in remote areas it continues on a limited scale.
2001	Revision of the Brick Burning (Regulation) Act of 1989	DOE, MOEF	The 1989 act was amended to regulate the location of brick kilns. The new provision required that brick kilns not be set up within 3 kilometers of the <i>upazilla</i> (district center), municipal areas, residential areas, gardens, and government reserve forests.	Using the given criteria, it is nearly impossible in reality to find land for brick kilns in Bangladesh. The Bangladesh Brick Manufacturing Owners Association often cites this as a major deficiency in the law. Despite this amendment, the location requirements have not been enforced.
2002	Brick burning	DOE, MOEF	The government introduced a rule	This requirement was successfully

⁵ Existing lending terms to brickfield owners include working capital loans to FCKs and working capital and investment loans to existing HHKs. The loans have a 40:60 equity–debt ratio, 150% overcollateralization, 3–5 years tenor, and an interest rate in the range of 12%–18%, depending on the borrower's creditworthiness and risk profile. Under the current conditions, there will be few borrowers who would be willing to enter the brick industry to develop advanced brick kilns, rendering the government directive ineffective. Therefore, relending terms should be provided at an extent that would boost brick industry development while not distorting the market.

⁶ Most FCKs are individually owned, with each owner possessing one kiln. Multiple ownership of one kiln and multiple kilns under the same ownership are rare. Such a structure led to the formation of the Bangladesh Brick Manufacturers Owners Association.

⁷ If it is impossible to phase out all FCKs by July 2013, as a contingency plan, ADB encouraged the government to charge those remaining FCKs an environmental premium as determined by the Department of Environment.

Year	Regulation	Responsible Agency	Details	Remarks
	rules		that made the use of 120 feet (36.6 meter) chimneys for brick kilns compulsory.	enforced, especially in the vicinity of urban areas, and most bull's trench kilns were upgraded to fixed chimney kiln technology. However, some bull's trench kilns continue to operate, albeit illegally.
2007	Government of Bangladesh notification	DOE, MOEF	The government issued notification that environmental clearance certificates would not be renewed if an owner did not shift to alternative fuel and improved technologies by 2010.	This regulation has not been implemented since little on-the-ground activity occurred to facilitate the switch.
2010	Government of Bangladesh notification	DOE, MOEF	A new notification was issued banning fixed chimney kiln operation from 2013.	Activities are being undertaken under the government's Clean Air and Sustainable Environment Project with World Bank support.
2011	Revision of Brick Burning Act	DOE, MOEF	The revision of the act has the objective of facilitating transition of the brick industry for improved energy efficiency and lower pollution.	Still in process. Promulgation may take more than 1 year.

Source: World Bank. 2011. *Introducing Energy-Efficient Clean Technologies in the Brick Sector of Bangladesh*. Washington, DC.

8. The long-term government policy or strategy should aim to (i) move from traditional brick-making technologies (i.e., FCKs) to cleaner ones (VSBKs, HHKs, and tunnel kilns), particularly in the promotion of most advanced tunnel kilns; (ii) develop modern, energy efficient bricks such as perforated and hollow bricks and alternative construction methods that are less energy intensive; (iii) modernize the brick sector in Bangladesh by rationalizing it into fewer businesses with large production capacity to attain technical, operational, and environmental efficiencies.

3. ADB Sector Experience and Assistance Program

9. Although ADB has not worked directly in the brick sector in South Asia prior to 2011, ADB has gained sufficient sector experience by working with the relevant development partners (e.g., The World Bank and United Nations Development Programme) in Bangladesh. From 2012, ADB's Private Sector Operations Department is implementing a commercial loan to the Bangladesh Industrial and Infrastructure Development Finance Company to support the construction of HHKs.⁸ Furthermore, ADB is gaining substantial market knowledge through Bangladesh Bank's ongoing credit facility also targeting HHK construction.

4. Market Demand Survey

10. In order to ascertain the market demand for funds, ADB (consultants) has conducted a number of surveys. The survey results are interpreted below.

11. **Component 1: Upgrade from fixed chimney kilns to improved zigzag kilns.** Among the 68 FCK owners being surveyed, (i) 46% expressed their interest in upgrading the FCKs to improved zigzag kilns, and this translates to 2,065 FCKs for the entire industry (assuming a total

⁸ ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Loan Facility and Technical Assistance to the Industrial and Infrastructure Development Finance Company and Other Financial Institutions for the Industrial Energy Efficiency Finance Program in Bangladesh*. Manila (Loan 7349-BAN).

number of 4,490 FCKs); (ii) 31% are eligible for bank loans, and this translates to 1,392 FCKs for the entire industry; and (iii) the average loan amount is \$250,000 equivalent. This translates to a funding demand of \$348 million for the 1,392 FCKs.

12. Component 2: Construction of more energy efficient brick kilns. ADB hosted a workshop on development of the brick sector and there was overwhelming interest from potential investors to enter the industry.⁹ A formal survey was conducted on 20 entrepreneurs who were interested in investing in energy efficient brick kilns. Of these, four operate FCKs, one operates a zigzag kiln, and 15 are not currently involved in the brick sector. The survey indicated that

- (i) 13 entrepreneurs cited the government directive to phase out FCKs as the main motivation to invest in advanced brick kilns (other 7 entrepreneurs did not respond to the survey);
- (ii) 16 entrepreneurs expressed their desire to invest in advanced brick kilns to diversify their business holdings (other 4 entrepreneurs did not respond to the survey);
- (iii) 10 entrepreneurs indicated that they are in related sectors with demand for high-quality bricks, and 14 indicated that FCKs cannot supply the quality bricks they need (other entrepreneurs did not respond to the survey);
- (iv) 19 entrepreneurs find commercial bank borrowing expensive and are unwilling to borrow at current rates, and 13 cited that concessional funds are needed to overcome the market failure (other entrepreneurs did not respond to the survey);
- (v) all 20 entrepreneurs expect an average of \$5 million capital investment in tunnel kilns with a 30:70 equity–debt ratio and collateral of up to 100% of land, 80% of equipment and machinery, and 30% of other assets;
- (vi) 65% of the potential investors have existing (owned) land, and 35% have to purchase land; and
- (vii) all are creditworthy medium-sized enterprises.

4. Lessons Learned

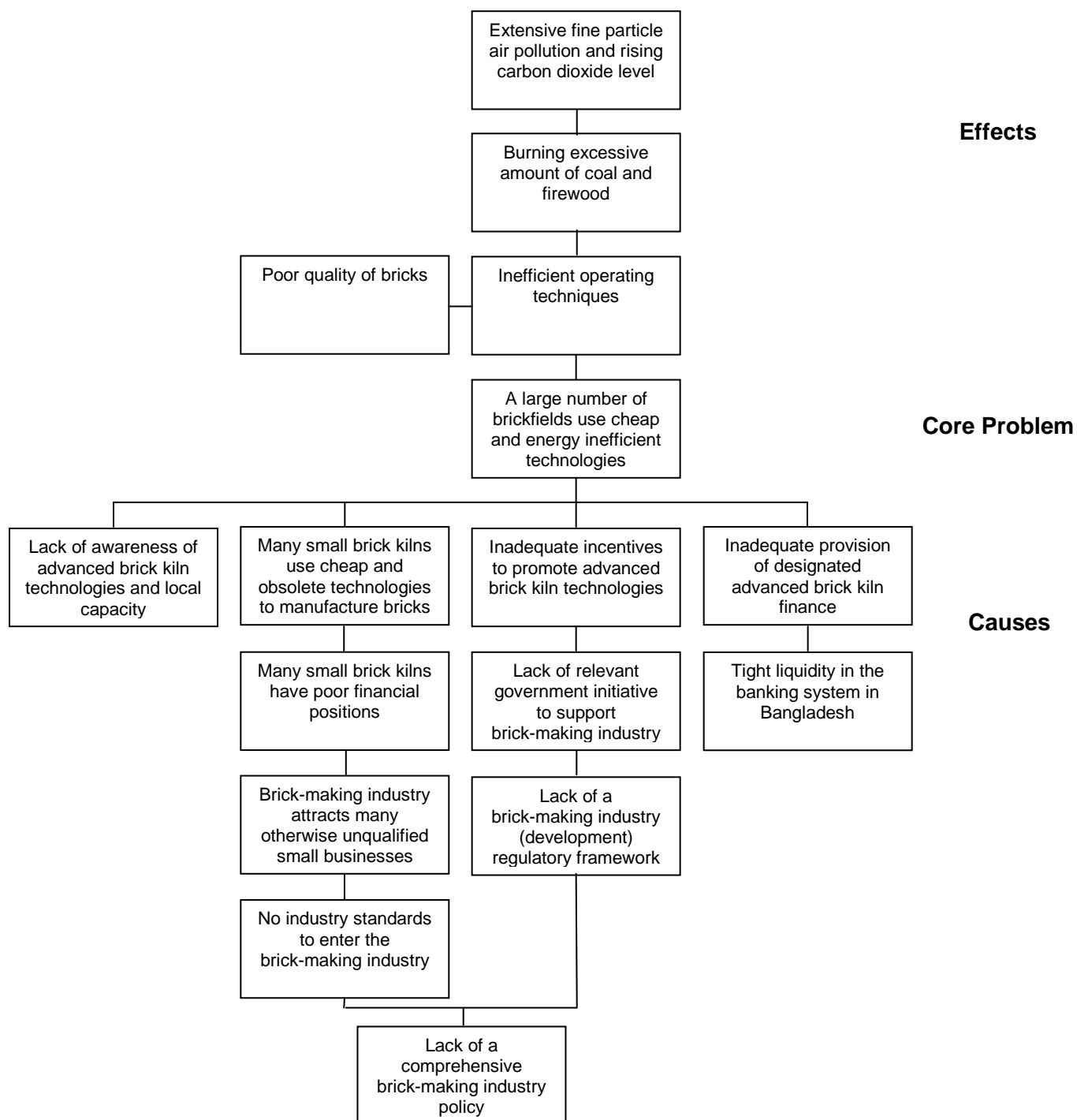
13. To facilitate lending by local financial institutions for advanced brick kilns, Bangladesh Bank established a \$30 million equivalent local currency credit facility¹⁰ for solar energy, biogas, and effluent treatment plants, within which about \$4 million equivalent was allocated to financing HHKs. The performance of this credit facility is a key market gauge of the success of the project. More specifically, Bangladesh Bank offers the \$4 million funds to participating financial intermediaries (PFIs) at a prime lending rate of 5%, and PFIs must relend it at 9%. The tenor of subloans is 5 years with a 6-month grace period. By the end of 2011, the fund had only disbursed about \$250,000 for one project.¹¹ The low disbursement is attributed to (i) lack of awareness about the credit facility; (ii) the profit margin of PFIs being capped at 4%, the same as the general lending spread (not making this credit facility particularly attractive); (iii) perceived trouble in having to undertake additional procedures to apply the funds from Bangladesh Bank for only \$250,000; and (iv) the limited amount available (\$250,000) for each project that can only apply to equipment costs (not for land, building, labor, and material). These lessons learned will be factored into the design of the ADB credit facility.

⁹ Twelve major banks and/or finance companies in Bangladesh have expressed their interest in supporting the ADB loan components, and provided an average of five business sponsors who showed strong interest.

¹⁰ The credit facility is supported by Bangladesh Bank's own funds.

¹¹ The project for HHKs contributes to a fixed amount of about \$250,000 equivalent local currency, regardless of the project amount.

Problem Tree for Brick Sector



Sector Results Framework (Brick, 2010–2011)

Country Sector Outcomes		Country Sector Outputs		ADB Sector Operations	
Sector Outcomes with ADB Contribution	Indicators with Targets and Baselines	Outputs with ADB Contribution	Indicators with Incremental Targets	Planned and Ongoing ADB Interventions	Main Outputs Expected from ADB Interventions
More efficient capital market for private sector enterprises: equity market capitalization growing by 20%–30% by 2015 over 2010 figure of 36.2% of gross domestic product	\$175 million, or 3.9% of total CPS envelope, of which: ENV: 0% GEN: 15.0% PSD: 100% RCI: 0%	Making finance and capital market more efficient for supporting private sector development	Industrial term loan amount increases by at least 50% in 2020 (2010 baseline: Tk321.6 billion)	Making brick sector finance more efficient	Mobilizing finance to upgrade at least 200 FCKs to improved zigzag kilns and finance at least 20 VSBKs and 5 HHKs and tunnel kilns (2011 baseline: 0) Number of energy efficient clean development mechanism projects registered increases to at least 50 in 2020 (2011 baseline: 5) Energy efficient brick kiln finance volume is at least \$200 million by December 2015. (2011 baseline: \$10 million)

ADB = Asian Development Bank, CPS = country partnership strategy, ENV = environmental sustainability, FCK = fixed chimney kiln, GEN = gender equity, HHK = hybrid Hoffman kiln, PSD = private sector development, RCI = regional cooperation and integration, VSBK = vertical shaft brick kiln.

Source: Asian Development Bank.